THE INTEGRATION OF LAND USE PLANNING PROCESS WITH WATER RESOURCES MANAGEMENT: ANALYSIS OF KÜÇÜK MENDERES RIVER BASIN CATCHMENT AREA-TURKEY

A Thesis Submitted to
the Graduate School of Engineering and Sciences of
İzmir Institute of Technology
in Partial Fulfillment of the Requirements for the Degree of

DOCTOR OF PHILOSOPHY

in City Planning

by
Rabia BOLPOSTA

January 2012
İZMİR

ACKNOWLEDGMENTS

Foremost, I would like to sincerely thank my supervisor Assoc. Prof. Dr. Semahat ÖZDEMiR for her critics, her inspiring ideas and patiently guidance during this thesis research. Throughout my research process she encouraged me to develop research skills and supported my professional growth. Her kind personality has increased my motivation in every step of the study.

I would also like to thank the other members of my PhD committee, Prof. Dr. Cemal ARKON, Prof. Dr. Oğuz SANCAKDAR, both who monitored my work and took effort in reading and providing me with valuable comments on development stages of this dissertation, Asst. Prof. Dr. Nicel SAYGIN and Prof. Dr. H. Murat GÜNAYDIN.

I am particularly indebted to my husband Serdar BOLPOSTA, for his love, belief, patience and support during the PhD period and my daughter Zeynep Ece BOLPOSTA who was born in this period. I thank to my parents Nuray ÇAM, Orhan ÇAM and my brother Gökhan ÇAM for for their inspiration, support, and confidence throughout my overall academic experience.

Finally, I am also grateful for the friendship, support and encouragement of Res. Assist. Uğur BOZKURT, City Planner Hasibe VELİBEYOĞLU, Asst. Prof. Dr. Koray VELİBEYOĞLU, Res. Assist. Esin İnce KOMPİL, Dr. Mert KOMPİL, Dr. Özlem Taşkın ERTEN, City Planner Hamidreza YAZDANİ, Asst. Prof. Dr. Güldem ÖZATAĞAN, Res. Assist. Gökhan H. ERKAN, İlknur UĞUR and civil engineer Ozan YENİEV.

ABSTRACT

THE INTEGRATION OF LAND USE PLANNING PROCESS WITH WATER RESOURCES MANAGEMENT: ANALYSIS OF KÜÇÜK MENDERES RIVER BASIN CATCHMENT AREA-TURKEY

The role of water in land use planning has aroused a growing attention in the recent years. The importance of the linkage between water resources management and land use planning has been discussed in related literature, but there has been less attention to practical ways to implement and assess this concept in detail. As a result, an "**Integrative Policy Framework (IPF)**" first was set out by focusing on three national contexts -Netherlands, England and Australia, in terms of interpreting the phenomena of the contribution of land use planning to water resources management. This phenomena was then used to examine the legislative and institutional approaches in Turkish legal system in relation to planning and environmental management. From the analysis of this examination, it is argued that, the potential of land use planning system at present is not fully appreciated. There is a need to utterly identify and characterize the interactions between the water sector and the land use planning and to establish the process of making consistent joint for the water sector and the land-use concept.

Finally, **Institutional Analysis and Development (IAD) framework**, developed around exogenous variables, action arena and five core dimensions based on Integrative Policy Framework, was applied to analyze the integration and the management activities in detail within Küçük Menderes River Basin catchment area. Results showed that this watershed faced institutional, administrative and financial problems. The research reinforces the importance of vertical and horizontal plan consistency, provincial and local leadership, building of networks among actors, emphasizing a process of problem assessment and strategy development on the local level to help the related watershed overcome problems.

ÖZET

ARAZİ KULLANIM PLANLAMASI SÜRECİNİN SU KAYNAKLARI YÖNETİMİ İLE BÜTÜNLEŞTİRİLMESİ-KÜÇÜK MENDERES NEHRİ DRENAJ HAVZASININ ANALİZİ-TÜRKİYE

Suyun arazi kullanım planlamasındaki rolü son yıllarda giderek artan bir ilgi görmüştür. Su kaynakları yönetimi ile arazi kullanım planlaması arasındaki entegrasyonun önemi ilgili literatürde tartışılmakta, ancak bu kavramı detaylı olarak uygulama ve değerlendirme konusundaki uygulama yöntemlerine daha az ilgi gösterilmiştir. Sonuç olarak, ilk önce arazi kullanım planlamasının su kaynakları yönetimine katkısını yorumlamak açısından, üç ulusal kaynak –Hollanda, İngiltere ve Avustralya- üzerine odaklanmış bir '**Bütünleşik Politika Çerçevesi'** (BPÇ) oluşturulmuştur. Bu olgu daha sonra, planlama ve çevre yönetimi ile ilgili Türk yasal sistemindeki hukuksal ve kurumsal yaklaşımları incelemek için kullanılmıştır. Bu incelemenin analizinden, mevcuttaki arazi kullanım planlama potansiyelinin tam olarak değerinin anlaşılmadığı sonucuna varılmıştır. Su sektörü ve mekansal planlama arasındaki etkileşimlerin tamamıyla tanımlanması ve nitelenmesi ve ayrıca su yönetimi ve arazi kullanım kavramı arazi kullanımı için tutarlı ortak projeksiyonların yapılması sürecini oluşturmak gerekmektedir.

Son olarak, Küçük Menderes Nehri Havzasında bu entegrasyonu ve yönetim faaliyetlerini ayrıntılı olarak analiz etmek için dışsal değişkenler, eylem alanı ve Bütüncül Politika Çerçevesi'ne dayalı beş ana boyut etrafından geliştirilen **Kurumsal Analiz ve Geliştirme (KAG) Çerçevesi** uygulandı. Sonuçlar, sözkonusu su havzasının kurumsal, yönetimsel ve finansal problemlerle karşı karşıya olduğunu göstermektedir. Çalışma, havzada yaşanan problemlerin aşılmasına yardımcı olmak için dikey ve yatay plan tutarlılığının, il düzeyindeki ve yerel liderliğin, paydaşlar arasında ağ kurulmasının, yerel düzeyde bir problem değerlendirme ve strateji geliştirme sürecinin önemini vurgulamaktadır.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

Table **Page**

CHAPTER 1

INTRODUCTION

This dissertation focuses on taking water issues into account in physical plans and decision making process, on behalf of the integration of land use planning and water resources management, which enhances the effective management of land and water resources and also provides long-term availability of adequate water supplies. At the present, throughout Turkey, rivers and streams are ecologically degraded. At the same time, growth in human population and expansion of urban areas continue to threaten these finite resources of water. Moreover, different jurisdictions and levels of government have separate regulations and standards as well as unequal degrees of power to enforce these regulations. The combined facts of increasing and competing demand for water, the limited nature of the resources, and a growing realization that the environment also requires the sharing of water are the conditions that inspired this thesis. Given these conditions, the proposition signifying that water resources management in spatial planning is a problematic issue under the current fragmented administrative and legal structure of Turkey as many other countries in reference to the mainstream accounts is to be examined in detail in the following chapter.

1.1. Background

With the increasing population, industrialization and climate change today, pressure on water resources has increased rapidly since the 20th century. Water related problems like too much water (flooding), too little water (drought) and dirty water (pollution) are already realities for many countries and regions. The quantity and quality of freshwater available to meet the demand of people and the environment are degraded at an alarming rate. There is significantly less freshwater available per capita for people to use today than there was 100 years ago (Global Water Partnership, 2004). At the same time, human need on freshwater continue to increase.

The reality in many river catchments today is that there is less water available for use by people and the environment than that is demanded. Therefore, water scarcity

is a pressing issue in worldwide. Water scarcity is a deficit between the water that is available and that which is required for ecosystem and societal uses (Carter et al., 2005; Food and Agriculture Organization of The United Nations, 2000). The literature points to a number of elements contributing to the hydrological effects of urbanization. Kallis and Coccossis (2002) claim that growing urbanization and related activities are posing serious threat to the survival of the water systems. Moss (2004, p. 85) points out that "new urban developments are still being located on floodplains, intensive agricultural production continues to pollute groundwater resources and run-off from sealed or ploughed land is a growing source of environmental damage". Urbanization affects water cycle, then causes hydrological changes that have significant implications for the quantity of fresh, clean water that is available for use by humans, fish and wildlife. Carter (2007) points to the close link between "land use change and environmental quality" and "influence of the nature and location of development" on both the generation and resolution of environmental problems. If water resource management is not taken into account while creating land use plans; therefore, freshwater resource problems and their impacts will likely limit development activities and opportunities in the future (Carter, 2007; World Water Assessment Program, 2003).

Integrated water resources management, new paradigm characterized by watershed boundaries, ecological goals and integration of governments and stakeholders, throughout the 20th and towards the 21st century, is today, still one of the most popular notions of spatial planning. Freshwater is critical for both the survival of human communities and for ecological systems. Internationally and lately, there has been a growing interest towards water resources management that includes monitoring, control, development of new technologies for efficient treatment of water and wastewater, pollution prevention programs, recycling and reuse applications, institutional development and public participation. Accordingly, water is observed to be more available in the recent years. The focus on water issues had evolved from an emerging awareness owing to the First UN Water Conference at Mar del Plata (1977), in the 1970s, passing through a period emphasized on the serious condition of the globe's freshwater resources in 1980's, and shifted with increasing concern to the principles for sustainable water management; so the major interest had slowly moved from the idea of pollution prevention and control towards the sustainable use of water resources. 1990's are subjected to the agreement on the developing idea of the fully integrated water resource management (IWRM) concept, which emerged from Dublin

and Rio Conferences of 1992 and also growing concern among policy makers in many developing countries. This new paradigm argues the utilization of freshwater resources and defines the land use planning (spatial planning activities) as the primary sector that should adapt both a proactive and a preventive approach towards integrated development objectives at all levels.

Past experience demonstrates that physical and socio-economical planning can no longer be undertaken independently. Attempts have been made to develop appropriate approaches for the integration of planning and resource management systems. In the late 1990's and 2000's, the emergence for the integration of land use planning/spatial planning and water resources management has been underlined by governments (Western Australian Planning Commission 2008; Northeast Georgia Regional Development Center, 2001; OPR, 2003; CWP, 2005; ODPM 2004 etc.) and academicians (Carter, 2007; Carter et al., 2005; Mitchell, 2003; Van de Wetering, 2007; Arnold, 2005; Arnold, 2006; Arnold et al., 2009; Carter, 2005; Moss, 2004; White and Howe, 2003 etc.). The European Union has recently created new opportunities to overcome problems of spatial fit and institutional interplay over water and land use in the form of the Water Framework Directive (WFD), adopted in December 2000 (EC, 2000 cited in Moss, 2003, p. 85). The WFD promotes a `river-basin approach' and refers explicitly to linkage between water management and land use (Wiering and Immink, 2006; Moss, 2003) The WFD includes the three innovative aspects targeted land-use issues as the river basin management, the combined approach to pollution prevention and the inclusion of hydromorphological parameter for the 'good' status of surface water. Although the effects of water scarcity have been on both the scientific and the policy agendas for a considerable number of years, it is obvious that a number of governments in Europe and some rest of the world have restructured water related laws and policies in land use and decision-making so as to come up with an effective and coherent integration policy. These new laws and policies constitute some parts of the changing paradigm of the sustainable strategies. On the other hand, planning procedures have also been recognized as a constraint on water resources management.

As a result, *integrated management* and *watershed management* are widely accepted in many countries including the UK, Netherlands, Sweden, Australia, the USA and Canada. Since 2005, these two concepts have been embraced and articulated at the national level in legislation, policy and administrative arrangements in jurisdictions, especially of Netherlands and The UK.

Unlikely, since most of the developing countries as well as Turkey had to deal with many water related urban problems like flooding; infrastructure, water quality, erosion, irrigation systems and water deficit problems have been inevitably put apart for years. Water management in Turkey is traditionally organized around political and administrative units rather than river basins. Legislative and executive responsibilities for water management are divided among more than ten central or local institutions and organizations working on the development of land and water resources of 26 river basins in Turkey. Çakmak et al. (2006, p. 870) poses that "although several organizations are authorized in water management issues in Turkey, there is not a single wide-scoped water law". They (2006, p. 879) also propose, as well as many other authors and politicians, that current available laws and regulations should be gathered under a single framework and a "water law". In fact, Turkey is recently on the way to construct a policy framework and administrative role models depending on the WFD. River and Basin Management Plans have been developed as a new planning type to be included in Turkish planning legislation within the context of EU Affiliation process.

The literature shows clearly that there are strong links between spatial planning and water resources both in theory and practice. There is no doubt that the utilization of water resources will influence the pattern of urban growth and land use, and also shape the spatial structure, which is the landscapes and cityscapes of prospective urban and rural environments. What the response of planning system and planning practices to the integration will be, and also what the contribution of planning to move towards sustainable development through promoting widespread water resources management will be are the questions that this study seeks to explore by focusing on the link between water and land use planning in an integrated way.

1.2. Problem Definition

As pressure on natural resources increases, land use planning (spatial planning) becomes to have an important function to regulate land use and development in attempt to manage and balance the stress placed upon land. From a land use planning/spatial planning perspective, both the ideology of planning and the specific requirements within planning legislation often determine the extent to which environmental concerns are considered. This is especially true for water resources (Carter et al., 2005; Carter,

2007; Waterman, 2004; Arnold, 2005; Mitchell, 2005). The notion of integrating land use planning and water resources planning is not a new approach. Little is known about the capacity of spatial planning system to deliver an integrated approach to manage water resources. Therefore, the planning of water resources and land use has usually been carried out as a disjoint process. In the planning system and decision making process, water resources management is often outside of the main planning theme. Yet, the need to integrate land use and water resources management and the devolution of responsibility for water management considered in spatial planning and land use decisions has been widely acknowledged from national to provincial and local level (Ivey et al., 2002; Kellogg, 1997; Ivey et al., 2006a; Ivey et al., 2006b; Hanak, 2005; Mitchell, 2005; Johnson and Loux, 2004; Moss, 2004; Tarlock, 2002; Wiering and Immink, 2006; Bruce and Mitchell, 1995).

In fact, there is extensive literature and policy on how spatial planning currently contributes to water resources management within the new concepts and new approaches. Today in the related literature, the mainstream arguments on the integration of land use planning and water resources management arrive at a consensus about the necessity of a balance between structural and non-structural measures basin-wide, to be comprehensively considered. As pointed out in above paragraphs, some countries lay claim to this integration at the national level in legislation, policy and or administrative arrangements in their jurisdictions.

On the contrary, the situation in Turkey is different from the international experiences. The context related to adoption of water resources management issues outlined in the above paragraphs has not been in the agenda of Turkish political grounds and national policies. The development and implementation of this integration is a complicated process. In Turkey, water resources management has still not been adapted and integrated into planning practice. The role of spatial planning often remains unclear; and, this integration is rarely visible in the analyses and policies of the land use plans. Moreover, the contribution of Turkish planning system to water resources management is not in inquiry since neither a strategic national integration policy nor a policy associated with indicative quantitative targets have ever existed. River basin management plans (RBMPs) are at their early stage of development. However, links between RBMPs and regional development plans is not defined at present. Additionally, the interaction or links between river basin management plans and regional development have not been defined yet, thus creating a considerable challenge to land

use decisions and planning. Strategies are still vague with respect to the concrete contribution necessity of spatial planning to integrate with water resources management. It should be noted that the foundation for the framework of linking land use and water resources management in Turkey needs to focus on creating more innovative mechanisms in order to legislative, organizational and planning process aspects of management practices. The presented dissertation provides an overview and systematic characterization of different national approaches to develop strategies for water resources management from a spatial planning/regional development perspective. The study primarily aims to determine and comment on how the integration between physical planning and water resources management will be provided, and to explore examples of the country to be inspired in this regard. In this respect, this study is a research to critically examine the approach for developing mechanisms to ensure the integration in the case of Turkey, given the political uncertainties, limited resources and available legislative and administrative framework.

Especially in the area of the integration of land use planning and water resources management in Turkey, which is the focus of this study, there is not much research and knowledge. Studies taking different geographical units and structures as a basis for water resources management in Turkey were carried out in the 1990s. The researchers have mainly focused on water quality management in river basins, surface water resources management, the administrative structure on water resources management and the problems of water resources. Among water resources management studies in Turkey, Balaban's study (2008) illustrates flood risk management systems in both theory and practice. This study poses that "current mitigation strategies and urban planning tools only are not sufficient to manage flood issue in existing built-up areas in Turkey" (Balaban, 2008, p. 296). In addition, there is no study about how local and regional land use plans anticipate and account for water resources and supply availability and reliability. In this context, the presented research will be the first study in Turkey which can be reached.

Many countries at the present still consider the necessity of manipulating urban land policy drivers and legislative instruments in favoring the integration of water resources management and land use planning as policy action targeted at increasing the quality of aquatic environment. In this respect, in addition to the knowledge of the related field, the presented research attempted to contribute to the knowledge base by exploring the development of the experience and understanding of integrated

management and policy in Turkey, after giving insight to legal and institutional framework , process and measures depending on the theoretical and policy context. This research also provides a discussion on particular concerns with the status of Küçük Menderes River Basin, which is achieved by means of three ways as: (1) a survey of Turkish spatial and water planning legal framework (2) a survey of institutional setup in Küçük Menderes River Basin (3) a survey of physical regional development plans, local structure plans and implementation plans. The focus of the research is limited to the planning and decision making stages of the integration, excluding the financial mechanisms.

This understanding will improve the ability of city planners to effectively account for the potential impacts on water resources from proposed land use plans. In recognition of the existing research gap, the presented study proposes recommendations to contribute to our understanding of how well both land use planning and water resources planning account for the reciprocal relationships between land use patterns and water resources systems separately. This contribution to the understanding also includes how those endeavors might be better integrated. This critique of the physical plan making process and the resultant plans should assist policy makers to refine the legal framework.

1.3. Aim and Objectives

This study emphasizes the importance of water resources management issues in land use planning process and the enormous potential of spatial planning for improving natural resources management. Given the nature and significance of the problem, the overall aim of the presented research is to analyze the integration of land use planning and water resources management in legal framework and institutional structure in Turkey, and to analyze this integration and these management activities in detail within Küçük Menderes River Basin.

The objectives of the research are:

- to develop a framework / normative model through synthesizing the literature, the related legal context and institutional structure of different national approaches to consider the key points of the linkage between land use planning and water management developing strategies for water

resources management from a spatial planning/regional development perspective by the following sub-objectives:

- to critically evaluate the legal and institutional policy framework in Turkey (policy analysis) to investigate the effectiveness of Turkish planning legislation in ensuring the integration between land use planning and water resources management after evaluating the experiences of the countries,
- to investigate the status of institutional structure in The Küçük Menderes River Basin catchment area by applying the framework developed; and, to evaluate physical plan qualities by examining the land use planning documents from regional to local level. (institutional analysis and plan quality evaluation)
- to propose recommendations for improving the achievements of the integration of land use planning and water resources management.

1.4. Research Questions

This study attempts to answer the following questions in order to determine the barriers and reduce the gap between spatial planning and water management:

With regard to integration of water resources management and spatial planning:

1. How can land use planning process and water resources management be integrated in order to provide effective and efficient outcomes?

With regard to integration of water resources management and spatial planning in Turkey:

2. How do Turkey's spatial planning legislation, policy and institutional structure currently contribute to water resources management?
3. What changes in spatial planning legislation, policy, guidance and institutional structure are recommended to improve the integration of water resources management?

With regard to the integration of water resources management and spatial planning in the case of Küçük Menderes Basin River:

4. What is the level of institutional arrangements in relation to the integration in Küçük Menderes Basin River?

5. What is the current state of regional land use plans in terms of their integration with land use planning process and fresh water resources management policies and strategies in Küçük Menderes River Basin Catchment Basin?
    a. How can the level of integration between land use planning process and freshwater resources management in regional land use plans be measured?
    b. What kind of new institutional arrangements and measures can be proposed in Küçük Menderes River Catchment area to integrate physical planning and water resources management?

1.5. The Methodology

As mentioned before, the realization of "(integrated) water resources management" is strongly linked to spatial planning system and decision-making process. This study is a qualitative study but does not seek to prove a hypothesis. Therefore, the main assumption of this study is as the following: "The current land use planning practices in Turkey does not regard the link between water resources management and land use planning. These practices consider water resources issues as fixed inputs beyond the control of the locality rather than as a plan element to be harmoniously developed and coordinated jointly with land use". Uncontrolled urban growth and provisions of development plans together with the current legislative and institutional capacities that neglect the water resources management, are the main causes of not only the water utilization problems, but also the environmental problems in Turkish cities and aquatic environment. The spatial planning raises the effectiveness and efficiency of actions and adds value for the utilization of water resources. Under the disjoint process, two sectors (namely land use planning and water resources management) would be coordinated and considered not only for promoting sustainable water resources and water supply so as to contribute to the integrated policy but also for providing their compatible and collective action in the social, environmental and spatial context.

The framework of the research design is shown in Figure 1.1. The research utilizes the literature review, field survey and case study techniques to explain the

current structure in Turkey. The study describes the *"**Integrative Policy Framework**"* (IPF) by which national policies and strategies of the three countries, namely Netherlands, England and Australia, are examined by considering the key points of the linkage between land use planning and water management. The examination intends to find out the common policies and strategies in each country's experience. It accordingly intends to derive some instructive and innovative lessons for the review and analysis of legal and policy context of Turkish planning system. It also includes an evaluation of the institutional structure and the physical planning content in Küçük Menderes River Basin catchment area as a case study.

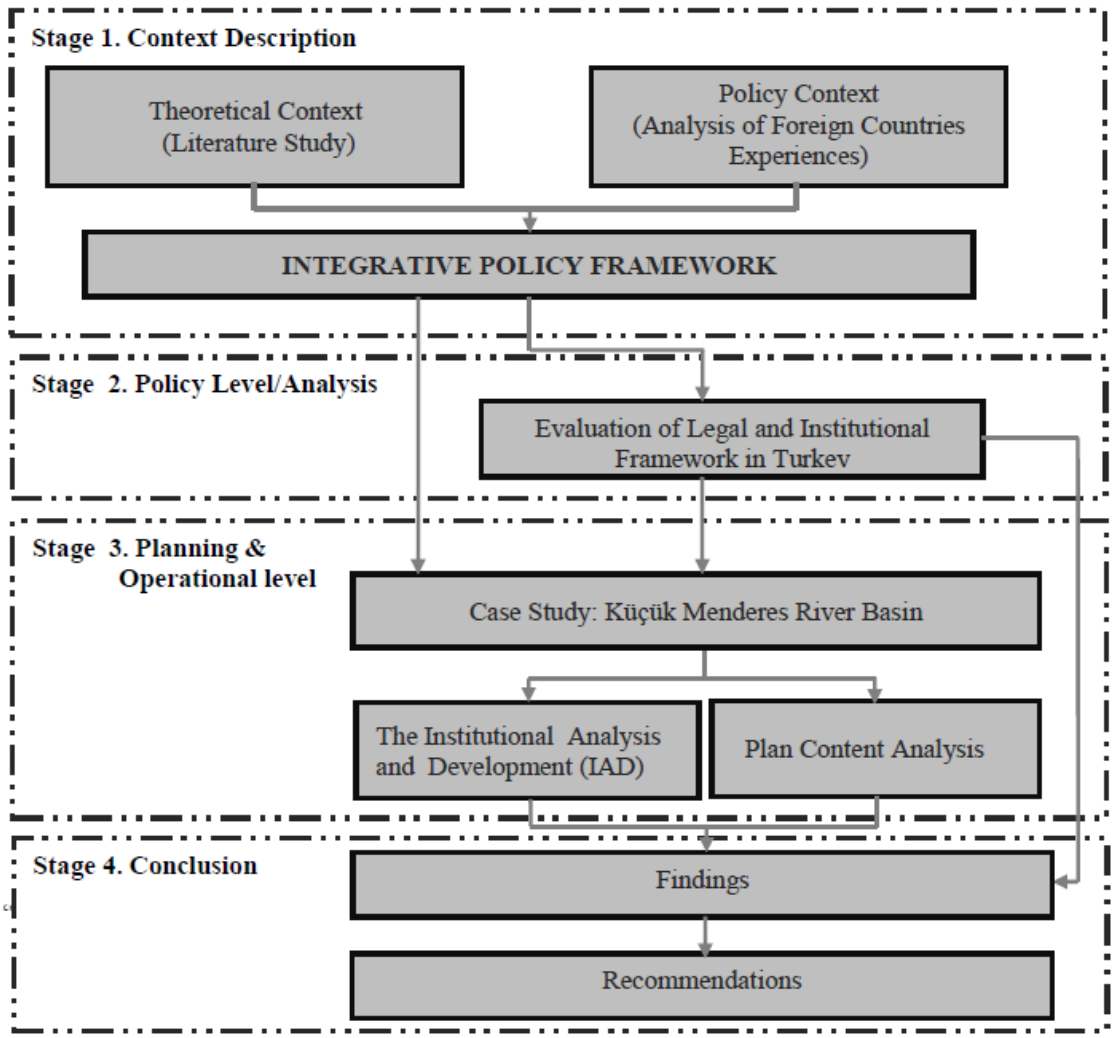


Figure 1.1 Structure of the Study

As this study is an attempt to understand the relationships between spatial planning and water resource management issues, a number of methods have been employed to achieve the goal statement of the study. Evaluation of the integration of land use planning and water resources management which must be defined within a

context; firstly, should be perceived as a process from the policy level to implement, rather than a single assessment of the situation. In order to create a joint planning and action initiated interdisciplinary environment, more than one methods of analysis are needed to clarify the existing legal and administrative structure. Thus, the study aimed to carry out an analysis of three purposes at policy, planning and decision-making, and application levels.

In general, the research was developed in four phases. The first phase includes a review of the existing policy and theoretical context for the consideration of the water environment in the planning system. Literature review is especially used in formulation of the theoretical basis of the notions, scope and the role models for the integration. Using a combination of content analysis and policy analysis, the study was carried out to determine how to integrate land use planning and water resources management and summarize why these two should be linked. Tools for integration are presented in Chapter 2.

In the theoretical part of the thesis, being the initial phase of establishing the frame of the study, the attempt was to identify the relationships between water issues and spatial planning variables, and also to introduce spatial linkage of the water system. It also raises the importance of tackling water–related problems at the very beginning of the spatial planning procedures and advocating a common language shared by planners and water managers. New planning approaches and institutional development, therefore, are explored. In order to assess the linkage between land use planning and water resources management considering the results of the country studies, it is necessary to gather knowledge about the political-administrative system.

Eventually, the study included a learning process through examining perspective and experiences of the selected countries, stated as policy context in Fig. 1.1. These examples were directed to understand practices, processes and their consequences, and also to understand the main arguments included in the relevant literature about the concepts related to the process. As included in the Third Chapter; Netherlands, England, and Australia were the selected countries for in-depth analysis. The selection of these countries depends on the availability of related data especially in English language. Each of these countries has its own characteristics, which are valuable in reflecting the dynamics of the interactions, explaining the water resource management issues into planning practices and the context and extent of the integration. The extent to which the integration criteria are met for land use planning and water management practices was

determined through consideration of survey planning policies and practices. International experiences on the integration of land use planning (spatial planning) and water resources management were examined in through the concept of the following: (1) administrative structures/ legal and institutional framework (2) decision making process and policy documents and (3) the applications of spatial planning tools for integration process. The findings of the examination on the case countries highlight a number of key points to be considered in integrating land use planning and water resources management. Based on the outcomes and findings of content analysis (contextual studies) in theoretical and policy background, it is attempted to identify the classification of the integration of both two sectors as a framework to register current experience and solicit case examples. To analyze the policy and legal framework of the integration, the ***Integration Policy Framework*** (IPF) is structured as a five-dimensional diagnostic based on the works of Eggenberger and Partidario, 2000; Briassoulis, 2004; Briassoulis, 2005; Kidd and Shaw, 2007; dimensions listed respectively as: (1) substantive, (2) methodological, (3) procedural, (4) institutional, and (5) policy. The IPF profiled in this study offers ideas on how to integrate the considerations of water resources into land use planning, as well as water and land use policy framework that may encourage more integrated approaches in the future. The extent to which the integration criteria are met for land use planning and water management practices is determined through consideration of survey planning policies, practices and the relevant literature. As pointed out in the previous pages, it is assumed that the selected worldwide projects developed within the last decade have added value to some extent to the concerned area in the end. The framework offered a means to systematically assess the current level of legal provisions policy in Turkey. In the light of this information, the evaluation is carried out with reference to the current legal and institutional structure in Turkey and in the case of Küçük Menderes River Basin.

Second phase of the study is focused on Turkish legal and administrative system. The purpose of this study is to define their legal status in order to make a sound, concrete and successful execution of the planning systems for water resources management. The study takes an approach to the "state of play" of integration and efforts implemented in Turkey. In accordance with what was mentioned by Yin (2003), this second phase emphasizes a deep and detailed coverage to ensure the representativeness of the case under investigation as a single-case study. The analysis of this country case study is based on legal provisions (such as laws, regulations,

circulars etc.), and academic literature on water resources management in Turkey. Content analysis is used to document and to understand the existing legal basis and comprehensive guidelines for the consideration of the water environment in the planning system based on the profiled Integrative Policy Framework (IPF), as well as to verify theoretical relationships. Based on the findings of the examination on case countries, several proposals and policy implications were discussed to frame the legislative and administrative aspects of integration of water resources management and land use planning in Turkey.

The last two phases of this study constitute some parts of the evaluation of this integration at planning and operational level. Based on the observations and on the nature of the research objectives, a (small-N) case approach was chosen. Küçük Menderes River Basin was selected as the specific study site based primarily on the political condition in Turkey at the time of the research, but also on the biophysical and regional character of the watershed. Küçük Menderes River Basin, like the other urban river basins in Turkey, is under great pressure from a diverse range of human activities and under scarce water condition that could cause severe problems. In this basin, there is a strong competition for the scarce water resources between the households and the industrial and agricultural activities. Based on the case study literature, the research area is bounded spatially (Yin, 2003). The spatial scale of the analysis was defined by the geographical boundary of Küçük Menderes River Basin catchment area.

Third phase is based on the assessment of institutional development in Küçük Menderes River basin catchment area. This study is set up to conduct a research in Küçük Menderes River Basin with the aim (1) to define the importance of (specific) institutional arrangement in the regional landscape, (2) to describe the status of exogenous variables and actors in Küçük Menderes River Basin, and (3) to understand the relationship between (related) institutional arrangements and the impact of this relationship on resource-use. The analysis of the river basin planning process in the Küçük Menderes catchment is performed by using the Institutional Analysis and Development (IAD) framework. Likely well-developed and frequently-cited Institutional Analysis and Design (IAD) Framework is selected as a foundation on which the evaluation is to be built based on its explicit focus on the context (biophysical etc) and its increasingly strong grounding in the integrative policy framework.

This stage of the research adopts a case study approach to develop cross-institutional and bio-physical analyses. It focuses on the following research questions:

1. How can the IAD framework and the integration criteria be applied to bring new learnings to the planning process in this case-study?
2. How can the evaluation of the IAD framework coordinated with water and physical planning and the analysis of institutional structure be achieved?

Components of the IAD framework, such as "exogenous variables" and "integration criteria" are analyzed. In addition, the planning process is analyzed from the "the criteria of integration policy framework" point of view.

The research is conducted in the period of March- November 2010. Data used in the analysis were derived from three main sources: (1) key informant interviews, (2) documentation, and (3) personal observations pertaining to the Küçük Menderes River Basin catchment area. 42 key informant interviews were conducted with the following actors in Izmir city: 2nd Regional Directorate of State Hydraulic Works (n=3); officials and seniors from Provincial Department of Environment and Forestry (n=4), Administration of Water and Sewerage (İZSU), Metropolitan Municipality (n=3), Governor's Office (n=2), Provincial Directorate of Forestry (n=2), Provincial Directorate of Agriculture (n=3), Special Provincial Administration (n=2); as well as academics (n=1) and non government organizations (n=2). In addition, a total of 20 semi-structured interviews are conducted with seven district municipalities (n=13) and seven district governors (n=7). Analyzed documents include provincial legislation, municipal planning strategies, municipal by-laws, and water utility statements. Key evaluative questions address significant issues within the integration dimensions of the policy framework developed in Chapter 4. Three protocol types for questions are used to guide semi-structured interview: for land use planners, water managers and local authorities (presented as Appendix B-C-D). Guiding questions for the semi-structured interviews are designed to elicit information about not only the presentation of the overview of the exogenous variables, but also the evaluation of the integration dimensions identified in the integrated policy framework. Audio-recordings are made and hand written notes were taken by the researcher in order to summarize the discussion. Interviews are subsequently transcribed. After transcription, the data are sorted thematically into five emerging integration categories.

The last phase of thesis considers that the key guiding principles of the integration of land use planning and water resources management is evaluated within land use plans by using plan evaluation method. This study extends the key guiding principles of the integration by converting them into indicators that can be measured in the regional land use plans. Specifically, the presented study addresses the specific research questions about the degree to which the local and regional land use plans have adequately addressed the linkages between water and land use. The study specifies its research questions as the following: (1) To what extent are water resources planning and management elements integrated into local/regional land use plans? (2) What are the indicators that receive the greatest or least attention in regional plans? The study is based on two methods. The first phase of the study consists of several subtasks, including the development of a literature review on the connection between water resources management and land use planning. The second phase, on the other hand, involves a review of the methods to evaluate the content and the quality of land use plans, the development of an evaluation protocol, the selection of regional plans, and the evaluation itself. By characterizing the extent to which current land use plans manage development pressures, the presented research will improve the abilities of the planners to anticipate the potential impacts on water-related areas, to increase their capacity of explaining those impacts effectively to the community, to enhance the potential for coordination between water resources management and land use planning, and to contribute ultimately in a rigorous way to the evaluation of the plan quality. The presented study utilizes descriptive statistics to assess the quality of sampled plans regarding land use and water. For the purpose of the evaluation of the integration level of water resources management and land use planning, plan evaluation frameworks for regional and local levels were developed. Given the characteristics of high quality plans, and based on the comprehensive literature review on the integration, general principles were formulated to provide a framework for integrating land use plans and decisions on water resources. The evaluation the framework and these guiding principles were built on the classification of the study of Rodriquez et al. (2004), extending them to address the water issues. They will be discussed in more detail in section 3.4.2.

Data will be collected from two sources; (1) survey of local planning officials/ planning directors, and (2) systematic content analyses of the regional land use plans in the light of these guiding principles. Both survey and content analyses are used to

elaborate on four topics related to this study: (1) the water elements in the plan, (2) how plans account for the land use-water integration, (3) planners' views about the connection, and (4) the role of institutional coordination.

1.6. The Structure of the Thesis

The thesis is composed of seven chapters. **Chapter One** provides a general introduction to the thesis comprising the domain of inquiry, general research questions, aim of the study and the methodological approach to the study.

Following this introduction chapter, **Chapter Two** lays out the theoretical framework of the study. This chapter presents a review of the literature that involves the integration of land use planning and water resources management. It examines the concepts of this integration, focusing on the clarification of the key terms of "water resources management" and the integration of land use planning and water resources management. This chapter also reviews the previous work of integration approaches. This chapter provides the general framework including the need for and the major obstacles to the integration. Before discussing why land use planning and water management is not currently linked and how integration can be accomplished, it is important to emphasize why this linkage is necessary and what happens in the absence of it. This chapter also examines the possibilities and feasibilities of the consideration for water resources systems in spatial/land use planning and why it is important in the achievement of sustainability in urban and rural regions, as recognized in the literature.

Chapter Three discusses the methodology used within the research. Background on the analysis of the experience of the foreign countries is provided in this chapter. The evaluation of the legal and institutional framework in Turkey, as well as the evaluative framework in case study area, is also provided in detail. Finally, the type of data sources and methodology used to analyze the data are explained.

Chapter Four informs the existing effort toward the integration of sustainable water resources management into land use planning system. It lays out several selected worldviews. The selected worldviews are experiences from three countries, which are the Netherlands, England and Australia. The possible lessons are extracted to evaluate the Turkish planning legal system. Each of these experiences provides us an opportunity to understand the key points for the integration of spatial planning and water resources

management. This chapter also develops a normative framework (Integrative Policy Framework –IPF) to evaluate the integration of land use planning and water resources management, and to identify the requirements of this integration recognized in the theoretical and policy context.

Based on the theoretical and practical discussion, **Chapter Five** focuses on the assessment of the various laws and policies regarding the requirements for the integration of spatial planning and water resources management. This chapter provides a description of the existing water resources management organizations for water resources development in Turkey. This chapter also provides an evaluation of the related Turkish legal and administrative structure regarding the requirements of Integrative Policy Framework (IPF).

In **Chapter Six**, two basic evaluation frameworks focusing on the integration of land use planning and water resources management in Küçük Menderes River Basin Catchment Area are discussed. In the case study area, the defined requirements and explanations discussed in Chapter Four led us to conclude that the relationship between water resources management and urban processes could not be properly understood.

In **Chapter Seven**, the reader will find our final evaluation on prospects for the integration of land use planning and water resources management in Turkey, and prospects and proposals concerning the planning in Küçük Menderes River Basin. There is also an overall evaluation in the concluding chapter. The reader will also see the recommendations for further studies and researches as well as some policy implications concerning the planning system in Turkey.

CHAPTER 2

THEORETICAL FRAMEWORK

> Society does not have the will to ensure that good land use planning will protect key features of the watershed… If we do not take a very different approach in protecting our streams, they will continue to be victims of our growth dependent socio-economic system… it is the healthy watershed that is the true indicator of a sustainable future and a high quality of life. (Otto Langer, cited in Lavigne and Gates, 2000, p. 205-206).

While the planning and implementation of water supply systems obviously required careful consideration of numerous complex technical, political, and institutional problems, the solutions emerging in recent decades have been heavily oriented toward an integration of land use planning and water management to satisfy a given level of future demands. Yet, the need to integrate land use planning and water management and to develop integrated policies have been widely acknowledged (Cruz, 1999; Carter, 2002; Hanak and Simeti, 2004; Johnson and Loux, 2004; Carter et al., 2005; Hanak, 2005; Arnold, 2006; Ivey et al., 2006a; Goddard, 2004; Carter, 2007).

If land use planning not to be proactive in terms of encouraging the sustainable use of water, water resource problems and their related environmental, social and economic impacts will be likely to limit development activities and opportunities in the near future (Carter, 2007). The recent studies have a tendency to manage water systems so as to integrate urban land use and urban water supply. This study focuses on the relationship between water supply and land use planning. Therefore, this chapter reviews the relevant literature on water and land use planning. The aim of this chapter is to present background information in order to provide better understanding for today's features of water issues and their relations with urban planning processes. It begins with new paradigms and the considerations of the linkage of water resources management and spatial planning / land use planning in the literature, and then reviews the considerations of the linkage of water resources management and land use planning and the theoretical context for this linkage.

2.1. Changes in Water Sector

The aim of this section is to present background information in order to provide better understanding for today's features of water issues and their relations with urban planning process.

2.1.1. Environmental Concerns for Water Resources Management

To a greater or lesser extent, all countries and cities have been active in protecting water resources. Urban water supply systems serve the aim of the city's continued existence by providing water for household, industrial, commercial and institutional uses. After the industrial revolution, cities grew rapidly. When the cities are aware of the the growing impact of urban areas and the increasing pressure on the finite resources, urban sustainability with environmental resources is high on the top of the agenda. With the existing and evolving physical, socio-economic and institutional challenges related urban water planning, the planning process is in need of review.

The issue water resources management in developing countries began to receive attention due to environmental movements that started to gain momentum in the late 1960s. New management approaches are examined by the authorities facing increasing pressure to be more economically efficient and environmentally effective. Since the major conferences and publications on environmental sustainability in the 1970s and 1980s, such as the Mar del Plata Conference (1977), the Brundtland Report (1987), the United Nations Conference on Environment and Development (UNCED) and Agenda 21 (1992), and the Johannesburg Conference (2002), questions pertaining to water management have received considerable attention (United Nations, 1993).

Guiding principles for the sustainable development and use of water resources were produced in 1992 at the International Conference on Water and the Environment (United Nations, 1993). These principles presented in The Dublin Statement, are as follows:

- A holistic approach to water management, linking social and economic development with protection of natural ecosystems
- Water management should be based on a participatory approach, involving, users, and planners … at all levels.
- The central role of women in the provision, management, and safeguarding of water.

- Water should be considered an economic good…basic right of all humans to clean water and sanitation (Grimes, 2001, p.18).

While climate change is having a multitude of immediate and long-term impacts on water resources in the world, such as flooding, drought, sea-level rise in estuaries, drying up of rivers, poor water quality in surface and groundwater systems, precipitation and water vapour pattern distortions, European governments continue to advance their efforts towards mitigating the causes of climate change (Mitchell, 2005).

'**River basin management**' is reflected as the best way of protecting resources in an integrated way is reflected in virtually all the major international policy documents on water management, from Agenda 21 of the Rio Conference on Environment and Development to statements from the World Bank (Carter et al., 2005; Moss, 2003). "The European Union has recently created new opportunities for overcoming these problems in the form of the Water Framework Directive (WFD), adopted in December 2000" (Moss, 2004a, p.85). The Water Framework Directive (2000) is a major piece of legislation, which aims to institutionalises river basin management across the EU, requiring water management plans, programmes of measures and environmental quality objectives to be pursued on the scale of entire river basins (Moss, 2004a; DCLG, 2005)

2.1.2. Paradigms in the Water Resources Management

Early water management policies consisted of supply-oriented solution. When the traditional supply planning has proven to be an ineffective process for some utilities since the late 1970s, comprehensive demand side management programs such as water conservation gained important. The water demand management that stresses making better use of existing supplies and water resources management are described as a "prediction and control" regime (Pahl-Wostl et al., 2005). Pahl-Wostl et al. (2005) stress about the prediction and control regime that there is a limit on possibilities to introduce change based on new sights. The integrated and participatory management is currently undergoing such a paradigmatic shift; decision making for this regime has shaped by regulatory frameworks including technical norms and legal prescriptions.

Inadequacies with traditional water management along with increased scientific understanding to the water resources environment have strongly emphasized the need for a new approach to water management. Recent approaches on water management paradigms have progressed from '**supply-oriented**', through '**demand-oriented**' and

onto '**integrative**', and '**adaptive**' frameworks (Bauman and Boland, 1998; Medema and Jeffrey, 2005; Jeffrey et al., 2005).

Since the first UNESCO International Conference on Water, which took place in 1977 at Mar del Plata, Argentina, **Integrated Water Resources Management (IWRM)** has been recognized as the most sustainable means to incorporate the multiple competing and conflicting uses of water resources (Jeffrey et al., 2005; Mitchell, 1990). However, this has emerged as a significant concept since the Earth Summit in 1992, and has more recently been given prominence by the Global Water Partnership (GWP) (Mitchell, 2005, p. 1335). The GWP defines IWRM as "a process which promotes the coordinated development and management of water, land, and related resources in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.' (GWP-TAC, 2000, p. 22).

GWP (GWP-TAC, 2004, cited in Medema and Jeffrey, 2005) describe the three pillars of IWRM as follows (see Figure 2.1):

- moving toward an **enabling environment** of appropriate policies, strategies, and legislation for sustainable water resources development and management;
- putting in place the **institutional framework** through which the policies, strategies, and legislation can be implemented;
- setting up the **management instruments** required by these institutions to do their job (Medema and Jeffrey, 2005, p. 13).

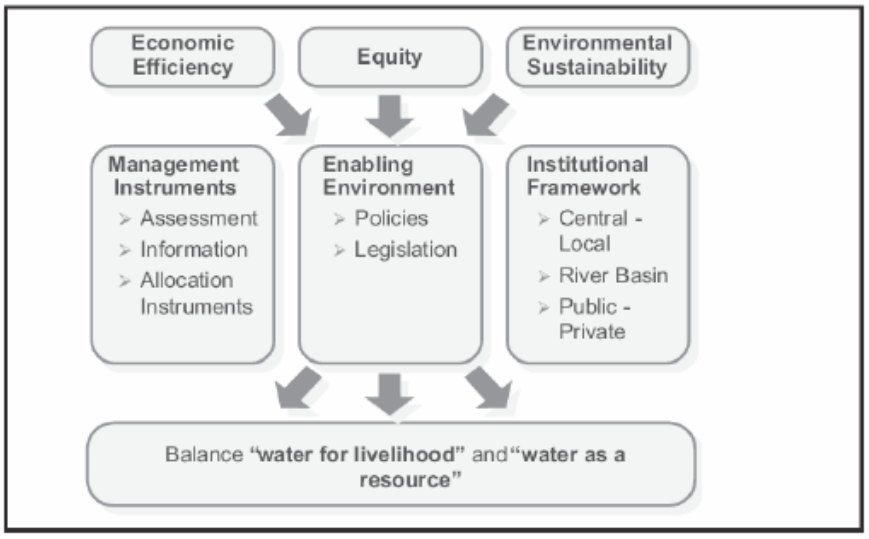


Figure 2.1. Three pillars of the IWRM concept
(Source: Medema and Jeffrey, 2005, p. 13).

Terms such as 'integrated water management', 'groundwater and surface water management', and 'integrated supply and demand management' have been common currency since well before the term sustainable development was coined in the mid-

1980 (Chapman et al, 2003). 'Integrated Water Resources Management (IWRM)' is placed firmly on the regional and local agenda in the water policy. There is now a considerable literature on Integrated Water Resources Management (IWRM) in the promotion of more sustainable approaches to water development and management.

Mitchell (2005) discusses the management approaches in terms of two basic interpretations of a holistic or systems approach: comprehensive and integrated water resource management. The author explains that because of the weaknesses of the comprehensive interpretation, the emergence of the integrated perspective seems to be desirable as a reaction to comprehensive water resource management.

Recently, **'adaptive management'** has been widely advocated as the approach which "natural resource managers should adopt; building on a recognition that ecosystems are complex systems, which are 'adaptive' or 'self-organizing' and that management systems must be able to readjust to change or surprise in the system" (Gunderson and Holling, 2001 cited in Jeffrey et al., 2006, p. 2). Pahl-Wostl and Sendzimir (2005) emphasize that the idea of adaptive management discussed in ecosystem management and IWRM are complementary and not competing concepts.

Medema and Jeffrey (2005, p. 31) find an evidence that "IWRM as well as AM have facing a large number of difficulties in their transfer from theory into practice". They simplify and visualize the question that "whether IWRM and AM would indeed create synergy when combined together or whether the barriers and challenges to both concepts will make a combination of them even more complex for successful implementation?" Figure 2.2 summarizes relationship between IWRM and AM.

Pahl-Wostl et al. (2005) discuss the differences between prediction and control regime and adaptive, integrated regime in terms of governance, sectoral integration, scale of analysis and operation, information management, infrastructure and finances and risk. (see Table 2.1.).

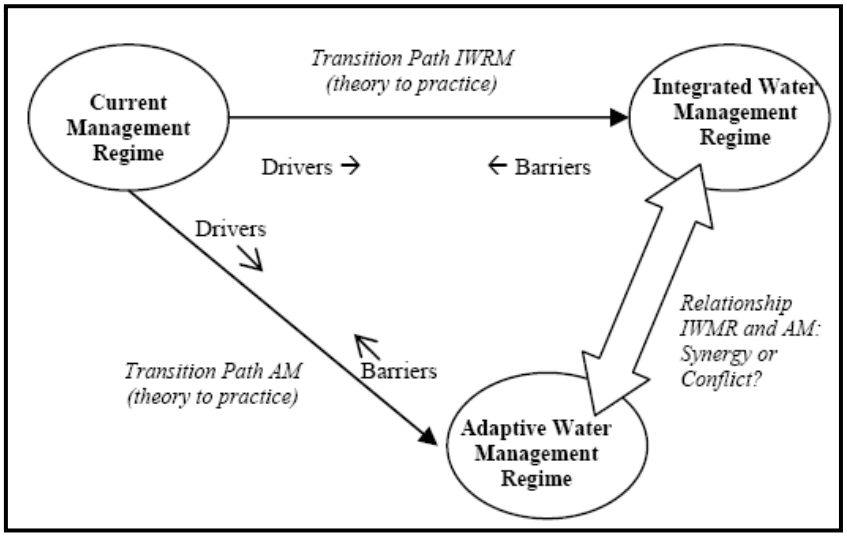


Figure 2.2. Relationship between AM and IWRM
(Source: Medema and Jeffrey, 2005, p. 31).

Table 2.1 gives an overview of the typical characteristics of two regimes. However, the IWRM approach is being widely criticized for difficulty of adaptation to local contexts in terms of generic description of strategies and techniques, and extensive gap between theory and practice (Jeffrey et al., 2005; Mitchell, 2005). Jeffrey et al., (2005, p. 4) state that "there is no clear evidence that IWRM has really been successfully implemented". Because of the fact that IWRM as currently practiced has not yet overcome predict and control paradigm which may a barrier for its successful implementation, they suggest the necessity of a more crisp definition and performance indicators for success of IWRM.

Table 2.1. Comparison of the characteristics of prediction and control with integrated and adaptive regimes (Source: Pahl-Wostl et al., 2005, p. 16).

	Prediction & Control Regime	**Adaptive, Integrated Regime**
Governance	Centralized, hierarchical, narrow stakeholder participation	Polycentric, horizontal, broad stakeholder participation
Sectoral Integration	Sectors separately analysed resulting in policy conflicts and emergent chronic problems	Cross-sectoral analysis identifies emergent problems and integrates policy implementation
Scale of Analysis and Operation	Transboundary problems emerge when river sub-basins are exclusive scale of analysis and management	Transboundary issues addressed by multiple scales of analysis and management
Information Management	Understanding fragmented by gaps and lack of integration of information sources that are proprietary	Comprehensive understanding achieved by open, shared information sources that fill gaps and facilitate integration
Infrastructure	Massive, centralized infrastructure, single sources of design, power delivery	Appropriate scale, decentralized, diverse sources of design, power delivery
Finances and Risk	Financial resources concentrated in structural protection (sunk costs)	Financial resources diversified using a broad set of private and public financial instruments

To sum up, water management approaches has developed from supply oriented, through demand oriented to integrated approaches over the past decades. Although, IWRM deal with complex water resources management issues, rather than supply and demand oriented management, it has not been coping with uncertainties. Furthermore, AM, as a concept, has been developed to support managers in dealing with uncertainties to improve the conceptual and methodological base and promote realization of the goals of IWRM.

The following section of this report provides an overview of the need of the relationship between water supply and land use planning and the recent studies related this relationship and presents recent approaches how to deal with the integration land use planning and water management

2.2. The Considerations of the Linkage of Water Resources Management and Land Use Planning

There has been an increasing recognition of the need approaches to the management of land and water resources, aimed at the control of negative land use effects on the water resources. The current trend reflects a growing concern of water managements to integrate institutional, sustainable and economical framework in decision making process. In recent years, the global concerns regarding water policy problems as collective reflection of local water needs and problems.

The extensive literature on this topic is reviewed the examination of how water quality or water flows are related to land use. However, the integration of land use planning and water resources management has been discussed in very few studies. Therefore, the following sections clarify the ‘whys’ and the ‘wherefores’ of this integration before explaining the ‘hows’.

2.2.1. The Features of Hydrologic Process

As it is known that urban and rural communities rely on a combination of surface water and groundwater for water supply. Surface water and groundwater are two important phases in the hydrologic cycle. The main process in hydrologic cycle is the movement of water among surface water, air, land, and ground water. Randolph (2004) states that process governs the physical, chemical, and biological characteristics of

water ecosystems in a watershed. Figure 2.3 shows the urban water pathways and transport processes and the way in which urbanization impacts on these conditions.

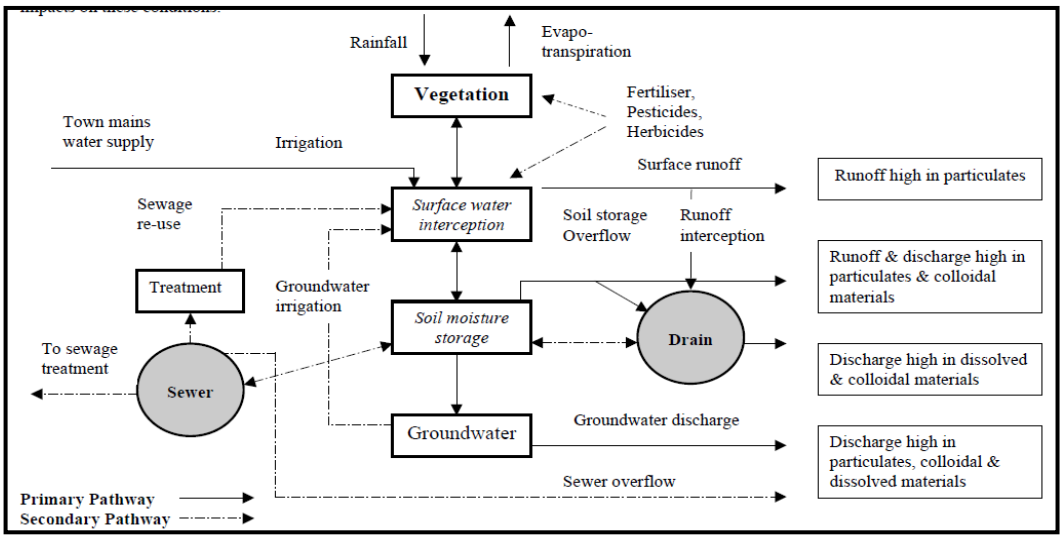


Figure 2.3. Outline of urban water cycle pathways and processes
(Source: Lawrence, 2001, p. 13).

Impervious surfaces have become a primary factor in protecting water quality and quantity. Brabec et al. (2002) state that increased amounts of impervious surfaces— roads, parking lots, roof tops, and so on— and a decrease in the amount of forested lands, wetlands and other forms of open space absorb and clean stormwater in the natural system. Figure 2.4 illustrates how the water-cycle works in natural and urban areas within three diagrams. The diagram underlines the potential benefits of **Water Sensitive Urban Design** in achieving a more natural hydrologic regime.

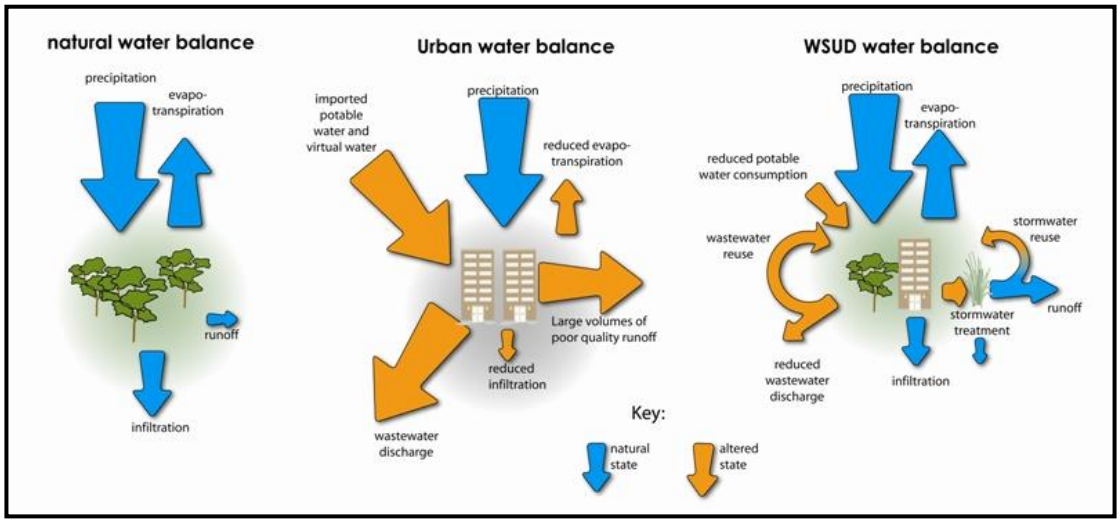


Figure 2.4. Water-cycle works in natural and urban areas.
(Source: *Water by Design, n. d.*).

2.2.2. Water and Land Relationship in the Watershed

Arnold et al. (2009, p. 57) define a 'watershed' or 'drainage basin' that "is the geographic land area where all water running off the land drains to given stream, river, lake, or other waterbody, and is characterized by hydrologic process and functions". A watershed is drained by hierarchical network of channels (Schueler & Holland, 2000a). Figure 2.5 (a) illustrates how watershed management units nest together within the drainage system (Schueler & Holland; 2000a).

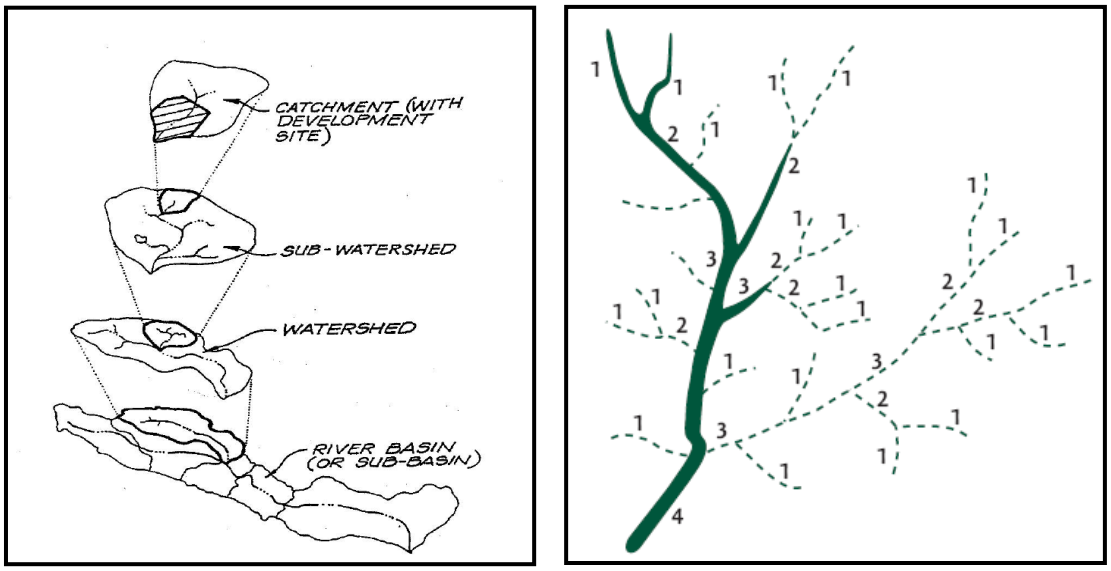


Figure. 2.5. The Watershed Management Units (a) and Fourth Order Rivers: The Strahler Method (b) (Source: (a) Schueler and Holland; 2000a, p. 136; (b) New Hampshire Department of Environmental Services, 2008, p. 245).

Schueler and Holland (2000) highlight the importance of stream classification in watershed management in terms of understanding the spatial connections between the stream and its watershed. They also examine that "each subwatershed contains a network of small stream channels that are known as headwater streams.

Randolph (2004, p. 253) underlines the relationship between water and land use that "a managing water body requires managing the land that drains to it". Brabec recognizes impervious surface as an indicator of the intensity of the urban environment. As mentioned by Randolph (2004), the development of land use alters drainage networks by adding artificial channels, obliterating natural channels or changing the size of the drainage basin. Du (2010, p. 33) poses that "these activities can bring about environmental consequences, such as flooding, poor water quality, loss of aquatic habitats etc".

The Center for Watershed Protection has developed an 'Impervious Cover

Model' (ICM) which predicts the quality and character of a stream based on the percentage of Impervious Cover in the watershed. The ICM contains three categories (Schueler, 1994): a sensitive stream, an impacted stream, and a non-supporting stream, examined as follows:

- **Sensitive streams** have watersheds that are under 10% impervious and typically have good water quality, good habitat structure, and diverse biological communities if riparian zones are intact and other stresses are absent. In these areas, the community would set goals to maintain those watersheds' hydrology by keeping impervious levels in the watershed below 10%.
- **Impacted streams** have watersheds that are 10 to 25% impervious and show clear signs of degradation and only fair in-stream biological diversity. The community's main goal in these watersheds would be mitigation of the impacts of existing and new development through site design that minimizes imperviousness, stormwater, BMPs and restoration of natural areas.
- **Non-supporting streams** have watersheds that are more than 25% impervious, a highly unstable channel and poor biological condition supporting only pollutant-tolerant fish and insects. The community's goal for these watersheds is restoration and pollution reduction. Some studies recommend that these watersheds be target areas for urban infill development (Schueler, 1995 cited in HRWC, 2004, p. 10).

Schueler (1995, p. 156) examines that "this simple classification scheme emphasizes the key role of impervious cover in influencing the future quality of urban streams, based on a range of hydrological, habitat, water quality and ecological studies conducted over broad geographic regions". Table 2.2 lists the stream attributes according to Impervious Cover (IC) Model.

2.2.3. Land Use Planning and the Protection of Water Resources

Throughout history, hydraulic capacities have been described a hallmark of the organizational social systems (Fernandez-Arnesto, 2000 cited in Jeffrey et al., 2005). Following the paradigm of rational planning, water supply objectives have supported the public health, food security and economic development (Jeffrey et al., 2005). Owing to urbanization, intensive agriculture, industrial, economic, social and cultural development, the efforts that underpin not only protecting natural resources but also enhancing economic and urban growth have led to the development of new approaches. According to Walsum et al. (2005), the current approaches show a trend towards further integration of land use planning and water resources management at the policy-making level and at the level of practical implementation. Therefore, it can be said that the integration of land use planning and water resources management, one of the strategies, is advanced as a product of this trend.

The land use planning is seen as the single most important component of water resources protection and management (Shuler and Holland, 2000; McDonald, 1996;

Kellogg, 1997; Wang and Yin, 1997; Wang, 2001; Ivey et al., 2002; Tarlock, 2002). Furthermore, the integration of land use and water management is defined as a key component of the integrated water management to address the impacts of land use activities and non-point sources of pollution on water resources (Tarlock, 2002; Kellogg, 1997; OMEE/OMNR, 1993; Wang, 2001 cited in Musselman, 2005). The issue of how to plan for water needs and to adopt planning practices is an important one. Many researchers agree that current policies must link water resources management and land use planning (Ivey et al. , 2006a; Ivey et al., 2006b; Hanak, 2005; Mitchell, 2005; Johnson and Loux, 2004; Tarlock, 2002; Carter, 2007). Therefore, integration of land use planning and water resources management is an important issue for minimizing difficulties caused by complexity and conflicts. Several sources highlight the linkages between land use planning and water:

- Better integration of the land use and water planning systems requires consideration of water resource plans by the land use planning system and consideration of land use strategies and plans by the water planning system to ensure that there is sufficient water available (WAPC, 2008a; p. 78).
- It is important that good links are made between the land use planning system and water planning (Environment Agency 2005, p. 12).
- Cities can no longer afford to ignore the relationship between water supply and land consumption (Myerson 2002, p. 4).
- The integration of water quality management and land use planning can promote protecting the biotic quality and habitat health and preventing pollution from happening, which serves the purpose of protecting water quality and maintaining ecologically and economically healthy land development (Wang, 2001, p. 34)
- Planning is therefore an ideal mechanism through which water considerations can be integrated at an early stage into the development of policies guiding the spatial expression of various sectors impacting on the water environment (Carter, 2007, p. 336).

In the literature, new approaches related water management have been referred to by various terms, such as 'watershed management', 'an ecosystem approach to watershed management', 'integrated water resource management', 'integrated watershed management', 'integrated land and water management', 'integrated water planning and management', 'total catchment management', 'ecosystem based catchment management' ‘wet growth’ and 'integrated catchment management'. “Integrated management and watershed management are widely accepted concepts in many countries including Britain, Australia, European countries, the United States and Canada). As stated by Cortner and Moote (1994), the evolving concepts of ecosystems management, collaborative decision making, institutional arrangements will be reflected any new paradigm as the pre-paradigm stage of scientific revolution

Is there enough water available to support more development in the world? is main question related to water availability. Quality of water resources affects natural ecosystem, human health, and economic activities. Salinity, high nutrient levels and the level of heavy metals rated as poor across most areas for drinking, irrigation and ecosystem management are the reasons of inadequate water quality. Table 2.2 summarizes human activities and their consequences for water quality as identified in the literature.

Tablo 2.2. Threats and consequences of water quality related issues (Source: RMC, 2006; PCE, 2000; Bolposta and Dedekorkut, 2006; McElfish and Casey-Lefkowitz, 2001; CWP, 2005; Musselman; 2005)

Human activities	**Specific actions**	**Consequences**
· Urbanization · Commercial and Industrial discharges · Agricultural practices · Recreation and Tourism activities · Waste disposal · Transportation · Mining activities	· Construction practices · Increased impervious surfaces · Stormwater pollution and runoff · Wastewater and septic impacts · Growth in flood plain areas and flood · Erosion and sedimentation · Wetland alteration · Loss of habitat and natural infrastructure · Groundwater overdraft and contamination · Inefficient /dispersed land use patterns · Riparian areas impacted by growth · Changes to hydrology · Runoff or leaching fertilizer, herbicides and pesticide application · Water quantity and flow modification · Unrestricted animal access to water resources · Loss of forests and vegetation cover	· Increased flooding, flow volume, erosion and sedimentation · Degradation /destruction of riparian areas · Degradation or loss of aquatic habitat · Habitat fragmentation · Increased toxic pollutants · Acidification · Decrease native species · Lowering groundwater level and increasing water salinity

Over the past four decades, spatial planning has sought to mitigate the negative environmental impacts on water-related areas. The policy agendas that have motivated this focus have included mitigation of water pollution, protection of groundwater sites, riparian areas and floodplain through zoning approaches. Mitchell (2005, p. 1348) puts emphasis on that land use planning process can systematically assist in the implementation of concepts associated with integrated water resources management (IWRM)". Carter (2007, p. 333) emphasizes that "plans are prepared according to a spatial hierarchy, with plans at national and regional level setting a general guiding

framework for plans for at the local level". He also (2007, p. 333) notes that "policies within regional spatial plans can usually set out a broad strategic framework for considering water at the local planning level". Spatial plans (both regional and local level) can influence development activities with the potential to pollute water bodies or to pressure water supplies of and wastewater treatment facilities. Therefore, planning strategies can help to guide land use activities as the primary instrument for integration land use planning and water resources management. Planning strategies include written policies, standards and criteria, and land use planning tools as implementing mechanisms (land-use and zoning by-laws, subdivision controls, site plan controls) and provide guidance for general use of land for the entire municipality/region. Specific planning policies can include a variety of mechanisms (Table 2.3).

Tablo 2.3. Land Use Planning Mechanisms for Protecting Water Resources (Source: Musselman, 2005, p. 34).

Purpose	Policy	Land use by-laws
To prevent point source and non-point source pollutants from entering water	· Control discharges to surface and groundwater (stormwater management) · Erosion and sedimentation control during development /construction	· Stormwater management · Collection, treatment and disposal of sewage · Monitor and maintain septic systems · Limit grading/excavation/fill (preservation of natural topography · Maintain natural drainage systems for storm runoff · Limit soil and vegetation removal, tree cutting · Large lot sizes, control development density · Limit amount of impervious density
To control urban growth and protect natural landscapes	· Supply and distribution of water / water and wastewater service boundaries · Urban growth boundaries · Develop open space systems Alternative development techniques	· Overlay zoning, cluster development, bonus zoning, planned unit developments, comprehensive development district
To protect water features	· Identification and protection of hydrological areas · Protection of natural watercourses · Protection inland lakes (shore land management · Water quality and water quantity targets	· Flood plain control · Water supply protection (surface and ground) · Setbacks from watercourses, streams, lakes · Protect water flow /hydrology(maintain base flow in surface waters, develop and monitor water budgets for groundwater) · Maintain water quality (use suite of indicators)
Other	· Enhance water conservation practices	· Transfer of development rights (TDRs) · LID (Low impact development) · BMPs (best management practices)

The increasing competition among cities, towns, and irrigation districts for attaining new urban water supplies, the increasing negative environmental impacts on drinking water resources, rising costs of developing new municipal water supplies, and

political, legal, institutional constraints are underlying causes of the need of integration. A review of the relevant literature gives some justification for why they should be linked. These could be summed up in the following goals:

- **Environmental goals:** Water conservation (wise and efficient use), long-term water availability, concurrency management of water quantity and water quality, and prevention or reduction of natural resource degradation are key concepts for these goals. Falkenmark (1981, p. 261) stresses the idea that environmentally sound planning should involve efforts to attain harmonious equilibrium between land use and water resources. Collin and Melloul (2001) also claim sustainable development is critical to urban planning; effective land use and natural resource planning must ultimately be integrated in the context sustainable water resources development. In reality, this integration serves a variety of related and important goals which lead directly to resolution of the problems between land uses and water resources; and these goals shows many conflicts between water uses and land uses. Lund (2002, p. 11) notes these conflicts that "agricultural water supply, environmental water uses, urban water supply, flood control, hydropower, recreation and other uses all compete in economic, legal, and political forums over the management of water, at local, regional, state, and federal levels." Detailed discussions have continued interrelated and conflicting processes for land use and water resources in the related agenda. Although researchers have drawn attention to the urgent need for integrated land use and water resources management, this integration has been handled, for the most part attempts, by explaining the effects of land use changes or covers on the water quality and water flows. Water quality studies; thus, has been placed firmly on the planning agenda. Mitchell (1990) stresses that integrated approach should concurrently recognize the importance of, and interdependence between surface and groundwater resources. The author also highlights that two dimensions of water, quantity and quality, require concurrent management. Therefore, the subject of the integration of land use planning and water resources management must be placed at the top of the agenda, that particularly, both water quality and quantity have become a part and parcel of the integration of planning studies and water resources management when exploring the dimensions of the adverse impacts issue.
- **Economic goals:** Creating local solutions, balance of demand -supply side management, growth and stability, and efficiency is the main objectives to emphasize the need to balance economic growth and environmental protection

Integration of land use planning and water resources management can result in significant financial efficiencies (Hanak and Simeti, 2004; Hanak, 2005). Enhancing economic returns on the environmental goods and services. This integration should intent create new mechanisms that encourage governments-including national, regional and local governments, individuals, communities, and businesses to recognize the value of ecosystem services.

- **Social and Organizational Goals:** The achievement of this integration is based on the concepts that includes leadership, partnership and communication; stakeholder participation; accommodation and compromise; public participation (Carter, 2002; Carter et al., 2005; Waterman, 2004; Johnson and Loux, 2004; Ivey et al., 2006a)**.** Stakeholder participation can provide significant benefits, both within an individual organization and among multiple organizations collaborating on a given project or program. Therefore, the current management and planning framework need to facilitate binding within the decision-making hierarchy.

In an effort to further the role of land use planning in water management, several researchers have been trying to determine which landscape prescriptions or indicators may be supportive in protecting of freshwater resources. Table 2.4 shows the land use indicators identified in the literature.

Common to previous studies is the implicit view that the observed integration between land use and water is the result of the aggregation of individuals' preferences. To evaluate the ability of regional/local jurisdictions to protect the components and processes of water resources management, it is first necessary to understanding how the guiding principles of water resources management can be integrated into regional /local plans and policies. As a consequence, this study will develop conceptual definition of regional /local plan quality regarding this integration.

Tablo 2.4. Summary of Land Use Indicators of the Integration Land Use Planning and Water Management

Author	Indicators
Schueler and Holland (2000b). Land use indicator in local watershed planning	· Percentage impervious cover · Housing density · Population density · Percentage of urban use
Kreutzwiser and de Loe (2002). Categories of municipal water management and water–related land use planning measures	· Regulations and planning tools · Compensation measures · Incentives · Land management and acquisition · Education and information · Partnership
Carter (2002) & Carter et al. (2005) Integrated and sustainable management principles to evaluate land use planning and water management activities	· Blending of resource sectors (integration of resource sectors) · Co-ordination of government, non-government, and community management policies and activities · Stakeholder participation in resource management · Accommodation and compromise between resource sectors · Long term objectives · The wise and efficient use of water resources · Local solutions · Prevention and reduction of natural resource degradation
WAPC (2003). The components of land use and water management strategies	· Priority source protection area map · Land zoning and reservation plan · Special control area · Realignment of catchment boundary · Definition of a reservoir Protection zone
NEMCOG (2005). Recommendation for each local unit of government in watershed	· Vegetative Buffer Zones (Greenbelts) · Setbacks of structures · Minimum Lot Width for waterfront parcels · Open space preservation · Septic Systems · Wetland Protection · Stormwater Management · Lot Coverage/Impervious Cover
J. Donovan (2005). Land Use and Watershed Protection Tool	· Watershed-based zoning · Land conservation · Buffer · Stormwater treatment practices
Beresford (2007). The Stream protection Strategy and the Local Development Cycle	· Watershed-based land use planning · Protect sensitive areas · Establish buffer network · Reduce impervious cover in site design · Limit erosion during construction · Treat quality and quantity of stormwater runoff · Main stream protection measures

2.2.4. Why Water Resource Management and Land Use Decisions are not Always Linked?

The above section makes a good cause for the integration land use planning and water resources management decisions, however we do not see a widespread implementation of this integration. The review of the literature pertaining to the relationship between water resource management and land use planning provides numerous reasons/barriers for this lack of integration between land use planning and water resources management. These reasons should reflect the obstacles for this integration.

A review of the literature focusing on this integration suggests many barriers that may constraint to implement an integrated approach to managing land uses and water resources. The components that impede this integrated approach, including lack of up-to-date watershed data and useful decision support tools, weak environmental legislation, excessive bureaucracy, non-congruence between natural and administrative borderlines, lack of technical expertise and/or technical assistance; politics; competing interests and professional differences and lack of monitoring and evaluation procedures (Arnold, 2006; Carter, 2002; Carter et al., 2005; Hanak and Simeti, 2004; Hanak, 2005; Johnson and Loux, 2004; Ivey et al., 2006a; Moss, 2003; Waterman, 2004; Mitchell, 2005; Carter, 2007). In order to explain the barriers, some examples can be given as follows:

- ***Non-congruence between natural and administrative borderlines:*** For this factor, various names are used in the relevant literature such as institutional confusion, differing institutional priorities and conflicting objectives/ organizational barriers. Many researches stress that this factor is mostly responsible for the lack of integration of land use planning and water resources management. This could be owing to the fact that water supply planning and land use planning often are managed by different agencies that do not coordinate constantly (Wang 2001). Lack of integration among policy networks reflects the lack of coordination in related administrations. Huang and Xia (2001) claim that in practice, barriers to integrating water management occur at both the delivery and political levels by way of organizational barriers. Johnson and Loux (2004) claim that the political variable may be a nodal point under consideration. Enforcement of existing regulations is problematic. Furthermore, the gap between the policy concerns and prevailing or

(expected) future external conditions is still widening. These are commonly based on the lack of institutional capacity and mismanagement.

- ***Data availability:*** It consists not only water-related data including pollution sources, mitigation measures, natural conditions, but also land use–related data including urban growth, population growth etc. Because of the insufficiency of data and limited information by social, economic, and political factors, the most developed management strategies have demonstrated incompetence in their handling of the reality. "Timely and accurate data are required to inform water management decisions" (TLUWMP, 2004; 35). Huang and Xia (2001; 15) explain this problem in scientific arena thus: "researchers have to work limited scopes where the required data are available, making it meaningless for the wordings of comprehensive analysis, integrated planning, global optimization, and systematic consideration". Furthermore, the current policy concerns disregard the related scientific researches and these outputs. The current attempts including what are generally known to be the `rules of the game' also are less tangible and implicit norms and standards, (Young, 2002 cited in Mitchell, 2005). Another problem about data availability is the absence of recording of the data. Means of sharing is not established effectively and efficiently and data are held by a variety of agencies and organizations (TLUWMP, 2004).
- ***Validity of methodology:*** As we can understand from the integration, this concept includes much complexity and confusion. Implementation is one of the important concern. It is a fact that there is a gap between integration at a strategic level and at the operational level owing to the absence of suitable models for implementation. Carter et al. (20005) mention that there exists a large disparity of plan objectives and actions suggesting a problem with getting to implementation. Mitchell (2005, 1337) provides an overview of the current land-water based approaches that "there is an intuitive appeal to the view that a broad array of variables and their interrelationships should be examined as a system. What is more, poor conceptual framework, and undeveloped planning methodology address the difficulty of the integration in consideration of time horizon, scale, and complexity.
- ***Professional Differences:*** Given the lack of a linkage between water supply management and land use planning, planning and legal experts have long considered the institutional split between these problematic. On the other side, even though environmental sustainability is the main objective, land use planners disregard the

water policies and strategies during the plan policy and implementation stage. In other words, because of professional differences, the process in adopting an integrated approach has been unsystematic and independent. Policy makers, managers, land use and water planners do not understand the large number of activities, competing interests, and diverse agencies involved in implementation. Furthermore, lack of training and education for the management personnel could be the one of reasons of this low effectiveness (Huang and Xia, 2001)

2.3. Theoretical Context for Land Use Planning and Water Management Integration

The literature indicates that there various ways in which research may be carried out in order to improve our understanding of the development-water supply relationship. Institutional analysis, management surveys, computer simulation models and analytical frameworks have all been used to study the relationship between land use planning and water supply management. Examples of each of these methods will be discussed briefly, exploring the benefits and drawbacks of each.

With increasing emphasis on water issues and especially on water management policies, several researchers have assessed management activities in an effort to gain more knowledge of how local-regional levels are managing land and water. This section includes the review of theoretical work and their findings.

Carter et al. (2005) developed normative model of **integrated and sustainable land-water management** that can help to measure the progress of municipalities towards integrated and sustainable land use planning and water management in order to provide a benchmark by which case studies may be evaluated. They determines the principles of integrated and sustainable water management, including **principles integrated land-water management** that are integration of resource sectors, coordination between government, non-government, and community management policies and activities, stakeholder participation in resource management, and accommodation and compromise; and **principles of sustainable land-water management** that are long-term objectives, wise and efficient use, local solutions, and prevention or reduction of natural resource degradation.

Carter et al.'s research is able to "illustrate how municipal land-water management activities can be evaluated at the local level, to determine the extent to

which these sectors' activities are integrated and sustainable" (2005, 116). Their cases examined focus primarily on groundwater management, but the issues addressed apply to all aspects of land use planning and water management. While the authors' strategy addresses key management practice undertaken by municipalities, it does not address the key elements needed to achieve these management strategies. Additionally, although the consolidation policy which should be reconsidered to include management strategies is not clearly defined, this research is the most effective study for this dissertation.

The concept of '**source water protection**' is executed by Ivey et al. (2006a), and Timmer et al. (2007). Ivey et al. (2006a) evaluate the extent to which existing institutional arrangements for land use planning and water management facilitate or constrain source water protection by municipalities in Ontario. They identified a number of factors shaping municipal capacity to implement source protection measures that are legal authority, integration, social and political support, knowledge, and resources (2006a, 197). For each factors, the specific indicator questions are identified to measure the status of that factors. Their practical conclusion is that "the Regional Municipality of Waterloo example shows that with leadership and creativity in planning departments, there is the potential to link land use planning more strongly to water management, in order to better protect the quality of drinking water sources" (2006a, p. 205). They also recognize that the institutional environment remain flexible, rather than '**one size fits all**' approach to local source water protection (2006a, p. 206). Timmer et al.'s (2007) research emphasizes a broad perspective on community capacity takes into account financial, human resource, institutional, social, and technical dimensions of local capacity to protect source water supplies. They use an in-depth case study analysis to evaluate the capacity of six small communities in Nova Scotia's Annapolis Valley to protect their drinking water supplies. Each of above research executed by Ivey et al. and Timmer et al. does address key factors to offer critical insights into the potential for municipalities to protect their source waters using existing institutional arrangements.

The above author's researches, including Carter et al., Ivey et al., Timmer et al., Musselman, are related on the local capacities in terms of the integration approach. Different indicators are taken on their studies to analyze factors that shape local capacity for water resources, mostly groundwater resources.

An integrated water-use and land-use model (WULUM), created by Zellner (2007), is used to "an agent-based model that represents simple mechanisms of land-use, water-use, and groundwater dynamics, in an attempt to understand how these

processes are connected to the reported changes in groundwater levels" (2007, p. 664). This model is based on simulation to test how the integrated land use and groundwater system responds to different conditions of the behavioral, natural, and policy environment using by two integrated components: land-use processes and the other, the water-use processes and the groundwater dynamics. The land-use component including the main groundwater extractors in the county-stone quarries, golf courses, farms, and households, and the groundwater component including the glacial deposits and the underlying bedrock aquifer are integrated the WULUM Model, depending on residential preferences for location, concentration of residents, existing development, and zoning. Zellner reached a practical conclusion that "the problem of declining groundwater levels would not be solved by eliminating stone-quarry extraction alone", and "the most significant were the zoning restrictions on the density of residential development, even more so than location preferences (2007, p. 682). Not only does Zellner's framework provide a model for Monroe County that can be guide for empirical research to evaluate the effects of natural and policy variables on settlement pattern, it also develop an excellent model to identify the thresholds of the integrated system.

Woltjer (2005) seeks to answer some questions as to how efforts to synchronize Dutch regional water management and spatial planning match international insights in strategic planning, focusing on strategy making and capacity building. The author assumes that "further attunement between 'space' and 'water' requires strategic capacities to 'frame mindsets', 'to organize attention', and to 'transform restrictions into opportunities" (2005, p. 2). Defining new platforms for strategy building related to water in North-Holland is the focus of his research. Because of the fact that strategic planning literature gives sample suggestions, the author sets out with providing a general idea of the Dutch administrative system for water management and spatial planning, emphasizing changing water policy and new challenges at the regional level of scale. Woltjer (2005) suggests that informal coordination platforms in the region is highlighted for performing strategic scans of emerging societal developments and opportunities and threats. This research articulates a clear need to giving more emphasis to a strategic approach towards regional water planning. Based on a literature review and case studies, this study findings show the structural lack of truly integrated visions at the regional level of scale. In conclusion, the author takes into consideration the association between 'water and space' as a strategic process, emphasizing 'real vision' and the need for more 'imagination applied to building a strategy'.

Game theory is the other one of these type of analytical models. Başaran and Bölen's (2005) study is to analyze interactive decision making processes according to game theoretic approach in the Nilüfer Watershed. They state that because of the fact that environmental externalities could be easily understood in river systems, a watershed is chosen for analyzing of behaviors of decision makers (players) (2005, p. 16). Determined 31 public authorities develop own strategies about the sustainability of the watershed, and act independently from each other. The game evaluated the strategic decision making process with two-person demonstrates that the strategy of industrial development is dominant strategy for the municipalities and the industrial enterprises. Their studies conclusion points out that "players always choose the strategy of industrial development because of economic benefits" (2005, p. 16).

As previously discussed, the literature suggests various ideas and concepts, key elements and components relating the integration of urban planning process and freshwater resources management (see Table 5). Related studies can be grouped into two framework: evaluative studies (capacity, performance) such as Carter et al. (2005), Timmer et al. (2007), Ivey et al. (2006a), Musselman (2005), and innovative and normative studies (developing a new model) such as Zellner (2007), Walsum et al. (2005), Hanak & Chen (2005), Chen et al. (2005). Above summarized studies help to assess scientific concepts that address land use planning and water management. As the literature survey shows that there is close connection between water resources management and land use planning. However, in fact, if the necessary policy actions and regulations are not clearly defined. The research questions of this study are what the response of planning system and planning practices to the integration will be, and also what the contribution of planning to move towards sustainable development through promoting widespread water resources management in Turkey will be. However, there is no established structure related integration of both of them in Turkey. Therefore, this study will attempt to develop proposed integrated approach for Turkey.

Consequently, this chapter reveals the fundamentals of this integration framework to review and establish viable methods to institute a comprehensive approach in Turkish case.

CHAPTER 3

METHODOLOGY

The main theme in this study focuses on the importance of land use planning in water management regarding the sustainability of water supply systems in order to maintain the quality of life in urban and rural areas. This dissertation aims to contribute to our understanding of how well both regional land use planning and water resources planning account for the reciprocal relationships between land use planning and water resources management separately and how those endeavors might be better integrated.

A review of the literature in Chapter 2 examines the importance of the integration of land use planning and water resources management. As noted in the first chapter, the following question frames this inquiry: "How to integrate land use planning and water management in order to provide effectiveness on land use planning and water management in general and in Turkey in particular". The research strategy utilized to pursue the answer to the question follows an approach that is characterized as descriptive and evaluative. It is descriptive insofar as extensive previous knowledge is described to provide a framework for understanding specific observations (Robson, 2002). This inquiry is evaluative as it seeks to determine the most successful approach.

An extensive literature review is conducted to inform the development of a conceptual framework designed to guide the study. The case study method used in the research provides a degree of flexibility needed in this context-specific research design, and facilitates the use of various data sources to the greatest extent possible (Yin, 2003).

This chapter details the methodology for the evaluation of the integration between land use planning and water resources management. First, an analysis of foreign country experiences is given, then the discussion of Turkish legal system in the context of spatial planning and environmental law is explained, followed by an evaluative framework in case study area. Finally the data collection methods and analytic methods used in the study are described. The following section will examine the research framework.

3.1. Research Framework

The main assumption of this study is that "the current land use planning practice in Turkey does not regard the link between water resources management and land use planning and accepts water resources issues as fixed inputs beyond the control of the locality rather than as a plan element to be harmoniously developed and coordinated jointly with land use". The current regime is faced with an increasing complexity and difficulty for the implementation of the integration. Therefore, this dissertation seeks a better understanding of the integration of land use planning and water management, the approaches used for implementation, the approaches that have been among more successful ones, and what can be applied to Turkey.

Understanding and managing the relationship between water and land use planning requires the definition of a process. In particular, this dissertation intends to provide a detailed framework for demonstrating how water management (including water allocation) and land use link to assist land use planners and water managers. Figure 3.1 provides the research design framework.

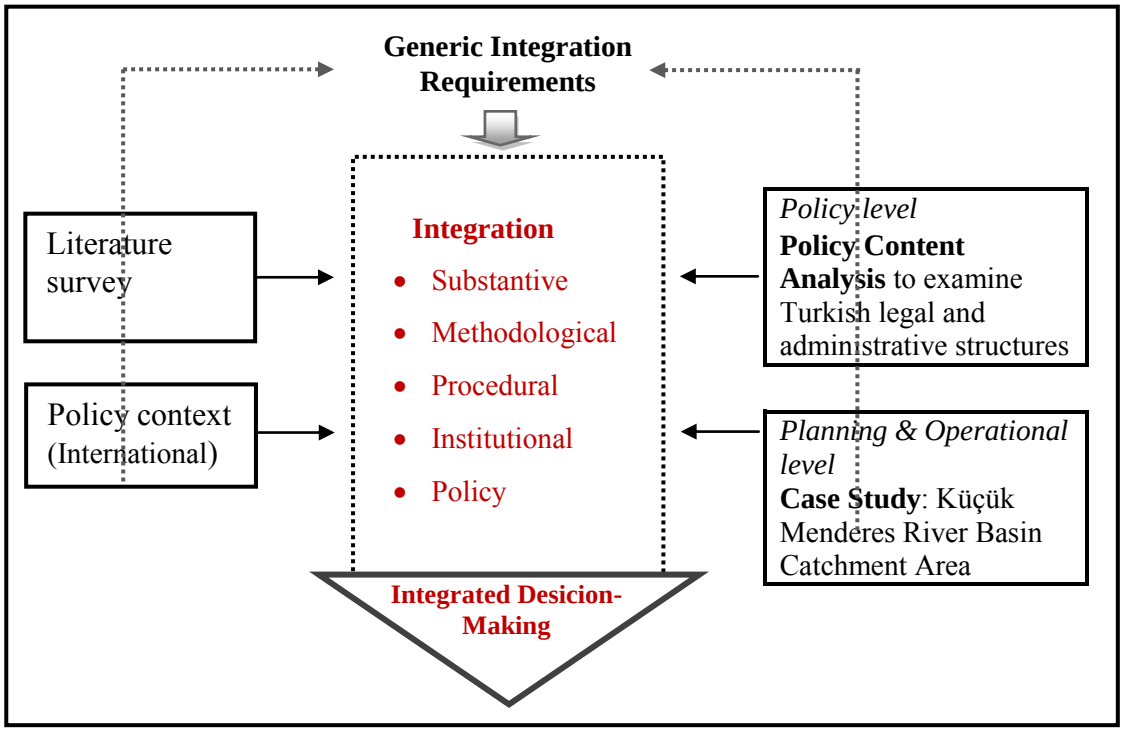


Figure. 3.1. Research Framework for the Integration of Land Use Planning and Water Resources Management

As identified in the Figure 3.1, the process begins with a preliminary review of the literature and policy content to evaluate the legal and administrative structure in Turkey and to evaluate the current status of Küçük Menderes River Basin as a case study. The choice and application of appropriate methodologies are crucial for the success of the study. In this chapter, Section 3.2 and Section 3.3 examine the research strategy utilized including a literature review, a policy context review and a primary case study design. The literature review in this research serves two purposes: to help develop a conceptual framework, and to enhance the validity of the study. The integration aspects of land use planning and water resources management are complex and multi-faceted.

3.2. Analysis of Foreign Country Experiences

In the course of content analysis in literature, it is noticed that there are considerable differences between countries and even within countries in experiencing the interaction of land use planning and water resources management and in the contribution of their planning system to water management policies. With respect to the differences in their governmental structure, in administrative and planning systems, each country has distinct features in terms of how national and local administrations and planning authorities approach to the quest of water resources, how planning authorities introduce water issues in their planning practices, and how these authorities deal with the tensions and conflicts introduced recently by the unaccustomed developments. Therefore, this stage necessitates understanding the national contexts, in terms of interpreting the phenomena of the contribution of the planning systems to water resources management in different countries.

In this respect, the first phase of the study is based on national contexts. This phase aims at investigating the experiences in different countries, discerning differences and similarities and also interpreting the national stories with respect to the concepts of the two sectors. The main research interest is to answer the question of what role both spatial planning and spatial development play in water resources management strategies. The results of this assessment are used to structure the assessment design for the case study of Turkey.

The main objective of this study is to provide an overview and a systematic classification of three national approaches in order to develop the strategies of water resources management from a spatial planning development perspective. Country studies mainly focus on the extensive characterization of the spatial strategies and legal grounds and especially the role of spatial planning within these strategies. The methodology applied in this project includes analytical synthesis of literatures on the integration of land use planning management and case study analysis on practical applications experienced by some nations with similar characteristics and challenges.

Netherlands, England, and Australia are the selected countries for in-depth analysis. The selection of these countries depends on the availability of extensive related data in English language. Each of these countries has its own characteristics, which are valuable in reflecting dynamics of the interactions, explaining water resource management issues within spatial planning practices and the context and extent of the integration. These policy documents at different levels show that spatial planning is regarded as an important factor for the internalization of water resources management. The rules and procedures of the planning and environmental laws of the three case countries are derived from a variety of sources: legislation/laws, legal instruments, policy documents and development plans as well related academic articles.

Document analysis, such as qualitative analysis; is used for the analytic rhetoric concerning water and spatial planning policy issues. Documents including books, reports, dissertations, articles, and reports related to water supply infrastructure will be examined. The main purpose is to explore the driving forces and the limitations of the present policies. The analysis of international experiences on the integration of spatial/land use planning and water resources management focuses on the following three key tasks:

- Identification of administrative structures/ legal and institutional framework
- Identification and analysis of decision making process and policy documents
- Review of the applications of spatial planning tools for integration process.

Drawing on three case countries across the world, evidence of the links in practice between spatial planning and water are presented and discussed. The findings of the examination on case countries highlight a number of key points to be considered in integrating land use planning and water resources management. This part precedes a

focused discussion of the relationship between spatial planning and water resources management, within which the key requirements of this integration are described.

Finally, a series of requirements within '**Integrative Policy Framework**' reflect on the role of water management, in theory and practice, in spatial planning and in helping the achievement of the water resources management goals.

3.3. Evaluation of Legal and Institutional Framework in Turkey

The second phase is based on the evaluation of the relationships between water resources management legislation and urban planning system. In the research conducted in this phase of dissertation, Turkey is selected as a case study country. The purpose of this study is to define the legal status in order to make a sound, concrete and successful execution of the planning systems for water resources management. Finally it is intended to derive some lessons to improve the current system in Turkey by considering the related international experiences.

In accordance with the approach of Yin (2003), this phase emphasizes in-depth and detailed coverage to ensure the representativeness of the case under investigation as a single-case study. A qualitative method such as planning policy analysis (document analysis) is used in the country case of Turkey. Policy analysis and content analysis provide a systematic thinking in this phase. Using a combination of these two analyses, a study is carried out to determine how to integrate land use planning and water resources management. Content analysis is used to document and understand the existing policy context for the consideration of the water environment in the planning system based on the profiled Integrative Policy Framework (IPF), as well as to verify the theoretical relationships.

The analysis of this country case study is based on;

- Legal provisions; such as laws, regulations, circulars etc. (see Appendix A)
- Academic literature on water resources management and its relationship with land use planning in Turkey.

An evaluation of the current statutory and administrative instruments will shed light on the status and prospects of the country's water-spatial planning perspective.

Table 3.1. Evaluative framework for Turkish case study.

Dimension of Integration	Sub-type of Integration
Substantive	The significance of water issues in spatial /land use planning
	The integration of sustainable water resources management with spatial/land use planning
Methodological	The integration of assessment approaches and techniques
	The integration of the different applications, and experiences with the use of particular tools
Procedural	The integration of informational requirements of water management in land use decision making
	The integration of procedural requirements of water management in land use decision making
	Horizontal plan consistency
	Consensus building
Institutional	The definition of leading and participating agencies
	Interagency coordination and Clear delineation of actor roles and responsibilities for each two sectors
	Human capacity
Policy	The integration of sector regulations
	The integration of sector strategies

3.4. Evaluative Framework in Case Study Area

In the third phase, the case study is utilized to address the research purposes and objectives. In order to research the integration between land use planning and water resources management, this approach is used, because the methodology lends itself well to an exploration of the relationships between locally-identified factors that shape the success of policies for water resources management and the context within which these factors are situated. Based on the observations and on the nature of the research objectives, a (small-N) case research design was used. This phase includes two theoretical frameworks for the case study to assess the institutional development and process and to assess of the quality of plans as follows:

3.4.1. The Institutional Analysis and Design Framework

Several formal frameworks for institutional analysis can be found in the literature (Ingram et al., 1984, Bandaragoda, 2000; Sabatier et al., 2005, etc). Likely well-developed and frequently-cited is the Institutional Analysis and Design (IAD) framework by Elinor Ostrom and her colleagues (Ostrom et al., 1994). The IAD

framework is an internationally widely applied method for the analysis of common-pool resources, such as fisheries (Yandle and Dewees, 2003), irrigation (Tang, 1994), forestry (Agrawal, 2000) and groundwater (Blomquist, 1994). Polski and Ostrom (1999) also identify this framework as a systematic method for organizing policy analysis activities that are compatible with a wide variety of more specialized analytic techniques used in the physical and social sciences. Larson (2006) describes the IAD framework as an appropriate theoretical background for the analysis as water, biodiversity, environmental and cultural values all exhibit characteristics of common-pool resources. The author also adds that "The IAD framework is therefore particularly useful as meta-theoretical language enabling analysts to investigate multiple types of resources and multiple research methodologies, using common language and groupings" (Larson, 2006, p. 7). The key components and conceptual units of the IAD framework are presented in Figure 3.2.

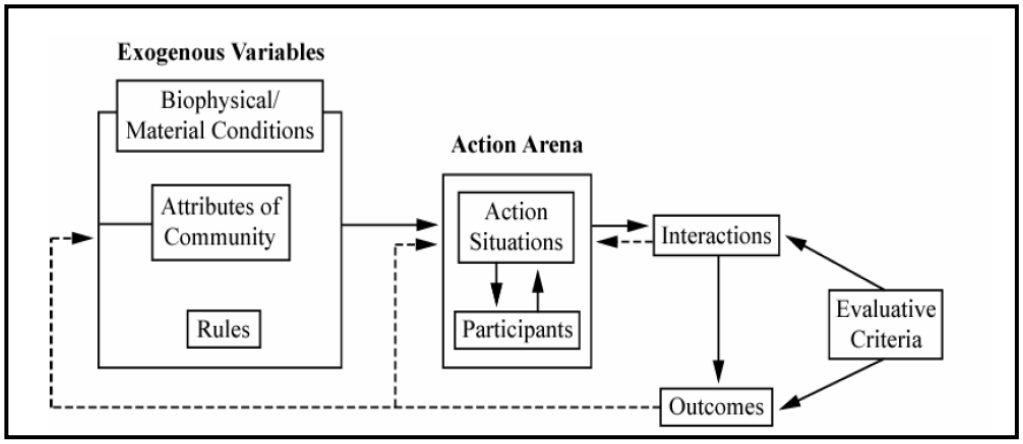


Figure 3.2. Institutional Analysis and Development Framework
(Source: Ostrom, 2000; Ostrom et al., 1994; Ostrom, 1992)

Figure 3.2 provides a schematic representation of the framework. Polski and Ostrom define this presentation as follows:

> After defining a policy question or problem, the focus of the analysis is on behavior in the action arena, which includes the action situation, and individuals and groups who are routinely involved in the situation (actors). One objective of the analysis is to identify factors in each of three areas that influence the behavior of individuals and groups in the policy situation: physical and material conditions, community. attributes (culture), and rules-in-use. Two other objectives are to identify and evaluate patterns of interactions that are logically associated with behavior in the action arena, and outcomes from these interactions. This can be a very demanding task, even for very simple policy situations (Polski and Ostrom, 1999, p. 6).

In sum, most studies underline that the IAD framework does not limit the analyst to the use of any particular theory as a key characteristic of this framework.

This framework is selected as a foundation on which to build for this evaluation because of its explicit focus on context (biophysical etc.) and its increasingly strong grounding in the integrative policy framework.

The analysis of the river basin planning process in the Küçük Menderes River Basin catchment area is performed by using the Institutional Analysis and Development (IAD) framework. This stage of the research adopts a case study approach to develop cross-institutional and bio-physical analyses. It focuses on the following research questions:

1. How can the IAD framework and the integration criteria be applied to bring new learnings to the planning process in this case-study?
2. How can the evaluation of the IAD framework coordinated with water and physical planning and the analysis of institutional structure be achieved?

These research questions have focused on the planning process in Küçük Menderes River Basin catchment. Components of the IAD framework, such as "exogenous variables" and "integration criteria" are analyzed. In addition, the planning process is analyzed from "the criteria of integration policy framework" point of view.

The modified framework enables both the detailed understanding of the existing situation and the diagnosis of the existing institutional arrangements to support the integrative policy framework. Therefore, this research proposes to use a modified framework, summarized in Figure 3.3 that presents the key parts of the IAD framework regarding the integration policy framework for the linkage between land use planning and water resources management. This IAD framework is adapted from the study of Ostrom et al. (1994).

This study is set up to conduct research in Küçük Menderes River Basin with the aim to define the significance of (specific) an institutional arrangement in the regional landscape; describe the status of exogenous variables and actors in Küçük Menderes River Basin, and understand the relationship between (related) institutional arrangements and the impact of this relationship on resource-use. The analysis results of this framework are explained in section 6.2 in more detail.

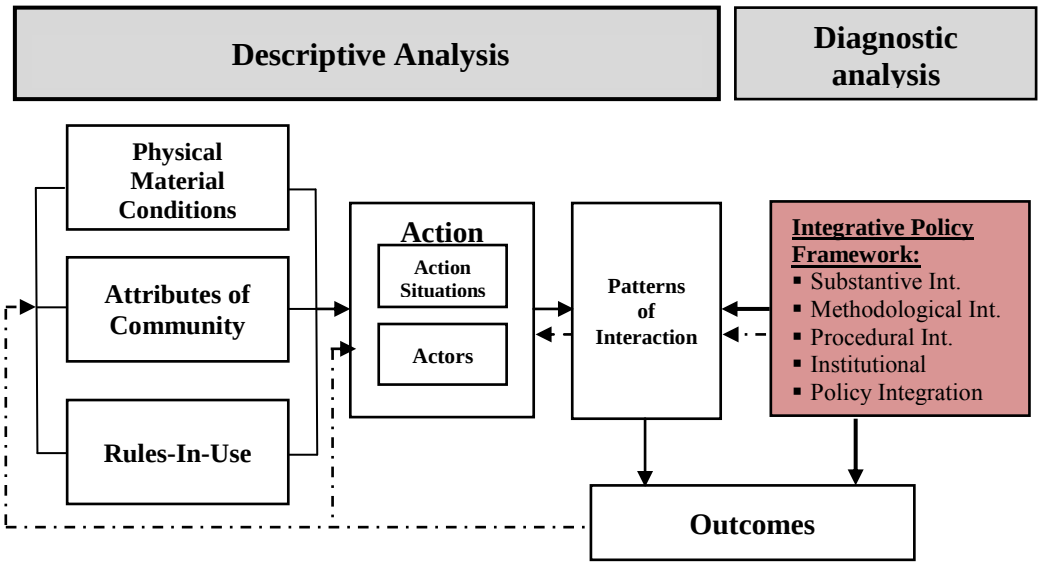


Figure 3.3. The Modified Institutional Analysis and Development (IAD) framework (Modified from Ostrom et al., 1994).

3.4.2. Plan Quality Evaluation: The Assessment of the Quality of Plans

To evaluate the ability of regional/local jurisdictions to protect the components and processes of water resources management, first it is necessary to understand how the guiding principles of water resources management can be integrated into regional plans and policies. Therefore, this study has developed a conceptual definition of regional plan quality regarding the integration.

The concept of assessing quality of the plans is an actual concern of planners, although determining good plans is difficult. Until the 1990s, improving the process of plan making has been considered rather than evaluating the quality of the plans produced except Alterman and Hill (1978), Calkins (1979), and Alexander and Faludi (1989). The theoretical and empirical aspects of evaluating plans, especially in the past decade, have been developed and discussed in planning literature to judge whether their overall quality is good, and to provide a basis in order to ensure that they reach a desirable standard. Talen (1996), Hopkins (2001), Baer (1997), Kaiser et al. (Kaiser, Godschalk and Chapin, 1995) and Hoch (1998), who are the major theorists focused on this concept of plan evaluation, provide better techniques that are more applicable to the research.

Land use plans play an important role in providing guidance and regulation for urban development. As Kaiser and Godschalk (1995, p. 365) assert that “not only do

such plans help decision makers to manage urban growth and change, they also provide a platform for the formation of community consensus about land use issues, now among the most controversial items on local government agendas." Although it is more difficult to evaluate the outcomes of land use plans, these developed frameworks are recognized as desirable to analyze the influence of planning mandates on plan quality (Kaiser and Godschalk, 1995).

Baer (1997) developed a conceptual model called "plan evaluation" and identified a set of criteria for systematically evaluating plans. He focused on a plan as a product or outcome of the planning process, as well as a blueprint for future actions (Berke and Godschalk, 2007). The plan quality evaluation has evolved from basic to advanced applications. 'Factual basis', 'goals and objectives', and 'policies, tools and strategies' are identified as the core characteristics of plan quality articulated (Kaiser and Godschalk 1995). This identified concept is focused on analyzing the dimensions of plans including their fact bases, goals, and policies, as well as their provisions for participation, coordination, and implementation. It applies evaluation principles and criteria, including both internal plan quality (issues and vision statement, fact base, goals and policy framework, plan proposals), and external plan quality (recognition of opportunities for use, creation of clear understanding, accounting for interdependent actions, and revealing participation of formal and informal actors and institutions). Most of the studies have used additional plan components to enable the definition of plan quality more effectively. Brody et al. (2004) suggest adding two additional plan components of inter-jurisdictional coordination and capabilities, and implementation. These framework components can be measured through a series of indicators or issues that allow for quantitative assessment and analysis of plan quality.

Rodriguez et al. (2004, p. 6) summarize the framework of a high quality plan based on plan assessment of Baer as follows:

- demonstrates a strong factual basis, including a land suitability analysis;
- incorporates the concept of spatial specificity, clearly relating policies to geographically identified areas;
- provides clearly articulated goals, including goals achieved with land use policies and objectives, or land use goals achieved with transportation policies and objectives;
- employs policies that are both directive (i.e., rather than exhortative) and appropriate (i.e., reasonably calculated to influence the desired goals);
- achieves several types of consistency (internal, horizontal, vertical and implementation consistency)
- facilitates meaningful ongoing public participation and incorporates ongoing monitoring and implementation evaluation procedures, using indicators (Rodriguez et al., 2004, p. 6).

Berke and Godschalk define plan quality evaluation methodology as follows:

> Plan quality evaluation methodology is based on content analysis of plan documents. Plans should be read by two readers to minimize bias, and then coded to reflect the degree to which quality is attained. Plan content is coded in terms of a basic binary scale (1 indicates an item is present; and 0 indicates not present), or an ordinal scale (e.g., 2 if the quality is fully realized in the plan, 1 if the quality is present but not fully realized, and 0 if the quality is not present). Then the numerical scores for each characteristic are summed. Thus a characteristic, such as a goal and policy framework, with four itemized criteria would have a maximum score of 8. The total score for a plan would be the sum of scores for all characteristics. In some studies these scores are reported as proportionate scores in which the scores generated by content analysis are divided by the total possible score which range from a low of 0 to a high of 1 (Berke and Godschalk, 2007, p. 8).

Many of the authors who have published cases in this field, about plan evaluation, have focused on the empirical and quantitative aspects of evaluating plans. Various studies have evaluated plans and their impacts on decision making regarding natural hazards (Dalton and Burby, 1994; Berke, Roenigk, Kaiser and Burby, 1996; Brody 2003a; Godschalk et al., 1998); ecosystem management (Brody 2003b; Brody Brody, S. D., W. Highfield and V. Carrasco, 2004); sustainable development and environmental protection (Berke and Conroy, 2000; Berke, Crawford, Dixon & Ericksen, 1999); green infrastructure (McDonald et al., 2005); transportation (Rodriguez et al., 2004a), and strategic environmental assessment (Tang, 2009). Berke and Godschalk (2007) also define plan quality evaluation as learning process that yields important planning lessons and guidelines.

Early in the research, after having reviewed comprehensive literature on natural resources and sustainable development, the significance of the integration of land use planning and water resources was determined. While a large of amount of study highlight the importance of water management issues in land use planning, a few have been done to show the required linkages between land use and water resources. This dissertation has delved into the level of the integration, whether the integration was evaluated and how this will be measured as a research strategy. The plan evaluation methodology and content analysis mainly are determined from literature as methods to use in the research in applying the evaluation of the linkage between land use and water resources. These methods have been used to evaluate the existing plans such as the connection between transportation and land use planning, ecosystem management, natural hazard mitigation, etc. The guiding principles with regarding integration to guide plan evaluation and content analysis were identified considering comprehensive literature and Rodriquez et al.'s study (2004) of "the connection between land use and transportation in land use plans". These principles are determined as important to assess from regional level to local level policies in terms of the integration. As a case study,

regional development plans are to be selected with regard to the previously identified criteria. Data for this research comes from a survey of the selected municipalities and from an evaluation regional development plans. For the evaluation of plans, two coders are in charge for the utilization of the plan evaluation tool. This study also was conducted with surveys (planning officials) of selected municipalities in Küçük Menderes watershed. The study was finished by the assessment protocol reliability, and the validity or the accuracy of self-reported planner responses to the survey.

To evaluate the integration at regional level, İzmir- Manisa- Kütahya Environmental Development Plan and İzmir Metropolitan Municipality Urban Region Development Plan are analyzed. This study applies the criteria to jurisdictions responding to the survey and possessing a land use plan.

3.5. Sample Selection

Küçük Menderes River Basin was selected as the specific study site based primarily on the political climate in Turkey at the time of the research, but also on the biophysical and regional character of the watershed. Küçük Menderes River Basin, as the other urban river basins in Turkey, is under great pressure from a diverse range of human activities and under "severe water stress" that could cause severe problems. In this basin, there is a great competition for scarce water resources between households, industry and agriculture.

Based on the case study literature, the research area is bounded spatially (Yin, 2003). The spatial scale of the analysis is defined by geographical catchment boundary of Küçük Menderes River Basin identified by DSİ. Because the basin has an increasing water demand and a decrease in the water quality and water quantity, it has medium to high vulnerability. In this catchment, rapid urban and population growth have been experienced, and these experiences have led to problems in providing adequate water supply.

Küçük Menderes River Sub-watershed Basin (Yan Havzası) (Tahtalı Dam and Çamlı Dam) is excluded from the scope for investigational reasons. This research involves more than one unit of analysis. The analysis units in this study consist of, respectively, the individual municipality, maven individuals from the various

organizations and institutions in the catchment. For the evaluation of the quality of plans, regional development plan have been served as an analysis unit.

3.6. Data Sources and Collection

Primary and secondary data are collected in the case study. Three primary methods are used to gather data in the Küçük Menderes River Basin Catchment area: (1) Document analysis; (2) Key informant interviews; and (3) Personal observations. To enhance results and to gain a better understanding of the relationship between the policy and stakeholders' perspective and experiences in Küçük Menderes River Catchment Area, data collection for the purpose of this study includes the following:

- **Document analysis (assessment)**: Available site background information is gathered and supplemented with documents and records that include provincial laws, municipal official plans (land use plans that guide growth and development); background reports for the official plans, environment plans, watershed plans and development guides from conservation authorities, and also the management documents including integrated, sustainable, groundwater and surface water management studies and written historical accounts of water development in the study area -totally 53 sources at all. In addition, digital resources such as educational videos and websites are utilized. These documents provide important background information on water resources and its management in the Küçük Menderes basin, they also help to identify subjects for key informant interviews.

  To assess the quality of plans, data for this study is from an evaluation for regional development plans. The first part of the research consists of a desktop study of the key documents related to spatial planning process in Küçük Menderes river basin; that are İzmir- Manisa- Kütahya Regional Plan (2010) and İzmir Metropolitan Municipality Urban Region Development Plan (2009).

- **Key informant interviews**: Interviews are essential information sources of the case study, and key informants are often critical to the success of a case study. For this study, land use planners and water managers have been interviewed using a semi-structured interview guide, with open ended questions. Key evaluative questions address significant issues within the integration dimensions of the policy framework developed in Chapter 4.

Between March - November 2010, a total of 42 face to face interviews were conducted, ranging in length from half an hour to one and a half hour, with a average length of three-quarter of an hour. Interviews provided an opportunity to obtain clarification on specific topics and to investigate recent developments not included in the written documentation.

Sampling of interview participants is purposive, based on contacting key experts and stakeholders closely involved in water management and land use planning in the Küçük Menderes Basin. Targeted individuals include public works managers, land use planners, local government departments and local mayors, district governors (ilçe kaymakamları) and professionals in relevant fields. Conducted key actors and officials representing organizations and groups include DSİ The 2. Regional Directorate (DSİ II. Bölge Müdürlüğü)(n=3), Provincial Directorate of Environment and Forestry (n=4), İZSU, Metropolitan Municipality of İzmir (İzmir Büyükşehir Belediyesi)(n=3), Izmir Governor's Office (İzmir Valiliği)(n=2), General Directorate of Forestry (İzmir Orman Bölge Müdürlüğü)(n=2), Agriculture Directorate (Tarım İl Müdürlüğü) (n=3), The Special Provincial Administration of İzmir (İl Özel İdaresi) (n=2), as well as academics (n=1) and non governmental organizations (n=2). In addition, a total of 20 semi-structured interviews are conducted with seven district municipalities (n=13) and seven district governors (n=7).

Three types for questions are used to guide semi-structured interview: for land use planners, water managers and local authorities (as presented in Appendix B-C-D) Guiding questions for the semi-structured interviews are designed to elicit information about not only presentation of the overview of the exogenous variables, but also about the evaluation of the integration dimensions identified in the integrated policy framework. Audio-recordings were made and hand written notes were taken by the researcher in order to summarize the discussion. Interviews are subsequently transcribed.

- **Personal observations:** These are used to corroborate written and verbal accounts. Observations varied in nature and they ranged from photographs of significant biophysical features, to written notations and insights gained, thanks to presentations that have been attended and watershed tours in the Küçük Menderes River basin. In total, over 50 photographs have been taken and 5 conferences have been attended.

3.7. Data Analysis

Data analysis is explained through two research stages as follows:

- **The assessment of institutional structure:**

The data analysis begins with the transcription of audio-recorded interview texts and written observation. Collectively, these are reviewed both the primary and the latent content and sorted into the categories laid out in the IAD framework. Interview transcripts are analyzed using data reduction, text analysis process. More specifically, interview data were coded according to the "integrative policy framework (substantive, methodological, procedural, institutional) dimensions. In general, the framework is used to assess the data in terms of the extent to which dimensions of the integration between land use planning and water resources management are being met in policies, legislation, planning and management documents in Küçük Menderes Basin.

- **The assessment of the quality of plans:**

This study includes two stages of data analysis: First, this study uses descriptive statistics to assess the quality of sampled plans regarding land use and water. Second, this study uses regression analysis to test the relationship between several independent variables and the integration level of land use planning and water resources management.

For the purpose to evaluate the integration level of water resources management and land use planning, plan evaluation frameworks for regional plans were developed. Given the characteristics of high quality plans, and based on the comprehensive literature review on the integration between water resources management and land use planning, general principles were formulated to provide a framework for integrating land use plans and decisions with water resources. The evaluation framework and these guiding principles are built on Rodriquez et al.'s study (2004), extending them to address the water issues, which have been discussed in more detail in Appendix E (for regional development plans)

Data are collected from two sources; survey of local planning officials/ planning directors and systematic content analyses of regional land use plans in the light of these guiding principles. Both survey and content analysis are used to elaborate on four topics related to this study: the water elements in the plan, how plans account for the land use-

water integration, planners' views about the connection and the role of institutional coordination with local municipalities and counties.

Norton (2008, p. 433) defines content analysis as a "set of methods for analyzing the symbolic content of any written communication. He further identifies the general approach for content analysis as "analogous to developing a set of close-ended questions for a survey. The content evaluation tool is used to provide a more detailed view on plan contents and plan quality. Researchers have used and developed evaluation protocols to measure various attributes of plans and codes and then used those protocols to score plans and zoning codes for the frequency and strength of specified indicators (e.g., Burby and May, 1997; Brody, 2003a, b; Brody, et al., 2004; Norton, 2007; Norton 2008; Berke and Conroy, 2000; Berke et al., 1999; Tang 2009).

In this study, content evaluation tool is developed by synthesizing criteria drawn from the plan quality assessment literature summarized above and also from requirements associated with the intent of examining the integration between water issues and land use. The protocol is divided into nine sections followed by the study of Rodriquez et al. (2004a): general presentation/information, plan components, supporting data/information base, planning process, background goals and policies, detailed goals and policies, content, implementation, and consistency. The plan quality is measured by evaluating regional development plans for each jurisdiction and region, yielding a 237-item evaluation protocol for regional development plans. Consistent with the works of Burby and May (1997), Norton (2005), and Rodriquez et al. (2004), plans are scored for the presence and strength of some specified items. To measure indicators, both binary scale (1 indicates an item is present; and 0 indicates not present), and an ordinal scale (e.g., 2 indicates an item is mentioned and detailed; 1 indicates an item is mentioned; and 0 indicates an item is not mentioned in the plan) are used.

The most recent regional comprehensive plans are evaluated against plan quality protocol containing indicators to determine the integration land use–water. Two training coders evaluate the sample of physical plans of Küçük Menderes watershed. Finally, plans are scored for the presence and strength of specified items related to the linking between water and land use, as below.

3.8. Data Limitations

In general, the methodology worked well, but there were some limitations. Face-to-face interview process may also have some inherent limitations associated with it, since it could be open to bias from the interviewer. Some of the stakeholders (six participants or stakeholders) could not be interviewed or refused to be interviewed despite the fact that they were contacted with by email or phone. Therefore, some of the interviews could not been achieved.

CHAPTER 4

INTEGRATION BETWEEN WATER MANAGEMENT AND SPATIAL PLANNING POLICIES: INTERNATIONAL CONTEXT

This chapter demonstrates the contemporary approaches, legislative structures and practices based on some international experiences for linking two policy areas that are land use planning and water resources management in the world. This chapter aims to present a framework for research into the issue of how spatial planning can adapt to the water resource management trends. This information will serve not only to introduce the policies and laws of the study areas but also the need for further study to determine the linkages between water resources management and spatial planning.

4.1. Policy Context: Integration between Water and Planning Policies

Since the 1990s, water resources management has become a growing concern among policy makers in many developing countries. Recently, the emergence of integration of land use planning/spatial planning and water resources management has been underlined by the government (Western Australian Planning Commission, 2008; Northeast Georgia Regional Development Center, 2001; OPR, 2003; CWP, 2005; ODPM, etc.) and the academics (Carter, 2007; Carter et al., 2005; Mitchell, 2003; Van de Wetering, 2007; Arnold, 2005; Arnold, 2006; Arnold et al., 2009; Carter, 2005; Moss, 2004a; White and Howe, 2003). Although the effects of water scarcity have now been on both the scientifical and the policy agendas since a considerable number of years, it is obvious that a number of governments in European and the world have restructured laws and policies related to water in land use policy and decision-making to come up with an effective and coherent integration policy. These new laws and policies are a part of the changing paradigm of the sustainable strategies. Yet, the great majority of the governments in the world today do not follow such a policy. Netherlands, England, Australia and the United States are relatively early starters; because they have

all confronted with extraordinary risks and events, such as flooding or water quality and quantity problems. Therefore, these governments are adopting a broad range of policy approaches in order to combine urban development and environmental sustainability. These countries are chosen to examine to how spatial planning legislation, policy and guidance have actually contributed to water resource management. International experiences on the integration of land use planning (spatial planning) and water resources management are examined in three steps: (1) governmental responsibilities; (2) decision making process and policy documents and (3) the applications of spatial planning tools for integration process.

4.1.1 Netherlands

The Netherlands, situated in the European delta, is a small and densely urbanized country, for a large part, well below sea level (Wiering and Immink, 2006; NOFDP, 2006). The country is made up of 1 national authority, 12 provincial authorities, and 489 municipalities: of which the four biggest are Amsterdam, Rotterdam, The Hague and Utrechtb (Royal Haskoning et al., 2004).

The Dutch has struggled with some threats, such as rising sea levels, land subsidence, changing patterns of precipitation and pollution, especially from agriculture (de la Motte, 2004). In the past decade, the country has been extremely faced with highly river discharges, flooded areas caused by extreme rainfall, groundwater problems in urban areas and dessification of nature (NOFDP, 2006). To prevent a further increase these problems, the Netherlands government was attempting to shift programs and policies considering governance issues and the integration water aspects of into spatial planning process.

Even though the concept of the integration of land use planning and water resources management has been discussed in many countries and studies, The Netherlands has developed its own system. Growing appreciation of the need for more integrative and interactive approaches for water management has also been evident in the Netherlands since the 1980s. The new policy line in the Netherlands was started with Room for the River (Ruimte voor de Rivier) Directive. The ‘Ruimte voor de Rivier’ (Room for the River) policy introduced in the late 1990s aims to partially reverse this. Recent years have witnessed a profound shift in the water resources

management in The Netherlands. The new perspective from technocratic water engineering to integral and participatory water management is advocated as a fundamental shift – which has had great influence on the command and control approach in the governance of water and history of comprehensive spatial planning (van der Brugge et al., 2005; Wolsink, 2006; Wiering and Immink, 2006). Wiering and Immink (2006, p. 429) state that "up until the 1980s, water management was focused on the needs arising from spatial planning including spatial separations of actions". They described this period as two domains: the old discourse of the "battle against water" (that is, separating water and land use; relience on dikes) and a new discourse of "accommodating water". Furthermore, the new policy practices include changes in interaction patterns between the two policy domain that are land use planning and water management (Wiering and Immink, 2006).

Dutch spatial planning system was criticized for being slow to respond to implementation process and legal procedures. Furthermore, it is stated that it is able to adapt and achieve a good vision or an ambitious goal presented by the national and provincial government at the local municipal level (Needham, 2005; Needham 2007; Wiering and Immink, 2006). With the new spatial planning act, the new spatial planning practices emerged and the dimensions of "rules of game" clearly were illustrated by the policy practices.

4.1.1.1. Administrative Structure

The Netherlands is a constitutional monarchy with a parliamentary system. Its organization is described as a decentralized unitary state with three- tier administrative structure: the national, the provincial (12 in total) and local (municipal) level (NOFDP, 2006; WROM, 2006; Van Dijk, 2008).

The Dutch Spatial Planning Act on July 2008 has fundamentally revised. This revision has some characteristics. One of them is related with the system of spatial planning organization that emphasizes the different roles and responsibilities of all three-tiers of government (NOFDP, 2006). The revised Dutch Spatial Planning Act emphasized also that the system of spatial planning organization attach importance to the position of municipalities and The NIMBY phenomenon by strengthening the importance of negations between municipalities and developers and the negotiations

between national government and municipalities (Needham, 2007; cited Du, 2010). The establishment of partnerships at the interface of water and spatial planning established in these three levels. In addition to, The Netherlands has 27 Water Boards. These have the power specify general ordinances (Warner et al., 2006). Responsibilities of each spatial planning institution at national, the provincial and the municipal level are seen in Table 4.1.

Table 4.1. Roles of spatial planning institution in the Netherlands (Source: WROM; 2007)

Levels	**Planning body**	**Main policy instrument**
National level	Parliament, Central Government	National spatial planning strategy National sectoral structure plan for policy sector
Provincial level	The Provincial Spatial Planning Commission; the Provincial Spatial Planning Agency (Provincial Council and Provincial Executive)	Region plan
Municipial level	The Municipal planning department (Municipal Council and Municipal Executive)	Structure plan; local land use plan; the urban renewal plan; living conditions ordinance

The Spatial Act lays out some mechanisms to realize coordination between different policy levels. It signifies ***vertical coordination*** that policy and plans at all levels will be taken into account sufficiently. In this way, spatial plan policies can be discussed and negotiated at different levels (NOFDP, 2006; Needham, 2007; cited Du, 2010). It also signifies ***horizontal coordination*** that spatial planning is regarded as multifaceted and the coordination between different responsible authorities at a certain level. Wiering and Immink (2006, p. 424, cited Healey, 2004) make a remark about the revised Spatial Planning Act that "processes of institutional rescaling are having effects of spatial planning and water management". The national water management executive called Rijkswaterstad RWS and Waterboards are involved in spatial planning-processes if water is important (NOFDP, 2006).

4.1.1.2. Decision Making Process and Policy Documents

The Water Management Act in Netherlands was impressed by the European Union Water Framework Directive. With this challenge in view, river basin management plans have been incorporated into the planning system as a part of national

policy. The Water Management Act entails the water management process in close coordination with the spatial planning process (Du, 2010). This means that the revised Spatial Planning Act must move simultaneously with the structural visions of the national and provincial water plans.

Water supply, aquatic management and flood protection has gained considerable significance in Netherlands policy discussions. Within climate change and calls for greater coordination within Europe, Dutch water managers and planners seek ways to connect water management and spatial planning (Woltjer and Al, 2007). At the national level, the Fifth National Guidelines on Spatial Planning (*Vijfde Nota Ruimte)*, approved in 2006, articulates the role of water in spatial planning. In this policy, security against floods, water quality, and the links with the main economic infrastructure are explained as the main focus areas in relation to water management (Warner et al., 2006).

Although The Fifth National Policy on spatial planning in 2000 identifies water as a 'guiding principle" in spatial planning, the new National Spatial Strategy in 2006 recognizes water as a "structuring principle, which will be an integral element in the spatial planning processes". Policy documents at national level shape the guidelines for the implementation of spatial planning measures at the province or municipality level as seen Figure 4.1. Van Dijk (2008) explains that in the new planning system, when the municipality will be given preference in deciding on spatial developments, the provinces and the national government will only assume control.

Spatial Planning Act [*Wet op de Ruimtelijke Ordening, WRO*] and the related Spatial Planning Decree [*Besluit op de ruimte-lijke ordening, Bro*] regulates responsibilities and related principles. At the national level, the national structural-outline plan [*structuurschets*], the national structural-policy sector plan [*structuurschema*] and specific policy decisions have a national importance [*concrete beleidsbeslissing*] (VROM, 2006). Van Dijk (2008) describes these plans and documents as decisions in spatial planning and also adds that such plans are usually only indicative.

In this framework, provincies are responsible for the coordination of the development of sub-catchment plans (deelstroomgebiedsvisie) as required by the WFD. When sub-catchment plan should inform the regional plan (streekplan) in provincial level, municipal water plan should inform the municipal spatial plan (bestemmingsplan) (Warner et al., 2006).

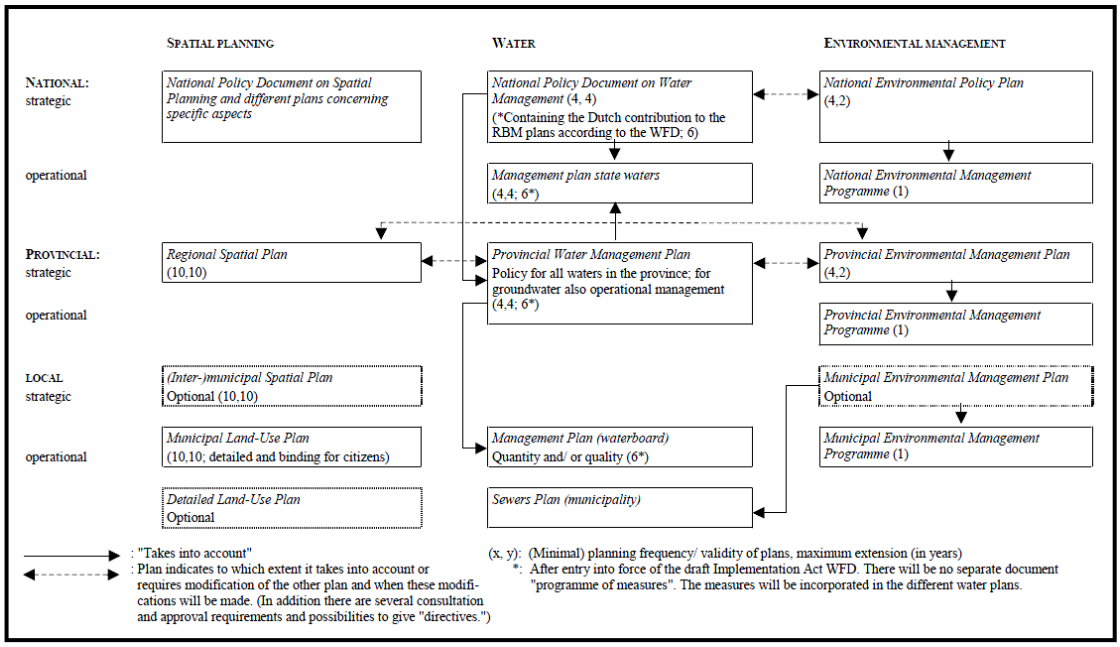


Figure 4.1. Policies and Plans in Netherlands
(Source: Enserink et al., 2003, p. 15).

"**Anders omgaan met water" (Handling water differently)** of the Ministry of Transport, Public Works and Water Management (V&W, 2000) and **Nota Ruimte (Spatial policy paper)** of the Ministry of Housing, Spatial Planning and Environment (VROM, 2003) are the important policy documents in which the Dutch government has formulated how to deal with environmental space in the Netherlands (Walsum et al., 2005). Nota Ruimte, particularly, consist the national policy that is important structural aspect for land use planning. In this policy, the new methods for combining spatial planning and water management were promoted. These are: (1) 'Layer approach' (the other name 'strata approach'), (2) Water system' approach, stemming from the hydrology community" (Walsum et al., 2005).

An important method for the problems of the planning in the Netherlands can be regarded as a layer approach presented in 1998. The following layers in the strata approach are identified as can be seen Figure 4.2:

- the base layer, consisting of the water systems and the biotic systems;
- the network layer, consisting of all types of networks, including traffic systems;

- the occupation layer, consisting of space for living, working, recreation, etc (Walsum et al., 2005; p. 11).

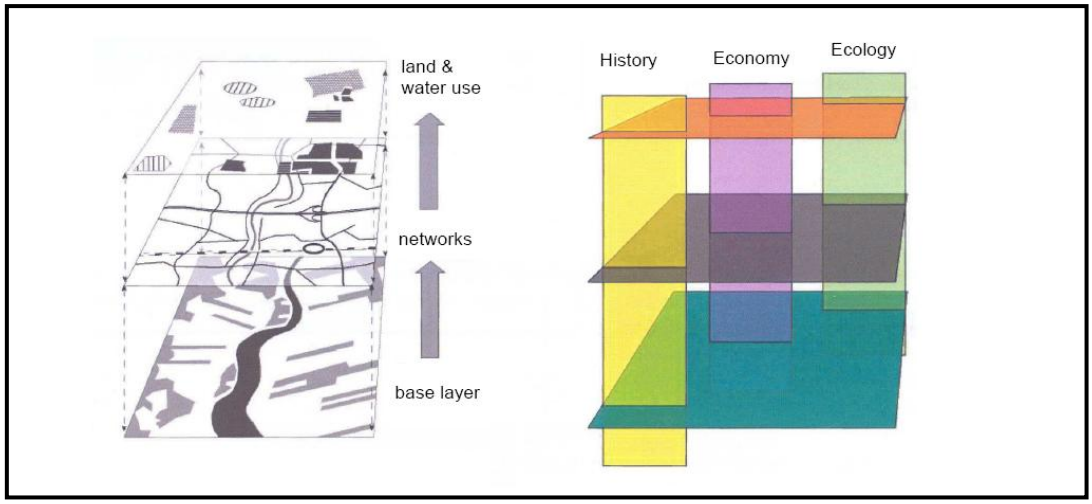


Figure 4.2. The 'strata approach' for water-based land-use planning (Nota Ruimte) (Source: Walsum et al., 2005, p. 14).

The other approach, named water system approach, is defined as a static approach by Walsum et al. (2005). This approach takes into account the horizontal ('chorological') between the planning layers as described in Figure 4.3. Walsum et al. (2005, p. 14) pose that this second aproach "takes into account the horizontal interactions via water as an integrating medium".

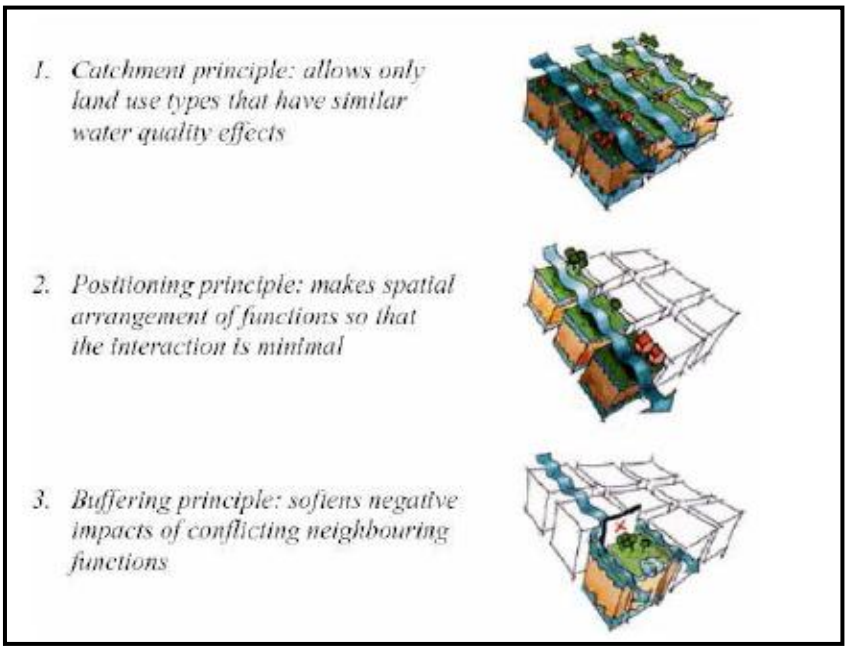


Figure 4.3 Principles for water-system based planning (Source: Kamphuis, et al., 1996 cited Walsum et al., 2005, p. 14).

Since 1998, the layer model in regional spatial planning have a place in balancing local and national responsibilities and ways of specifying the importance of water and infrastructure issues. From ten years, the layer model of national, regional and local documents was formalized as a planning approach (Schaick and Klaasen, 2009).

In National Spatial Strategy, this approach is explained that 'can prevent conflicts between different users of the same land, as well as creating greater coherence in the measures to be taken' and 'works well with the different aspects of spatial quality standards: use-oriented value, experience-oriented value and future value' (VROM, 2004).

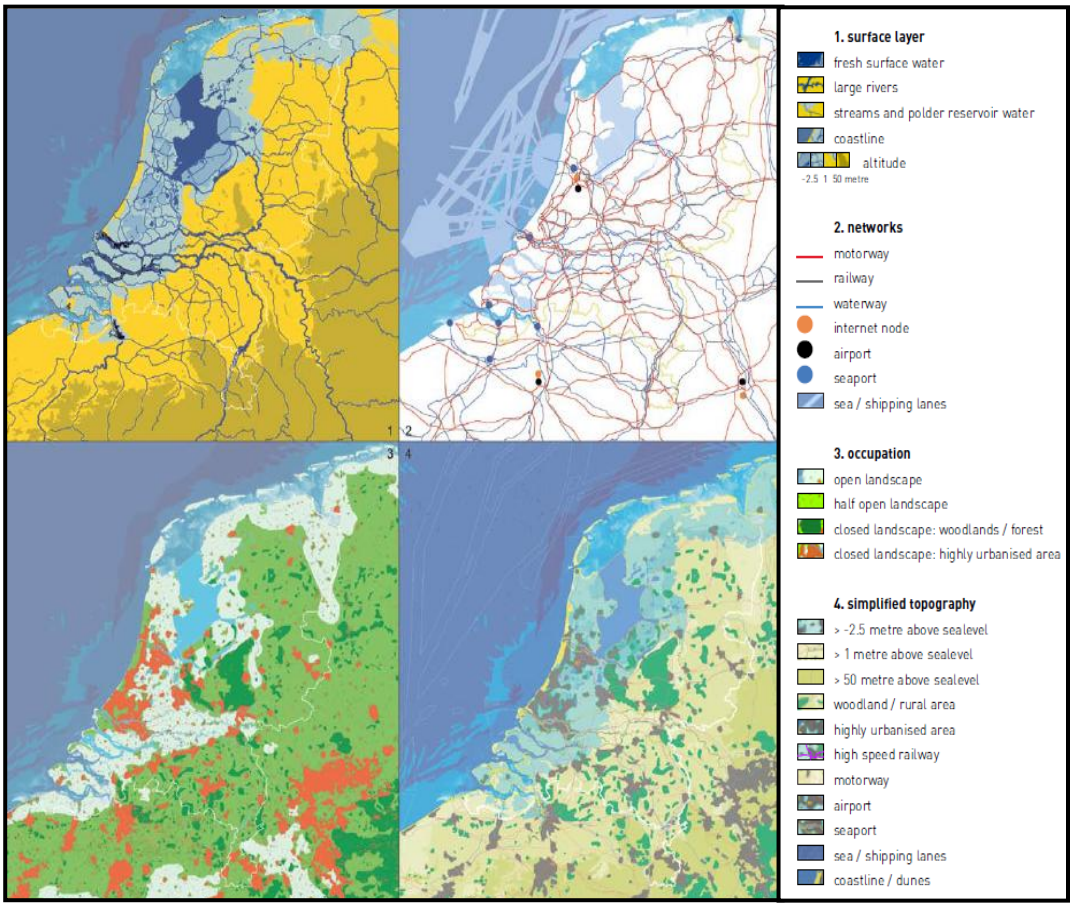


Figure 4.4. Structure of the Netherlands in layers
(Source: VROM, 2006, p. 7).

Figure 4.4 indicates the structural elements of the surface layer and the water system (Map 1) infrastructure network (map 2), the main aspects of the occupation pattern (map 3) and these composition (map 4) which forms the basis of a number of national spatial planning key decision maps. This layer approach analyzes Dutch

situation at the end of the 20th century in the Fifth Memorandum on Spatial planing and the National Spatial Strategy document (Schaick and Klaasen, IT, 2009).

To ensure public safety from flooding, the national government proposed the national spatial strategy based on water (as seen fig 4.5). Water was discussed as important structuring principle for spatial planning, design and land use due to the necessity of this national planning approach. This strategic approach based on water includes indicative illustration of the elements listed in the legend of Figure 4.5 which are eight high priority weak links identified in the coastal defences, space for water, found by combining water management with other functions…etc.

For instance, '**Space for the River**' (Ruimte voor de Rivier) at all levels aims to find space for floods as seen Figure 4.5. The measures were developed and approved by authorities that are 'creating side channels', 'restoring flood plains', 'restoring meanders in the river', assigning areas for controlled flooding in case of emergencies,and re-locating dikes.

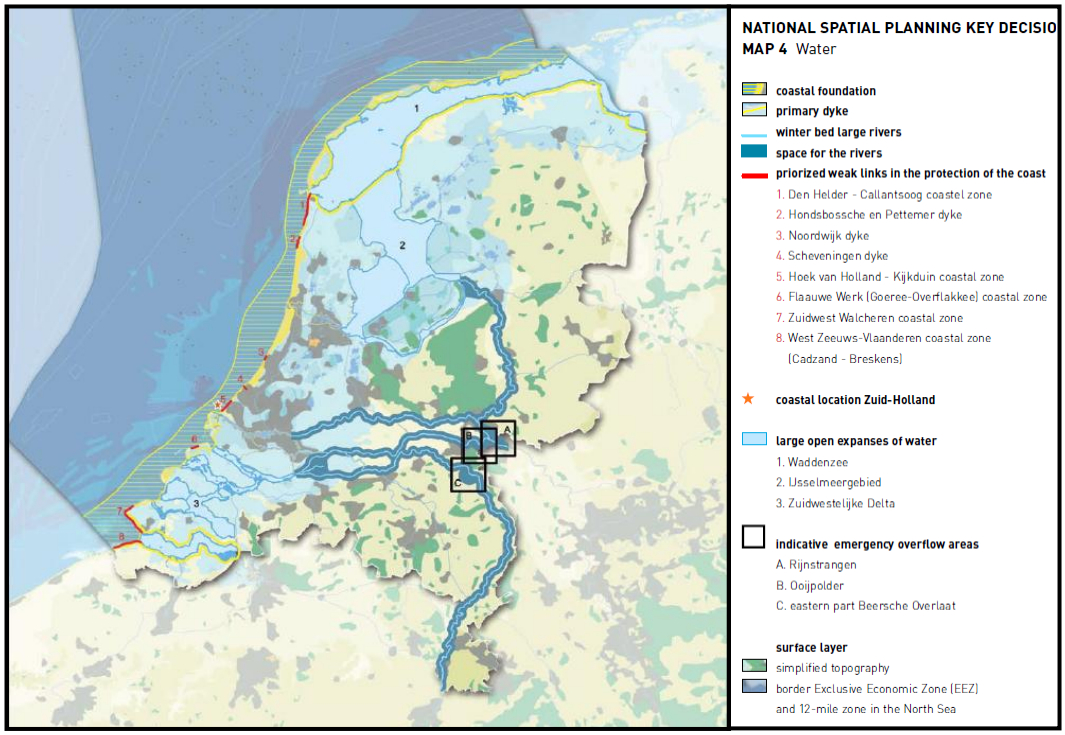


Figure 4.5. Water Strategy in the National Spatial Planning Key Decisions (Source: VROM, 2006, p. 23).

At provincial level, regional spatial plan covered the entire province, or a part of it. These plans are also indicative. At municipal level, structure plans and local land use plans are the important planning documents. As structure plans is not obligatory, local land use plan is legally binding. However, structure plans are considered as regional

spatial plan to set up for certain issues. Van Dijk (2008) defines the function of local land use plan that is to designate the land use and regulates such use in the area. He also states that "this plan includes one or more maps showing the land uses permitted on the various sites of the area covered [plankaart met bestemmingen]. NODPF (2004) states that the bestemmingsplan (local land use plan) has to be approved by the provincial executive. To give an example for municipal level, Figure 4.6 shows area for water retention (the shaded area in the centre) combined with a residential area to illustrate the integration of land use planning and water resources management in municipal level.

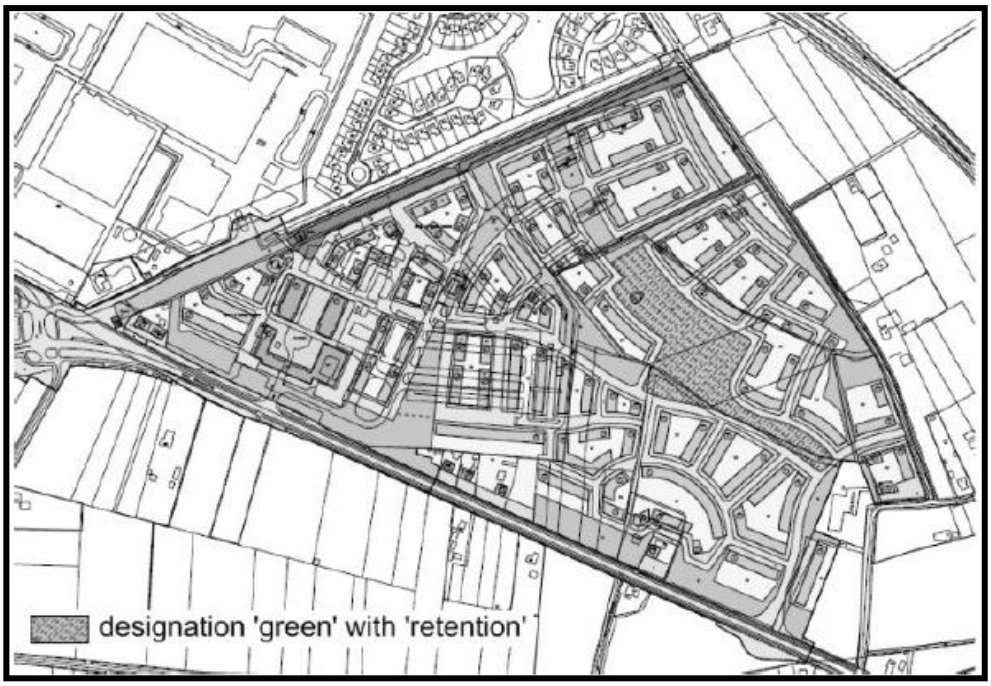


Figure 4.6. An example of local land use plan
(Source: Van Dijk, 2009, p. 21)

Existing structure in the Netherlands, put it up to contribute to the national level of integration, provides a new opening at the local level. Therefore, to provide a process instrument for the integration of water aspects into the spatial planning process, '**Water Assessment' (WA) or 'Water Test'** (Dutch: water toets) has been introduced in 2001 (NOFDP, 2006; WROM, 2006; Van Dijk, 2009) A WA is defined as "a process of interaction during spatial design, rather than a test on water aspects of a completed spatial plan." (www.watertoets.net). It is stated that "The Water Assessment is not meant to be a new procedure, but a process of interaction that is fully integrated into existing spatial planning procedures". Van Dijk states that the status of WA is anchored in policy documents and legislation on spatial planning as a part of national and most of regional policy. From November 2003, WA has become compulsory for the formal

spatial plans, such as regional spatial plans, the different kinds of structure plans, and municipal land-use plans (streekplannen) (NOFDP, 2006). Urban Water Project Partnership (2008) describes two ways for this integration of water in spatial planning works that are 'plan is assessed with regards to its implications for the water system' and 'the restraints the water system puts on land use are illustrated'.

This Water Assessment process, from national scale to local scale, including water managers that involve the planning process is a useful tool. Van Dijk et al. (2010; 5) describe the WA as "interactive process towards shared understanding relates to communicate planning". They also provide an overview of the fundamental justifications for 'Water Assessment' as a form of controlled informality that most of these are design and practice. One of the justifications of his arguments, it is suggested that The WA system operates through a mixture of communicative and rational planning elements.

Article 3.1 of the Spatial Planning Decree is a provision of great importance from the point of view of clarity of '**Water Assessment**' in terms of the relationship between water management and spatial planning. In accordance with Article 3.1.1 of this Decree, municipalities must consult with Water Boards where the preparation of land-use plans is concerned (Hobma and Schutte-Postma, 2008). The explanatory notes of the land-use plan must provide a description of how the plan takes into account the consequences for water regime as defined in article 3.1.6 of the Spatial Planning Decree. In this discussion, article 3.1.6(f) requires municipalities to state the outcome of their consultation with the Water Boards in the explanatory notes (Hobma and Schutte-Postma, 2008, p. 16).

The process of Water Assessment consist of four phases: (1) Initial phase: Agreements on water criteria and cooperation during planning process; (2) The developing phase: Water Recommendation; (3) The decision-making phase: Water Paragraph, and (4) The reviewing phase: A "go!" for realization (see Fig. 4.7).

The spatial planning authority; the water authority; and the higher authority are the main actors in processing WA, that has to give its final approval to the spatial plan (NOFDP, 2006; Van Dijk, 2008) This assessment provide close consultation with water manager and spatial planner named initiator from very beginning to takes water management into consideration in spatial plans and decisions (NOFDP, 2006; VROM 2006).

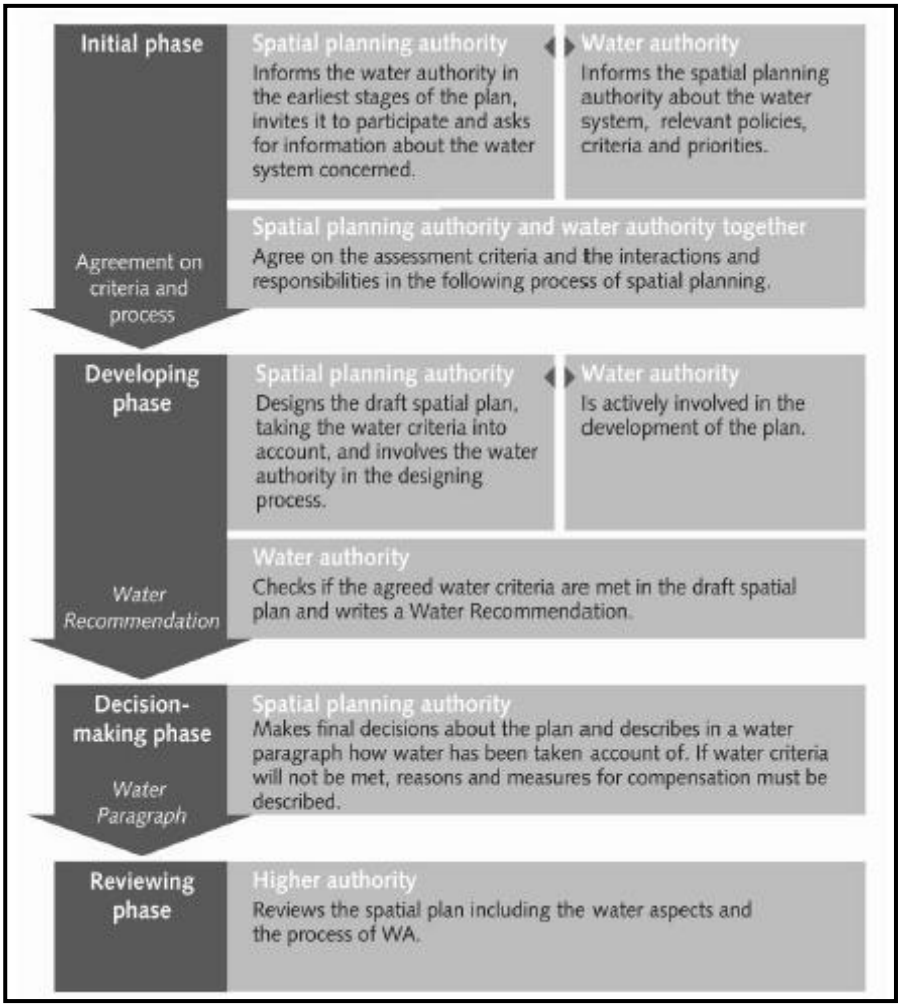


Figure 4.7. Steps in the Water Assessment
(Source: NOFDP, 2006, p. 9/31).

Ministry of TPW describes the following criteria for the "Water Test" to evaluate spatial planning decisions:

- In designating a location, the activity may in principle not impede the retention, storage or drainage of water in the catchment area.
- Incorporation of the activity should be guided by the underlying principle that water-related problems may not be passed from one catchment area to another. As much water as possible must be retained on site (for instance, by minimizing the amount of surface hardening), stored and only then be drained.
- If, after an integrated assessment, a decision is made that has adverse consequences for (future) safety or exacerbates water-related problems, the measures that are required to keep the water management system in working order must be identified. These measures form part of the spatial planning decision; the costs will in principle be borne by the initiator of the proposed activity (Ministry of TPW, 2000, p. 45-46).

At the end of this process, the national government evaluates provincial and municipal plans and decisions to control whether or not they pass the water test (VROM, 2006). '**Water Recommendation'** and '**Water Paragraph**' are two products in WA process. Van Dijk (2008, p. 28) states that "The Water Recommendation is

formulated in response to the draft spatial plan". The author (2008, p. 29) poses that "the Water Paragraph makes explicit the decision-making on aspects of water and describes how account has been taken of any water-related im-pacts of the spatial plan". He also adds that it consists a description of the way the water authority has been involved in the spatial planning process" (2008, p. 29).

The Dutch spatial planning has some concepts that are '**space for nature'**, '**green-blue network**', '**more space for water**' '**climate-proof city'**. These concepts can be described as good practice for integration land use planning and water management. For example; "more space for water" is related with the currency and proposed areas. When it offers opportunities for improving the structure and quality of cities, towns and villages, by restoring historic waterways or developing new water-rich residential and employment areas, it is relied on water storage capacity for new urban areas. In Nota Ruimte, to balance between red (urban) and green/blue (water-based) land uses, spatial plans should balance construction and green/blue spaces by provinces and municipalities as the guideline of 75 square meters of green space per dwelling is binding in local scale (VROM, 2004).

To cope with greater volumes of water in a safe manner, The Spatial Planning Key Decision (SPKD) called '**Room for the River'** was approved by The Dutch Cabinet *(*Parliament) in 2006 as a Bill. To decrease flood levels, this new policy provide a provision for situating the dikes further away from the river, or by lowering the river forelands. This concept of room for the river aim to achieve "flood protection by the year 2015", and "improvement of the overall environmental quality in the delta" (van Meel et al., 2005). Some types of measures are shown in Figure 4.8.

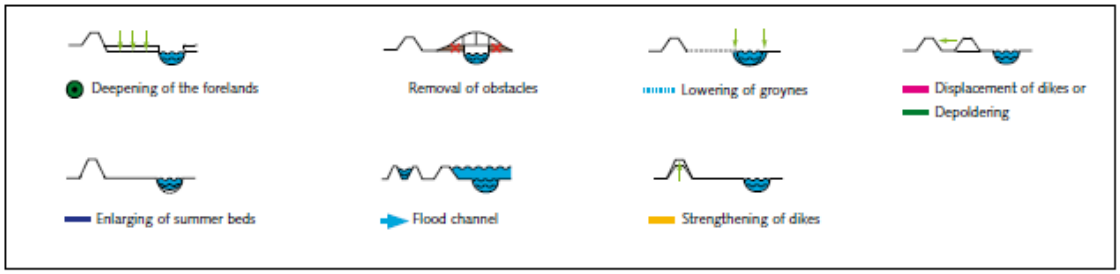


Figure 4.8. Measures in the Spatial Planning Key Decision 'Room for the River' (Source: Woorden, 2006, p.4).

This approach in flood protection includes visions of both short-term and long-term in regional and town planning to improve the overall environmental quality of the

Dutch Rhine delta (Van-Meel et al., 2005). This approach is stated by Van-Meel et al. (2005) that A SPKD describes a general or specific spatial planning policy. What is important for the implementation is that where a combination of initiatives, including the construction of flood channels or bypasses will clearly improve spatial conditions. Therefore, the spatial development around various river towns combined with the flood damage protection, particularly in regard to the flood protection measurements in SPKD.

Horizontal and hierarchical cooperation is other concept of the spatial policy in Netherlands. National spatial strategy provides basic spatial qualities and the main spatial structure. Government is responsible for adapting these policies. Local authorities and provinces have statutory responsibilities to adapt national and regional policies. VROM (2004, p. 7) concludes that "Local and regional governments, social organizations, citizens and private actors are explicitly invited to participate in spatial planning in order to arrive at regional and local visions and policy implementation with a broad support base".

In order to planning of the physical environment in the Netherlands, many actors are involved in Dutch planning regime related with urban water governance (1) land-use planning, (2) environmental protection (3) nature conservation and (4) water management planning as seen Figure 4.1. As water management, environmental protection and nature conservation are added components related to spatial planning. NOFDP (2006) describes two policies and laws linked to spatial planning regulations that are protected areas and protection of species. NOFDP (2006, p. 10) poses that "In planning schemes at the level of *Streekplan* and *Bestemmingsplan*, the protection status of specific areas must to be taken into account".

The *Ecologische Hoofdstructuur* (EHS, Ecological Main structure) is gained importance at both policy level and implementation level to achieve objectives for enlarging the area of natural and semi-natural habitats and reinforcing the ecological networks in the Netherlands. (Hobma and Schutte-Postma, 2008; These objectives laid down in the policy plan *Natuur voor mensen, mensen voor natuur* is that "before the year 2020, 500.000 hectares will be added to the existing 500.000 hectares (1990), connected with ecological corridors" (NOFDP, 2006, p. 11). the *Streekplan* and the *Bestemmingsplan* involve the changes and effects supplemented by the implementation of the Ecological Main Structure with specific rules including physical or financial compensation for schemes or projects.

It is clear that nature protection strongly links with flood prevention measures in Netherlands. Ecological main structure (the Ecologische Hoofdstructuur – EHS) in Netherlands including a large part of the Dutch rivers and their floodplains consider flood prevention measures that are water retention areas and ecological restoration schemes (Urban Water Project Partnership, 2008; NOFDP, 2006).

4.1.1.3. The Application of Spatial Planning Tools for Integration Process

The recent studies on further development of the spatial vision include examination of water resources management and spatial planning relationships. In Dutch experience, informal policy documents take an important place to implement the new spatial approach in water management by linking water management with spatial planning. These documents are "water-opportunities maps [*waterkansenkaarten*], subcatchment visions [*deelstroomgebiedsplannen WB21*], water visions and water-structure plans" (Van Dijk 2001; Hidding and Van der Vlist 2003 cited in van Dijk,2008, p. 18).

Warner et al. (2006, p.14) state that spatial plans adapt planning tools used to check on key water management measures, such as sufficient space for wetlands, infiltration and retention and for controlled flooding in the case of extreme events. These measures are shown on a Water Opportunities Map (*waterkansenkaart*) which is socalled Urban Water Challenge (*Stedelijke Wateropgave*). These maps are not legally binding; but "some municipalities have used it as an opportunity to develop inspiring visions in water management" (Warner et al., 2006; 14).

In Netherlands, the Water Plan was developed by the cities of Arnhem, Nijmegen and Nieuwegein to integrate all water related issues in their municipalities. This plan aims to improve water quality and the quantitative operation of the water system in close relation to spatial development and provide a comprehensive and agreed framework for integrating and handling water-related issues in spatial plans, property development and a basis for the participatory development of implementation plans concerning water (Urban Water Project Partnership, 2008). This process of preparation of the plans, the city's water-related natural events in the control of wetlands, water infiltration and retention of key management methods were used. For example; the

second Water Plan Arnhem (see Figure 4.9), published in 2009, provides a long term vision to 2040 and found measures and projects for the period till 2015 (Du, 2010).

The water opportunity map for Arnhem depends on main objectives to make city attractive: (1) a climate proof water system(water quantity) to mitigate flooding and water shortage; (2) a good water quality to meet the objectives of EU WFD; and (3)water awareness to ensure that water has a clear role in every spatial project (Du, 2010). This plan can be given as a good example to emphasize water as indispensible element for spatial structure and spatial development. This plan includes innovative measures that are the restoration of natural streams and making them visible contruction of eco-zones and nature friendly river banks, green-blue belts, green roofs and more space for retaining rainwater, disconnection of rainwater and sewage, pollution source control and purification, good maintenance and management of sewage systems.

Du (2010) poses that the urban water plan in Arnhem shows us that "it is possible to consider the components of water systems in a spatially integrated way. He also adds that "the implementation process is not easy and much depends on a good communication and cooperation with different groups of residents, entrepreneurs, natural and environmental organizations and other stakeholders" (2010, p. 130).

The Dynamic Brook Valley, the Reconstruction of the Tongelreep Valley, and The Hondsbroeksche Pleij are a few of The Dutch cases dealing with spatial planning and water management which provide valuable lessons for the implementation of sustainable floodplain management principles (Becker-Goss; 2007). For instance; The Dynamic Brook Valley is located the southern part of the Netherlands (see figure 10). Its project is under the European Interregional IIIb Project "Nature-oriented flood damage prevention" which strives to use resilience strategies in floodplain management (Becker-Goss; 2007). .

Water retention, stream restoration, improvement of ecological corridors and improvement of water related recreation (Grontmij, 2006, p. vii) are main goals of the Dynamic brook valley project. In this project, the restoration of meanders and removal of embankments and various water works to increase the water retention in the floodplain are defined as the measures to be taken in the Aa valley (Becker-Goss; 2007).

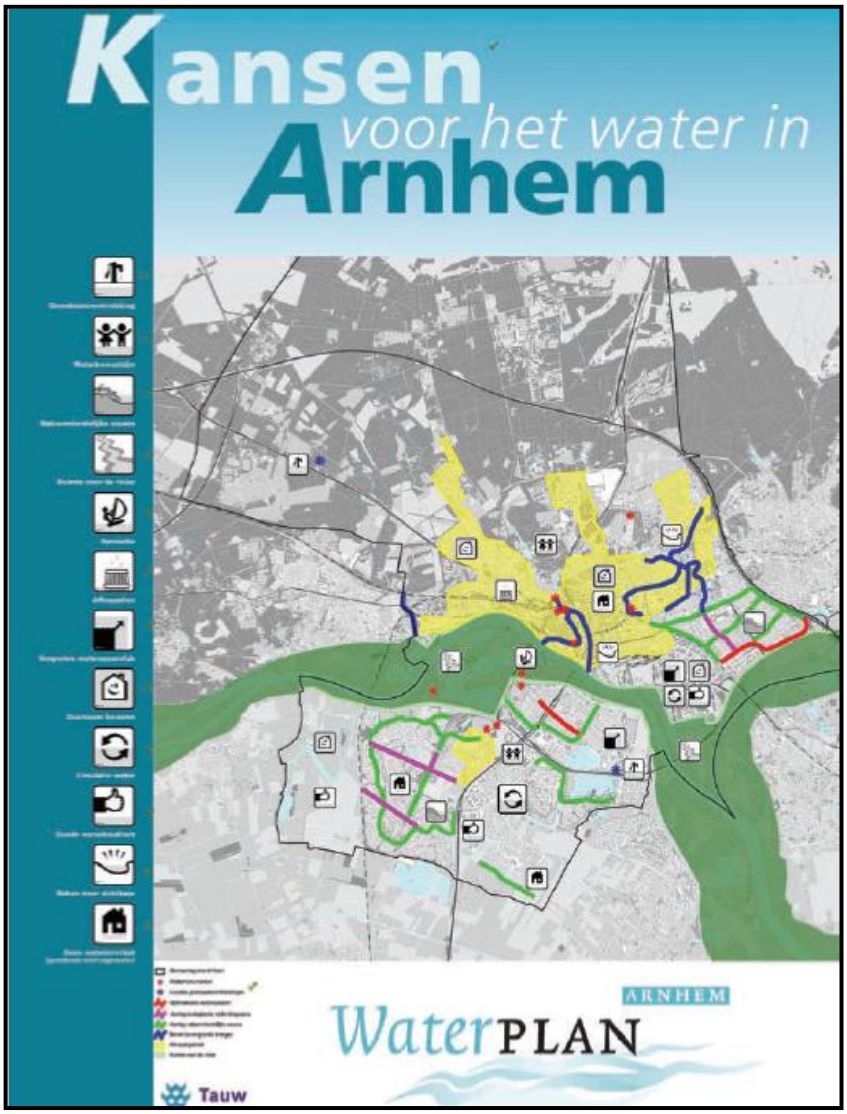


Figure 4.9. Example for Water Opportunity Map for Arnhem
(Source: Du, 2008, p.129).

Figure 4.10. Dynamic Brook Valley Project area with projected meander at Hersend shown here in the red square (Source: Becker-Goss, 2007, p. 39).

Figure 4.11. Location of measures and alternatives in the Rhine delta (Source: Woorden, 2006, p. 5).

In addition to these examples, Figure 4.11 shows location of measures and alternatives the areas along the major Dutch rivers to provide a prescribed level of flood protection by the year 2015. Woorden (2006, p. 4) states about these alternatives that "the objectives of the SPKD Room for the River are realised on time and that the parties concerned can guarantee sufficient financing for the project."

The Urban Water Partners commend the Water Assessment as being an appropriate and well developed instrument to support the integrated planning process. (Warner et al., 2006) On the other hand, the effectiveness of the WA is found to be limited because "provinces have quite some power in this, in practice they do not provide sufficient guidance and feed-back on these plans according to some of the interviewees.

4.1.2. England

There are ten river basins in England and Wales (Defra, 2005a). Eight river basins are covered by Regional Spatial Strategies; the other two basins are London and Wales. (Sue and Dave, 2007, p. 324)

The spatial planning system and the governance of water management in England has been affected by the Water Framework Directive (WFD) as in the other European countries. This advocated that River Basin Planning (RBP) aims to provide an opportunity to bring about the effective co-ordination of water environment policy and regulation across Europe. It is within this context that the main aims are prevention of deterioration and enhance the status of aquatic ecosystems, including groundwater, to ensure waters reach '**good**' status (for surface waters 'good' is in terms of chemical and ecological quality, and for groundwaters 'good' is in terms of chemical quality and water quantity); promotion of sustainable water use; reduction of pollution, and contribution to the mitigation of floods and droughts (Baker Associates, 2005). One of the key aspects of the River Basin Planning is integration of the River Basin Management Plans with other planning activities. Therefore, to paralel with the need for challenge, there has been fundamental revision of Spatial Planning Act - the Planning and Compensation Act (ODPM 2004a)- since 2004 as seen Figure 4.12.

Kidd and Shaw (2007, p. 319) note that "this act paved the way for a new ambitious era for spatial planning in England. There are several new characteristics of the Planning and Compensation Act 2004. First, this act emphasizes a set of principles for sustainable development. Second, territorial and sectoral integration are made clearer in this act. Kidd and Shaw (2007, p. 319-320) mention about the tiered system of statutory plans at both regional [Regional Spatial Strategies (RSSs)] and local [Local Development Frameworks (LDFs)] levels "requires connections to be made with key national strategies such as the Sustainable Communities Plan (ODPM, 2005) (the closest to a national spatial strategy that England has at present) and at an international level with the European Spatial Development Perspective.

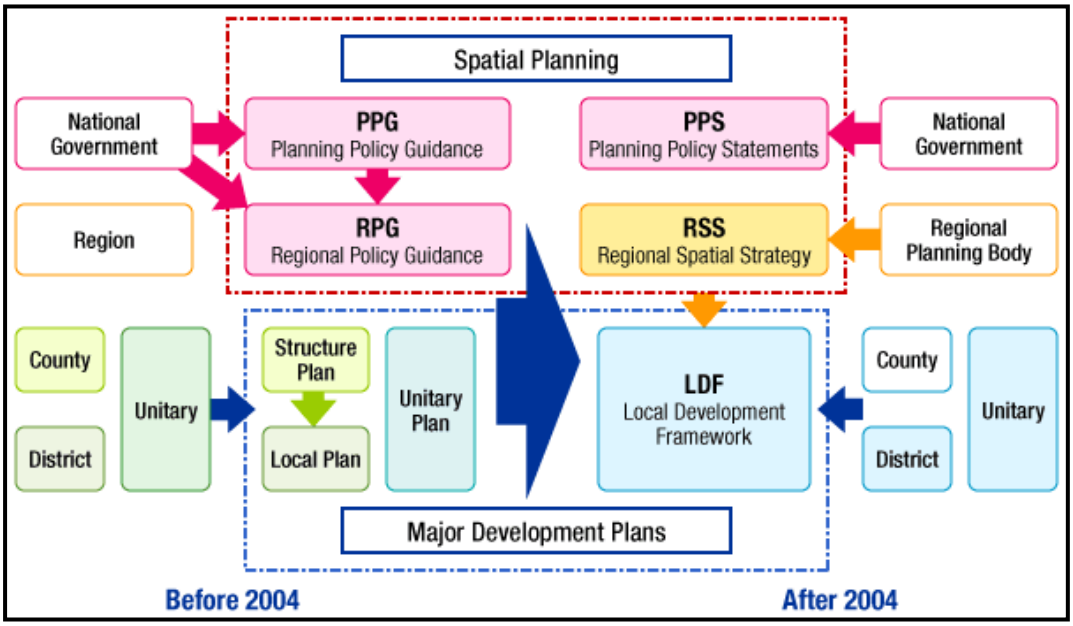


Figure 4.12. Spatial plannning system in England
(Source: *United Kingdom, n. d.*).

Figure 4.13 shows the pattern of territorial and sectoral integration with specific reference to water/environmental related documents in England.

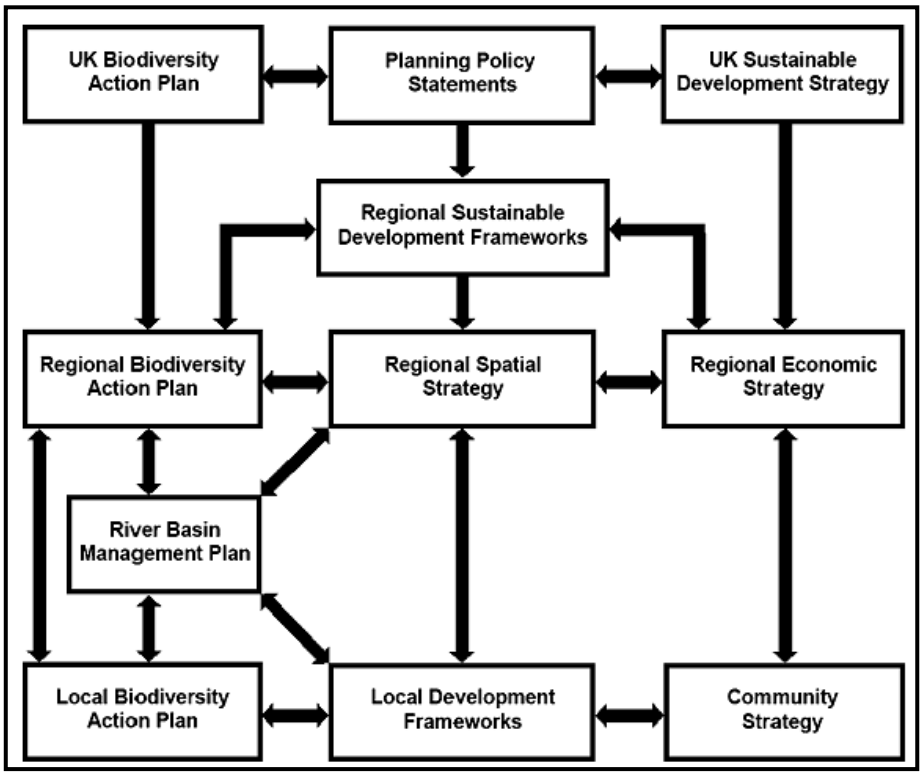


Figure 4.13. Spatial planning and examples of linkages with environmental plans and strategies.
(Source: Countryside Commission et al., 2005, p.8 cited in Kidd and Shaw, 2007, p. 320).

4.1.2.1. Administrative Structure

The Environmental Agency (EA) is central to spatial planning system as water management in England. Under Water Framework Directive (WFD), EA is responsible for produce a river basin management plan (RBMP), with the assistance of other stakeholders, for each of 9 River Basin Districts identified as covering England and Wales. It is mentioned in 'River Basin Planning Guidance' published by Draft Defra/WAG that the Environment Agency will have to work with elected councillors to ensure that the relevant RBMP requirements are reflected in the statutory spatial plans, where measures will need to be delivered through the statutory development planning process (DCLG, 2006).

Table 4.2 provides an overview of the key public agencies and plans that are currently considered to have a role to play in the governance of spatial planning and water management.

Table 4.2. Spatial Planning System in England (Source: NOFDP, 2006, p. 5).

Level	Planning body	Main policy instrument
Nation	Central Government Office of the Deputy Prime Minister(ODPM)	National Planning Legislation and Planning Policy
Region (9)	Government Offices for the Regions (GORs) Regional Development Agencies (RDAs)	Regional Spatial Strategies (RSS) (Post 2004)
Counties (34)	Elected County Council	Minerals and Waste Local Plans(post2004) Development Control
Districts (238)	District Council	Local Development Frameworks (post2004) / Development Control
Unitary Authorities and Boroughs (115)	Urban areas with a single tier of local government National Parks Authorities The Mayor of London	Unitary Development Plan (Pre 2004 Act) Local Development Frameworks (Post 2004 Act) / The London Plan

Under the Water Framework Directive, 2009 was the publishing date for the first River Basin Management Plans (RBMPs). Furthermore, these must be made operational by 2012. The spatial planning plans and strategies are influenced by them. EA (2006) listed the responsibilities of regional planning bodies and local planning authorities to improve under measures set out in River Basin Management Plans, drawn up for river basin districts across England:

- Identification of the water management issues that are relevant to spatial planning - planning policies should influence the design and location of new development to ensure it does not create adverse pressures on the water environment that could compromise our ability to meet WFD objectives.
- Including policies on sustainable water management in their development plans – including policies in Regional Spatial Strategies (RSS), core policies in Local Development Frameworks (LDFs) and area wide policies in Local Development Plans (LDPs).
- Helping to ensure that understanding of the pressures of, and opportunities for, development are reflected in the analysis underpinning RBMPs.
- Ensuring that spatial plans complement River Basin Management Plans
- Reviewing plans on publication of RBMPs to ensure that they contribute towards, and do not compromise the achievement of, WFD objectives.
- Using established mechanisms for community involvement and communication (EA, 2006, p. 2).

Planning Policy Statement 25 Development and flood risk (PPS 25) (DCLG, 2009), for example, determine the responsibilities of Regional planning bodies (RPBs) and local planning authorities (LPAs) to prepare and implement planning strategies that help to deliver sustainable development by appraising risk, managing risk, and reducing risk in para 6.

The Environment Agency's River Basin Planning Framework, named 'Water for Life and Livelihoods", considers the provision of arrangements for consultation and engagement on WFD based on linking activities at different scales, such as national engagement (a national stakeholder group), river basin district engagement (government office regions), catchment scale engagement, local engagement.

4.1.2.2. Decision Making Process and Policy Documents

In the case of England, the revised spatial planning system influenced by WFD and RMBPs is concentrated on particularly water in rivers, estuaries, coasts and aquifers (water and related concerns) as well as surface run off, coastal zone management and flooding. In national level, there is no national plan; but there are the set of national planning policy guidance notes (PPGs), include guidance that deals variously with development topics. CLG (2006) expresses that PPG and PPSs (planning policy statements) have an importance on how planners can begin to incorporate WFD objectives, prior to the publication of the RBMPs and the associated programmes of measures in 2009. Baker Associates (2005) underlines that the land use planning system have an important role to implement the elements of the "Programme of Measures" related to development and the use of land through preparation of development plans, and to make a contribution to WFD objectives. They also explain

that the existing and revised national planning policy guidance (PPG and PPSs) take an importance place in ensuring the linkage between water and planning.

To promote the objectives of the WFD through the planning system and to go beyond traditional land use planning concerns, Regional Spatial Strategies (RSSs) and Local development Framework (LDFs) play a central coordinating roles to draw together the spatial planning dimensions of a wide range policy areas (Kidd and Shaw, 2007). Baker Associations (2005) mentions about that RSSs are statutory with the enactment of the Bill and "to provide a spatial strategy, a framework for sub-regional spatial strategies and a framework for the policy content of LDFs and clear links to other strategies and programmes" (2005, p. 39). Baker Associations also note that "the essential components of LDFs are to be a spatial strategy, area action plans for some areas showing types of change wanted, proposals allocating land for development, a small number of policies identifying the tests for development to be acceptable, supplementary planning documents to guide the interpretation of policies" (2005, p. 39). Key policy references which directly relate to water planning and management issues are listed in Table 4.3.

Table 4.3 Key national planning guidance which directly relates to water planning and management (Source: Kidd and Shaw, 2007, p. 323).

Planning Policy Statement 1 Delivering sustainable communities (ODPM, 2005c)
Planning policy statement 11 Regional spatial strategies (ODPM, 2004b)
Planning policy statement 12 Local development frameworks (ODPM, 2005a)
Planning policy statement 23 Planning and pollution control (ODPM, 2004c)
Planning policy statement 25 Development and flood risk (DCLG, 2010)
Planning policy guidance 14 Development on unstable land (DoE, 1990)
Planning policy guidance 20 Coastal planning (DoE, 1992)
Planning policy statement: Planning and climate change, supplement to planning policy statement 1 (consultation document CLG, 2006)

PPS 11 'Regional Spatial Strategies' (2004) outlines what needs to be done to prepare the ground for the preparation of RSS. It is envisaged that all inland and coastal water should achieve to reach EU '**good status**' by 2015. In this PPS, a river basin district structure within which demanding environmental objectives is suggested to reach ecological targets for water areas.

The Core Output Indicators reported in the document 'Regional Spatial Strategy and Local Development Framework Core Output Indicators - Update 2/2008' (DCLG, 2008). '(Inappropriate) Development in the floodplain' and 'development that adversely affects water quality' have been specified by the Government as core output indicators

directly to be linked to specific national targets. Therefore, UK's legal framework is focused on the persistence of PPG 23 Planning and pollution control and PPG25 Development and flood risk (Baker Associates, 2005). PPG 23 Planning and pollution control includes "Annex 1: Pollution Control, Air and Water Quality" and "Annex 2: Development on Land Affected by Contamination". For instance, Annex 1 aims to explain the background to the Pollution Control legislation, its interactions with the planning system and how these interactions are dealt with in planning.

Due to the geographic location of the country, The UK is concentrated on the flood prevention in legal sense, is observed. DCLG (2009) defines Planning Policy Statement 25: Development and Flood Risk (PPS25) as a part of the plan led approach to spatial planning. PPS 25 (Planning Policy Statement 25: Development and Flood Risk) is initially stated that the general aims in planning for avoiding inappropriate development in the flood plain are:

- to protect land that is required for current and future flood management
- to clarify how to implement its policies in practice
- to set out how regional planning bodies and local planning authorities can deliver the national policies. (Grant, 2010; DCLG, 2010; DCLG, 2009).

Planning authorities suggest to "avoid inappropriate development in the flood plain and are recommended to make use of "the benefits of green infrastructure for flood storage, conveyance and SuDS; re-creating functional floodplain; and setting back defences" (Grant, 2010, p. 19). It is advocated that however there is no legal requirement for their implementation, the sustainable urban drainage systems (SUDSs), which local authorities must actively promote, in the management of run off from developments must be considered for all new developments in the UK in order to minimize their impact on surface waters (Grant, 2010; Kidd and Shaw, 2007). In the PPS 25, the aproaches of Sustainable Drainage Systems (SUDS) are explained as below:

- source control measures including rainwater recycling and drainage;
- infiltration devices to allow water to soak into the ground, that can include individual soakaways and communal facilities;
- filter strips and swales, which are vegetated features that hold and drain water downhill mimicking natural drainage patterns;
- filter drains and porous pavements to allow rainwater and run-off to infiltrate into permeable material below ground and provide storage if needed; and
- basins and ponds to hold excess water after rain and allow controlled discharge that avoids flooding (DCLG, 2010, p. 34).

The PPS 25 also offers that RPBs and LPAs should further the use of SUDS by:

- incorporating favourable policies within Regional Spatial Strategies;
- adopting policies for incorporating SUDS requirements in Local Development Documents;
- encouraging developers to utilise SUDS wherever practicable in the design of development, if necessary through the use of appropriate planning conditions or by planning agreements;
- developing joint strategies with sewerage undertakers and the Environment Agency to further encourage the use of SUDS as an aid to mitigating the rate and volume of surface water flows; and
- promoting the use of SUDS to achieve wider benefits such as sustainable development, water quality, biodiversity and local amenity (DCLG, 2010, p. 34).

The activities to manage flood risk and coastal erosion are defined by EA as maintaining flood barriers and pumping stations, clearing grills and removing obstructions from rivers, controlling aquatic weed within rivers, managing grass, trees and bushes on our flood embankments, inspection and repair of flood defence structures, and controlling aquatic weed within rivers, managing grass, trees and bushes on our flood embankments, and inspection and repair of flood defence structures (EA, 2006).

PPS 25 Practice Guide (2009) provides a technical guidance for the role of surface water management plans in the planning system. The hierarchy used in this practice guide with applying the source-pathway-receptor model (seen Figure 4.14) to planning for development in areas of flood risk further develops the appraise, manage and reduce flood risk approach in PPS25 (DCLG, 2010; DCLG, 2009).

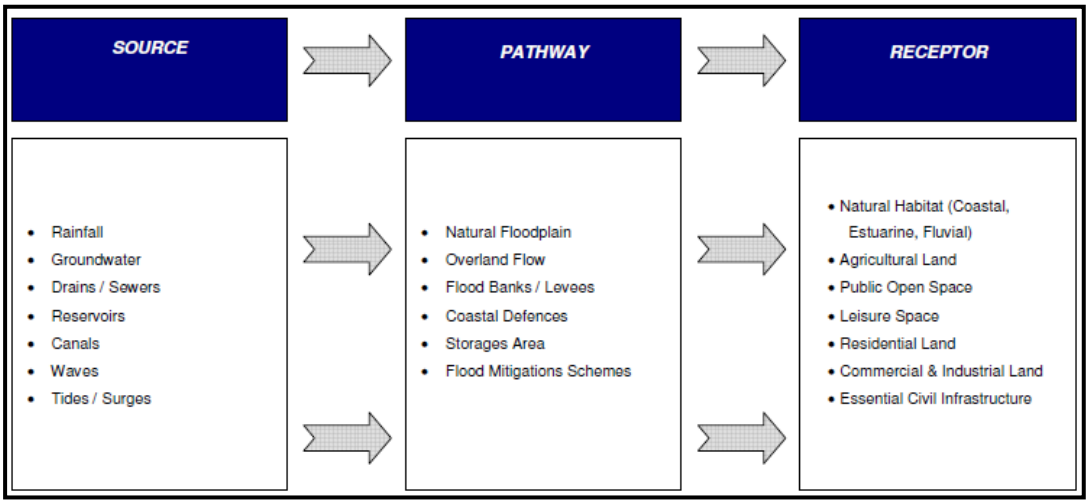


Figure 4.14. Source-Pathway-Receptor Model for flood risk management (Source: DCLG, 2010, p. 25).

Kidd and Shaw (2007, p. 321) pose that "land and water interactions receive more attention in PPS 25. In PPS 25, It is advised that "Regional planning bodies (RPBs) should ensure their Regional Spatial Strategies (RSSs) that include a broad

consideration of flood risk from all sources and set out a strategy for managing it, consistent with Regional Flood Risk Appraisals (RFRAs) and Strategic Flood Risk Assessments (SFRAs), the policies in this PPS and Shoreline Management Plans, Catchment Flood Management Plans and River Basin Management Plans prepared by the Environment Agency under the Water Framework Directive" (DCLG, 2010, para 7).

When RFRAs provide a broad overview of flood risk issues across a region, SFRAs provide an assessment of all types of flood risk to inform land use planning decisions. Furthermore, Flood Risk Assessments (FRAs) are site or project specific.

Responsibilities for producing the key documents required managing flood risk through each stage of the spatial planning process and linkages between strategic documents prepared by flood and coastal defence operating authorities operating authorities are presented in the Figure 4.15. This figure also, as stated by Kidd and Shaw (2007), is an example of the pattern of territorial and sectoral integration for managing flood risks.

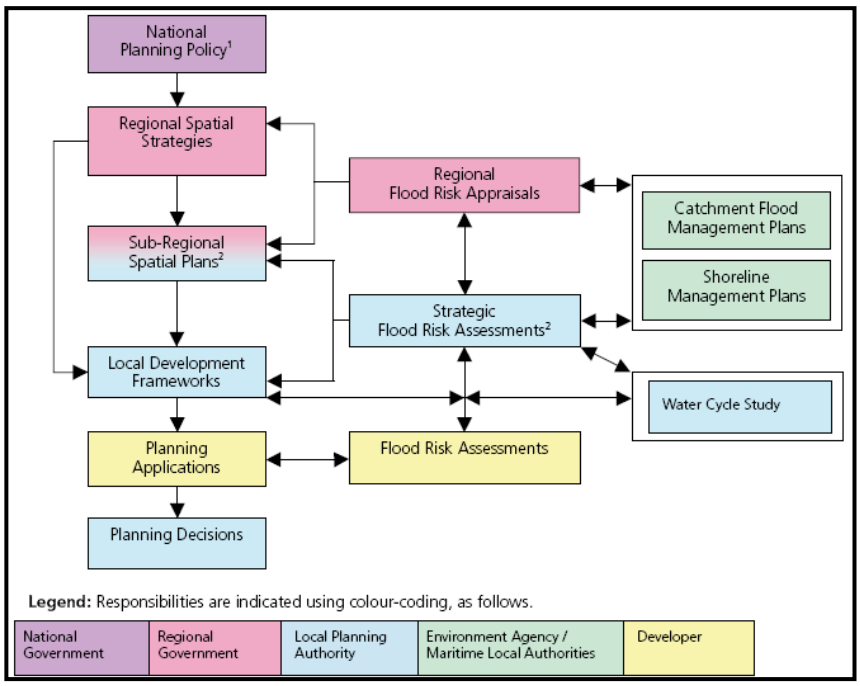


Figure 4.15. Key documents in the spatial planning process and their links with other key strategies for managing flood risk (Source: DCLG, 2009, p. 9).

Furthermore, the guidance advises local planning authorities to prepare Local Development Documents (LDDs) that "set out policies for the allocation of sites and the control of development which avoid flood risk to people and property where possible

and manage it elsewhere, reflecting the approach to managing flood risk in this PPS and in the RSS for their region" (DCLG, 2010, para 7).

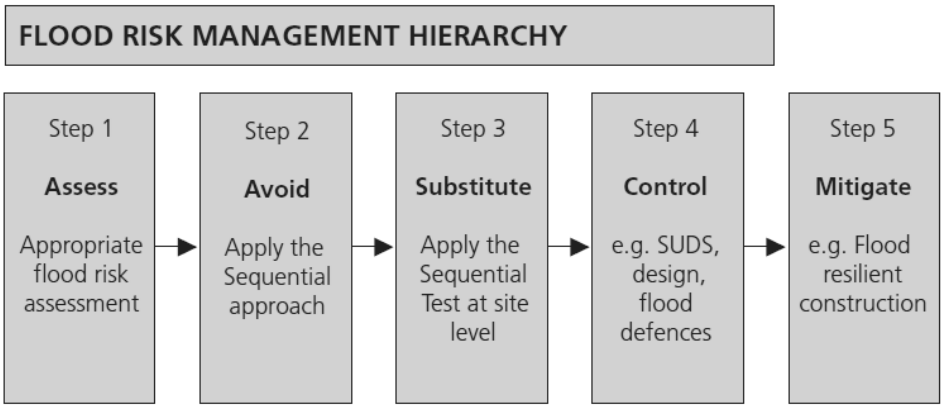


Figure 4.16. The steps of the flood risk management hierarchy
(Source: DCLG, 2009, p. 2).

In this guidance, more sophisticated flood risk management hierarchy approach, to explain how flood risk should be taken into account at all levels of the planning system are suggested. This process of this approach is composed of five sequential stages that are assess – avoid – substitute – control – mitigate as presented in Figure 16. In the Table 4.4, this sequential approach is summarized to examine how the spatial planning process should do this.

DCLG (2009, p. 15) states that "the RSS should include policies to limit the vulnerability of development in flood risk areas by establishing locational criteria to guide development allocation at the local authority level. The effective locational criteria will aid LPAs in applying the Sequential Test and help avoid the type of development that requires application of the Exception Test at the Local Development Document stage".

Under PPS 25, zones with an 'acceptable' level of flood risk are defined. These zones are summarized in Table 4.5. These Flood Zones referred to the probability of river and sea flooding; ignoring the presence of defences is given to inform the planners within the UK example.

Table 4.4. Overview of how the spatial planning process can manage flood risk strategically (Source: DCLG, 2009a, p. 7-8).

Flood risk management stage	What it means	How the planning system deals with it	Who is responsible
Assess	Undertake studies to collect data at the appropriate scale and level of detail to understand what the flood risk is.	Regional Flood Risk Appraisals, Strategic Flood Risk Assessments, Flood Risk Assessments and application of the sequential approach.	Planning bodies and developers.
Avoidance/ Prevention	Allocate developments to areas of least flood risk and apportion development types vulnerable to the impact of flooding to areas of least risk.	Use the Sequential approach (including the Sequential Test and Exception Test where relevant) to locate development in appropriate locations.	Planning bodies and developers.
Substitution	Substitute less vulnerable development types for those incompatible with the degree of flood risk.	At the plan level, the Sustainability Appraisal should show how flood risk has been weighted against other sustainability criteria.	Planning bodies and developers
Control	Implement flood risk management measures to reduce the impact of new development on flood frequency and use appropriate design.	Use River Basin Management Plans, Catchment Flood Management Plans, Shoreline Management Plans, Surface Water Management Plans, Flood Risk Management Strategies, appraisal, design and implementation of flood defences.	Planning bodies, Environment Agency and other flood and coastal defence operating authorities, developers and sewerage undertakers. Developers are responsible for design of new developments
Mitigation	Implement measures to mitigate residual risks.	Flood risk assessments. Incorporating flood resistance and resilience measures. Emergency Planning Documents. Implementation of flood warning and evacuation procedures	Planning bodies, emergency planners, developers, the Environment Agency, other flood and coastal defence operating authorities and sewerage undertakers

As it is pointed out that during the preparation and review of Regional Spatial Strategies (RSSs) and Local Development Documents (LDDs), within each Flood Zone, new development should be directed to sites at the lowest probability of flooding from all sources (DCLG, 2010; DCLG, 2009a). Development locating in Flood Zone 2 and then Flood Zone 3 should apply the Sequential Test to be consistent with wider sustainability objectives. It is envisaged that if application of the Sequential Test cannot deliver wider sustainability development objectives, the Exception Test can be applied when there are large araes in Flood Zones 2 and 3 (DCLG, 2010). Furthermore, this guidance includes Flood Risk Vulnerability Classification that consists of classes such as essential infrastructure, high vulnerable (Zone 3a), more vulnerable (Zone 2), less vulnerable (Zone 1) and water-compatible development. These classes identify appropriate uses to keep functioning during flooding. The class of high vulnerable, for example, includes police stations, ambulance stations, fire stations, command centres, telecommunications installations required to be operational during flooding; emergency dispersal points; basement dwellings, aravans, mobile homes and park homes intended for permanent residential use; and installations requiring hazardous substances consent" (DCLG, 2010, Table D.2 Annex D).

Table 4.5. Flood Zones defined by PPS25 (Source: Adapted from DCLG, 2010).

Zone 1 - Low Probability	
Definition	land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%).
Appropriate uses	All uses of land are appropriate in this zone.
Zone 2 - Medium probability	
Definition	land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% – 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% – 0.1%) in any year.
Appropriate uses	The water-compatible, less vulnerable and more vulnerable uses of land and essential infrastructure are appropriate in this zone Subject to the Sequential Test being applied, the highly vulnerable uses are only appropriate in this zone if the Exception Test (see para. D.9.) is passed.
Zone 3a - High Probability	
Definition	land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
Appropriate uses	The water-compatible and less vulnerable uses of land are appropriate in this zone. The highly vulnerable uses should not be permitted in this zone. The more vulnerable and essential infrastructure uses should only be permitted in this zone if the Exception Test) is passed. Essential infrastructure permitted in this zone should be designed and constructed to remain operational and safe for users in times of flood.
Zone 3b - Functional Floodplain	
Definition	land where water has to flow or be stored in times of flood. SFRAs should identify this Flood Zone (land which would flood with an annual probability of 1 in 20 (5%) or greater in any year or is designed to flood in an extreme (0.1%) flood
Appropriate uses	Only the water-compatible uses and the essential infrastructure that has to be there should be permitted in this zone. It should be designed and constructed to: – remain operational and safe for users in times of flood; – result in no net loss of floodplain storage; – not impede water flows; and – not increase flood risk elsewhere.

Morever, in 2007, Kidd and Shaw's paper *Integrated water resource management and institutional integration: Realizing the potential of spatial planning in England*, published in The Geographical Journal, emphasizes the importance of regional spatial strategies and local development frameworks in delivering Water Framework Directive and IWRM ambitions. By critically assessing the potential of the spatial planning system in England to contribute to the new IWRM arrangements, they examine sectoral (cross-sectoral and inter-agency), territorial (vertical -horizontal) and organizational (strategic-poerational and disciplinary/ stakeholder integration) integration are the key issues in spatial planning activity related with IWRM. As stated in this paper, running parallel with these gaps or inadequacies, revised spatial planning in England provides clearly an opportunity to build upon these relationships in order to play a more active role in water management affairs. Kidd and Shaw also emphasize the poorly developed links between RBMPs and RSSs at present (Kidd and Shaw, 2007).

White and Howe's paper *Planning and the European Union Water Framework Directive*, published in The Journal of Environmental Planning and Management, poses that the interaction between RMBP's and land use planning and development control systems presents a degree of ambiquity. In that circumstance, White and Howe (2010, p. 630) argue that there is "a need for new government planning quidance to clarify change in role or responsibilities as in its absence it is only possible to speculate about the impact"

4.1.2.3. The Application of Spatial Planning Tools for Integration Process

As pointed out by Kidd and Shaw (2007), The English case gives many examples of good practice and innovation which illustrate the ability of the spatial planning system to place water management at the centre of planning for communities. The designation of the Blue Ribbon Network in the London Plan and the development of associated policies (Pinch and Munt 2002; Kidd and Shaw, 2007), range of LDF initiatives taken by London Borough of Hackney or Leeds City Council are regarded as the good examples.

The case of the Blue Ribbon Network in the London Plan (The Office of the Mayor of London, 2008) can be taken into account as a successful example for the development of innovative water-sensitive spatial strategies and plans. The report of

this case points out that The Mayor's London Plan (2008) has an establishing a principle for, that 'the water must be the starting point' when considering waterside developments". Howes (2008) outlines this network as a major step forward in advancing integrated water management through the planning system. The Blue Ribbon Network recognizes the value of ecological networks, the improvements to diversity, and the creation of habitat nodes (Howes, 2008).

The **Blue Ribbon Network**, a policy element of the London Plan, includes the Thames, the canal network, the other tributaries, rivers and streams within London and London's open water spaces such as docks, reservoirs and lakes as seen Figure 4.17.

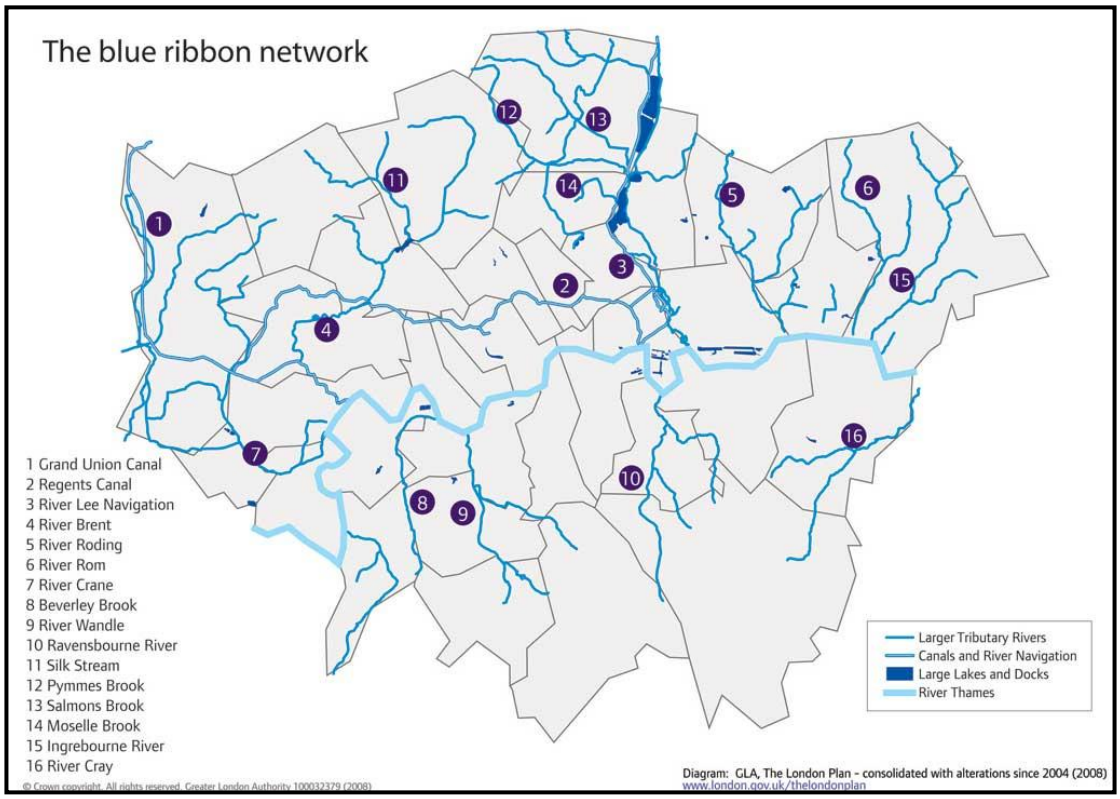


Figure 4.17. The Blue Ribbon Network
(Source: The Office of the Mayor of London, 2008, p. 16).

In regard to the Blue Ribbon Network, Section 4C of the London Plan includes six principles to inform decisions that summarised as follows:

- protecting and enhancing the multi-functional nature of the Blue Ribbon Network to support uses and activities that require a water or waterside location;
- protecting and enhancing the Blue Ribbon Network as part of the public realm and London's open space network, and promoting sport, leisure and education;
- exploiting the potential for water-borne transport, leisure, tourism and waterway support industries, and capturing the investment potential of the Network through appropriate waterside development and regeneration;

- ensuring the Blue Ribbon Network is accessible for everyone and that its cultural and environmental assets are used to stimulate appropriate development in areas of regeneration and need;
- increasing use of the Blue Ribbon Network for transport of people and goods;
- protecting and enhancing the biodiversity and landscape of the Blue Ribbon Network, and having regard to the need for water supplies, sewage disposal and the risk of flooding (London Assembly, 2006, p. 11).

The Blue Ribbon Network section of the London Plan considers 34 policies for meeting these principles. The key statutory organisations include British Waterways, the Environment Agency and the Port of London Authority. It is noticed that "all agencies involved in the management of the Blue Ribbon Network have worked collaboratively to ensure a co-ordinated and cohesive approach to land use planning" (The Office of the Mayor of London, 2008, p. 268).

Another example is Hackney Wick Area Action Plan (LDF initiatives) taken by London Borough of Hackney. Hackney Wick Area is at risk of flooding and therefore in order for growth and development. Hackney Wick Area Action Plan suggests that development in Hackney Wick should:

- reduce surface water runoff rates through the application of Sustainable Drainage Systems (SuDS). The use of SuDS will ensure that rainwater runoff, is stored and treated on-site before it is discharged into local waterways;
- ensure potential overland flow paths are determined and appropriate solutions proposed to minimise the impact of the development;
- include opportunities in the development for rainwater harvesting, green roofs, permeable gardens and public realm areas should be essential initiatives to minimise run-off. Water storage and treatment areas can be incorporated into public realm and open space areas (London Borough of Hackney, 2010, p. 63).

In Hackney Wick Area, the master plan includes Strategic Flood Risk Mitigation Scheme and a site specific Flood Risk Assessment (FRA) to support the planning application. In this document, the flood hazard classifications across the Hackney Wickarea during the 1 in 100 year fluvial and 1 in 20 year tidal flood event, illustrated with regard to the classifies as 'Extreme Hazard', 'Significant Hazard', 'Moderate Hazard', and 'Low Hazard' (London Borough of Hackney, 2010).

In the line with PPS 25, examples of planning appeal decisions shows where a sequential approach has not been properly followed and, as a consequence, has had a bearing on the appeal decision reached. Brentmead Place located in Barnet, London is given an example. The planning application site in this area was located partly within Flood Zone 3a and partly within Zone 3b, the functional flood plain. The application (to replace derelict houses with new build residential student accommodation) was refused

by the Council of the London Borough of Barnet due to not passed the Exception Test, and the Sequential Test.

Furthermore, 'Sustainable Management of Urban Rivers and Floodplains' (SMURF), adopted as a Supplementary Planning Document in 2007 by Birmingham City Council, is a European Commission-sponsored project that the Environment Agency is undertaking in partnership with Birmingham City Council, HR Wallingford, Severn Trent Water, Staatliches Umweltamt Herten (Germany) and the University of Birmingham (EA, 2004, p. 54). EA (2004, p. 54) defines this project as "a demonstration project aiming to develop tools to allow the sustainable, integrated planning of land use and water resources management within the urban extent of the Tame catchment".

The SMURF document is produced to overcome the problems that are polluted and artificially constrained water bodies, with run-off from the urban catchment leading to low oxygen levels, contamination from former mine workings, urban diffuse pollution and flood risk management problems (EA, 2006).

Policies for development near to river corridors in Birmingham plan are depend on twelwe headings that are water quality, water pollution prevention, sustainable urban drainage systems (SUDs) and surface water run off, character of the river corridors, the floodplain nature conservation and landscaping, the historic environment, design of developments, access, education and recreation, safety and litter, and community involvement (Birmingham City Council, 2007). These policies are carried out as part of the SMURF Project, based on existing European, National and Local Guidance and on the results of consultation. This project also aims to develop a Geographical Information Systems (GIS) resource which will include flood modelling in addition to water quality and land planning information (EA, 2004).

4.1.3. Australia

The Australian mainland is made up of five states and three territories, with the sixth state of Tasmania being made up of islands.The states are Western Australia, South Australia, Queensland, Victoria and Tasmania as seen Figure 4.18.

As extensive spatial restructuring, Australian cities have experienced urban water management during the past two decades (Dodson, 2009). Australian cities have

seen a revival of interest in minimizing the hydrological impacts of urban development on the surrounding environment. In recent years there has been a growing awareness of the significance environmental issues in Australian cities.

Reviews of literature regarding integration land use planning and water resources management in Australia have generally focused on within the aspects of Water Sensitive Urban Design (WSUD) on urban water/wastewater and stormwater provision and management solutions (Dodson, 2009; Tjandratmadja et al., 2008; Western Australian Planning Commission, 2008). The dynamics of major water system and the initiatives, such as Water for Future, have been vital for the reclamation and urbanization of Australian territory.

Figure 4.18. Regional map of Australia
(Source: *Resource Management, n.d.*).

There is a large range of guidelines and planning tools accross Australia, both statutory and non-statutory that can be used at different stages of the planning process to incorporate WSUD into new developments. These are building codes, plumbing codes, Australian standards, national and state guidelines, state planning provisions, local government environment plans, development plans, sustainability assessment tools (e.g. BASIX) and national schemes (Tjandraatmadja et al., 2008, p. 6; Essential Environmental Services, 2004).

4.1.3.1. Administrative Structure

State and local governments play a pivotal role in the implementation of WSUD in Australia, primarily through the State and local government planning approvals system as seen Figure 4.19 (Essential Environmental Services, 2004).

The Department for Planning and Infrastructure/Western Australian Planning Commission (WAPC) and the Department of Water with local governments play a key role in the administration and monitoring of planning, and water plans, policies and programmes. The agencies working together to integrate land and water planning and implement water sensitive urban design and their roles within the Australian planning system are illustrated in the Table 4.6. WAPC's document Better Urban Water Management (2008) examines in detail the responsibilities for actions required at each planning stages. This table shows the planning tools and responsible agencies on both aproval and preparation in WA.

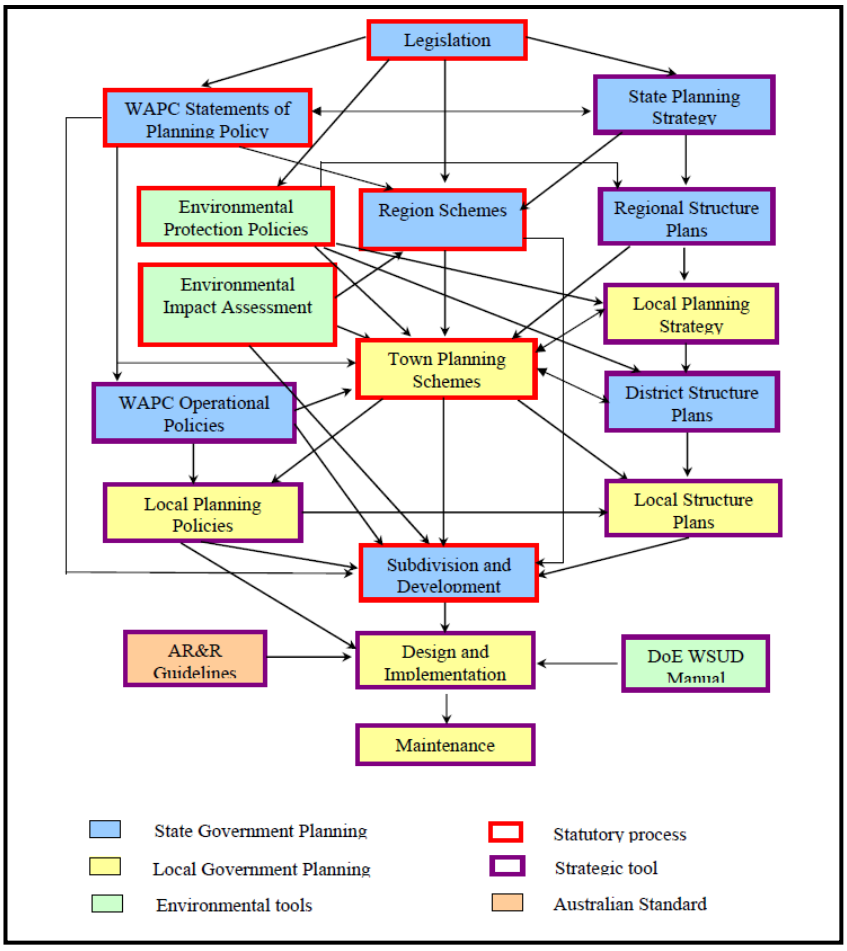


Figure 4.19. The statutory of approval process
(Source: Essential Environmental Services, 2004, p.2).

Table 4.6. The proposed process and accountability for stages of the process in Western Australia (Source: WAPC, 2008a; WAPC, 2008).

Planning Stage	Land planning tool	Responsibility for preparation	Responsibility for approval
Regional and subregional planning (Greater than one local government area)	Regional or subregional strategy, region scheme or regional or subregional structure plan	State government agencies	WAPC on advice of DoW
District planning (Generally > 300 ha (may not be in inner metro areas), may be >1 LGA)	District structure plan, local planning strategy, region scheme amendment	State/local government planning agencies, depending on initiator of planning action	WAPC on advice of DoW
Local planning (< 300 ha)	Local planning Scheme amendment, local structure plan	Landowner/local government, depending on initiator of planning action	WAPC on advice of DoW
Subdivision (Large > 20 ha Small < 20 ha)	Subdivision Proposal	Landowner/developer	N/A

In regard to its administrative system, in the e-paper of "*Achieving better urban water management in Western Australia"* (Shepherd, 2009), New WAter Ways is considered as A capacity-building program established to build a greater level of understanding and support for water sensitive urban design. This program partners are the Department of Water, Department of Planning and Infrastructure, Water Corporation, Urban Development Institute of Australia (WA) and the Western Australian Local Government Association. Though the extent of planning does not reach the broader approach of national spatial planning context, the existing administrative system and institutional framework is facilitated by delivering an adaptive and responsive up-skilling program for State and Local Government engineers, planners and the development industry in water-sensitive urban design (Shepherd, 2009).

4.1.3.2. Decision Making Process and Policy Documents

The National Water Initiative (NWI), inter-governmental agreement by State and Territory Governments in the Australia, is a comprehensive national strategy to improve water management across the country (Joint Steering Committee for Water Sensitive Cities, 2009). All states and territories are responsible for innovation and

capacity building to create "Water Sensitive Australian Cities" in accordance with NWI Clause 92 (Joint Steering Committee for Water Sensitive Cities, 2009). In terms of sustainable development, integrated urban water cycle management has been defined by The National Water Commission as:

> The integration of water supply, sewerage and stormwater, so that water is used optimally within a catchment resource, state and national policy context. It promotes the coordinated planning, development and management of water, land and related resources (including energy use) that are linked to urban areas and the application of water-sensitive urban design principles in the built urban environment (WAPC, 2008a, p. 1).

Within the National Urban Water Planning Principles, some key principles to achieve optimal urban water planning outcomes include such phrases as 'manage water in the urban context on a whole-of-water-cycle basis', 'consider the full portfolio of water supply and demand options', 'develop and manage urban water supplies within sustainable limits', 'periodically review urban water plans' (The Australian Government-Department of Sustainability, Environment, Water, Population and Communities, 2009). These are worthy regarding inclusion of water concept and water-environment relations in plans and planning. Under the objective to '**Innovate and Build Capacity to Create Water Sensitive Australian Cities'**, the concept of "**Water Sensitive Urban (WSU) developments** that incorporate '**Water Sensitive Urban Design'** (WSUD) and '**Integrated Urban Water Management'** (IUWM) principles are has received considerable attention since the early 1990s (Tjandraatmadja et al., 2008).

Definitions and sets of principles for WSUD According to Engineers Australia (2006), the peak engineering institutional body for Australia defined WSUD as a significant shift in the planning and design of cities and towns (2006). Brown, Keath and Wong, in their 2008 paper – propose urban water transitions framework that highlight transitional stages in the development of urban water management across Australian cities as seen Figure 4.20. They express the 'Cumulative Socio-Political Drivers' as shifts in the normative and regulative dimensions of the hydro-social contract and the 'Service Delivery Functions' as the cognitive response. In accordance with Urban Water Management Transitions Framework, Smith (2010; 23) poses that "Water Sensitive Urban Design fundamentally is seeking to retrofit and transform cities in the 21st century into water sensitive cities that are resilient to climate change"

Throughout their development and implementations, spatial planning concepts of Australian planning have been associated with the basic principles of concentration

of total water cycle management and water sensitive urban development to improve the management of stormwater and increase the efficiency of the use of water (Department of Planning and Infrastructure, Department of Water, Western Australian Local Government Authority and Department of Environment, Water, Heritage and the Arts, 2008; WAPC, 2008).

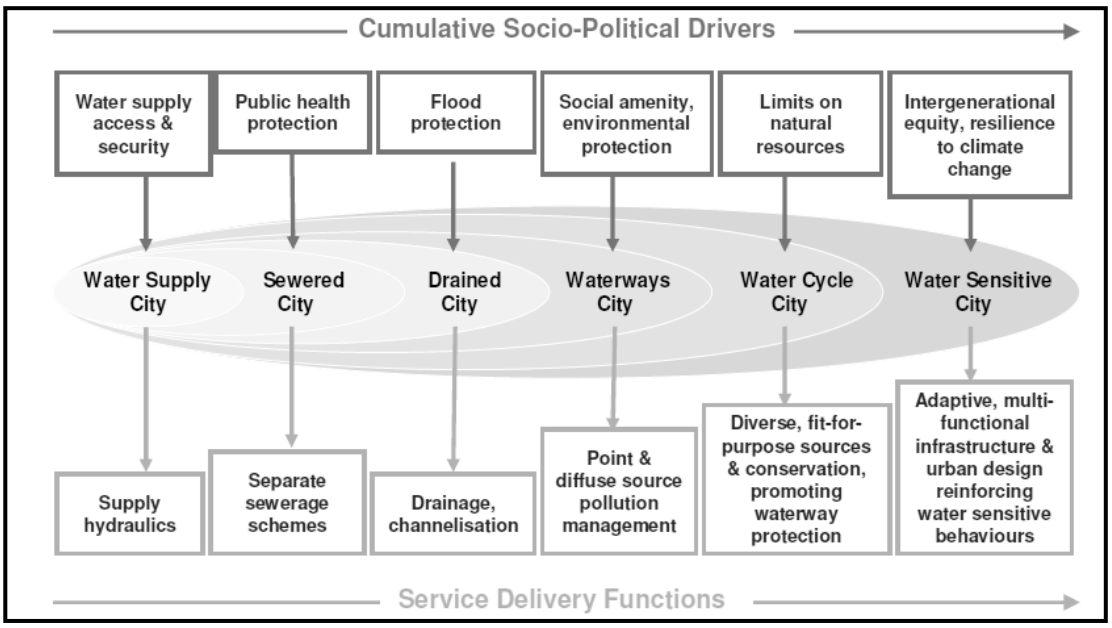


Figure 4.20. Urban Water Management Transitions Framework
(Source: Brown et al., 2008 cited in Smith, 2010, p. 6).

It is accepted that Water Sensitive Urban Design (WSUD) commonly used across Australia reflects a new paradigm that aims to management of water resources opportunities are being considered in the earliest stages of the decision making process that is associated with urban planning and design (Mouritz et al., 2006; Joint Steering Committee for Water Sensitive Cities, 2009). NWI paragraph 92 focus on providing guidance on WSUD option as follows:

> Water Sensitive Urban Developments are developments designed to apply WSUD principles at the on-site scale, including large scale residential developments (typically greenfield developments), small–medium scale residential developments (likely to include infill developments and conversions in existing urban areas), large and small–medium scale industrial developments and regional developments (Paragraph 92, National Water Initiative).

All local governments, states and territory agencies in Australia are encouraged to consider the adoption of the WSUD principles and techniques. The government has published guidelines of the adoption of WSUD on a more widespread scale. Figure 4.21 represents the objectives of WSUD. A particular issue, raised by WSUD framework, is

that there will be consistency between objectives across various agencies at local, state and national levels.

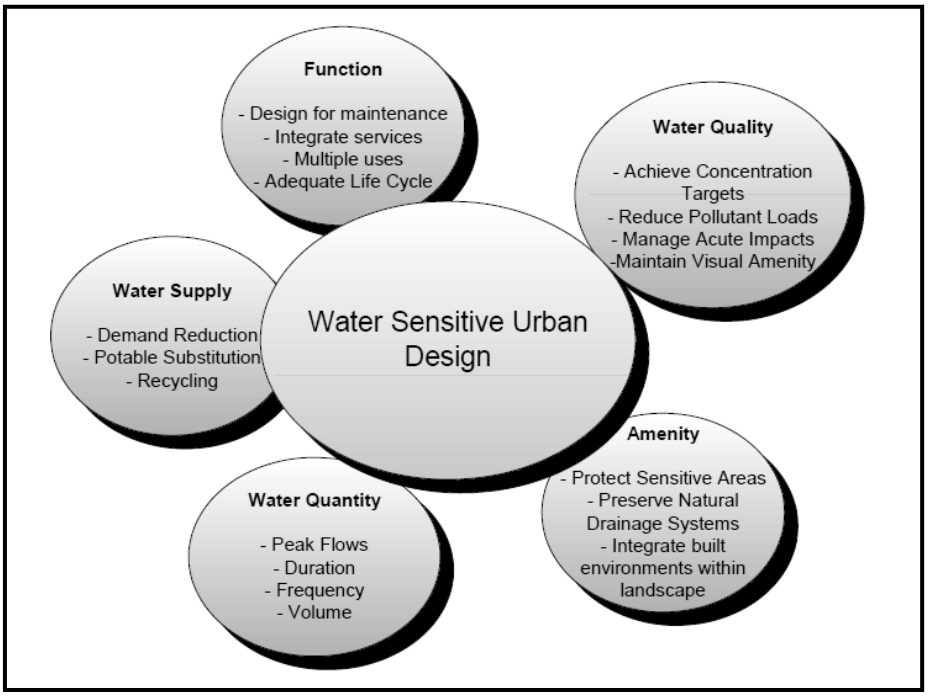


Figure 4.21. Objectives of WSUD
(Source: Smith, 2010, p. 7).

In the nationwide, most government policy and guideline documents associate the aspects of WSUD with addressing stormwater quality and quantity problems in order to improve the health of receiving waters in Australia (Morrison and Brown, 2010, p. 83). Although these guidelines are not mandatory and have no formal legal status, each state or local jurisdictions have their own legislative and regulatory tools to refine these guidelines into their own locally specific material such as territories of Western Australia, New South Wales, Queensland, South Australia and Tasmania (Joint Steering Committee for Water Sensitive Cities, 2009). Furthermore, it is recognized that the local policy for WSUD is outlined in a general provisions for district zoning schemes (local planning schemes) for Local Governments (Joint Steering Committee for Water Sensitive Cities, 2009). This policy document is directed by the scheme provisions for WSUD that require to contain the following parts: preliminary, local planning policy framework, reserves, zones and the use of land, general development requirements, special control area, heritage protection, development of land, applications for planning approval, procedure for dealing with applications, enforcement and administration, schedules, scheme provisions for WSUD.

This sub-section, in the scale of Australia, is focused on Western Australia's spatial restructuring and the management of water resource because of realization of strategies and policies across (in) the State - in Perth and the south-west region, as well as in the north-west to achieve better water management in Western Australia. Since 1980s, the government of WA has been trying to minimize the impact of urbanisation on the natural water cycle. In response to this, the emerging planning agenda focuses on the use of water sensitive urban design techniques employed during planning, design and construction of urban developments.

Guided by an integrative national policy framework, The Western Australia State Water Strategy aims **to recycle 20% of treated wastewater by 2012** with a preference for large scale reuse schemes (rather than household scale). Within the realm of this strategy, the potential for providing water 'fit for purpose' for irrigated horticulture, green space irrigation and industry, the adoption of managed aquifer recharge to increase water availability in groundwater systems and to maintain environmental values are considered important (Tjandraatmadja et al., 2008). Key current guidance documents of relevance to water planning and management to integrate more efficiently land and water planning, recognized by The State Government are:

- State Water Plan (2007);
- State Water Strategy (2003);
- Government Response to the Irrigation Review (2005);
- A Blueprint for Water Reform in Western Australia (2006);
- State Planning Policy No 2: Environment and Natural Resources (2003);
- State Planning Policy No 2.9: Water Resources (2006); and
- Liveable Neighbourhoods: a Western Australian Government sustainable cities initiative (2007).

Another key guidance documents Better Urban Water Management (Department of Planning and Infrastructure, Department of Water, Western Australian Local Government Authority and Department of Environment, Water, Heritage and the Arts, 2008) is being developed. This document provides guidance for how water resources should be considered at each stage of the land use planning process.

Laying down the vision on urban water management, the national policy document *State Planning Policy 2.9 Water Resources* (Government of WA, 2006) constitutes the key principles for integrated water cycle management are:

- consideration of all water resources, including wastewater, in water planning;

- integration of ***water and land use planning***;
- the sustainable and equitable use of all water sources, having consideration of the needs of all water users, including the community, industry and the environment;
- integration of human water use and natural water processes; and a whole-of-catchment integration of natural resource use and management (Department of Water. 2008, p. 1).

Within a requirement of the *State Water Strategy for Western Australia* (Government of Western Australia, 2003, *State Planning Policy (SPP) 2.9 Water Resources* (Government of Western Australia, 2006) supports integration of land and water planning to achieve more sustainable development and the protection of water resources by the implementation of water sensitive urban design (Tjandraatmadja et al., 2008, p. 11).

The published guidance of Better Urban Water Management (Department of Planning and Infrastructure, Department of Water, Western Australian Local Government Authority and Department of Environment, Water, Heritage and the Arts, 2008) has been developed to ensure an appropriate level of consideration is given to the total water cycle at each stage of the planning system and to provide guidance on the implementation of State Planning Policy 2.9 Water Resources (WAPC, 2008). This guidance is able to advise on the general principles and issues that need to be considered when formulating a WSUD for developers, strategic urban planners, urban designers.

In this guidance, it is recognized that "the urban water cycle should be managed as a single system in which all urban water flows are recognised as a potential resource and where the interconnectedness of water supply, groundwater, stormwater, wastewater, flooding, water quality, wetlands, watercourses, estuaries and coastal waters is recognised" (Department of Planning and Infrastructure, Department of Water, Western Australian Local Government Authority and Department of Environment, Water, Heritage and the Arts, 2008, p. 1). In addition to urban development context, managing water systems are expressed in three levels as follows:

1. **Integrated water cycle management** including long-term water resource management and planning (extends to catchment /regional scale)
2. **Water sensitive urban design** focussed built environment (local scale)
3. **Water sensitive urban developments** on built environment (on site scale) (Department of Planning and Infrastructure, Department of Water, Western Australian Local Government Authority and Department of Environment, Water, Heritage and the Arts, 2008).

Figure 4.22 presents a review of the regulatory/statutory framework for the implementation of Water Sensitive Urban Design (WSUD) through the statutory approvals process in Western Australia on scales of planning -state, regional and sub-regional, district, local, subdivision.

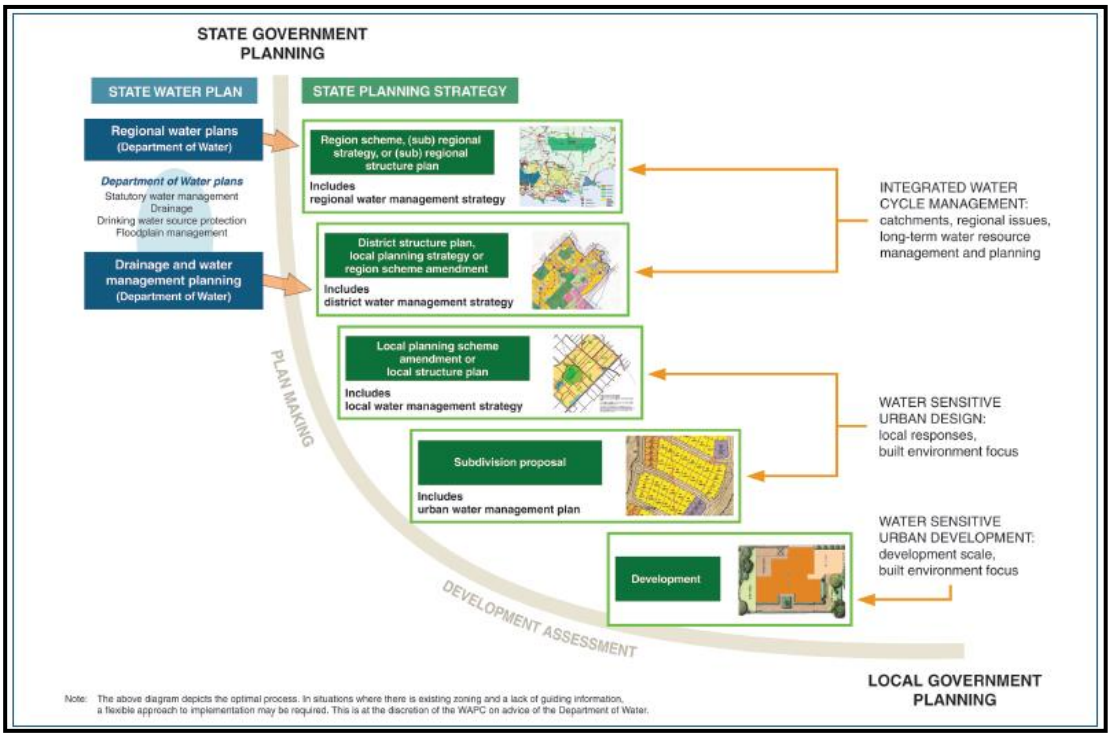


Figure 4.22. Integrating water planning with land use planning processes in Western Australia (Source: Department of Planning and Infrastructure, Department of Water, Western Australian Local Government Authority and Dept. of Environ. Water, Heritage and the Arts, 2008, p. 14).

The policy provides a framework to assist local government to determine whether strategic and statutory proposals including planning tools and issues and mechanisms for the implementation of WSUD. In regional schemes, broad regional drainage requirements and framework should be determined. According to the policy, local and regional plans should indicate the information of urban management strategy, best planning techniques and ongoing management arrangements and responsibilities that is required (WAPC, 2007; Department of Planning and Infrastructure, Department of Water, Western Australian Local Government Authority and Department of Environment, Water, Heritage and the Arts, 2008).

What is important here is that planning policies both regional and local scale are consistent with and supported by environmental and planning instruments that include environmental, Water Quality Improvement Plan, Statement of Planning Policy

Environmental and Natural Resources and Urban Management Plan. For instance, the City of Wanneroo Planning and Sustainability Local Planning Policy Framework - *Local Planning Policy 4.4: Urban Water Management* wrote;

> The City of Wanneroo will not support development of strategic urban planning documents, subdivision or development applications unless the information required and the process has been complied with district water management strategy (DWMS, Local water management strategy (LWMS), Urban Water Management Plan (UWMP) etc.

State Planning Policy (SPP) 2.9 Water Resources (Government of Western Australia, 2006) states that the degree, accuracy and availability of information relating to water resources varies across the state. Planning strategies, structure plans and associated decision making have consideration the availability of useful information considered in management plans for water protection areas, water allocation plans and water provisions for environmental flow requirements and riparian management, water resource management plans prepared by the State Government. The planning policy framework depicted in Figure 4.23 provides guidance for how water resources should be considered at each stage of the land use planning process to meet total water cycle management objectives within the Policy Area.

Liveable Neighbourhoods: a Western Australian Government sustainable cities initiative (2007) currently indicates that what are mandatory requirements and what are simply design guidelines. This policy draws specific issues that are called element such as community design, movement network, lot layout, public parkland, urban water management, utilities, activity centres and employment and schools. In this policy, ponds, lakes, sand filters, swales, buffer strips, porous pavement, storwmater harvesting and reuse, water efficient apliances, education programs, aquifer storage and recovery, landscaping, bioretention, wastewater treatment and reuse, reticulated recycled water, constructed wetlands, rainwater tanks, sediment basins, greywater reuse are listed as water sensitive features (Fig. 4.24).

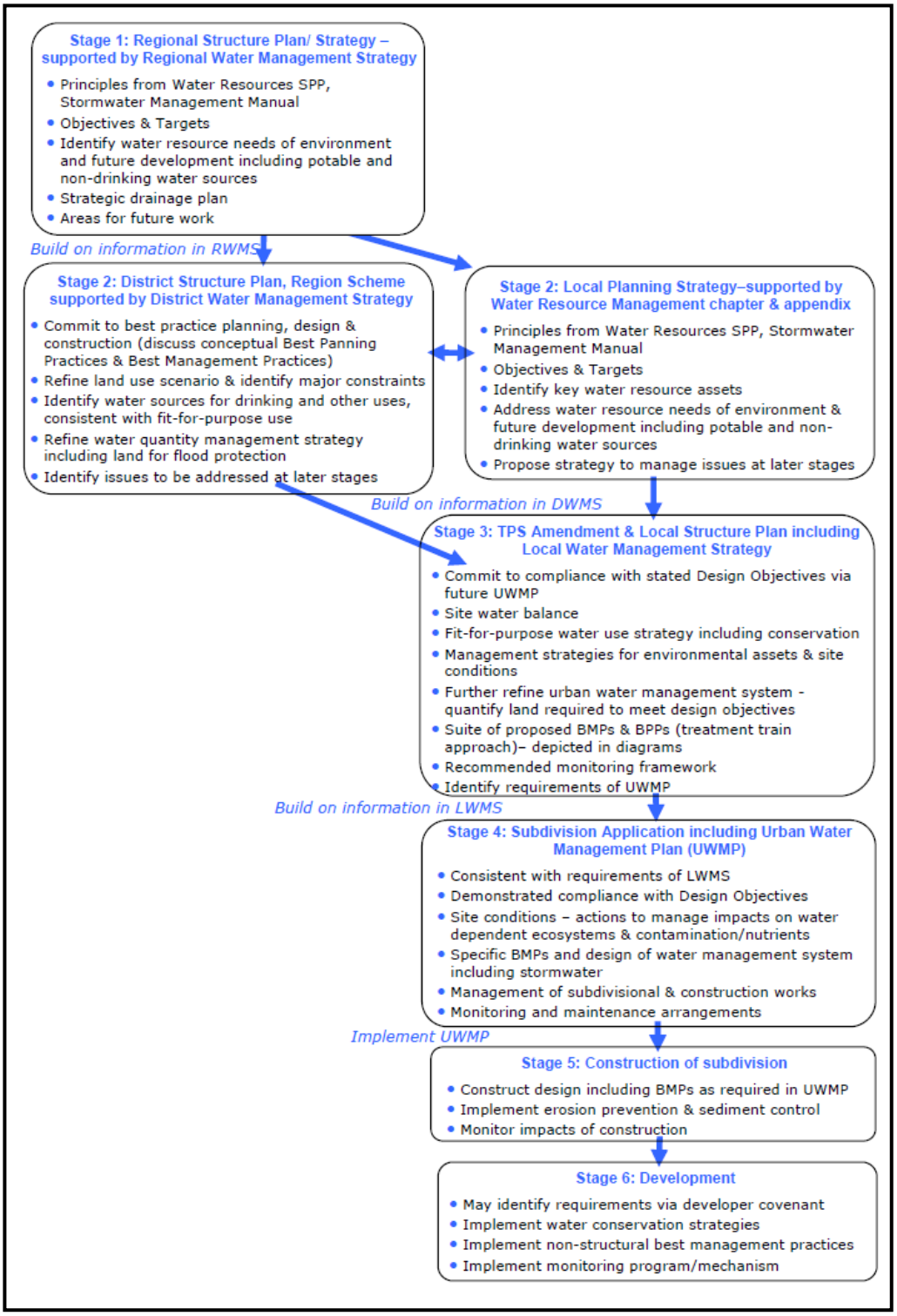


Figure 4.23. Framework for integrating water planning into the planning approvals process (Source: Peel Development Commission et al., 2006, p. 6).

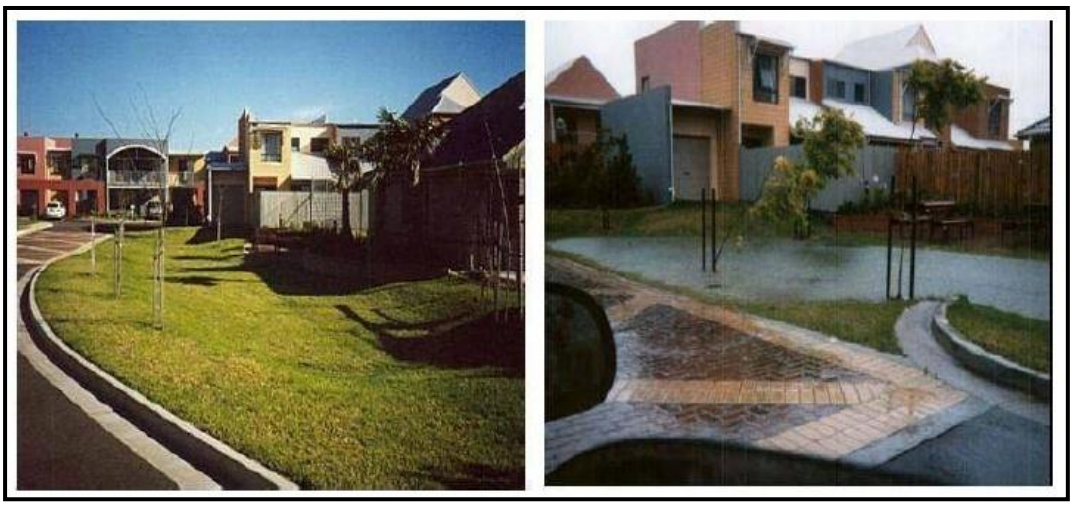


Figure 4.24. Typical use of road verge/swale for stormwater conveyance /detention (Source: Peter Combes, Figtree Place, University of Newcastle, Australia).

It should be noted that some design objectives adopted for using in the planning and design process have been proposed in Western Australia, due to limited data regarding the actual performance of water sensitive urban design measures (Swan River Trust, 2009; WAPC, 2008). These are based on water sustainability, protection from flooding, ecological protection, and stormwater quality as listed in Table 4.7.

Table 4.7. The design objectives for water sensitive urban design (Adapted from: Swan River Trust, 2009; WAPC, 2008).

Water sustainability	Consumption target for water of 100 kL/person/yr, (State water plan target) including not more than 40-60 kL/person/yr scheme water.
Protection from flooding	Post-development annual discharge volume and peak flows to be maintained relative to pre-development conditions, unless otherwise established through determination of ecological water requirements for sensitive environments.
Ecological protection	Maintain surface and ground water quality at pre-development levels and, if possible, improve the quality of water leaving the development area to maintain and restore ecological systems in the sub-catchment in which the development is located.
Stormwater quality	water sensitive urban development to achieve a reduction in pollution transported to receiving waterways when compared with conventional urban development. This reduction is in the order of: o At least 80 per cent reduction of total suspended solids o At least 60 per cent reduction of total phosphorus o At least 45 per cent reduction of total nitrogen o At least 70 per cent reduction of gross pollutants

In Australia, the report by The Liveable Neighborhoods recognized the need for urban water management as element to enable consideration by the Commission, local governments, and referral authorities in structure plans and subdivision applications as

early as 2000. The overall aim is to present a frame of this guidance drawn through examining the routes and elements adopted at WA, and to learn from their experiences. This report notes that the design of new urban areas needs to consider key water management issues including stormwater drainage, seasonal inundation, urban water quality and protection of natural drainage, groundwater and aquifer systems.

The guideline *Urban water management plans: guidelines for preparing plans and for complying with subdivision conditions* (Department of Water, 2008), compliance with the Western Australian Planning Commission's Better Urban Water Management and State Planning Policy 2.9 Water Resources, constitutes the main framework for the principles and strategies of water-sensitive urban design. In this guidance, it is envisaged that these principles and strategies should demonstrate four key elements using a UWMP that are addressed as outlined in Table 4.9.

Table 4.8. The objectives and basic design principles of Water Sensitive Urban Design (Source: Mouritz et al., 2006; Wong, 2006; Rijke, 2007).

Objectives	▪ Reducing potable water demand through water efficient appliances, rainwater and greywater re-use. ▪ Minimising wastewater generation and treatment of wastewater to a standard suitable for effluent reuse opportunities and/or release to receiving waters. ▪ Treating urban stormwater to meet water quality objectives for reuse and/or discharge to surface waters. ▪ Preserving the natural hydrological regime of catchments.
Basic design principles	▪ Detention, rather than rapid conveyance, of stormwater ▪ Capture and use of stormwater as an alternative source of water to conserve potable water ▪ Use of vegetation for filtering purposes ▪ Water-efficient landscaping ▪ Protection of water-related environmental, recreational and cultural values ▪ Localised water harvesting for various uses ▪ Localised wastewater treatment systems

Table 4.9. Key elements for water-sensitive urban design (Source: WAPC-Dept. of Water, 2008, p. 5).

Key elements	Action
Water balance, conservation, use and efficiency	Predevelopment water balance should have been agreed during the structure planning or earlier. The development should achieve: 1.**conservation of drinking water**, through water-efficient fixtures and fittings and through xeriscaping (landscaping using plants that don't need irrigation) both private and public spaces 2 **.fit-for-purpose water use**, including from rainwater tanks, greywater and/or reticulated non-potable supply 3 **ecological protection**, i.e. maintaining the daily, monthly and annual variation in groundwater and surface water (minimums and maximums, flow intensities, extremes).
Flood protection (managing extreme events, such as 100-year floods)	• Demonstrate that the development is not within a floodway. Development is not permitted within floodways; however, development may occur within a floodplain (flood fringe), but only if approved in the local structure plan. • Ensure that buildings' floors are 0.5 metres above the 100-year flood level. It is advisable to check with local government and consider climate change. • Accommodate major floods in road reserves and public parkland in accordance with *Liveable neighbourhoods* and the agreed landscape plan. • Identify the likely flood event flowpaths, flow rates and velocities, storage areas and hydraulic grade lines, including top water levels.
Frequent (up to 1year ARI)events	• Ensure that runoff from constructed impervious surfaces from the one-in-oneyear • Design the development so that the amount of water flowing offsite remains unchanged before and after development. • Plant vegetation on all surfaces that are used to accommodate one-in-one-year • Size the water quality structural controls according to the design criteria contained in the local water management strategy and the guidelines in the *Stormwater management manual for Western Australia*.
Groundwater	If it is part of the proposal, indicate the proposed controlled groundwater level; for example, through the installation of a subsoil drain. If a controlled groundwater level is proposed close to environmentally sensitive areas, it must be shown that the new regime will be similar to that currently existing. • Treat any additional outflow of groundwater (e.g. via subsoil drainage) through a structural control, ie bioretention system or riparian vegetation zone

4.1.3.3. The Application of Spatial Planning Tools for Integration Process

The case of Australia, with the integration of water resources and land use planning from region scale to subdivision, is possible to see a lot of plans and reports. Under the the regulatory/statutory framework for the implementation of Water Sensitive Urban Design (WSUD), the most cases have considered key water management issues including stormwater drainage, seasonal inundation, urban water quality and protection of natural drainage, groundwater and aquifer systems.

One of the plan in WA is "Southern River Integrated Land And Water Management Plan" developed in accordance with the memorandum of understanding (MOU) between the Environmental Protection Authority, the then Water and Rivers

Commission (now Department of Water), Western Australian Planning Commission, City of Armadale, City of Gosnells, Water Corporation and the Armadale Redevelopment Authority (the MOU group)(Government of Western Australia- (DoW) 2009). It aims to "present the Department of Water's guidance for the Western Australian Planning Commission, the City of Gosnells, the City of Armadale, the Water Corporation, land developers and other state agencies with regard to water management issues to help development proceed within the *Southern River/ Forrestdale/ Brookdale/ Wungong district structure plan* (Western Australian Planning Commission, 2001) area" (Government of Western Australia- (DoW), 2009, p. 2). This plan also "assists in integrating land and water planning as required by *State Planning Policy 2.9: Water Resources* and outlined in *Better Urban Water Management* (DPI et al., 2008)" (Government of Western Australia- DoW 2009, p. 3).

The MOU group recognizes the importance of integrating the total water cycle management approach with land development processes. This plan constitutes management requirements for water management at the regional, local and lot scale, including specific targets (design objectives) for the management of surface and groundwater quantity and quality and for potable water use, and also requirements for monitoring, auditing and reporting to support an adaptive management approach. This plan suggests the following strategies endorsed by the MOU group as follows:

- Protection of environmental assets from the potential impacts of development.
- Surface water management to protect infrastructure and assets and receiving environments.
- Water quality management measures for urban development in the Southern River catchment.
- Water conservation and improvement in water use efficiency.

This plan can be given as an example for the force and effect of Australia's laws and regulations on the integrated process and produced plans. Since 2005, there is a trend towards WSUD implementation approach at regional and municipal levels. The Southern River and Peel-Harvey catchments, particularly, are the key areas experienced gained from the water sensitive urban design demonstration projects.

4.1.4. Synopsis

In the previous sections, it has become apparent that in the cases of Netherlands, England, and Australia spatial planning is organised and practiced to link with water resources management at different levels. In the light of how spatial planning legislation, policy and guidance have actually contributed to water resource management, it is interesting that the experience of these cases offers many valuable lessons not only in planning content, but also physical planning process for this dissertation. It also provided many examples that illustrate successes in achieving sustainable water resources management.

Review of these cases shows us that there are three main areas in which spatial planning and water resources management can be better aligned.These cases:

- provide evidence that **cross-sectoral integration** in national policy development to support their spatial planning systems through river basin management.
- provide **planning guidance**. These guidance set out government policy on water relevant to spatial planning and specifically what considerations regional and local authorities and others involved in planning should take. These also detail steps local authorities should or could take to reflect these considerations in local spatial plans.
- provide **organizational structure** regarding water management.

Table 4.10 summarizes key characteristics of those countries (The Netherlands, England and Australia) which spend particular attention to spatial planning within water resources management strategies. Some strategies such as the Dutch offer concrete tools for a Water Assessment Test (WAT) and Water Opportunity Map (WOM). When looking at this table, it becomes obvious that there are integrative concepts which link spatial planning and water resources management.

Based upon the previous sections, this review demonstrates that this integration in the three countries has **high priority** on incorporating the aspects of water management into their spatial planning system and process. For each country, as it is understood that their legal documents and their practices, the concept and implementation of this integration is relatively new.

Different aspects of water management such as quality and quantity of fresh water supply, sustainable use of water resources, water pollution, preservation and

treatment, flood risk management and navigation of waterways are intended to be performed by one main coordinating body. However establishment of close relations and cooperation with other ministries or other leading organizations regarding spatial planning are also observed in each country. For instance, The Environment Agency (EA) is competent authority for the WFD (Water Framework Directive) in England. Netherlands system adopts three-tier structure of government, and participation is a core feature of this system. Provincial and municipal authorities are required to implement measures laid down by central government. The water boards are also part of the local government. In Netherlands system, different than the other two case, there is also a well-defined hierarchy (and 'dialog') of water management bodies structured on three levels.

Table 4.10. Overview of the integration of water resources management to spatial planning

Coutries	***Priority of integration***	***Integrative concepts***	***Concrete measures***
Netherlands	**Water as a** "*structuring principle, which will be an integral element in the spatial planning processes*". (the new National Spatial Strategy 2006)	▪ **Concepts:** − space for nature − green-blue network − more space for water − climate-proof city ▪ **Water Assessment (2003)** − Compulsary − discussion in early stage ▪ **Flood management / Planning and pollution control** ▪ **Layer approach**	▪ **Space for the river** − creating side channels − restoring flood plains − restoring meanders in the river' − assigning areas for controlled flooding in case of emergencies − re-locating dikes
England	Water Framework Directive and River Basin Management Plans through the planning system	▪ **Sustainable water management** **Methods:** ▪ Strategic Flood Risk Assessment ▪ Sustainability Appraisal ▪ Integrated water Cycle Studies ▪ **Integrated coastal zone management (ICZM)**	▪ Program of Measures (pollution, abstarction, flood…) ▪ The aproaches of Sustainable Drainage Systems (SUDS)
Australia	Water Sensitive Australian Cities (NWI Clause 92)	▪ **Integrated water cycle management** ▪ **Water sensitive urban design** ▪ **Water sensitive urban development**	▪ Total water cycle management issues - Best Management Practices and Best Planning Practices ▪ Water sensitive urban design measures − water sustainability, − protection from flooding − ecological protection − stormwater quality

In conclusion, the Netherlands and England have demonstrably more advanced approaches to addressing the linking of water related issues into spatial planning than Australia. These are arguably the most forward looking countries in terms of developing the role of spatial planning in linking the water resources management. Australian approach to identifying impacts and integration responses is not particularly well advanced at national policy level. However, spatial planning is contributing to water resources management with respect to '**Integrated Water Cycle Management'**, and Australia has some strong policies in place to respond to '**Water Sensitive Urban Design'.**

These cases have strong strategic policies-plans and their hierarchically distribution to lower level for integration of water resources management at the national level with a strategic policy framework so as to guide policy and actions at the regional and local level. Present examples show more and more clearly that water resources management as a sectoral policy influences land use and spatial organization. The trend shows that the context and extent of legal and regulatory frameworks and especially the transparency of permitting procedures in the country cases clearly set criteria, time period of approval, the role and competence of authorities and the actors.In terms of interagency coordination between the national government and regional and local planning bodies that each country is unique in their administrative structuring.

4.2. Possible Lessons from the Selected Countries: Key Points of the Integration of Spatial Planning and Water Resources Management

In assessed countries, although a very differentiated pictures emerge concerning the integration land use planning (spatial planning) and water resources management, these cases, essentially, show the importance of integrated approach in handling water resources management within the spatial planning policy. As a review of selected countries' approaches are summarized under seven main headings: (1) interagency coordination and cooperation, (2) consensus building, (3) existence of national spatial strategy related with water as prominent issue in national spatial planning, (4)vertical plan consistency, (5) horizontal consistency, (6) objectives and specified measures for this integration, (7) assessment instruments and decision support approaches with relevance to sustainable water resources management. To develop institutional and

social capacities for urban sustainability, the following key points are discussed both from theoretical points of view (examined in chapter 2) and practical (policy) points of view (examined in the section 3.1.) The following sections list the key points in this chapter and will be elaborated further and will be compared in the case of Turkey in the next chapter.

4.2.1. Interagency Coordination and Cooperation

Effective integration between comprehensive planning and the water supply resources and management activities has a critical importance to allow for more efficient and effective management. Throughout its literature and practice, there is widespread recognition that interagency coordination of central, regional, and local entities is needed to address land use and environmental problems. In recent years, greater coordination among multiple agencies and units of government, and multistakeholder negotiations over regional planning has become a recurring topic in commission meetings, legislative hearings and growth management seminars for better "linkage" between land use planning and proposed development and water supply, because of the variety of impacts on different sectors and the interdependences between impacts and response strategies (Arnold, 2005; Arnold, 2006; Kidd and Shaw; 2007). Interagency coordination for the river basin management can be promoted in various ways, e.g., designating a lead agency to promote coordinated decision-making across sectors (leadership) (Norton, 2008) and clarity of actor roles and responsibilities for each two sectors (Norton, 2008; Carter et al., 2005), forcing the makers of decisions into a process of horizontal and vertical coordination (Moss, 2004a; Moss, 2004b; de Loë et al., 2002; Carter et al., 2005; Ivey et al., 2002, GWP, 2004) and requiring more integrative forms of planning. Carter et al. (2005) subsume these ways under the heading of "**blending resource sectors**" regarding land use planning and integrated-sustainable water resources management.

It is known that conflicting objectives, overlapping responsibilities and gaps in responsibilities occur not only between two resource sectors but also between various levels of management. It is recognized that strong social capacity is demonstrated through stakeholder participation, leadership and effective coordination and cooperation. Utilising strong leadership is seen as a critical component for successful

integrated management in both the public and private sectors and at the local level (Carter et al., 2005; de Loë et al., 2002). Experts on collaborative watershed conservation processes underline that successful processes require considerable leadership and participation by governmental institutions and also by local stakeholders. Given the importance of the strong leadership for this integration, local leadership is equally as important as government leadership to govern integration to control and manage land use for water environment health. Waterman (2004) points out that local government will coordinate and cooperate with each other on the development of the plan in the process of plan development.

Clear definition of tasks and responsibilities is one of important factor for integrated land use planning and water management to be achieved. As mentioned by Norton (2008) and Carter et al. (2005), a clear understanding of their roles in a planning process from the beginning through to the end, provides to participants when and how they will be able to influence decisions or to access to information, knowledge and financial facilities.

Finally, the vertical and horizontal coordination is the important for this integration. It is recognized that this integration needs to create linkages amongst government agengies and other stakeholders, both vertically and horizontally (de Loë et al., 2002; Carter et al., 2005; Ivey et al., 2002; GWP 2004). Jasper (2003, p. 87) connotates that "an integrated planning process can support a system of integrated river basin management in that way the production of plans forces the makers of decisions into a process of horizontal and vertical coordination". Waterman (2004) also emphasizes that the general plans should define the coordination/ collaboration between land use and water agencies.

For instance, Dutch system is based on three-tiers of government that the national, provincial and municipal levels are relevant in spatial planning. NOFDP (2006, p. 1) states that "the national level prevails over provincial orders, which prevails over the municipalities and water boards". In other words, Government at the highest level is responsible for supervising regional and provincial levels in order to control the accuracy and relevance of the decision. Ministry of Transport, Public Works, and Water Management has responsibility for specifying water quality objectives and emission standards, environmental impact assessment, drinking water, sewerage systems and land use (spatial planning) and controlling power on the coastal zone and the major rivers for the national environmental policy (EA, 2006; NOFDP, 2006). Provinces are

responsible for integration the policies of the different sectors of government, such as water management, environment, nature conservation, housing, physical planning and transport within their regional plans (streekplan) to execute the spatial development strategies (NOFDP, 2006). Local authorities are defined as having a central role in implementing the WFD (Water Directive Framework), in partnership with others, "to engage in the River Basin Planning process and incorporate WFD priorities into other plans, and help deliver measures to achieve WFD objectives" (EA, 2006, p. 18). These authorities also have certain rights to adapt regional policies based on their local situation. The national law on spatial planning (Wet Ruimtelijke Ordening WRO) regulates the responsibilities and relevant principles in co-ordination with environmental and water management plans to ensure an interdisciplinary integration between all levels. Hence, it is emphasized by NOFDP that "waterboards and RWS (Rijkswaterstad- The national water management executive) are involved in spatial planning-processes if water is important" (2006, p. 2).

As mentioned before, the procedures of spatial planning and water management have become more closely integrated since the application of the legally obligatory "watertoets" in 2003. Therefore, the example of Netherlands shows us that vertical and horizontal coordination with the different authorities has been guaranteed during the plan-making process and plan implementation.

In England system, Environment Agency (EA) supports planning authorities through its role as a statutory consultee on development plans. It is a consultee on strategic spatial planning to make sure that sustainable water management is fully incorporated (EA, 2006). The responsibilities of EA are, for example:

- develop summaries of Significant Water Management Issues for each River Basin District (RBD) with key stakeholders, including planning authorities
- incorporate sustainable water management into its comments on Sustainability Appraisals of development plans
- advise on appropriate policies for inclusion in development plans
- advise on any WFD implications of proposed housing allocations (EA, 2006, p. 15).

'Water for Life and Livelihoods', Framework for River Basin Planning, published by The Environment Agency sets out proposals for engagements with co-deliverers and other stakeholders in each River Basin District vertically, such as national (a national stakeholder group), river basin district (government office regions), catchment scale, local. Local authorities and regional planning bodies have responsibility for delivering the WFD objectives. While regional planning bodies (RPBs) should ensure their

regional spatial strategies, the role of the local planning authority (LPA) is the principal decision-maker that "responds actively to requests for pre-application discussions in submitting a planning application for a site. In addition, Planning Policy Statement (PPS) 25 (DCLG, 2009) includes a detailed diagram ilustrated in Figure 15. It indicates the responsibilities of operating authorities. This also consists of guidance on how to produce a Regional Flood Risk Appraisals (RFRAs) by regional planning bodies (RPBs) prepare Strategic Flood Risk Assessments (SFRAs) by the local planning authority (LPA) (DCLG, 2009).

Australian planning sytem, as mentioned in Section 3.1.3 the case of Western Australia, is a hierarchical process that includes the scales respectively: state, regional and sub-regional, district, local, subdivision etc. (Department of Planning and Infrastructure et al., 2008).

The Western Australian Planning Commission (WAPC) plays a central coordination role in the State planning process. For each stage, responsibilities for the plan preparation and approval considered water management information to accompany planning actions are elaborated in WAPC's document Better Urban Water Management (2008). This document provides a context for spatial planning and decision-making by the WAPC, local governments and other responsible authorities. At regional, strategic and statutory planning scale, The Western Australian Planning Commission (WAPC), under the Town Planning and Development Act 1928, has responsibility of aproval of plan making phase and on advice of Department of Water (DoW) (WAPC, 2008).

Given the importance of the level of cooperation of regional or local level governments in the development and realization of integration policies, regional and/or local governments play a major role in cooperating with the national government, in almost all countries. One of the common points of water management organization in each case country is that river basins are accepted as the major scale of organization and administration such as Water Boards in Netherlands. Therefore, the case of each country examined indicates stakeholder participation. The roles of stakeholders are cleary defined vertically and horizontally in the case of each country.

4.2.2. Consensus Building

Almost all the selected the countries recognize the need for a cross-sectoral coordination and relate this task with spatial planning. Generally, their national or

regional spatial strategies include the legal basis for this coordination. The review of these countries shows that professional consensus and public consensus building are the priority for the proper water supply and land use planning. In the related literature, it is advocated that public participation and consensus building needs to be encouraged in the planning process. According to Du (2010, p. 51), "professional consensus building leads to the technical support for strategic policy formulation and action programming while public consensus building assists policy making and successful implementation".

- **Professional consensus building / interdisciplinary cooperation**:

From the perspective of policy-making or decision-making process, one of the common points of between two sector bodies in each case country is that '**early engagement of urban planner and water planner**' is accepted and mandated. The early cooperation of spatial planning and water management authorities is crucial for aiming at and realizing both sustainable urban development and water management. Carter et al. (2009) argue for a prominent role for professional aggrement, especially between urban planners and water managers, at first in this regard. Waterman (2004) especially emphasizes that working groups of land use and water planner should be involved the early stage of each other's longterm planning processes in order to voice their mutual concerns, to gain efficiencies, and to standardize assumptions. Wetering signifies that;

> State legislatures could facilitate integrated water and land use planning by strengthening the requirements for a water resources element in comprehensive plans. For example, they might require that such plans identify the known supplies of water for future development, quantify the demand that would result from projected population growth, and analyze how demand will be met by available supplies (or what additional water will have to be obtained). This level of analysis at the broader planning stage may prove more useful than asking for assurances that water is immediately available once a particular development is under consideration. It would be particularly useful if land use planners worked in close cooperation with water planners in this exercise in long-term thinking (Waterman, 2006, p. 10).

In these selected cases, there are the advanced approaches considered good practice examples for urban planners and water managers. It is vital that there is close coordination and consultation between Dutch's water supply agencies and Dutch's land use approval agencies. "**Water test (watertoets)**" introduced in the Netherlands is one of the advanced approaches to the integration of water management into the spatial planning process. In this regard, The Dutch case addresses that "the watertest or water assessment is an instrument that is not linked to a specific plan system and therefore can be integrated with different kinds of local land use or development plans" (Royal

Haskoning, 2007, p. 30). Netherlands is used an intergrated /cross sectoral approach that different policy fields such as agricultural, water management, biodiversity, transport are taken into account.

Voogd (2006) states that three types of actors in Water Assessment Test (WAT): the initiator, the advisor and the reviewer. The author defines these roles of these in Table 11. Land use planning authority is the initiator that can be a local, regional, national authority. While the advisor is the water authority with jurisdiction: the water board, groundwater authority or national Rijkswaterstaat, the reviewer is the authority that should review land-use decisions according to urban and regional planning legislation. Voogd (2006, p. 52) gives an example for the reviewer that "the provincial authority reviews land-use decisions taken by municipal authorities".

Table 4.11. The role of initiators, advisors and reviewers in a WAT process (Source: Schwartz & Voogd, 2004 cited in Voogd, 2006, p. 53).

Initiator	Advisor	Reviewer
1.Land use development initiative 2.Review and decisions on 'relevance for water' 3.Presents the initiative to the advisor		
	4.Assesses all aspects relating to water 5.Proposes mitigation and compensation measures 6.Advises the initiator	
7.Considers advice 8.Decides on the initiative for land use development 9. Draws up land use decision, water clause		
		10.Reviews and decides on procedure and contents of land use decision
11.Implements decision: -review and modification -licensing /construction		

In England system, there is also a growing recognition of the need for integration between spatial planning and water management on both sides. While the Flood Risk Assessment is a relatively new approach to spatial planning in UK, focused on the prevention of and protection against flooding into the spatial planning process. For instance, in Planning Policy Statement (PPS) 25, sectoral integration for managing flood risks is aimed at regional and local planning officers, as well as development control officers, as seen Figure 4.15. This figure illustrates "who is responsible for producing the key documents required to manage flood risk through each stage of the spatial planning process" (DCLG, 2009, p. 10). It also shows the link with other

strategic documents prepared by flood and coastal defence operating authorities. On the other hand, EA (Environment Agency) (2006, p. 15) lays emphasizes on that "local authorities and regional planning bodies are involved at an early stage in the development of River Basin Management Plans as co-deliverers". So in many respects, it can be concluded that "a **professional consensus**" should be developed between water managers and urban planners from the earliest stages.

- **Public consensus building/ community involvement / public participation**

In the light of the theoretical and policy context, public involvement has an important role in the development and realization of sustainable land use planning and water resources management policies. Many authors have pointed out the significance of policy in defining and applying public participation / involvement as an essential element in developing adaptive and integrated water management (Pahl-Wostl et al., 2007; Carter et al., 2005; Moss, 2004a; Mitchell, 2005). Carter states that;

> There are a range of opportunities for stakeholders to become involved in the spatial planning process. The extent of these opportunities depends in part on the legal and administrative framework guiding the planning system (2007, p. 335).

Norton (2008, p. 22) states that "achievement of broader environmental or socio-economic goals is becoming increasingly common in planning and may require a moderate and or high degree of local involvement". Therefore, it is necessary to have spatial planning processes that are open and allow for an early and substantial public participation in order to gain the trust of public , inform and the educate the public.

In England, public participation is defined a key component of the new planning system. It is mentioned that "the preparation of local development documents should be a participatory process, the scope of which will be set out in the Statement of Community Involvement." (NOFDP, 2007, p. 11) In other words, the Water Directive Framework (WFD) institutionalises forms of public participation as actively involving the public and interested stakeholders in water management planning, required by higher-level governance bodies in the EU (European Union). This reflects an overall emphasis in public information and consultation of future river basin management planning in current policy, as outlined in Article 14 of the 2000 WFD".(Moss, 2003; Newig and Pahl-Wostl, 2005; Lamers et al., 2010). PPS11 and PPS12 examine how these policy principles should be applied in preparing RSS(Regional Spatial Strategies) revisions and LDFs (Local Development Frameworks), and also set the context for public involvement and consultation (ODPM, 2005). It is stated that:

> For both RSS revisions and LDFs, effective consultation means that the public and other stakeholders are involved in the preparation of the options from the start of the plan making process, and decisions regarding the plan are arrived at early (ODPM, 2005, p. 27).

Australia embarked on formulation of policies and legal frameworks that would institutionalize public participation in its definition of water resource plans. Section 25 of the National Water Initiative provides that the State and Australian governments will develop planning frameworks which "provide for adaptive management of surface and groundwater systems in order to meet productive, environmental and other public benefit outcomes" (Western Australia Dept. of Water, 2007, p. 21). With a mandate to public participation develop the Regional Natural Resource Management Plans in consultation with all relevant stakeholders on the basis of best scientificand socio-economic assessment, and provide secure ecological outcomes and resource security for users, NWI (National Water Initiative) has developed the framework of legal requirements. Mackenzie et al. (2008, p. 101) pose about the Australian national priorities for water resources management that "an effective adaptive management system would not only identify targets towards the achievement of sustainability and effective public participation, but also include a monitoring system to measure progress and achievements against the targets, and a response system that enables modifying interventions in response to the findings.

Therefore, it is foreseen that the legal and administrative framework guiding the planning system should provide opportunities for the involvement of citizens, public agencies, public utility companies, and civic, education, and other community groups, through public hearings and any other means the city or county deems appropriate in the river basin management districts. In other words, over the past decade, selected countries have created a legal framework for community involvement.

4.2.3. Existence of National Spatial Strategy Related With Water as Prominent Issue in National Spatial Planning

At national level, governments in particular have the important responsibility of ensuring a strong enabling environment; so, integration of water resources management into spatial visions is already reflected in national and sectoral development policies and plans to see more value in pursuing an integrated approach.

These cases have shown that the concept and implementation of integration is relatively new. Integration at present is described a high priority for these governments. National policy establishes the framework and direction for policy at the regional and local levels. While England and Australia (Western Australia) countries are working towards a national spatial strategy, only Netherland has created a national land use plan. Three case countries have not only an integration strategy or plan and but also any legal documents or acts establishing adaptation as a policy agenda item.

Policies and decisions determined at national level are not dictated to the lower levels. Instead these decisions are supervised at regional, provincial and local levels in order to control the accuracy and relevance of the decision.

In Dutch spatial planning system, different than the other two cases, there is special emphasis on water resorces management such as spatially relevant sectoral planning. With respect to the role of spatial planning the adaptation strategies can be described as follows (see the described thereinbefore sections for more detailed information):

1. Netherlands: The existing national spatial strategies as well as national actions plans acknowledge water resources as a key sector. The particular role of water is described and (partly) implemented in planning law and practice. The new National Spatial Planning Strategy adopted the Senate (2006) identifies water as *'**structuring principle, which will be an integral element in the spatial planning processes**"*. This shows us that not only water is reinforced as important element for the basic quality standards and the national spatial structure, but the national spatial strategy takes the spatial water policy into account, which means that spatial choices need to be made on the basis of the characteristics of water systems. As a consequence of new national policy in the Netherlands and emergence of European Water Policy, as two major developments, provides an opportunity to break new ground in the fields of linkage of water resources management and spatial planning.
2. England: Contrary to Netherlands, the England does not have a national land use plan, national spatial strategies. Instead, national planning policy is conveyed through a number of national Planning Policy Statements and planning policy Guidance Notes (PPGs), includes guidance that deals variously with water related topics. As mentioned by Howes (2008), The Planning and Compulsory Puchase Act (2004) and contingent Planning Policy Statements provides additional opportunities to promote sustainable water management with

significant implications in the planning process. Howes (2008, p. 10) also states that "The combinationation the Planning and Compulsory Puchase Act 2004, Water Framework Directive and The Strategic Environmental Assessment Directive is bringing about a fundemental revolution to the relationship between water related issues and statutory planning system.

3. Australia: Eight urban planning systems combine with national and local environmental policy contribute to the design and structure of Australian cities and regions. Specific aspects of water quality protection and management are guided by a number of national and state policies such as the National Water Quality Management Strategy, the State Water Quality Management Strategy for Western Australia etc.

    Norman (2010) offers that these need to be re-evaluated to incorporate national objectives. Western Australia State, one of the eight state, have been analyzed in depth in this study. State Planning Policy 2.9 Water Resources is consistent with the guiding principles of the above policies in the land-use planning context. The State Planning Strategy prepared by The Western Australian Planning Commission (WAPC, 1997) provides the overall vision and framework in which land use planning operates, including dealing sustainably with the natural environment. 'Ensure that water resources are conserved and their quality protected' is one of its key strategic statements (Government of WA, 2006). In this state, Water Sensitive Urban Design (WSUD) framework is the main framework in the implementation of the spatial plans. Joint Steering Committee for Water Sensitive Cities (2009) is defined the term 'Water Sensitive Urban Design', originally coined in Western Australia, as a new Australian approach to urban planning and design. This Committee also signifies the parallel moments in international movement towards the concept of integrated land and water management and the emergence of WSUD in Australia. It is described that WSUD is mandatory for certain scales and types of developments in some States/Territories.

Based upon survey, this chapter finds that three countries are in the initial stages of incorporating water resources management into their national spatial planning; however, Netherlands (2006) has to be seen as a pioneer.

Based on the review of selected countries, it is possible to mention that water-related issues seem to have highest priority among other issues at national level. After

the recognition of this reality, (national) spatial planning strategy or national spatial plan should contribute to sustainable management of water by providing visions for resilient spatial structures as argued by Netherland. In any legal documents or acts, "integration of water resources management into spatial visions" should be established as a policy agenda item.

4.2.4. Vertical Plan Consistency

The strong enabling environments at both local and regional level are essential to successful water resources management (Musselman, 2005; de Loë et al., 2002). In other ways, they provide clear policies, rules and procedures that support linkage between two sectors for the success of integration between both of them. Literature related with water resources management indicates that "water-related decisions at local and river basin levels are in line with, or at least do not conflict with, national objectives' (GWP 2004, 7 cited in Kidd and Shaw, 2007, p. 317). The expectation is that it is a law for spatial planning that should establish a stronger hierarchy of spatial planning documents supporting water-related objectives (Kidd and Shaw, 2007). That's why, the vertical consistency is required for what appropriate information is provided from the regional scale through to the local level to inform the type of decision being made. As mentioned by Kidd and Shaw (2007), vertical consistency refers to 'policy coherence across spatial scales'.

On the basis of the country studies, spatial plannnnig legislation and policies directly and indirectly integrated water resources management, including blending of land and water management, and environmental perspective. Special emphasis is given to formalised spatial planning (regional planning, local land-use planning) and water management as relevant sectoral planning. With respect to the spatial planning laws, policies and regulations, specific policies related water and environmental issues at both regional and local context can be specified as follows:

- The management of water resource - (ensuring the protection of rivers and groundwater resources)
- The management of water quality (the processing of waste water to an adequate and appropriate standard, alleviating and treating point source pollution, reducing diffuse pollution at source and maintaining river water quality).

- The management of the risk of flooding (the protection floodplains and their fuctions, assessing the relative risk of flooding in terms of probability and impact of a flooding event and the use of sustainable drainage)
- Conserving and enhancing the environment (the delivery of biodiversity, the improvement of the ecological quality of the water environment and the restoration of rivers)

In the selected countries, there is policy frameworks that include the process proposed to ensure that planning decisions at all levels and scales are founded on adequate information since 2004. For example, spatial planning policy in England gives the importance on strong hierarchical nature of the new system that includes the new Regional Spatial Strategies (RSSs) and Local development Frameworks (LDFs). Its legislative framework is providing increasingly strong support for linkage between spatial planning and water management. The statutory regional planning documents, the RSSs, must also be seen as a positive development within to facilitate interaction with the new River Basin Management Plans (RBMPs), which will relate to a similar scale of administrative unit (Kidd and Shaw, 2007). Therefore, it is outlined that Regional Spatial Strategies (RSSs) in England, are noticed to reflect overarching sustainable water management requirements, including strategic polices on the WFD (EA, 2006). It is pointed out that when preparing Regional Spatial Strategies (RSSs) and Local Development Documents (LDDs), considerations of flood risk; water supply and resources issues are taken into consideration as well as regional targets for housing, economic growth and urban growth targets.

In the case of England, under the Planning and Compulsory Purchase Act 2004, Sustainability Appraisal is mandatory for Regional Spatial Strategies (RSS), Development Plan Documents (DPDs) and Supplementary Planning Documents (SPDs) (ODPM,2005; Scott Wilson and Levett-Therivel, 2009; Howes, 2008). These plans should go through Sustainability Appraisal (SA) has been established. It is envisaged that to identify and assess significant environmental effects arising from policies, plans and programmes, planning authorities to fulfil the objective of contributing to this process and in that way, possible mitigation measures can be considered where it is predicted that plans may produce negative effects on sustainable development (ODPM, 2005). The document of "*The Sustainability Appraisal of Regional Spatial Strategies and Local Development Documents: Guidance for Regional Planning Bodies and Local Planning Authorities"* published by ODPM (2005) provides an overview of the SA

process through better integration of sustainability considerations into the preparation and adoption of plans.

It should be noted that the policy guidance in Western Australian planning system propose that "land use planning decision-making should be based on an appropriate level of information"; and "relevant issues should be investigated at a scale consistent with land use planning decision-making" (WAPC, 2008a, p. 15). The process proposed in this document aims to ensure that "planning decisions at all levels and scales are founded on adequate information at the local scale" (WAPC, 2008a, p. 15).

For instance; *Peel-Harvey WSUD Local Planning Policy*, a model local planning policy to assist Local Government to determine strategic and statutory proposals within the EPP Policy Area of the Peel- Harvey Coastal Catchment, has the context for preparation of more detailed Structure Plans and Outline Development Plans to support scheme amendments and provide guidance for subdivision. This guidance includes procedures for the actions recommended for the various stages of planning as depicted in figure 4.23 in section 4.1.3.1.

4.2.5. Horizontal Plan Consistency

This dimension encompasses policy coherence between both two sector plans that form part of the same natural system. In case countries and literature, it is indicated that the water management plans at each scale need to consider appropriate spatial strategies and vice versa. Waterman (2004) determines the policy coherence between both two sector plans as the "process requirements in preparation of the general plan", and implies that;

> The land use planning agency must utilize the Urban Water Management Plan (UWMP) of the relevant water planning agency (or agencies) as a source document for the adoption or revision of the general plan, if the UWMP has been submitted to the land use agency (2004, p. 138).

Morever, Johnson and Loux (2004, p. 55) state that "General plan states that the city or county shall utilize as a source document any urban water management plan submitted to the city or county by a water agency".

In the case of England, NOFDP(2006, p. 16) expresses that "Regional Spatial Strategies must consider the inclusion of relevant policies; appropriate land uses in light of the WFD; and have a holistic consideration of water issues. RBMPs must consider

Regional Spatial Strategies by incorporating all land use requirements and consulting spatial planners as key stakeholders". Figure 4.13 illustrates the spatial planning and examples of linkages with environmental plans and strategies that is now envisaged for spatial planning in England, with specific reference to water/environmental-related planning documents (Kidd and Shaw, 2007). In England, the planning system and methods more likely lays emphasis on that development plans will be subject to the Strategic Environmental Assessment. Within the requirement of Strategic Environmental Assessment, Scott Wilson and Levett-Therivel (2009) state that prepared draft River Basin Management Plans should include proposed measures for water quality in the plans to show how these requirements will be met by 2025:

- Inclusion of water efficiency and groundwater protection policies in RSSs and LDDs
- Inclusion of planning policies that require waste water treatment infrastructure capacity
- Promotion of sustainable drainage schemes
- Strategic development planning, incorporation of green infrastructure, and controls on specific pollution
- Provision of national guidance for spatial planners on integrating development planning and water planning
- Ensuring that Local Development Documents take into account the objectives of the River Basin Management Plan
- Action to reduce the physical impacts of urban development in artificial or heavily modified waters (Scott Wilson and Levett-Therivel, 2009, p. 175).

Figure 4.15 in section 4.1.2.2 shows the linkages with other strategic documents prepared by flood and coastal defence operating authorities when producing the key documents required managing flood risk through each stage of the spatial planning process. "In order for flood risk to be properly evaluated at the Sustainability Appraisal (SA) stage, an appropriate Regional Flood Risk Appraisal and/or Strategic Flood Risk Assessment needs to be undertaken" when Regional Spatial Strategies (RSSs) and Local Development Documents (LDDs) (DCLG, 2009, p. 13).

In Australian case, as can be seen from Figure 4.22 in section 4.1.3.2, cities and counties must consult and coordinate with water planning agencies during the planning decision making to developed plans consistent with the water planning framework. For example, a regional water plan should be prepared to support a regional or subregional land use planning exercise, such as a regional strategy or regional plan (WAPC, 2008a). On the other hand; regional structure plan and strategies should include regional water management strategy and municipal land use plans should include local water management strategy. The regional plans must consider the inclusion of relevant policies; appropriate land uses in light of such as regional water plans, statutory water

management and drainage plans, flood management and drinking water source protection plans produced by Department of Water, as depicted in Figure 4.22.

4.2.6. Assessment Instruments and Decision Support Approaches/ Techniques with Relevance to Sustainable Water Resources Management in Decision Making Process

On the basis of the country studies, one of the key outputs of this integration is the principle decision support approaches linking water more closely to planning to offer benefits for regional planning bodies and local planning authorities. The assessment instruments or techniques used in the case countries are summarized as follows:

- **Netherlands:** Water Assessment (WA), Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA) are all instruments of national-level government in the Netherlands. Water Assessment (WA) is described as a new policy instrument in the fields of water management and spatial planning. This assessment instrument (WA) has to be applied to formal and informal plans, whether strategic or operational, of different tiers of government. EIA is obligatory for activities that may have significant, negative impacts on the environment, and focuses on decisions at project rather than strategic levels (van Dijk, 2008). SEA is mandatory partly related to the same activities for which an EIA is required and partly to all activities with impact on habitat areas. All three assessment instruments have to deal with the problem of influencing the decision-making of regional and local governments. Table 4.12 summarizes the characteristics of WA, EIA and SEA and also compares between these instruments.
- **England:** Sustainability Threshold Analysis and Integrated Water Cycle Studies are described as important techniques, compatible with both Strategic environmental Assessment and Sustainability Appraisal. Sustainability Threshold Analysis is closely related to the concept of environmental capacity. As a part of "Accommodating Growth in The South East of England, which is between Environment Agency and The Regional Assembly to improve the understanding of potential severity of the constraints, this analysis technique was used to compare four major development areas in the Thames Gateway.

Table 4.12. A comparison of the basic characteristics of WA, EIA and SEA (Source: van Dijk, 2008, p. 39-40)

	Water Assessment	Environmental Impact Assessment	Strategic Environmental Assessment
status	not required by EU	required by EU	required by EU
	a very small part is regulated	described extensively in law	Most parts are described extensively in law, some parts are discretionary
	spatial planning regulation	environmental regulation	environmental regulation
area of application	plans	Projects: final decision made before construction can start	plans
	Plans on all levels of scale (not permits)	Decisions on detailed scales: permits, also elaborations of local land use plans	Plans on all levels of scale (not permits)
	formal and informal plans	formal plans	formal plans
	all spatial plans	plans including a listed activity	plans including a listed activity and plans with impacts on natural habitats
range of impacts	water related impacts	environmental impacts, including water	environmental impacts, including water
	assessment criteria are defined by the water authoriry, anda re based on policy documents	impacts to be described are defined by the competent authority, after consulting the public, legal advisors and EIA Commission (scoping)	impacts to be described are defined by the competent authority, after consulting the authorities concerned (scoping)
process	informal start as soon as possible	formal start, linked to start of the formal decision making procedure	formal start, linked to start of the formal decision making procedure
	process fully integrated into the planning procedure	procedure with a link to a decision-making	procedure has more links with planning procedure than EIA
	no dedicated public consultation	dedicated public consultation	dedicated public consultation if not prescribed by planning procedure
products	Water Recommendation written by water authorities	Environmental Impact Statement (EIS) written by the proponent, which may be the competent authority	Environmental Impact Statement (EIS) written by the competent authority (=proponent)
	plan with Water Paragraph written by spatial planning authority (=competent authority)	decision with statement written by the competent authority	plan with statement written by the competent authority
	Water Paragraph refers to Water Recommendation	written statement refers to the EIS	written statement refers to the EIS

In the book '*Strategic Planning for Water'*, published by Hugh Howes (2008), in this research and development study, this technique is expressed as a value for identifying issues and priorities for development plan revision, preparation of development / planning briefs, and identifying the most environmentally sustainable sequence of proposed development using a limited number of key factors for the environment. Howes identifies this analysis and carrying capacity as "an opportunity for the Agency to become more closely involved with Local authorities on the selection of appropriate sites for development (2008, p. 154).

This technique offers systematic and trasparent process with the matrices that present the relative constraints and opportunities for the development of alternative sites. In spite of effectiveness of this technique for improving the depth of the Agency's input to the work of Regional Assemblies and Local Planning Authorities, this author argues about the difficulty of evaluating progress in short-term perspective.

Integrated Water Cycle Studies are also defined as an opportunity to link to hydrological cycle into the forward planning process of local authorities (Howes, 2008). This approach is particularly effective at subregional or whole catchment studies. The Hampshire Water Strategy and The Mersey Basin Campaign are shown as excellent examples of how water issues can be fully integrated into the planning process. Howes (2008, p. 78) states that "The Hampshire Water Strategy demonstates what a Local Authority can do to promote the water environment". This strategy include ensuring appropriate water policies based on the four key issues: pollution, increasing demand, flooding, and climate change. These policies included in all development plans. Howes also emphasizes the urgent need for "Integrated Water Cycle Studies" for key growth areas and adaptation to climate change.

On the other hand, PPS 25 'Development and Flood Risk Practice Guide' provides guidance of the assessment of flood risk on how to do Regional Flood Risk Appraisals, Strategic Flood Risk Assessments and site-specific Flood Risk Assessments (DCLG, 2009). In this paragraph 3.9 of PPG 25, Development and Flood Risk Practice Guide suggests that:

> For spatial planning purposes, the main use of the map will be as a starting point to highlight areas where the potential for flooding from surface water needs particular assessment and scrutiny within Strategic Flood Risk Assessments (SFRAs) and Regional Flood Risk Appraisals (RFRAs). The output from these assessments should in turn inform development allocations within LDDs and outline the requirements for site-specific Flood Risk Assessments (FRAs) to be carried out by developers. LPAs should assess the suitability of the map in conjunction with other evidence (for example historical data, other models, and other organisations' data). The map should not be used as the sole evidence for any specific planning decision at any scale without further supporting studies or evidence (DCLG, 2009, p. 41).

As mentioned above paragraphes, flood risk assessments are defined in three categories: Regional Flood Risk Appraisals (RFRAs), Strategic Flood Risk Assessments (SFRAs) and site-specific Flood Risk Assessments (FRAs). Figure 4.25 gives information about scope and responsibilities for flood risk assessments.

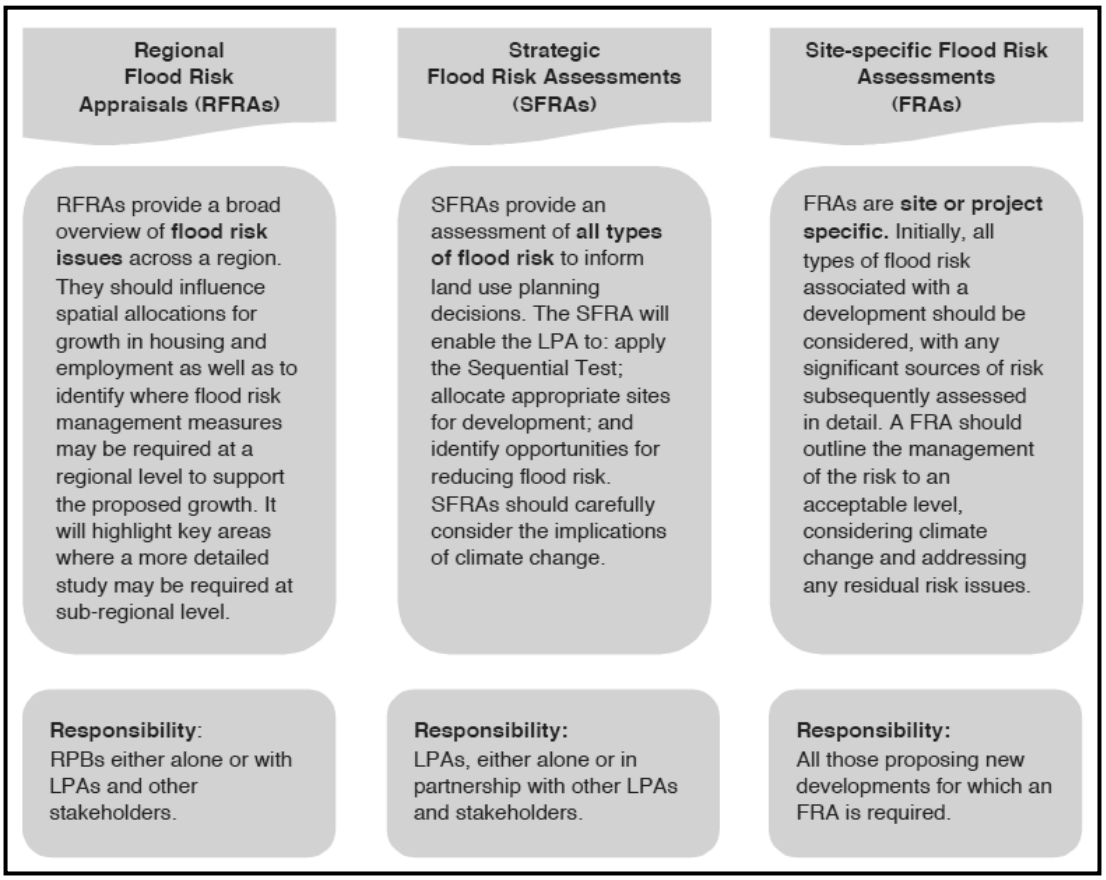


Figure 4.25. Scope and responsibilities for flood risk assessments in England (Source: DCLG, 2009, p. 43).

- **Australia:** The relevant policy provisions are most used rather than assesment techniques in Australia. For example, *Liveable Neighbourhoods* provides information about water sensitive design approaches to urban water management to aid the achievement of good urban structure planning. However, the document – Evaluating Options for Water Sensitive Urban Design (WSUD) - a comprehensive national reference- developed in accordance with National Water Initiative Clause 92 by the Joint Steering Committee for Water Sensitive Cities (2009) highlights the assessment of a WSUD at several levels. This assessment is provided at two quite distinct levels:

  - WSUD *option evaluation* involves providing guidance to WSUD designers on how to evaluate a range of potential WSUD options; and
  - WSUD *option assessment* involves providing guidance to a consent authority (e.g. Local Government) on how to evaluate a specific WSUD proposal submitted by a developer (Joint Steering Committee for Water Sensitive Cities, 2009, p.11).

In conclusion, given the importance of the assessments in decision-making and plan making, the countries and these spatial planning systems, especially Netherland

and England, shows the need for new techniques or assessment approaches more centrally into the decision making process to promote the water management agenda. Clearly, much has been achieved in integrating water into the planning system.

4.2.7. Objectives and Specified Measures for This Integration

Voogd (2006) states that technical measures alone are not sufficient to prevent floods and protect water resources. So, the author also emphasizes that modern water management needs to combination of technical and spatial measures. In the selected countries, states, regional planning bodies and local governments have implemented a variety of measures to better connect water resources and land use planning. The countries need to implement management strategies and to improve regulatory measures. Based upon the survey, this study identifies that the majority of strategies and used/ mandated measures/implementation mechanisms are targeted towards (using and refining statutory mechanisms for the management, protection and enhancement of waterways, including legislation, environmental protection policies, codes/guidelines for appropriate practice, and the identification of water protection areas): water quality and water resources, flood management and natural conservation and biodiversity. These are discussed below:

- **Netherlands:** the Fourth National Policy Document on Water Management (1998-2006), entitled '**A Framework for Water'** focuses on an integrated area-specific approach and the use of hydrological processes as a guiding principal in spatial planning. The concept of 'a good mix of spatial and technological measures' is envisaged as a good way to address safety requirements and reduce water-related problems (Du, 2010). The document "*A Different Approach to Water, Water Management Policy in the 21st Century*" focuses on for a new approach to ensure safety and reduce water-related problems that is founded on three underlying principles

  - anticipating instead of reacting,
  - not passing on water management problems, by following the three-step strategy (retaining, storing and draining), and not passing on administrative responsibilities;
  - allocating more space to water in addition to implementing technological measures (EPD, 2007, p.16-1).

This means a constant consideration of spatial measures in addition to technological measures. Voogd (2006) determines the use of both technical and spatial measures as a distinguishing characteristic of the Dutch approach to solving water-related problems -stemming from the Netherlands "Room for Rivers" Spatial Planning Decision of 2006. Under this policy, spatial measures are designed can be "to change land use in order to (1) prevent fast run-off from surfaced areas, (2) enable and safeguard the storage and discharge capacity of the water system, and (3) prevent damage to built-up areas downstream" (Voogd, 2006; 52). In the Dutch policy, flood protection is clear that river-widening measures, retention areas are defined in the event of flooding. A variety of measures to achieve the goal to safeguard the flood protection level are deveoped and approved such as like widening and deepening the river bed, removal of obstructions, dike relocations and excavating bypasses around urban areas, as seen Figure 4.8.

- **Australia:** A national framework for protection includes two main options:
  - **Whole river basin protection:** establishment of an Australian Heritage river system provides identification of candidates at the large scale (i.e.river basin, tributary river) (Kingsford, 2004).
  - **Protection of dependent ecosystems at the catchment scale:** to work within a catchment scale, four main inter-related mechanisms are defined such as environmental flow management, protected area acquisition and management, natural resource management and incentives (Kingsford, 2004).

In the local scale, "Water Sensitive Urban Design Local Planning Policy" has three main objectives are:

- to improve the achievement of total water cycle management outcomes via the planning and development approvals process, consistent with *State Planning Policy 2.9: Water Resources* (2006) and *Better Urban Water Management* (WAPC, 2008);
- to achieve better integration of land and water planning and thereby improved water management outcomes for the catchments within the local government area;
- to ensure that land use planning decisions are consistent with the requirements of environmental protection policy and compatible with the achievement of relevant objectives and environmental quality criteria (Kingsford, 2004, p. 5).

A range of broad principles and objectives adressed in the application of WSUD is grouped into the following generic 'outcomes by Joint Steering Committee for Water Sensitive Cities (2009) as follows:

- Integration of the whole water cycle;
- Management and minimisation of hydrologic impacts;
- Protection and enhancement of the ecological function of local and regional receiving environments;
- Provision of alternative sources of water;
- Maintenance and/or enhancement of visual and social amenity values;
- Minimisation of whole of life asset costs (Joint Steering Committee for Water Sensitive Cities 2009, p. 5-1).

To support the implementation of the strategies in the Water Sensitive Urban Design Local Planning Policy, Table 4.13 shows matrix demonstrating how the water sensitive urban design strategies to achieve the principles. As mentioned before, Statement of Planning Policy 2.9 Water Resources (WAPC, 2004) shows the need to take into account total water cycle management and WSUD principles and ensure that development is consistent with current best management practice and best planning practices for the sustainable use of water resources.

Table 4.13. Linking WSUD strategies to the achievement of better urban water management). (Source: Essential Environmental Services, 2004, p. 2)

Water Sensitive Strategies	**Water Sensitive Urban Design Principals**					
	Flood protection	**Maximise water use efficiency and reuse**	**Minimise runoff/ increase infltration**	**Retain natural systems and water balance**	**Minimise pollution inputs to ground and surface waters**	**Enhance social amenity**
Compliance with environmental criteria	**xx**	**xx**	**x**	**x**	**xx**	
Compliance with stromwater management policies	**xx**		**xx**	**xx**	**x**	
Water conservation and reuse		**xx**	**x**	**xx**	**x**	**x**
Water efficiency		**xx**		**x**		**xx**
Stormwater infiltration	**x**	**x**	**xx**	**xx**		
Vegetation swales	**x**	**x**	**xx**	**x**	**x**	**x**
Rain Gardensand bio filtration systems	**x**		**x**	**x**	**xx**	**xx**
Soil amendment			**x**		**xx**	
Retention of bursland			**x**	**x**	**x**	**xx**
Landscaping techniques	**x**	**x**		**xx**	**xx**	**xx**

Key: **xx**: significant contributer to achievement of principal - **x**: contributes to achievement of principle

In this policy, it is envisaged that the following design principles and management measures should be indicated in the Planning strategies and plans:

- proposed measures to manage vegetation cover and dependent ecosystems such aswetlands and riparian corridors;
- proposed measures to manage site constraints and hazards such as flooding, slope stability, reactive soils, coastal hazards, erosion hazard, salinity, acid sulfate soils and land contamination; and
- proposed measures to ensure implementation of best planning practice and best management practice to achieve effective total water cycle management and integrated urban water management. The strategy should also identify opportunities for best-practice water sensitive urban design (WAPC, 2004, p. 5717).

Especially in local scale, Best Management Practices where applicable and water sensitive urban design in all new developments are incorporated in implementing Local Planning Policies, Strategies and Planning Conditions. For instance, Table 4.14 gives the potential applicability of potable water demand reduction and stormwater BMPs (techniques) for different development types.

Table 4.14. Potential WSUD Options for Various Development Types and Scales (Source: Joint Steering Committee, 2009; 3-20)

Option		Household	Medium Density	High Rise	Commercial and Industrial	Subdivision	Urban Retrofit
Potable water demand production techniques	Water efficient appliances	Y	Y	Y	Y	Y	?
	Water efficient fittings	Y	Y	Y	Y	Y	Y
	Rainwater tanks	Y	Y	Y	Y	Y	Y
	Reticulated recycled water	N	N	Y	Y	Y	N
	Stormwater harvesting and reuse	N	N	?	Y	Y	Y
	Greywater treatment and reuse	Y	Y	Y	?	Y	Y
	Changing landscape form	N	?	N	N	Y	N
	Water use education programs	Y	Y	Y	Y	Y	Y
Stormwater management techniques	Sediment basins	N	N	N	N	Y	N
	Bioretention swales	?	Y	N	Y	Y	N
	Bioretention basins	Y	Y	N	Y	Y	Y
	Sand filters	N	?	N	Y	Y	Y
	Swales and buffer strips	Y	Y	N	Y	Y	?
	Constructed wetlands	N	N	N	?	Y	?
	Ponds and lakes	N	N	N	?	Y	?
	Infiltration systems	?	?	N	Y	Y	Y
	Aquifer storage and recovery	?	?	N	?	Y	?
	Porous pavements	Y	Y	?	Y	Y	?
	Retarding basins	N	N	N	?	Y	N
	Green roofs/roof gardens	Y	Y	Y	Y	N	Y
	Stream and riparian vegetation rehabilitation	N	N	N	?	Y	Y
	Water quality education programs	Y	Y	Y	Y	Y	Y

(Y- Potentially suitable; ? – Possibly suitable; N – Generally Not Suitable).

4.3. Integrative Policy Framework (IPF)

A useful starting point for considering the dimensions of policy integration is a paper *Development of a Framework to Assist the Integration of Environmental, Social and Economic Issues in Spatial Planning* by Eggenberger and Partidario (2000). This suggests that integration issues fall into five classes: substantive, methodological, procedural, institutional, and policy. A similar division is promoted by the Briassoulis (2005). According to Eggenberger and Partidário (2000), these forms emerged from everyday experience:

> Integration is something that is done all the time, or that is argued as being done. Whenever there are two professionals with different backgrounds looking at the same problem with similar objectives they are integrating. Whenever there are two different topics that need to be tackled together, there is integration . . . Integrating in fact means a new entity is created where new relationships are established, bearing on individual entities that have specific characteristics and specific dynamics but in combination act in a different way (Eggenberger and Partidário, 2000, p. 204).

Eggenberger and Partidario (2000) define the integration of different sector policies with respect to sustainable development as a major challenge for spatial planning. The authors make a crucial point about the the trend of greater integration of policies, approaches and measures in the 21st century arguing that "integration has become a favoured means of increasing the effectiveness of environmental assessment and social and economic appraisal in decision making in order to promote sustainable development" (Eggenberger and Partidario, 2000, p. 204). To fulfil this challenge successfully, spatial planning need to ensure full integration and assessment of environmental, social and economic issues. Since discussions of physical planning and environmental issues generate demand for more encompassing, multi-level, spatially and temporally integrated policy approaches by reason of the complexity of contemporary socio-environmental problems, "policy integration" has been encouraged to adopt in a range of other policy areas and sectors, for example rural development, land use planning, agriculture, regional development, tourism, public infrastructure, environment, nature protection and energy policies.

Meijers and Stead (2004, p. 2) define policy integration that "concerns the management of cross-cutting issues in policy-making that transcend the boundaries of established policy fields, and which do not correspond to the institutional responsibilities of individual departments". In the literature, there are many definitions

about the policy integration. Bauer and Rametsteiner (2007) classify the definitions of policy integration found in the literature into three basic conceptualizations as depicted in Figure 4.28:

1.Policy integration as process and output of policy coordination of different policy areas (Shannon 2002; Eggenberger and Partidario, 2000),
2.Policy integration as the incorporation of the concerns of one policy area into another policy area (Briassoulis, 2004, Kivimaa and Mickwitz, 2006),
3.Policy integration as the development of a joint new policy (Briassoulis, 2004, Eggenberger and Partidario, 2000; Meijers and Stead, 2004) (Bauer and Rametsteiner, 2007, p. 34).

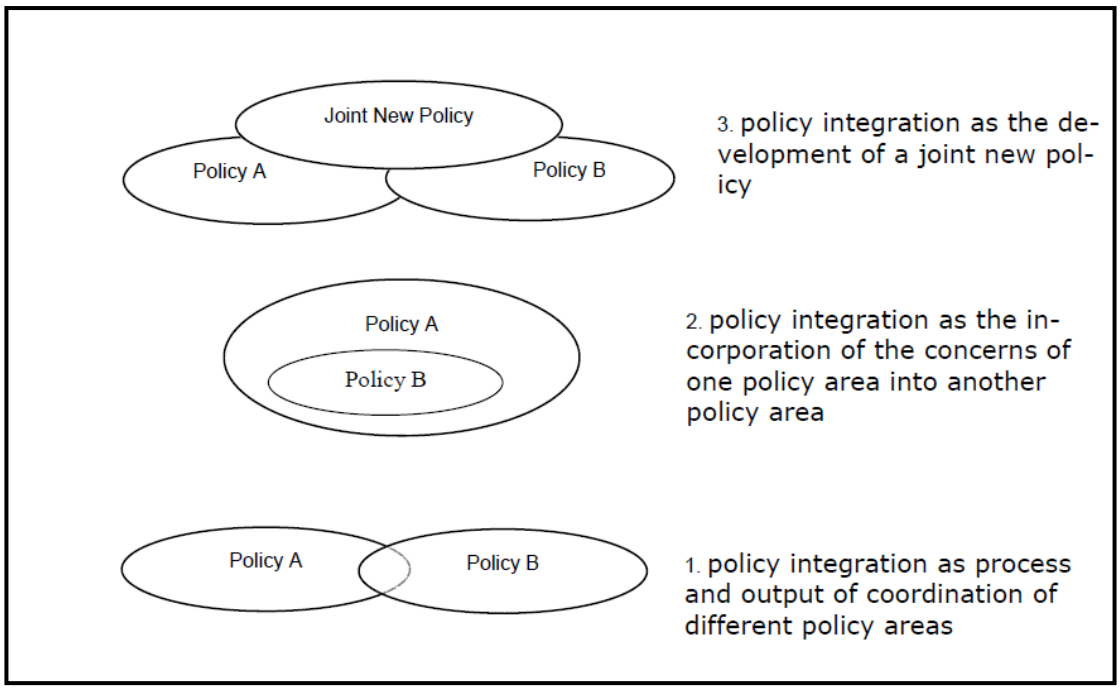


Figure 4.26. Three Understanding of Policy Integration
(Source: Bauer and Rametsteiner, 2007, p.34).

The concept of policy integration is most often applied and widely analysed in the context of 'Environmental Policy Integration' or 'linking spatial planning with Strategic Environmental Assessment (SEA)' (Shannon, 2002; Eggenberger and Partidario, 2000; Briassoulis, 2004; Meijers and Stead, 2004). Linking spatial planning with water resources management is being considered as a crucial condition for success of the sustainable cities.

To analyse the policy and legal framework of integration of land use/spatial planning and water resources management, the **Integration Policy Framework (IPF)** is structured a five-dimensional diagnostic based on the work of Eggenberger and Partidario (2000), Briassoulis (2004), Briassoulis (2005) and Kidd and Show (2007). When dealing with spatial planning and assessment, and its impact on water environment, the dimensions of IPF – substantive, methodological, procedural,

institutional, and policy – are discussed in the following to expand on the content of IPF and to inform its operationalization.

- ***Substantive integration*** refers to the congruence of the theoretical and conceptual framings of two or more policies. In the article "*Policy Integration for Complex Policy Problems: What, Why and How"* presented in Berlin Conference, Briassoulis (2004) recognizes the thematic, conceptual, and value dimensions as "substantive dimensions". Briassoulis (2004, p. 15) states that this congruence "is perhaps the necessary precondition and the sine qua non for their substantive, and not only instrumental, sustainable integration". Therefore, these dimensions have to do with the constitution of the policy objects to be integrated.

  The author defines the thematic dimension as the essential relationships among policy objects that usually concern selected characteristics of an issue. Persson, in her publication *Environmental Policy Integration: An Introduction* (2004*),* also identifies 'substantive' form as objectives of integration. Thematic integration requirement should be embeded in the policy integration as the issue of what relationships should be satisfied exactly. In other words relationships among sectoral policies account for the relationships of the characteristics of the issue considered. Briassoulis (2004, p. 19) offers that "integrated, interdisciplinary theories should indicate relationships among the characteristics of an issue to be addressed by the respective policies, thus constituting the substantive basis of their integration". Morrison et al. (2004) argue that "due to incorporating sustainability principles into water resources and land management, achievements have been frustrated by lack of integration of substantive matters in policy design. Therefore, substantive dimension of policy integration occurs under framed in concrete and substantive terms to understand the integration of environmental, economic and social aspects.

- ***Methodological integration*** deals with coordinating different assessment approaches, the creation of joint databases and indicators and also the clarification of terminology (Eggenberger and Partidario; 2000). Kidd and Fischer examine this form of integration as "the integration of different methods and their results in impact assessment and policy, plan, programme and project making" (2006, p. 10). Briassoulis (2004) poses that "multidimensional, comprehensive and integrated policy problem definitions and theories dictate the use of integrated, multi-dimensional methods and techniques at all stages of policy making". It seems likely

that technical and methodological cooperation, in particular at the regional and local levels, similarly provide informational benefits across planning. Morrison et al. (2010) mention that methodological integration is about developing an integrated awareness (e.g. across separate concepts, parochial foci, sectoral terminologies) more than just technical outputs.

- ***Procedural:*** This dimension signifies the integration of policy, plan, programme and project making procedures with the various assessment procedures (Kidd and Fischer, 2006). Initiatives to integrate different sector policies as well as environmental policies need to more broadly deliberate about strategies and action plans and systematic assessment procedures, consensus building, conflict resolution, the nature of their participation in the decisionmaking, and process-review arenas. Further, context-specificity of policy and procedural information is important in Integrative Policy Framework. The context specificity of policy interventions should be portrayed. The rules of decision-making can provide coordination among different actors. Persson (2004) explains these rules as the right to set formal agendas, the right to develop policy proposals and the timing of participation by different departments and agencies.
- ***Institutional integration*** considers leadership, responsibilities and the co-ordination of different policies. Persson (2004, p. 29) uses the term organizational factors for policy integration that include "the general government architecture, interaction of actors within and outside government, power structures, resource allocation and budgeting, and capacity". In addition, communication and coordination, through vertical linkages among agencies at different management levels, and through horizontal linkages among agencies at the same management level, strongly influence the capacity of agencies.
- ***Policy integration:*** Nilsson and Eckeberg (2007) state that it is important whether policy-making rules –environmental and sectoral- have necessarily reflection of formal policy outputs and have clear beginning and ends. To lead to meeting objectives and targets, policies have important tasks that are collecting existing economic, social, and environmental objectives and targets, identifying policy options, and etc. Eggenberger and Partidario (2000) emphasize that policy integration ensures integration of sector regulations and strategies. They use "policy integration" as one of the forms of integration by formulating the factors into an

analytic framework for understanding the integration of environmental, social and economic issues in spatial planning.

Within the above dimensions of integration, this framework described below is a basis for the assessment of the integration of land use planning and water resources management which is important for a spatial development policy point of view. Based on the outcomes and findings of content analysis (contextual studies) in theoretical and policy background, it is attempted to identify the classification of integration of both two sectors as a framework to register current experience and solicit case examples. The following requirements defined for each dimension of integration will be considered in the legal ground and planning domain in accordance with national priorities and legislations to evaluate these into Turkish context by evaluating the legal and institutional structure. In accordance with above sections, the following points need to be emphasized in contemporary spatial planning and also in spatial planning policy context. Each of these aspects of integration is considered in more detail below.

4.3.1. Substantive Integration

The thematic, conceptual or value dimensions for the integration should be embedded partly in development plans and legal provisions (Briassoulis, H. 2004). To highlight the first form of substantive (theoretical) integration, the notion of water resources management and its issues should be included in spatial planning as well, as much as other emerging issues as follows.

4.3.1.1. The Significance of Water Issues in Spatial /Land Use Planning

'**Water'** should be considered as "**critical planning consideration required early integration in the planning decision making – land use planning",** as well as in national spatial planning act (Howes, 2008, p. 59). Water should be mainstreamed into national spatial planning policies, strategies, plans. The water issues should be identified in planning as water resources, flood risk, surface water drainage and wastewater disposal. Additionally, the planning system will be important delivery mechanism for the water resources management.

Within this dimension, it is expected to be created with the awareness of the meaning of concepts. Definitions of some of the key terms, as well as contextual clarification, are needed to facilitate a better understanding of the range and scope of the material to be presented. For terms which have already been defined in the relevant literature, legislative and regulatory basis should include corresponding definition taken into account water management matters. In addition, terms can be used local or regional plan as defined in related spatial and environmental law or specified in plan or development regulations as an example.

4.3.1.2. The Integration of Sustainable Water Resources Management with Spatial/Land Use Planning

The definitions of what constitutes sustainable water management should be set out and included. In addition to, national planning law should provide explicit expression on that water resources management and planning is an essential part of the spatial planning/ land use planning process when dealing with climate change. Statutory controls should provide the framework for the control of development and land uses, taking account the water. Many countries have developed and described the new concepts and approaches that are good practices for integration land use planning and water resoures management, such as '**space for nature'**, '**green-blue network'**, '**more space for water**', and '**climate-proof city'**. The legal arrangements governing the activities of planning must be internalized water resources management and related requirements.

4.3.2. Methodological Integration

This integration should clarify the basic ideas and evaluation methods which spatial planners are applying when working in the field of water resources management. The methodological dimension of IPF (Integrative Policy Framework) concern the relationships of the methods and techniques for policy analysis associated with different policies and the creation of joint databases and indicators, based on the study of Eggenberger and Partidario (2000). There are two dimensions as the particular methodological approach advocated in the Integrative Policy Framework as seen below:

4.3.2.1. The Integration of Assessment Approaches

Using evidence in spatial planning provides understanding of the needs of the area and the opportunities and constraints which operate within that area in the preparation and justification of the strategy, proposals and policies within parts of the spatial/land use plans. Spatial planning approaches need specific studies that can be used for developing the plan or testing it. When preparing the regional or local plans, spatial planning approaches should be contributed to the wider evidence pool and each council or planning group should decide wich information will be required for their own purposes (Atkins, 2008; Morphet 2011; NOFDP, 2007). These assessment approaches or techniques have been developed and used by the countries, as mentioned in the selected countries reviewed. It should be noted that assessment approaches -environmental appraisal- provide "systematic process for evaluating the environmental consequences of proposed policy, plan or programme initiatives in order to ensure they are fully included and appropriately addressed at the earliest stage of decision-making" (Bradley, 1999, p. 16). Therefore, assessment of development impact on the water environment should be considered in the legal basis coordinated with spatial planning system.

Carter (2007) underlines that a range of tools and approaches available to planners can strength the link between planning and water issues, such as the use of Strategic Environmental Assessment and stakeholder participation procedures. The assessment methods and techniques should be acted to make objective comparison between alternative potential sites. There are available some techniques to do this. The following approaches are the common used assessment approaches or techniques to support physical plans (regional and local plans).

- **Environmental Impact Assessment (EIA):** Carter (2007, p. 2) defines Environmental Impact Assessment as "the systematic identification and evaluation of the potential impacts of proposed projects, plans, programs or legislative actions relative to the physical-chemical, biological, cultural and socioğ-economic components of the total environment". The author also states that "numerous regional planning organizations, such as councils of government, and local municipalities have implemented EIA type requirements in conjunction with land use planning and zoning considerations.

- **Strategic Environmental Assessment (SEA):** Fischer and Seaton (2002) describe that SEA is the assessment of spatial and land use policies, plans and programs above the project level. Strategic Environmental Assessment (SEA) is well-established in California and in some countries such as Canada, New Zealand and Australia, as well as in the EU, particularly for urban planning in the Netherlands as well as research into integrating assessments for integrated water management projects in developing countries. Van Dijk (2008) explains that SEA applies to the government‘s spatial and sectoral (non-spatial) plans and the documents.
- **Sustainability Appraisal (SA):** This approach is defined as an essential feature of the evidence base of spatial planning by Morphet (2011). In England, “Sustainability Appraisal” is mandatory for Regional Spatial Strategies (RSS) revisions and for new or revised Development Plan Documents (DPDs) or Supplementary Planning Documents (SPDs) under the Planning and Compulsory Purchase Act (2004) (Howes, 2008). Morphet (2011, p. 94) states that SA provides a systematic way of reviewing the approaches to spatial planning in a way which seeks to make transparent and externalize the impacts of policies and proposals. The national planning guidance on preparing Local Development Frameworks (PPS 12) says that:

> A sustainability appraisal is a systematic and iterative appraisal process, incorporating the requirements of the Strategic Environmental Assessment Directive. The purpose of a sustainability appraisal is to appraise the social, environmental and economic effects of the strategies and policies in a local development document from the outset of the preparation process. This is to ensure that decisions are made that accord with sustainable development (ODPM, 2005a).

- **Integrated Water Cycle Studies (WCS):** Morphet (2011, p. 87) also identifies water cycle studies as “one of key concerns in collecting the evidence that underpins the spatial planning process is to ensure that there is adequate information on the supply of services such as water , drainage and energy”. This holistic study of capacity in water supply, wastewater infrastructure and the water environment in growth areas is defined by Howes (2008, p. 83) as “much needed technique with ensures that all aspects of water management are considered together and have enormous potential for ensuring that water issues are integral in the planning process”. This study aims to consider when and where new water provision and treatment infrastructure would be required to

facilitate new development, and assess likely environmental and ecological impacts of future growth, to ensure that new development meets with current and future legislative requirements such as the Water Framework Directive (Howes, 2008). WCS gives planning authorities a robust evidence base to assess the effect of development on the water environment. Water cycle studies identify what the environmental capacity issues are at an early stage. Figure 4.27 helps planners about the kinds of capacity issues should be considering.

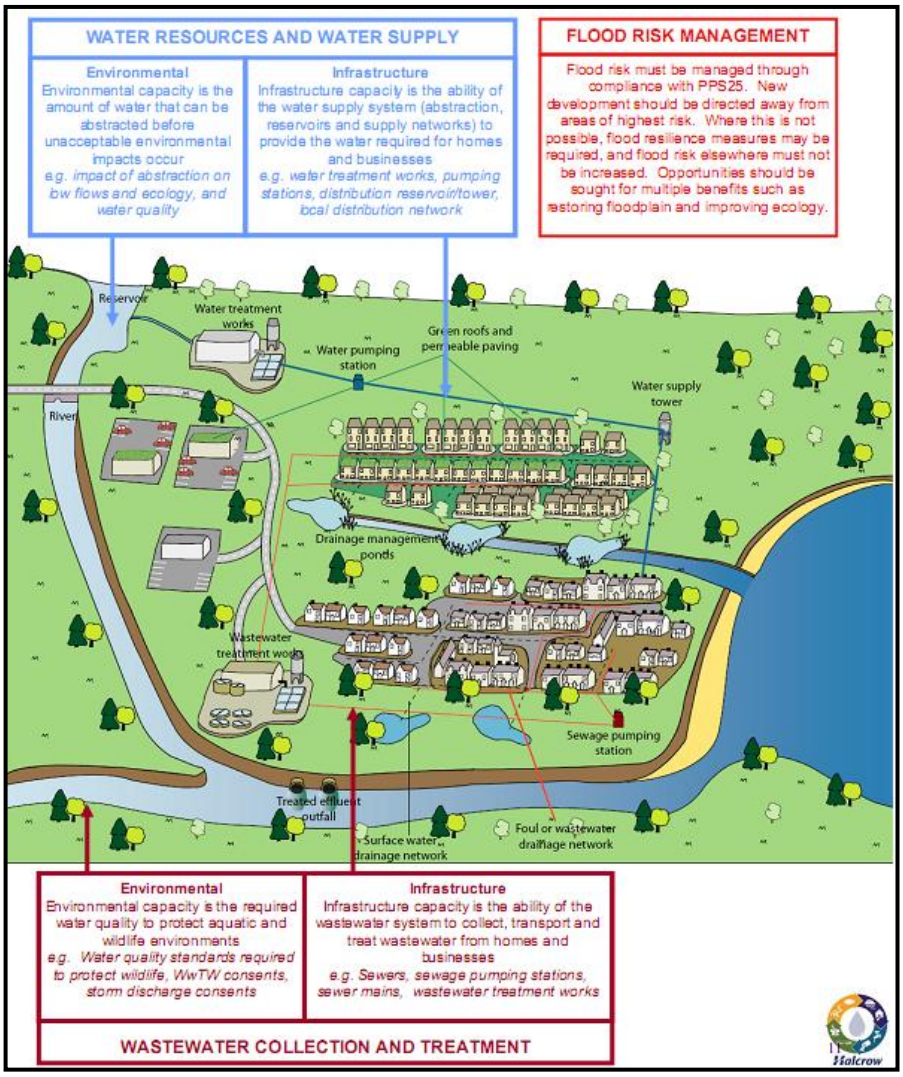


Figure. 4.27. Capacity issues for Water Cycle Studies
(Source: EA, 2008, p. 11).

As can be seen from the examples described above, assessment instruments or techniques should be defined in spatial/land use planning process to give water and the environment a fully-valued place in decision-making.

Therefore, the legislative framework should compromise that regional and local land use plans will include an environmental analysis of sub-region catchment in terms

of water resources, water quality and flood risks, using such methodologies and techniques.

4.3.2.2. The Integration of the Different Applications and Experiences with the Use of Particular Tools

To manage data collection, construct digital databases, update data and perform spatial data analysis, spatial planners and water managers need useful and effective way to share data and create new information so as to new and better sources for the future. They also need to use the latest GIS techniques to integrate spatial planning and water to adopt a cooperation working method. The related regulations should require all river basins to develop a water-resources-based GIS database for staff to review in regard to development plans and proposals. Therefore, to encourage such professionals to work together to use the best available water quality data and watershed analyses to guide growth policies to protect and improve water quality and meet water quality regulatory requirements, the different applications with the use of GIS database for water data should be defined in legal ground.

Waterman (2004, p. 187) specifies that "state-of-the-art GIS water demand forecasts use a model to map existing and projected land use types." The planning process will be based on the technical studies undertaken in the analysis phase (i.e. resources inventories and assessments, current land use mapping, historic customer water use information) to project future water demand according to the various land use categories. In the same way, the effects of conservation efforts targeted at specific land uses and land use types can be included in water demand projections. For example, it can be developed a GIS database to refine methods for calculating impervious cover to provide baseline data and aid in prioritizing restoration efforts.

In conclusion, it should be developed a repository for the collection of water resources information at national and river basin level. Spatial planning portal should include comprehensive watershed database and transparently spatial plans to citizens, private institutions and government agencies. Development of data and information system locally should support the planning process, including

- Geographical data collection and integrate into a GIS system,
- Socio-economic data collection on land utilization trends and related incomes, expectations of farmers etc.

It also helps to meet mitigation planning requirements within the basin and watershed characterization. In addition, the related law of spatial planning should require that all municipalities make their spatial plans digitally available.

There is growing interest in considering the environmental effects of land use planning. Many of these models have a land use model integrated with the water management, such as NEMO (Arnold et al., 2009).

NEMO, The University of Connecticut's Nonpoint Education for Municipal Officials Project, is the other one of the models that "is a research-based educational program for land use decision makers that addresses the links between land use and natural resource protection, with a particular focus on water resources. NEMO promotes natural resource-based planning, with programs that help communities to pursue both the conservation and development sides of the equation". (Arnold et al., 2009, p. 5) Arnold et al. (2009) identify this model that enable local officials to visualize the future impacts of their current land use policies and plans. NEMO using advanced technologies –Geographic Information Systems (GIS), remote sensing (RS), and World Wide Web (WWW) aims to help local land use decision makers about the links between land use and water quality (Arnold et al., 2009). Impervious surface zoning-based build out analysis is one example of NEMO applications. This analysis suggests that the current levels of impervious surface that is a reliable indicator of the potential for water quality degradation contrast with future levels estimated from zoning (Schueler 1994; Arnold and Gibbons, 1996 cited in Arnold et al., 2009).

4.3.3. Procedural Integration

The procedural integration refers to the structural and procedural relationships among policies. Two points are important in studying the procedural dimensions of IPF; first, their relationships with the substantive and analytical dimensions that include contextual knowledge for physical plans at regional and local level (internal consistency); and, second, the consistency and effectiveness of the procedural arrangements provided. These include calls for more integrated policy making at strategic and operational levels. As a part of the effectiveness of the integration land use planning and water resources management, the dimension focuses on substantive planning requirements (information base, goals and policies, implementation measures emphasized in the contents of regional/local land use plans) and the the process-

oriented planning requirements (i.e., the decision making process with water resources management, vertical and horizontal plan consistency, consensus building –professional and public-). The context-specificity of policy should be portrayed in evaluation studies focusing on this integration. Waterman (2004; 133) states that "plan requirements include both informational requirements (specific discussion of particular issues related to planning, i.e. the location of floodplains within the jurisdiction), and procedural requirements (procedures that planning agencies must follow while preparing a general plan)". The author also emphasizes that these requirements are inseparable part in the statute and helps to consider them. Therefore, planning obligations should include both the principles of policy content and of policy process. By isolating the substantive and procedural aspects of the land use plan process as described below.

4.3.3.1. The Integration of Informational Requirements of Water Management in Land Use Decision Making

This dimension of the policy stresses the need for guidance on how to incorporate requirements of the water resources management from regional level to local level that there is need a considerable amount of support for planning professionals. As mentioned by DCLG (2006), there is 'skills gap' amongst planners with regard to water management issues. Tarlock and Lucero (2002) recommend that the state should establish a planning framework with clear goals and policy direction on sustainable water supplies, guidance about elements to include in comprehensive plans, and data or information to support the planning process. There should be a sufficient guidance on sustainable water management to assist the planner in the decision making process. This guidance should be provided through supplementary planning guidance for regional and local development plans and should be dealt with separately. When preparing development plans and development briefs, the whole approach to planning obligations needs to be greatly improved with policy clarity and greater attention to requirements for water resources management.

The planning obligations should give a clear understanding of how local/regional development planning reports demonstrate the reciprocal relationships between local/regional land use planning and water resources management to communicate to key decision makers and other stakeholders and how to balance conflicting spatial demands. While a large amount of study highlight the importance of

the linkage water management issues in spatial/land use planning, but, it is not clear of how this integration is achieved in the land use planning process and the plans. In terms of substantive planning requirements, this study suggests the key guiding principles for this integration in regional /local physical spatial plans described below in detail, based on characteristics of high quality plans and the comprehensive literature and policy review on the integration between water resources management and land use planning. These guiding principles should be viewed as useful extension that will help in evaluating plans and in drawing lessons that could be applicable for spatial/ land use planners.

The different levels of spatial planning regional and local—are responsible for different tasks within the planning systems. This implies differences in importance with regard to the individual fields of action. Given the differences from 1: 100 000 at the regional level down to 1:1000 and 1:5000 at the local level—the possibilities and focuses of each planning level are differentiated. By clearly presenting the informational baseline requirements for spatial/land use plans, it will be easier to review the benefits and drawbacks of the proposed water element. These requirements will be used to assses qualities of Küçük Menderes River Basin's spatial plans in the section 6.3. These are discussed in more detail below.

a. Informational Requirements in Regional Development Plans:

To create cohesion and to be performed successful integration of water resource and land use planning, regional planning documents should include the following guiding principles:

Plan presentation

Guiding principle 1: The plan should be understandable to a wide a range of readers. Plans should be readable and well-organized and provide references to information sources, and employs tables, maps, and figures that are informative and easy to interpret (contain clear and readable land use maps, conveying usable information without the need to read accompanying text) (Godschalk et al., 1998, Rodriguez et. al, 2004a; Norton, 2008). The key issues and data assembled for the water resources element should be clearly specified on map and summarized in report (natural resource systems and infrastructure systems) (MAPC, 1992). Water features should be shown on the land use map, including the streams, floodplains, and wetlands.

Guiding principle 2: Regional plans should provide a clear articulation of scheduled water improvements. Thus, identifying the timing of when development will most likely occur makes it possible to plan more systematically for expansion of public services.

Information base and content

Guiding principle 3: The plan should characterize the region in the river basin. Characterization stage should focus on gathering existing information and creating water resources inventory to analyze the regional data. This regional characterization should be based on physical and natural features, land use and population characteristics, and waterbody conditions that should be clearly described and related to geographically identified areas (EPA 2008; RMC et al., 2006; California State Coastal Conservancy and Jones & Stokes, 2006; Randolph, 2004: 256; WAPC, 2007; WAPC, 2008).

In addition to, the plans should specifically addresses spatial specifity issues related water resources. The regional development plans and strategies need to be foundation through understanding water environmental profile of the region, including water quality and quantity; flood risks areas of the region(s) concerned, pointing out significant characteristics or issues for water resources /bodies, to enable an understanding of the opportunities for, and threats to, economic development from the environmental assets (WAPC, 2008a). Items should be included in the description of the existing environmental condition:

1. Description of surface waters. (Stream description and first and second order streams)
2. Description of ground waters.
3. Status of existing facilities, condition of water supply facilities in each member utility and map showing location of existing supplies.
4. Past and current trends in climate changes (precipitation, evaporation (this amount by approximately x mm a year), air temperature.
5. The water supply profile:

- Resources of water supply (regionally): Surface water abstraction% (rivers and reservoirs) and Groundwater abstraction %
- The categories of resource availability status is defined for each of the surface waters and groundwater catchments in the region as follows:

- "No Water Available (NWA) (No water is available for further licensing at low flows. Water may be available at higher flows with appropriate restrictions.
- Over Licensed (O-L)(Current actual abstraction is such that no water is available at low flows. If existing licences were used to their full allocation they could cause unacceptable environmental damage at low flows. Water may be available at high flows, with appropriate restrictions.)
- Over Abstracted (O-A): Existing abstraction is causing unacceptable damage to the environment at low flows. Water may still be available at high flows, with appropriate restrictions." (Scott Wilson, 2008; 63)

6. Historical Flooding and the potential sources of flood risk:
   - Fluvial Systems - fluvial flooding- (sections of rivers not affected by the sea)
   - Sewers –sewer flooding- (exceedance of the capacity of the sewer system from heavy rainfall or if the system becomes blocked and will continue to remain flooded until the water drains away.
   - Surface Water (pluvial or overland flooding)
   - Groundwater flooding (groundwater levels rise above prevailing ground levels)
   - Artificial Sources (raised channels such as canals, or storage features such as ponds and reservoirs) (Scott Wilson, 2008)

Guiding principle 4: The plans should identify issues of critical regional importance (with the aid, as appropriate, of a map or maps) (Cumulative effects and causes). They also should include the pressures on the water environment affected by growth and development in the region (as listed in Table 4.15). The plans also should include qualitative description of how the pressures may affect the water resources (low-medium-high).

Guiding principle 5: Plans should include assessment of water resources management policies to prevent and mitigate cumulative effects on water bodies. Potential indicators to be used in monitoring significant effects are listed in Table 4.16.

Table. 4.15. Cumulative effects and causes in the water bodies (Source: Adapted from Howes, 2008)

Water issues	Contribution of growth and development to pressure
Point source pollution	− increased loads for waste water (Biological Oxygen Demand, nutrients, chemicals) treatment of additional flows from new development. − Municipal sewage treatment plant discharges − Industrial plant discharges − Stormwater
Diffuse urban pollution	− Silviculture sources /during construction (mobilisation of contaminants, sedimentation, pollution incidents etc). − afterwards through biological, chemical and other pollutants/sediments washing off from hard standing areas into watercourses
Diffuse rural pollution	− Agro-chemical runoff /Agriculture (Livestock sources, cropland sources) − Septic systems (Onsite wastewater systems) − Suburban runoff (pollutants from roadways and grassed areas) − Wildlife (eg. soils high in iron) − Silviculture sources
Pressure on the quantity of water (over-abstraction)	− Abstraction and other artificial flow pressures arising from need to supply water to new developments. − Developments leading to physical modification of water courses, affecting the quantity and dynamics of flow (depleted water supply).
Flood	− Development in areas of flood risk (or development which increases flood risk elsewhere).
Other impacts on the status of water	− Pressure for physical modification of watercourses (morphology, development in wetlands, alteration waterways, riparian areas impacted by growth). − Biological pressures - including fish stocking, biota removal, invasive non-native species. − Increased pressure from recreation (e.g. boating, fishing). − Loss and fragmentation of habitats and green space (loss of habitat and natural infrastructure, subsidence, loss of watershed function) − Soil sealing (extensions, drives patios)

Table 4.16. Potential indicators for assessment of water resources management (Source: OECD, 2004; Friescke 2004; Hirschman and Kosco, 2008; Swan River Trust, 2009; WAPC, 2008).

Water subject	*Indicator*
· Freshwater quality	▪ Pollution loads to water bodies ▪ Pollution loads from municipal and industrial point sources ▪ Pollution loads from diffuse agricultural sources ▪ Total pollutant load in untreated stormwater runoff from the developed part of the site: · % total suspended solids · % total phosphorus · % total nitrogen · % gross pollutants. ▪ River quality in the region ▪ % river length of good/fair chemical quality ▪ % river length of good/fair biological quality ▪ River Water with high phosphate levels ▪ River Water with high nitrate levels ▪ Waste water treatment connection rates
· Freshwater resources	▪ Intensity of use of water resources (abstractions/available resources) ▪ Daily domestic water consumption per capita ▪ Water company abstraction rates ▪ % of new development incorporating water conservation measures eg meters, greywater recycling, rainwater collection
· Freshwater quantity:	▪ % increase in area of impermeable surface; ▪ % of new development incorporating sustainable urban drainage systems (SUDS). ▪ Leakage rates
· Flood risk assessment	▪ Declaration of flood risk areas as priority areas ▪ Declaration of flood risk areas as reserve areas

Guiding principle 6: The regional plan should set out the vision and long term strategies for growth across the region and include planning policies which supported the development of additional strategic water resources; for example, "consider the carrying capacity of the air, land and water". The presentation of future land uses in the region should provide strategies and recommentations for planning precints to guide and control land uses and development where necessary, having consideration of regional/subregional water resource information and strategy. This plan should also set out objectives for the water environment for the 20-50 year planning horizon (Baker Associates, 2005). Regional plans and strategies should include strategic priorities for water in the region that will be ensure more efficient management and use of water; increase the supply of water to accommodate growth in the region; diversify water

supplies to address climate variability, climate change and other supply risks; ensure policy frameworks and subsidies support total water cycle management etc. The recommended strategies of regional development plan should be presented in the following headings:

- The protection of environmental assets
- Flood management
- Stormwater management
- Water quality
  - Urban point sources – this strategy focuses on wastewater treatment plant upgrades using enhanced Nutrient Removal technology.
  - Urban nonpoint sources – this strategy addresses stormwater runoff, septic systems, growth management and urban nutrient management.
  - Agriculture – this strategy addresses best management practices on farmland.
- Water supply & conservation

Guiding principle 7: The plan should provide an examination of whether projected water demands can be met by available supplies prior to approving proposed development. Water demand for residential, tourism, industrial, and agricultural (rural) sectors should be assessed under the banner of region supplies. Snapshot of the current consumption for sectors in this region highlights the dominance of sectoral demands for water is useful to identify the known supplies of water for future development and quantify the demand that would result projected population growth and analyze how demand will be met by available resource (Van de Wetering, 2007; Far North Queensland Regional Planning Advisory Committee, 2007; Summit Environmental Consultants, 2005; Hanak and Chen, 2005).

This should take account of the amended housing growth. It is recognized that housing growth requires a provision for environmental infrastructure including surface water drainage and flood risk management; water resources and supply systems and wastewater treatment and disposal. These capacity issues need to be considered by the regional plan strategies to understand environmental limits and requirements for a new or replacement infrastructure. In addition to scenarios should be tested with a range of assumptions on the more efficient use of water.

Guiding principle 8: Plans should examine the existing and proposed local and regional water infrastructure investments. The plans should map and inventory the conditions

and capacities of existing facilities and proposed changes in those systems. Water demand and supply of water infrastructure should be discussed in the plan. The regional development plan should consider the assessment of the capacity of water resources and other water related issues, including the assessment of water resource capacity, wastewater treatment & sewer network capacity, flood risk constraints, waste treatment capacity requirements.

Guiding principle 9: The regional development plan should discuss a number of potential technical solutions to deal with water issues at planning application to meet the objectives and decrease the impacts of sprawled regional development, taking account river basin management plans and the other water management plans. Identification and incorporation of mitigation or control measures for surface and ground water resources in the region are helpful in understanding these actions Table 4.17 lists implementation measures, such as increasing the requirements for SUDs (Sustainable Urban Drainage Systems), investigating alternatives to impervious surfacing, the use of buffer zones, etc. These actions may be suggested as mandatory items, but, rather, are intended to suggest options available to the local authorities.

Goals and policies

Guiding principle 10. The plans should provide clearly articulated goals, including water resources management goals achieved with land use policies and objectives, and land use goals achieved with water supply policies and objectives (Godschalk et al., 1998, Rodriguez et. al, 2004a; Norton, 2008).

Guiding principle 11: The water resources management and land use goals should be reasonably achievable with the policies /specific policies suggested in the plan to guide decision making and planning. These policies lie in the intersection between land use and watershed planning at the regional level. Water resource goals and policies should take a watershed approach to planning, considering human activities that affect water, land/water interactions, aquatic life and aquatic resources and in particular, potential impacts to other communities upstream or downstream within the watershed. Water management goals and policies should be integrated in detail with the land use element and address all relevant water management issues, and be presented comprehensively as seen Table 4.18.

Table 4.17. Implementation mechanisms (Source: Howes 2008, 87; EA 2009, 8; Carter, 1996; Kavanagh and Bree, 2009; EA; 2009).

Water issues	**What spatial planning may be able to do address this**	**Implementation mechanisms**
Point source pollution	− timing and phasing development to coincide with delivery of additional capacity to meet demands from urban growth and industry. − sustainable drainage systems − groundwater protection − surface water protection	− SUDs (sustainable urban drainage systems) − Setbacks from watercourse − Drinking water protection zone
Diffuse urban pollution	− sustainable remediation techniques which reduces/removes/ render them harmless. − sustainable drainage systems − The development and implementation of Total Maximum Daily Loads (TDMLs)[1]	− Impervious cover limits − Sustainable drainage systems (SUDs) − Constructed wetlands (sediment basins, grassy filter, wetland, pond) − Stormwater retention ponds − Vegetated buffer strips along streams
Diffuse rural pollution	− Reduce agro-chemical runoff − Improve rural land management /improving irrigation systems	− Pest and weed management − Water conservation measures − Creation of buffer strips around waterbodies to prevent pollutant loss. − Installation of fencing to prevent livestock access to watercourses. − Reduction of agricultural intensity (e.g. lower stocking density on land, land reclamation).
Pressure on the quantity of water (over-abstraction)	− timing and phasing development to coincide with delivery of enhancements to water storage, transfer systems and local supply networks.	· water-conservation measures, e.g. rainwater-harvesting schemes, awareness campaigns, introduction of best-practice guidance · Water metering and charging programmes for residential users · Restrict development if abstraction already at capacity. · Reduce abstraction demand, e.g. reduce leakage and unaccounted water loss, modify plumbing codes to support conservation, ensure daily metering of abstracted volumes, implement small schemes with smallerdemand.
Flood risks	− locating development sites outside of flood risk areas, controlling the rate and impact runoff downstream and mitigating the potential impacts of flood defences, drainage works and surface water management on water bodies	*Flood mitigation measures* shown in detail in Table 4.31
Erosion and chemical transport		The use of on side sediment retention basins,

[1] *Total Maximum Daily Loads (TMDLs) for impaired waters presents a significant opportunity to integrate planning for land uses across a watershed both spatially and temporally (McElfish and Casey-Lefkowitz, 2001: 51). A wealth of evidence indicates that land use decisions affect water quality and therefore can have a significant role in the development and implementation of TMDLs (McElfish and Casey-Lefkowitz, 2001:57)."TDML's sets allowable limits for pollutants. TDML's are established for waters polluted by point sources and non-point sources" (McElfish and Casey-Lefkowitz, 2001:55).*

Table 4.18. Goals and their policies maintaining overall water quality and water quality issues (Source: WAPC, 2008; Berkshire Regional Planning Commission, 2001)

Goals	Policies
Sustainable water resources	· Encourage sustainable and efficient management of water resources · Reduce the demand for water · Maximize water use efficiency and reuse · Retain natural systems and water balance · Minimise the environmental effects of water abstraction, both inside and outside the authority boundary · Ensure the installation of water saving measures such as rainwater harvesting and water metering
Flood protection	· Minimise the risk of flooding from rivers and watercourses to people and property · Reduce surface water run-off · Limit development in floodplains · Ensure the use of sustainable drainage systems (SUDS) in appropriate circumstances · Take a sequential approach to the location of new development away from areas at highest risk of flooding
Preservation and protection of water quality / stormwater management /wastewater management	· Control erosion and/or sediment at construction sites · Retention of vegetation and/or re-planting at construction sites · Limit impervious surface areas to 10% in Critical or Sensitive Areas and in new development · Septic system inspection and maintenance · Minimise pollution inputs to ground and surface waters · Minimise runoff and increase infiltration · Ensure that essential water infrastructure is co-ordinated with all new development8concurrency principle) · Incorporate the use of nonstructural best management practices (BMPs) · promote low impact development (LID) techniques.
Biodiversity and habitat protection	· Preserve and improve the ecological integrity of important natural environments and resources: surface waters and watersheds, forested areas, critical wildlife and plant habitats, wetlands, prime agricultural soils, flood prone areas, aquifers and recharge areas, steep slopes and mountain tops · Protect a public open-space network · Restore of streams

Implementation

Guiding principle 12: The regional plan should facilitate meaningful ongoing public participation and incorporate ongoing monitoring and implementation evaluation procedures, using indicators (Rodriguez et al., 2004, p. 7; Norton, 2008; EPA, 2008). The plan should identify the stakeholders responsible for developing, implementing, and updating the plan to ensure long-term accountability. The plan should also describe the stakeholder involvement conducted during the development of the region development plan.

Coordination and Consistency

Guiding principle 13: Coordination and collaboration between land use and water agencies should be well-defined in the plan. The plan should use a common, consistent, and persuasive set of assumptions in its integration of future land uses with water supply plan. Demand estimations for land use should be based on the same population and economic forecasts as the estimates used in the water management plans. This plan should be integrated with other planning efforts. Plans should consider the other sector plans' policies and strategies taking account river basin management plans and the other water management plans. When appropriate such strategies should be provided as a part of plan or references, strategies of this plan prescribing urban water management principles should be provided as follows: flood management, urban water supply plan…etc.

Guiding principle 14: The plan should achieve internal consistency (between facts, goals, analyses, and policies), horizontal consistency (between the plan and plans of neighboring jurisdictions), and vertical consistency (between the regional and environmental / master plans and mandates. (Rodriguez et al., 2004, p. 7; Norton, 2008, p. 452).

b. **Informational Requirements in Local Structure and Implementation Plans:**

This section includes an overview of plan requirements for all municipalities to prepare the local structure and implementation plans. The local land use plan should contain complete and accurate information in the following areas:

Plan presentation

Guiding principle 1: The local development plans should be understandable to a wide a range of readers. Plans should be readable and well-organized and provide references to information sources, and employs tables, maps, and figures that are informative and easy to interpret (contain clear and readable land use maps, conveying usable information without the need to read accompanying text) (Godschalk et al., 1998, Rodriguez et. al, 2004a; Norton, 2008). The key issues and data assembled for the water resources element should be clearly summarized in plan report (MAPC, 1992). Maps to illustrate water resource issues in relation to land use, jurisdictional boundaries and watersheds should also be presented in the comprehensive plan.

Guiding principle 2: Local plans should provide a clear articulation of scheduled water improvements. These should also identify where further work is required to support

future development Time horizon of the plan determines the extent to which certain impacts, such as the land development impacts of the water supply plans/projects should be examined. This is helpful in anticipating the impacts and data in the land use plan.

Information base and content

Guiding principle 3: This plan should provide an inventory of the major natural resources and features within the project study area along with an assessment of the environmental conditions and features. Water resource inventories and analyses are the basis for natural resource planning in any comprehensive plan.

The plan should have spatially specific information (Rodriguez et. al, 2004a). Differences in the quality and availability of water resources, water infrastructure and in land uses should be clearly related to geographically identified areas. Plans should describe components of water resource protection areas such as streams and these classifications, urban lakes, water supply reservoirs, coastal/estuarine, and aquifers. It is important to identify as specially as possible where conditions or recommended actions are located in space. The local plan and report should include as follows:

- Inventory water resources, including rivers, lakes, streams, bays, estuaries, reservoirs
- Identify the boundaries of watersheds, aquifer recharge areas, and groundwater basins
- Describe unique water resources sources
    - Groundwater bores, levels, quality and flows
    - Surface water flows and quality
- Identify the information related flood:
    - Identify flood-prone areas
    - Inventory flood control structures and areas managed for flood control (dams, reservoirs, levees, flood walls, sea walls, channel alterations, diversion channels and weirs)
- Identify existing and planned land uses within the floodplain (Open space, Habitat, Agriculture, Flood control, Developed -e.g., residential, commercial, industrial, etc.)
- Identify the information related soil types (slight-moderate-severe), landforms, and geological features (steep or otherwise erodible slopes). (Lawrence, 2001; EA, 2009).

Guiding principle 4: The local land use plan should include water supply system description and evaluation. Additional information required for local plans should be provided from Water Resources Management plans etc. Drinking water source protection plans should be taken into account for historic customer water use information. The plan should include history and baseline conditions. Waterman describes two reasons for this decriptions for existing conditions and trends that are "(1) justifying the the goals and policies expressed in the plan (2) providing the context necessary for the public and those parties interested in the general plan to understand the motivations of the city or municipality" (2005; 1021). Description of water supply system analysis approved by water authorities should include:

- *Local water infrastructure investments*. Plans should examine the existing and proposed investments. The plans should map and inventory the conditions and capacities of existing facilities and proposed changes in those systems (Rodriguez et. al, 2004a).
- *Sewer infrastructure and sewage disposal*: This should identify and evaluate existing sanitary sewers (septic system and sewer service) and identify system improvements to meet the needs for the current population and the estimated population in 20-30 years. (Current number of on-site disposal system).
- *Treatment and storage capacity*: The plan should describe the annual amount and method of disposal of treatment residuals and all storage structures and capacities (depicted in table 4.19 as an example).

Table 4.19. Storage capacity

Total Storage Capacity	**Average Day Demand** (average of last 5 years)
Gallons	Gallons per day
Number of Structures	Gallons

- *Analysis of water demand*: This should require information in the following the example table (Table 4.20) for the past 10 years water demand.

Table 4.20. Historical water demand

Year	Total Population	Population Served	Total Connectionns	Residential Water Sold	Total Water Sold	Total Water Pumped	Percent Unmetered/ Unaccounted	Average Demand	Maximum Demand	Residential gallons/ capita/day	Total gallons/ capita/day
1											

- *Water Demand Projections:* Projected water demand reduction from conservation (Table 4.21).

Table 4.21. Ten Year Demand Projections

Year	Population Served	Average Day Demand (MGD)	Maximum Day Demand (MGD)	Projected Demand (MGY)

MGD – Million Gallons per Day MGY – Million Gallons per Year

Guiding principle 5: Plans should identify the critical water issues and their causes in municipality which can influence water availability and quality. A local comprehensive plan may have a section which lists the current water issues of concern to the community. Although the details of these factors will be captured in the water supply plan/projects, a need to communicate broad land use impacts remains. The issues and their causes should be associated with specific geographic areas, as follows:

- Pollution entering streams from nonpoint sources (stormwater runoff from urban, suburban and agricultural lands)
- Erosion (either on-land or in-stream) caused by stormwater runoff.
- Depletion of groundwater levels due to number and capacity of wells
- Contamination of ground water from on-lot septic systems
- Contamination of groundwater from spills or releases of pollutants
- Contamination of streams and resultant fish/wildlife kills from spills or release of pollutants
- Declining stream flows
- Stream salinisation (Frederick County Division of Planning, 2010).

Guiding principle 6: The size, location and type of present and future growth should be planned to take into account water supply issues. In other words, growth should go where the water supply source can support it. This determination should be based on the adequacy assessments (Frederick County Division of Planning, 2010). The assessment should be mentioned in plan report. The adequacy assessments are divided into three components:

- **Drinking Water Assessment:** Water demand and water supply capacity should be discussed in the plan. To make the best possible plans for using water resources to

serve a planning area, the comprehensive plan must identify the adequacy of existing water supplies, identify adequate sources and infrastructure for future needs and identify steps that need to be taken to protect existing and future water supply sources (Frederick County Division of Planning, 2010). These understandings must be made in the context of projected population growth and changing land use patterns. The plan should include:

1) The assessment existing and projected demands upon water supply sources, including agricultural, commercial, residential, industrial, and public demands. The plan should assess current water needs from existing development. The plan, then, should assess future and total water needs considering future land use patterns and population distribution, using water supply capacity management plan guidance. The assessment of existing and projected demands upon water supply sources should be based on agricultural, commercial, residential, industrial, and public demands (Maryland Department of Planning et al., 2007).
2) the assessment the adequacy of existing and future water supply sources: "how is adequate defined" and "adequate for what period of time?" Given the distribution and amount of water demand, the plan should include the determination whether water supply will be sufficient to support that demand.

- **Wastewater Assessment:** The plan should include the findings of assessments of wastewater capacity needs and water body assimilative capacity to connect the implementation policies that include existing or new local ordinances or regulatory programs pertaining to wastewater disposal, capacity allocation, authorization and water quality protection (Frederick County Division of Planning, 2010).
- **Stormwater Assessment:** To manage stormwater and non-point source pollution, it is intended to ensure that the land use planning process is used as an effective nonpoint source pollution management instrument. An analysis of nonpoint source nutrient loading and impervious surface changes at a broad planning level of detail should be considered as a component of a comprehensive plan. The results of the nonpoint source loading assessment should be used to inform the land use, sensitive areas, environmental and other elements of the comprehensive plan that will direct and influence future development (Maryland Department of Planning et al., 2007).

Guiding principle 7: The local plans should identify and apply land use indicators to determine their practical usefulness in local watershed planning and management defined in the Table 4.22.

Table 4.22. Indicator for local physical plans (Source: Swan River Trust, 2009; WAPC, 2008).

Subject	Indicator
Water sustainability	Consumption target for water of kL/person/yr, (State water plan target) Existing supply adequacy
Protection from flooding	the critical one year average recurrence interval (ARI) event the post-development discharge volume peak flow rates
Ecological protection	Water body assimilative capacity Existing wastewater treatment capacity
Stormwater quality	A reduction in pollution transported to receiving waterways · percent reduction of total suspended solids · percent reduction of total phosphorus · percent reduction of total nitrogen · percent reduction of gross pollutants

Guiding principle 8: "The water resources element is linked to the various planning documents that set land use policy and implement development plans" (Maryland Department of Planning et al., 2007, p. 6). The information should provide guidance to policies that will promote conservation, preservation, and encourage management practices that properly align projected growth with the planned area's water resources. The land use element should include action recommendations that support the proper coordination of water resource limitations and opportunities with current and future land uses. The local comprehensive plans should include following strategies applicable to the water resources element as listed in Table 4.23.

Table 4.23. Water strategies required in local land use plan content. (Source: Anderson, C., et al., 2008; Maryland Department of Planning et al., 2007).

Subject	Strategies
Water quality	• Preserve open spaces of the rural areas through zoning that protects the rural resources • Promote agricultural preservation
Water supply	• Reduce the amount of growth development • Focus growth within water and sewer planning areas • Phasing growth
Wastewater	• Reduce nonpoint source nutrient loading through stormwater and septic tank
Storwmwater	• encourage the retention of rain water • limit set on the percentage of impervious surfaces allowed in new developments

Guiding principle 9: The plans should identify and map areas that require special measures to protect source water, water quality or other water resource values. In other words, these should use tools to provide assessment of water policies. The objectives

and measures for local land use plans are shown in Table 4.24. These policies lie at the in the intersection between land use and watershed planning at the local level (Brody et al., 2004).

Table 4.24. The objectives and measures for the local-level land use plans (Source: SEMCOG, 2003; Du, 2010; Freistaat Sachsen, 2006; Schueler and Holland, 2000b).

Objectives		***Measures***
Surface water management and water quality management/ Stormwater management / Flood management	Space for detention/retention facilities	*Structural Best Management Practices*. Detention facilities: ▪ detention ponds ▪ wet ponds ▪ storm water wetlands ▪ multiple pond systems Retention facilities: ▪ wet ponds ▪ infiltration basins ▪ storm water wetlands ▪ multiple pond systems ▪ rain gardens
	Space for riparian corridors or buffer zones	*Riparian corridor preservation:* Vegetated riparian buffer zones *Ecological buffer zones*(stream, river corridor, or lakes, wetlands
	Space in watersheds	*Policy (non-structural) Best Management Practices.* Storm water system maintenance ▪ street sweeping ▪ catch basin cleaning ▪ outfall inventory/inspection ▪ woody debris management ▪ stream bank stabilization ▪ floodplain/wetland management ▪ household hazardous waste disposal ▪ equipment/storage area maintenance ▪ fertilizer management Site development ▪ cluster housing ▪ minimize street parking ▪ minimum/maximum parking space criteria ▪ lot coverage requirements ▪ open space requirements ▪ require use of structural best management practices (BMPs) ▪ enforce soil erosion and sedimentation control (SESC) practices ▪ development and maintenance agreements
Habitat protection and restoration		Use restrictions /Density restrictions Phasing development Stream and wetland restoration

Goals and policies

Guiding principle 10. The plans should provide clearly articulated goals, including water supply goals achieved with land use policies and objectives, and land use goals achieved with water supply policies and objectives (Rodriguez et al. 2004).

Guiding principle 11: The water resources management/planning/protection and land use goals should be reasonably achievable with the policies /specific policies suggested in the plan to guide decision making and planning (DWG, 2004).The achievement of better urban water management outcomes requires consideration of the total water cycle in an urban context (WAPC, 2008). This is best explained by the principles of water sensitive urban design. Therefore, in local context, water sensitive urban design principals should be addressed in the proposed plans. The goals and policies are defined in the Table 4.25.

Table 4.25. Goals and policies for local land use plans (Source: Maryland Department of Planning et al., 2007; Frederick County Division of Planning, 2010).

Goals	Policies
Manage a water regime	▪ Maintain appropriate aquifer levels, recharge and surface water ▪ characteristics in accordance with assigned beneficial uses; ▪ Manage groundwater recharge sustainably; ▪ Prevent flood damage in developed areas; ▪ Prevent excessive erosion of waterways, slopes and banks.
Maintain and, where possible, enhance water quality	▪ Minimise waterborne sediment loading; ▪ Protect riparian vegetation; ▪ Minimise the export of pollutants such as phosphorus and nitrogen to surface or groundwater; ▪ Prevent groundwater acidification processes; ▪ Minimise the export and impact of pollution from sewerage.
Encourage water conservation	▪ Minimise the import and use of scheme water; ▪ Promote the sustainable use of rainwater; ▪ Promote the sustainable re-use and recycling of wastewater; ▪ Reduce irrigation requirements; ▪ Promote opportunities for localised supply.
Enhance the protection and management of open space and maintain the character of the region.	▪ Protect significant ecosystems and habitat of threatened and endangered species. ▪ Protect important habitat areas from development impacts. ▪ Promote use of alternative and innovative technologies for on-site sewage disposal in developed areas where failing systems exist.

Implementation

Guiding principle 12: The local plan should facilitate meaningful ongoing public participation and incorporate ongoing monitoring and implementation evaluation procedures, using indicators. The plan should identify the stakeholders responsible for developing, implementing, and updating the plan to ensure long-term accountability.

The plan should also describe the stakeholder involvement conducted during the development of the region development plan (Godschalk et al., 1998, Rodriguez et al., 2004a; Norton, 2008).

Coordination and Consistency

Guiding principle 13: The plan should use a common, consistent, and persuasive set of assumptions in its integration of future land uses with water supply plan. Most importantly, estimates of the demand for land should be based on the same population and economic forecasts as the estimates used in the water management plans (Godschalk et al., 1998).

Guiding principle 14: The plan should achieve internal consistency (between facts, goals, analyses, and policies), horizontal consistency (between the plan and plans of neighboring jurisdictions), and vertical consistency (between the regional and environmental / master plans and mandates) (Godschalk et al., 1998).

4.3.3.2. The Integration of Procedural Requirements of Water Management in Land Use Decision Making

Waterman (2004) emphasizes that the substantive and procedural requirements are not segregated in the statute. The author (2004, p. 117) emphasizes that judicial and legislative action should "add procedural requirements that ask land use and water planners to communicate with one another more consistently, as well as adding new substantive requirements for land-use and water planning". These requirements should also reflect a comprehensive and rigorous analytical and policy making process. The procedural requirements can be defined as procedures that planning agencies must follow the procedures while preparing spatial/land use plans. Because of the nature of water resources management analysis, this land use plan might be a first draft – revisions might be necessary as a local/regional government explores water resource demands and impacts of the plan. After the assessments of water supply and wastewater these findings should be incorporated into comprehensive plan land use action recommendations (Van Dijk, 2008). Water assessment in the Netherland can be given as a successful example for the procedural provision. For example, England case, the stages in the preparation of the RSS are identified what will be needed – primarily from the Agency – in order to make use of the Regional Spatial Strategies to achieve the maximum influence in bringing about the objectives of the Water Framework Directive,

as well as the stages in the preparation of the local development framework (Baker Associates, 2005).

The legal basis should provide a framework for how water resources should be considered each planning stages (regional and local) involved in the preparation of spatial/land use plans as well as water resources management plans such as river basin management plans. This legislative regulation of land use planning should include who is responsible for producing the planning documents required to consider water manager through each stage of the spatial planning process (EA, 2006¸ EA 2009). Spatial planning policy guidance should establish a stronger hierarchy of spatial planning documents supporting water-related objectives (Kidd and Shaw, 2007). It also should include procedures for the actions recommended for the various stages of planning process. The governance guidance should ensure that all their policies and proposals have consistency provisions in planning statutes in vision statements applicable to the water resources element between regional development plans and local land use plans.

Therefore, there should be a legal provision for the early integration of water resources management and land use plan preparation as seen in the case of Australia and England. It should be designed as a flexible process, of which only the basic steps are described in the national manual or legislative base. At each planning stage, actions and responsibilities for each action should be outlined and the requirements for water planning should adjust accordingly, such as seen in the Table 4.26).

Table 4.26. Interactive process required determination in legal provisions (Source: Baker Associates, 2005; EA, 2009).

Stages in the preparation of the plan	**Responsibility for action**
Identify the study objectives	
Identify and assess the water and related resources problems, needs, and opportunities relevant to the planning setting associated with the study objectives;	
Inventory, analyze, and determine the existing and most likely future water and related resources conditions within the study area relevant to the identified problems and opportunities	
Formulate alternatives and combinations of nonstructural and/or structural measures to ensure that all reasonable solutions are considered;	
Evaluate the potential effects of all reasonable and viable alternatives	
Compare alternatives	
Select and recommend the plan	
Implementation and monitoring	

This procedural requirement should also include that the indicative timeframe each step is anticipated to take. In addition to, it should be mandatory that local

governments must assess how well their adopted comprehensive plan has worked in managing growth and protecting land and water resources in every five or seven years.

4.3.3.3. Horizontal Plan Consistency

Policy coherence between both two sector plans and strategies from national to local scale needs to be considered to mutually support appropriate spatial strategies and vice versa. Regional/local plans should be supported by sectoral plans and strategies such as watershed and forest management plans. Current and technically-sound Urban Water Management Plans, Water Master Plans or other integrated water planning documents should provide needed data for analysis, making coordination with planning documents easier (Johnson and Loux, 2004). It may be mandatory that national, regional and local sustainable development strategies and plans should be produced based on regionally through statutory key documents or water management plans (such as Urban Water Management Plan, Asset Management Plans, Catchment Flood Management Plans, and the Regional Flood Risk Appraisal) at regional, local or river basin level should be produced to integrate issues related to water management into national, regional and local sustainable development strategies and plans. Therefore, these plans and strategies should have regard to plans and strategies related water resources management. For example, Florida has locally a legal requirement that every municipality has a a ten-year Water Supply Facilities Work Plan "to project the local government's needs for at least a ten-year period, and identify and prioritize the water supply facilities and source(s) of water that will be needed to meet those needs" (Van de Wetering, 2007, p. 9). Another example of horizontal plan consistency is Minnesota law that requires all municipalities to develop three chapters that constitute their water resources management plan: (a) a wastewater and comprehensive sewer plan (b) a surface water management plan (c) a water supply plan.

To ensure horizontal plan consistency, plans at a single level of government (e.g., local) should also be consistent with plans of neighboring jurisdictions or sister agencies. In addition to, the legal framework should provide clarification on the relationship between RBMPs and local and regional development plans as well as water planning documents as depicted Figure 4.15 and Figure 4.19 (EA, 2009).

- ***The integration of River Basin Management Plans (RMBPs) and land use development plans:*** The integration of water resources management and land use planning needs to link between land use development plans and the RBMPs. It is important for the planning system that the regional planning guidelines, regional/local land use plans should take account of the objectives established for waters in river basin management plans; thereby ensuring that new projects consider the objectives of the WFD (EA, 2009). This integration provides a "consistency with the relevant aspects of the urban-water-quality and urban stormwater management strategies, policies and associated guidelines under their jurisdiction" (Queensland Government. 2009, p. 4). Figure 4.28 may give an idea of proposed interaction of river basin management with the planning system as key way align the spatial and water planning systems.

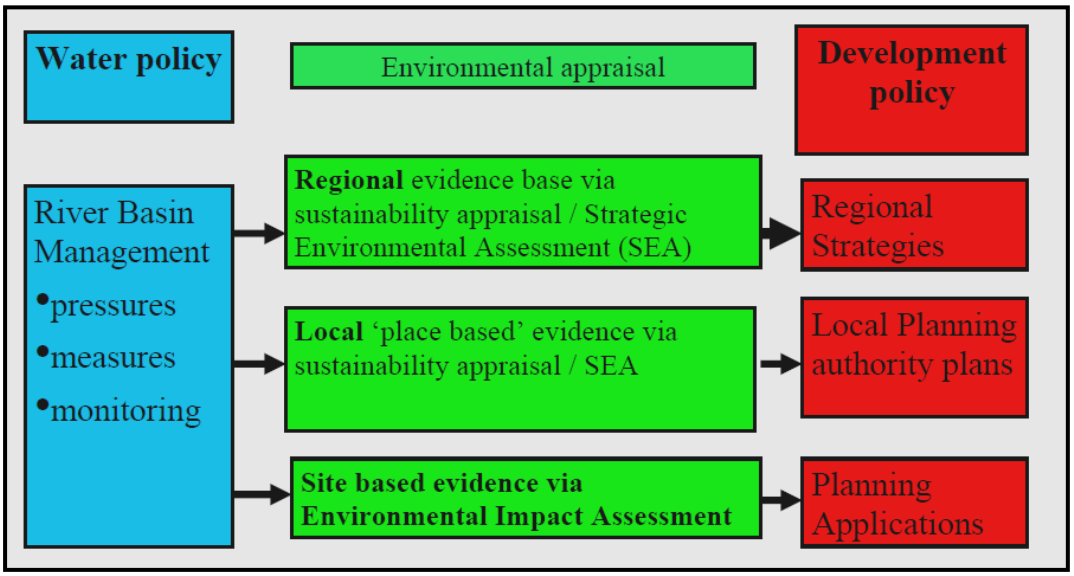


Figure 4.28. Proposed interaction of river basin management with the planning system in England (Source: EA, 2009, p. 10).

4.3.3.4. Consensus Building

The **professional consensus building** and **public participation (community involvement)** needs to be encouraged in the planning process. Spatial planning policy guidance should include requirements for consultation with statutory bodies and the public at specific stages in the process. The concept of interagency coordination and cooperation and the concept of consensus building including professional and public involvement have importance in the integration of land use /spatial planning and water

resources management activities (Carter et al., 2005). Undertaking these during the preparation of a spatial plan or water management plan/river basin management plan is expected to be beneficial to final plans and implementation.

- **Professional consensus building:** The professional agreement between urban planners and water managers at early stage and during the decision making process should be underlined in the policy context (NOFDP, 2006; WROM, 2006; Van Dijk, 2009). The objectives of Water Assessment should be an example for professional consensus mentioned in section 4.1.1.2. The interaction between the spatial-planning authority and water authority should be legalized in the initial and developing phase in order to work together interactively and creatively on the design of the plan.
- **Public consensus building:** The policy and legal environment should support enforcement of public participation in the preparation of the options from the start of the plan making process, and decisions regarding the plan are arrived at early (EA, 2009). Special emphasis should be given to the community involvement / public participation in the planning decision making process that attempt to provide consultation of future river basin management planning in the decision making process. It is clear that there remains a need for physical spatial plans that have been tested via public examination. Therefore, it should be mandatory that public involvement should be clearly defined in the legal ground.

4.3.4. Institutional Integration

This major driving force behind the move towards integrated policy framework is the concept of governance. Kidd and Fisher (2003, p. 8) state that "integrated or 'joined-up' thinking and action are in fact increasingly seen as essential aspects of effective and efficient governance". All the following dimensions of institutional integration clearly have parallels in the related literature.

4.3.4.1. The Definition of Leading and Participating Agencies - Representation

The planning system should establish and formalized relationships with many of the key public, private and voluntary sectors in water management. The combined participation of central, regional, and local entities may be needed to address land use and environmental problems (Arnold, 2006).

A lead agency should be identified to coordinate land-water management activities, programs, or policies. In addition to, local leaders should be encouraged to ensure prompt decision-making in the river basins in order to elaborate collective vision of development. Arnold (2006) examines that successful collaborative watershed conservation processes require considerable leadership by local stakeholders at the grassroots level, but also require a meaningful federal government involvement. Another important aspect of effective governance relates to the current emphasis on wide stakeholder participation.

Carter et al., (2005) signify multiple participation strategies for stakeholders as an important component in integrated land-water management. Durham and Brown (1999) give an example that "stakeholder participation in watershed planning in the United States helped to increase awareness of watershed conditions, heightened interagency coordination, helped to achieve consensus on resource management plans and lent legitimacy to final plans" (cited in Carter et al., 2005, p. 117). The integrative process for land use-water management should include stakeholders that are not only municipal and regional governments, conservation authorities/watershed councils, and government agencies, but also special interest groups, landowners, businesses, and residents. In conclusion, it is clearly identified who should be involved in land-water management.

4.3.4.2. Interagency Coordination (Horizontal and Vertical) and Clear Delineation of Actor Roles and Responsibilities

The requirements of vertical and horizontal coordination should clearly be defined in legal ground. These include calls for more integrated policy making at strategic and operational levels, horizontal integration between local agencies or between departments within the same local agency, and vertical integration between

tiers of government (de Loë et al., 2002; Carter et al., 2005; Ivey et al., 2002; GWP, 2004). The policy guidance should also be eludicative for administrative power controls and all stages of the planning process i.e. initiating, organizing, implementing, and monitoring follows.

- ***Vertical coordination***: Coordination between the different administrative levels is of particular importance for the integration land use planning and water resources management. It should be organized in such a way as to enable local and regional authorities to adapt their spatial development objectives to measures decided on at higher level, while national authorities in turn take the objectives, plans and projects proposed at regional and local level into consideration in their decisions (Carter, 2007; Kidd and Shaw, 2007).
- For ***horizontal coordination,*** cross-jurisdictional collaboration in the river basin is a necessary principle for successful project planning, development, implementation and operation (Wiering and Immink, 2006).

The roles of stakeholders should be clearly defined to identify the tasks and responsibilities of stakeholders groups. Clearly defined roles help to reduce confusion and conflict, and also ensure the efficient and effective implementation of management activities. Therefore, it should be formal criteria specifying stakeholders to be involved. It should be also clearly stated and presented roles for stakeholders and a strong role for stakeholders in decision making. Finally, an effective institutional environment for this integration is one in which stakeholders have a clear understanding of their roles and responsibilities.

4.3.4.3. Human Resource Capacity

Water resources protection requires involving technical studies such as hydrogeological assessments, and evaluations of relationships between land and water ecosystems. Thus, individuals with appropriate skills should be involved in undertaking these activities (GWP, 200; Timmer et al., 2003; Litke and Day, 1998). Timmer et al. (2003, p. 190) define the human resource capacity that is reflected in the knowledge, skills, and abilities of individuals such as town planners and utility operators. They also state that "human resource capacity is not static, and a community or organization that combines a professional environment where individuals are motivated and challenged

with opportunities to increase skills and abilities through training and education programs can build human resource capacity" (Timmer et al., 2003, p. 190). In addition, local governments should involve staff with skills to interpret and use the data and information provided by external specialists (Timmer et al., 2003; de Loe et al., 2002). Staff in sufficient numbers and skills in related institutions / organizations or enterprises, public or private sector during the prevention of water pollution and protect water resources planning studies should be included for the element, such as city and regional planning, engineering geology, hydrogeology engineering professions.

4.3.5. Policy Integration

Based on the not only Eggenberger and Partidario (2000), but also the selected case countries, the success of the integration of land use planning and water resources management should be based on government guidance on specific aspects of water quality protection and management in land use planning/spatial planning. It is envisaged that these guidance ensure planning decision-making, where water issues are a consideration, is informed via relevant and appropriate information. Therefore, there is a need to ensure that the government policies and legislative provisions should provide guidance on water management matters to be taken into account by national, regional bodies and local governments. The primary aim of this integration is to clarify the basic rules and procedures and sector strategies that spatial planners are applying when working. This integration is discussed two dimensions as below.

4.3.5.1. The Integration of Sector Regulations

The rules and polices of spatial planning system should need to include water related policies for environmental enhancements. Kidd and Shaw (2007) highlight cross-sectoral integration that implies integration of different public policy domains. They emphasize that the spatial planning guidance set out clearly demonstrates water management activities to government and planning practitioners of the need to engage with water management matters. Planning authorities work with a system that has legislation and regulations. The statutory and policy basis of land use/spatial planning shoud be consistent with and supported by the aspects of the water environment. The

planning policy guidance should make numerous references to 'water' and as such provide some generic advice on good water management practice. It may involve the following headings; water resources, public drinking water supply, water resources element, stormwater management and nonpoint source pollution, water sensitive urban design, flood management etc. as seen demonstrated in particularly Australian and England case.

The guidance should set out government policy on water relevant to spatial planning and specifically what considerations local authorities and others involved in planning should take. It will also detail steps local authorities should or could take to reflect these considerations in regional and local spatial plans.

4.3.5.2. The Integration of Sector Strategies

Effective consideration of water resources management issues depends on clear guidance. Relevant planning policy guidance on water management shoud be nested in various policy sources, and make specific reference to the issues of water management requirements. It is advocated in the integration of sector strategies that there should also be guidance for incorporation of policy measures into planning mechanisms and decision-making. It is seen that regulatory manual is required to support the implementation of the water strategies in Regional /Local Planning Policy (Kidd and Shaw, 2007; Waterman 2004, and DCLG, 2009). Planners and agencies need a basis for regulating land use within water related environment. Implementation tools, approaches and policy measures vary from country experiences, as well as the examined case countries. These of the related urban water management issues are described under four headings:

- **Drinking water protection**: To ensure a sustainable supply of potable water, land use and activities within these areas need to be managed to prevent, restrict or control uses or activities such that contamination of the water resource is prevented at its abstraction point. The protection of Public Drinking Water Source Areas (PDWSAs) should rely on statutory measures available in water resource management and land use planning legislation. In Australian case, the protection of PDWSAs includes three risk management based priority classification areas and two types of protection zones. Based on Drinking Water Source Protection Assessment

(DWSPA) documents to reflect readily available information for use in land use planning assessments and decision making prepared by Depatrment of Environment (DoE), the priority classification areas and protection zones are identified in the Table 4.27.

Table 4.27. Classification of Public Drinking Water Source Areas (Adapted from DoE, 2004).

Priority classification areas	***Description***	***Guiding principle***
Priority 1 (P1)	there is *no degradation* of the drinking water source by preventing the development of potentially harmful activities in these areas.	*Risk avoidance*
Priority 2 (P2)	there is *no increased risk* of water sourcecontamination/ pollution.	*Risk minimisation.*
Priority 3 (P3)	to *manage the risk of pollution* to the water source from catchment activities.	Guided or regulated environmental (risk) management for land use activities.
Wellhead and reservoir protection zones		
Wellhead protection zones (WHPZ)	to protect underground sources of drinking water	A radius of 500 metres in P1 areas 300 metres in P2 and P3 areas.
Reservoir protection zones	*prohibited zones*	Statutory 2 kilometre wide buffer area around the top water level of storage reservoirs

DoE defines compatibility of various land uses within Public Drinking Water Source Areas. To provide information for activities that may affect the quality of the water resources, DoE define land uses in terms of their compatibility with the sustainable use of the drinking water source in land use compatibility tables, as seen example in the Table 4.28.

Table 4.28. An example for land use compatibility table (Source: DoE, 2004, p. 7).

Model Scheme Text & interpreted type of land use	P1 areas	P2 areas	P3 areas
Agriculture– extensive			
- pastoral leases	Compatible with conditions	Acceptable	Acceptable
- floriculture (non irrigated), stock grazing (excluding pastoral leases) and broad hectare cropping,	Incompatible	Compatible with conditions (see notes 11, 12)	Acceptable
Agriculture- intensive			
- aquaculture (fish, plants and crustaceans)	Incompatible	Compatible with conditions	Compatible with conditions
- orchards; production nurseries– potted plants; viticulture– wine and table grapes	Incompatible	Compatible with conditions	Acceptable
- floriculture; market gardens (see note 24); turf farms	Incompatible	Incompatible	Compatible with conditions
- hydroponic plant growing	Incompatible	Compatible with conditions	Compatible with conditions
- plant nurseries / garden centres	Incompatible	Compatible with conditions (see note 2)	Acceptable
Agro-forestry	Incompatible	Compatible with conditions	Acceptable
Amusement parlour	Incompatible	Incompatible	Acceptable (see note 1)

The three definitions used are 'Incompatible', 'Compatible with conditions' and 'Acceptable'. Land use compatibility tables define land uses in terms of their compatibility with the sustainable use of the drinking water source. This tables include such land uses that are agriculture (animals-plants), development (commercial, industrial, urban, rural), education (research),mining and mineral processing, processing of animals / animal products, processing of plants / plant products, subdivision, sport and recreation, storage of toxic and hazardous substances (THS), tourism accommodation, waste treatment and management and other developments.

- **Stormwater management:** It is vital that storm water runoff is one of the major sources of pollution degrading our water resources. "**Total water cycle management**', or '**integrated water resource management'**, or '**water sensitive urban design**' are used as the new approach to managing water resources. Key principles of total water cycle management is listed as follows:

  - considering all water sources, including wastewater and stormwater;
  - using all water sources sustainably;
  - allocating and using water equitably; and
  - integrating water use and natural water processes, including maintaining environmental flows and water quality (Queensland Government. 2009, p. 100).

Hirschman and Kosco (2008) state that comprehensive stormwater management approach supports an interconnected network of open spaces and natural areas (such as forested areas, floodplains and wetlands) that improve water quality while also providing recreational opportunities and wildlife habitat. In EPA's study, it is found that, conceptually, higher-density development can be more protective of regional water quality than lower-density scenarios because less stormwater and associated pollutants are produced on a per-unit basis (USEPA, 2006a). Figure 4.29 shows "how dense developments, although they have a high site-level impervious cover, can result in a lower watershed impervious cover compared to a scenario where development is equally spread out across the watershed" (Hirschman, and Kosco, 2008, p. 3-3).

Related laws and regulations, storm water management techniques should be included. These techniques should be clearly explained the criteria to be included in the plans. Land use planning, design and management measures and criteria should be:

- Regional Stormwater Management Approaches:

  - Preserving open space and critical ecological features

- Encouraging development in already-degraded areas (Redeveloping already degraded sites such as abandoned shopping centers or underutilized parking lots rather than paving greenfield sites for new development)
- Using land efficiently (directing and concentrating new development in areas targeted for growth) (Hirschman, and Kosco, 2008, p. 3-4).

- Local Stormwater Management Approaches: It is advocated that "one of the challenges to local governments in protecting water quality is preventing and treating storm water runoff" (SEMCOG, 2003, p. 80).

SEMCOG (2003) examines that the goals for storm water management for local planning should include elements that:

- Protect the land's natural ability to absorb, clean, and store storm water.
- Minimize impervious surfaces in new construction and redevelopment projects to reduce the amount of runoff and improve infiltration.
- Use Best Management Practices (BMPs) throughout the community to handle storm water.
- Implement community programs that improve water quality and educate the public about their role in water quality.
- Link protection of water quality through storm water management, impervious surface reduction, and erosion and sedimentation control, to the protection of residents' health, safety, and welfare (2003, p. 81).

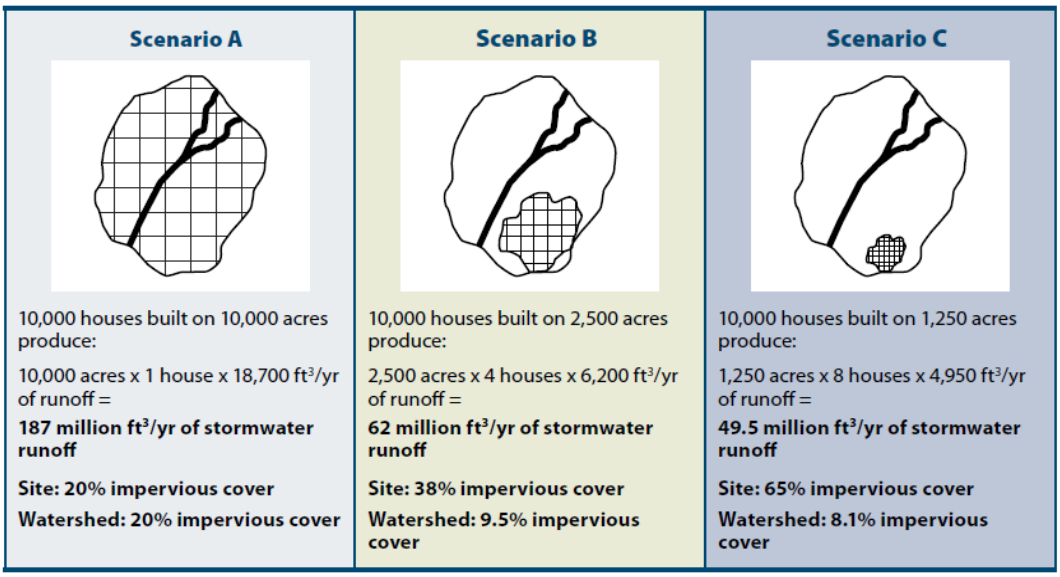


Figure 4.29. Watershed impervious cover at different development densities (Source: U.S. EPA, 2006a cited in Hirschman, and Kosco, 2008, p. 3-4).

Land use tools can be utilized to aid storm water management in two ways:

- Reducing and preventing storm water runoff*:* Preserve and restore natural features, utilize low-impact development and use open space development are such efforts at the local planning and zoning level that can prevent storm water runoff from residential, industrial, and commercial property. Arnold et al. (2009) identify Low-impact development" (LID) as a comprehensive approach that "is a set of site

planning and design methods that preserve a landscape's hydrologic functions and both minimize and mitigate tormwater runoff close to its sources" (2009, p. 12).

There are several different lists of specific LID techniques that should be considered, many of which have substantial overlap. For example,

- Rain gardens and bioretention
- Rooftop garden
- Sidewalk storage
- Vegetated swales, buffers, and strips and tree preservation
- Roof leader disconnection
- Rain barrels, and cisterns
- Permeable pavers
- Soil amendments
- Impervious surface reduction and disconnection
- Pollution prevention and good housekeeping (Arnold et al., 2009, p. 110).

- Managing storm water runoff once it has occurred. Initiate a storm water ordinance, and use Best Management Practices (BMPs) are the requirements for managing stormwater run off. Sustainable storm water management requires the preparation of a good water quality. One aspect for stormwater management is stormwater discharges and Total Maximum Daily Loads (TMDL) for non-point pollution.

  Since land use conditions affect the amount and extent of non-point source pollution, future development patterns should take into account their potential impact in order to protect water resources. McElfish and Casey-Lefkowitz (2001, p. 1) underline that "poor land use management is a chief cause of nonpoint pollution. They also pose that "in a rapidly suburbanizing area, TMDLs will need to consider allocations for agriculture, forestry, urban stormwater, sewage treatment, and other sources. TMDL implementation forces an integrated approach to the many different types of water pollution that result from human land development patterns. "Because of their focus on water quality and the need to include all types of discharges in solving the problem of water quality impairment, TMDLs may affect land use patterns in the future. At the least, they provide a framework for states and localities to rethink their land use choices and begin to coordinate land use planning and water quality management" (McElfish and Casey-Lefkowitz, 2001, p. 57-58).

  In the United States, TMDLs for impaired waters is required under Section 303 of the Clean Water Act as one land use provision. The Water Act requires states to put together a list of waters that are ''**impaired**'' because they do not meet state water quality standards. For instance, in Maryland, elements of TMDL

implementation planning are being incorporated into the local land use planning process via a new Water Resource Element.

As stated by MA DEP, "a TMDL specifies how much of a specific pollutant can come from various sources, including stormwater discharges, and identifies strategies for reducing the pollutant discharges from these sources" (Massachusetts Department of Environmental Protection (2008, p. 13). It is vital that the storm water program regulates land use by means such as requiring vegetated buffer zones and stormwater holding ponds and by restricting impervious ground cover (Klein and Kenney, 2009). Much of the pollution addressed by TMDL is '**nonpoint source pollution'**, meaning rainfall runoff from cities, forestry, and farmers' fields (Wortzel and Christman, 2007). Massachusetts Department of Environmental Protection (MA DEP, 2008) highlights that proper selection of non-structural and structural stormwater management practices is an essential component of any plan to reduce these pollutants. In general, Best Management Practices (BMPs) can be "structural, non-structural and managerial techniques that are recognized to be the most effective and practical means to prevent and reduce nonpoint source pollution" (SEMCOG, 2003, Hirschman and Kosco, 2008), depicted in Table 4.30.

Table 4.29. Best Management Practices (BMPs) (Source: Berkshire Regional Planning Commission. 2001; SEMCOG, 2003).

Structural BMPs:	1) Detention structures. Structures that "detain water, and let it out slowly until the pond is dry. • detention ponds • wet ponds • storm water wetlands • multiple pond systems 2) Retention structures. Structures that "retain" water, holding it until it infiltrates into the ground or evaporates. • wet ponds • infiltration trenches • infiltration basins • storm water wetlands • multiple pond systems • rain gardens 3) Vegetated swales and strips. • grassed swales • filter strips 4) Other practices to reduce accumulated pollutants picked up by runoff, regulate the amount of impervious areas, and eliminate inappropriate discharges to drains and storm sewers.
Nonstructural BMPs	▪ Sediment and erosion control duringconstruction ▪ Recycling and hazardous waste disposal ▪ Setbacks from water resources

These non-structural BMPs involve environmentally sensitive site design, pollution prevention and source control. “By reducing impervious surfaces and allowing stormwater to infiltrate into the ground and by selecting a landscape design that minimizes the need for fertilizers and pesticides, developers can substantially reduce the concentration of pollutants in stormwater runoff from development and redevelopment projects” (MA DEP, 2008, p. 13). Structural BMPs such as infiltration BMPs, bioretention areas, constructed stormwater wetlands, and filter systems may be effective tools for reducing the concentration of nutrients and bacteria in stormwater discharges.

- **Flood management:** As reviewed in the previous sections in this chapter, land use regulation at national, regional and local level should act as a barrier to the development of meaningful flood planning policies. As mentioned by Balaban (2009), flood management can only be achieved by an integrated implementation of structural and non-structural measures. Böhm, Haupter, Heiland and Dapp (2004) define actions for preventive flood protection that indicates that flood risks can only be reduced effectively by not only technical measures but also spatial planning regulations on land-uses in flood prone areas.

  Böhm et al. (2004) emphasize that the regional level of spatial planning plays a decisive role in the long-term safeguarding of areas and the control of land use over larger areas (fields of action A, B and D listed in Table 4.30), while the scale used at the local level is much too detailed to fulfil planning tasks where interrelated actions within the whole catchment have to be taken into account (e.g. rain water management and renaturalization of streams—field of action C, and e.g. precautionary measures on buildings and information of the public—field of action D).

  For spatial planning, the importance of the fields of action A–D (see Figure 4.30) varies according to the specific conditions. Regional spatial plans obliged by the legal framework should demonstrate how preventive flood protection will be realized on the regional planning level. The plans should emphasize the identified action areas and the importance of the fields of action for spatial planning.

Table 4.30. Fields of action for preventive flood management (Source: Böhm et al., 2004, p. 255).

A. Protection of existing retention areas Keeping of clear of non-tolerable use of - Flood plains - Meadow land - Existing detention ponds	**Focuses of Spatial Planning**
B. Extension of retention areas - Backward relocation dikes - Creating detention ponds - Restoration of large streams - Floodplain of large streams - Floodplain scrapes /deepening of retention areas	
C. Retention in the catchment - Rainwater storage and greywater use - Restriction of Sealed surfaces - Reduction of interflow on agricultural and forestry land - Restoration of small streams	
D. Minimisation of the damage potential - Preventive land use management - Precautionary measures of construction - Information of the public - Improvement of public awareness - Prediction and warning of floods - Disaster prevention control	
E. Technical flood protection measures - Dikes - Flood protection ponds - River dams and barrages	

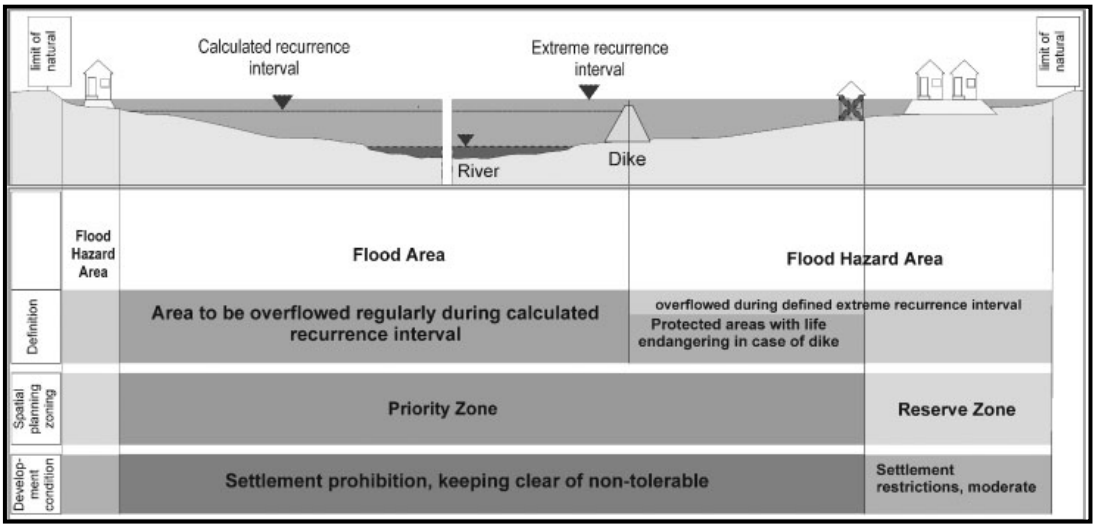
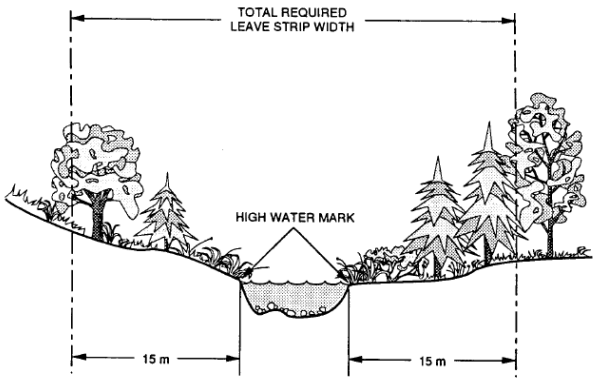
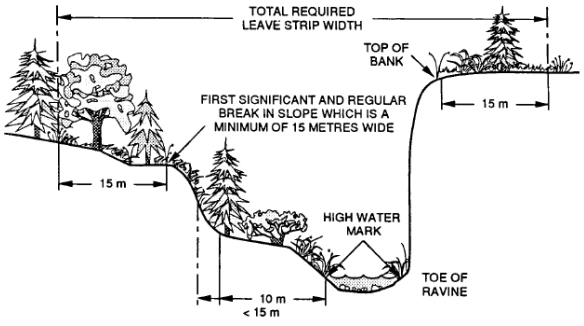


Figure 4.30. Tasks for flood risk management in regional planning (Source: Böhm et al., 2004, p. 266).

- **Surface Water Protection.** The legislative and regulatory policy should include guidance for the appropriate buffer of waterways and estuaries. Chilbeck et al. (1993) use a term of "Leave Strip Widths" for riparian buffer strips (Table 4.31). They identify minimum leave strip widths for riparian zone protection to regional

and local authorities to meet set-back requirements for flood protection, parks, community planning. To manage development near watercourses, a 15m protective natural buffer, as a minimum, should be retained between waterbodies and urban or other proposed development. Chilbeck et al. (1993) pose that leave strips should be defined on all watercourses to protect the riparian zone, which is critical to the maintenance of a healthy aquatic environment. They also emphasize that "the leave strip helps to protect private property from flooding and potential loss of land due to stream erosion and instability" (1993, p. 15)

Table 4.31. Riparian Buffer Zones (Source: Chilbeck et al., 1993, p. 18-20).

<table>
<tr><th colspan="2">Watercourse with well defined high water mark in a Residential/Low Density Area</th></tr>
<tr><td>The minimum leave strip width on each side of the watercourse should be 15 meters from the high water mark.</td><td> 
</td></tr>
<tr><th colspan="2">Watercourse with steeply sloped topography in a Residential/Low Density Area</th></tr>
<tr><td>If the distance from the high water mark to the toe of the slope is less than 15 meters, then the leave strip should be located at the first significant and regular break in slope which is a minimum of 15 meters wide.</td><td> 
</td></tr>
<tr><th colspan="2">Watercourse with well defined high water mark in a Commercial/High Density Area</th></tr>
<tr><td colspan="2">The minimum leave strip width on each side of the watercourse should be 30 meters from the high water mark</td></tr>
</table>

4.3.5. Summary

This chapter presents a number of general principles that can be used to assess water management requirements in spatial/ land use planning. It also discusses some considerations about integration with planning. The Integrative Policy Framework (IPF) profiled in this report offer ideas for how to integrate considerations of water resources into land use planning, as well as water and land use policy framework that may encourage more integrated approaches in the future. Based on the discussion outlined above, Table 4.32 provides a summary of the dimensions and requirements of integration that require consideration in water resources management. The main legal requirements in the process of decision making and plan-making for guiding regional plan and local plans are clearly described in more detail in section 4.3. This section explains a set of dimensions resulted from the above discussion and how they will be applied to the case study described in Chapter Five and Chapter Six. The criteria are consolidated through defining the key considerations and elements involved in each type of dimension. The discussion of the extensive water and land use planning literature also helps with the development of conceptual and analytical framework for this study.

Assessing consistency in policy setting requires a very broad system perspective. As a consequence, a framework of integration is set out. The conceptual framework used in this study distinguishes between five principal policy orientations. The framework will be used to critically assess the potential of the spatial planning system in Turkey to contribute to the water resource management requirements.

Table 4.32. Integrated Policy Framework (IPF) for the Integration of Land Use Planning and Water Resources Management

Type of Integration	Sub-type of Integration	Definition of Sub-type
Substantive	The significance of water issues in spatial /land use planning	Critical planning consideration for water issues in spatial/land use planning
	The integration of sustainable water resources management with spatial/land use planning	The importance of sustainable water resources management in land use planning
Methodological	The integration of assessment approaches and techniques	Decision support approaches linking water more closely to planning to support physical plans
	The integration of the different applications, and experiences with the use of particular tools	Construction digital databases and performing spatial data analysis to integrate spatial planning and water
Procedural	The integration of informational requirements of water management in land use decision making	The informational baseline requirements of the water resources management for spatial/land use plans
	The integration of procedural requirements of water management in land use decision making	Legal provision for the early integration of water resources management and land use plan preparation
	Horizontal plan consistency	Integration of spatial planning activity regarding water resources management between adjoining areas or areas with some shared interest
	Consensus building	The concept of professional consensus building and public involvement
Institutional	The definition of leading and participating agencies	Integration of public, private and voluntary sector activity related to water resource management; Leadership, and Representation
	Interagency coordination (Horizontal and vertical) and Clear delineation of actor roles and responsibilities for each two sectors	Coordination between ministries (horizontal) and effective coordination across administrative levels (vertical) Clarity of actor roles and responsibilities for each two sectors
	Human capacity	Technical and human resource capacities
Policy	The integration of sector regulations	Development of formal guidelines of water resources management principles in the land use planning system
	The integration of sector strategies	Integration of water resource management with different public policy domains

CHAPTER 5

THE EVALUATION OF LEGAL AND INSTITUTIONAL FRAMEWORK IN TURKEY

This chapter briefly reviews the existing policy context for the consideration of the water environment in the planning system and comments on how water environment appears to feature in the planning process in practice. As the governments in the world continue to advance their efforts towards integrating water resources management issues into spatial development policy and decision making process, there is a clearer understanding that these efforts include broad polices, decisions, preparation of water management plans, guidelines, maps, and operational plans. In light of this, it is increasingly being recognized that integrative measures must be taken. This study looks at the "state of play" of integration and efforts implemented in Turkey.

This study has been carried out in four phases. This chapter constitutes the second phase that includes an evaluation of the existing policy context for the consideration of the water environment in the planning system in Turkey based on the profiled Integrative Policy Framework (IPF) in section 4.3. This chapter has several aims:

- to determine the status and potential of spatial planning policy regarding requirements of water resources management in Turkey.
- to identify gaps and recommend future activities to ensure that the potential of spatial planning decisions and tools, it is also intended to derive some lessons to improve the current system in Turkey by considering the related international experiences.

Although there is no formal law or governmental document about "integration of spatial planning and water resources management in Turkey, the dimensions of Integrative Policy Framework are discussed in the current legislative and policy framework. This section of the dissertation argues that there is much to be gained by developing stronger links between spatial planning and integrated water resources management from both a conceptual perspective but also operationally, at least in the Turkish context. Moreover, substantive and procedural requirements, including plan

preparation, approval, implementation processes and coordination between stakeholders regarding measures and means of implementation are also checked.

Given the evident synergies that exist between water resources management and spatial planning, this section goes on to consider whether the existing spatial planning system in Turkey has the potential to deliver water resources management objectives using the integration policy framework set out in the Chapter 4 as a means of structuring the analysis. In order to set the discussion in context, this section starts, however, with a short introduction to the existing Turkish spatial and water planning system. The current situation is outlined as below.

5.1. Existing Water Management Structure in Turkey

When we look at the water management and at the effort to associate it with the spatial planning with respect to sustainable development in the world in the last 15 years, we see that these efforts are led by international organizations and developed countries. Upon being a candidate member of the European Union, Turkey assumed responsibility in the field of sustainable development at international level. Therefore, it is liable to harmonize its national legislation with the legislation of the European Union. The harmonization efforts of Turkey with the EU Water Framework Directive (WFD) were carried out in 2000s with the contribution of the EU funds and the cooperation of the member countries (Grontmij, 2004).

The harmonization efforts in reorganizing the public administration have been listed as follows based on the fact that the current legal and institutional organization in Turkey is insufficient, that there is a clear confusion in the distribution of tasks and responsibilities and therefore it wouldn't be possible to implement within the current structure a water management system as required by the WFD:

- "Pre-accession Program Project (MATRA) for the implementation of the Water Management Directive in Turkey.
- 'Environmental Heavy-Cost Investment Planning Project' (ENVEST Project – prepared for the Ministry of Environment and Forestry).
- Research on 'The Restructuring the Turkish Water Sector for Harmonization with the EU Water Directives' " (Taşkın; 2006, p. 261).

In these works, the followings are the principles that are frequently expressed to contribute to the harmonization process of Turkey with the EU water legislation and to transpose the experience of the other countries:

- Water is a limited and scarce resource. Therefore it needs to be regarded as an economic source/commodity.
- The water related environmental problems can only be solved with the effective/efficient use of it and with the fact that it is a commodity. Water should be priced in this framework and the polluter pays principle should be implemented.
- The decisions and management should be reduced to the lower management units as much as possible.
- There should be a basin based management.
- Integrated water management should be applied.
- The participation of the users in the water management is important and should be taken as a basis. Authority sharing should be accepted (Taşkın, 2006, p. 262).

Within the scope of the 2006 Program of the European Union-Turkey Financial Cooperation, the twining project "Capacity Development for the Water Sector in Turkey" was jointly carried out by the General Directorate of State Hydraulic Works and the Ministry of Environment General Directorate of Environment Management and significant results were obtained (ORSAM). A significant capacity increase has been realized under the project in terms of implementation and harmonization with the Water Framework Directive 2006/60/EC dated October 23, 2000, Urban Water Treatment Directive 91/271/EEC dated May 21, 1991, Hazardous Substances Directive 76/464/EEC dated May 4, 1976 and twin directives which require heavy investment and which are attempted to be harmonized (DSİ, 2010). Büyük Menderes River Basin has been worked as pilot basin.

Erdem and Çoşkun (2006, p. 64) state in their study that Turkey in the membership process to the European Union had been party to many international agreement on environment and attempted to transpose these agreements into its internal law. The authors underlined at the same time that these international agreements taking effect had a status in the Turkish legal system equal to laws. Turkey signed various international agreements on water resources as well as on the issues like national and international landscape, environment, ecology and environmental pollution.

Within the framework of these laws and regulations, there are many institutions and organizations with respect to the development and maintenance of the water resources and in direct and indirect relation with water. In the structure of the water resources in Turkey; (1) decision making mechanisms (Prime Ministry, State Planning Organization and ministries); (2) management (State Hydraulic Affairs, EİEİ, Bank of

Provinces, Provincial Special Administrations and similar organizations) (3) users (farmers, water usage unions and other water consumers).

The investor organizations and agencies for water management are General Directorate of State Hydraulic Works, Electric Power Resources Survey and Development Administration, Ministry of Environment and Forestry and Bank of Provinces. The main monitoring and auditing organizations and agencies are Ministry of Agriculture and Rural Affairs, State Meteorology Affairs General Directorate, Provincial Special Administration Directorates, Municipalities, Ministry of Environment and Forestry, Ministry of Health, Ministry of Finance, Special Environment Agency, Undersecretariat of State Planning Organization, State Statistics Agency and Universities.

5.2. Evaluating the Capacity for The Integration of Spatial Planning and Water Management in Turkey

As it is known that while there is an invisible but urgent necessity for integration between land use planning and water resources management, it is required to build this need on solid basis. What aimed by this study is to question the place of integration between spatial planning and water resources management in Turkey in relevant Turkish planning legislation in accordance with concerning laws and regulations. This study is significant for strengthening measures and applications related to protection of legislation concerning planning and housing system in Turkey and protection of water resources. A detailed analysis has been performed in order to determine inadequacies, gaps and conflicting points of current situation within the context of Integrative Policy Framework (IPF) made after reviewing some foreign countries' experience and relevant literature; and the study will try to present to what extend the relevant legislation in effect has internalized the requirements of this framework.

In line with this objective, relevant laws and regulations are evaluated within the framework of adopted approach under five titles below. Laws and regulations reviewed are listed in Appendix 1 and analyzed one by one in line with the titles determined.

5.2.1. Substantive Integration

There are two substantive requirements shaping this integration: (1) significance of water issues in spatial planning/land use planning; (2) the integration of sustainable water resources management with land use planning. These requirements which should be expressed both at political level and legal basis are evaluated below:

- **The significance of water issues in spatial planning/land use planning**

When a content analysis is conducted for water problems within planning decisions and definitions, it is understood that water is not approached at sufficient level despite of its significance.

In the statement of "**determining soil and water potentials** in order to form different use methods in accordance with sustainability principle and evaluating systematically, and preparing rational land use planning which presents their interrelations" written in Subparagraph m of Article 3 of Soil Conservation and Land Use Law No. 5403 having entered into force in 2005, water potential is emphasized as an input in land use planning. It is clearly seen that integrative, constructive/ conceptual planning concept and approach are mostly stated in definitions in the subject of water resources management within current spatial planning system in our country and its significance in planning in general purpose and policies is not emphasized.

Coexistence of basin and water potential concepts and existence of descriptions containing planning by considering these concepts in the laws and regulations studied mean that there is awareness about integration of these two sectors. Attention- drawing point is that descriptions in Table 5 are included in planning legislation in effect and that it entered into force in 2005 or included in revised laws and regulations (see Table 5.1).

As a result of evaluation made within this thesis, the point of which absence is felt is that water resource management tools and descriptions are not found in urban planning legislation. No description of water resource management is existing in the legislation. In particular, those concepts developed and used in examples around the world such as sustainable urban drainage systems (SUDs), water sensitive urban design, total maximum daily loads, impervious coverage; low impact development (LID) techniques are not included within the framework of legislation in effect.

Table 5.1. Relevant descriptions in current laws and regulations

Descriptions	Relevant Articles
Soil Conservation and Land Use Law	Article 3 /m **Land use planning: Determining soil and water potentials** to form different land use ways in accordance with sustainability principle considering ecological, social and economical conditions in order to prevent soil and other environmental resources from damage, and evaluating these potentials and rational land use plans indicating their interrelations in order to form a basis for planning at any scale. Article 3 /o **Soil Protection Projects:** projects comprising physical, cultural and plantal measures taken to prevent soil from being eliminated due to natural and human activities or damaged and keep it always productive
Agricultural Reform Law for Land Consolidation in Irrigated Areas No. 3083	Article 2/d **Cultivating the soil effectively:** Cultivating soil by using soil and water resources according to region's ecological and economical conditions, and modern agricultural methods; protecting it and taking necessary measures to increase its productivity.
Law on Environmental Planning	Article 4 –j **Basin**: Areas determined by General Directorate of State Hydraulic Works in a way to cover natural water collection area of surface and ground water resources feeding a stream. **Planning area:** Area covering borders of basin and/or region or area determined by considering those fields having integrity in terms of spatial, administrative and urban function,

- **The integration of sustainable water resources management with land use planning**

The legal arrangements of the countries studied in the previous chapter and the world literature showed us that there should be a national strategy plan to associate the spatial planning with the sectoral policies and that this would be provided by creating a political awareness. Under this topic, this study has been to find out whether the general principles cover the association of spatial planning and water resources management, and whether the legal arrangements or national policy dialogues include explanatory, guiding and highlighting law, strategy, concept or guidance throughout the country and at what level.

As known, the structural harmonization policies brought by the globalization process necessitated the development of unique processes and devices. In this process, the studies developed in the field of water management in Turkey have been stated below:

- National Environmental Action Plan: Management of Water Resources (Burak et al., 1997)
- National Environmental Action Plan: Management of Land Usage and Coastal Areas (Ongan, 1997).
- National Environment Strategy and Action Plan (UÇEP) (DPT, 1998)

- Specialization Commission Report on the Use and Management of Water Basins (DPT, 2001)
- National Rural Development Strategy (Undersecretariat of State Planning Organization, 2005)
- "Usage and Management of the Soil and Water Resources: Specialization Comission Report" prepared under the scope of the 9th Development Plan of the State Planning Organization (DPT, 2007)

In the study of Burak et al. published in 1997 under the title of *Ulusal Çevre Eylem Planı: Su Kaynaklarının Yönetimi (National Environmental Action Plan: Management of Water Resources)*, the management of water resources was underlined under the objective of the protection of the ecological balance and provision of the water requirements. Burak et al. (1997) revealed the requirement for urgent adoption of the relevant legal arrangements in order to realize the water resources management. In the laws to be arranged, they prepared basin management plans and underlined the requirement to have principles to ensure the rational use of water and soil depending on the hydrological and ecological properties of the basins.

The phrase "developing policies for the protection and management of the water basins, aquifers and wetlands including the management of integrated water resources" is included under the heading of "Actions on the Management of Water Resources and Waste Water" in the National Environmental Action Plan (NEAP) signed in 1998 by the Undersecretariat of State Planning Organization with the technical support within the Ministry of Environment before its merge with the Ministry of Forestry and with the technical support of the World Bank. However, there is no phrase on the land use planning and integration (DPT, 1998, p. Annex 6-6).

The priority determined by the basic objective of "giving priority to institutionalization in the environmental sector and to increase efficiency" stated in the Preliminary National Development Plan (2004-2006) is the "protection of water resources, increasing the efficiency of potable water and drainage services and waste disposal management". The subsequent 9th National Development Plan Strategy (2007-2013) (DPT, 2007) studied the issue of water resource management and development under the heading of the Protection of the Environment and Development of the Urban Infrastructure which is included in the development axis of "increasing the competitive

power, which is one of the five development axes. This plan is detailed with the following items:

- Determining the need for urban infrastructure for the environmental protection throughout the county will reveal the infrastructural need of the municipalities like potable water, drainage, waste water treatment plant and solid waste disposal plants and the urban infrastructure major plan and finance strategy will be prepared.
- The most appropriate systems and technologies shall be chosen for the country in the construction, maintenance and operation of infrastructural facilities for the protection of environment like water, waste water, solid waste.
- Losses and leakage will be reduced in the current water supply plants and the effective use of the water resources of the country will be ensured.
- The works that have been started in our country for the legal arrangements and administrative structure building regarding the allocation, use, development and protection against pollution of the water resources.
- It will be ensured that the underwater and surface water resources are protected without being polluted and the use of post-treatment waste water in agriculture and industry (DPT, 2007, p. 3).

The Specialization Commission Report for the Use and Management of the Ground and Water Resources" prepared under the 9th Development Plan of the State Planning Organization is a study that focuses on the issues like "base-case analysis, determining concrete strategy and policies with future projection, taking serious measures by public open to the participation of all parties, correcting the insufficient and complex legal and institutional structure, revealing the implementation tools, planning for the required man power and meeting the financial resources timely and adequately" (DPT, 2007). As a result of this study, the priorities and measures have been determined for the basic goals and policies. The priority topic of "ensuring the planned use of the soil and water resources with the detailed and definite data obtained in accordance with scientific principles", there is a mention on the measure of "determining the land use by periodical updates according to the international standards". The followings are the other measures mentioned in the other priorities:

- Keeping water basins and agricultural fields under absolute protection,
- Determining the duties and tasks of the officials on the multi purpose use, protection and management of the ground and surface waters,
- Determining the authorities and responsibilities of the organizations responsible for the soil and water resources according to the laws of their foundation, eliminating repeated task areas and integrating the services,
- Making the basin plans (DPT, 2007, p. 88-90).

Besides, in the "National Rural Development Strategy" prepared by the Undersecretariate of the State Planning Organization, the issue of ensuring the sustainable management of the agricultural soil and water resources has been included. 'The effective use of the water and soil resources' has been addressed under the

strategic goal of 'development of the economy and increase of employment opportunities' and under the priority of 'ensuring a competitive structure in the sectors of agriculture and food' which are determined under the scope of basic goals and principles for 'the effective use of water and soil resources'. Here, focus has been made on the rational use of resources and the effective use of soil resources.

The report of the 'Commission of the Climate Change, Natural Resources, Ecologic Balance, Energy Efficiency and Urbanization' in the Urbanization Council realized by the Ministry of Public Works and Settlement" includes as an explanatory statement to highlight the importance of the issue the following statement: "for the sustainability of the water resources and their compliant use with the urban development, they need to be used as stronger tools to control the water consumption. Here, it is important to be aware that the use of water resource is one of the moving forces of development and to accept that this moving force is not an external input in the city planning but a basic moving force that needs to be addresses with priority and importance" (Bayındırlık ve İskan Bakanlığı, 2009, p. 33). Following the council meeting, a decision was given to determine the strategy of "improvement and increasing the efficiency of the legislation determining the borders for prevention of construction in these areas and development of the monitoring and audit mechanisms in order to ensure the protection of water resources, river beds, wetlands ……." within the objective of "Ensuring the Protection of Natural and Cultural Values and Bringing into the Focus of the Spatial Planning works" included in the KENTGES Integrated Urban Development Strategy and Action Plan (2010-2023) published in the Official Gazette no 27749 dated November 4, 2010 " (Bayındırlık ve İskan Bakanlığı, 2009, p. 31). This action plan is the first example where the relation between the field use and water resources are expressed. Until the KENTGES work, it is noticed that the existing national legal structure didn't include any general approach supporting the integration of water resources management and the land use planning.

It has been seen that one of visions, policies, programs and targets in territorial, sectoral and thematic topics related to protect natural, historical, cultural and environmental values is water resource and management- focused spatial strategies in the countries studied. One of the major items of planning is existence of territorial spatial strategy plan and its approach towards water resources within the scope of regional strategies throughout the country.

Territorial (national) spatial strategy plan is among high- scale plans determining long- term principles and targets, and spatial major guiding decisions at physical plan level or in other words in planning system stipulated by legislation in effect (Public Works Law No 3194 which is urban planning legislation, and relevant laws and regulations) in our country.

As planning levels, Development Plan -Regional Plan- Environmental Development Plan and local structure and implementation plans systems exist. Lack of territorial spatial planning strategy are among the major reasons of negligence of relationship between land use planning and water resources' strategically planning, and accordingly, deficiency of content and scope of high-scale plans (regional and metropolitan plans) and local-level plans (Land use plans- local structure and implementation plans).

To sum up, lack of a "water resources management" and territorial spatial strategy plan in our country prevents present and future rational use of water resources throughout the country. Lack of a plan determining prior regions and resources in terms of settlement, agriculture and industry leads resources to be used extravagantly by spontaneous decisions. In particular, there is no legal document or policy agenda on highlighting this integration and there is no mention about the basic principles, strategic goals and priorities. It is a fact that the effect of the urban development ignoring the planning content of the water management and development in Turkey and the importance of "water" in urban planning are issues that need to be addressed as priority policies.

5.2.2. Methodological Integration

Methodological integration criteria determined within Integrative Policy Framework (IPF) is assessed under two titles:

- **The Integration of Assessment Approaches**

Legal arrangements have been made for assessment of environmental impacts of plan, program and policies in many developed countries. In line with this, it is seen that approaches to environmental assessment are addressed in legal terms and that works to complete legal inadequacies have increased in Turkey of which EU membership process

still continues. Concept of Environmental Impact Assessment (EIA), which entered into Turkish Environment Legislation with Article 10 of Environment Law in 1983, has been applied by Regulation Environmental Impact Assessment-EIA since 1993. EIA Regulation in Turkey is described as a key tool for adaptation of economic activities to the environment. Regulation on Environmental Impact Assessment (EIA) has been effective to prevent environmental impacts of individual activities. Since the regulation has recently been inadequate in effectively assessing cumulative impacts or alternatives arising from multiple developments, Strategic Environmental Assessment (SEA) has been applied in many countries as a more comprehensive assessment system (Partidario and Therivel, 1999). Australia and the United Kingdom are among those countries where SEA is frequently applied. While sample applications have been carried out in different sectors, such methods as Sustainability Threshold Analysis, Integrated Water Cycle Studies, and strategic flood assessment for use and management of water resources are the techniques developed within the scope of this assessment processes. In particular, strategic environmental assessment studies have been implemented in housing plans of new settlement areas in the subjects of water supply capacity and assessing flood risks.

Regulation on Environmental Impact Assessment stated above has been reviewed in this study. Firstly, it was examined what kind of methods were used to constitute decisions regarding conservation and use principles to decrease the impact on water resources and land use decisions in the regulation. However, no data was found regarding such techniques and methods. When it was evaluated in terms of content, it was determined that Environmental Impact Assessment was stipulated for project of pumping ground water in the amount of 10 million m^3/year and more or storing it under ground, projects of transmitting large- scale water out of transporting drinking water via pipes, and projects of water storage facilities (those dams of which lake volume is 100 million m^3 and more or lake area is 15 km^2 and more). Moreover, while sensitivity of area possible to be affected is evaluated in the regulation, the provision of "issues regarding wetlands in the list of existing land use and quality (agricultural area, forest, planned area, water surface, etc.) and sensitive regions, coasts, mountainsides and forests, agricultural areas, national parks, special conservation areas, highly- populated areas, those zones significant for its historical, cultural, archeological characteristics, erosion regions, landslide areas, forested (planted) areas, potential erosion and forestation areas and aquifers to be protected under Law on Groundwater No. 167" is

included. Explanatory information is not given on what kind of assessment criteria, matrix or system should be developed. Consequently, it is seen that assessment system and techniques for water resources do not exist for land use plans in Environmental Impact Assessment.

Works on Strategic Environmental Assessment in Turkey was initiated by section of "Activating Environmental Impact Assessment by Strengthening and Adaptation to Strategic Environmental Assessment Directive" under the title of "Environment" in Article 22 of National Adjustment Program prepared for adjustment with EU legislation and published on Official Gazette dated March 24th, 2001 with the issue of 24352 (Serter, 2005). Two pilot projects have been implemented so far to fulfill targets determined in the subject of Environmental Impact Assessment in Turkey: (1) "Pilot Project for Applying EIA to 1/25.000- scale Environmental Planning Revision in Canakkale and its Neighborhood" implemented in Çanakkale; (2) "Project For Preparing and Applying SEA Regulation for Turkey" (Serter, 2005). In the second project, a draft SEA regulation was prepared and the process stipulated by the regulation was tested by a pilot project.

In Draft Regulation of Strategic Environmental Assessment, it is stated that elimination method is basis in evaluating plans and programs, and is consisted of 3 elimination steps. These elimination steps indicated in the draft are summarized below:

1. Pre- Elimination: 14 types of plans in the list of plans and projects to which Strategic Environmental Assessment will be implemented such as regional plans, environmental development plans, rehabilitation plans for water basins and programs and basin master plans are subjected to the provisions of this regulation.
2. Sensitive Regions: SEA is applied to these 14 plan types and programs which have impact sensitive regions of which content has been indicated above.
3. Elimination on the base of plan and program: It is specified that for each plan type, a systematic analysis regarding their environmental impacts should be made. This analysis includes classifying environmental impacts and evaluating the area, potential to be affected, by general concepts stated in the draft. It is specified in the draft that possibility, frequency, duration, reversibility of impacts in terms of assessment of characteristics, and cumulative structure of impacts should be considered. However, it is not explained what these issues specify. Although it contains more systematic assessment

procedures and principles than EIA, any assessment criteria other than classifying sensitive regions has not been indicated related to water resources in the draft. Moreover, another restriction of this draft regulation is that it does not contain major indicators of these environmental impacts and their limits.

Say et al. (2010) have underlined difficulties to be faced in integration of urban plans, of which preparation and approval process is highly complicated, with the scope of Strategic Environmental Assessment. However, this regulation is in draft now and has not started to be applied yet. On the other hand, a statement of " in addition to such physical studies as threshold analysis and on-site examination, comprehensive and qualified economic, social, cultural, political, historical, sectoral and technological researches based on scientific techniques and method are carried out, views and suggestions of relevant institutions and organizations are obtained and evaluated in order to regard the area, where environmental planning will be conducted, and its neighborhood in unity" is included in Regulation on Environmental Planning. Although this article also indicates the necessity of threshold analysis based on scientific techniques and methods, there is no information about what these methods are and how they will be followed.

Consequently, legal arrangements –regulations- in our country do not contain any information on analysis (analysis of water basin border, analysis of water quality and potential, analysis of determining drinking and utility water resources, groundwater, surface water, shelter belts) of hydro geological characteristics in terms of conservation and development of areas having hydro geological properties (like groundwater, surface water, coasts, reed fields and marsh area, etc). Impact of physical plans, prepared and implemented before determining region's settlement potentials and habitability capacities and analyzing habitability around water resources and potential water areas, on water resources are seen in such events as flood and pollution we experience.

- **The Integration of the Different Applications, and Experiences with the Use of Particular Tools**

With its circular note titled Geographical Information System (GIS) issued in 2008, Ministry of Environment and Forestry gives information about expansion of GIS applications including which Ministry's units, collecting new data, updating previous data.

The following issues are advised in Integrated Urban Development Strategy and Action Plan (2010-2023): (1) making legislation arrangements in establishing and operating Urban Data systems; (2) carrying out inventory analyses, developing shared data portal, developing tools to ensure its sustainability by using modern technologies in determining water resources and basins, stream beds, wetlands and similar areas; (3) and associating it with "National Spatial Planning Portal".

We also see that collecting and updating data for planning by geographical information systems are included in provisions of some regulations. However, no explanatory information is found in using GIS database and separating groundwater and surface water branches for collecting such data as water quality, geological properties, hydro-geological structure, meteorological data, forests, agricultural areas, and domestic, industrial and agricultural pollution loads and developing maps in these regulations.

While encouraging geographical information systems is significant, it is also necessary to develop data networks to use decision-makers of land use working locally in order to make right decisions in reducing non point resource pollution and protecting natural resources. As it is seen in Arizona example, obligation to use a data network like NEMO compulsory for local municipalities in cooperation university has been incentive to emphasize relationship between water supply and quality, to integrate basin management and planning, and research based and vocational training based data system, and environment- friendly land use decisions. In particular, developing and using effectively a data network helping management tools be used in the subjects of soil erosion, irrigation applications (agriculture), stockbreeding, on-site septic systems, mining, forestry, recreation, rain water and urban surface flow are significant for this integration. However, there is no condition which makes developing, establishing and using such data networks compulsory in our country.

5.2.3. Procedural Integration

After it was searched to what extend legal enforcements have contributed to "planning content" and "planning process" to ensure integration of water resources and land use planning under relevant law and regulations, it was studied under five titles in details in line with requirements determined in 4.3.3.

- **The Integration of Informational Requirements of Water Management in Land Use Decision Making**

Physical planning understanding and practice represent a process started in order to solve a range of problems and a balls-up. Endogeneity of water resource management looked out in the planning has been reflected to countries' legislation in line with targets and strategies adopted in the design of new international approaches, methods and process mentioned in the previous section. As Ersoy (2000) stated, it should be determined / tried to be known that these problems arise in the context of which relations, why and how they arise and that findings should be examined and that how these problems can be solved various intervention tools should be searched. In this study, plan assessment criteria, based on the approach that plans contain concrete data and observational findings in a systematic order and that practice decisions and control mechanism are taken for these findings within relationship between water resource management and land use planning, have been developed within "Integrative Policy Framework" specified in 4.3. Within the context of these plans, criteria developed for different plan levels, arrangements concerning planning in Housing Law and relevant regulations have been examined at national- regional- local physical planning levels. It has been examined to what extend relevant laws and regulations in environmental legislation determining the quality of plans directing road maps related to application provide content.

- **Informational Requirements in Regional Plans**

Complexity of content, scope and scales of environmental plans which have become complicated due to current legal arrangements still continues in planning and environmental legislation. The report titled "Urbanization Council 2009- Kentleşme Surası 2009" of " Commission of Awareness of Urban, Climate Change, Natural Resources, Ecologic Balance, Energy Efficiency and Urbanization- Kentlilik Bilinci,

İklim Değişikliği, Doğal Kaynaklar, Ekolojik Denge, Enerji Verimliliği Ve Kentleşme Komisyonu" of T.R Ministry of Public Works and Settlement provides a wide range of content on this complexity. It is stated in this report that since rules to prepare Environmental development plans of which definition is in Public Woks Law No 3194 and provisions regarding preparation and approval authority do not exist in Public Works Law, there is a serious complexity related to authority to prepare environmental development plan. At this point, there are two regulations in effect concerning preparation and approval of Environmental development plan at regional scale determining settlement and land use decisions such as house, industry, agriculture, tourism, transportation prepared at 1/50.000 and 1/100.000 in accordance with planning decisions of the country: (1) Regulation on Procedures of Environmental Planning entering into force after being published on Official Gazette dated 4.11.2000 with the issue of 24220 by Ministry of Environment and Forestry; (2) Regulation on Procedures of Planning entering into force after being published on Official Gazette dated 2.11.1985 with the issue of 18916 by Ministry of Public Works and Settlement.

In Regulation on Procedures of Environmental Planning, Environmental development plan is described as the plan determining settlement and land use decisions such as house, industry, agriculture, tourism, transportation prepared at 1/50.000 and 1/100.000 in accordance with planning decisions of the territorial and regional plan. In Regulation on Procedures of Planning, Environmental development plan is described as a "plan integrated with plan notes and report, prepared at 1/25000, 1:50000, 1:100000, or 1:200000 scale, determining procedures of coordination between administrations, planned in accordance with regional planning decisions, prepared within the borders having administrative, spatial and functional integrity determining land use decisions and stabilizing protection-use balance between sectors like housing, industry, agriculture, tourism, transportation and urban- rural structure, and development and natural, cultural values.

Authority issue between Ministry of Public Works and Settlement and Ministry of Environment and Forestry regarding environmental development plans was solved in 2006. By amending Article 6 of Law No 5491 dated 26.04.2006 and Article 9 of Environmental Law No 2872, authority of environmental planning was granted to Ministry of Environment and Forestry. It is stated in Subparagraph (b) of Article 9 of mentioned law that "by considering protection-use balance in line with the principle of sustainable development in physical environment of the country, the Ministry is entitled

to prepare, get prepared, make and approve environmental development plans at 1/50.000-1/100.000 scale on regional and basinal base to be basis for local structure and implementation plans in order to prevent pollution likely to arise due to meeting urban and rural population's accommodation, work, resting, transportation needs. Principles and procedures to be issued regarding environmental planning are determined by the regulation by the Ministry."

While both regulations have parallel provisions regarding environmental planning, it is seen that they are different in terms of content. Discussions on authority and scale regarding environmental planning have been excluded from this study's scope. Despite differences in areas they cover, the study focused on to what extent these plans, the most important high- scale plan type, contain coordination requirements of water resources management and planning studies of two sectors. In Regulation on Procedures of Environmental Planning, assessment made in content and scope of principles and procedures effective in strengthening environmental development plan concerning integration of water resources and spatial planning has been summarized below:

- In Article 1 of Regulation on Procedures of Environmental Planning, "to arrange principles and procedures of regional and basinal plans" is stated in section of aims of these plans at 1/50.000-1/100.000 scale basis for local structure and implementation plans. Existence of concept of "basinal" is a positive development to approach water resources strategically and to provide consistency between target based actions.
- In determining planning area, "considering administrative borders of these areas in addition to wide stream basins determined by General Directorate of State Hydraulic Works or statistical regional units (level 2) determined by State Planning Organization" has been ruled in Article 6/a of Chapter of *Administrative and Technical Principles and Procedures concerning Determining Areas of Environmental Development Plan, Preparing, Making Prepared Environmental development plan* of Regulation on Procedures of Environmental Planning. Although it is a positive development to express administrative borders in this article, requisite of these borders to lay on these basin borders has not been emphasized, which seems like a provision open to different interpretations.

- In Article 7 of Regulation on Procedures of Environmental Planning, it is stated that a digital database shall be set by collecting data from relevant institutions and organizations, satellite images and/or aerial photographs and field surveys regarding the below-mentioned issue required to be at 1/25.000 scale map sensitivity within the borders of planning areas in the stage data collection and process of preparation of environmental development plan:

    - Hydrologic- Hydro geologic structure (lakes, dams, streams, flood plains, ground and surface water resources, basin borders)
    - Climatic characteristics and soil quality
    - Agricultural land use
    - Ecologic structure (ecosystem types, flora and fauna):
        - Areas granted protection status (protection areas of surface drinking water resources and others)
        - Technical infrastructure (waste recycle and disposal facilities, and drinking water and waste water treatment facilities)
        - Waste water discharge areas
        - Agricultural irrigation areas
    - Characteristics, spatial development tendencies and potentials of settlement areas
    - Regional public projects and investment decisions for area of planning
    - Approved construction plans
    - Determining environmental problems.

First principle for land use- water resources relationship focused by this study is to determine inventories of potential resources correctly and ascertain convenient use of natural treasures by revealing them. General expressions have used for data to be used in analyzing current situation to determine action plans and strategies in environmental planning, and there is no explanatory content concerning indicators required by these titles. Moreover, there is no detail related to which strategies and actions will support these data, which application tools will be used and how they will be used, which institutions and cooperation will participate, which report will define them. There are ambiguities in these subjects. In particular, no approach special for planner is proposed concerning water supply of a region of which land use decisions shows differences and its water infrastructure requirements, quantitative indicators of regional strategies, protection of water resources and reducing problems.

- In Article 8 of the Regulation, the following provisions are included concerning environmental planning:

  - to arrange economic decisions and spatial use decisions in a way to ensure sustainability of environmental resources,
  - to determine preventive strategies and policies for recourses causing environmental problems,
  - to determine projection population by considering sustainable use of natural resources,
  - to determine present and projection values regarding amounts of drinking water, solid and liquid waste
  - to determine land use decisions by considering ecologic, geologic, hydrologic risks.

  These provisions, which are basic principles to be observed in planning mentioned above which is a particular concern to coordination of water resource management and land use planning, are for all environmental resources. Expression of "to determine present and projection values regarding amounts of drinking water, solid and liquid waste" is significant for integration focused by this study.

  Above mentioned provisions are insufficient to interpret determination of situations they contain and have ambiguity. Similarly, in Regulation Procedures of Planning, the statement of "to provide protection- use balance by considering principle of habitability and bearing capacity in the areas within the borders of environmental planning" does not contain any explanation whether it is directly associated with water resources or not.

- In technical procedures, planning decisions and provisions are formed after targets, strategy and policies of the plan are determined in line with the results of analysis and synthesis studies obtained from data described in Article 7 with sufficient quality and scope based on scientific methods. Moreover, it is stated that principles regarding application studies and inspection are determined. Planning and application procedures of the plan are at political level and they do not contribute to decide what should be done. Moreover, it is not sufficient to define application tools for carrying out planning decisions regarding protection of water resource and prevention of potential effects.

In the scope of the study, it is seen that relevant regulation(s) determining the quality of regional plan level is below expectations. It is not qualified to present aims and targets of land use planning- water resource management relationship, and to describe application tools and processes. In addition, legend terminology specified for

environmental planning is more comprehensive and detailed in terms of water resources and subjects comparing to content of the regulation. It is composed of such projections as protection borders of water resources (dam protection areas, natural water resource protection areas, wetland border, wetland buffer zone border), ecologically important areas (ecologic influence zone, buffer zone), areas restricted for use (geologically risky area), energy- irrigation (utility and irrigation water, irrigation and drinking water dam, drinking water dam, drinking water resource, groundwater resources, irrigation area, and basin) and water surfaces (sea, lake, pond, river, and creek), and waste treatment and facility areas (land filling and solid waste disposal areas, hazardous waste disposal facilities, interim waste storage station and treatment facility). Although these projections stated above are at sufficient level in control and treatment of domestic and industrial pollutions described as "point source pollution" in terms of water resource protection, such projections of prevention zone as reducing agricultural density to control "spread or dispersed" agricultural pollutions should be added to legend terminology of environmental planning.

In current public works and environment regulation, environmental development plan guiding low scale plans and basis for low scale plans, and forming protection and development policies and strategies contains use decisions at abstract level and provisions concerning basic principles; and it also includes plan decisions moving from abstract to concrete and details of planning level. Moreover, it is also seen that the regulation studied is not directive in planning and content detail describing the scope of planning language, plan notes, analysis report and plan description report.

It is also stated that "environmental development plans", which are prepared on the base of region and basin to be basis for local structure and implementation plans in order to constitute general land use decisions and relevant strategies and policies which enable both economic decisions and ecologic decisions be thought at the same time by taking development plans and regional plans as basis by considering natural, historical and cultural diversities our county has, shall be made by taking wide stream borders of planning area into account (Coşkun, 2010). It is important to ensure application of abstract use decisions of these plans, their principles and procedures at regional level after being filtered on basinal level in an integrative system. However, it is seen that emphasis and requirement of this idea are not adopted in the regulation. While geographical and ecologic problems are significant in regional planning studies within hydrographic zone formed by the areas within the border of drainage network,

resembling a tree and its branch, with other drainage network, no planning approach is presented concerning the whole of this region and its parts in the regulation.

Written and visual expression of strategies on water resource management tried to be summarized above should be different from language of "environmental development plan" used in current planning practice and report content. Our country, of which water resources are insufficient, should adopt a planning language which emphasizes water resource management strategies and spatial applications as a prior strategy. Although we understand that importance of integration is not mentioned when we look at legal framework of two planning sector regarding land use planning and water resources planning and management, directive legend terminology exists related to planning stages. However, regional planning content is not sufficient in terms of water resources and land use planning relationship and ambiguous, and its enforcements are at obscure level as well.

- **Informational Requirements in Local structure and Implementation Plans**

In Article 8/b of Public Works Law No. 3194, requirement to ensure accordance of construction plans to regional plan (if there is) and environmental development plan has been mentioned. In Article 5 of the same law, it is stated that local structure plans shall be drawn according to planning procedures, and that local implementation plans shall be arranged to be basis for preparation of local structure plans. Provisions concerning requirement of water management plans in local structure and implementation plans which are planning level important in application stage have been studied. To what extent the provisions of Regulation on Procedures of Planning entering into force after being published on Official Gazette dated March 17th, 2001 with the issue of 24345 and of Law on Metropolitan Municipality No 5216 can meet information requirements to prepare land use plans with capacity and content convenient to capacity and requirements of water resources.

In Regulation on Procedures of Planning, these titles concerning water resources and to be obtained from relevant institutions in preparation process of the plan have been stated as the following: physical structure (streams, flood plains, climate, ground and surface water resources, basins and characteristics); environmental resources and protection areas (wetlands, special environmental protection areas, forests, areas to be protected ecologically); technical infrastructure (drinking water,

sewer system and waste). Although in Article 19 of the regulation it is stated that "it is compulsory that health protection strip, approach distance to security zone and construction, and similar areas, which have been determined by various laws and regulations according to characteristics of planned area, are within the area planned and that property is certified in the way stated in paragraph 1 for the whole of the area", which indicates that it is fed from relevant regulations and legal arrangements, it is seen that the regulation is insufficient in terms of planning method to be used in local structure and implementation plans, which are low scale plans, and content of the plan.

In Article 23, titled Hazardous Areas, of Regulation on Planned Areas Type Public Works, it is stated that "Those areas, which are forbidden according to the plan or reports prepared or approved by relevant administration since they are within disaster zones such as flood, landslide and rock fall and have health and geologic risks and pose danger, cannot be subdivided." No buildings other than facilities directed to land consolidation can be built in such areas. It is also stated that "in areas which are indicated as "forestation areas" in construction plans due to above mentioned reasons, same procedures shall be followed." However, there is no restrictive principle concerning application tools to be used in flood management in these areas.

Public works law's regulations concerning local structure and implementation plans, constituting the third level in plan stepping, do not contain articles special to requirements in the subjects of aims and policies, principles and procedures, and application tools for water resources protection and planning. Principles of water resources protection and management do not go beyond the dimension in current state analysis. There are ambiguities on how plans and data to be collected during preparation of the plan should be assessed and what kind of contents they should have. Consequently, legislation system in Turkey is not able to present opportunity to provide water- friendly developments at sufficient level.

- **The Integration of Procedural Requirements of Water Management in Land Use Decision Making**

In order that planning process can be an effective and active process, administrative approaches should be coordinated. It is significant that information share and information feed planning process at the right time so that integration of water resources management and land use planning can be achieved. In our country's present planning system, many institutions have planning authority, which constitutes a

problem. Moreover, there is no road map specified in every stage for planning and approval process. In line with this integration, it has been discussed in the study whether provisions presenting strategic aims and targets, process design to be followed and experienced to achieve these aims, and inter-feeding methods of two sectors 'plans are existed, and if exist, at which level they are.

Planning institution(s) entitled at each level specifies its work procedures in its own regulation. The fact that many institutions have planning and approval authority in application of current legislation reflects that there is a divided and complicated planning system in Turkey. In planning process, data collection and analysis are the stages at which the mentioned institutions should share information. Sharing necessary information in both planning processes (water and land use planning) is significant to ensure consistency of applications and plans and to prevent different planning understandings. In providing coordination of two sectors a model, related to significant planning process in relevant laws and regulations concerning the existence of legal arrangements for institutionalization of feeding processes at every plan level, is seen. Integration model to perform the documents related to water, environment and planning interdependently and simultaneously has not been developed in Turkey. There are not provisions concerning connectivity of each plan level's feeding mechanism, contents and timing with other sectors' plans. Therefore, a certain association cannot be ensured between spatial planning works and water management plans.

Principles and Procedures on Determining Special Provisions in Basins Directive of Regulation on Water Pollution Control which entered into force in 2009 and canceled in 2010 had many principles and procedures necessary for this integration and a comprehensive content regarding a road map guiding application. Although it had been thought as a qualified legal arrangement meaning that positive practices started to be performed to provide this integration, it was cancelled. Cancellation of this directive having potential to enhance current level of the integration means a back step.

On the other hand, the aim of vertical integration criteria necessary to exist among sector plans accepted in this study is to ensure coordination of spatial planning activities and to describe water management targets and management system in accordance with plan level and content within planning system hierarchy.

In study report titled "Spatial Planning System and Institutional Structuring" of Urbanization Council of Ministry of Public Works and Settlement, inconsistency

between administrative jurisdiction area and planning area was emphasized. It is significant to adopt major principles of decisions, determined in high scale plans, in system of same targets of construction plans to be made at local-level scales. Within the framework of principle of "stepped association of plans", each local plan is expected to contain more information and details, to include also new information and data required by its own scale, and to be an original plan which preserves major plans of next scale as well (Ersoy, 2000:37).

As it is summarized in examples of countries examined within the scope of this study, it necessary to handle intersection of plan decisions moving from abstract to concrete and documents with different scope and content within the stepped association principle strategically in approaches of effective plans to water resources. However, when we study planning legislation in Turkey, we see that there is no described content about coordination of water management knowledge with plan actions from regional level to local level. The fact that "National development plans" which indicates planning secured by the constitution as a state duty has no spatial planning system and strategies for water management and protection result in failure to reduce priorities and measures, developed at the highest level, to construction plans' level. Nonexistence of high scale plans at macro level containing economic, cultural, ecologic and social items and complexity in basin and planning concepts are restrictions faced in failure of vertical plan consistency in land use- water management relationship.

The following issues are among the principles to be obeyed pursuant to Regulation on Environmental Planning containing provisions on Environmental development plans: "To determine preventive strategies and policies for recourses causing environmental problems, to determine projection population by considering sustainable use of natural resources, to determine present and projection values regarding amounts of drinking water, solid and liquid waste.

As it is stated before, detailed strategies required by its own scale are not specified in the regulation. In scale of development plan, no strategy is given in this subject under the title of principles to be obeyed in construction plan changes. That principles and procedures of sustainable urban design, in other words convenient land use planning, and dimension of water resource management (precipitation management, flood management, protection and use criteria, etc) are not detailed enough required by local development plan scale is seen as a serious factor in failure of horizontal plan consistency.

Associating special- purpose plans (special environmental protection zone, coast planning, etc) which has priority comparing to general purpose plan type (listed in Table x) with other plans has been found as a problem in coordination of institutions' plans (Coşkun, 2010). In particular, not describing clearly the decision making processes of special purpose plans for water resources indicates that planning and practical studies are independent from each other and that disconnected planning understanding is prevalent.

It is really hard to say that reflection of environment and water resources management policies can be integrated by these legal arrangements with various- scale plans of institutions working in different sector. As a result, taking into account information about water management issues, there is no vertical consistency between regional and local plans.

To sum up, there is a legal arrangement which does not require high scale plans and in which organic ties cannot be established between general and special plans (in local scale plans) and special- purpose plans (water supply, flood plan, water management, wastewater plan, basin pollution plan, etc) are far from integrative understanding. While new process designs appear and more reality researches gain significance in international planning today, Turkish planning legislation is observed to be insufficient to direct process design and application of planning.

- **Horizontal Plan Consistency**

Horizontal integration means integration of spatial planning activities which have been performed or planned to be performed in the same regions or areas. In Article 14 of *Regulation on Procedures of Planning* and other similar legislation' provisions (Regulation on Procedures of Environmental Planning, etc), it is stated that data shall be obtained from relevant institutions and organizations.

It is obviously seen that both systematics of horizontal relationships and harmony of sectoral planning and spatial planning, and approaching within the framework of basinal and regional planning are necessary. Water Pollution Control Regulation (2004) of Ministry of Environment and Forestry mentions about water quality conservation plan and basin protection plans including whole of studies carried out in order to protect potential of water resources for any use purpose, to ensure them be best used, to prevent pollution and to enhance water quality of polluted water

resources. In Article 16 of this regulation, it is clearly stated that special provisions concerning each resource and its basin related to description of protection areas and protection principles must be included exactly in relevant construction plans and environmental development plans and be applied by the administration by evaluating characteristics of the resource and its basin by scientific studies in the course of protection of drinking and utility water reservoirs and similar water resources.

For effective horizontal integration, while planning legislation must be descriptive in high scale plans, these plans must be locally separative depending on high scale approaches and strategies. Thus, relevant legislation must be binding for local planning institutions to set local planning activities on common ground directed to concerns of river basin.

However, written rules and principles for horizontal coordination and information flow are not specified sufficiently in legal arrangements directing planning practices in our country, and integrity between strategies and plan levels cannot be provided. Necessity of basin management planning creates a potential to provide horizontal information flow and coordination with regional plans; however, it has been found as a result of content analysis that there is no article in planning legislation to be reference for this horizontal functional integration in planning and scales.

- **Consensus building**

Developing forward-looking collective perspective between stakeholders and existence of consensus in line with targets determined are significant in water resources-land use planning relationship. Within the scope of this study, it has been examined whether there is a condition which encourages city planner and water managers to work in a coordinative environment and which encourages or force public participation in planning studies from the beginning

- **Professional Consensus Building:** Existence of decision makers having different training and experience in isolated environments and failure in providing consensus sufficient to finalize decisions are serious factors to ignore capacity of water resources in the process of land use planning and not to achieve effective water management. Creating an environment for physical planning and water specialists to work together, taking common decisions and creating common ideas, adoption of consequences by two parties are important to minimize obstacles likely to emerge in

application stage. Thus, legal provisions must be constituted to create a common work environment for these specialists from the beginning.

In planning stage, it has been searched whether there are relevant provisions of laws and regulations which states that these work groups shall study together as of data collection and analysis. In particular, it is seen that there is no obligatory circumstances for information sharing between decision makers concerning water and planning. Besides, in classification of lands and soils, there is an example for decision makers having different training and experience to work together in the definition of "Soil Conservation Committee" stated in Law on Soil Conservation and Land use No 5403 entering into force on 3.7.2005 and applied by Ministry of Agriculture.

> **Article 5 –** Under the presidency of the governor, a committee shall be constituted from three units of public institutions and organizations having authority to make plan in the city and of universities, and from top representative of Ministry of Finance in the city, and from three local representatives of vocational organizations having the characteristics of public institutions performing national activities in the subjects of planning and/or soil conservation in every city. Secretary and vice- president of this committee shall be chief of the unit responsible for agricultural activities in the city. **Authorized representative of the unit carrying out agricultural activities in lands on the agenda of the committee, in the areas protected by special laws, in project area of General Directorate of State Hydraulic Works or the areas announced as application areas pursuant to Agricultural Reform Law for Land Consolidation in Irrigated Areas No. 3083 dated 22.11.1984 shall also be included into the committee.**

- **Public Consensus Building (Public Participation):** Participation of local people in planning natural areas, especially in planning and implementation processes) is significant for the success of the plan. In recent years, provisions arranging public participation have increased with amendments in several laws. Provisions concerning public participation are given in Table 5.2.

Table 5.2 Current provisions concerning public participation

Law/Regulation	Related Articles
Environmental Law	**Article 3 – General principles regarding protection, improvement of environment and pollution prevention:** a) Everybody, especially administration, professional associations, unions and **nongovernmental organizations**, are responsible for protection of environment, pollution prevention and are obliged to obey measures taken and principles determined on this issue. b) When necessary, Ministry and local administrations shall cooperate with Professional associations, unions and **nongovernmental organizations** in the fields of environment protection, prevention of environmental damage and pollution. **Article 3 -** General principles regarding protection, improvement of environment and pollution prevention: e) Right to participate is essential in environmental planning. Ministry and local administrations are liable to create a participation environment in which professional associations, unions, **nongovernmental organizations and citizens** shall use their environmental right. **Article 9 –** In order to protect the environment; a) It is essential to protect biological diversity forming natural environment and ecosystem hosting this diversity. Principles for protection and use of biological diversity are determined by obtaining opinions of local administrations, universities, nongovernmental organizations and other relevant institutions.
Regulation on Environmental Impact Assessment	**Starting Environmental Impact Assessment Process and Constituting Commission** **Article 8-** (...) When necessary, Ministry might call representatives from universities, institutes, research and expertise organizations, professional associations, trade unions, unions, nongovernmental organizations to meetings of commission by considering subject, type and place of the project. Members of commission which are representatives of institutions and organizations must have sufficient Professional knowledge and experience, and be authorized to present opinions on behalf of organizations and institutions they represent.
Regulation on Making Amendment in Environmental Impact Assessment Regulation	**Article 2 —** Subparagraph 2 of Article 18 of the same Regulation has been amended as the following:After "project owner or authorized representative has obtained decision of "Environmental Impact Assessment is Positive" or "Environmental Impact Assessment is not Necessary", he/she is liable to submit this decision together with other permits and licenses obtained pursuant to relevant legislation to the governorate as well as monitoring reports concerning start, construction, operation and post-operation periods. Governorate enlightens PEOPLE and informs the Ministry.
Regulation on Waters for Human Consumption	**Article 19 —** "(...) When necessary, other relevant technical staff shall be included into committee. Moreover, specialist representative of relevant NONGOVERNMENTL ORGANIZATION might attend to the Committee as supervisor. Attendance of the mentioned representative to the Committee is not compulsory."
Urban Wastewater Treatment Regulation	**Article 5 —** Principles stipulated for implementation of this regulation (...) i) It is essential to announce information about wastewater and sewage sludge disposal to the public by means of periodic reports.
Wetlands Conservation Regulation	**Constituting National Commission for Wetlands** **Article 27 —** Under the presidency of Undersecretary or Deputy Undersecretary of the Ministry, the commission is composed of 10 members consisted of General Director of Nature Conservation and National Parks, General Director of Conservation and Control of Ministry of Agriculture and Rural Affairs, General Director of State Hydraulic Works, General Director of Cultural Heritage and Museums of Ministry of Culture and Tourism, Chairman of Special Institution for Environmental Protection, 2 representatives from biology and agriculture departments of universities on condition that both of them are not from the same department, and 2 people from **NONGOVERNMENTAL ORGANISATIONS** performing in the subject of wetlands. **Constituting Local Commission for Wetlands** **Article 31 —** In cities where wetlands of which plan has been prepared or is in preparation process and have international significance, Local Commission for Wetlands is constituted. Under the presidency of city's governor or deputy governor entitled by the governor, the commission is composed of regional or provincial directors of institutions which are member of National Committee for Wetlands, district governor of the district where wetland is, chairman of provincial trade chamber, if there is, one person from cooperatives of water products, one person from hunting and shooting associations, 2 representatives from biology and agriculture departments of universities on condition that both of them are not from the same department, and one person from **NONGOVERNMENTAL ORGANISATIONS** performing in the subject of wetlands.

(cont. on next page)

Table 5.2. (*Cont).*

Law/Regulation	Related Articles
Regulation on Environmental development plans	**Principles to be observed** **Article 8 –** (1) In areas within the borders of environmental development plan; ç) To obtain opinions of relevant institutions and organizations, Professional and nongovernmental organizations and to provide these opinions be included into planning process. **Article 10**-(4) Method for providing participation into process of environmental planning is determined by the authorized administration. The authorized administration might use such methods as correspondence, survey, meeting, internet environment or workshop to provide effective participation into planning stage.

Public participation practices are the implementations which are dependent on goodwill and at restricted level and have not been included into planning legislation. In Article 8 of Public Works Law No 3194 and Article 20 of Regulation on Procedures of Planning, approval processes of a plan are determined as: "*Construction plans shall enter into force after being approved by council of municipality within the borders of the municipality and adjacent area, and by provincial administration committees out of these borders. Approved plans shall be announced for 30 days by being hung by the administrative in places where everybody can see them. Where and how they can be seen shall be announced by means of local communication tools.* Appeal to plans might be lodged in the presence of relevant administration within these 30- day announcement period. This process determined is far from participation and it is ineffective and insufficient to announce plans to the public

One of significant principles of Article 14 of Water Environment Directive effective as of December, 2004 is the "public participation" principle. In this directive, it is aimed to announce work plans and schedule of basin management, to provide people with access to working documents, and to form work groups for information sharing and awareness-raising.

5.2.4. Institutional Integration

Institutional integration includes whole ongoing information flow integration as in other private and public works. Evaluation results concerning this integration criteria of relevant regulation is specified below.

- **The definition of leading and participating agencies -Representation**

Since water resource management is a multidisciplinary planning type, providing participation of effected groups into resource management is significant to support and apply decisions made. Performance change of works carried out in the area results from existence of a integrative understanding difference between planning practitioners.

This criterion is one of the requirements of water management and entails inter-institutional coordination. A participative water resource management aims to bring many actors together from public, private and voluntary organizations and to ensure them struggle for common targets. At this point, planning authorities must have more active role on water management issues.

It is stated in National Environmental Action Plan of Turkey for Water Management that since participation of users into planning and application stages is not ensured, projects are not adopted, and therefore, they cannot fulfill intended targets.

Incentive studies for this integration are described by Ministry of Environment and Forestry which performs and undertakes activities. In Article 3 of Law on Making Amendment in Environmental Law No 5491 and Article 11 of Regulation on Procedures of Environmental Planning, it is stated the following institutions are responsible for protection, improvement of the environment and pollution prevention: "(a) everybody, in particularly administration, professional associations, unions and nongovernmental organizations are responsible for protection, improvement of the environment and pollution prevention and liable to obey measures taken and principles determined in this subject. (b) In any and all kind of activities concerning protection, prevention of the environment from damage and pollution prevention Ministry and local administrations coordinate with professional associations, unions and nongovernmental organizations when necessary. (c) Authorized organizations making resource use decisions and project evaluation shall observe the principle of sustainable development in decision making processes. In *Article 11* titled *Coordination* of *Regulation on Procedures of Environmental Planning*, it is stated that (1) Coordination is under the responsibility of the Ministry in activities related to environmental development plans covering multiple cities and prepared or made prepared by the Ministry. Participation of administrations into planning process within planning area, their responsibilities, contributions and duties might be determined by protocol when necessary."

Coordination is expressed as a general concept in these articles given as examples. However, expectation under this criterion is to indicate clearly the interaction of water management and spatial planning from national level to local level, and to describe them on legal grounds. Within this context, it is obvious that there is no strong institutional structure to be able to provide inter-sector integration in planning and environmental legislation in Turkey.

In sections of "Targets and Predictions for Period of Plan" in 9th Development Plan (2007-2013),it is seen that a democratic and transparent management is adopted, and attention is paid to such subjects as to establish coordination between public, private and nongovernmental organizations in local and regional development, to ensure effective resource use, to make public management have a modern insight, structure and function which offers citizen- oriented, quality, effective and quick service and can bring towards such concepts as feasibility, transparency, participation, accountability, predictability.

Water resource management requires representative and accountable governance systems providing both regional and basinal strategic and farseeing leadership, inclusive, active and effective participation of individuals and organizations. In particular, an effective and productive governance model based on consensus requiring preparation of joint projects with local representatives of public sector, in other words municipalities, industry and trade associations, unions of merchants, trade unions, employers' unions and local administrations' associations could not be drawn within the framework of rural development.

Consequently, failure in forming common performance criteria for planning and water authorities and accordingly failure in providing participative, effective, transparent process management and effective inter-institutional coordination emphasize the significance of this criterion.

- **Interagency Coordination and Clear Delineation of Actor Roles and Responsibilities**

Corporate responsibilities under the legislation are relatively in complex structure. The fact that most of the public corporations concerning water issue in Turkey sometimes agree or disagree with each other about the practices they carry out depending on different regulations decreases the efficiency of governance. It is encountered with this situation in legal arrangements such as Water Pollution Control

Regulations, Aquaculture Regulation, Public Health Law, Law No 6200, Law No 167, Article 22 of Law No 5197, Article 2/c of Law No 2560, sub-paragraph (r) of paragraph 1 of Article 7 of Law No 5218, etc.

As it is mentioned before, central and local investment agencies and institutions in relation to water management are State Hydraulic Works (DSI), Mşinistry of Environment and Forestry (COB), Bank of Provinces and EIEI. On the other hand, the main observer – supervisor agencies and institutions are Ministry of Agriculture and Rural Affairs (TKB), Turkish State Meteorological Service (DMI), Municipalities, Special Provincial Directorates of Administration, Ministry of Environment and Forestry (ÇOB), Ministry of Health (SB), Ministry of Finance (MB), Undersecretariat of State Planning Organization (DPT), Turkish Statistical Institute (TUIK), South-eastern Anatolia Project Regional Development Administration (GAP BKI), Environmental Protection Agency For Special Areas (OCKKB) and Universities. Furthermore, Metropolitan Municipalities and their subsidiaries such as General Directorates of Water and Sewerage Administrations, Village Legal Entities, Irrigation Unions and Irrigation Cooperatives are the relevant agencies about water management in our country (DPT, 2007). In local basis, a pattern which is far away from central control, lacks of legal coordination, functions in independent administration and practice levels is exhibited.

Due to the fact that each of these agencies implements their own foundation laws, as it has been expressed in a number of studies before, main problem of water management in Turkey is the lack of (inter-ministerial) cooperation and coordination. The complication of authorities and responsibilities concerning building flood protection facilities and improvement of stream beds can be given as an example for these coordination problems. This issue is in two different authorities' responsibility and duty in Turkey. This duty is given to DSI with Law, but these services within the borders of metropolitan municipalities are to be performed by metropolitan municipalities with the Metropolitan Municipalities Law number of 5216. As a result of streambed paving, drawing down and even building some structures in order to use these in various purposes of metropolitan cities, provinces, districts or municipalities, the stream beds run over with rain or snow water and cities are drenched in water. This is the embodiment of aforementioned lack of cooperation and coordination, existence of partial practices within the current planning system and complication of authority. As it can be understood from this example, one of the reasons of interagency integration

problems is that interagency disagreements and environmental problems, which have occurred in the administration of different agencies, cannot be prevented because of their same watershed but different administrative borders. As it is regarded in the examples of other countries, local administrations possess major tasks in terms of water resources protection. Duties and missions of the local administration in Turkey still remains insufficient concerning protection of non-renewable resources or prevention of dangerous situations. Especially by law No. 5216, in the municipalities which are within the borders of metropolitan municipalities, there is a different process of application and intervention in water-related transactions and this leads to the emergence of a serious problem in terms of water resources and planning. Therefore, we see that the deficiencies of interagency information sharing and cooperation stem from complication of authorities concerning water and planning law.

It is seen that the management of water as well as the complication of authorities and more than one planning authorities' taking responsibilities at the same spatial level is relatively given to the responsibilities of water authorities. There is not any management schema in relation to the watershed with working method based on the interagency cooperation and integration. In the related regulations, the necessity of determining spatial strategies for the future of water management in our country and the abundance of laws and regulation on which knowledge, opinions and recommendations set forth makes it impossible to comprehend in which processes, with which actors' attendance and by which agencies' implementations shall these strategies be fulfilled.

Within the legal framework, water and planning authorities do not have any political program in relation to professional association and there is not an organizational structure as it should be. There are not adequate written laws and principles in relation to horizontal coordination and flow of information within the current legal regulations that directs planning practice in our country and the integrity between strategies and ranks cannot be ensured. According to Article 18, Paragraph 2 of Law No. 2560 of General Directorate of Istanbul Water and Sewerage Administration concerning its Establishment and Duties, the statement "It is essential to get the review of İSKİ in term of infrastructure facilities in the preparation of construction plans" takes place. In the process of preparation of construction plans, the provision of ensuring to get opinion from Water and Sewerage Administrations and Watershed Management Unit is one of the positive principles that can be provided within this interagency horizontal coordination.

The issue of orientation of urban development which works depending on different administrative boundaries in terms of planning, programming, evaluation, monitoring and practicing shows up as an area of problem that negatively affects systematic of horizontal relations. Due to the fact that planning authorities, which are on the same watershed, remain within the different administrative boundaries (within and out of metropolitan boundaries) depending on artificial distinction stemming from administrative or political divisions and are subject to different legal arrangements, they cannot provide a practice and integration in relation to common planning rationale or they cannot implement this in desired levels. In this sense, it is necessary to establish strong bonds on region plans and strategies along with the decisions in relation to water management on watershed plan and to increase binding status of the planning so as to strengthen and orientate this bond in sub-scales by enlightening it. In conclusion, there is a legal loophole in establishing horizontal relations systematic of regional planning.

Water Management National Platform was established in 2002 in order to fill the deficiencies of cooperation and coordination in terms of water management (inter-ministerial) in Turkey (Grontmij, 2004). Among the basic concepts of EU Water Framework Directive concerning management of water resources protection within the watershed are 'integration of all legislation concerning water in single framework' and 'integration of disciplines, analyses and specialties' (Yıldız and Dişbudak, 2006). It has been decided to prepare a new Water Law in which legal requirements of EU Water Framework Directive are met, which ensures legal basis for Water Management National Platform and specifies the interagency relations, and it has been decreed that this National Platform shall be formed in coordination with Turkey Integrated Water Management Plan (Grontmij, 2004). It has been decided that leadership of this platform shall be DSI and chairmanship of the preparation group that will carry out the arrangement of meetings (determining of agenda, dates of meetings, and topics of discussions) shall be Ministry of Environment and Forestry. With the 'Water Framework Directive' which is thought to take effect in these days, there is a general opinion that single legislation concerning water shall solve the problems more easily by being the object of single authority or establishment.

Some obligations have been imposed in relation to cooperation and coordination in the related articles; however, this does not provide enough extension for planning of land use and enabling integration of water management. Moreover, it is necessary to

make legal arrangements which explain and encourage interagency and interdisciplinary integration on horizontal and vertical level.

- **Human Resource Capacity**

Availability of city planner personnel within the institutions concerning water, similarly availability of hydrology engineers within planning institutions and establishment as well, and working on institutional capacity increase opportunities must be bounding for both of the planning sectors in terms of human resource capacity in both technical content and in their stage of formation and approval process. Therefore, it is expected that qualified human factor that uses and produces technology efficiently must be ensured and these statements must take place in laws and regulations of the organizations. For example, in General Directorate of DSI's Promotion and Change of Title Regulation which was issued on official gazette on 08/11/2007, it is positive to be an article in relation to embodying 'city planner'. However, there is not any explanation concerning availability and capacity of these positions and obligation of making them present.

5.2.5. Policy Integration

Issues of planning and management of water resources in the planning system of analyzed countries were discussed again on every planning level and these were reflected to their legal and institutional arrangements. These are the formal arrangements that are developed within planning system. However, in spite of the fact that some does not have any formal arrangements, it is seen that informal arrangements are also effective with progressive planning depending on the needs and statements. Current situation of planning and environmental legislation in Turkey is evaluated in two titles below:

- **The Integration of Sector Regulation**

In developed countries, legislation concerning drinking water and system concerning organizational structure are arranged through single law, and water resources are evaluated on the basis of watershed. On the other hand, there are lots of

legislations that arrange this system in Turkey; tasks and responsibilities of lots of agencies and organizations take place within these legislations.

The most comprehensive arrangement in relation to protection of water resources is the arrangement of Constitution. According to Article 56 of 1982 Constitution, "everyone has a right to life in a balanced and healthy environment. It is the duty of the state and citizens to improve the natural environment, and to prevent environmental pollution." With these statements, it is enabled to protect and not to pollute water which is one of the most important elements of the environment. "This process started with the enactment of Environment Law in 1983 and continued with Water Pollution Control Regulations (1988) and related Administrative (1989) and Technical (1991) Notifications. Furthermore Control of Dangerous Wastes (1989) and Solid Wastes (1991) regulations and Environmental Inspection (2001) and Environmental impact asessment (2002) regulations took effect as supplementary" (Tekeli, 2007, p. 252). The said legislation has been revised in accordance with EU legislation since 2004 and the regulations which do not correspond to our regulation have been enacted in accordance with the EU legislation. Hereby, with the amendments of Water Pollution Control Regulation in 2004 and Environment Law (number 5491) in 2006, Control of the Pollution that is caused in and around Water by Dangerous Substances (2005), Quality of Surface Water from which Drinking and Utility Water is acquired and thought to be acquired (2005), Control of Soil Pollution (2005), Regulation of Water Protection against Agricultural Nitrate Pollution (2004), Regulation of Good Farming Practices (2004) Urban Wastewater Treatment (2006) regulations are the ones that have taken effect recently (Tekeli, 2007). İSKİ (Istanbul Water and Sewerage Administration) Regulation of Drinking Water Basin (2006) and Regulation of Basin Protection which aims at protecting watersheds are the regulations taken effect recently, as well.

As specified above, there are lots of laws and regulations in relation to the protection and sustainability of environment. However, it is observed in Turkey that integration of these two sectors and their legislation specifically falls behind the regimes and approaches developed by the world. In order to execute the practices, it is aimed at researching in which levels water resources management includes legal necessities and how the relationship is established with physical planning and protection and management of water resources. At this point, the problem that arises in Turkey is that the process of finding expression in plans about the arrangements and carrying them

into practice other than the legislation related to the issue. For instance, there are 16 Metropolitan municipalities in our country. Most of the Metropolitan municipalities have issued their own Construction Regulations and applied these on their district. However, there is one issue that has to be careful about here: some acceptances of Water Pollution Protection Regulation provisions are amended and not recognized in the regulations of metropolitan municipalities; as a result, this causes occurrence of inconsistency in planning and practice principles and practice differences varying from one administrative boundary to the other. Therefore, it arises as a problem that different regulation provisions stem from administrative and watershed structuring within and out of the metropolitan municipality boundaries and this threatens the integrated planning perception.

It is seen that planning legislation concerning management of water resources and planning authorities concerning rationalization of water policies do not comprise sufficient expansion in terms of the relationship between land use and water planning in Turkey. In addition, it has been also observed that management of water resources in the examined laws and regulation is perceived only as a technical issue and some solutions have been found for this problem with structural measures. There is not any legal or informal arrangement (regulation, directive or notice) that direct planning practices in regional and local scale in terms of water resources management.

With the organization of World Bank and Ministry of Environment and Forestry on 3 March 2010, National Water Basins Management Strategy Scope Determination Workshop carried out in Ankara and Ministry of Environment and Forestry performed basin plans throughout the country and this shows that these practices are noticed in our country. Moreover, with the coordination of the Ministry of Public Works and Settlement and Higher Planning Council, “Integrated Urban Development Strategy and Action Plan” whose short name is Urban Development Strategy (KENTGES) has been prepared with the attendance of related institutions and organizations and reconstruction of spatial planning system”, “increasing spatial and life quality of the settlements”, “strengthening economical and social structures of the settlements” have been grouped in 3 main axis and purposes, strategies, actions, responsible and related institutions and the processes in which these tasks will have been completed until 2023 have been determined. In this study, it is anticipated that some arrangements shall be done in order to reflect water management policies and practices onto spatial planning within the determined actions (Ministry of Public Works and Settlement, 2011).

When we make an evaluation from past to present, due to the fact that spatial planning practices in relation to water planning have been performed independently from each other and not in a desired level, the related planning legislation that is insufficient concerning protection and management of water resources and composes of some provisions which include uncertainties, it is relatively clear that the developed plan decisions cannot produce suitable solutions for carrying capacity of water resources and cause waste of natural and economic resources. It appears that strategic integration and operational integration are substantially related with each other. In this context, it arises as a problem that strategies of our country have not been determined yet and there is a lack of legal framework for the actions to be taken. Consequently, it is clearly seen that Turkish planning law does not establish a suitable ground for the development of transparency, accountability, accessibility, and negotiation environment on every stage of governance which strengthens democracy in order to prevent pollution and depletion of water resources, and does not increase the potential of planning system. Therefore, integration between spatial planning and water resources management is still very much in a nascent stage in Turkey. Legal environment in Turkey do not inform the strategy on the importance of the linkage between spatial planning and land use management in the legal context. The reason for this is perhaps the lack of national spatial strategies and plans.

- **The Integration of Sector Strategies**

With this criterion, it is sought that spatial planning shall not be only a passive structure of water resources planning and management, but also a part of strategy and planning process. In the development of strategic targets in relation to further studies, it is necessary to use tools which fit for purposes of water resources management with the inclusion of two planning sectors and form plans. Under this title, it has been researched that there are legal arrangements concerning in which concept and content have the components of water resources management been discussed on different decision levels and on which level should these decisions be developed. Current situation of decision and tools in relation to planning of the needs of water resources management on legislation in Turkey is examined in 4 titles specified as 4.3.5.2. Sub-section:

- **Drinking Water Protection**:

The regulations which have been enacted in order to protect water resources for reserve areas of drinking and utility water contain a more descriptive structure in relation to practice and planning, decision making processes when compared to planning legislation.

These regulations are:

- *Regulation on Water Resources Protection:* Aim of this Regulation is to protect public health by taking measures in order to provide absolute, short and long term protection by preventing surface water resources from being polluted with domestic, industrial, agricultural and every kind of wastes caused by livestock activities. Again in the 2nd article of this Regulation, definitions of absolute, short, medium and long range protection areas are made and provisions shows how to carry out agricultural activities on these areas. On the forth section of "Planning Principles and prohibitions Concerning Water Quality" of Water Pollution Control Regulation, pollution prohibitions in relation to drinking water suppliers are defined in 16th Article. The provision of prohibition about discharge of waste water on dry and flowing streams that are in the condition of water resource and throwing of solid waste is obvious. Absolute, short range, medium range and long range protection areas are defined in the articles of 17, 18, 19 and 20, respectively and the limitations in relation to these areas are specified. Furthermore, in the articles of 9-11, it has been placed restriction for nitrogen and phosphorus as the receiver environment standard in order to classify lakes (as well as dam reservoirs) and control "eutrophication" threat within these waters.

  On the other hand, in the article of 21, it is specifically dealt with pollution prohibitions concerning lakes and the prohibition of "untreated domestic and industrial waters cannot be provided" is applied for the lakes which are used in purposes other than drinking water supply. A tertiary / advanced treatment facility, which eliminates nitrogen and phosphorus together, is suggested in order to enable discharge standards defined in the 31st and 32nd articles in terms of eutrophication control of domestic and industrial waste waters.

  Discharge of domestic waste waters to the environment of receiver directly and/or as treated is arranged with Article 32 and the related standards are restricted depending on both pollutions loads and population equivalent (PE) (less than <1000, between 1000 and 10 000, and more than 10 000).

There are lots of articles in relation to protection areas and measures. However, it is observed that there are incoherencies as well as conflict in these principles and procedures which are in force with different legal arrangements. There are some incoherencies between drinking water basins protection regulations and SKKY concerning absolute and short range protection areas and their activities. For instance, under the title of "protection of water resources and permissions in mining activities" in the Mine Law No of 3213, it has been determined that drinking water basins have been opened for mining activities and there are conflicting provisions with the regulations of drinking water protection. Moreover, we can see these differentiations in basin protection regulations of different metropolitan municipalities. For example, in the (a) sub-paragraph of article 7.1 of drinking water basin protection regulation of İSKİ, after the statement of "oven cannot be opened or exploited within Absolute and Short range areas", it is stated that permission is given for those facilities which does not use any chemical substance and/or mine extraction can be allowed in short range protection areas with the scientific environmental impact asessment report taken from Governorship or General Directorate of Mining Affairs showing that it will not cause any pollution except from explosives. It has been amended that "it it obligatory to obey with the provisions of Discharge of Waste water to Drainage Regulation in discharge to the receiver environment during activity". Here, as well as preparing some disobeying statements for the specified rules and prohibitions, contradictory provisions are reflected in terms of urban principles and public interest. Similarly, exclusion of oil and geothermal resource and mine searching activities out of the scope of Environmental Impact Assessment (EIA) can be given as an example for these contradictions.

- *Regulation on City and Town Drinking Water Project Preparation:* In the 3rd Article of the Regulation, a catchment area by taking topographic, geological and settlement status of the catchment quarter into consideration:
  - "Protection area in springs is in the form of circle if it is possible, and it takes place nearly in the centre of catchment area and in the direction of downstream. 50-250 m from the most distant point of catchment structure in symmetric axis of the round and the minimum distance from downstream to the side of catchment protection area are determined as 20 m.

- On the other hand, in terms of wells, protection area in percolation well is 50 m circle with radius and the well is placed in the centre of this circle.
- In Drains and Galleries: It is stated that "Drain or gallery axis of symmetry of protection area border and edges shall be in a distance of 40 – 100 m".

It is seen that greatness of protection area and protection principles are more clearly conditioned in the regulations as a drinking water facilities in dam areas. However, it is obvious that provisions in terms of drinking water wells and water reservoir protection areas and protective measures are insufficient. Particularly, protection area distances are lower than it should be when compared to the standards of other countries. While the distances in springs are 500 m in other countries (see, .3.5.2.), they are determined as between 50 and 250 m in our country. Furthermore, not any convenient fields for land use have been specified on these areas.

As summarized above, the presence of lots of regulations in terms of drinking water protection causes serious complications and ignorance in the process of planning while applying the knowledge for evaluation.

- **Storm Water Management:**

There isn't any directly related regulation on this subject. No related articles have been seen in planning and environment legislation regarding permeability status of the land (Permeable Surface) and water sensitive urban design. Nonetheless, articles seen as relevant to these subjects are examined below under the specification of the matters requiring the integration of these two sectors' strategies.

Regulation on Protection of the Waters against Agricultural Nitrate Pollution: As per Article 5 of this regulation, in the objective of determination, reduction and prevention of the agricultural nitrate pollution caused on the surface waters, the whole surface and ground waters containing more than 50 mg/L nitrate are deemed as "polluted" and these fields are described as "sensitive area" as per Article 6. Action programs (Articles 8 and 9.) based on the principles of "good farming" practices stated in the article 7 are stipulated to be prepared under the coordination of Ministry of Agriculture in the year following the completion of the pollution and sensitive field detection in two years. It is stated that in the preparation of these action programs, primarily present scientific and technical data regarding the nitrogen loads coming from agricultural and other sources, and environmental conditions of the related areas should

be taken into account. It is also mentioned in the regulation that the amount of farm manure to be applied on the sensitive areas is determined by Ministry of Agriculture and Rural Affairs considering the regional, edaphic and climatic properties and agricultural regime to be applied, and nitrogen load per hectare can be calculated according to the number of animals. This regulation does not contain any matters supporting political objectives, policy and land use planning. It mentions that for the limitation of manure to be applied on soil, one of the stated measurements on action programs, the land use type should be taken into consideration. In this regulation, in pursuant to the principles of good farming practices; "determination of the times that are inconvenient for dressing; dressing systems on very sloping areas; water saturated areas, remaining under flood water; frozen and snow capped areas; and dressing conditions for the areas close to waterbeds and water sources" moreover, "determination of **Land Use Management** that will be planned in consideration of the plant rotation systems and proportion of the fields reserved for perennial and annual plants" statements take place. However, no detailed information is provided in regards to the content of these principles and what these conditions are.

Just like point pollution sources, diffused pollution sources that are not discharged from a specific point, such as the whole land use activities in rural and urban areas, polluting emissions in the atmosphere are the sort of pollutions diffusing to the receiver environment through the watershed depending on the climatic and meteorological conditions (rain and snow melt), geographical and geological conditions (Şeker et al., 2009). Among these, as an example to the important diffused pollution sources in our country waste synthetic and natural manure caused by agricultural fields; wrong and untimely pesticide applications; park and garden watering; unenclosed pastures, grazing lands and animal farms; forestry activities (wood chopping, logging, road opening etc.), urban areas without sewer system, zoning activities, seepage waters coming from cesspit systems of rural areas, wet (acid rains) and dry atmospheric accumulation (traffic emissions, domestic and industrial emissions), deserted or still active mining fields, disordered solid waste storage areas, urban runoff, rural runoff and natural disasters (soil and wind erosion, flood, etc.) can be shown (Şeker et al., 2009, p. 2). On the condition that the necessary precautions aren't taken on time, these pollutions will cause ecological collapse as a result of the rapid decrease of the oxygen amount in catchment basins, increase of the ammoniac load, resulting in the excess of the limit values for standard drinking water.

In recent years, eutrophication and nutrients pollution -commonly found in watersheds and significantly indicated to be in need of a sustainable management, is trying to be taken under control by making of pollution maps with the calculation of the loads coming into the water sources and determination of the best land use for the watershed. In addition to the good management of the point pollution sources in the watershed, calculation of the diffused and dispersed agricultural pollution loads (nutrient amount) across the watershed takes an important place in watershed management. As we see in the example of Australia, many countries make studies for suggestive solutions on how to the reduce the pollutions caused by agriculture, forest and pasture- grazing lands and bring legal provisions in order to prevent the pollution caused by agricultural nutrients; in other words, the application of sediment and nutrients using the information in regards to land structure of the watershed, permeability level of the land, erosion and plant pattern. At this point, especially in order for total phosphorus and nitrogen loads to be balanced, calculation based on multiplication of the field with nutrient containment coefficients – which are variable to land use types, and restriction of the pollution have great importance in determination of land use decisions. Pollution loads of the wetlands depend on the size of the watershed, its land use and open water ecosystems of the wetland such as river and lake (Korkanç, 2004).

Total Maximum Daily Load (TMDL), has emerged as a method whose analysis started to be practiced since 1990s. This approach is used for determining the levels of the limit values required to be made on the quality variants that are not stated in the regulations or imposing restriction to the discharge limits of the watersheds whose surface waters couldn't provide the expected quality. When it comes to the watersheds open for development, based on the idea that "water sources can take the waste to the extent that it doesn't restrain their intended use (drinking water, irrigation water)" with the understanding of "sustainability", it is the method determining development capacity of the watershed (Boyacıoğlu and Alpaslan, 2002).

Water quality requirements are directly connected with the land use and development practices. In the agenda of urban development, TMDL decisions and land use are interpenetrated as they affect the quality of the water sources. Total maximum loads of the cities and settlements should be determined in the related law and regulations (Bleier, 2004). This has taken its place in legal arrangements of many countries. We especially come across with it as a new input to the planning and a new

approach to the calculation of diffused agricultural pollution loads (nutrient amount). It has been emphasized that it is seen not only as a scientific and technical problem. At this point, the importance of the necessary precautions to be taken in control of the nutrients coming to the receiver environment from external resources and the reduction of application materials' and land use decisions' effect on water sources are also emphasized.

Determination of the limit values of agricultural drainage water as well as domestic and industrial waste water which is rich in phosphorus and nitrogen for the watershed, considering land use decisions relevant to this and the effect that the population living on the watershed will have, neither any conditions nor any matters have been found referring to the land use decisions and potentials especially in regional planning studies. Maximization of the forest lands in land use planning which make the least contribution to the food challenge per hectare across the region can be shown as an example to this subject. For example, calculation of the forestland required for the whole watershed to hold the nitrogen flow at a present level, etc. On a local scale, it is determination of the criteria for water sensitive urban design studies giving the priority to the reduction of impermeable area percentages and nutrient loads, and determination of materials for land use practices in reduction of pollution loads.

Regulation on Protection of Wetlands: This regulation contains the provisions relevant to the practices and principles to be applied in the ecological exposure area and buffer zone. It takes an important place in protection of wetlands.

No explanations or provisions have been found in the reviewed related laws and regulations regarding the rain water and its management, which is described as a new natural resource. Especially, the **Regulation on Urban Wastewater Treatment** has been reviewed but no legal information has been found in regards to the necessity of rain management by utilization of rain waters, building rain water catchment tanks etc. In addition to that, it has been also seen that not any decisions regarding the prevention of rain water mixing up with the sewage and waste water line of the city has been stated.

In the report of Integrated Urban Development Strategy and Action Plan (KENTGES) (2010 - 2023), in pursuant to the preparation of a legislation in order for rain water storage and generalization of its usage, deficiency in this issue has been underlined and it has been stated that rain water storage facilities should be founded and

arrangements should be made to extend the practices regarding the treatment of these waters in accordance with their intended use.

- **Flood Management:**

Flood management is one of the subjects that require the protection of natural and ecological balance as well as consideration and follow of the interaction between land uses and natural resources in the planning process. Many European countries have determined spatial development policies about flood management and stipulated strategic arrangements with the cooperation of spatial planning and water management authorities. Besides having the top priority amongst the other subjects on a national level, the approach of risk based flood management has started to be adopted. Risk Maps (such as showing high, medium and low risk levels) are the fundamental means of the close relation between spatial planning and reduction strategies based on good designed (regularly updated) spatial data management and used for preparation of Risk Management Plans (Balaban, 2008).

Present flood management system of Turkey is based on the limited power of intervention and means of DSI, a central institution. As Balaban suggested, there is a dependant structure on the structural measures of the institution. "Flood emergency plans" has been made by DSI for river basins. However, these plans descent on structural measures are declared to be non-functional to manage urban plans exposed to floods and directly urban development (Balaban, 2008). Related legislation is reviewed under two titles:

1) *The importance of flood management in the planning process of the regional and local plans*: As mentioned in Part 4, structural plans are prepared on a regional scale and assessments are made by the central government particularly in England. This plan goes into effect after being elaborated by local governments. It is also seen that no housing can be constructed as long as compliance for settlement in terms of flood is not accepted by local government authorities regardless of the housing permit given by regional administration.

   In the Geological– Geotechnical and Micro-zoning Investigation Circular (2008) of Ministry of Public Works and Settlement, is indicated that flood investigations are made on-site and flow conditions of the waterbed capacities depending on the local conditions are assessed at regular intervals by DSI to form a

basis for physical planning studies. In this circular, it is stated that "General Directorate of DSI makes flood situation investigations to be used as a data in planning process on requests of municipalities and other related state institutions and organizations. Moreover, it is stated in the circular that "preparation of upper and lower scaled settlement plans and plan decisions about the site use, regarding submersions and possible flood risks in the investigation area, are formed in the direction of opinions received by General Directorate of DSI." It is also underlined that cooperation should be made with DSI in making plan decisions.

2) *Precautions*: Besides of structural measures, some non-structural measures are also recommended by DSI. There are requirements for flood danger limits (Q_{500}/Q_{1000}) in preparation of zoning plans and demonstrations for forestation and protection from erosion. However, as Balaban indicated, it has been observed for years that cities in Turkey have a high risk of exposure to flood regardless of the structural measures taken. It is seen that the related legislation in force in Turkey is inadequate in preventing floods, measures taken are not sufficient and land use planning actions about the precautions are not described.

- **Surface Water Protection**

The title of surface water protection is focused on the strict protection zones. Since 1980s, making of Regulations on Water Basin Protection based on İSKİ law especially in places with metropolitan city status in terms of the protection of water sources are considered to be essential for the administrations to show their determination on this issue and activation of their practices. These regulations provide detailed information about surface drinking water resources (lake and brooks); strict – short- medium and long distant protection zones; protection zones under the titles of brooks, surface and ground waters; and measures to be taken. For example, it is stated in the İZSU Regulation on Protection of Water Basins that "It is fundamental to prepare an 'environmental development plan' for each surface water source whose content will be exactly the same with the Regulation". It is stated that as in the other metropolitan city regulations, in the case that Environmental development plan is made, provisions of environmental development plan is to be in force in the areas within the scope of metropolitan municipality; and it is a must to take the opinion of General Directorate of IZSU to provide the essential compliance between the basis formed in the preparation

process of 1/1000 scaled application zoning plans to be prepared in accordance with the provisions of this regulation and the issues hereby arranged with the provisions of this regulation. In the cases that administrative and watershed boundaries don't coincide, two different regulation provisions will be valid for the same river basin (Regulation on Water Pollution Control and Water Basin Protection in the places with metropolis status.). There are differences between the conditions of these two regulations. Coinciding and conflicting situations have been seen on the upper and lower parts of the watershed as a result of the differentiating management mechanisms. For instance; while there is a condition in the Regulations on Water Basin Protection for places with metropolis status to set 0- 100 m buffer strips on both sides of the rivers whose basins are located in the short, medium and long protection zones, absence of any obligatory conditions regarding this issue in the Regulation on Water Pollution Control that is in force for the same basin causes contradictory practices.

In the spatial planning system, there are some insufficiencies in the integration of water sources management. It is seen that planning system doesn't offer a new scope for water sources problems and issues, and tries to respond this connection on the basis of the water related legislation. As summarized above, we see that different policy measures having strong effects on the consequences are particularly focused on the protection zone issues. However, no tangible indications could be found in terms of compliance with the requirements of water sources management.

In addition to this, reviewing current Turkey planning system it is seen that policies and rules on protecting, managing and planning water sources on local, regional, national and international levels are not determined with a systematic approach, there are deep gaps and contradictions. In the relevant regulations of planning legislation, these approaches are only in statements and don't include any clear details regarding the process. In legal context, it has been determined that planning and applications don't provide each other with sufficient reference in both zoning and water planning, and they are barely binding.

Especially, it is seen that in the basis of watershed management plans within the boundaries of watershed, there are no regulations or laws describing the objectives and policies to form a unique base making each of the application oriented action areas pieces of a whole. An innovative approach is also not seen in Turkish zoning law in regards to abstract and leading arrangements on subjects such as flood management, water sensitive urban development, climate change mitigation as we reviewed in the

examples of Holland, America, Australia and England. That's why, there are no leading legal or illegal documents supporting the applications today. "Contextual barriers" for the above four headings summarised in Table 5.3.

Table 5.3. Contextual barriers for four strategies

Contextual barrier	Drinking water protection	Stormwater management	Flood management	Surface water protection
Conflicting policy goals/lack of consistent policy framework	x		x	x
Lack of / insufficient legal obligations		x	x	x
Lack of clear leadership		x	x	
Lack of partnership working	x	x	x	x
Lack of knowledge and awareness		x	x	

5.2.6. Discussion

Recently there has been a significant change in the arguments throughout the world about the protection and management of water sources. It is seen that the arguments on the agenda put the way plans and policies reaching from nationwide into the regions made at the forefront and give the priority to the design of the process instead of preparation of regional plans and policies describing structural developments in line with the legal duties of the institutions active in water management. On a global and national scale, the importance of the studies on protection and management of existing water sources has gradually increased as a result of the increase in the need of clean and drinkable water. Studies on this subject have been made in Turkey, as well. In recent years, many legal arrangements have been made especially on environment legislation; however, these are insufficient and complicated.

This study is focused on how the legal system leading the decision making processes adopts the reflection of water management policy and its applications on spatial planning. That's why, in this part, primary arguments about management requirement and planning of water sources intervened by urban planning and how they should be described in related legislation are summarized under five titles determined within "Integrating policy framework" and explained above:

- ***Substantive Integration:*** *How strong is the relationship between land use planning and water sources management? How internalized is this relationship?*

There aren't the concepts of land use planning and integration of water sources management in the laws and regulations stated in planning legislations, and there is no arrangement or description emphasizing the importance of this issue in the other legal arrangements regarding the environment, either. The importance of the integration of physical planning and zoning works with water planning works is not properly emphasized with the exception of Soil Protection and Land Use Law No 5403 and KENTGES report (2010- 2013).

- ***Methodological Integration:*** *How are the rules for the followings determined? Setting a scientific data base about the areas with hydro geologic characteristics in the joint work of two disciplines, setting a data base as part of geographical information systems in order to reveal the primary problems and potential values of the region and necessity of environmental value analysis.*

Evaluation of suggested and present land uses effects' on the areas with hydro geological characteristics brings a new perspective to land use and water management relationship. In this process, going from the affected and effected relationship to association, integration of planning to water sources management should be eased and present effects should be evaluated and reflected on the plans. However; EIA regulation, which is in force on this issue in our country, is limited with project based evaluations. There aren't legal arrangements indicating that any of the contemporary methods used in the integration of environment size, water sources capacity and pollution dimension with the physical plans shouldn't be used in the preparation process of the relevant plans. It is seen that there are draft regulation studies made on the evaluation of plans' effects on the natural resources. Nevertheless, there are uncertainties about how the process suggested in these studies will be integrated with planning system.

In addition to that, within the framework of the activities to be made elaborated in Environment Chapter (Chapter 27) promulgated within the scope of National Program published in the Official Gazette dated 31/12/2008 and No. 27097 containing the works Turkey will do within the scope of EU membership, activities to be made by Ministry of Environment and Forestry are elaborated (Ministry of Public Works and

Settlement; 2010). In KENTGES Council report (2009), it is indicated by the Ministry that studies for a strong geographical information systems configuration continue.

- ***Procedural Integration:*** *To what extend are the relationship between land use planning and water sources management; conditions, content and extension of all planning levels from nationwide to regional scale determined by the rules? To what extend should the participation of local organizations be supported? On what scale the relationship between the actors of physical planning and water management contains negotiation and mutual learning processes?*

It is very obvious that legal and scientific references to support the criteria to base the physical plans regarding water sources planning and management are insufficient. In the relevant legislation, water sensitive planning methodologies and concepts are not properly perceived on national and regional scales, and there are provisions regarding both the data and indications about neither water's quality nor the use of planning techniques.

It is seen that law and regulations couldn't internalized the operation and planning programs of the planning process. There isn't a national spatial planning strategy or nation spatial strategy plan that has an importance for land use planning and water sources relationship. In present legal arrangements, there aren't adequate written rules and principles of coordination that needs to be provided horizontally and vertically in planning processes for the other existing stage levels. Not only extensions, contents, scales, application and approval processes of the plans in force are unclear, but also there are uncertainties and insufficiencies in different planning stages of the relationship between settlements and efficient use of the water sources. These issues are hardly ever found in the framework of complicated legislation in force. It is seen that especially debelopment legislation is quite inadequate in leading the planning and elaborating the concepts of water potential and protection. Also, in our country there is a complication about the compliance and cohesion of plans. In planning legislation, there isn't a structuring executed in accordance with the principle of staged cooperation amongst the plans.

Main features of the planning progress to be followed in every planning stage and rules about the participation processes have a complicated structure. Even though there

are provisions regarding the participation of the public, they do not provide a clear content and extension of the legislation.

- ***Institutional Integration****: On what scale is the legal system directing the ways of decision making internalized with the subjects such as power sharing, leadership, joint of stakeholder coordination and representing in the specification of these two sector's integration?*

Turkey couldn't make a "National Water Policy" requiring the protection and development of water sources and economization of water use. And our planning system couldn't create a spatial strategic planning approach on the management of resources. As a result of this, each public institution has its own approaches depending on their protection understanding and jurisdiction and they perform contradicting applications. Even though power sharing is usually adopted as a principle, this subject isn't internalized in governance system. Presence of a lot of prevalent laws, regulations, legislation, institutions and organizations cause contradictions and conflictions of administrative goals and create problems in the accomplishment of the administrative goals. It is seen that coordination mechanism of the two disciplines doesn't have a sufficient and clarified content in the relevant legislation. Within the boundaries of watershed incentive arrangements aimed at harmonizing the actions in both planning sectors to maintain a productive and efficient management on a regional and local scale, and actualizing participatory democracy besides representative democracy are insufficient.

- ***Policy Integration:*** *Does land use planning and water sources management relationship contain new arrangements on legal basis? What sort and extend of content is provided for this relationship?*

Planning problems resulting from the high amount and need of protection statuses in Turkey should also be emphasized. There are more than 70 laws and regulations on water sources management. When reviewed in the light of present legislations and applications, relationship between land use planning and water source management displays an irregular and complicated legal structure. Besides, it is also seen that some of the laws and provisions which are still in force have lost their

currency and cannot meet the requirements of today (for example; Village Law). These laws and regulations also face inadequacy of technical details for application. Followings are some of the detected problems about water sources management in the relevant legislation: each of them refers to water related issues under different titles; there isn't an integrated system; surface, ground and coastal water sources are considered independent from each other in their laws; water source is evaluated not on the basin scale but on a general scale; some judgements in the laws are not certain and law enforcements are not deterrent.

In the planning legislation of developed countries, the concept and requirements of "Sustainable water resources management", describing the development by maintaining the balance of water protection and use, are adopted. However, it appears that water sources management studies made in our country can't respond to the new developments with the relevant legislation predominant in technical and structural measures along with the planning understanding of water authorities. Legal legislation on protection of the environment and water sources scientifically refers to lots of issues. Nonetheless, binding status of the integration of water planning works with physical planning and zoning works and the importance of this subject aren't emphasized enough. In the mean time, this law and regulations also face inadequacy of details for technical application. In many regulations, there aren't details or tangible criteria on the application of water protection and water sources management or they are insufficient for leading the requirements of plan stages (Control of the pollution sources, setting of a criteria for water sensitive urban development design).

Within the scope of the 5th compound of the integrating policy framework, assessment study made as a result of the evaluation of legal and institutional structure in Turkey is summarized in Table 5.4.

In conclusion, planning legislation of our country is quite inadequate not only in mere water sources planning and management but also in governance and planning materials. As a result, rearrangement of our planning system and immediate change of the present complicated, unattended and uncontrolled structure are found necessary. This probably has a higher priority for our country compared to the developed countries. However, the fact that we can't present control mechanisms, application tools and planning decisions to substantially put into practice other than adopting the improvements in terms of general extensions and contents is really upsetting.

Table 5.4. Evaluation of the planning and environmental legislation and institutional structure in Turkey based on Integrative Policy Framework (IPF)

Dimension of Integration	Sub-type of Integration	Evaluation
Substantive	The significance of water issues in spatial /land use planning	*Not a priority* *No substantive policy content* *Lack of national spatial strategy* Emphasized only by the descriptions
	The integration of sustainable water resources management with spatial/land use planning	*No integration strategy or plan* *No any legal documents or acts establishing integration as a policy agenda* The existence of the strategies for the water – landuse planning in KENTGES report (2010)
Methodological	The integration of assessment approaches and techniques	*Lack of assessment system in EIA regulation* The existence fo draft regulation of SEA *Lack of clear techniques and guidelines in draft regulation of SEA* *No compulsory spatial impact analysis in water related environment*
	The integration of the different applications, and experiences with the use of particular tools	Circular note titled GIS *No explanatory information on procedures and techniques*
Procedural	The integration of informational requirements of water management in land use decision making	*Lack of territorial spatial strategy plan and its approach towards water resources* *Limited explanatory content concerning indicators of water management* *Lack of emphasis and requirements for this integrationin relevant regulation* *Insufficient level of planning legislative system to provide water friendly environment* *Ambiquities in data collection, assessment and plan contents* *No detailed strategies required by its own scale specified* Specified legend terminology for environmental development plan
	The integration of procedural requirements of water management in land use decision making	*Links between plan levels poorly developed at present* *Lack of clear guidance to planning and water authorities*
	Horizontal plan consistency	The preparation of RBMPs - Potential for close links between RBMPs and regional development plan *No close links between RBMPs and regional development plan at present* *Lack of national spatial strategies and key objectives water – land use issues*
	Consensus building	Exist provision concerning public participation; *but limited* *No mandatory condition for information sharing among relevant decision water and spatial planning makers*

(cont. on next page)

Table. 5.4. (Cont).

Dimension of Integration	Sub-type of Integration	Evaluation
Institutional	The definition of leading and participating agencies	*No leadership description in organizational framework* *Not formalized relationship between public, private and voluntary sector interests in water management* *Relative weight given to water interests*
	Interagency coordination and Clear delineation of actor roles and responsibilities	Article 18, Paragraph 2 of Law No. 2560 of General Directorate of Istanbul Water and Sewerage Administration concerning its Establishment and Duties *Complex cross-sectoral responsibilities* *Lack of coordination at all levels*
	Human capacity	*Lack of binding rules*
Policy	The integration of sector regulations	*Absence of instrument for policy coordination* *Lack of / insufficient legal obligations* *Difference legal framework between inside and outside of metropolitan areas*
	The integration of sector strategies	Absolute, proximate, mediate and remote protection zones in the Regulation on Water Resources Protection *Lack of clear rules and measurable standards* *Lack of stormwater managementpriciples and measures* *Limited recognition for drinking water assessment and flood management*

Positive drivers and actions already in place = regular font
Negative or absent drivers/actions = Italics

CHAPTER 6

CASE STUDY: KÜÇÜK MENDERES CATCHMENT AREA

In this chapter, the planning process, current planning and management activities and institutional structure in Küçük Menderes River Basin have been analyzed and summarized within the Integrative Policy Framework.

6.1. Background: Küçük Menderes River Basin Catchment Area

Küçük Menderes River is 24th biggest basins according to their precipitation areas in 25 main river basins of Turkey. The Küçük Menderes River basin is located to the south of İzmir, in western Turkey. It is surrounded by the Aegean Sea on the west, and steep mountain ranges on the north, east and south. Bayındır, Ödemiş, Kiraz, Beydağı, Tire, Selçuk and Torbalı are the main settlements in the Küçük Menderes plain (Figure 6.1). The mountain ranges at the margins of the plain are divided by streams and their tributaries; hence resulting in a rugged topography.

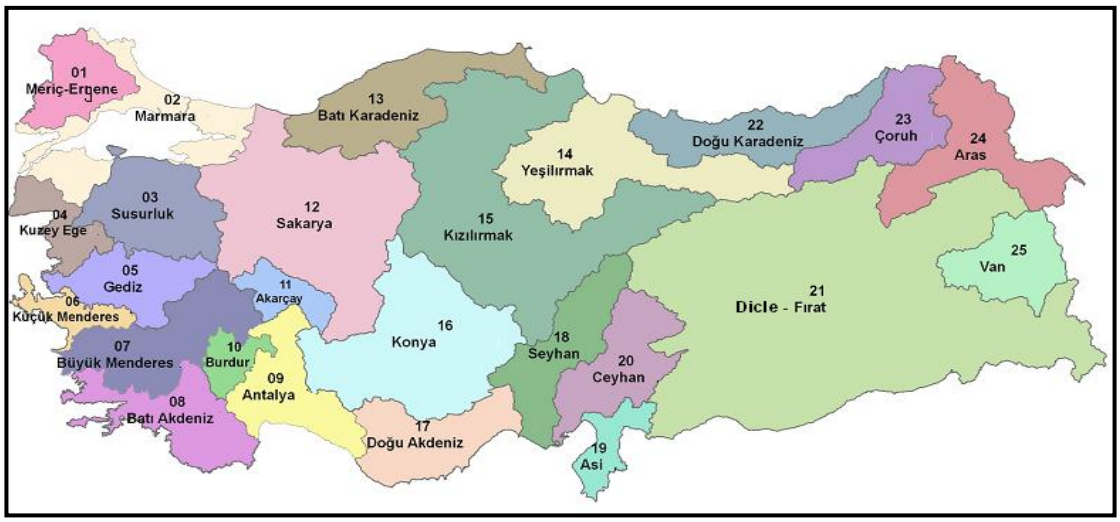


Figure 6.1. Basins in Turkey
(Source: Türkiye Çevre Atlası, 2004).

Küçük Menderes basin is planned in two sections. The first section is the drainage area which is planned as the area where agricultural irrigation is a priority. The

other section in the basin is Küçük Menderes Side Basin in connection with the Tahtalı Dam and Çamlı Dam regarded as the most important water sources of İzmir. This area is planned as drinking water. The area study of this thesis, as shown in Figure 6.2, is limited with the Küçük Menderes Drainage Basin covering the districts of Bayındır, Beydağ, Kiraz, Ödemiş, Tire, Torbalı and Selçuk.

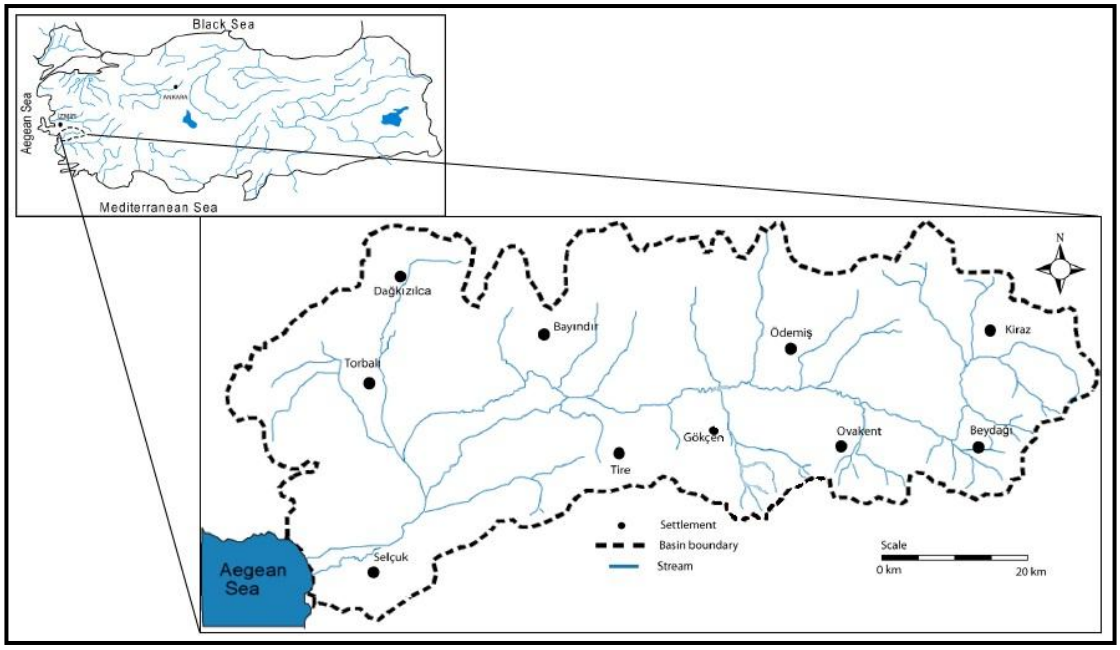


Figure 6.2. Küçük Menderes Drainage Basin and its location in Turkey.

After a summary of the conceptual foundations for '**The Institutional Analysis and Development (IAD) Framework',** the current status of Küçük Menderes River Basin Catchment Area is introduced based on the different elements of the IAD. Then, application is exemplified by the analysis of the relationship between land use planning and water resources management in the case study area.

6.2. The Assessment of Institutional Arrangement: The Institutional Analysis and Development (IAD) Framework

The case study is applied the conceptual model of the IAD framework based on the definitions of the relationship between land use planning and water resources management and typology of rules. The IAD framework can be used to analyse sets of rules existing at different 'levels' as rules are typically nested within another set of rules (Smajgl, 2009, p. 20). "Three vertical levels of rules analysis, proposed by Ostrom et al.

(1994), are seen as cumulatively affecting the actions taken and outcomes obtained in any setting (seen Figure 6.3) (Larson 2006, p. 11). The levels of rule are:

- Operational rules: "Actions are taken or decisions about future actions are made by individuals operating at this level and are based on the set of institutional arrangements within which they operate" (Larson, 2006, p. 11).
- Collective-choice rules: This level determines what the basic operational rules are and in particular sets the rules about who is eligible to participate at the operational level (Smajgl, 2009, p. 20).
- Constitutional-choice rules: The rules of this level are "set to guide future collective-level decisions that will authorise future operational-level actions." (Larson, 2006, p. 11)

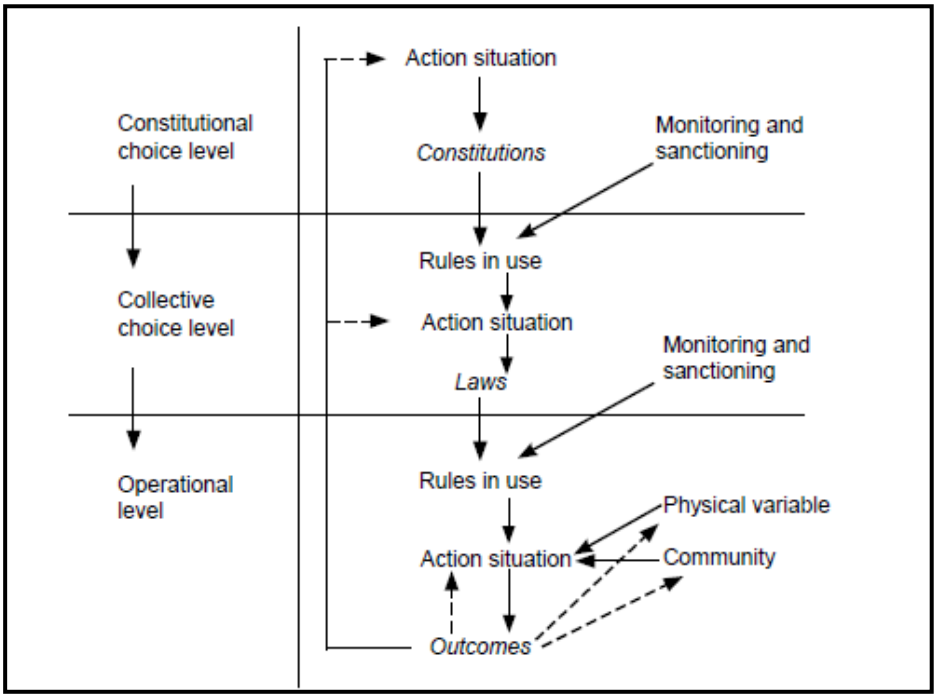


Figure 6.3. Levels of Rules and Linkages between Them
(Source: Ostrom et al., 1994, p. 47; Smajgl, 2009, p. 20).

In the Küçük Menderes Drainage Basin case study, the IAD framework was applied to the collective-choice level and the operational level, with some focus on the link between these two levels. The IAD framework very effectively allows a systematic analysis of institutional arrangements across basin and territory borders. This framework also provides a structured identification and classification of rules and of action arenas. The application of the IAD framework requires rich information on

physical conditions of the region, existing rules and other attributes of the communities (Ostrom, 1994, p. 2000).

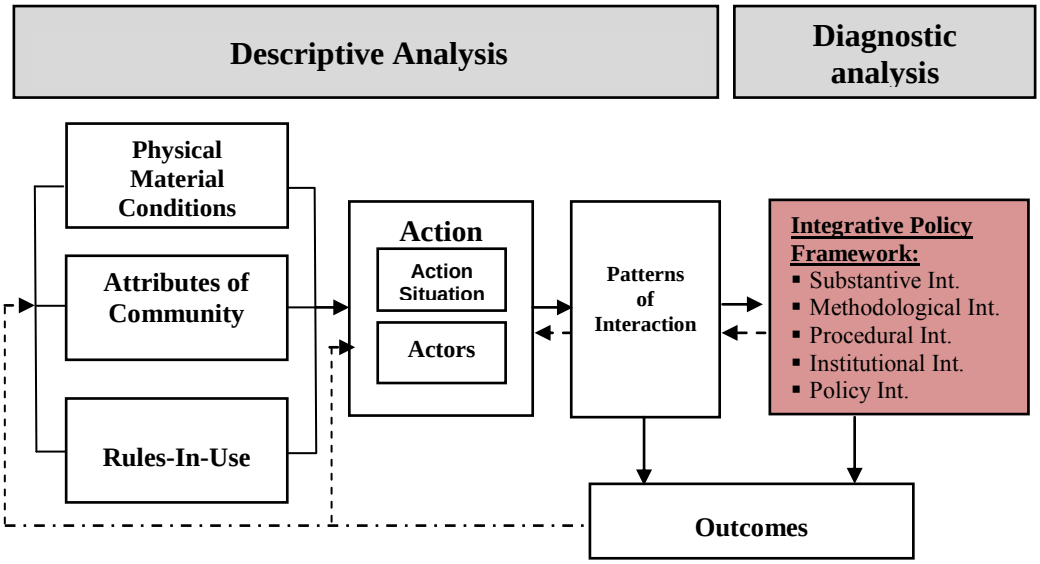


Figure 6.4. The Institutional Analysis and Development (IAD) Framework (Modified from Ostrom and others;1994).

The aim of the modified evaluation framework (Figure 6.4) is to assess the physical conditions of case environments, attributes of local and regional communities, and the rules in use (the formal and informal arrangements influencing behaviour), and impact of these variables patterns of resource use, conflicts and other outcomes. In order to provide information to identify and classify of rules and of action arenas, the status of relationship between land use planning and water resources management in the Küçük Menderes River catchment area will be evaluated based on the Integrative Policy Framework (IPF defined in Section 4.3). Additional information on stakeholders and current outcomes also were supported to be collated through desktop analysis and interviews.

Table 6.1. Methods used in the case study.

Dimension	Sub-type dimension	Data collection
Substantive	- The significance of water issues in land use planning - The integration of sustainable water resources management into land use planning	- Document analysis
Methodological	- Assessment approaches - Data portal and use of GIS for analysis	- Document analysis - Reports of stakeholder meeting
Process	- Informational requirements in plans' content - Collaborative planning process - Vertical and horizontal plan consistency - Consensus building	- Plan content analysis (Plan quality evaluation) - Semi-structured interviews with key informants - Outcome of stakeholder meeting
Institutional	- Leadership, representation - Interagency coordination and clear definition of roles and responsibilities - Human capacity	- Semi-structured interviews with key informants - Outcome of stakeholder meeting
Policy	- The integration of sector regulations - The integration of sector strategies	- Semi-structured interviews with key informants - Document analysis

The land use planning and water resources management integration in the Küçük Menderes River Drainage Basin, as shown in Figure 6.2, will be considered within the criteria of the integrative policy framework. In the first part of this section, the exogenous variables in the basin, action area and actors are examined. In the second part, it is attempted to describe the current status in the basin. The evaluation of the personal observations, surveys, printed and digital documents, plans and reports is eloborated in the following sections.

6.2.1. Exogenous Variables

Osrom et al. (1994) define the exogenous variables as key determinants of any action arena. Larson (2006, p. 8) defines exogenous variables that "might affect the structure of an action situation, that is the situation participants find themselves in the action arena".

The base characteristics of the exogenous variables in Küçük Menderes River Basin are summarised below. Section 6.2.1.1 presents an overview of the biophysical conditions in the plan area, followed by the characteristics of the community in Section 6.2.1.2 and a summary of the current "rules-in-use" in Section 6.2.1.3.

6.2.1.1. Biophysical Conditions

'Biophysical world' to which the action is related – for example, a fishery or a forest – is defined one of the critical variables that "affect the structure of the action situation, as does the specific nature of the resource" (Smajl, 2009, p. 17). The information on the basin has been taken under two topics: (1) existing water and wastewater infrastructure; (2) aquatic ecosystem condition.

- **Aquatic Ecosystem Condition**

The Küçük Menderes Basin has been exposed to a rapid industrial development in recent years as well having a high agricultural production potential. As a result of the interviews with the institutions and the analysis of their documents, it has been understood that the polluted river water causes negative effect on the ecological system in the basin. Besides, in these interviews, both the local administrations and the central organizations stated that the problems of the Küçük Menderes Basin in the last twenty years are the water pollution, insufficiency of the irrigation water supply and the low ground water (Table 6.2). Table 6.3 illustrates impact levels of the factors that cause environmental problems in the Küçük Menderes River Basin based on interviews with the local represantatives. Ödemiş Municipality representative stated that their current and most urgent problem is the garbage landfill area. During the works done in the area, black and bad smelling water has been determined in the Küçük Menderes River (see Figure 6.5). Even in some areas, near the Tire drainage discharge area, the bad smells are found to be more intense.

In a study conducted by DSİ (State Hydraulic Affairs) in 2000, irrigation water total pollution risk map during the pluvial period in the Küçük Menderes Basin. According to this pollution risk map, 4 contaminating activity areas are defined: 1) Beydağ, Kaymakçı and Kiraz municipality areas of pluvial period irrigation water region polluted contaminated by natural minerals; (2) The area between Ödemiş and Bayındır contaminated by agricultural activity; (3) Torbalı and Tire settlement areas contaminated by factory waste water and (4) Selçuk in the region with sea water entrance. When the irrigation water is examined in terms of total contamination index, as it can be seen from Figure 6.6, Selçuk and Tire central settlements and their vicinity

are the most polluted areas and they are in alarm status. Additionally, it is seen that the other pollution areas have similar values with these areas.

Table 6.2. Priority order of the environmental problems faced by the local administrations within their boundaries.

Environmental problems	Ödemiş	Kiraz	Beydağ	Tire	Bayındır	Torbalı	Selçuk
Water pollution		5	5	5	5[1]	5	5
Soil pollution					5		
Insufficiency in drinking water supply							
Insufficiency in irrigation water supply			5		5	5	
Low agricultural productivity					5	5	
Flood			3	3			
Low ground water		5	4	5	5	5	
Salinization		5		5			
Ecosystem deterioriations				5		5	5
Erosion							
Garbage landfill	1						

Table 6.3. Impact levels of the factors that cause environmental problems in the Küçük Menderes River Basin.

Causes	Ödemiş	Kiraz	Beydağ	Tire	Bayındır	Torbalı	Selçuk
Rapid population increase and lack of infrastructure						5	
Land use decisions and applications						3	
Agricultural activity based environmental pollution	5				5		
Industrial activity based environmental pollution						5	5
Untreated discharge of domestic industrial waste water	5		5	5	5	5	5
Lack of coordination between local administrations							
Lack of integrative water management plan for the basin			5	5		5	
Inability to clearly define the tasks and responsibilities for the protection of water resources in the basin			5		5		5
Whey based / urban dairy farming activity based		5	5	5	5	5	
Mining activity based pollution			3				

[11] Bayındır Municipality stated that the water pollution seen in their district is not caused by themselves.

.

Figure 6.5. Küçük Menderes in Tire-Mahmutlar village (b) Küçük Menderes in Selçuk Belevi.

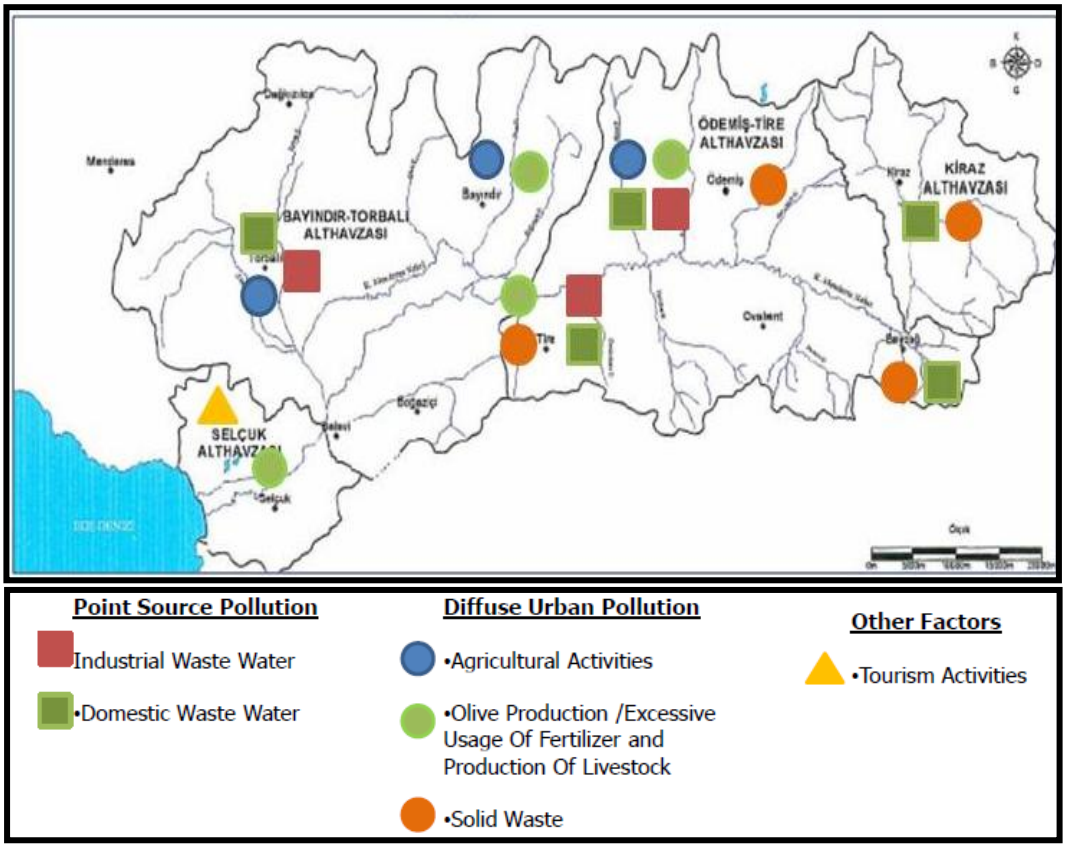


Figure 6.6. Pollution risk map in the Küçük Menderes Basin during the pluvial period (Source: TÜBİTAK MAM, 2010).

When we study the main reasons causing environmental problems in the Menderes River Basin, we see that these reasons are: the infrastructure problems of the settlement areas in the basin and consequently the mixing of the domestic and industrial

waste water to the river, wrong and insensible use of the chemical fertilizers and pesticides in the agricultural fields in the basin and the heavy dairy farming activities.

- **Existing water and wastewater infrastructure**

Data obtained from interviews in the field on the existing water and waste water infrastructure in the basin has been evaluated. It is determined that in the basin settlements, the existing drinking water is supplied from the wells opened from the branches of Menderes far from its main arterial stream. Especially, the districts of Tire and Bayındır stated that their water source has the quality of spring water and that the tap water is used as drinking water. It is stated that the water supply problem in this area is mainly in the agricultural irrigation area. It is also stated that for the last thirty years, there have been low groundwater levels, that the irrigation was mainly made from the ground water system through wells during drought periods and that this caused significant reductions in the ground water table.

There are 7 dam projects in the region and only one of these dams, Beydağ Dam, is still in operation in 2009 (Figure 6.7). When we look from the view point of resource protection and management, the Beydağ Dam realized for this basin is a very late regional investment decision for this basin. Küçük Menderes Basin, as stated before, is a very fertile basin which lives on agriculture and livestock farming. It has been understood from the statements made during the interviews that there are around 20000 wells in the basin (Figure 6.8) – 11600 licensed and 80000 unlicensed – and investments made so far in the region where the ground water is mainly used for agricultural purpose have been insufficient to meet the agricultural irrigation requirement in particular. In addition to this, Beydağ local administration representative stated that the tender for the necessary irrigation channels in parallel to the Beydağ invesment was carried out after the dam was completed (May, 2008). Besides, he added that this was not a correct planning approach in terms of timing and that there were problems in the basin for transferring the financing in the basin at the rights times to the necessary areas.

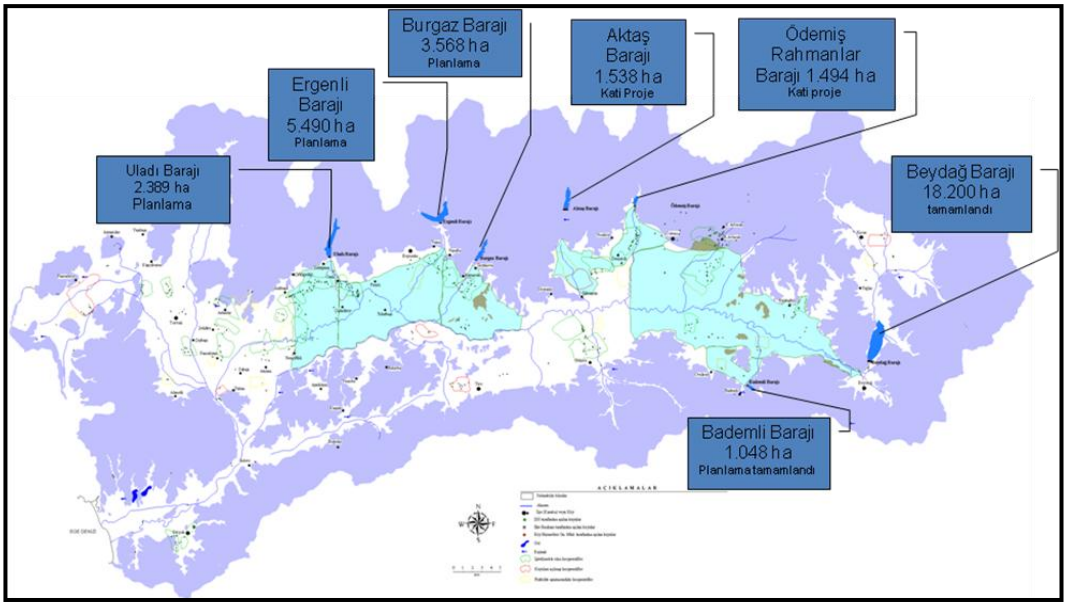


Figure 6.7. Surface water storage facilities in the basin, planned by DSİ, with final project done and now at the implementation stage (Source: DSİ, 2000).

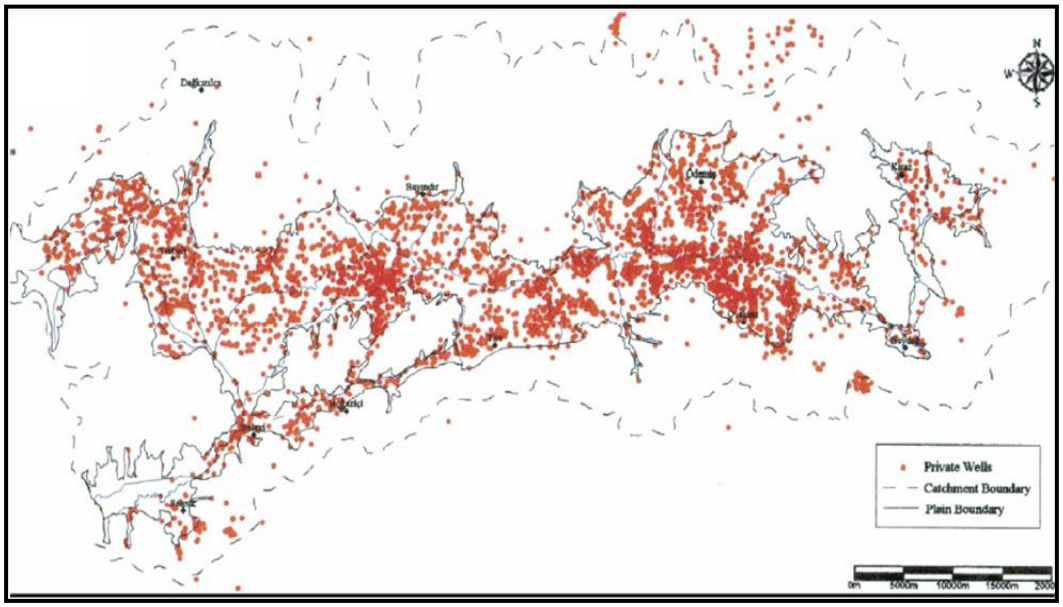


Figure 6.8. General Distribution of the Wells Opened by Individuals in the Districts around the Küçük Menderes River (Source: Paper by DSİ İzmir Regional Directorate in November 2009).

When we look at the financial capacities and facilities of the local municipalities in the protection of ground and surface resources, we see that there is no pleasing picture in addition to the different problems experienced in the basin. One of the most important inputs of the water resources management is not polluting the water resources, in other words, treatment of the drainage systems and industrial wastes of the settlements. In short, the existence and operation of treatment plants take an important

part in the protection and management of the water resources. The current status in the Küçük Menderes River in terms of the infrastructure facilities for the protection of environmen in the basin as of 2010 is indicated in Table 6.4. The pollution experienced in the region, as shown in Table 6.4, is that there are settlements in the basin which need to be treated, that the existing plants are not used because they cannot afford the electricity and diesel fuel expenses, that even the industrial and drainage wastes are discharged to the Küçük Menderes River and its branches without treatment. From the statements made, it is understood that these problems are caused by financial limitations as well as insensibility. For instance, the Ödemiş representative said that as the District Governorship, they constructed drainage and treatment facility in 5 villages near Hamamköy and they provided a solution to the problem of operating the treatment facilities in the villages by funding 80% of the electricity expenses. Besides he added that the town municipalities couldn't allocate any share to the environmental management.

Table 6.4. Condition of the existing infrastructure facilities in the Basin as of 2010.

Existing infrastructure investments	**Ödemiş**	**Kiraz**	**Beydağ**	**Tire**	**Bayındır**	**Torbalı**	**Selçuk**
Treatment plant	**Ç**	**İ**	**H**	**Ç**	**İ**	**İ**	**İ**[2]
Garbage landfill area	**Ç /acil**	**V**	**V**	**Ç**	**H**	**H**	**İ**
Rain water collection sys.	**Ç**	**Ç**	**H**	**İ**	**İ**	**Ç**	**İ**
Organic agriculture works	**İ**	**H**	**H**	**H**	**Y**	**H**	**H**
Biogas system	**Ç**	**H**	**H**	**H**	**H**	**H**	**H**

Ç: None but there are works to construct it; İ: functional / available; Y: Functional, but insufficient; H: no work or operation. V: None, there is uncontrolled damping.

On the other hand, three municipalities within the boundary of the İzmir Metropolitan Municipality (Bayındır, Torbalı, Selçuk) stated that they couldn't make special allocations for these works as their annual revenues are transferred to İzmir Metropolitan Municipality. Besides, İZSU representatives stated that they realized the necessary projects and investments for these setllements. The question "Did you make any funding request from the national or international organizations for realizing your projects with respect to water resources? If yes, did you have any return to your applications" was generally answered with a negative reply. In local administrations,

[2] In the interview made at the Selçuk Municipality, information was given on the fact that the system existing within the service area of the municipality was the first and only system in Turkey. It was mentioned that there were two sediment tanks and one reserv area in the south of the Küçük Menderes River.

Ödemiş Municipality and Selçuk Municipality stated that they applied to this kind of loans. For instance they stated that they beneffited in 2006 from the loan aimed for the infrastructure investments of the municipalities through the Bank of Provinces within the scope of the World Bank Municipality Services Project and they were constructing the waste water and drinking water treatment facilities. In conclusion, we see that the external finance resources are not sufficiently used in the basin.

Moreover, many municipalities stated that they applied to the Agricultural and Rural Development, Tourism and Environmental Financial Assistance Programs carried out by the İzmir Development Agency (İZKA) under its Financial Assistance Programs for 2009. The municipalities also underlined that the condition that the local administrations should not be in debt to be eligible for the İZKA project made it difficult for them to find a solution. The projects added to the assistance program in the basin are given in Table 6.5.

Tablo 6.5. Projects receiving financial asistance from the Tourisim and environment financial assitance program of the İzmir Development Agency

Organizations / Applicant	**Project Title**
Union for Service Providing to the Villages of the Beydağ District	Beydağ District Alakeçili Village Sewage System Project
Izsu General Directorate	İzmir Province Bayındır District Kızılcaağaç Village 31'ler quarter, Sewage System and Cesspool Construction
Ödemiş Municipality	Biogas Plant for Waste Water Treatment Plant Mud
Kiraz District Governorship Union for Service Providing to the Villages	Yenişehir Village Natural Treatment Plant Project
Kiraz Municipality	The Project of "Let birds fly, don't let fishes die and don't let children without water

The fact that there are different organizations authorized with different powers on the water management in the basin causes differences in the sharing and direction of the financing. The fact that the first dam was built in Küçük Menderes Basin in 2008 and that the waste water management cannot be applied means that no sufficient resource is allocated for the Küçük Menderes Basin. When we look at the issue from the viewpoint of local administrations, we observe that they allocated very rarely their own resources for the construction of the infrastructure facilities. The concerned administrations usually prefer to explain the lack or the deficiencies of the infrastructure facilities with the excuse that the resources are not sufficient and to accept this as the destiny of that region.

6.2.1.2. Attributes of Community

Within the IAD framework, this section presents the key characteristics of the communities of the Küçük Menderes watershed area. Seven local governments are responsible for administering this water planning area. The 2009 population of the case study area was 465.173, shown in the Table 6.6. Of this, more than 164000 (35 percent) lived in rural administrative units. The regional economy of the case area is based largely on agriculture and intensive livestock operations, with tourism. Agricultural activities constitute a significant part in the economy of the basin.

Table. 6.6. The total population in the river basin (2009 census result) (Source: TUİK, 2009).

Municipality	Urban	Rural	Total
Tire	50900	27276	78176
Bayındır	21407	19837	41244
Ödemiş	73310	55900	129210
Beydağ	5710	7337	13047
Kiraz	8469	35967	44436
Torbalı	113211	11370	124581
Selçuk	27801	6678	34479
Total	300808	164365	465173

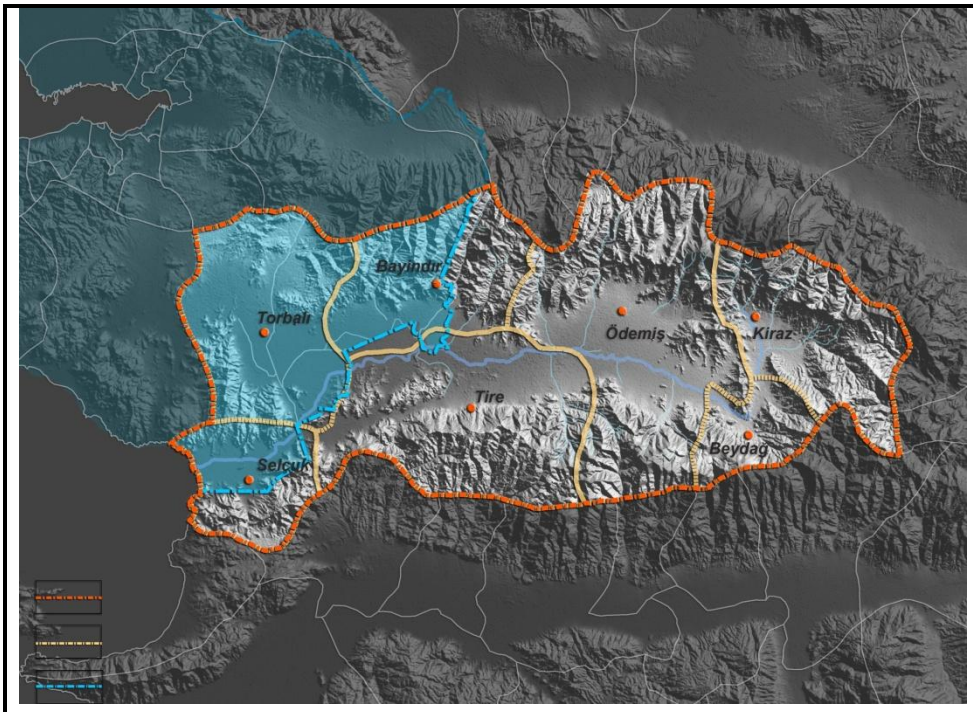
Although Küçük Menderes catchment is large in geographic terms, they are relatively small in terms of human capacity, number of potentially affected people and number of participants. Some of the community attributes of Küçük Menderes, such as low population density and dominance of the agricultural land use.

6.2.1.3. Rules–in-Use

There are lots of public establishments which carry out the practices of water management and physical planning in the Küçük Menderes watershed as it is in Turkey. Roles and responsibilities of these establishments are generally specified in their Organizational Laws. However, some arrangements such as closing some establishments and tying local establishments to Special Provincial Administration with the public administration reform proposal studies. Public Works and Settlement Provincial Directorates' roles have been taken away with law. As Special Provincial Administration representatives (planners) state, "Provincial Directorate of Agriculture

was closed with the Law No. 5302 and Head of Agriculture Department was established within the body of Special Provincial Administration. At present, while Provincial Directorate of Agriculture continues its works, Head of Agriculture Department also performs its work within the body of Special Provincial Administration. The budget for agriculture is shared between these two units half and half. There has not been any amendment, arrangement or updating within the organization laws of other present establishments which share same roles and responsibilities. This situation is one of the examples showing that different establishments possess similar and overlapping roles within the watershed.

Table 6.7.Existing rules in use and responsibilities in Küçük Menderes Drainage Basin.



Settlements within the İzmir Metropolitan Municipality (Torbalı, Bayındır and Selçuk)	**Settlements outside the İzmir Metropolitan Municipality (Tire, Ödemiş, Kiraz and Beydağ)**
Rules in use: ▪ Metropolitan Municipality Law No. 5216 ▪ İZSU Water Protection Regulation	**Rules in use:** ▪ Municipality Law No. 5393 ▪ Regulation on Water Pollution Protection
Responsible: İZSU	**Responsible:** Directorate of Technical Works in Kiraz and Beydağ district municipalities/

In another situation, as a result of the approval of Metropolitan Municipality Law No. 5216 after 2004, venue of İBŞB İZSU General Directorate extended; while only urban water supply and wastewater issues were dealt with before, in the current

situation the necessity of dealing with agricultural irrigation issues has been understood due to the characteristic of the area. Table 6.7 shows the the formal rules in case study area.

6.2.2. Action Arena

This section presents the following building blocks of the Institutional Analysis and Development (IAD) framework, as they apply to the Küçük Menderes River Catchment area water and land use planning processes: Participants and Action situation.

- ***Participants:*** The responsibilities in relation to implementation of water supply, sewerage (wastewater / storm water) and wastewater treatment / disposal services in the Küçük Menderes Basin are presented in the Section 6.2.4.4.
- ***Action situation:*** The both process (water planning and land use planning) described in this study is an "action situation". "Action situations are typically integrated within a wider set of rules and action situations" (Larson, 2006; 25). In the case of Küçük Menderes planning processes, collective-choice level rules are:
  - Küçük Menderes Watershed Protection Action Plan (TÜBİTAK MAM, 2010)
  - Manisa-Kütahya-İzmir Region 1/100000 scale Environmental Development Plan (2010)
  - 1/25.000 scale İzmir Metropolitan Municipality Urban Region Development Plan (İKBNİP) (2009)

The collective-choice level rules, such as the Environmental Development Plan and the 1/25.000 scale İzmir Metropolitan Municipality Urban Regional Land Use Plan, are modified in the last two years.

6.2.3. Evaluative Framework

The information obtained in accordance with legal regulations and the literature of different countries, how it should be an emphasis on integration, sub-components of the categories were enlarged on this framework in the light of the findings detailed in the following sub-sections.

6.2.3.1. Substantive Integration

As stated in section 4.3, it is necessary to associate the two information areas by the interdisciplinary thematic approach and to integrate to a general theme. The main theme of the relation between the land use planning and water resources management is to define the water related subjects based on the decisive strength of planning and to integrate the water resources management to land use planning. In this section, in terms of substantive integration it is attempted to put forward these thematic approaches in the strategy, policy, objectives and plans produced with respect to the Küçük Menderes Basin.

As stated in section 5, there is no future oriented spatial strategy of our country that is associated with the development plans. The 2009-2013 İzmir Regional Development Plan (İZBGP), Küçük Menderes Watershed Protection Action Plan (TÜBİTAK MAM), 1/25.000 scale İzmir Metropolitan Municipality Urban Region Development Plan (İKBNİP) (2009) which are prepared within the framework of the Ninth Development Plan (2009-2013) and the Long Term Strategy (2001-2023), have been studied with respect to the above mentioned thematic approaches.

The basic policy document which addresses in an integrative approach to the development strategy to be realized by İzmir in the economic, social and cultural areas and which reveals the thematic and sectoral development axes, objectives and priorities is the 2009-2013 İzmir Regional Development Plan (İzmir Bölgesel Gelişme Planı - İZBGP). The main framework of this plan has been determined along the axis of sustainable environmental development based on the goal of *protecting the environment and improving the environmental quality while the economic activities* continue the strategic priority of **Provision of Sustainable Water and Waste Water Management in Basin Areas, Regions with Tourism Values and Rural Areas** has been determined

as Within the framework of the objective for providing the pollution control and basin management in the water basins determined in accordance with this strategic priority, the pollution problems experience in the Küçük Menderes Basin and the solution proposals are discussed. In addition to the treatment of domestic wastewater, technical and financial support to allow the application of the environmental management systems towards the industrial and agricultural activities in particular will be provided. However, apart from this declaration, it is seen that there is no thematic approach or discourse for the objective of the study.

Küçük Menderes Watershed Protection Action Plan (TÜBİTAK MAM, 2010) includes the works to calculate the pollution load caused by the land use in the settlements around the Küçük Menderes River. The fact that this action plan examines the pollution load in the basin by taking into consideration the existing land uses can be regarded as a positive feature. However, the action plan doesn't include any proposal or emphasis on the importance of these two disciplines.

The water resources and hydrological structure have been addressed in the 1/25.000 scale İzmir Metropolitan Municipality Urban Region Development Plan (İKBNİP) (2009) and Manisa-Kütahya-İzmir Region 1/100000 scale Environmental Development Plan. However, while the water resources are not accepted as a critical factor in land use planning, these include provisions on environmental problems. In the strategies of these plans, although the realization of the water resources for a sustainable environment is proposed, there is no thematic statement on the integration of two disciplines.

Effective continuation of the practices on the integration of land use planning and water resources is closely related with the basic planning and application approaches. When we look at the terms used in the content of the physical plans produced; it is seen that the concept of water resources pollution is frequently used. In the implementation provisions of the Manisa-Kütahya-İzmir Region 1/100000 scale Environmental Development Plan the definitions of the terms wetlands, wetland protection regions, drinking and utility water protection zones, ecological impact region and buffer zone are included. However, among these terms, there are no definitions and usages with respect to the recently developed concepts (water sensitive urban development) and application techniques (low impact development programs etc) for the sake of reducing these negative impacts.

6.2.4.3. Methodological Integration

Two headings under the section 4.3 evaluate in what extent the works done or being done in the Küçük Menderes Basin meets the requirements of the methodological integration:

- **The Integration of Assessment Approaches**

It is seen throughout the basin that the environmental and strategic impact assessments of the regional planning works on the water resources have not been carried out. The meetings revealed that there was no study on this matter during the construction and implementation stages of local plans.

- **The Integration of the Different Applications, and Experiences with the Use of Particular Tools**

In the studies conducted in the Küçük Menderes River (Watershed Protection Action Plan, Manisa-Kütahya-İzmir Region 1/100000 scale Environmental Development Plan and 1/25.000 scale İzmir Metropolitan Municipality Urban Regional Land Use Plan), it is seen that the geographical information systems are effectively used. Especially, in the Küçük Menderes Watershed Protection Action Plan work, within the scope of the water resources quality classification works, the surface water quality maps according to the classes determined on the basis of the Water Pollution Control Regulation quality criteria were created in GIS environment. This study included all kinds of calculations and inquiries on the basis of the available data and produced information and maps which can be a base for the planning activities. Similarly, data have been organized and plans have been produced in the Manisa-Kütahya-İzmir Region 1/100000 scale Environmental Development Plan and 1/25.000 scale İzmir Metropolitan Municipality Urban Region Development Plan by using the geographical information systems.

However the expectation in these criteria is to carry out the analysis of the spatial impact of the land use decisions on the water resources. The works on the basin so far indicated that the ability of the Geographical Information System to make analysis and to create alternatives has not been effectively used in determining the development areas and in providing environment sensitive urban development. It is seen

that the usage space of the GISs in the works have been within the framework of the collection and organization of data.

Spatial impact analysis takes an important place in the process of land use planning. This evaluation plays an important role in the stages of determining alternative land use forms and water supply and treatment for these forms, determining the land use decisions for keeping the pollution loads within certain standards. Therefore, land assessment is related to the existing performance of the land in terms of water resources and it is expected that it will take into account the changes in the land use around water resources and its environmental impacts. In this matter, GIS are important to enable the fast and correct analysis of the basin data. Therefore, it is seen that in the current plans, the analysis and research techniques to put forward the present and future impacts of the alternative land use policies on water resource use are not used within the scope of GIS. Besides the works completed didn't benefit from the potential of GIS with respect to the evaluation of the environmental effects of these plans, calculation of the permeability surfaces and the impact of the proposed pollution loads to the land use planning decisions, as understood from the meetings made with the experts and from the plans produced as a result of the evaluation of the data collected from the basin.

6.2.3.3. Procedural Integration

As stated in section 4.3, within this integration category, the followings are the summary of findings from the evaluation of the extent where the relation of land use planning and water resources is internalized by the plans produced in the Küçük Menderes Basin and whether there are common planning activities during the works conducted if yes, in what level.

- **The Integration of Informational Requirements of Water Management in Land Use Decision Making**

Within this scope, the evaluation of the plans in the regional-local physical planning stage is aimed. As mention in Section 5, in our country, there is no spatial strategy plan type at the country level. Therefore, like the other basins, we see that there is no planning approach developed at the country level for the Küçük Menderes basin.

Under this component, the qualities of the plans existing in the basin have been evaluated in terms of the relation between the land use planning and water resources. Protocols have been prepared and evaluated for carrying out the content analysis of the Manisa-Kütahya-İzmir Region 1/100000 scale Environmental Development Plan and 1/25.000 scale İzmir Metropolitan Municipality Urban Region Development Plan (İKBNİP). The general evaluation of these plans based on the guiding principles defined in Section 4.3.3.1 is summarized below:

- **Assess the Plan Quality of Regional Development Plans**

Based on the study of Rodriquez etal (2004), the method developed for the plan evaluation has been used and these two plans available in the basin have been evaluated in this respect. The followings are the general results of the content analysis of these plans conducted in line with the works performed in the Küçük Menderes Basin and the produced decisions:

- **Manisa-Kütahya-İzmir Region 1/100000 scale Environmental DevelopmentPlan**

The findings on the Küçük Menderes Basin in the Manisa-Kütahya-İzmir Region 1/100000 scale Environmental Development Plan are generally listed below:

- A misunderstanding on the Küçük Menderes Basin is caused in the sub regions of planning by the fact that the name of the Torbalı district is not mentioned in the Küçük Menderes Sub-Region or program area definitions and in all definitions in the report.
- In the **data collection stage**, which is the first step of the planning process, data to guide the planning over the current condition of the water resources should be obtained. Within the borders of the Manisa-Kütahya-İzmir Region Environmental Development Plan, the stream structure, lakes, artificial lakes, dams, irrigation projects, surface and under ground water resources with respect to the hydrological structure of the region have been addressed and detailed information has been provided. However, the report doesn't include any information on the water usage ratios, current and proposed water consumption requirements, flood areas and protection regions. In the decision making stage, the lack this date to form a base to these plans may be shown as one of the

reasons why the relation between the land use planning and water resources management couldn't be sufficiently established.

- It is seen that like in all planning zones, the planning decisions in the Küçük Menderes Basin didn't take into account the carrying capacity and adequacy of the water resources. It is also determined that the data on the hydrological structure of the basin was not taken into consideration during the decision making. Table 6.8 includes the district based information on the ground water condition of the İzmir province under the "Analysis" heading of the plan report.

Table 6.8. Ground Water Reserve in the Küçük Menderes Basin (Source: Manisa-Kütahya-İzmir Region 1/100000 scale Environmental Development Plan; 2010, p. 154).

Districts	Safe reserve (hm3/a)	Drill depth (m)	Static level (m)	Output (lt/sec)
Bayındır	22	50-200	25	10-60
Beydağ	2	50-100	15	5-60
Kiraz	6	100-150	10	5-20
Ödemiş	22	100-150	5-50	5-60
Selçuk	4	100-150	5-15	5-25
Tire	22	50-200	5-45	5-35
Torbalı	22	100-150	10-30	5-25

It is felt that there is a lack of the works for the interpretation of this information, reflecting to the land use decisions and evaluating the current problems in the field. The ground water consumption in the basin takes place in two ways: ground water consumption for the drinking, utility and industrial activities as well as the ground water consumed for agricultural irrigation. As a result of the rapid increase in the numbers of the licensed and unlicensed wells in the basin, the output of the ground water reserves was reduced as indicated by TÜBİTAK MAM (2010). Besides, it is remarkable that the safe ground water reserves in the basin settlements, especially Selçuk, Beydağ and Kiraz districts, are below $6hm^3/a$. The experts and local representatives contacted indicated that the reason of the salinization of the ground waters in the basin was the fact that the draft water was more than the reserve capacity. The main subject that needs to be focused on in the Küçük Menderes Basin is the ground water consumption for agricultural purpose (TÜBİTAK MAM, 2010, p. 139). Especially, during the interviews in the field, it was mentioned that the water levels of 7 districts were below the drill depths determined in Table 6.8 and even most of them could reach water in 200 meters and they had problems in agricultural irrigation in particular.

It is expect that these values will be interpreted and reflected to the alternative plan scenarios and land use plans. It is seen that there is no consistency between the population assumptions stated in Table 6.9 for the 2025 plan target year of the Küçük Menderes Basin and the water capacity and current condition. Especially the assumption of the development areas as many as or more than the settlements like Kiraz, Beydağ, Tire etc. shows that the supply and carrying capacity of the water resources are not taken into consideration. Besides, the interviews and studies conducted in the field indicated that the treatment facility was insufficient or couldn't be fully operational as a result of the mixing of the animal husbandry activities in the central settlement of the Kiraz district to its drainage system. Therefore, Beydağ Dam, the only dam of the basin was polluted. Besides, it has been also determined that the Kiraz Municipality was constantly fined as the pollution caused by the animal husbandry activities in the city could not be treated as it exceeded the capacity of the treatment facility of the municipality and caused the dam to be polluted. The employees of the Kiraz Municipality said that they couldn't stop the animal husbandry activities in the city and were incapable to control it.

Table 6.9. Estimates of the Settlements within the Küçük Menderes Basin for 2025 (Source: Manisa-Kütahya-İzmir Region 1/100000 scale Environmental Development Plan; 2010).

Districts	Population (2025)	Settled area (ha)	Gross intensity Person/ha	Development area (ha)	Total area (ha)
Settlements within the İzmir Metropolitan Municipality					
Torbalı	90.000	734	85	390	1124
Bayındır	25.000	224	75	97	327
Selçuk	43000	223	90	151	374
Settlements outside the İzmir Metropolitan Municipality					
Ödemiş	93.000	713	90	783	1496
Tire	67.000	444	90	504	948
Kiraz	16000	131	70	171	302
Beydağı	7500	97	60	87	184

While the central area of the Kiraz settlements was 131 hectares, the total area suggested is 302 hectares and this indicates that the problems in the field are not sufficiently determined and taken into account in the works for the Manisa-Kütahya-İzmir Region 1/100000 scale Environmental Development Plan. As seen in Figure 6.9, proposing a development area in the branches feeding the Beydağ Dam which covers the agricultural irrigation requirement of the Küçük Menderes Basin in an amount

which is twice as big as the current settlement means that this pollution cannot be prevented and the pollution load of all basin together with the irrigation water will be doubled. This and similar implementation decisions imply that the concerned plan includes decisions which are against the elimination of the existing pollution in the receiving environments (water, soil and air), development of the decisions to prevent new pollutions and the goals for keeping the protection-usage balance.

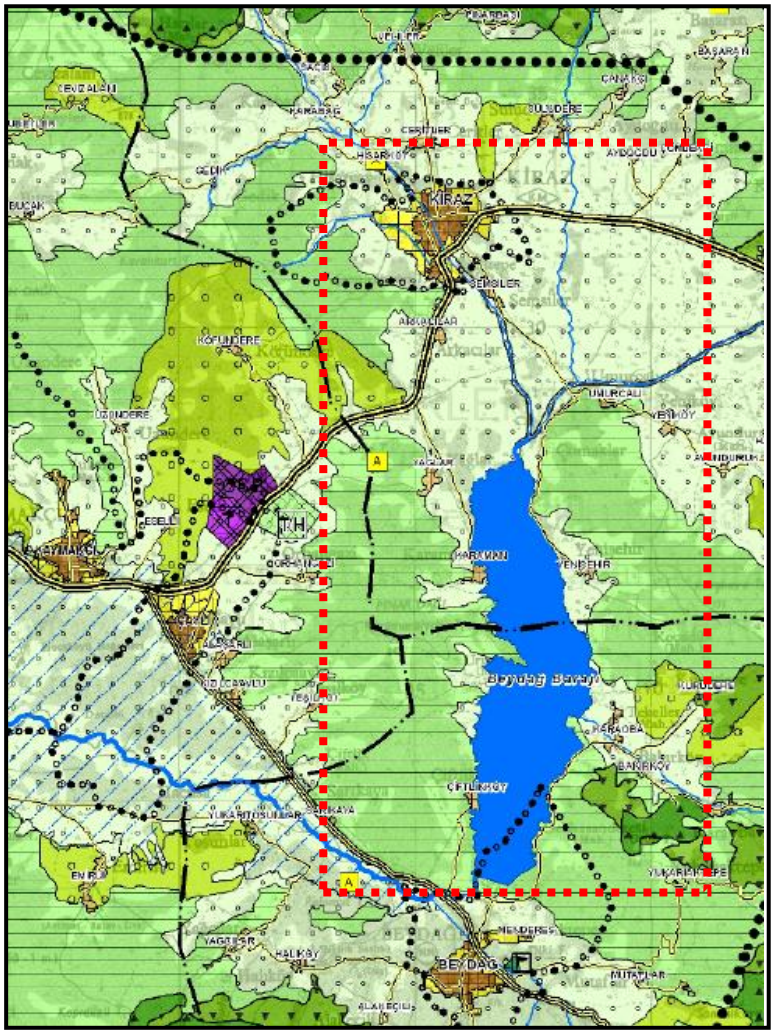


Figure 6.9. Manisa-Kütahya-İzmir Region 1/100000 scale Environmental Development Plan - Kiraz Settlement and Beydağ Dam

Based on the sample given above, another deficiency determined in the plan report is the fact that the problems and pollution resources in the water resources in the basin are not described. No information was found on the point and spread sources and their aggregate - the nutrient loads (nitrogen and phosphor). There is no statement that the population estimates and the calculation of the pollution loads arising from the settlement areas are taken into consideration and evaluated in the plan decisions.

In addition, the plan report does not include the implementation decisions and standards determined for reducing the effects of the spread loads caused by the land use (forest, meadow, urban and rural area surface flow waters) which are important in the water resources management and land use planning. Also in addition to that, the planning report on the pollution areas in the basin does not include sufficient examination of the field specific interventions, uses limited application tools required by the plan scale and has superficial plan application provisions. As a result, the pollution areas of the Küçük Menderes River, which is the main stream within the Küçük Menderes Basin, pollution levels and the measures to be taken in these areas are not stated in the plan. Besides, as to the rain water and flood management, there are no field specific findings and implementation based proposals.

Within the plan implementation provisions, it is said with respect to the **Wetlands** included in the Küçük Menderes Planning Sub Region that "the Planning Sub Region Plan will include the protection zone borders to be determined in line with the "Wetlands Protection Regulation" and the provisions about the measures to be taken for the Küçük Menderes Delta and the Belevi Lake". However the measures are not clear in this provision and the field specific conditions are uncertain.

- **1/25.000 scale İzmir Metropolitan Municipality Urban Region Development Plan (İKBNİP)**

The review results of the Küçük Menderes Basin of the İzmir Metropolitan Municipality Urban Region Development Plan (İKBNİP) report are summarized below serving the purpose of this study:

- In the spatial structure building of the urban zone create by the İzmir Metropolitan and its vicinity; there is no spatial integrity principle in determining the borders of the planning sub regions. The settlements in the Sub-regions of Küçük Menderes have been dealt with in different regions and decisions have been produced.
  - South Urban Sub-development Region: Major part of the Torbalı district and Bayındır district
  - West Urban Sub-development Region: Selçuk district

  The natural basin border of the Küçük Menderes Basin within the İzmir Metropolitan Municipality and the İKBNİP planning sub-region borders do not match. In other words, when considered that the water basins are decisive, the

fact that the sub basin area within the borders of the İzmir Metropolitan Municipality are dealt with in different regions indicates that no rational solutions are produced in compliance with the principle, policy and values for the protection of the water resources at the decision making stage.

- In the İKBNİP plan report, there are no data to guide the planning on the existing water resources in the area, water usage status, pollution areas and indicators and treatment facility capacities, and there is no sufficient base to produce detailed data.
- In the literature work, it is stated that planning input should be created by taking into consideration the socio-economic and physical structure in the basin, the effects of the urban development on the water resources usage supply and environment in order to remove the uncertainty in defining the relation between the land use planning and water resources. İKBNİP plan report states that the input of the plan is the water resources protection areas and flood areas based on the İZSU and DSİ data. However, it is determined that the indicators like the current water usage ratios in the basin, daily water consumption per person and the evaluation of this consumption in accordance with the projected population with respect to the existing water resources capacity are not discussed in the plan preparation stage. The uncertainties on the plan and proposals produced because of this kind of findings remain in the İKBNİP plan. The goals in the İKBNİP plan report on this subject are:

  - Protection of the agricultural lands, forest lands, maquis shrubland, meadow areas and all environmental values; ensuring the continuity of the ecological balance and transfer of these resources to the future generations,
  - Eliminating the pollution existing in receiving environments (water, soil and air) and developing new decisions to prevent the creation of new pollutions.

  With respect to protecting and supporting the agricultural fields and preventing the pollution in receiver environments and under the light of evaluating the existing data; it is important that the socio economic and physical structure should be correctly diagnosed and the field specific implementation decisions and tools should be proposed. With respect to the fact-finding and proposals, upon the evaluation of the İKBNİP plan, it is seen that the plan language and content is insufficient for the protection of water resources. It is also seen that no systematic approach is adopted for determining the current status of pollution sources whether or not point based. The plan doesn't include field specific

evaluations and subjects like determining pollution areas in terms water pollution, defining the pollution loads in accordance with the land use types, determining the plan decisions to keep these pollution loads within certain standards in the development areas; evaluation the water consumption and supply in the rain water and flood protection areas.

- Besides, the İKBNİP plan report argues that "the negative effects of the environmental pollution on agriculture and animal husbandry are increasing every day". The condition is reverse of this statement here. The excessive usage of fertilizer and pesticide in the field caused by the disorganized agriculture and animal husbandry activity and their discharges has negative effects on the water resources. In addition to domestic waste water, the fact that the agriculture and animal husbandry are the dominant sectors in the basin causes the increase of the ground water nutrient loads (nitrogen and phosphor) and excessive pollution in the surface and ground waters.
- Torbalı Solid Waste Disposal Plant, which was determined in the 1/25.000 scale İzmir Metropolitan Municipality Urban Region Development Plan but had changes in the place and size within the scope of the new evaluations and studies, was entered into the plan as 121 ha in the north of the Taşkesik Village of the Torbalı District. Proposing a plant to store the waste of a metropolitan city in Torbalı which has rich ground water reserves is not a positive approach as it will cause the increase of the environmental problems of the basin.
- In the implementation provisions of the concerned plan, it is stated that the measures on the protection of the ground water resources which do and will supply drinking and utility waters will be taken by the General Directorate of İZSU and General Directorate of DSİ, the 1/1000 scale local development plans to be prepared in the urban residential areas within the absolute stream protection areas should be approved upon technical affirmative opinion of the İZSU General Directorate. This is positive viewing the fact that it will guide applicators and determine the roles of the water related organizations. Besides, the report doesn't include a statement on the 150 meter stream absolute protection distance as determined by the İZSU Basin Protection Regulation.

- **The Integration of Procedural Requirements of Water Management in Land Use Decision Making**

The planning process should an effective and efficient process and its management approaches should be coordinated. Information sharing and the integration of information to correct planning process are important for the success of the water resources management and land use plan integration. It has been attempted to explain the existing organizational structure in the basin and the way followed in the creation process of the plan decisions applied in recent years within the current planning practice and process which functions within this structure. In order to ensure consistency in the plan decisions applied as a result of the information sharing in the data collection, analysis and planning stages of the organizations of the two sectors, prevention of the independent planning approach is important for minimizing the negative impacts of the environmental problems and ensuring the consistency of the long term goals in particular.

The question "How was the data on the Küçük Menderes River Basin obtained?" was asked to the analysis group working in the Küçük Menderes Basin. 80 % said that it was obtained from written resources and 20 % said from the interviews with the organizations. The other choices to this question, that are the local information through public meetings and process based monitoring, are not mentioned.

The question "which organizations did you meet at which stages regarding the water resources management and planning in the Küçük Menderes Basin throughout your planning works?" was asked to the planners as an indicator of the coordination between sectors. The answers to this question are given in Table 6.10

Table 6.10. Stages where the planners contacted other organizations

	Organizations	**Data collection and analysis**	**Plan making**	**Approval**
Province Special Administration	DSİ		√	
	Ministry of Environment and Forestry			
	İZSU			
	İBŞB			
İBŞB	DSİ	√		
	Ministry of Environment and Forestry			
	İZSU	√	√	√
	İBŞB			
Free planners	DSİ			
	Min. of Environ. and Forestry			
	İZSU			
	İBŞB			

As it can be understood from Table 6.10, the planners said that they only met İZSU and DSİ during their works. Besides one of the frequent answers by the planners is that they had difficulty in reaching the works of the İzmir Environment and Forestry Provincial Directorate or they couldn't reach at all. Therefore, the fact that the answers in Table 6.10 didn't include the Environment and Forestry Provincial Directorate which is the representative of the central administration with respect to water resources and planning in the basin is another important finding on the lack of communication and coordination among the sectors. In this matter, the expert representative included in the İKBNİP team stated that they had an inclusive working process in the 1/25.000 scale İzmir Metropolitan Municipality Urban Region Development Plan works, that the organizations with hierarchical structure didn't make any criticism but more flexible organizations like İZSU expressed their views and opinions with more clear statements. He also added that the sanctions of the political structure on the plans were not adopted.

The views and expressions of the organizations on the "process" have been considered in the data collection, analysis and planning stages as summarized below:

- **Data Collection – Analysis Stage:** In the data collection and analysis stage, the urban water plans or relevant decisions created by the concerned water administration (carriying capacity of the water resources, population – water supply projections, water potential of the settlements and proposed projects) need to be transferred to the land use plans in the most updated ways. Within the framework of the evaluation of this integration, the interviews with the relevant organizations and persons revealed the data they used in the data collection analysis stage and their experience and views for the information sharing.

The first step of the works conducted on the protection and improvement of environment in basins should be the fact- finding works in the region. This fact- finding works require the determination of the changes in land use, determination of the pollution resources, monitoring the water resources, association and evaluation of the deterioration in the structure of the region with the socio-economic structure. The answers to the question "which analyses did you make on the water resources and problems for determining the fact- finding in the basin in your planning works?" are given in Table 6.11.

Table 6.11. Assessments of the status in the basin.

Organizations	Determining the change in the land use	Determination of the pollution resources	Monitoring the water resources	Evaluation of the socio-economic structure
DSİ	√	√ Boron ve salt pollution	-	-
İZSU	√	√ Arsenic	√	-
PROVINCE Special Administration	-	-	-	-
İzmir Metropolitan Municipality	√	-	√	-
DEU	√	√	√	√
Forest Provincial Directorate	-	-	-	-

As it can be understood from the Table 6.11, the representative met in the Province Special Administration said that there was no other work in this scale. The experts of the Province Special Administration said they had difficulties with respect to the opinions they requested from DSİ. The fact that DSİ gave opinion non-complying with the current status over the map that had been created years ago by ignoring the findings on the land and that the planning works are performed over these opinions has been criticized by the representatives of the Province Special Administration. In other words, the answers like "there are no stream beds" to the fields which are shown as stream bed in the field indicate the extent of the discrepancies between the decision makers on the evaluation of the current status. Another statement made by this institution is the inconsistency of the opinions given in the planning process and constant change of opinions without any certain rule. The relevant subject here is the determination of the garbage landfill area proposed in Ödemiş. The garbage landfill area was proposed to be located on the stream bed and upon receiving the opinion that it can be constructed on the left or right of the stream bed there have been many decision changes like moving the stream bed, having an approach center of 20 meters each from the two sides of the river bed, reducing this distance to 10 meters, changing the direction of the stream bed without protecting its natural direction. The inconsistency of the opinions provided by DSİ and the incompliance of the guide maps with the current status reveal the lack of information sharing between the two organizations.

The planners replied to the question "with which organizations did you have exchange of information on the planning of the water resources?" with the answer "just on the proposed projects". The answers given indicate that there was no joint work on

carriage capacities of the water resources, population and water supply projections and the water potential of the settlements. On the other hand, the questions "which data (population projections, urban growth ratios, proposed development housing areas etc) was needed on the physical plan resolution of the field? / from which organizations was this information obtained?" had no reply indicating that the planning works of the two sectors are independent from each other.

- **Planning stage:** The development plans should be put up upon the consensus of the concerned planning organizations and the water administrations related to planning. The statements by many organizations revealed that the works of these two resource sector and the planning works are not simultaneous and parallel.

This study included questions on the extent of the cooperation and coordination of the organization carrying out the physical planning and water management works necessary during the decision making process and implementation. These questions are intended to determine the coordination level between the sectors during the planning works.

The questions asked to the experts of water management are listed below:

"During the works of Manisa-Kütahya-İzmir Region 1/100000 scale Environmental Development Plan and 1/25.000 scale İzmir Metropolitan Municipality Urban Region Development Plan (İKBNİP) (2010 and 2009), was there any joint work? / Did you have any chance to work together?"

a. Do you think that your views and institutional works are included in these works?
b. If there are contradictions, can you identify the subjects which you find negative or incomplete?
c. Are there any aspects of your views and institutional works conflicting with the 1/5000 scale plans of the settlements in the basin (Ödemiş, Torbalı, Kiraz etc)?
d. If there are contradictions, can you identify the subjects which you find negative or incomplete?

The distribution of the answers of the experts to the question "During the works of Manisa-Kütahya-İzmir Region 1/100000 scale Environmental Development Plan and 1/25.000 scale İzmir Metropolitan Municipality Urban Region Development Plan (İKBNİP) (2010 and 2009), was there any joint work? / Did you have any chance to work together?" has been as follows: 60% No, 5% Yes, 35% No idea. Especially the three interviews made with the top officers at the 2nd Regional Directorate of DSİ, they emphasized that there was no work with them in the construction and approval stages of these plans and they expressed their concern on this matter. Different views have been

found among the İZSU employees. The question "Do you think that your views and institutional works are included in these works?" was generally replied with 'No' or 'Partially'. İZSU represantative stated that the issues like the fact the Manisa-Kütahya-İzmir Region 1/100000 scale Environmental Development Plan first to be approved by the General Directorate of Environmental Impact Assessment and Planning of the Ministry of Environment and Forestry includes aspects against the protection principles under the protection of dam basins. Besides, in the areas under the authority and responsibility of the institution, she stated the issues they found incomplete with respect to the requirements of the planning principles and that they objected within the framework of the legal arrangements. For instance; they fought through legal and illegal ways for entering the Çamlı Dam Basin and Protection areas into the 1/100000 scale Environment Development Plan. In this process, one of the consensus problems found is the fact that the Çamlı Dam Basin within the Küçük Menderes River Side Basin is shown in the concerned environment Development plan. The fact that Çamlı Dam, which was taken out from the investment plan by DSİ based on the ground that the water resources of İzmir were sufficient and there was no need for construction, was pointed by İZSU as one of the most important investments to solve the future water problems of İzmir; that İZSU underlines the obligation to construct the Çamlı Dam and fights to ensure that it is stated in the Manisa-Kütahya-İzmir Region 1/100000 scale Environmental Development Plan shows that there are coordination problems between the organizations in the Basin. Besides the questions "Are there any aspects of your views and institutional works conflicting with the 1/5000 scale plans of the settlements in the basin (Ödemiş, Torbalı, Kiraz etc)? If there are contradictions, can you identify the subjects which you find negative or incomplete?" were answered by the İZSU officer claiming that these plans have negative aspects which can be remedied.

In the questions asked to planners;

- Were you invited to / did you participated in the meetings and projects carried out for the protection of the water resources and basin in the Küçük Menderes Basin?
- If yes, can you state the open title of these projects and meetings, the names of the partners involved in the production and implementation project in the basin and the stages of the project?
- If your answer is yes, can you state the extent where the knowledge of the city planners was used in the works conducted?

All of the planners met stated that they were not invited to and didn't participate in the "Küçük Menderes Basin Protection Action works" which was in progress since 2009 as one of the works carried out in the basin in recent years. However, they

participated in October 21, 2010 in the 2nd Stakeholder meeting of the Küçük Menderes, Büyük Menderes and Northern Aegean Basins Protection Action Plan project organized after the completion of the field studies. The understanding of the project team for the planning process and land use – water resources management arisen from the questions and answers is summarized below:

- The questions asked by the managers of the relevant universities and the participants of the organizations have not been fully answered and many of them have been overlooked by negative manner. Therefore, it has been observed that many managers left the meeting as their point was not carefully listened although repeated several times and replied with negative reactions by the char and TÜBİTAK team.

- Especially, in their answers to the questions asked on the position of the Manisa-Kütahya-İzmir Region 1/100000 scale Environmental Development Plan in this work, the planners working at the basin related organizations stated that the team didn't do any works on the plans in force in the region. This is another indicator of the fact that these works and the land use planning works are independent from each other and the project draft report for the Küçük Menderes Watershed Protection Action Plan didn't have any statement on this matter.

- **Vertical and Horizontal Plan Consistency**

There should be hierarchy and consistency in the plans from the country scale to the micro basin scale. As stated by Geray and Küçükkaya (2001), the basic principle should be that the resource management plans need to be realized and implemented consistently with the plan, policy and strategies in the regional and local scales. The consistency approach applied today in the physical planning system is to ensure consistency from top to bottom. Besides, it has been determined that the policies and application tools should be differentiated among the plan stages. During the interviews held in the study area, it was stated that there are no differences in the scales of the hierarchical physical plans in the field and usually they are treated with the same decisions and tools. The representative, Chairman of the Chamber of Architects (former Development Department Head) who headed the 1/25.000 scale İzmir Metropolitan Municipality Urban Region Development Plan stated that he didn't find appropriate the fact that there is no strategy in the provincial scale plans despite there are decisions in an area of 50 km. He described this situation in the planning system as follows:

There is an institutional situation for different decision processes. I think it is a problem that there is no organized institutional structure. For instance, the data of the flows to the city is hold by DSİ. When we look at the actors in the process of reflecting this produced and collected information into the land use plans, the institutional structure becomes much more important. A different planning level comes out from those which make employment stronger.

The vertical plan consistency shall be considered based on the principle of gradual union of the plans of 1/25.000 scale İzmir Metropolitan Municipality Urban Region Development Plan (İKBNİP) and Manisa-Kütahya-İzmir Region 1/100000 scale Environmental Development Plan and the land use plans of the 7 district municipalities in the working area. Especially, a search will be made to reveal whether the water resources planning and management approaches include the strategies in the detail required by the scale of the concerned plans. The results on the consistency between these plans of different scale summarized in the Figure 6.10.

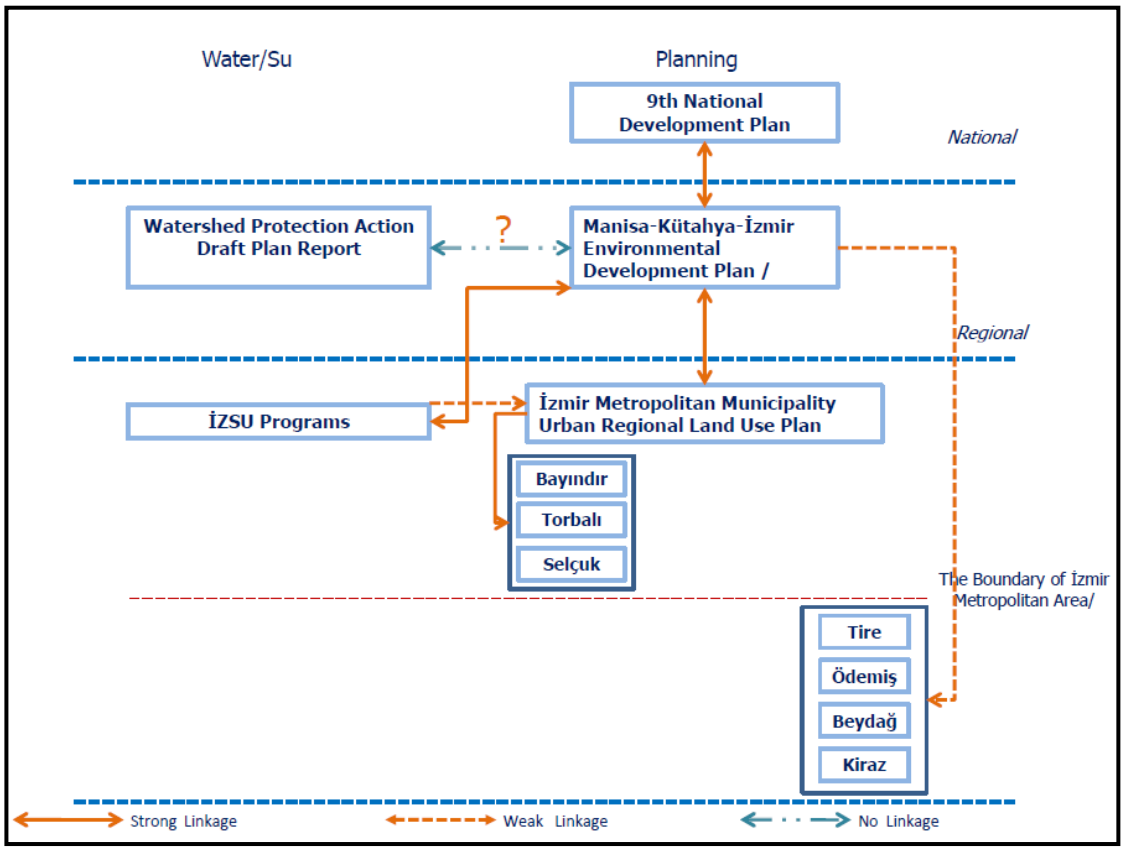


Figure 6.10. The summary for current status of the existing plans Küçük Menderes

It was seen during the field works that Kiraz and Beydağı district settlements, which are the upper basin settlements in particular, were not revised according to the provincial level plans and there was no land use plan works. Therefore, it is seen that

the planning works of the settlements in the Küçük Menderes Basin are well behind the requirements of today.

The project called '**Preparation of the Watershed Protection Action Plans of 11 Basins'** in Turkey was signed in Ankara in August 12, 2009 by TÜBİTAK and Environment Management General Directorate of the Ministry of Environment and Forestry. Under the coordination of the Ministry of Environment and Forestry, a project draft report was prepared by the Turkey Scientific and Technological Research Institution – Marmara Research Centre (TÜBİTAK–MAM) for the Küçük Menderes Watershed Protection Action Plan. This draft report includes detailed information on subjects like the pollution of the basin, water resources capacity and proposals for the action plan. The Manisa-Kütahya-İzmir Region 1/100000 scale Environmental Development Plan was revised because of the objections despite it was approved in Agust 24, 2009 by the Ministry of Environment and Forestry. In September 9, 2010, the Environmental Development Plan, revised by the Ministry of Environment and Forestry, was approved. Therefore, the works of the two planning sectors in the Küçük Menderes Basin were realized at the same time in parallel to each other. Moreover, there are some inconsistencies and incompliance in the reports of the works carried out in the same area and at the same time (Manisa-Kütahya-İzmir Region 1/100000 scale Environmental Development Plan and Küçük Menderes Watershed Protection Action Plan) although these reports don't refer to each other. For instance; in the population estimation scenarios realized in the project draft report of the Küçük Menderes Watershed Protection Action Plan, it has been decided to use the population values obtained with the MAM Estimation Method. According to the estimation method selected for the whole of the basin, population estimations are made from 2009 to 2040. On the other hand, in the Manisa-Kütahya-İzmir Region 1/100000 scale Environmental development plan, there is information on the basin based population estimates. For instance, according to the census results of 2000 for the İzmir province, the 2025 population is taken as 5.106.000 people obtained by the arithmetic method in the periods of 5 years until 2025. However, together with the plan revision, the suggested population was reduced. Besides, in the plan application provisions, a definition was made for "Küçük Menderes Planning Sub-region: Ödemiş, Tire, Bayındır and Selçuk districts within the Küçük Menderes Basin as the area covering the settlements around the Küçük Menderes River." In other words, this sub-region planning refers to the drainage area border of the Küçük Menderes River. However the term here implies that

borders of only four districts are covered. For the settlements within the borders of the Küçük Menderes Planning Sub-region, the target year was accepted as 2025 and the total urban population size was mentioned as 296.500. The population estimates in the tables include population projections on the areas within and outside the İzmir Metropolitan Municipality. There are no statements referring to each other in the concerned two plans. It appears that the fact that there is no contact between the works carried out in the same basin parallel to each other cause's decisions produced over different population projections. Küçük Menderes planning works face the inconsistency of the long term goals and compliance problems. In addition to that, as these two works cannot be carried out at the same time, both plans are insufficient for the proposals made to the action plans and for the content and application decisions. The fact that the proposals made for the pollution management in the basin stated in the project draft report of the Küçük Menderes Watershed Protection Action Plan can be given as example to this defect caused by the disintegration of these two disciplines. At the same time, the fact that only the current land use is considered in the calculation of the pollution loads in the basin is the most apparent indicator of the fact horizontal coordination couldn't be achieved in the basin as the loads to take place in the future plan decisions and their effects are not taken into consideration and therefore there is no feedback to the environmental development plans.

- **Consensus Building**

As mentioned in the previous section, when we take into consideration some foreign country experiences and the relation between the land use planning and water resources management referred in the literature, it is clear that it is necessary to provide an atmosphere for joint work of the physical planning and water experts. As mentioned above, the two professional groups didn't make enough efforts for the consensus throughout their works in the Küçük Menderes Basin. Since the legal arrangements for the professional and expert coordination are missing or insufficient, the works in the basin are carried out independently like all works in Turkey.

Witnessed in many works and applications, the contributions of the local people to the planning process and application stage in various ways are very important. Geray and Küçükkaya (2001) state that the participation of the basin people to this process is the basic condition of the process in terms of supporting the negotiations of the planning

team, remedying the mistakes and reaching a consensus. In many countries, the environment laws give great importance to the public participation and provide that public participation in the basin management can be motivated by public awareness campaigns, subsidies and awards and fines

Under this study, the question "Do you believe that the public is sufficiently included in the water resources management process of the Küçük Menderes River Basin?" was answered by 90% with "No" and 10% with "Partially". In the basin, it is observed that İZSU, DSİ and Ödemiş Municipality carry out some works for the public awareness and that there are no other initiatives or contribution. They stated that the participation level of the public is limited in the concerned agencies and managements. This low participation level is caused by the lack of interest of the people in the works done and the fact that they are informed only when necessary. In particular, the Bayındır Municipality representative said that they started a work for garbage collection and they had to step back from this application of after works of 6-7 months due to the insensitivity of the public.

The information works carried out by the organizations in the basin are summarized below:

- In the end of 2008, DSİ II Region Directorate said that they had information interviews in the districts of Beydağ, Kiraz, Ödemiş, Tire, Bayındır, Torbalı, Menderes and Selçuk which are in the Küçük Menderes Basin. The interviews were attended by three represantatives. They provided information on the projects for Küçük Menderes, condition of the ground and surface waters in the basin and districts, modern irrigation systems for water savings in irrigations and loan facilities. The interviews were also attended by the district directors and employees of organizations, managers of the Agricultural Loan, Irrigation, Development cooperatives, village headmen and producers as well as broad public.
- İZSU stated that they continued their works along the expropriation of the Tahtalı Dam Basin included in the Küçük Menderes Basin with effective participation from local people, local non governmental organizations, prominent people, headmen, municipalities and similar groups.
- Ödemiş municipality stated that they included in their agenda preparation of a TV program, annual poster, brochure and printed material distribution,

providing education in the primary schools with the cooperation of the Directorate of National Education under the works for information and awareness on water saving as of 2010. They mentioned that they printed posters and brochures on this subject and organized awareness meeting for the water saving with drip irrigation.

Trainings were held in the following settlements under the works for "Good Agriculture High Revenue Education Project" started as of 2009 July with the contribution of the Aegean University Faculty of Agriculture Department of Horticultural Crops, İzmir Provincial Directorate of Agriculture and İzmir Chamber of Agriculture, to increase the education level of the agricultural businesses and employees in İzmir on the sustainable agricultural development and to increase and diversify revenue making activities with good agricultural activities with achieved sustainability.

It is determined from the data obtained from digital resources that a panel was organized in 2 June 2020 in Ödemiş Municipality Wedding Hall on Good Agricultural Practices with the contributions of the Ödemiş City Council Agricultural and Animal Husbandry Working Group, Ödemiş Municipality and Ödemiş Vocational High School of the Aegean University. The education seminars included in this list were realized after this date.

Table 6.12. Trainings held in the settlements of the basin under the Good Agriculture High Revenue Education Project (Source: *İyi Tarım Uygulamaları).*

Town	**Subject of the education seminar**
Gölcük, Ödemiş district	Good Agricultural Practices in Cherry Growing
Kaymakçı, Ödemiş district	Good Agricultural Practices in Cherry and Plum Growing
Tire district	Good Agricultural Practices in Fig Growing
Selçuk district	Good Agricultural Practices in Peach Growing
Kiraz district	Good Agricultural Practices in Bean Growing Good Agricultural Practices in Cherry Growing
Torbalı district	Good Agricultural Practices in Vegetable Growing

Moreover, some settlements in the basin, especially the Kiraz Municipality - said that the public are insensitive to environment due to economic dependencies. These administrations also stated that they found the works of the central public organizations and agencies insufficient in providing awareness and guidance to the public.

When the works on the participation and awareness of the people in Basin are examined, it is observed that some organizations, especially the local municipalities have sensitivity for the subject. However, we see that the institutional organization in

basin doesn't have the will to "take action for the solution of the problem" which is parallel to this sensitivity. On the other hand, the fact that these limited works took place between 2008-2010 shows us that it is late for intervention and taking action. In solving the problems lived in the water resources in the basin, the environmental sensitivity of the public didn't increase and as seen in the Kiraz example, there are no activities and awareness for the solution of the problems. This is directly related with the fact whether the public has opportunities to participate in the making of administrative plans. Like in the similar works, it is clearly seen that the participation of the public will remain limited unless solutions are produced enabling the public participation in the creation and performance of the environmental policies. Improved production and cooperation activities should be directed especially in the rural settlements area and villages in the basin.

6.2.3.4. Institutional Integration

Under the light of the literature search and theoretical information with respect to the integration of the water resources management and land use planning, five components have been determined and attempted to be evaluated with the interviews made with the concerned organizations in the Küçük Menderes River Drainage Basin: (1) Leadership and representation, (2) vertical intergovernmental coordination horizontal intergovernmental coordination and Clarity of the actors roles and responsibilities (3) Human capacity. The components under this main integration category can be regarded as the factors effecting the implementation of this integration.

- Leadership and representation

For the realization and accomplishment of the works on the protection of water resources, this coordination and consensus process should be directed by an effective executor. The identity of the organization organizing the works in the basin and the level of the power of the concerned organizations are dealt with under this component. When the answers to the question "Which organization or organizations coordinate these works in the Küçük Menderes Basin?" are examined, it has been determined that there is no effective executor on the land use planning and water resources management in this basin. Besides, different answers were given both by the regional public organizations and local administrations. The central organizations other than DSİ and

İzmir Provincial Directorate of Environment and Forestry commented that there was no effective leader. DSİ and İzmir Provincial Directorate of Environment and Forestry stated that this was their job; and İZSU said it was the executor organization within the borders of the İzmir Metropolitan Municipality.

When we look from the point of local administrations we determined that there are differences among the representatives of district governorships and municipalities. When we examine the distribution of the answers on the leadership question; 85,7% of the 7 district governors referred to Governorship and 14,3% referred to the Küçük Menderes Environment and Infrastructure Union coordination. Especially in the matters of water management, the district governors were optimistic like in the other issues and in some subjects they refrained because of political structure.

Municipalities gave different answers to this question. When we study the distribution of the answers to the question "Which institution or organization coordinates the works in the Küçük Menderes Basin?", among the 7 district municipalities, 28,55% (Tire and Selçuk) said Provincial Directorate of Environment and Forestry, 28,55 % (Kiraz and Ödemiş) said Irrigation Union, 14,3% (Bayındır) said DSİ and 25.55% said (Beydağ and Torbalı) there was no such organization. Tire and Selçuk Municipalities mentioned that they found the effectiveness of the works of the Provincial Directorate of Environment and Forestry, which they pointed as the executor, to be low and insufficient. Representative of the Bayındır Municipality, within the borders of the İzmir Metropolitan Municipality, stated that he didn't like the idea to be connected to the political authority as the administration because of his political differences and because he couldn't internalize the subject. He stated that DSİ was the executor of the basin and that he felt himself closer to the central organization. Ödemiş and Kiraz municipalities replied with "irrigation unions" which was the most irrelevant answer to this question. With this answer, Küçük Menderes Basin Environment and Infrastructure Union could be meant and there was a confusion of names. It is understood from this answers that the unions in the basin are confused, there is no sufficient awareness of the duties and responsibilities of the unions, and most importantly, there is no awareness of the organization which is effective in the region.

Within these interviews, it has been determined that there are three local unions in the Küçük Menderes basin as the coordination mechanism.

- *Küçük Menderes Basin Environment and Infrastructure Union:* It was established to create an integrated and effective water quality management in the Küçük Menderes Basin, to prevent the pollution taking place in the arms of the Küçük Menderes River, to develop protection and improvement projects. It aims to develop projects to create water resources utility areas, to eliminate infrastructure problems, for waste water, drainage, solid waste and similar infrastructure services and to protect environment and ecological balance.

- *Küçük Menderes Basin Irrigation Union*

- *Küçük Menderes Basin Union of Municipalities*

In conclusion it is clearly seen from receiving different answers that there is no established concepts for an effective executor responsible for the basin management right now. The fact that both local administrators and their basin stakeholders give different answers or be in hesitation indicates that the Provincial Directorate of Environment and Forestry coordinating especially then public organizations in Küçük Menderes Basin could not sufficiently provide effectiveness in the basin. Ensuring the participation of all effective groups in the resources management is very important for supporting and implementing the decisions given (Bolposta and Dedekorkut, 2006). In the catchment base management approach, the most convenient and economic technologies should be used and the environmental awareness of the stakeholders (using the basin/responsible organization and people) should increased and they should be included in the management. Based on this requirement, the participation of the affected groups in the resource management should be ensured due to the principle of representation. The success in the management of the water resources and the basin can be achieved by the participation of the politicians with authority in the process of decision making, approval and implementation, planning and water related organizations, people living there and non-governmental organizations in these works. Therefore the question “are the effective participation and representation of all stakeholders in the basin ensured in the works carried out in the Küçük Menderes Basin?” was asked. The answers to this question are shown in Table 6.15 and the results are interpreted.

Table 6.13. The participation of the affected groups in the resources management

Organizations	Yes	No	Partially	No Idea
Regional Organization	0%	40%	33,3%	26,6%
Local administration	21,4%	28,57%	42,86%	7,14%
Total	10,35%	34,5%	34,5%	17,25%

It is seen that the "no" and "partially" answers given to this question by the public organizations responsible in the basin and the analysis group in the local management are equal. The fact that the total of the "no" and "partially" answers obtained in the regional meetings in the Küçük Menderes Basin is 73% can be interpreted that the effective participation of all stakeholders in the basin could not be achieved or that the works were insufficient.

Local representatives stated that they attended to the meetings by the coordination of the governorship when necessary. Another point that draws our attention in this study area is the fact that the answers to the question "What are the non-governmental organizations that are active in the protection of water resources in your district/municipality" don't include the non-governmental organizations that are active in the protection of water resources which are desired to be included in the participation of the affected groups in the resource management. In the interview made with the analysis groups, it has been determined that all stakeholders are not sufficiently represented in the works for the protection of the water resources in the Küçük Menderes River Basin, in all works carried out so far in the basin and in the works related to the protection of water resources.

Upon the completion of field studies it has been seen that only some of the Ministry of Environment and Forestry, State Hydrological Affairs Regional Directorates, Bank of Provinces, Province Special Administrations, Province Environment and Forestry Directorates, Province Agricultural Directorates, Universities and Municipalities attended in the 2nd Stakeholder meeting of the Protection Action Plan Project for the Küçük Menderes, Büyük Menderes and Northern Aegean Basins held in 21 October 2010. However during the interviews, local administrators and relevant organizations as well as the representatives of the non-governmental organizations were not present. Moreover, as stated in section 6.2.4.2, there was a tension between the project team and the meeting coordinators during the questions in the stakeholder participation meeting, the answers were dictated unilaterally and the

participants expressing their options to improve the conditions were rebuffed. The stakeholder meeting is carried out in a way where the principles of clarity, transparency and democracy are not fully observed because of these conditions.

- **Interagency Coordination and Clear Delineation of Actor Roles and Responsibilities**

The issue of interagency coordination is considered important by many researchers for the management of water resources and integration of land use planning. Coordination is discussed in two titles within the scope of this integration: (1) Vertical intergovernmental coordination; (2) Horizontal intergovernmental coordination. The following questions have been asked in order to find out the interagency coordination levels within watershed:

-Vertical coordination: How do you assess the coordination level between regional public establishments which are affiliated to centralized administration within the Küçük Menderes River and municipalities in relation to protection and management of water resources?

-Horizontal coordination: How do you assess the coordination level among the municipalities within the Küçük Menderes River in relation to protection and management of water resources?

Distribution of the answers given to these questions is shown in Table 6.16.

Table 6.14. Percentage distribution of the answers given to coordination questions

Coordination	Establishments		1 Very Low	2 Low	3 Average	4 High	5 Very High	6 None	0 No Idea
Vertical Coordination	Regional Public Esth.		33,3%	33,3%	%13,3	-	-	13.3%	6,7%
	Local Gov.	Municipality	71,4%	28,6%	-	-	-	-	-
		District Gov.	-	-	85,7%	14,3%	-	-	-
Total			**34,5%**	**24,18%**	**27,6%**	**3.45%**	**-**	**%6.9**	**3.45%**
Horizontal Coordination	Regional Public Esth.		60%	-	-	-	-	-	40%
	Local Gov.	Municipality	57.14%	-	-	-	-	47,8%	-
		District Gov.	14,29%	-	-	-	-		85,71%
Total			**48,2%**	**-**	**-**	**-**	**-**	**10,35%**	**41,4%**

The relevant public institutions in the region generally express their opinions that the coordination level between regional public establishments which are affiliated to centralized administration within the Küçük Menderesand municipalities in relation to protection and management of water resources is “very low” or “low”. On the other hand, district governors state that they find this coordination level as average and high. It is seen that district governors give more optimistic answers to these questions when compared to the other representatives within the watershed due to the fact that they are

local representatives of the governorship. When we look at the general result, it is possible to make a general assessment in the direction that the vertical coordination level within the watershed is low with a rate of roughly 59%. In addition, it was determined that the vertical coordination level is average or high with the answers of district governors with a rate of 30%.

The issue of ***horizontal coordination*** in the watershed has been discussed in two ways: (1) inter-municipality coordination, (2) interagency coordination level that realizes practices of water resources protection and physical planning. More clear results are seen concerning inter-municipality coordination in Table 6.16. The individuals in analysis group possess the results that 41.4% "no idea", 48.2% "very low" and 10.4% "none". It is possible to say that inter-municipality coordination levels are very low except from the rate of individuals who do not have any idea.

In addition to this situation, a representative (planner) of the Special Provincial Administration of İzmir has stated that this coordination is realized to a certain extent within the boundaries of İzmir Metropolitan Municipality (İBŞB); however there is not any control mechanism for supervising and providing dialogue among local administrations which are within the boundaries of Küçük Menderesdrainage area but outside of the İBŞB boundaries, therefore coordination is not assured. Water management and planning practices are carried out by İBŞB in the districts of Bayındır, Torbalı and Selçuk. However, the municipalities except from İBŞB (Tire, Ödemiş, Beydağ, Kiraz) state that they are left alone with the problems of environment and infrastructure. The representative of Municipality of Bayındır has expressed that functionality of Küçük Menderes Union of Municipalities, which was established as a control mechanism for providing horizontal coordination in the watershed, could not be ensured; Torbalı, Selçuk and Bayındır entered within 50 km borders of İBŞB with the enactment of Law No. 5216, as a result they were separated from the union and therefore, a common working platform could not be created. Furthermore, the relevant representative has stated that performing practices under the responsibility of different organizations and establishments and under different legislation within the same watershed affects this coordination negatively.

The analysis group was also asked *in which level is the cooperation of interagency which carries out the protection of water resources and physical planning practices* in the watershed in order to enlighten this issue more clearly. It is seen that this coordination level question has mostly been answered as "very low". The fact that

district governors answered as “no idea” with a percentage of 100% can be interpreted as they perform their practices disjointedly from this process as district organizations. In addition to these, one of the İZSU representatives who have stated that the level of horizontal coordination within the watershed is on average has emphasized that this coordination can be ensured if their opinions go parallel with İzmir Metropolitan Municipality. Moreover, this individual points out that İBŞB does not permit İZSU to be involved in public housing due course of law, İBŞB only continues its works by showing the decisions of İZSU as representation in the conditions that they agree on an issue; otherwise the process is not realized with the common decisions taken .

At the result of the interview carried out ***in relation to clarity of the actor roles and responsibilities***, it is clearly seen from the responds given by both regional public establishments and local administrations that there is a complication in terms of roles and responsibilities of the actors within the watershed. Particularly, 100% of the local administrations have stated that “roles and responsibilities are not clear”.

The problems determined in the interview with the local administration in watershed have been discussed in two titles; (1) problems of the municipalities within İBŞB boundaries and problems of municipalities outside of İBŞB. These are:

1) *Problems of the municipalities within İBŞB boundaries*:

Due to the fact that these municipalities are within the boundaries of İBŞB, they have stated that they experience role conflicts with İBŞB in relation to practice, supervising and financing. The negative statements in relation to these problems in the interview are summarized below:

- Municipality of Bayındır states that when it rains heavily on their settlements, they encounter with a natural disaster. However, because of the fact that the responsibility of intervention for this natural disaster is on İBŞB with law, they point out that they cannot do any work on this issue as the municipality. They say they made their application to İBŞB 4 years ago in order to take the necessary precautions. In the present situation, as they state, planning has been made on a base map and stream improvements are about to be done; however they have not been included even in the investment program. Furthermore, they express that there is not a collaborative work of interagency with each other, long term strategies are not created and the administrations such as İBŞB and Special Provincial Administration which have the power of making different plans try to put across their own desires in the meetings.

In addition to these, the representative of Municipality of Bayındır explained his/her negative feelings stemming from the limitation of roles and responsibilities within certain rules with the following words:

> After Metropolitan Municipality Law, we got the responsibility of a geography with which we were not acquainted as the municipality. 18 forest villages have been tied to our municipality, as well. There is a two-horse administration here. They must execute an article which is present in Metropolitan Municipality and Municipality Laws. Municipalities may bring service to the adjacent areas by getting approval from city council where necessary. Forest villages are within the adjacent area of İzmir Metropolitan Municipality with the law. İBŞB has given its construction powers to us by handing over these powers with the decision of council; however it says water and sewerage issues belong to İZSU with legal arrangements. The construction shall be planned by us as municipality, but the infrastructure shall be planned by İZSU under the control of İzmir Metropolitan Municipality. I think there is a contradiction here.

It is emphasized that there has been a problem of power contradiction concerning its works within the boundaries of İzmir Metropolitan Municipality since Municipality of Bayındır was tied to İBŞB. Another problem that Municipality of Bayındır encounters with is stated below:

> There is a livestock plant in the estuary of Maeander tributary in Hasköy and it leaves its wastewater into this tributary. Samples taken from the wastes of this plant and a tomato paste factory called Denex were sent to the Provincial Directorate of Environment and Forestry by our municipal police officers. However, the response of Provincial Directorate of Environment and Forestry was that they could not accept these water samples in that way, they want to come and find out and in those conditions, they stated that they would come if we informed them and they suggested they could hand over their authorities to us in those situations.

- Municipality of Bayındır has emphasized that there are some inconsistencies in construction and infrastructure services, especially the local administrations within the boundaries of Metropolitan municipality do not have a voice and interagency confidence is not assured.
- Municipality of Selçuk has also stated that they made the necessary investments in relation to environment management at the right time as municipality and after entering into the boundaries of İBŞB, municipalities have been in serious financial difficulties due to the fact that income of water and infrastructure has been handed over İBŞB.

2) *Problems of municipalities outside of İBŞB's scope of authority:*

These municipalities assess the institutional structuring both all around Turkey and within the watershed and roles and responsibilities in a regional level such as planning, permission for funding and investments which are not distributed to authorized organizations in a way that will enable use of sustainable water resource as

the weakness of the system. Opinions and suggestions of these municipalities in relation to roles and responsibilities of the organizations and establishments within the watershed are shown in Table 6.17.

Table 6.15. Opinions and suggestions of the municipalities outside of İBŞB's scope of authority (From the interviews made with the relevant representatives of municipalities)

Municipality	Opinion	Suggestion
Municipality of Kiraz	Each establishment works on its behalf. There is not any work for municipalities. Centralized establishments expect that their tasks shall be performed by municipalities. It is a wrong opinion that they carry out their duties by only fining.	Works in relation to environmental cleaning are organized by centralized establishments.
Municipality of Tire	▪ There is not any work of DSİ with us ▪ There are some uncertainties within the tasks and roles of the organizations. Because of uncontrolled irrigation practices, production ways within fields are abandoned. After Directorate of Rural Services was removed, roles were handed over the town and therefore chiefdoms instead of municipalities. However, villagers are always demanding help from us about highways and transportation and we have 65 villages. Although we try to be helpful with these capabilities, our authority is limited.	▪ Decentralization is needed ▪ DSİ must work in coordination with the municipalities. ▪ These responsibilities and financings should be hand over municipalities.
Municipality of Beydağ	There are some problems in administrative structuring.The official letters from Ankara, similar letters from governorship and İBŞB are sent us without any arrangements for municipalities in order to carry out the same conditions. In my opinion, a mistake is made and there is a problem in the system in relation to the issues that we cannot meet in terms of financing and number of employees.	With the contribution of centralized establishments, it is possible to prevent environmental problems. It is impossible to enable this with only penal sanctions. They must play an active role in actualization of guiding and applicable investments."
Municipality of Ödemiş	Works of regional public establishments are suitable, but not sufficient. Particularly, works of DSİ and Provincial and District Directorates of Agriculture for our district are highly insufficient.	Presentations in relation to guiding local administrations with seminars and joint works must be carried out and an environment of cooperation must be created.

Moreover, it was asked to express efficiency levels of the establishments which protect water resources and the watershed in the Küçük Mendereswith the interview made among local representatives throughout the watershed. It is understood from all the answers given by municipalities, it is firstly and generally emphasized by them that efficiency levels of the works of Directorate of Environment and Forestry throughout the watershed are very low. They state that Directorate of Environment and Forestry mostly carry out the work of tree planting, but in addition to these significant works, they must carry out their works more efficiently in terms of environment management

As it is seen in the example of Küçük Menderes Watershed, there are lots of public establishments carrying out the practices of water management and physical planning in different levels and areas within this watershed as all around Turkey. Roles and responsibilities in different areas of activity are shared among various establishments. Figure 6.11 summarizes the relationships between them. The conflict of responsibilities stemming from multi-headed administrative boundaries throughout the watershed ends up with the insufficient application of environmental rules and failures of activating efficient water use policies.

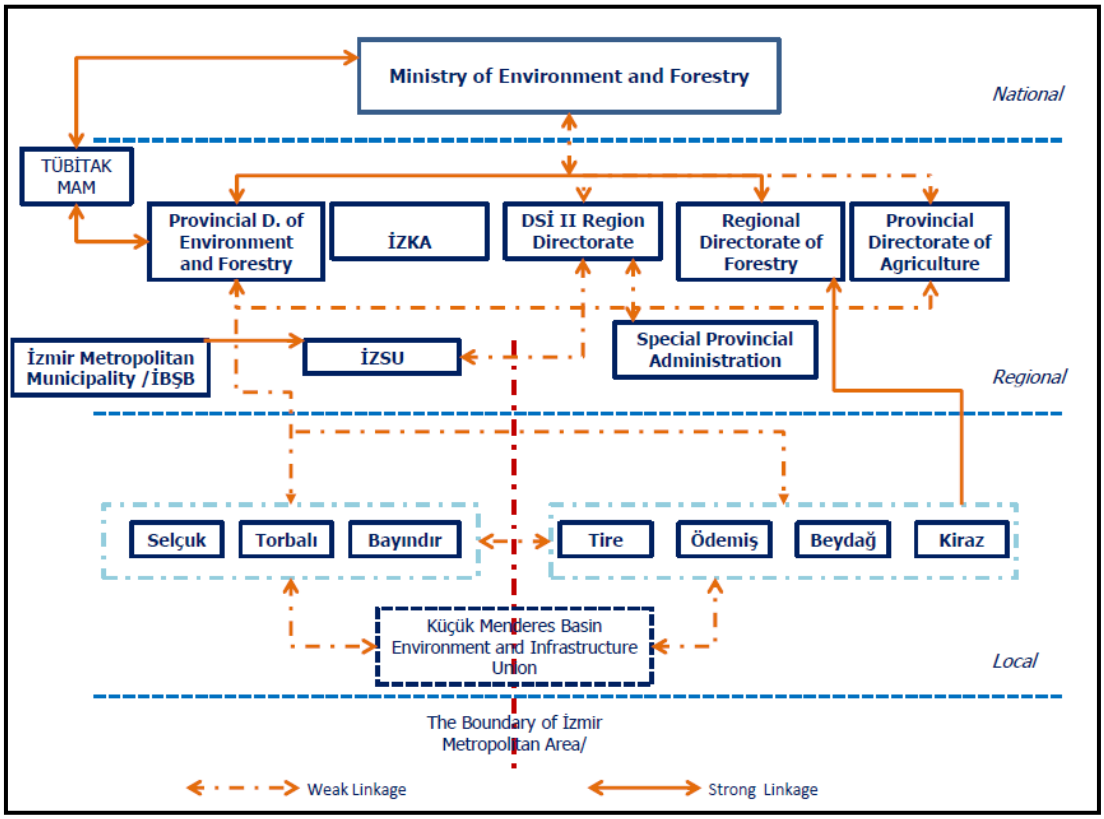


Figure 6.11. The current provisions of the relationship between national, regional and local authorities related Küçük Menderes River Catchment Area.

- **Human Resource Capacity**

Human resource capacity and sufficiency is important in the protection of water resources. Human resource capacity of the groups in which there are town planners and engineers in relation to the protection of water resources and watershed management issues is evaluated in terms of individual capabilities, knowledge and skills as well as employee numbers. Frank (1999) and Timmer et al. (2007) state that human resource capacity is not static; a community or person merge their motivation in a professional atmosphere with the help of education and teaching program organizations and chances

in order to increase skills and capabilities and as a result human resource capacity can be built.

What do you think of the sufficiency of technical and human substructure in protection of water resources by governorships, district governorships and relevant units and local administrations which take place within the watershed of authorized public establishments and individuals in the region? When we assess the distributions of the answers given for this question, we can see that they find insufficient with a percentage of 100% for both centralized establishments and local administrations. One of the representatives of DSİ has expressed that local administrations are highly concerned with the issue of water resources management; however they fail to satisfy the needs due to the lack of qualified employees. In addition, an authorized person of İZSU stated after this question that they would establish directorships in the districts within the boundaries of İBŞB. Moreover, especially the municipalities of Ödemiş, Kiraz and Beydağ have stated that they are open to local administration consultancies of centralized organization establishments and their guiding works (seminars) in increasing local human resource capacities and raising awareness of the public.

Furthermore, it is specified that the reason for the lack of continuous works in desired levels except from the presence of planner staff is the insufficiency of technical personnel in local administrations (e.g. Municipality of Kiraz) which carry out the works of practice and planning. Particularly the lack of town planners within the body of local administrations is understood from the questions in relation to the land use tools for water resources protection or remaining unresponsive and leaving unanswered the questions concerning planning decisions. Besides, among the reasons of being incapable of preventing environmental problems within the watershed are absence of town planners in DSİ II District Directorate, absence of town planner staff in the work of preparing action plan for the protection of Küçük MenderesWatershed, the planners' who work within the body of Provincial Directorate of Environment and Forestry not taking part in the working team of watershed.

6.2.3.5. Policy Integration

Within the scope of "policy integration", the last compound of Integrated Policy framework, present status of the formal and informal arrangements that are in force or in practice on Küçük Menderes watershed and the bottlenecks experienced are tried to be determined. Moreover, evaluations are made on planning studies and practices made in the area for determining to what extent land use plan is cared and transferred into water sources management.

Decisions and means of water sources management requirements of Küçük Mendereswatershed in regards to planning are addressed in two parts. First part includes the status and problems of the legislative framework in the watershed concerning the application of water sources management. In the second part, it is evaluated that how supportive the effective plans and practices in the watershed are of the relationship between land use planning and water sources.

- **The Integration of Sector Regulations**

As we indicated before, it is essential that legal arrangements leading planning and application should be integrated and cohesive supporting each other in the planning and decision processes. Under the title of 6.2.1.3, rules, information is provided about the legal arrangements in force in the watershed (Metropolitan Municipality Law No 5216, Regulation on Water Pollution Protection, İZSU Water Protection Regulation). First of all, in this watershed bordered with legal arrangements determined not geographically but administratively, no guiding formal or informal arrangements have been found to be used in land use planning.

The example of Küçük Menrederes Drainage Basin is good examples in order for the problems of watersheds differentiate in watershed borders and administrative borders to be understood (see Figure 6.12). One of the subjects especially emphasized by the analysis group in the negotiations is that; the difference of the watershed borders and administrative borders makes the accomplishment of water quality maintenance across the watershed harder because of the fact that this area is subjected to two different regulations according to its administrative borders. (1) İZSU Water Protection Regulation for the districts of Torbalı and Selçuk located within the borders of İzmir Metropolitan area, and a part of Bayındır district. (2) Regulation on Water Pollution

Protection for the districts of Kiraz, Beydağ, Ödemiş and Tire –places worked on by Provincial Coordination Committee. There are also differences between the conditions of these two regulations. The given administrative border reveals the fact that both the horizontal integration on a legitimate level and vertical integration between the planning levels of the watershed could not be provided. The representative from İKBNİP planning team has stated that information including the whole city has been gathered in 1/25.000 scaled İzmir Metropolitan Municipality Urban Region Development Plan (İKBNİP) as well as criticizing meter based planning system of the law no 5216. Besides he indicated that they had to carry out their works within İBŞB borders owing to the zone determined by the law no 5216. And the representative from İzmir Provincial Master Plan (İKBNİP) (2006) works scaled 1/25.000, has added that their works moved on the data, analysis and decisions of three watersheds since the beginning, but no planning could be made on watershed basis due to the lack of legal basis for planning understanding across the watershed.

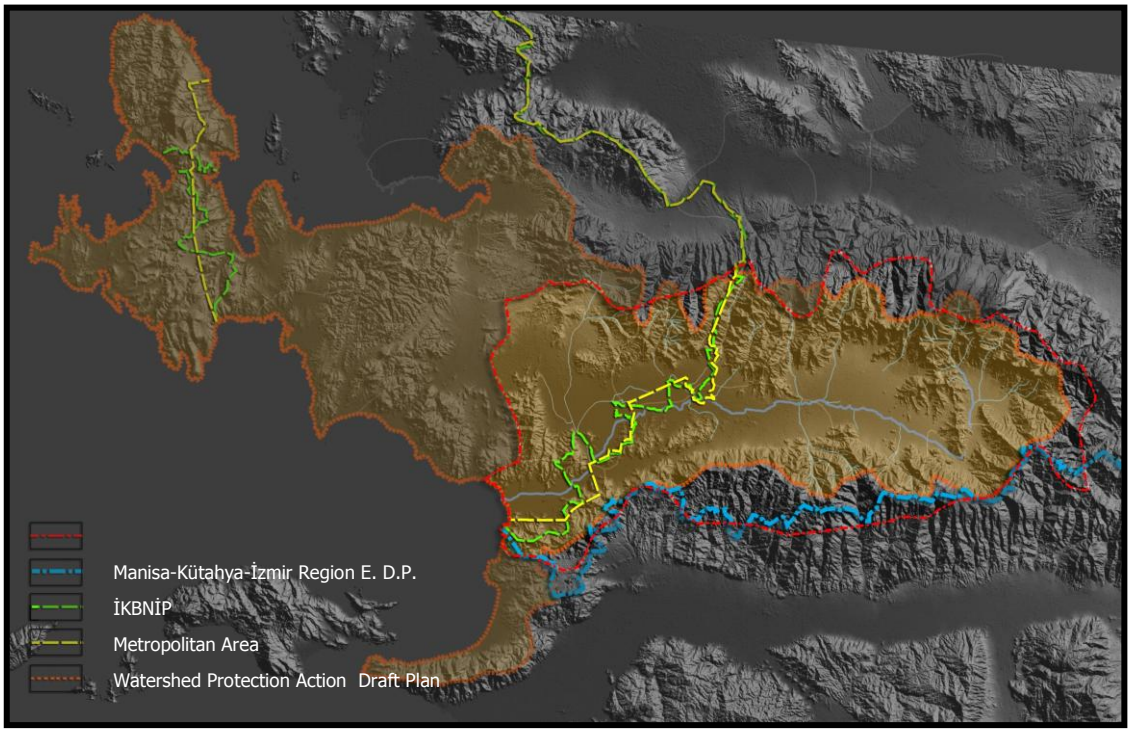


Figure 6.12. Borders of plans and watershed in Küçük Menderes River Basin

At the meeting made at General Directorate of İZSU, the representative in charge has first stated that two different regulations' being in effect in Küçük Menderes Watershed causes complication at application process. He also stated that there are no provisions suspending the present situation and restricting mining practices in the exact

zone where İZSU Basin Regulation is prohibited and in the places beyond İBŞB including the districts of Kiraz, Beydağ, Ödemiş and Tire –places worked on by Provincial Coordination Committee-.

In the negotiations made, problems detected by the experts involved in the application and their opinions on this integration were tried to be determined with the following question: "Would you please address the gaps and conflicts you have detected on a legal basis and planning practice about the integration of land use planning and water sources management?". Indicated gaps and conflicts in these negotiations are mainly as follows:

- Inadequacy of the laws in application
- Problems about planning and providing its maintenance
- Lack of legal basis regarding watershed planning
- Complication in the border planes and multi- headed institutional structuring
- Having problems in taking opinions of the related organizations
- Adoption of segmental planning practice by the planning system based on integrated planning.

Moreover, it has been stated particularly by the planners that making of upper scaled planning decisions as a result of the ruling party's initiative causes conflicting situations to occur in this process. The followings are the precautions stated by the analysis group in order for the integration of land use planning and water sources management to be successful:

- Interdisciplinary studies should be increased,
- Studies should be made on a legal basis because of the lack of land use means,
- Brook reserves should be used as land use application means,
- Planning studies should be carried out in digital environments,
- Besides inter-institutional coordination studies, coordination of the units at the same institution should be increased,
- Local regulations should be prepared on watersheds,
- A separate coordination administration should be assigned.

The most essential point here is; Küçük Menderes Watershed, which can be easily managed in respect of its borders and scale, didn't have an integrated managing plan by 2010. Even though every institution set forth plenty of investment, application and planning studies in their activity reports and programs, there wasn't a common managing plan for watershed management across the watershed. Ministry of

Environment and Forestry has determined Küçük Menderes as the "priority watershed" in Watershed protection action plans studies made in order for water sources to be protected for all uses, enabled to be used in the best way, prevented from pollution and for the polluted water sources to be treated. And in this context, "Action Plan for the Protection of Küçük MenderesWatershed" studies has started in 2009 (Sarıkaya ve Çiçek, 2010). In the negotiations made, it has been stated that this action plan study covers the studies about waste water infrastructure management. In addition to that, project design report on Action Plan for the Protection of Küçük MenderesWatershed has been prepared within the scope of Action Plan for Watershed Protection studies as of 2010.

These action plan studies are construed as pollution prevention practices by DSI and Provincial Directorate of Environment and Forestry upon their realization the seriousness of the situation when pollution started to spread with the delivery of the water to Beydağ Dam and the places where water wasn't delivered. Moreover, they have stated that the river has a serious pollution problem and no sufficient measures are taken. They have also added that we have been late for the application of protection and development practices.

As mentioned before, there are two different regulations applied on the watershed. But there isn't any leading study regarding the operability and basis of plan decisions in practice to be used by technical staff and operators except these.

- **The Integration of Sector Strategies**

These strategies are concerned about the protection and management of water sources on watershed basis, identification of water sources and irrigation areas, risk assessment, rehabilitation works, data management and planning based on quantitative and qualitative data on a local and regional scale. (Neufeld, 1998; de Loe et al., 2002; de Loë and Kreutzwiser, 2005). Regional and local institutions and organizations should have the technical equipment for determining and observing polluted areas and taking measures, enabling exchange of information about hydrologic features of the region, potential pollutant surface water flow, water quality, its chemical about features and aquifer. Especially, to what extent a municipality can accomplish these activities is an important measurement for the integration of sectoral strategies (de Loë and

Kreutzwiser, 2005). It has been tried to be determined what sort of applications were made on the watershed in terms of the study's objective.

In consequence of the negotiations made, practices going on across the watershed are summarized below:

▪ DSI II. Regional Directorate has indicated that level measurement and water quantity observation in Küçük MenderesRiver Watershed are made by institutions; however they haven't made any studies on water quality and they plan making *water quality measurements* at the beginning, middle and end of the river. As there is a high demand on irrigation systems by the public, they have also indicated that these kinds of studies stay only in planning and can't be put into practice.

▪ Representative of İZSU Water Protection Management Unit has indicated that water qualities of the Torbalı, Selçuk and Bayındır districts are evaluated based on the 1st article of Regulation on Water Pollution Protection; there are 7 stations in total within the area, 6 of them in this three districts and 1 in Tire; samples taken from these stations are transferred into the data base over 24 parameters and questioned. It has been stated that water of Küçük Menderes River is identified as "highly polluted water" in the studies made; besides, especially prevention, control and improvement of Fetrek creek's pollution and taking the facilities around it under surveillance are among the practices planned by İZSU. It is also indicated that flow measurement is made.

Prevention or reduction of degradation of natural resources is one of the most essential principles of watershed management (Carter, 2002). In protection of water sources, water supply, water quality, waste water and recycled water assessment, protection from flooding and flood management, watershed management and restoration of the habitats are the fundamental issues. Application practices have been sought for these issues. Responses given to the following question aimed to determine the status of these function areas in the watershed are shown in Table 6.18: "Would you please address the open topics of the strategic actions and projects that your district/ municipality conducted or involved in Küçük MenderesRiver watershed for the protection of water sources, names of the partners who took part in the creation and application of the project on the watershed, the project names you consider as important and the phase of the projects?". These projects are usually determined in the negotiations. Within

the scope of this compound, asking local administrations the question "Would you please address the municipalities you cooperated or negotiated with regarding the protection of the water sources in Küçük MenderesRiver watershed?" and getting no answer regarding a cooperation, leads us to the conclusion that horizontal coordination couldn't be established.

Table 6.16. Applications determined in the watershed in conclusion of the negotiations

Function Areas	**Name of the Project**	**Stakeholders**
Water Supply and Water Quality	1. Beydag Dam (2009)	DSİ
	2. Hydrologic based planning practices in the districts of Beydağ and Bayındır (2010)	İzmir General Directorate of Forestry
	2. "Water holding lagoons" in the district of Torbalı (2009)	Municipality of Torbalı
	3. Transfer of the spring located at Ayrancılar to Tahtalı Dam (2010)	İZSU
	4. Beydağ Dam irrigation channels (2010)	DSİ
	5. Bid for Irrigation Project of Küçük MenderesRiver watershed – Plan study regarding ground waters (2000)	DSİ & ODTÜ & Japan International Cooperation Agency (JIRA)
	Improvement of the brooks in Ödemiş	Municipality of Ödemiş
Waste water and Evaluation of recycled water	1. Project for establishment of sewerage in twelve villages	District Governorship of Ödemiş & Association of Village Services
Protection from flooding and Flood Management	1. Flooding Control Facilities of Upper Watershed and Küçük MenderesLateral Rivers · İzmir-Ödemiş Birgi Town and Surrounding Villages Birgi Creek · İzmir-Tire Lands of 5 Villages Gökcen Town and its Lands Eğridere · İzmir- Sırımlı Brook of Kiraz Haliller Vilage Land	DSİ
Protection and restoration of habitats	1.Gölcük Lake rehabilitation work	Special Provincial Administration,
	2. Municipality of Ödemiş treatment facility works	Provincial Department of Environment and Forestry, Special Provincial Administration, Municipality of Ödemiş
	3. Pilot area application of good farming practices in Gölcük and Bozdağ pilot areas	Ödemiş City Council of Agriculture and Breeding Working Group , Municipality of Ödemiş and Ödemiş Vocational School associated with Ege University
	4. Project of solid waste in villages	Special Provincial Administration,

▪ <u>Water supply and water quality</u>

- Beydağ Dam (2009): It is declared to be the first storage structure where water source potential is used in the Küçük Mendereswatershed, one of the important watersheds of West Anatolia awaiting for improvement with the 70.000 hectares of irrigable plain

potential whose interior is drained by Küçük Menderesriver. Besides meeting the needs for irrigation water, Beydag dam is stated to have an essential regulative effect on the prevention of the floods seen on main stream bed of Küçük Menderes.

- *Hydrologic based functional planning practice in the districts of Beydag and Bayındır (2010)*

Representative of Izmir Regional Directorate of Forestry has stated that within framework of the European Concert, studies on operation of forests are conducted within the scope of functional planning. He has stated that they perform application practices setting criteria upon assessing the forests in respect of the functions such as ecologic, hydrologic, reaction, defense, production, honey and forest protection. For example; he has expressed that hydrologic function is prominent around Beydag Dam, Beydag Dam and its surrounding is bare at present and works have begun. He has stated that they intend to do every work such as catchment holes, lagoon, dam etc that can prevent erosion. And he added that they try to take precautions against flood by building reservoirs inside the brooks, wooden fences and planting.

- *"Water holding lagoons" in the district of Torbalı (2009) and transfer of the spring located at Ayrancılar to Tahtalı Dam (2010)*

It has been stated by the Deputy Mayor of Torbalı that the application of water holding lagoons has been carried out to feed the ground waters in Fetrek Creek. He has emphasized that they applied to İBŞB for the sustainability of these practices. He expressed that a spring flowing down the drain in Ayrancılar has been transferred into Tahtalı Dam by İZSU by means of conveyance lines.

▪ <u>Protection from Flooding and Flood management</u>

It has been understood in the negotiations made that the watershed doesn't have a potential risk of flood. In addition to that Municipality of Tire has expressed that they need lagoon project around Kırtepe and Dereli creek in order to prevent flooding and erosion in their region.

▪ <u>Protection and restoration of habitats</u>

- *Pilot area application of good farming practices in Gölcük and Bozdağ pilot areas*

It has been expressed by the negotiated institutions that collective training with related institutions and organizations, awareness raising and control practices are urgently needed for this integration to be maintained. When the situation in the watershed is examined, it is seen that the awareness and demand about this subject has

risen, and number of the certified producers on good farming practices will increase with panels and seminars.

The following question has been asked to the relevant people in the negotiations made on 7 campuses located in the watershed: "Application means required by environment management planning in the planning system. For example; urban development limits, density restriction zones, parceling standards, impermeable surface limits etc. What are your planning decisions or land use means you use especially in order for the protection of water sources?" The information received from 7 municipalities regarding the environmental problems and application decisions required by environment management planning are summarized in Table 6.19.

In addition to these, representative of the Municipality of Bayındır has indicated in the negotiations made that there are no land consolidation and expropriation practices in the areas where land protection and agricultural irrigation techniques are made essential in Küçük MenderesWatershed. Especially in the local municipalities he has referred to the reduction of ground water use caused by the cadastral disintegration by means of these practices, and added that central institutions should make especially consolidation practices across the watershed. Besides that, he underlined that contribution of reducing the drills on five separate parcels into one parcel with consolidation practices to the national wealth would be unremarkable.

Table. 6.17. Problems and solutions stated in the district municipalities

Municipality	**Determined problems**	**The interventions made and suggestions**
Municipality of Bayındır	There is flooding problem within the city and there are improvement areas requiring improvement	· 60 % construction 40 % garden in settlements. · Within the framework of Olive Protection Law and Land Law, Built-up settlement is stucked between the railway and oil groves. · There is no possibility of expanding the adjacent area and urban settlement area is occupied at present. · Provisions of all laws just as olive protection law are strictly applied and precedent values are beheld to be protected.
Municipality of Beydag	No brooks or strict protection areas Disordered land fill (seepage waters flow into Beydağ Dam irrigation area)	-
Municipality of Tire	Flooding areas, discharge of the sewage waters without treatment near the district entrance	Parceling less than 20000m2 isn't allowed in the agricultural lands.
Municipality of Selçuk	In the housing plans drew by Provincial Bank	Construction approach distance is set for this area.

6.3. Discussion

The Küçük Menderes River case study involves a theoretical analysis of the institutional setting within which collective-choice level decisions are made about water allocation and management. The Institutional Analysis and Development (IAD) framework was applied in an Küçük Menderes River Catchment Area in the case study of the integration. The application of the IAD framework to this area has enabled a picture to be sketched of some of the institutional settings. This framework also gives understanding of how these institutions may help people in these regions to achieve their aspirations, and of the way in which these institutions affect sustainability.

Results that were colected through the key informant interviews, document analysis are outlined section 6.2.4. Within the results sections, the factors were grouped together with aspects of each factor being identidied as facilitating or contraining. Table 6.20 indicates implementing factors that were identified in five dimensions of the Integrative Policy Framework. They affect many aspects of successful implementation.

Table 6.18. Evaluative framework of the Küçük Menderes River Catchment Case Study

Dimension of Integration	Sub-type of Integration	Evaluation
Substantive	The importance of water issues in spatial /land use planning	− **agreement on the problems in the catchment area (facilitating)** − no thematic statement (constraint) − no spatial objectives for the case study area − water is not critical factor in regional development plans
	The integration of sustainable water resources management with spatial/land use planning	
Methodological	The integration of assessment approaches and techniques	− **sufficient initial data available (facilitating)** − **determination of Water Quality and Pollution Loads (facilitating) in Küçük Menderes Watershed Protection Action Plan with ArcGIS (facilitating)** − potential unavailability of GIS (constraint)
	The integration of the different applications, and experiences with the use of particular tools	
Procedural	The integration of informational requirements	− no include any information on the water usage ratios, current and proposed water consumption requirements, flood areas and protection regions (constraint) − no description of pollution sources and their strategies(constraint) − no clear provision for implementation standards (constraint) − lack of clear direction on exemptions const

(cont. on next page)

Table 6.20. (*Cont).*

Dimension of Integration	Sub-type of Integration	Evaluation
Procedural	The integration of informational requirements	− weak contribution of the institutional arrangements guiding local land use planning and water resources management (constraint) − no data to guide the planning on the existing water resources in the area, water usage status, pollution areas and indicators (constraint) − Insufficient the plan language and content for the protection of water resources (constraint) − no systematic approach is adopted for determining the current status of pollution sources (constraint)
	The integration of procedural requirements	− **existence of draft plan for Küçük Menderes River Basin Watershed Protection Action Plan (facilitating)** − weak provincial direction to local land use plans for integration of land use planning and water resources management(constraint)
	Horizontal plan consistency	− weak contribution between Küçük Menderes River Basin Watershed Protection Action Plan and Manisa-Kütahya-İzmir Environmental plan (constraint) − lack of consensus on revisions (constraint)
	Consensus building	− lack of professional consensus on exemptions (constraint)
Institutional	The definition of leading and participating agencies	− lack of provincial and local leaderships (constraint) − limited opportunity for stakeholders to participate in watershed management activities (constraint)
	Interagency cooperation and Clear delineation of actor roles and responsibilities	− vertical and horizontal fragmentation (constraint) − lack of coordination between procedural authorities (constraint) − recognition of great need for improved coordination in the watershed (facilitating) − confusion about the roles and responsibilities (constraint) − lack of provincial bodies cooperation (İZSU and DSİ) (constraint) − insufficient of training municipal partners and stakeholders/ (constraint)
	Human Capacity	− lack of training municipal partners and stakeholders (constraint)
Policy	The integration of sector regulations	− Weak provincial direction for integration of land use planning and water resources management − Problems based on the boundaries (constraint) − insufficiently 'spatial' and not necessarily lend by Küçük Menderes River Basin Watershed Protection Action Plan(constraint)
	The integration of sector strategies	

CHAPTER 7

CONCLUSION

The aim of this research was to analyze **the integration of land use planning and water resources management** with regard to **the legal framework and institutional structure in Turkey**, and to analyze this integration and included management activities in detail within **Küçük Menderes River Catchment Area**. This chapter summarizes the major findings for each of the research objectives and questions presented in Chapter One. This section concludes with general recommendations for Turkey and for the case study area on the relationship between land use and water resources management, and proposal of a new research agenda that guides further studies on this relationship.

7.1. General Discussions on the Research Findings and Recommendations

In the introduction part of the thesis, subjects to be dwelled upon in the study were pointed out, and the objectives upon which the study would be based and the relating research questions were put forward. Findings about the objectives of the research were supported by the results and presented in Chapter four, Chapter five and Chapter six.

- ***With regard to integration of water resources management and spatial planning:***

In this part, the study attempts to perform two activities. The first is to present both a practical and an informative framework within which integration approaches and management activities at the country level could be categorized and analyzed. The spatial water policies of the selected countries offer new perspectives that require innovations in the planning process, new planning methods, institutional reform and most particularly the organization of the negotiation and cooperation for our country. The experiences of the spatial water policies of the selected countries indicate that the traditional end-of-pipe techniques were not able to solve all water-related problems.

Bringing together water resources management and land use planning creates the opportunity to protect both the water system and an adequate level of spatial quality.

In the light of how spatial planning legislation, policy and guidance have actually contributed to water resource management, it is interesting that the experiences of the case countries offer many valuable lessons not only in planning content, but also in physical planning process. This review on the three case countries demonstrates that the integration concept has high priority on incorporating the aspects of water management into their spatial planning system and process. Specificially, water and land-use are presently high on the political and scientific agenda in Netherlands. In conclusion, Netherlands and England have demonstrably more advanced approaches to address the link of water related issues and spatial planning than Australia has.

Second, the **Integrative Policy Framework** (IPF) for the relationship between land use planning and water resources management set out that a particular part of this inquiry is built upon the work by Eggenberger and Partidario (2000). This experience of IPF is particularly valuable in helping to clarify and develop thinking related to the integration issues that this relationship can address. Such a framework can be used in structuring an analysis of the efficacy of legal and institutional arrangements. An integrated planning, to which the proposed framework could contribute substantially, is urgently needed. A framework is proposed to deal with integrated planning of land use in combination with water for the case of Turkey.

- ***With regard to integration of water resources management and spatial planning in Turkey:***

The review of related legislative framework presented in Chapter five, is an important component of this thesis because legislation provides the framework in which watershed resources management policy is developed. Although the social and policy context in Turkey is quite different from the contexts of the selected case study countries, the experiences are valuable for Turkish physical planners and water managers in order to demonstrate the value of working together to tackle the various water related problems in urban and rural regions. The review indicates that the management of water and land use planning are not adequately integrated in the existing relevant legislation or the related policies of administrating governmental departments.

Although water and land are inextricably linked resources, their policy regimes in Turkey are quite separate. To properly align water resources management and spatial planning in order to achieve the objectives of each regime, the planning systems in Turkey have to apply new standards examining experiences of other countries. The concept for the integration of land use planning and water resources management needs to be created within a system in which the coordinating departments are identified and the roles and responsibilities of each stakeholder are confirmed as parts of an integrated planning process.

The arrangements of water management and spatial planning in policy domains have different features in Turkey. In water management, we find that existing water related policy encourages an accelerated mode of interaction patterns within structures and mechanisms for delivering some of the outcomes of the Water Framework Directive rather than spatial planning. In spatial planning, there is a growing discontent with the `rule and order' of spatial planning with its restrictions.

This study finds that Turkey is in the initial stages of incorporating water resources management into legal system. Current regulatory and legislative frameworks have not yet reflecting the integrated nature of water-land use planning. Although the volume of legal texts related to the integration concept has been steadily increasing, much of the law-making actions in Turkey seem to be ad hoc and piecemeal, or have not been endowed with the necessary institutional authority for enforcement and time adjustment in regard to the support for integrated planning of land use in combination with water. In addition, these legal texts do not have clear requirements on developers in relation to the technical aspects of impact prediction of when to make plans for the future care.

Current regulations do not compel the collaboration between water and land use planners early enough in their long-term planning processes. In Turkish context, a lack of guidelines on a range of technical aspects, inconsistency between performance evaluation requirements and the lack of prescribed regulations act as barriers to the integrative framework.

In addition to these more generic findings, the overriding conclusion is that this study has revealed that the potential of land use planning system at present is not being fully appreciated under the integration pattern in Turkey. Water issues are still insufficiently integrated into law and policy options in national, regional and local level. There is a need to fully identify and characterize the interactions between the water

sector and spatial planning and establish the process for making consistent joint projections for the water sector and land-use.

Hence, it is necessary to make a number of proposals regarding organization, legislation, and planning in accordance with the legislative structure of Turkey. The following highlight policy recommendations to land-use planning at the national level for Turkey, which also address the challenges in applying integrative framework:

1. **Adopt A Holistic Approach**

In Turkish case, there is a need an evidence for **cross-sectoral integration in national policy development** to support their spatial planning systems through river basin management. The national spatial planning law should provide explicit expression on that water resources management and planning is an essential part of the spatial planning/ land use planning process. Turkish government should attempt to shift programs and policies considering governance issues and the integration water aspects into spatial planning process. The integration of global and local issues should be mainstreamed into Turkish national spatial planning policies, strategies for water issues.

At the national level, the guidelines on spatial planning should articulate the role of water in spatial planning. National Development Plan statement should have an importance on how planning can begin to incorporate WFD objectives. In this national spatial policy, a river basin district structure within which demanding environmental objectives should be suggested to reach ecological targets for water areas. Integration land use planning and water resources management should be constituted in Turkish national spatial planning policy as a principle for integrated manner.

As seen Netherlands case, the national spatial strategy for Turkey should include key strategic statements for water as a "structuring principle" which can be an integral element in the spatial planning process. The position of spatial planning should be reinforced as a coordinating activity.

The Turkish national spatial planning strategy should take spatial water policy into account, which means that spatial choices need to be made on the basis of the characteristics of water systems. With European Union Water Framework Directive, River Basin Management Plans have been incorporated into the planning system as a part of national policy.

A national spatial strategy should be developed in Turkey, as examined by the selected countries and the others. The National Spatial Strategy should include a

principle for water. Turkish Government should develop key spatial strategies at national level for the next 20 years to implement a more holistic approach with respect to manage water resources in Turkey. **Three-tiered priority area concept** should be used to establish for incorporation development plans and water resources management regimes. According to River Basin Management Plans (RBMPs), **Priority Intervetion Zones** should be determined for each watershed to manage lands along the river and improve water quality. In these zones, action plans should be prepared to determine measures need to be taken, and identify priorities for the protection, restoration, conservation and enhancement of the river and surrounding area. The priority classifications should be used to provide the basis for future land use decisions: (1) **Priority 1** source protection areas - no degradation of the water source. (2) **Priority 2** source protection areas- no increased risk of pollution to the water source. (3) **Priority 3** source protection areas - manage the risk of pollution to the water source.

To balance urban and water-based land uses, Turkey national planning strategy should put forth specific recommendations for water issues to address specific problems. In Turkey, future oriented national spatial strategy should consider the importance of water source protection, flood management, nature protection.

Key spatial strategies at national level (NLUP) should be produced as an essential aid to implementing national strategies of sustainable land resource use and environmental protection. These should also highlight the importance of water in urban and rural planning issues that need to be addressed as priority policies.

2. Technical and Methodological Cooperation

There is a need to search for the ways of creating innovative approaches, applicable techniques to overcome existing problems in water related urban-rural development schemes. The necessary instruments and methodological tools for sustainable development should be developed to the policy process in a rigorous, systematic and comprehensive manner.

In Turkey statutory framework, there is an immediate need for study on law and policy options for improving the conduct of Strategic Environmental Assessment (SEA). Draft Regulation of SEA should clearly broaden one's scope about what methods are used and how they will be followed by planners. Therefore, to assess of the effects of certain plans and programmes on the environment, The Draft Regulation of SEA should be redrafted to be undertaken for certain plans and programmes likely to

have significant environmental effects, particularly in the context of land use planning. This regulation should start to be applied in the assessments of the land use policies, plans and programs.

For local level planning studies, the planning statutory framework should obligate the assessment methods for identifying tensions growth proposals and environmental requirements and identifying potential solutions to addressing them. These methods should serve a purpose. These should give planning authorities a robust evidence base to assess this. These should identify and asses risk, investigate all the options and issues, and help decide which option/s will best support the watershed and local strategy and related policies. To understand the environmental and physical constraints, water cycle and environmental capacity to development and to bring together all planners, developers, and water managers, these assessment methods should be assist local authorities.

Besides the above- mentioned assessment approaches, The Natural Resources Data Management System (NRDMS) should be developed by Province as a multidisciplinary program that is developing decision support systems to draw together the natural resources data of sectoral agencies, process them to computer compatible format and build up a database for watershed planning in an integral manner. The Turkey Government should pursue the development of an information network to support watershed management.

3. Revisions of Legal Framework

There is a need to replace the ethos of the statutory planning system with a more adaptive and action–oriented planning. In the other words, the law enforcements should contribute to how spatial planning can contribute to addressing the water management issues.

The Regulation on Procedures on Environmental Planning should set out that what regional planning documents include the guiding principles. This regulation should include **explanatory content** which strategies and and actions will support these data, which application tools will be used and how they will be used, which institutions and cooperation will participate, which report will define them.Therefore, this regulation should be revised to be directive in planning and content detail describing the scope of planning language, planning notes, analysis report and plan description reports.

In addition, Regulation on Procedures of Planning and relevant regulations for local plans should contain articles special to requirements in the subjects of aims and policies, principles and procedures, and application tools for water resources protection and planning. This regulation should also be revised on how plans and data to be collected during preparation of the plan should be assessed and what kind of contents they should have. In sum, existing regulations, specifically Regulation of Environmental Planning and Regulation on Procedures of Planning should outline what needs to be done to prepare the ground for the preparation of regional or local plans and their full report content.

For effective horizontal integration, River Basin Management Plans (RBMPs) should consider Regional Spatial Strategies by incorporating all land use requirements and consulting spatial planners. In addition, river basin management plan should have sub-catchment planning. When sub-catchment plan should inform the regional plan in provincial level, municipal water plan should inform the local spatial plan.

The early cooperation of spatial planning and water management authorities should be mandated. The national spatial planning policy should include the legal basis for this coordination. **Professional aggrement between spatial planning and water management authorities** should be mandatory. In other words, the related law should include that working groups of land use and water planner should be involved in the early stage of each other's longterm planning processes in order to voice their mutual concerns, to gain efficiencies, and to standardize assumptions. On the other hand, local authorities and regional planning bodies are involved at an early stage in the development of River Basin Management Plans"

Existing legislative perpectives should be revised to encourage city planner and water managers to work in a coordinative environment and encourage or force public participation in planning studies from the beginning.

4. Effective Institutions At Local, Regional, And National Level

Political leadership and commitment are crucial. For Turkey, each of 25 watersheds should have watershed organization, commonly referred to as WO (or in Turkish HY- Havza Yönetimi). A chief task of each WO should be the development of RBMPs, to consult with the population on this plan, and to coordinate its implementation. Spatial planners and water managers should ensure accessible and transparent communication between the community and key decision-makers. The

creation of community action strategies with creating forums for discussion and opportunities for stakeholders to become involved may be one step towards a greater inclusion of stakeholder groups. Requirements for participation in scoping should be clarified.

5. An Enabling Policy and Regulatory Environment with Harmonization and Completion of Existing Legislation

The harmonization and completion of existing policies and legislation with respect to land use and water resources should be a first priority for this integration of land use planning. Much of the existing legislation should be redrafted or refined, with the objectives of reducing complexity, and eliminating conflicts and confusion in relation to resource management. Water supply, flood management, aquatic management and stormwater management should be gained considerable significance in Turkey policy discussions.

After inventorying all existing policies and laws related to land use and water resources, laws covering all land uses should be drafted with a view to benefiting from the experiences of other countries. On the basis of the findings of this study, the following recommendations can be put forward:

- Laws and regulations should be **internalized** the requirement for this integration. There is a need to provide to how water resources should be considered at each stage of the land use planning. This guidance should include what contents, scales, measures and approval process will need to be delivered through the statutory development planning process. These should also provide guidance for planners and decision makers regarding the consideration of water issues during land use planning.
- There is no regular and comprehensive programme to prepare biodiversity action plan or flood hazard maps for each major river basin in Turkey. In addition to, the range of decision making activity should run from project level through to the strategic level of policies, plans and programmes. The followings can be specific examples of plans and programmes in national and regional context.
  - *Water resources management* (Water Resources National and Regional Strategies; Catchment Abstraction Management Strategies (CAMS), Water Level Management plans (WLMPs);

- *Flood management* (Catchment Flood Management Plans, Flood and Coastal Defence Strategies, Flood and Coastal Defence Capital Programmes; Flood and Coastal Defence Operational Maintenance Programmes)
- *Wastewater resources management (* Regional Waste Strategies)
- *Biodiversity management* (Sustainable Irrigation Program Biodiversity Action Plans, Natural Resources Investment Program);
- *Coastal zone management* (Shoreline Management Plans, Recreation Strategies and Action Plans; Fisheries Action Plans).

• Regulations or enforceable procedures in Turkey should specify the study of growing Sustainable Urban Drainage Systems **(SUDs)** planning in national and local policy framework established.

▪ ***With regard to the integration of water resources management and spatial planning in the case of Küçük Menderes River Basin:***

In addition to above suggestions related to the policy context with the consideration of the water environment and planning system, evidence is presented through a catchment-based case study in Chapter Six. The analysis reveals the identification and assessment of the multi-dimensional character of the problems, the solutions and policy trends in the Küçük Menderes River Catchment Area.

The Institutional Analysis and Design (IAD) framework by Elinor Ostrom and her colleagues has been applied in the case study within contextualising methodologies. The Küçük Menderes case study involves a theoretical analysis of the institutional setting within which collective-choice and operational level decisions are made about water management and land use planning. The evaluation of the integration of land use planning and water resources management is based on five forms of integration: substantive, methodological, procedural, institutional and political (Eggenberger and Partidario, 2000).

This case study has documented the rules guiding and governing the decisions of key stakeholders and whether to engage both two sectors of water and land in development activities. The study has also analyzed how the current rules impact on the conditions in the case area. In addition, this part of the thesis focuses on the analysis of the quality of regional land use plans in terms of mentioned integration. The aim of this study was to improve the understanding of how land use plans and related land

management tools are being utilized by regional and local authorities and the degree to which such plans account for the effects of water related plans.

As defined in Chapter Six, Küçük Menderes River Catchment is seen as one of the most agriculturally productive regions in the Turkey. In order to continue the deserved reputation of supplying with high quality food crops, the River Catchment must appreciate and conserve its vital resources which enable the production of such valuable crops. One of these important vital resources is water. Agricultural production is a significant contributor to one of the biggest water quality problems in the Küçük Menderes River watershed: eutrophication (nutrient loading) of waterways. Other contributors include municipal wastewater, and septic systems. TÜBİTAK-MAM has rated the water quality as ―bad to― very bad along nearly the entire length of the Küçük Menderes River. Küçük Menderes's biodiversity and ecosystems are under pressure as a result of changing land use patterns, changes to water regimes, habitat loss and degradation, invasive species and other threatening processes. This situation is exacerbated by poor rural land use influence.

The findings of this research show that the results of the evaluation of the linkage between the two sectors, based on document analysis, semi-structured interviews and plan quality assessments, are helpful for physical planners and water managers to understand spatial issues, problems and solutions concerning water and land. In the case study context, major efforts for data standardization and data sharing between two planning sectors are necessary to create the conditions for them to work together successfully.

The following results based on the Integrative Policy Framework and recommendations for the planning and management activities in the Küçük Menderes River Catchment Area are discussed below. They are based on characteristics of effective integrated water-land use management in the policy and theoretical literature, and the barriers, and opportunities identified in this study. The following is a list of potential policy options for building better linkages between land use decisions and water supply planning.

- **Substantive Integration:**

Rural land use planning in Küçük Menderes Catchment Area mainly employs prescriptive planning on a watershed basis. Küçük Menderes River Catchment Area requires a rural land use policy to guide the use, development and management of the

land. This guide should encourage revegetation, drainage management, pest and weed management (the management of livestock numbers and areas and fertilizer usage). This policy should also provide a planning framework for regional and local goverments, which aims to integrate catchment objectives as set out in the Küçük Menderes River Basin Watershed Protection Action Plan. It can assist local governments to achieve land use planning outcomes with the objectives of water strategy.

An examination of the written reports and interviews indicates that while water is not accepted as a critical factor in land use planning, these include provisions on water problems. Hence, water is not being addressed as a critical factor in regional and local land use plans in force. Integration of land use planning and water is inadequate.

Recommendation: Adopt and promote a land use and water management strategy

The Küçük Menderes Catchment Area Land Use and Water Management Strategy may be proposed as a key mechanism through which the common decision-making and appraisal steps proposed as part of the research. This strategy should be "**Water-Sensitive Rural Land Use Management / Planning**". This strategy should include the following objectives:

- Adequate domestic –rural water supply
- Protection of surface waters
- Adequate agricultural irrigation water supply
- Protection of water resources from hazardous materials
- Coordinated water management

Notwithstanding, Küçük Menderes River Basin Watershed Protection Action Plan includes overall themes (decrease nonpoint source pollution, decrease water withdrawals, rehabilitate degraded aquatic habitat), this planning strtaegy need to include specific goals (for example) for the Küçük Menderes River as below:

- Reductions by 12 per cent of suspended solids
- Reductions in phosphorus in water by 12 per cent
- Reductions in nitrogen of six per cent
- Reductions in pesticides applied to land by 15 per cent
- Increase by 10 per cent the area of permeable surfaces (in order to slow water runoff)
- Protect 20 per cent of wetlands

- Restore 50 km of riparian areas
- Recycle 20 % treated water by 2012 etc.

The Küçük Menderes Catchment Area Land Use and Water Management Strategy can be proposed to be delivered through:

- **The allocation of priority areas and water quality objectives**: Under the current watershed management scheme, planners need to identify priority watershed/sub-watersheds for land use plans. Priority source protection area map should be proposed. This map recommends the classification of all land in the boundaries of the Küçük Menderes catchment area as priority 1, priority 2 or priority 3 source protection areas.
- **Realignment of the defined planning boundaries:** The development of the land use and water management strategy for the Küçük Menderes catchment area should have an opportunity to review the catchment boundary. Due to the location of the Küçük Menderes catchment area being in the İzmir metropolitan area, there is a need to re-define the area of İzmir Metropolitan Municipality under the enactment of Law No. 5216.
- **Definition of a reservoir protection zone:** To protect the Beydağ Dam from immediate risks to water quality, including human contact, it should be proposed that the area in the immediate vicinity of the reservoir should be managed as a reservoir protection zone. The current Regulation of Water Pollution Control provide for the designation of strict, short , medium and long distant protection zones. The reservoir protection zone for the Beydağ Dam should cover the two kilometers from the dam.
- **Use of planning controls to guide planning decision-making in accordance with water issues objectives:** Land use controls should be proposed to be imposed consistent with the priority classifications. Planning decision making in the Küçük Menderes a catchment area is to be guided by the objectives and controls applicable to the water catchments reservation (priority 1), rural water protection zones (priority 2) and priority 3 areas. The proposed land use controls are listed to be imposed consistent with the priority classifications as below:

  - **Water cathment reservation (priority 1):** A portion of the area identified as water catchments reservation should be proposed for incorporation into a regional or

national park. The west and north of the boundary of the Küçük Menderes catchment area should be defined as water catchment reservation areas. These are generally forests and mountains.

- **Rural water protection zone (priority 2):** A rural water protection zone should be proposed for land located in areas classified as priority 2 source protection areas. Local planning schemes, amendments, subdivision and new land use development approvals in the rural water protection zone should;
    - Not allow urban and industrial development,
    - incorporate lot sizes to suit local conditions that are based on land capability and suitability assessment that do not result in the creation of lots less than two hectares in areas zoned for rural living or equivalent zones,
    - protect and restore waterways through negotiation with developers and landowners about the establishment of suitable setbacks from waterways, limiting clearing, promoting revegetation to create waterway buffers or foreshore areas, and habitat and/or flow enhancement.
- **Other areas in the Küçük Menderes catchment area (priority 3):** The objective of these areas is to manage the risk of pollution to the water source and to manage these areas through the adoption of best management practices. Local planning schemes, subdivision and development approvals in priority 3 source protection areas (as designated in a special control area in the local planning scheme) should:
    - incorporate best practice water-sensitive urban design in all new development and redevelopment proposals
    - protect landscape features, significant wetlands and regionally and locally significant vegetation and incorporate into open public space where possible;
    - incorporate best management practices compatible with water source protection objectives.

In conclusion, **Catchment-Sensitive Farming** should be promoted further. Under Catchment-Sensitive Farming**,** farmers will make a significant contribution towards reducing run-off of sediment and nutrients entering watercources through the production and implementation of soil and nutrient management plans. Therefore, catchment-sensitive farming should be a priority in the Küçük Menderes

River Catchment future, particularly in the light of the impending Water Framework Directive.

- **Methodological Integration:**

In this catchment area, the seemingly obvious link between land use and water resources is often disregarded and undervalued. It is seen throughout the basin that the environmental and strategic impact assessments of the regional planning works on the water resources have not been carried out. The principles of development is determined regardless of environmental appraisal.

On the other hand, Watershed Protection Action Plan is purely based on the primarily biophysical conditions and overall pollution loads. However, this action plan is excluded from the regional and local plans, and policies, and carrying capacities.

Recommendation: Adopt an approach to integrated framework with the usage of GIS

The approach to integrated appraisal should initially be developed and applied at the policy level. Such approach should provide for Küçük Menderes River Basin Management with the opportunity to screen options and proposals conceived at all levels of the decision-making hierarchy against a checklist of economic, social and environmental concerns and identify potential impacts.

It should be developed a generic process for consideration of water resources management activities in local and regional land use plans, taking strategic environmental assessments or sustainability appraisal into account. This assessment should be mandatory for preparing these plans, such as mentioned in England case. The status of environmental appraisal of development plans (Manisa-Kütahya-İzmir Environmental Development Plan and İzmir Metropolitan Municipality Urban Region Development Plan (İKBNİP-2009) should be discussed through this appraisal.

Planning bodies should integrate the early, evidence gathering stages of the plan-making and **Strategic Environment Assessment** processes in order to foster a more efficient and effective approach. Sustainable threshold assessment may be realized as a better approach for the consideration of development in relation to the water environment than constraints mapping in Küçük Menderes.

In addition, SEA or strategic appraisal procedure should be designed as shown in ‘Sustainable Management of Urban Rivers and Floodplains (SMURF)’ case, mentioned in 4.1.2.3. Better information infrastructure (e.g. statewide GIS data) should support

local planning and development efforts in the case area. The development of **an information network** should be pursued to support Küçük Menderes watershed management. This network can provide the base conditions to planner and water managers to carry out the analysis of the spatial impact of the land use decisions on the water resources. This network will provide an easier way to use the ability of the GIS to make analysis and to create alternatives.

- **Procedural Integration:**

The results of the content analysis of regional plans suggest that this integration is rarely visible in the regional land use plans. The quality of plans and thire reports, including Manisa-Kütahya-İzmir Environmental Development Plan and İzmir Metropolitan Municipality Urban Region Development Plan (İKBNİP-2009) are perceived to be poor in order to deliver successfully in rural areas. Water and land use planning are not sufficiently integrated and within the different boundaries (natural and administrative) having significant problems in the case study area. The results found are as follows:

- Manisa-Kütahya-İzmir Environmental Plan and İzmir Metropolitan Municipality Urban Region Development Plan (İKBNİP-2009) do not discuss and revise the evaluation of impacts of existing and proposed land use decisions and the adequacy of mitigation measures, based on the baseline data and projected data summarized in Küçük Menderes River Basin Watershed Protection Action Plan. Evidence assembled for both plans is **insufficiently 'spatial'** and **does not necessarily lend** themselves to the development and the testing of alternatives related to water environment in Küçük Menderes.
- In these plans, a number of the water issues were not really addressed adequately. The both regional development plans applying in the watershed did not identify **priority areas** for water related issues, such as water quality protection, flood management etc.
- The Manisa-Kütahya-İzmir Environmental Plan does not have a solution related with water issues by using land use measures. The plan does not propose policies and measures for river bank clean-ups, wastewater improvements, doing an inventory of industrial effluents, addressing combined sewage system overflows, improving waste storage sites, rehabilitating wetlands and general water quality monitoring.

- There is a discrepancy between Küçük Menderes River Basin Watershed Protection Action Plan and Manisa-Kütahya-İzmir Environmental Plan based on population forecasting (horizontal integration). Their population forecastings in the same watershed do not figure in any meaningful way in provincial and local land use planning and water resources management, and also in policies and activities. Küçük Menderes River Basin Watershed Protection Action Plan is particularly in relation to the technical aspects of impact prediction.

Recommendation: Strengthen the Role of Spatial Planning & Provide Consistency Between Two Sector Plans

In view of the weak performance of current planning practices, the key question is how to strengthen the role of spatial planning. The recommendations for land use plans are listed below:

- In these plans, water criteria must be identified, particularly information on the water usage ratios, current and proposed water consumption requirements, flood management areas and protection regions, location and consequences and impacts.
- These plans should focus on providing an evidence base and a framework which better reflects the scope of the alternatives that are likely to be considered. This plan should also **guide strategic development to locations offering greater protection from impacts such as flooding, erosion, pollution, water shortages and subsidence.** These plans should review the implementation strategies throughout the river basin. The Küçük Menderes River Basin Watershed Protection Action Plan requirements should be reflected in the statutory spatial plans, where measures will need to be delivered through the development planning process. In line with Watershed Protection Action Plan, Manisa-Kütahya-İzmir Environmental Development Plan and İzmir Metropolitan Municipality Urban Region Development Plan (İKBNİP-2009) should identify the spatially priority areas and zones that change with distance with away from the river. These plans should include priority areas according to the strategy. Some of the Best Management Practices (BMPs) prioritized for this area should be applied that include streambank stabilization, riparian buffers, slope / shoreline stabilization, revegetation, etc. Best Management Practices emphasized will be directly related to causes of water quality degradation.

The following zones should be invested to protect high value assets threatened by ecosystem deterioritation, soil degradation, dryland salinity, nutrient pollution: (a) Beydağ and Kiraz Zone, (b) Bayındır zone (soil degradation impacts (sediment and nutrients); (c) Tire-Ödemiş Zone; (d) Torbalı Zone; (e) Selçuk Zone.

- The plans should provide design objectives to mitigate cumulative effects on water bodies.
- Manisa-Kütahya-İzmir Environmental Plan should contain overarching policy for water with some aspects developed in further detail. The followings should be a component of this plan:
  - 20-year projection of water supply needs and service areas based on sound comprehensive planning principles;
  - Protection of watershed and evaluation of surface and ground water resource impacts, and actions necessary to maintain or improve water quantity and quality to meet projected needs and to maintain the ecological, and recreation functions of the water resources;
  - A stormwater and flood plain management element addressing the on-site prevention, retention and treatment of stormwater runoff;
  - Future diffuse pollution reviews, scientific evidence and related strategies and policy development that will derive from them and future development of agriculture-specific and forestry-specific regulations addressing issues of significant risk should be taken into account.
  - Water availability review. More accurate population projections are needed to determine capacity in relation to the projected demand.
- Manisa-Kütahya-İzmir Environmental Development Plan should suggest pest and weed management, water conservation measures, buffer strips around waterbodies, and installation of fencing to prevent livestock access to watercources to increase rural pollution. It should also include rainwater harvesting schemes etc.

On the other hand,

- There is a need for the integration of Manisa-Kütahya-İzmir Environmental Plan, İzmir Metropolitan Municipality Urban Region Development Plan (İKBNİP-2009) and Küçük Menderes River Basin Watershed Protection Action Plan. Therefore, the spatial and water planning systems should be aligned to

ensure the analysis for river basin management (and the River Basin Management Plans) feeds into the evidence and appraisal process required for all plans and the consideration of local-level planning applications.

- There is a need for a good flow of information and knowledge between the water managers and planners to help in reaching the right decisions. Therefore, the local government and regional authorities or planning officers should seek advice from İZSU and DSİ where the planning application has the potential to impact on water quality or other environmental values not only **before data collection – analysis stage** but also **before approval stage of the plan**

- **Institutional Integration:**

As demonstrated in numerous river basins in the world, watershed management or catchment management has the potential to facilitate the development of partnerships. However, in Küçük Menderes, there is a necessity for provincial government to endorse the watershed management approach and to support it with appropriate institutional arrangements. Discussions on the results reached at the case study can be listed as follows:

- There is a lack of leadership at regional and local levels. Küçük Menderes Basin Environment and Infrastructure Union was established to create an integrated and effective water quality management in the Küçük Menderes Basin. Hovewer, this union has not been effective.
- There is a need for good relationships between water companies and local planning authorities.
- The existence of boundary differences in the case areas is the potential cause in coordination and leadership problems. Many participants stated that there is a great need for improved coordination in the process, in relation both to local government responsibilities and to those of sectoral authorities. Because of the considerable problems caused by the boundary problems, a lack of trust between local and provincial government was remarked upon.

Recommendation: Active Leadership in Regional Coordination and Clarity of the roles

There are, however, a few points still requiring clarification about these roles and responsibilities. In the case area, leadership and co-ordination in the region should

be provided through an authoritative and consistent source of information on planning and management priorities.

In the Küçük Menderes watershed, the organization should be called the WO–K.Menderes. In order to keep abreast of wider developments, the new WO- K. Menderes should strengthen existing links with Government and the other statutory bodies, as well as universities and other institutions, and consider establishing an informal external working group on integrated appraisal to share experience. The WO–K.Menderes should help gather water quality data in partnership with the various universities (EGE, DEU, IYTE etc), towns, municipalities and community groups. While the WO–K. Menderes acts at planning and consultation levels, sub-basin entities work with farmers on a more regular and constant basis (the WO–K.Menderes works more with Ministries, interest groups and municipalities).

Municipalities actively work on integrating and better coordinating land-use planning with Strategic Environmental Assessment and Water Cycle Study processes. Furthermore, municipalities should be primarily responsible for data collection, parameters and standards. The national government will play a major role in the establishment basic databases. Therefore, provincial level database will facilitate planning across municipal boundaries.

In addition, relevant institutions (DSİ, Ministry of Environment and Urban Planning and municipalities should strengthen capacity in terms of finance and human resources.

In sum, regional institutional capacity should be strengthened. The related recommendations for institutional integration are described below:

- Local planning authorities should consult early with the statutory consultees when preparing development plans and development briefs.
- University and professional bodies should be involved in capacity building in the design and construction sectors through introducing water related planning approaches.
- There should be increasing awareness and expertise at local level of water–land use development through programs targeting local governments.

- **Policy Integration:**

While many actions are being taken to increase water quality and decrease the pollution, there is a sense that these are **piecemeal efforts** which are not up to the scale of the challenge. Taken together, these findings suggest that water resources and land use planning are not as coordinated as they could or should be, describing in the section 4.3. The findings for policy integration in the case study can be summarized as below:

- There is a lack of a regional programme or standards.
- There is a lack of implementation of requirements and recommendations at the local level; for example agriculture and intensive livestock operations.
- Intensive livestock operations and agriculture activities, are important potential pollution sources for the Küçük Menderes, and are not constrained by the current actions.
- There is no statutory duty to provide sustainable drainage and no common standards to work towards.

Recommendation: Strenghten Watershed Protection Action Plan for Küçük Menderes

The River Basin Watershed Protection Action Plan for Küçük Menderes should depend on the main objectives: (1) a good water quality to meet the objectives of Water Framework Directive (included in the River Basin Watershed Protection Action Plan); (2) **water awareness to ensure that water has a clear role in rural land use development**.

Stream restoration, improvement of ecological corridors, water retention and improvement of water related recreation should be main goals for Küçük Menderes River Basin Watershed Protection Action Plan. This plan should identify the key water resource management issues for the River Basin and their priorities. There will be a series of "component plans" related to resource management, which cover areas like flood control, groundwater management, catchment abstraction management, and water allocation, so on.

This plan should also include innovative measures such as the restoration of natural streams, nature-friendly river banks, green-blue belts, pollution source control and purification, disconnection of rainwater and sewage, good maintenance and manage of sewage systems. Location of measures and alternatives should be shown along the Küçük Menderes River.

This action plan should also provide guidance on sustainable water management be provided through supplementary planning guidance and mandatory requirements, such as environmental targets, could be incorporated in planning schemes and building codes. Watershed-sensitive planning should include the consideration of stream setbacks, clustering development, water quality considerations, and environmental assessments for other important or sensitive resources. For example: land requirements to meet stormwater management objectives should be addressed at each stage in the planning framework. In addition, a strategy for securing land for stormwater management and guidance regarding long term management responsibilities are needed. The policy guidance should be produced to make specific reference to the need of promoting better water quality outcomes and to the roles of agriculture and forestry.

In conclusion the land use plans and strategies should be included by River Basin Management Plans (RBMPs). On the other hand, it should ensure that the land use plans complement RBMPs.

Evaluation of the arrangements and management activities through the close view provided by the Integrative Policy Framework (IPF) utilized in this dissertation can provide useful insights regarding the decisions of provincial authorities' vice versa local governments or, potentially, land use and water planning bodies.

The findings throughout the above studies found, in paralel with the argument of the study, indicate that water and land use planning are not as coordinated as they could or should be. As mentioned by Ivey et al. (2006), lack of formal mechanisms for integration of land use planning and water resources management is a key concern for the case. There is evidence from this research that the lack of strong enabling environment for this integration is a significant barrier. In addition, this study has answered initial questions regarding the strength of the land use-water resource management in land use plans. How is land use considered in water related plans? Are land use plans considered when making local and regional water (watershed action plan eg) plans and vice versa? How can such connections be strengthened? This study is a recommendation to develop a community guide highlighting how attention to land use plans can help water managers/planners.

The results suggest that a shifting governance regime for drinking and irrigation water safety in Küçük Menderes River Catchment Area is required to contribute to integration between land use and water management. However, proactive and ongoing efforts are required to ensure that integration.

7.2. Directions for Future Research

This study examines the watershed-level capacity for the relationship between land use planning and water resources management in Küçük Menderes River Catchment Area. It contributes to the understanding of some of the opportunities and constraints to the relationship between them. However, during the research, many questions has aroused that could not be addressed given the scope of this study. These questions may provide opportunities for further research, which could contribute to greater understanding of this relationship in the case study area. The subjects for future research can be summarized as follows: **(a)** *Assessment of land use conversion and imperviousness of urban and rural development in the Küçük Menderes River context*. As mentioned before, this study is based on theoretical analysis of the institutional setting. The further case study can be an empirical analysis of the decisions on the catchment area in responding to the use of this to simulate a number of policy options. GIS spatial analysis tools within the ArcGIS environment can be used to measure and evaluate the spatial temporal data of Küçük Menderes. This analysis may focus on three types of areas: surface buffer bodies, riparian buffer zones of surface water bodies and urban land coverage in the built up area. **(b)** *Assessment of land use and water policies, plans and programs using Stratejic Environment Assessments (SEA) approaches and tools to analyse both the current shortcomings in the water environment and the impact of planned and unplanned development*. For instance, Sustainability Threshold Analysis, described in section 4.3.2.2. can be used to assess the alternative locations for development and the impacts of individual developments where no alternative sites are avaliable. **(c)** *Analysis of the relative strength of planning policy relating to SUD (sustainable urban drainage) systems to be undertaken at the regional, subregional and local scale, including analysis of the SUD policies of the seven local authorities located in the Küçük Menderes River Catchment Area.* This can be designed to shed light on any relationship between the content or strength of planning policy and the actual implementation in practice, thus helping to identify both good practice and barriers to implementation. **(d)** *The regional dynamics and local effects of water right marketing in Turkey river basins*. **(e)** *Comparison of the capacity for the relationship between land use planning and water resources management to other watersheds in Turkey*.

REFERENCES

Agrawal, A. (2000). Small Is Beautiful, but Is Larger Better? Forest-Management Institutions in the Kumaon Himalaya, India. In Gibson, C., McKean, M., & Ostrom, E. (Eds.), *People and Forests: Communities, Institutions, and Governance*. (pp. 57-85). Cambridge, MA: MIT Press.

Alexander, E. R, & Faludi, A. (1989). Planning and Plan Implementation: Notes on Evaluation Criteria. *Environment and Planning B* (16):127-140.

Alterman, R., & Hill, M. (1978). Implementation of Urban Land Use Plans. *Journal of the American Planning Association*, 44(3), 274-285.

Anderson, C., Meyer, J., Podolsky, L., & Stoner, P. (2008). *Water Resources and Land Use Planning: Watershed-based Strategies for Amador and Calaveras Counties*. Editing+Design. California State Water Resources Control Board. Retrieved from http://water.lgc.org/amador-calaveras/amador20watershed%20plan%202.pdf/view.

Arnold, C. A. (2005). Is Wet Growth Smarter Than Smart Growth?: The Fragmentation and Integration of Land Use and Water. *The Environmental Law Reporter* 35: 10156-10158.

Arnold, C. A. (2006). Clean-Water Land Use: Connecting Scale and Function. *Pace Environmental Review* 23 (2): 291-350.

Arnold, C. A., Norton, C., & Wallen, D. (2009). Kentucky Wet Growth Tools for Sustainable Development: A Handbook on Land Use and Water for Kentucky Communities. University of Louisville Center for Land Use and Environmental Responsibility. Retrieved from louisville.edu/landuse/Title_Pages_TOC_Chapter %201_ Introduction.pdf

Baer, W. (1997). General Plan Evaluation Criteria: An Approach to Making Better Plans. *Journal of the American Planning Association*, 63:329-344.

Baker Associates. (2005). *The Relationship Between the Land Use Planning System and the Water Framework Directive*. Environment Agency. Bristol.

Balaban, M. Ş. (2009). *Risk Society and Planning: The Case of Flood Disaster Management in Turkish Cities.* (Doctoral dissertation, METU, 2009).

Bandaragoda, D.J. (2000). *A Framework for Institutional Analysis for Water Resource Management in a River Basin Context*. Working paper 5. Colombo, Sri Lanka: International Water Management Institute.

Barr, L. (2008). Spatial Planning in England: Harmonizing National and Local Priorities. Dept. of Communities and Local Governments. *Paper presented at 3. Bölgesel Kalkınma ve Yönetişim Sempozyumu"Planlamadan Uygulamaya"*, Mersin, TEPAV, Ankara: Matsa Basımevi.

Başaran, A., & Bölen, F. (2005). A Method for Strategic Decision Making In a Watershed: Game Theory. *Paper presented at the 45th Congress of the European Regional Science Association*, Vrije Universiteit, Amsterdam.

Bauer, A., & Rametsteiner, E. (2007). Policy Integration and Co-ordination: Theoretical, Methodical and Conceptual Aspects. In: Rametsteiner, E. (Ed.), *Proceedings of the 1st COST Action E51 Joint MC and WG Meeting*, October 12-14, 2006, Grosspetersdorf, Austria, University of Natural Resources and Applied Life Sciences, Vienna; Department of Economic and Social Sciences:31-48. Access: 15042011.

Baumann, Duane D. & Boland. J. (1998). The Case for Managing Urban Water, in Duane D. Bauman, John J. Boland and W. Michael Hanemann (Eds.), *Urban Water Demand Management and Planning*, McGraw Hill, 1998, pp 1-30.

Bayındırlık ve İskan Bakanlığı. (2009). *İklim Değişikliği, Doğal Kaynaklar, Ekolojik Denge, Enerji Verimliliği ve Kentleşme Komisyonu Raporu*. Kentleşme Şurası. Ankara.

Becker-Goss, K. (2007). *Urban Floodplain Management in Europe and America: Related to Flood Damage Prevention: a Few Examples and Strategies Compared*. Research project. Second Phase Environmental Science, Saxion University, Deventer, Netherlands University of Greenwich, London, England, UK.

Berke, P., Roenigk, D., Kaiser, E. & Burby, R. (1996). Enhancing Plan Quality: Evaluating the Role of State Planning Mandates for Natural Hazard Mitigation. *Journal Environmental Planning Management, 39*: 79–96.

Berke, P., Crawford, J., Dixon, J., & Ericksen, N. (1999). Do Cooperative Environmental Planning Mandates Produce Good Plans? Empirical Results From the New Zealand Experience. *Environment and Planning B: Planning and Design 26*: 643-664.

Berke, P., & Manta-Conroy, M. (2000). Are We Planning For Sustainable Development? An Evaluation of 30 Comprehensive Plans. *Journal of the American Planning Association, 66* (1): 21-33.

Berke, P., & Godschalk, D. (2007). Evaluating Land Use Plan Quality. Conference on the Science and Education of Land Use. September 24-26, 2007, Washington, D.C.

Berkshire Regional Planning Commission. (2001). *Berkshire Planning Tools: Stormwater Management*.

Birmingham City Council. (2007). The Birmingham Plan: Sustainable Management of Urban Rivers and Floodplains Supplementary Planning Document. Retrieved from http://www.birmingham.gov.uk/cs/Satellite?c=Page&childpagename=Development%2FPageLayout&cid=1223092715125&pagename=BCC%2FCommon%2FWrapper%2FWrapper.

Bleier, C. (2004). *Principles for Integrated Planning in Watersheds*. Retrieved Feb. 7, 2005, from http://cwp.resources.ca.gov/integrated_planning.html.

Blomquist, W. (1994). Changing Rules, Changing Games: Evidence from Ground-Water Systems on Southern California. In Ostrom, E., Gardner, R., & Walker, J. (Eds.), *Rules, Games, and Common-Pool Resources* (pp. 283-300). Ann Arbor: University of Michigan Press.

Böhm H. R., Haupter, B., Heiland, P., & Dapp, K. (2004). Implementation of Flood Risk Management Measures Into Spatial Plans and Policies. *River Research and Applications,* 20(3): 255–267.

Brabec, E., Schulte, S., & Richards, P. L. (2002). Impervious Surfaces and Water Quality: A Review of Current Literature and Its Implications for Watershed Planning. *Journal of Planning Literature*, 16: 499–514.

Bradley, K. (1999). Environemental Appraisal of Regional Development Plans in the Context of the Structural Funds. *Environmental Impact Assessment Review,* 19: 245-247.

Briassoulis, H. (2004). 'Policy Integration for Complex Policy Problems: What, Why and How'. In Greening of Policies: Interlinkages and Policy Integration, Berlin, 3–4 December.

Briassoulis, H. ed. (2005). *Policy Integration for Complex Environmental Problems: The Example of Mediterranean Desertification*. Aldershot: Ashgate.

Bolposta, R. & Dedekorkut, A. (2006). The Integration of Urban Planning and Water Supply Management". Paper presented at *Antalya İçme Suyu ve Sorunları Sempozyumu,* The Chambers of Architects of Turkey and Antalya Kent Konseyi. Antalya.

Boyacıoğlu, H., & Alpaslan, M. N. (2002). *Su Kalitesi Yönetiminde Yeni Bir Yaklaşım: Günlük Maksimum Yük (GMY) Analizi*. DEÜ Araştırma Projesi.

Brody, S. D. (2003a). Are We Learning to Make Better Plans? A Longitudinal Analysis of Plan Quality Associated With Natural Hazards. *Journal of Planning Education and Research,* 23: 191–201.

Brody. S. D. (2003b). Measuring the Effects of Stakeholder Participation on the Quality of Local Plans Based on the Principles of Collaborative Ecosystem Management. *Journal of Planning Education and Research,* 7 (4): 107–119.

Brody, S. D., Highfield, W., & Carrasco, V. (2004). Measuring the Collective Planning Capabilities of Local Jurisdictions to Manage Ecological Systems in Southern Florida. *Landscape and Urban Planning*, 69: 33–50.

Brown, R., Keath, N., & Wong, T. (2008). Transitioning to Water Sensitive Cities: Historical, Current and Future Transition States. In Ashley, R.M. (Ed). Paper

presented at *Proceedings of the 11th International Conference on Urban Drainage*, Edinburgh, Scotland, 31st August - 5th September 2008, CD-ROM.

Burak, S., Duranyıldız, L., & Yetiş, Ü. (1997). *Ulusal Çevre Eylem Planı: Su Kaynakları Yönetimi*. Devlet Planlama Teşkilatı, Ankara.

Burby, R. J., & May, P. J. (1997). Making Governments Plan: State Experiments in Managing Land Use. Baltimore, MD: Johns Hopkins University Press.

California State Coastal Conservancy, & Jones&Stokes. (2006). Watershed Management/ Habitat Protection and Restoration Component of the San Francisco Bay Area Integrated Regional Water Management Plan (Bay Area Watershed Plan). Oakland, CA. Retrieved from http://www.bayareawatershedplan.net.

Calkins, H. W. (1979). The Planning Monitor: An Accountability Theory of Plan Evaluation. *Environment and Planning A* 11: 745-758.

Carter, N. 2002. *Integrated and Sustainable Land-use Planning and Groundwater Management in Ontario Municipalities*. Unpublished MSc Thesis. Geography Department, University of Guelph, Guelph, Ontario.

Carter, N., Reid. D. Kreutswiser, ve Rob C. De Loé. (2005). Closing the Circle: Linking Land Use Planning and Water Management at the Local Level. *Land Use Policy*. 22: 115-127.

Carter, J. G. (2007). Spatial Planning, Water, and the Water Framework Directive: Insights From Theory and Practice. *The Geographical Journal*, 173 (4): 330-342.

Chapman R., Goldberg, E., Salmon, G., & Siner, J. (2003). *Sustainable Development and Infrastructure*. Report for the Ministry of Economic Development. , A report for the Ministry of Economic Development, Maarama Consulting, Wellington. Retrieved from http://www.med.govt.nz/upload/17953/maarama.pdf.

Chilbek, B., Chislett, G., & Norris, G. (1993). Land Development Guidelines for the Protection of Aquatic Habitat. Government of British Columbia, Ministry of Environment, Lands and Parks and the Department of Fisheries and Oceans. *Habitat Management Division*, Pacific Region.

City of Wanneroo. (2010). *Local Planning Policy 4.4: Urban Water Management (LPP 4.4)*.

Collin, M. L., & Melloul, A. J. (2001). Combined Land-Use and Environmental Factors For Sustainable Groundwater Management. *Urban Water* 3: 229-237.

Cortner, H. J., & Moote, M. A. (1994). Trends and Issues in Land and Water Resources Management: Setting the Agenda for Change. *Environmental Management* 182, pp. 167–173.

Coşkun, A. A. (2010). AB Su Çerçeve Direktifi Açısından Türk Hukukunda Nehir Havza Yönetim Planlaması. *Süleyman Demirel Üniversitesi Orman Fakültesi Dergisi A* 1:43-55.

Çakmak, B., Uçar, Y., & Aküzüm, T. (2006). Water resources management, problems and solutions for Turkey. Paper presented at International Congress on River Basin Management, Ankara, Turkey.

Çevre ve Orman Bakanlığı. (2004). Türkiye Çevre Atlası, Ankara. Retrieved from www.2cedgm.gov.tr/dosya/cevreatlasi/atlasin.metni.pdf.

Çevre ve Orman Bakanlığı, (2005). *Taslak SÇD Yönetmeligi, Çevre ve Orman Bakanlığı SÇDYönetmeligi'nin Çıkarılması Projesi Çalışmaları*, Ankara.

Dalton, L. C., and Burby, R. J. (1994). Mandates, plans, and planners: Building local commitment to development management. *Journal of the American Planning Association, 60*(4), 444–461.

Department of Communities and Local Government (DCLG). (2009). *Planning Policy Statement 25: Development and Flood Risk Practice Guide* (*PPS25: Practice Guide).*

DCLG. (2009a). PPS 25 – Appendix A – Risk Based Sequential Approach Table D.1 Annex D: The Sequential Test and Exception Test.

Department for Communities and Local Government (DCLG). (2008). Regional Spatial Strategy and Local Development Framework Core Output Indicators - Update 2/2008. Retrieved from http://www.communities.gov.uk/documents/planningand building/pdf/ coreoutputindicators 2.pdf

DCLG. (2010). Planning policy statement 25: Development and flood risk, London.

de la Motte, R. (2004). *D10h: WaterTime National Context Report*– Netherlands. Retrieved from http://www.watertime.net/docs/WP1/NCR/D10h_Netherlands.doc.

de Loë, R.C., S. E. Digiantomasso, and R.D. Kreutzwiser. (2002). Local capacity for Groundwater Protection in Ontario. *Environmental Management 29(2)*: 217-233.

Defra. (2005). *Making space for water: developing a new Government strategy for flood & coastal erosion risk management in England* – Consultation, London: Defra.

Defra. (2005a). *Consultation on river basin planning guidance*, London.

Devlet Planlama Teşkilatı Müsteşarlığı. (2005). *Ulusal Kırsal Kalkınma Stratejisi*. Ankara.

Dodson, J. (2009). The 'Infrastructure Turn' in Australian Metropolitan Spatial Planning, *International Planning Studies, 14(2),* pp.109-123.

DoE (Department of Environment - Government of Western Australia). (2004). *Land use compatibility in Public Drinking Water Source Areas*. Australia.

DPT. (1998). *National Environmental Action Plan / Türkiye Ulusal Çevre Stratejisi ve Eylem Planı,* Devlet Planlama Teşkilatı (SPO), Ankara. Retrieved from http://ekutup.dpt.gov.tr/cevre/eylempla/ucep.html

DPT. (2001). *Su havzaları kullanımı ve yönetimi özel ihtisas komisyonu raporu. Sekizinci Beş Yıllık Kalkınma Planı*, DPT 2555, ÖİK 571, Ankara.

DPT. (2007). *Dokuzuncu Kalkınma Planı: Toprak ve Su Kaynaklarının Kullanımı ve Yönetimi: Özel İhtisas Komisyonu Raporu*.

Du, N. (2010). Integrating Surface Water Management in Urban and Regional Planning, Case Study of Wuhan in China. (Doctoral dissertation,Utrecht University, 2010).

EA (Environment Agency). (2004). *River Tame Strategy Scoping Report*.

EA (Environment Agency). (2006). *The Water Framework Directive and Planning: Initial Advice to Planning Authorities in England and Wales*, EA, Bristol.

EA (Environment Agency). (2009). *River basin management plan, Thames River Basin District. Annex J: Aligning Key Planning Processes To River Basin Management*.

Environmental Protection Department (EPD). (2007). *Review of the International Water Resources Management Policies and Actions*

Eggenberger, M. and Partidario, M. (2000). Development of a framework to assist the integration of environmental, social and economic issues in spatial planning. *Impact Assessment and Project Appraisal* 18(3): 201-207.

Engineers Australia. (2006). *Australian Runoff Quality A Guide to Water Sensitive Urban Design. Engineers*, Australia.

Enserink, B., Kamps, D, & Mosterd, E. (2003). Public participation in river basin management in the Netherlands. The HarmoniCOP project—workpackage 4—case study of the Netherlands, Osnabrück, Germany.

Erdem, N., & Coşkun, A. A. (2006). Avrupa Peyzaj Sözleşmesi Hükümlerinin Türk Planlama Mevzuatına Uyumluluk Analizi. *İstanbul Üniversitesi Orman Fakültesi Dergisi*.

Ersoy M. (2006). *İmar Mevzuatımızda Planlama Kademeleri ve Üst Ölçek Planlama Sorunu.* Paper presented at *Bölgesel Kalkınma Ve Yönetişim Sempozyumu*, Mimarlik Faculty & TEPAV.

Essential Environmental Services (2004). *Water Sensitive Urban Design and the Development Approvals Process: Identification of Issues and Potential Solutions for Better Implementation.* Report for the Drainage Management Forum.

Directive 2000/60/EC of the European parliament and of the council of 23 October 2000 establishing a framework for community action in the field of water policy,

European Community (EC), 2000, *Official Journal of the European Communities L327*, pp. 1–72.

Falkenmark, M. (1981). Integrated View of Land and Water: the New Cornerstone . *Environmental Planning*. Geografiska Annaler, 63A: 261- 271.

Far North Queensland Regional Planning Advisory Committee. (2007). *Far North Queensland Draft Regional Water Supply Strategy,* Draft Regional Water Supply Strategy, Queensland.

Federal Ministry of Transport, Building and Urban Development (BMVBS). (2010). *National strategies of European countries for climate change adaptation: A review from a spatial planning and territorial development perspective*. (BMVBS-Online-Publikation, No. 21/2010).

Fernandez-Armesto, F. (2000). *Civilizations*. Macmillan, London.

Franks, T. (1999). Capacity building and institutional development: reflections on water. *Public Administration and Development* 19, 51–61.

Frederick County Division of Planning. (2010a). *Frederick County's Water Resource Element*. Maryland.

Freistaat Sachsen. (2006). Preventive flood management measures by spatial planning for the Elbe river basin, ELLA; Dresden.

Friesecke, F. (2004). Precautionary and Sustainable Flood Protection in Germany – Strategies and Instruments of Spatial Planning, *Paper presented at 3rd FIG Regional Conference*, Jakarta, Indonesia. Retrieved from http://www.fig.net/pub/jakarta/paper s /ts_ 16/ts_ 16_2_ friesecke.pdf

Grant, L. (2010). *Multi-Functional Urban Green Infrastructure. The Chartered Institution of Water and Environmental Management* (CIWEM). Retrieved from www.ciwem.org/FileGet.ashx?id=1875&library=Public%20Access.

Geray, U., & Küçükkaya, İ. (2001). Havza yönetim modeli üzerine düşünceler. Retrieved from http://www.cekulvakfi.org.tr/img/doc/havzayonetimmodeli.doc 01.06.2009

Grontmij. (2004). *Su çerçeve direktifinin Türkiye'de uygulanmasi, uygulama el kitabi, Handbook. Implementation of the Water Framework Directive in Turkey - Final.* (Senter International Reference: MAT01/TR/9/3, Document number: 13/99044324/MJH), Grontmij Consulting Engineers, Houten, April 2004.

Goddard, T. (2004). Adequacy of Municipal Water Supplies to Support Future Development in the City of Santa Cruz Water Service Area. Prepared for The City of Santa Cruz Water Department.

Godschalk, D.R., Kaiser, E.J. & Berke, P.R. (1998). Integrating hazard mitigation and local land use planning, in: R. Burby (Ed.) *Cooperating with Nature: Confronting*

Natural Hazards with Land-Use Planning for Sustainable Communities. Washington DC, Joseph Henry Press.

Government of Western Australia (WA). (2003). *State Planning Policy 2, Environment and Natural Resources*, State Law Publisher, Perth, Western Australia. Retrieved from http://www.wapc.wa.gov.au/ Publications

Government of Western Australia (WA). (2006). *State Planning Policy No. 2.9 Water Resources.*

Government of Western Australia, Department of Water. (2008). *Urban water management plans: Guidelines for preparing plans and for complying with subdivision conditions*. Department of Water, Perth, Western Australia.

Government of Western Australia- Department of Water (DoW). (2009). *Southern River integrated land and water management plan*. Perth Western Australia.

Grimes, P. M. (2001). Urbanization and water in the Northern San Joaquin Valley. MSc of Science (Civil and Environmental Engineering), University of California Davis.

Grontmij. (2006). *Final design lay-out: Dynamic Brook Valley* (Eindontwerp Inrichtingsplan Dynamisch Beekdal). Waterschap Aa en Maas: .s-Hertogenbosch.

Gunderson, L., & Holling, C. S. (2001). *Panarchy: Understanding Transformations in Humanand Natural Systems.* Island Press, Washington DC.

GWP. (2004). *Catalyzing change: a handbook for developing integrated water resource management and water efficiency strategies*, GWP, Stockholm.

GWP-TAC. (Global Water Partnership - Technical Advisory Committee). (2000). *Integrated Water Resources Management.* TAC Background Papers No. 4. (GWP, Stockholm, Sweden).

Hanak, E., & Simeti, A. (2004). *Water Supply and Growth in California: A Survey of City and County Land-Use Planners,* Occasional Papers, Public Policy Institute of California, San Francisco, CA.

Hanak, E. (2005). *Water for Growth California's New Frontier*. Public Policy Institute of California: San Francisco, CA.

Heathcote, Isobel W. (1998). *Integrated Watershed Management: Principles and Practice.* John Wiley and Sons,Inc.: New York.

Hirschman, D., & Kosco, J. (2008). M*anaging Stormwater in Your Community: A Guide for Building an Effective Post-Construction Program. Center for Watershed Protection*. Ellicott City, MD. Retrieved from http://www.cwp.org/Resource_Library/ Controlling_Runoff_ and_ Discharges /sm.htm

Hobma, F.A.M., & Schutte-Postma, E.T. (2008). *Planning Law in the Netherlands: An Introduction*. Delft University of Technology.

Hoch, C. (1998). Evaluating plan pragmatically. *Paper presented at the 40th Annual Conference*, Association of Collegiate Schools of Planning, Pasadena, CA, November 5.

Hopkins, L. D. (2001). *Urban development: The logic of making plans*. Washington, D.C., Island Press.

Howard County. (2009). *Water Resource Element-Research Paper: Stormwater Management and Nonpoint Source Pollution*. Retrieved from www.co.ho.md.us /DPZ/Environment/environment.htm

Howes, H. (2008). *Strategic Planning for Water*. Taylor & Francis. Abingdon, UK.

HRWC (Huron River Watershed Council (2004). *Watershed Planning: Determining Impervious Surface Capacity to Better Manage Growth at the Rural/Urban Fringe*. Huron River Watershed Council, Ann Arbor, MI.

Huang, G.H., & Xia, J. (2001). Barriers to Sustainable Water-Quality Management. *Journal of Environmental Management* 61: 1–23.

Ingram, H.M., Mann, D.E., Weatherford, G.D., & Cortner, H.J. (1984). Guidelines for improved institutional analysis in water resources planning, *Water Resources Research*, 20(3), pp. 323± 334.

Ivey, J.L., de Loe¨, R.C., & Kreutzwiser, R.D. (2002). Groundwater management by watershed agencies: An evaluation of the capacity of Ontario's conservation authorities. *J. Environ. Manag*. 64: 311–331.

Ivey, J.L., De Loe, R. C., & Kreutzwiser, R. D. (2006). Planning for source water protection in Ontario. *J. Appl. Geogr*. (26):192-209.

İyi Tarım Uygulamaları. Retrieved from http://www.iyitarim.org/HaberVeDuyurular.asp (10.03.2010).

Jaspers, F. (2003). Institutional Arrangements for Integrated River Basin Management. Water Policy, vol. 5:1:77-90.

Joint Steering Committee for Water Sensitive Cities. (2009). Evaluating Options for Water Sensitive Urban Design (WSUD). Retrieved from http://www.environment.gov.au water/publications/urban/ pubs/wsud-guidelines.pdf

Johnson, K. E., & Loux, J. (2004). *Water and Land Use: Planning Wisely for California's Future*. Solano Press Books: Point Arena, California.

Kaiser, E.J., Godschalk, D. R.,& Chapin S. (1995). *Urban land use planning*. Fourth edition. Urbana, IL: University of Illinois Press.

Kallis, G., & Coccossis, H. (2002). Sustainable Management of Water Supplies for Developed Urban Areas: Issues, Perspectives and A Vision. *Paper presented at Third International Forum on "Integrated Water Management: the Key to Sustainable Water Resources"*. Athens Water Supply and Sewerage Company, Zappeion Hall, Athens. Retrieved from http://www.watermagazine.com/secure/jc/sustain1.doc).

Kavanagh, P. & Bree, T. (2009). Water Framework Directive Programme of measures: protection of high-status sites, forest, water and on-site wastewater treatment systems. *Biology and Environment:* Proceedings of the Royal Irish Academy 109B.

Kellogg, W. A. (1997). Metropolitan growth and the local role in surface water resource protection in the Lake Erie Basin. *Journal of Great Lakes Research* 23(3): 270-285.

Klein, R., & Kenney, D. (2009). The Land Use Planning, Water Resources and Climate Change Adaptation Connection: Challenges and Opportunities - A Review. Western Water Assessment Report, 15 pp. (User input status).

Kidd, S., & Fischer, T. (2003). Towards sustainability in the English regions: is integrated appraisal a step in the right direction? *Paper presented at the AESOP/ACSP Congress*, Leuven.

Kidd, S., & Fischer, T. (2006). Towards Sustainability in the EnglishRegions: Is Integrated Appraisal a Step in the Right Direction? Department of Civic Design, The University of Liverpool. Submitted to Environment and Planning C.

Kidd, S., & Shaw, D. (2007). Integrated water resource management and institutional integration: Realizing the potential of spatial planning in England. *The Geographical Journal,* 173(4), 312–329.

Kingsford, R.T., Dunn, H., Love, D., Nevill, J., Stein, J., & Tait, J. (2004) River protection in Australia: holy grail or fool's gold? *Paper presented to the Stream Management Conference*, Launceston.

Kivimaa, P., & Mickwitz, P. (2006). The challenge of greening technologies – Environmental policy integration in Finnish technology policies. Research Policy 35: 729-744.

Korkanç, S.Y. (2004). Sulak Alanların Havza Sistemi İçindeki Yeri. *ZKÜ Bartın Orman Fakültesi Dergisi,* Volume:6 Number: 6,pp:117-125, Bartın, Turkey.

Kreutzwiser, R. D., & de loe, R. C. (2002). Municipal capacity to manage water problems and conflicts: The Ontario experience. *Canadian Water Resources Journal* 27(1): 63-83.

Lamers, M., B. Ottow, G. Francois, and Y. von Korff. (2010). Beyond dry feet? Experiences from participatory water-management planning case in The Netherlands. *Ecology and Society* 15(1):14. Retrieved from http://www.ecologyandsociety.org/vol15/ iss1/art14/.

Larson, S. (2006). *Analysis of the water planning process in the Georgina and Diamantina catchments: An application of the Insitutional Analysis and Development (IAD) framework,* CSIRO Sustainable Ecosystems.

Lavigne, P., & Gates, S. (2000). Why Rivers? Why Watersheds?: Lifelines of the Ecosystem. In GregorvvGilpin Beck and Bruce Litteljohn, (Eds.), *Voices for the Watershed*. McGill-Queen's University Press: Montreal, Canada.

LCC (Leeds City Council). (2004). *Sustainable drainage in Leeds: supplementary guidance no. 22.* (Draft LCC), Leeds.

London Assembly. (2006). The Blue Ribbon Network, Planning and Spatial Development Committee, London: London Assembly.

London Borough of Hackney. (2010). *Local Development Framework (LDF), Hackney Wick Area Action Plan (Phase 1)* – Masterplan, Development Plan Document.

Lund, J.R. (2006). Approaches to Planning Water Resources, unpublished typescript, 35pp.

Mackenzie, J., Ayre, M., Oliver, P., Ling Tan, P., Jackson, S., & Proctor, W. (2008). Collaborative Water Planning: Context And Practice. *Literature Review* Volume 1, Land and Water Australia.

Maryland Department of Planning (MDP), Maryland Department of the Environment (MDE), & Maryland Department of Natural Resources (DNR). (2007). *Water Resources Element of the Comprehensive Plan Guidance Document Planning for Water Supply, Wastewater Management and Stormwater Management*, Maryland.

Massachusetts Department of Environmental Protection (MA DEP). (2008). *Massachusetts Stormwater Handbook*. Retrieved from http:// www.mass.gov/dep/water/laws/ policies.htm#storm

McAlister, T. (2007). *National Guidelines for Evaluating Water Sensitive Urban Design (WSUD).* BMT WBM Pty Ltd, Queensland Australia.

McDonald, L., Allen, W., Benedict, M., & O'Connor, K. (2005). Green Infrastructure Plan Evaluation Frameworks. *Journal of Conservation Planning*. Vol 1, Issue1/12–43.

McElfish J.M., and Casey-Lefkowitz, S. (2001). *Smart growth and the Clean Water Act*. Washington, D.C.: Northeast-Midwest Inst. Retrieved from http://www. nemw.org SGCleanWater.pdf

Medema, W., & Jeffrey, P. (2005). IWRM and Adaptive Management: Synergy or Conflict? NeWater Working Paper 7.

Meijers, E., & Stead, D. (2004). Policy Integration: What does it mean and how can it be achieved? *Paper presented at 2004 Berlin Conference* on the Human Dimensions of Global Environmental Change: Greening of Policies - Interlinkages and Policy Integration, Berlin.

Metropolitan Area Planning Council (MAPC). (1992). *Land Resources Element of Metro Plan 2000* (The Regional Development Plan for Metropolitan Boston).

Ministry of Land, Infrastructure, Transport and Tourism, Japan (MLIT). (2010). *An Overview of Spatial Policy in Asian and European Countries*. http://www.mlit.go.jp/kokudokeikaku/international/spw/general/netherlands/index_e.html.

Ministerie van VROM (Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer) et al. [Ministry of Housing, Spatial Planning and the Environment et al.] (2004). *Nota Ruimte: Ruimte voor Ontwikkeling [National Spatial Strategy: Creating Space for Development]*, Den Haag [in Dutch.

Ministry of Housing, Spatial Planning and the Environment (VROM). (2006). *National Spatial Strategy; creating space for development.* Part IV endorsed by parliament. Summary. The Hague, The Netherlands: Ministry of Housing, Spatial Planning and the Environment, Ministry of Agriculture, Nature and Food Quality, Ministry of Transport, Public Works and Water Management, Ministry of Economic Affairs.

Ministry of Housing, Spatial Planning and the Environment (VROM). (2007). *The spatial planning system in the Netherlands, related to European sector policies*. Retrieved from www.lntpa.lt/get.php?f.53

Ministry of TPW. (2000). *A Different Approach to Water: Water Management Policy in the 21st Century.* Ministry of Transport, Public Works and Water Management. Retrieved from http://www.verkeerenwaterstaat.nl.

Mitchell, B. (2005). Integrated water resource management, institutional arrangements, and landuse planning. *Environment and Planning A* 37:1335-1352.

Morphet, J. (2011). *Effective Practice in Spatial Planning*, London: Routledge.

Moss, T. (2003). Solving problems of 'fit' at the expense of problems of 'interplay'? The spatial reorganisation of water management following the EU Water Framework Directive. In Briet, H., Engles, E., Moss, T., & Troja, M. (Eds.), *How institutions change: Perspectives on social learning in global and local environmental concerns*, pp. 85-121. Opladen, Germany: Leske and Budrich.

Moss, T. (2004a). The governance of land use in river basins: prospects for overcoming problems of institutional interplay with the EU Water Framework Directive. *Land Use Policy*, 21(1), 85-94.

Moss, T. (2004b). Regional sustainable development as a cross-sectoral task. *Proceedings of the REGIONET Workshop*. Brussels (Belgium).

Mouritz, M, Evangelisti, M. & McAlister, T. (2006). Water Sensitive Urban Design. In: T.H.F. Wong(ed.), *Australian Runoff Quality: A Guide to Water Sensitive Urban Design, Engineers Australia*, Canberra.

Myerson, D. L. (2002). *Water and the Future of Land Development*, ULI Land Use Policy Forum Report. in The ULI/Larson Forum on Land Use Policy, Urban Land Institute Washington, D.C.

Mussellman, R. W. (2005). *An assessment of local-level capacity for integrated water management in Kings County, Nova Scotia*. (MSc thesis, Dalhousie University).

National Spatial Strategy. (2006). Summary National Strategy: Creating Space for Development Retrieved from http:// international.vrom.nl

Needham. B. (2005). The Dutch Spatial planning Act: Continuty and Change in the Way in Which the Dutch Regulate the Practice of Spatial Planning. *Planning Practice and Research* 20(3): 327–340.

Needham, B. (2007). *Dutch land use planning. Planning and managing land use in the Netherlands, the principles and the practice*. Den Haag, Sdu.

Neufeld, D. (1998). Planning for groundwater: municipal implementationc tools. In: Moraru, L., de Loe¨, R.C. (Eds.), *Groundwater in a Watershed Context*. Symposium Proceedings. December 2–4, 1998, Burlington, Ontario. Canadian Water Resources Association, Cambridge, Ontario, pp. 71–80.

New Hampshire Department of Environmental Services (NHDES). (2008). *Innovative Land Use Planning Techniques: A Handbook for Sustainable Development*. October 2008.

Nilsson, M., & Eckeberg, K. (Eds.). (2007-forthcoming) *Environmental Policy Integration in Practice: Shaping Institutions by Learning.* London: Earthscan Publications Ltd.

NOFDP. (2006). *Spatial Planning in the Context of Nature-Oriented Flood Damage Prevention: The Spatial Planning System of Netherland.* The NOFDP project, INTERREGIII B programme, European Commission. Retrieved from http://www. nofdp.net/data/documents/projects_reports_publications/spatial_planning_report/spatiall_planning_report_5_netherlands.pdf.

NOFDP. (2007). *Spatial Planning Report: The Spatial Planning System of The United Kingdom*. The NOFDP project, INTERREGIII B programme, European Commission.ww.nofdp.net/data/documents/.../spatial_planning_report_3_uk.pdf.

Norman B. (2010). Low Carbon and Resilient Urban Future: A Discussion Paper on an Integrated Approach to Planning for Climate Change, University of Canberra - Urban and Regional Planning. Melbourne.

Norton, R. (2005). More and better local planning: State-mandated local planning in coastal North Carolina. *Journal of the American Planning Association* 71 (1): 55-72.

Norton, R. K. (2008). Using content analysis to evaluate local master plans and zoning codes. *Land Use Policy* 25:432-454.

ODPM (Office of the Deputy Prime Minister). (2004a). *Planning and Compulsory Purchase Act*, The Stationery Office, London.

ODPM. (2004b). *Planning policy statement 11: Regional spatial strategies*. ODPM, London.

ODPM (2004c). *Planning policy statement 23: Planning and pollution control*. ODPM, London.

ODPM. (2004d). *The planning response to climate change: advice on better practice*. ODPM, London.

ODPM. (2005a). *Planning policy statement 12: Local development frameworks*. ODPM, London.

ODPM. (2005b). *Sustainable communities building for the future* ODPM, London.

ODPM. (2005c). *Planning policy statement 1: Planning for sustainable communities*. ODPM, London.

ODPM. (2005d). *Core output indicators*.

Ongan, S. E. (1997). *Ulusal Çevre Eylem Planı, Arazi Kullanımı ve Kıyı Alanlarının Yönetimi*, T.C. Başbakanlık Devlet Planlama Teşkilatı Müsteşarlığı Ankara.

ORSAM (Orta Doğu Stratejik Araştırmalar Merkezi). *Türkiye- AB İlişkilerinde Su*. Retrieved from http://www.orsam.org.tr/tr/SuKaynaklari/ MerakEdilenler.aspx? SoruI D=4 PROGRAMI

Orta, E., (2006). İmar Hukukunda Plan Hiyerarşisi ve Planların Çatışması, Legal Yayınevi, İstanbul.

Ostrom, E. (1990). *Governing the commons: The evolution of institutions for collective action*. Cambridge University Press, New York.

Ostrom, E. (1992). *Crafting Institutions for Self-Governing Irrigation Systems. San Francisco: Institute for Contemporary Studies*, ICS Press.

Ostrom, E., Gardner, R., & Walker, J. (1994). *Rules, Games, and Common-Pool Resources.* Ann Arbor: University of Michigan Press.

Ostrom, E. (2000). Collective action and the evolution of social norms. *Journal of Economic Perspectives* 14(3) : 137-158.

Pahl-Wostl, C., Sendzimir, J., Jeffrey, P., Aerts, Berkamp, J. G., & Cross, K. (2007). Managing change toward adaptive water management through social learning. *Ecology and Society* 12(2): 30. Retrieved from http://www.ecologyandsociety.org /vol12/ iss2/art30/.

Partidario. M. R., & Therivel, R. (1999). The Practice of Strategic Environmental Assessment, United Kingdom.

Peel Development Commission, Parsonsbrinkerhoff, Essential Environmental Services. (2006). *Peel-Harvey Coastal catchment Water Sensitive Urban Design Technical Guidelines.* Peel Development Commission.

Persson, A. (2004). *Environmental Policy Integration: An Introduction*. Stockholm: Stockholm Environmental Institute.

Polski, M. M., & Ostrom, E. (1999). An Institutional Framework for Policy Analysis and Design. *Paper presented at the Workshop on Political Theory and Policy Analysis*, Department of Political Science, Indiana University.

Randolph J, (2004). *Environmental Land Use Planning and Management*. Washington, DC: Island Press, 95–105.

Resource Management (n.d). Retrieved from : http://www.daff.gov.au/abares/conferences events/regional-outlook/2010

Rijke J.S. (2007). *Mainstreaming innovations in urban water management – Case studies in Melbourne and the Netherlands*. (MSc thesis, Delft University of Technology)

RMC, Water and Environment, & Jones&Stokes. (2006). *Bay Area Integrated Water Resources Management Plan*. Retrieved from http://www.bayareairwmp.net.

Robson, C. (2002). *Real world research: A resource for social scientists and practitioner researchers* (2nd ed.). Malden, MA: Blackwell.

Rodriguez, D, D.R., Godschalk, R., Norton, K., & Aytur, S. (2004a). *The Connection between Land Use and Transportation in Land Use Plans.* Report presented to the North Carolina Department of Transportation (Project 2003-16). Raleigh, NC.

Rodriguez, D, D., Godschalk, R., Norton, K., & Aytur, S. (2004b). *Summary Report: The Connection between Land Use and Transportation in Land Use Plans*. Report presented to the North Carolina Department of Transportation (Report Summary: Project 2003-16). Raleigh, NC.

Royal Haskoning, & Institut für Stadtplanung und Staedtebau, University Duisburg-Essen. (2004). *ESPACE: European Spatial Planning Adapting to Climate Events – Developing a Knowledge and Information Base*, Draft Final Report.

Royal Haskoning. (2007). The Spatial Planning Systems of the INTERREG IIIB North West Europe (NWE) Member States Per State and in Comparison, RH 9M9288 4/2007. Retrieved from www.nofdp.net/data/documents/projects_reports_ publications/spatial_planning_report/s patial_planning_report_1_nwe.pdf

Queensland Government. (2009). *South East Queensland Regional Plan 2009–2031. Implementation Guideline No. 7. Water sensitive urban design: Design objectives for urban stormwater management*.

Ontario Ministry of Environment and Energy (OMEE), & Ontario Ministry of Natural Resources (OMNR). (1993). *Water Management on a Watershed Basis: Implementing an Ecosystem Approach*. Queen's Printer for Ontario, Toronto, Ontario.

Sabatier, Paul A., Focht, W., Lubell, M., Trachtenberg, Z., Vedlitz, A., & Matlock, M. (Eds.). (2005). *Swimming Upstream: Collaborative Approaches to Watershed Management.* Cambridge, MA: MIT Press.

Sarıkaya, H.Z., & Çiçek, N. (2010). Su Kaynaklarının Yönetimi, AB Süreci ve Çevre ve Orman Bakanlığı Uygulamaları, *TÜBA Günce Dergisi*, Mart Sayısı, 40, s. 5-13.

Wetering, S. B. V. de. (2007). *Bridging the Governance Gap: Strategies to Integrate Water and Land Use Planning*, PPRI.

Say, N. P., Çolakkadıoğlu, D., & Özyurt, S. (2010). Sea of Urban Development Plans in Türkiye. *Paper presented at IAIA10 Conference Proceedings' The Role of Impact Assessment in Transitioning to the Green Economy 30th Annual Meeting of the International Association for Impact Assessment* 6-11 April 2010, International Conference Centre Geneva – Switzerland. Retrieved from www.iaia.org

Schaick, J. van, & Klaasen, IT. (2009). *The Dutch layer approach - a turn-of-the-century phenomenon or fundamental approach to urban design and planning tasks*?. In AESOP; Univ. of Liverpool (Ed.), Book of Abstracts. 23rd AESOP Congress. University of Liverpool: 1-20).

Scott Wilson ltd. (2008). *Milton Keynes Water Cycle Study: Outline Strategy*. Mansfield, Nottinghamshire.

Scott Wilson ltd, & Levett-Therivel. (2009). *Regional Spatial Strategy for the South East: Sustainability Appraisal and Habitats Regulations Assessment/Appropriate Assessment of the Secretary of State's Final Revisions*. Prepared for Government Office of the South East, London: Scott Wilson.

Serter, G. (2005). *Çevresel Değerlendirme Sürecinin Türkiye'deki Tarihsel Gelişim ve Çevresel Etki Degerlendirmesi (ÇED) – Stratejk Çevresel Degerlendirme (SÇD) İlişkisi*. (MSc thesis, Ankara University).

Shannon, M., & Schmidt, C.-H. (2002). Theoretical Approaches to Understanding Intersectoral Policy Integration*. Cross-Sectoral Policy Impacts on Forests*. Joensuu, European Forest Institute: 15-26.

Schueler, T. R. (1994). *The Stream Protection Approach: Guidance for Developing Effective Local Non-point source Control Programs in the Great Lakes Region.* Prepared by The U. S. Geological Survey in cooperation with U.S. Department of Transportation, Federal Highway Administration.

Schueler, T. (1995). *Environmental land planning series: site planning for urban stream protection.* Prepared by the Metropolitan Washington Council of Governments and the Center for Watershed protection, Silver Spring, Maryland.

Schueler, T. R., & Holland, H. K. (Eds.). (2000a). Basic Concepts in Watershed Planning, Article 28 in: *The Practice of Watershed Protection, Center for Watershed Protection*: Ellicott City, MD, pp. 135-151.

Schueler, T. R., & Holland, H. K. (Eds.). (2000b). The Tools of Watershed Protection, Chapter 2 from The Rapid Watershed Planning Handbook, Article 27, in: *The Practice of Watershed Protection*, Center for Watershed Protection: Ellicott City, MD, pp. 135-151.

Smajgl, A., Leitch, A., & Lynam, T. (2009). *Outback Institutions - An application of the IAD framework to four case studies in Australia's outback.* Australia.

Smith, M. (2010). *Water Transformed: Sustainable Water Solutions for Climate Change Adaptation - Module C*, The Natural Edge Project (TNEP), Griffith University, and Australian National University, Australia.

Southeast Michigan Council of Governments (SEMCOG). (2003). *Land Use Tools and Techniques: A Handbook for Local Communities*. Detroit, MI: Author.

Summit Environmental Consultants. (2005). *Okanagan Basin Water Supply and Demand Study: Phase 1.* Project 572- 02.01. Retrieved from http://www.obwb.ca/fileadmin/docs/Supply_Demand_Phase1.pdf

Swan River Trust. (2009). *Appendix 2: Achieving Better Urban Water Management in Western Australia.Swan Canning Water Quality Improvement Plan*. Draft for public comment. Swan River Trust, Perth, Western Australia.

Şeker, D. Z., Tanık, A., & Öztürk, D. (2009). CBS'nin Havza Yönetimi Çalışmalarında Uygulanması. *Paper presented at TMMOB Coğrafi Bilgi Sistemleri Kongresi*, İzmir.

Tekeli, İ. (2007). *Türkiye'de Bölgesel Eşitsizlik ve Bölge Planlama Yazıları (Regional Disparities and regional Planning*), İstanbul: Tarih Vakfı Yurt Yayınları, TGSD.

Talen, E. (1996). Do Plans Get Implemented? A Review of Evaluation in Planning. *Journal of Planning Literature*. 10, (3): 248-259.

Tang, S. Y. (1994). Institutions and Performance in Irrigation Systems. In Ostrom, E., Gardner, R., & Walker, J. (Eds.). *Rules, Games, and Common-Pool Resources*. (pp. 225- 245). Ann Arbor: University of Michigan Press.

Tang, Z. (2009). How are California local jurisdictions incorporating a strategic environmental assessment in local comprehensive land use plans? *Local Environment* 14, 4:313 – 328.

Tarlock, A. D., & Lucero, L. A. (2002). Connecting Land, Water, and Growth. *Urban Lawyer* 34: 971-979.

Taşkın, T. (2006). Su Yönetiminde Neoliberal Reform Girişimleri. In Tayfun Çınar ve Özdinç, H. K. (Eds.), *Su Yönetimi* (pp:43-89) Ankara: Memleket Yayınları.

The Australian Government Department of Sustainability, Environment, Water, Population and Communities. *National Urban Water Planning Principles*. Retrieved from http://www.environment.gov.au/water/policy-programs/cities-towns/index.html.

The Office of the Mayor of London. (2008). The London Plan: Spatial Development Strategy for Greater London. Retrieved from http://www.london.gov.uk/thelondon plan.

Thérivel, R. (1998). Strategic Environmental Assessment of Development Plans in Great Britain. *Environmental Impact Assessment Review* 18: 39-57.

Tjandraatmadja, G., Cook, S., Sharma, A., Diaper, C., Grant, A., Toifl, Barron, M. O., Burn S., & Gregory, A. (2008). *ICON water sensitive urban developments*. CSIRO Technical Report.

Timmer, D.K., de Loë, R.C., & Kreutzwiser, R. D. (2007). Source water protection in the Annapolis Valley, Nova Scotia: lessons for building local capacity. *Land Use Policy* 24: 187-198.

TÜBİTAK MAM. (2010). *Havza Koruma Eylem Planlarının Hazırlanması Projesi Küçük Menderes Havzası Proje Taslak Raporu*, Ankara.

"*Türkiye'de su sektörü için kapasite geliştirilmesi desteği projesi"* kapanış toplantısı. Retrieved from http://www.dsi.gov.tr/basinbul/detay.cfm?Bulten ID=202

United Kingdom. (n. d.) Retrieved from http://www.mlit.go.jp/kokudokeikaku/international /spw/general/uk/index_e.html.

United Nations. (1993). *Earth Summit: Agenda 21*. The United Nations Programme of Action from Rio, United Nations, New York.

Upper Clinton Subwatershed Core Group. (2005). Upper Clinton Subwatershed Management Plan.

Urban Water Project Partnership. (2008). *Urban Water–Living Cities: Spotlights and Experiences from the Urban Water Project 2003 – 2008*. Emschergenossenschaft, Essen.

US Environmental Protection Agency (EPA). (2008). *Handbook for Developing Watershed Plans to Restore and Protect our Waters.* USEPA: Washington, DC.

Van de Wetering, S. (2007). *Bridging the Governance Gap: Strategies to Integrate Water and Land Use Planning*, University of Montana Public Policy Research Institute: 8.

Van der Brugge, R., Rotmans, J., & Loorbach, D. (2005). The transition in Dutch water management. *Regional Environmental Change* 5: 164–176.

Van Dijk, J. M. (2008). *Water and Environment in Decision-Making: Water Assessment, Environmental Impact Assessment, and Strategic Environmental Assesment in Dutch Planning - A Comparison.* Eburon Academic Publishers, Delft.

Van Dijk, J., Vlist, M. van der, & Tatenhove, J. (2010). Water Assessment as Controlled Informality. *Environ Impact Asses Rev*.

Van Meel, P-P. A., van Boetzelaer, M. A., & P. C. Bakker. (2005). *Spatial planning key decision room for the river. Paper presented* The 3rd International Symposium on Flood Defence (Nijmagen, the Netherlands).

Voogd, H. (2006). *Combating flooding by planning: some Dutch experiences*. disP, 164 – 1/2006.

Walsum, P.E.V. van, Aerts, J. C. J. H., Krywkow, J., van der Veen, A., der Nederlanden, H., Bos, M. Q., & Ottow, B. T. (2005). *Framework for Integrated Design of Water and Land Management Systems: Towards Robust Water-Space Partnerships as A Basis for Adaptive Water Management.* Report to the NeWater project, Wageningen.

Wang, X. (2001). Integrating Water-Quality Management and Land-use Planning in a Watershed Context. *Journal of Environmental Management* 6 1 :25-26.

Wang, X, & Yin, Z. (1997). Using GIS to Assess the Relationship Between Land-use and Water Quality at a Watershed Level. *Environmental International* 23(1): 103- 1 14.

Warner, J., Smits, S., Winnubst, M., & Butterworth J. (2006). Local governance in Integrated Water Resources Management in the Netherlands. LoGO Water working paper. Retrieved from http://www.iclei-europe.org/fileadmin/user_upload/logo water/resourcesLocal_governance_in_IWRM_in_the_ Netherlands. pdf.

Water Assessment in the Netherlands. Retrieved from http://www.espace- project.org/publ ications/library/English%20version%20of%20Water%20Test.pdf

Water by Design. Retrieved from http://waterbydesign.com.au/whatiswsud/.

Waterman, R. (2004). Addressing California's Uncertain Water Future by Coordinating Long-Term and- Use and Water Planning: Is a Water Element in the General Plan the Next Step? *Ecology Law Quarterly* 3(1): 117–204.

Western Australian Planning Commission (WAPC). 2003. *Middle Helena Catchment Area Land Use and Water Management Strategy.*

Western Australian Planning Commission (WAPC). (2007). *Liveable Neighbourhoods: A Western Australian Government Sustainable Cities Initiative*, 4th ed., Western Australian Planning Commission, Perth.

Western Australian Planning Commission (WAPC), Department of Water. (2008). *Urban water management plans: Guidelines for preparing plans and for complying with subdivision conditions.*

Western Australian Planning Commission (WAPC). (2008a). *Better Urban Water Management,* Western Australian Planning Commission, Perth.

Western Australian Planning Commission (WAPC). (2008b). *Planning Bulletin 92. Urban Water Management*, Western Australian Planning Commission, Perth.

Western Australia-Dept. of Water. (2007). *WesternAustralia's implementation plan for the national water initiative / Government of Western Australia,* Dept. of Water, Perth, W.A.

White, I., & Howe, J. (2003). Planning and the European Union Water Framework Directive, *Journal of Environmental Planning and Management*, Vol.46, No.4, pp.621-631.

Wiering, M., & Immink, I. (2006). "When water management meets spatial planning: a policy-arrangements perspective." *Environment and Planning C: Government and Policy* 24: 423-438.

Woltjer, J., & Al, N. (2005). Strategic Capacities in Dutch Water Management and Spatial Planning. *Paper presented at ERSA conference* (ersa05p566), European Regional Science Association.

Wolsink, M. (2006), River Basin Approach and Integrated Water Management: Governance Pitfalls for the Dutch Space-water-adjustment Management Principle. *Geoforum* 37, pp. 473–487.

Wong, T.H.F. (2006). Introduction. In T.H.F. Wong (ed.), *Australian Runoff Quality*: *A Guide to Water Sensitive Urban Design*, Engineers Australia, Canberra.

Woorden, M. A. (2006). *Spatial Planning Key Decision 'Room for the River:' Investing in the safety and vitality of the Dutch river basin region. Ministry of Transport, Public Works and Water Management.*

World Water Assessment Program 2003. *Water for people, Water for life*. Unesco Publishing.

Wortzel A. W., & Christman, J. N. (2007). Water Quality and Water Quantity: New Considerations in the Land Development Equation. *The Real Estate Finance Journal.*

Yandle, T., & Dewees, C. (2003). Privatizing the Commons. Twelve Years Later: Fishers' Experiences with New Zealand's Market-Based Fisheries Management. In Dolšak, N. & Ostrom, E. (Eds.), The Commons in the New Millennium: Challenges and Adaptations. (pp. 101-27). Cambridge, MA: MIT Press.

Yildiz, F. F., & Dişbudak, K. (2006). AB Su Çerçeve Direktifi ve Havza Yönetimi Yaklaşımı Bağlamında AB Ortak Tarım Politikasında Su Yönetimi. *Tarım ve Köyişleri Bakanlığı Türktarım Dergisi*, 167, s.64-71, Ankara.

Yin, R. K. (2003). *Case study research: Design and methods* (3rd ed.). Thousand Oaks, CA: Sage.

Young, O. R. (2002). *The Institutional Dimensions of Environmental Change: Fit, Interplay and Scale*, MIT Press, Cambridge, MA.

Yüksek Planlama Kurulu. (2003). Türkiye Cumhuriyeti- Ön Ulusal Kalkınma Planı (2004 - 2006), ANKARA.

APPENDIX A

LIST OF LEGISLATION EXAMINED

NAME	Date of Gazette
Türkiye Cumhuriyeti Anayasası	1982
Laws	
Ameliyatı Iskaiye ve İşletme Kanunu Muvakkati	1329
Köy Kanunu (442/3367) Köy Kanununda Değişiklik Yapılmasına Dair Kanun (5443)	1924 / 2006
Sular Hakkında Kanun (831)	1926
Umumi Hıfsızsıhha Kanunu (1593)	1930
Çeltik Ekimi Kanunu (3039)	1936
Taşkın Sulara ve Su Baskınlarına Karşı Korunma Kanunu (4373)	1943
İl İdaresi Kanunu (5442)	1949
Bataklıkların Kurutulması ve Bunlardan Elde Edilecek Topraklar Hakkında Kanun (5516 / 5963)	1950 /1952
Orman Kanunu (6831), Orman Kanununda Değişiklik Yapılmasına Dair Kanun (4999/5192)	1956 / (2003 – 2004)
Yeraltı Suları Kanunu (167)	1960
Köy İçme suları Hakkında Kanun (7478)	1960
Askeri Garnizonların İçme, Kullanma Sularının Temini Hakkında Kanun (178 sayılı)	1960
Belediye Teşkilâtı Olan Yerleşim Yerlerine İçme, Kullanma ve Endüstri Suyu Temini Hakkında Kanun (1053)	1968
Su Ürünleri Kanunu (380)/ Su Ürünleri Kanununda Değişiklik Yapılmasına Dair Kanun (4950)	1971 / 2003
Turizm Teşvik Kanunu (2634) ve Turizmi Teşvik Kanununda Değişiklik Yapılmasına Dair Kanun (5761)	1982 / 2008
Çevre Kanunu (2872) ve Çevre Kanununda Değişiklik Yapılmasına Dair Kanun (5491)	1983 /2006
Mili Parklar Kanunu (2873)	1983
Sulama Alanlarında Arazi Düzenlenmesine Dair Tarım Reformu Kanunu (3083) ve Sulama Alanlarında Arazi Düzenlenmesine Dair Tarım Reformu Kanununda Değişiklik Yapılması Hakkında Kanun (4626)	1984 / 2001
İmar Kanunu (3194) ve İmar ve Gecekondu Mevzuatına Aykırı Yapılara Uygulanacak Bazı İşlemler ve 6785 Sayılı İmar Kanununun Bir Maddesinin Değiştirilmesi Hakkında Kanun (5006)	1985 / 2003
Maden Kanunu (3213) ve Maden Kanununda ve Bazı Kanunlarda Değişiklik Yapılmasına İlişkin Kanun (5177)	1985 -2004
Kıyı Kanunu	1990
Mera Kanunu (4342)	1998
Türk Medeni Kanunu (4721)	2001
Büyükşehir Belediyelerinin Yönetimi Hakkında Kanun Hükmünde Kararnamenin Değiştirilerek Kabulü Hakkında Kanunda Değişiklik Yapılmasına İlişkin Kanun (5019)	2003
Belediye Kanunu (5272)	2004
Büyükşehir Belediyesi Kanunu (5216)	2004
Mera Kanunu İle Bazı Kanunlarda Değişiklik Yapılması Hakkında Kanun(5178)	2004
Toprak Koruma ve Arazi Kullanımı Kanunu (5403) / Toprak Koruma ve Arazi Kullanımı Kanununda Değişiklik Yapılması Hakkında Kanun (5578)	2005 / 2008
Köy Hizmetleri Genel Müdürlüğünün Kaldırılması ve Bazı Kanunlarda Değişiklik Yapılması Hakkında Kanun	2005
Jeotermal Kaynaklar ve Doğal Mineralli Sular Kanunu (5686)	2007
Bazı Kanunlarda Değişiklik Yapılması Hakkında Kanun" (5625)	2007
Enerji Verimliliği Kanunu (5627)	2007
Toprak Koruma Ve Arazi Kullanımı Kanunu İle Mera Kanununda Değişiklik Yapılması Hakkında Kanun (5751)	2008
"İmar Kanunu ile Bayındırlık ve İskan Bakanlığının Teşkilat ve Görevleri Hakkında Kanun Hükmünde Kararnamede Değişiklik Yapılmasına Dair Kanun" (5940)	2009
Turizmi Teşvik Kanununda Değişiklik Yapılmasına Dair Kanun (5761)	

Institution Laws	
DSİ Genel Müdürlüğü'nin Teşkilat ve Görevleri Hakkında Kanun (6200)	1953
İstanbul Su ve Kanalizasyon İdaresi Genel Müdürlüğü Kuruluş Ve Görevleri Hakkında Kanun(2560)	1981
Devlet Meteoroloji İşleri Genel Müdürlüğü Kuruluş ve Görevleri Hakkında Kanun (3254)	1988
İller Bankası Kanunu (4759)	1990
Çevre ve Orman Bakanlığı Teşkilat ve Görevleri Hakkında Kanun (4856/4864)	2003
İl Özel İdaresi Kanunu (5302)	2005
Bulletins	
Su Kirliliği Kontrolü Yönetmeliği Teknik Usuller Tebliği	2009
Su Kirliliği Kontrolü Yönetmeliği Numune Alma Ve Analiz Metodları Tebliği	2009
Kentsel Atıksu Arıtımı Yönetmeliği Hassas ve Az Hassas Su Alanları Tebliği	2009
Sulak Alanlar Tebliği	2005
Circulars	
Coğrafi Bilgi Sistemleri Çalışmaları	2008
Dere Yatakları ve Taşkınlar	2006
Akarsu ve Dere Yataklarının Islahı	2010
Plana Esas Jeolojik, Jeolojik- Jeoteknik ve Mikrobölgeleme Etüt Genelgesi	2008
Statutory Decree	
180 sayılı Bayındırlık ve İskan Bakanlığının Teşkilat ve Görevleri Hakkında Kanun Hükmünde Kararname	1983
Özel Çevre Koruma Kurumu Başkanlığı Kurulmasına Dair Kanun Hükmünde Kararname (383)	1989
Çevre Bakanlığı Kuruluş ve Görevleri Hakkında Kanun Hükmünde Kararname (443)	1991
Regulations	
Lağım Mecrası İnşaası Mümkün Olmayan Yerlerde Yapılacak Çukurlara Ait Yönetmelik	1971
2981 sayılı imar ve Gecekondu Mevzuatına Aykırı Yapılara Uygulanacak Bazı işlemler ve 6785 sayılı İmar Kanununun Bir Maddesinin Değiştirilmesi Hakkında Kanunun ilgili maddeleri (14/e) ve Yönetmelik	1984
Şehir ve Kasaba İçmesuyu Projelerinin Hazırlanmasına Ait Yönetmelik	1985
Planlı Alanlar Tip İmar Yönetmeliği	1985
Plansız Alanlar İmar Yönetmeliği	1985
Sulama Alanlarında Arazi Düzenlenmesine Dair Tarım Reformu Kanunu Uygulama Yönetmeliği	1985
Kıyı Kanununun Uygulanmasına Dair Yönetmelik -Kıyı Kanunun Uygulanmasına Dair Yönetmelikte Değişiklik Yapılması Hakkında Yönetmelik	1990 / 2004
Özel Çevre Koruma Kurumu Başkanlığı Çevre Koruma Projelerinin Yaptırılması Esaslarına Dair Yönetmelik	1992
Gayri Sıhhi Müesseseler Yönetmeliği - Gayri Sıhhi Müesseseler Yönetmeliğinde Değişiklik Yapılmasına Dair Yönetmelik	1995 / 2003
İmar Planı Yapılması ve Değişikliklerine Ait Esaslara Dair Yönetmelikte Değişiklik Yapılması Hakkında Yönetmelik /Plan Yapımına Ait Esaslara Dair Yönetmelik	1995 / 2001
Su Ürünleri Yönetmeliği / Su Ürünleri Yönetmeliğinde Değişiklik Yapılmasına Dair Yönetmelik	1995 / 2008
İSKİ İçmesuyu Havzaları Yönetmeliği	1998
3030 Sayılı Kanun Kapsamı Dışında Kalan Belediyeler Tip İmar Yönetmeliği /3030 Sayılı Kanun Kapsamı Dışında Kalan Belediyeler Tip İmar Yönetmeliğinde Değişiklik Yapılmasına Dair Yönetmelik	1999/ 2008
İZSU Su Havzaları Koruma Yönetmeliği	2002
Organize Sanayi Bölgeleri Uygulama Yönetmeliği	2002
İSKİ Atıksuların Kanalizasyona Deşarj Yönetmeliği	2003
Su Kirliliği Kontrolü Yönetmeliği / Su Kirliliği Kontrolü Yönetmeliğinde Değişiklik Yapılmasına Dair Yönetmelik	2004 / 2008
Tarımsal Kaynaklı Nitrat Kirliliğine Karşı Suların Korunması Yönetmeliği	2004
Yüzme Suyu Kalitesi Yönetmeliği	2004
Tehlikeli Maddelerin Su ve Çevresinde Neden Olduğu Kirliliğin Kontrolü Yönetmeliğinde Değişiklik Yapılmasına Dair Yönetmelik	2005
Sulak Alanların Korunması Yönetmeliği	2005
Toprak Kirliliğinin Kontrolü Yönetmeliği	2005
İnsani Tüketim Amaçlı Sular Hakkında Yönetmelik	2005
Maden Kanunu Uygulama Yönetmeliği	2005/ 2006
Toprak Koruma Ve Arazi Kullanımı Kanunu Uygulama Yönetmeliği	2005

İçme Suyu Elde Edilen ve Edilmesi Planlanan Yüzeysel Suların kalitesi Hakkında Yönetmelik	2005
Kentsel Atıksu Arıtımı Yönetmeliği	2006
Yüzme Suyu Kalitesi Yönetmeliği	2006
Jeotermal Kaynaklar ve Doğal Mineralli Sular Kanunu Uygulama Yönetmeliği	2007
ÇED Yönetmeliği	2008
Çevre Düzeni Planlarına Dair Yönetmelik/ *Çevre* Düzeni Planlarına Dair Yönetmelikte Değişiklik Yapılması Hakkında Yönetmelik	2008 / 2009
Çevre Düzeni Planlarının Yapılması Esaslarına Dair Yönetmelik	2009
3194 sayılı imar kanunun 46, 47, 48 ve geçici 7. maddelerine ilişkin yönetmelik	
Ankara Büyükşehir Belediyesi İmar Yönetmeliği	2008
İzmir Büyükşehir Belediyesi İmar Yönetmeliği	2002
Draft Regulation	
Stratejik Çevre Değerlendirmesi Yönetmeliği Taslağı	

APPENDIX B

INTERVIEW QUESTIONNAIRE FOR LAND USE PLANNERS

1. A part of the İKNİP plan cover the Küçük Menderes Basin. Did you search during the planning process the works done on the protection of the water resources and the basin? If yes, what kind of information did you obtain?
2. Were you invited to / did you participate in the projects carried out on the protection of the water resources and the basin in the Küçük Menderes Basin?

   ☐ Yes ☐ No
3. If yes, please specify the level of benefiting from the knowledge of the city planners?

   ☐ Very ☐ Quite ☐ Partially ☐ Little ☐ None
4. How was the data on the Küçük Menderes River and the Basin obtained in the works performed by your organization / team?

From the written sources	☐
From the talks with the organization	☐
From the local information and meetings with the public	☐
Process based monitoring	☐

5. Throughout your plan works, in which stages did you meet with the organizations on the water resources management in planning in the Küçük Menderes River?

Organizations	Data collection and analysis	Plan creation	Approval	No meeting
DSİ				
Ministry of Environment and Forestry				
İZSU				
İBŞB				
Other				

6. In what subjects did you make exchange of information on the planning of the water resources with the organizations you met?

Organizations	Water resources carrying capacities	Population – water supply projections	Water potentials of the settlements	Proposals and projects	Other
DSİ					
Ministry of Environment and Forestry					
İZSU					
İBŞB					
Other					

7. What types of analysis works have been done on the water resources and problems in the Küçük Menderes Basin? (The first step of the works on the protection and improvement is the fact-finding works in the region that require the determination of the changes in the land use, determination of the

pollution sources, monitoring of the water resources, deterioration of the structure of the region and association and evaluation of the socio economic structure.)

determination of the changes in the land use	☐
determination of the pollution sources	☐
monitoring of the water resources	☐
deterioration of the structure of the region and association and evaluation of the socio economic structure	☐
Other	☐

8. During the planning, was there any approach from your side on the discussion or opinion request with the relevant organizations before the approval stage? If there was, can we reach the information and documents on this sharing?

   ☐ Yes, there was ☐ No, there wasn't ☐ No Idea

9. How do you evaluate the coordination level among the official organizations working under the central management and the municipalities working in the field of protection of the water resources in the Küçük Menderes Basin?

   ☐ Quite Sufficient ☐ Sufficient ☐No Idea ☐ Little sufficient ☐ Insufficient

10. How do you evaluate the coordination level on the protection of the water resources between the municipalities included in the Küçük Menderes Basin?

    ☐ Quite Sufficient ☐ Sufficient ☐No Idea ☐ Little sufficient ☐ Insufficient

11. What is the coordination level in your opinion among the organizations carrying out the physical planning works and the water resources protection works in the basin?

    ☐ Quite Sufficient ☐ Sufficient ☐No Idea ☐ Little sufficient ☐ Insufficient

12. Please specify the impact levels of the following factors in experiencing the institutional coordination and integration problems among the water and planning disciplines.

Factors	**Impact level**				
	1 Very low	2	3 Medium	4	5 Very high
a. Laws and regulations					
b. Differences in the planning approaches and practice					
c. Lack of common values and views					
d. Lack of joint work					
e. Other					

13. What are the disputes and conflicts that you determined among the central organizations and municipalities for the protection and management of the water resources throughout the basin?

14. The "Basin Protection Plan Works" in the Basin has been going on since 2008. Were you invited to these meetings or were you involved in the creation of the other projects carried out before?

    ☐ Yes ☐ No

15. If yes, do you think that your views in the period you were invited were properly included in these works?

    ☐ Yes ☐ No

16. Was your planning team involved in the strategic actions and projects applied/proposed in the Küçük Menderes Basin? Please specify the open title of these projects, names of the partners involved in the production and implementation process of the project in the basin and the stages of the project?

17. Did you have any talks with the local municipalities in the basin throughout your planning works?

    ☐ Yes ☐ No

18. While determining policies and strategies in the physical planning works in the basin, in what extent did you take the views and opinions of the local administrations into consideration?

    ☐ Very much ☐ Quite ☐ Partially ☐ Little ☐ None

19. What kind of information did you obtain for the protection of the Küçük Menderes Basin and the water resources?

20. While you carry out your works in throughout the basin, in what extent did you evaluate the physical plans of the settlements in the basin?

    ☐ Quite Sufficient ☐ Sufficient ☐No Idea ☐ Little sufficient ☐ Insufficient

21. As a result of this evaluation, which improvement works did you do in the basin and which proposals did you present? Please specify?

22. In your opinion, do you think the water and land use plans in force (1/100000, 1/25000, 1/5000, 1/1000) can ensure the protection and management of the local and regional water resources in terms of implementation policies?

    ☐ Yes ☐ No ☐ No Idea

    a. If not, in what aspects do you think it has shortcomings and or misinterpretation?

23. [The implementation tools required by the environmental management planning should be included in the planning system. For instance; urban expansion borders, intensity restriction zone, parcellation standards, impermeable surface limits etc.] Please specify the land use tools you used or planning decisions you took for the protection of the water resources in particular in your physical plans?

24. What do you think about the level of sufficiency of the protection and management of the water resources?

    ☐ Quite Sufficient ☐ Sufficient ☐No Idea ☐ Little sufficient ☐ Insufficient

    a. What subjects should be reconsidered and improved in your opinion?

25. What do you think about the sufficiency level of the implementation tools and planning process with regard to the protection of the water resources by the planning legislation?

    ☐ Quite Sufficient ☐ Sufficient ☐No Idea ☐ Little sufficient ☐ Insufficient

    a. Specify your proposals on this subject?

26. Please specify the gaps and incompliance that you determined in the planning practice and legal platform for the integration of the land use planning and water resources management?

27. Are there any guiding principles used by you for the local and regional integration of the land use planning and water resources management?

    ☐ Yes, there are ☐ No, there aren't ☐ No Idea

    a. If yes what are they? (Can we obtain them?)

28. Do you have any information on the *"Water Pollution Control Management Notice of Methods and Principles on the Special Provision Determination Works in the Basins" in force*?

    ☐ Yes, there are ☐ No, there aren't ☐ No Idea

    a. If yes, what are the two subjects that you find positive / missing in the "*Water Pollution Regulation Notice of the Methods and Principles on the Works to Determine Special Provision*"?

29. What do you think about the adequacy of the technical and human infrastructure of the governorship, district governorship and relevant units as well as the local administrations in the basin in the protection of the water resources?

30. What can / should be done in your opinion for the success of the integration of the land use planning and water resources management?

APPENDIX C

INTERVIEW QUESTIONNAIRE FOR WATER MANAGERS

1. What types of works are carried out for the protection of the water resources and the basin in the Küçük Menderes Basin? The water resources management works consist of information collection, establishing the plans, implementation, monitoring and audit works. In what stage are the works carried out in the Küçük Menderes Basin in the last five years?

Works	Information collection	Determining the goals and objectives	Establishing the plans	Implementation	Monitoring and audit
1					
2					
3					
4					

2. [The first step of the works on the protection and improvement is the fact-finding works in the region that require the determination of the changes in the land use, determination of the pollution sources, monitoring of the water resources, deterioration of the structure of the region and association and evaluation of the socio-economic structure.] Which of these have been realized in your works?

determination of the changes in the land use	☐
determination of the pollution sources	☐
monitoring of the water resources	☐
deteroriation of the structure of the region and association and evaluation of the socio economic structure	☐

3. In what stage is the Küçük Menderes Basin Protection Action Plan?

☐ information collection	☐ Determining the goals and objectives	☐ establishing the plans	☐ implementation	☐ monitoring and audit

4. Apart from the Küçük Menderes Protection Action Plan coordination work, which of the following coordination works are present for the protection and management of the water resources in the basin? Specify their names and the organizations you made these works with?

Coordination works		**Names**	**Organizations**
Protocol	☐	1.	
Project	☐	1.	
Horizontal or vertical cooperation	☐	1.	
Action Plans	☐	1.	
Unions	☐	1.	
Boards	☐	1.	
Local Strategic partnership	☐	1.	
Others	☐		

5. The basic issues in the protection of water resources are water supply and water quality, waste water and recycled water evaluation, flood protection and management, basin management, restoration of the habitats, land use planning and water management. Please specify the titles of the strategic action and projects participated in or executed by your district/municipality for the protection of the water resources in the Küçük Menderes River Basin, the names of the partners

involved in the production and implementation process of the project in the basin, the names of the projects that you find important and the stages of the project?

Function areas	**Project number**	**Project name**	**Stakeholders**	**Stage**
Water supply and water quality		1. 2.		
Waste water and recycled water evaluation		1. 2.		
Flood protection and management		1. 2.		
Basin management and habitat protection and restoration		1. 2.		
Land use planning and water management		1. 2.		
Other				

6. [The success in the management of the water resources and the basin can be achieved with the involvement in these works of the politicians, planning and water related organizations, people living there and non-governmental organizations who are authorized in the decision taking, approval and implementation process.] Therefore, are there effective participation and representation of all stakeholders in the basin carried out in the Küçük Menderes Basin?

   ☐ Yes ☐ No ☐ No Idea

7. Under which conditions has the participation of the stakeholders been realized (group discussion, panels, symposium etc)?

   ☐ group discussion ☐ panels ☐ symposium ☐ Other

8. How do you evaluate the coordination level among the official organizations working under the central management and the municipalities working in the field of protection of the water resources in the Küçük Menderes Basin?

   ☐ Quite Sufficient ☐ Sufficient ☐No Idea ☐ Little sufficient ☐ Insufficient

9. How do you find the coordination level in the protection of the water resources between the municipalities in the Küçük Menderes Basin?

   ☐ Quite Sufficient ☐ Sufficient ☐No Idea ☐ Little sufficient ☐ Insufficient

10. In what level do you think there is coordination between the organizations realizing the water resources protection and physical planning works in the basin?

    ☐ Quite Sufficient ☐ Sufficient ☐No Idea ☐ Little sufficient ☐ Insufficient

11. Do you believe that the public are sufficiently involved in the Küçük Menderes River Basin water management?

    ☐ Yes ☐ No ☐ No Idea

12. Please specify the participation level in the water resources management process in the Küçük Menderes River Basin.

Superficial participation (recommendation)	☐
Passive participation (there is no strong dialogue)	☐
Effective participation (effectiveness of powerful classes)	☐
Discussion environment participation (seeking and advocating the ideal)	☐
Resource creating participation (participation in all process)	☐

13. What is the level of cooperation between the municipalities and non-governmental organizations in the field of water resources protection and management throughout the Küçük Menderes Basin?
    ☐ Quite Sufficient ☐ Sufficient ☐No Idea ☐ Little sufficient ☐ Insufficient

14. What types of problems are caused by the lack of sufficient coordination in the basin and for the water resources? Please list them.
15. Please specify the impact levels of the following factors in experiencing the institutional coordination and integration problems among the water and planning disciplines.

Factors	Impact level				
	1 Very low	2	3 Medium	4	5 Very high
a. Laws and regulations					
b. Differences in the planning approaches and practice					
c. Lack of common values and views					
d. Lack of joint work					
e. Other					

16. Are there / were there any contradictions / discrepancy / disharmony on any subject related to water basins in the Küçük Menderes Basin?
☐ Yes ☐ No ☐ No Idea

17. If your answer is yes, which of the following is among the contradictions / discrepancy / disharmony occurring in the basin?

Project and practice differences	☐
Division of labour	☐
Sharing limited resources	☐
Communication	☐
Complexity of the tasks and responsibilities	☐
Lack of common values and views	☐
Objective differences	☐
Perception differences	☐
Specialization differences	☐

18. Are there any incompliance or discrepancy between the protection and land use planning of the water resources in the Küçük Menderes River Basin?!!What are they? How do you solve these contradictions, conflicts and disputes? Can you solve them?

Conflict details						
Name						
Definition						
Parties						
Time						
How is it solved?	Conciliation	Mediation	Negotiation	Fact-finding	Facilitation	No Solution

19. What are your opinion/proposals to remove the coordination and conflicts in the administrative structure to ensure an effective and efficient institutional organization in the Küçük Menderes Basin? How can an effective cooperation level be provided?

20. a. Have there been any joint works during the 1/ 100000 scale Manisa-Kütahya-İzmir Environment Layout Plan and 1/25.000 scale İzmir Metropolitan Municipality Strategic Plan (2006 and 2009)?/ Did you have any chance of joint work?
☐ Yes, there have ☐ No, there haven't ☐ No Idea
b. Do you think your views and institutional works are included in these works?
☐ Yes ☐ No ☐ No Idea
c. If there are conflicting aspects, please specify the incomplete / negative subjects in your opinion?
d. Are there any aspects of your views and institutional works conflicting with the 1/5000 scale plans of the settlements in the basin (Ödemiş, Torbalı, Kiraz etc)?
☐ Yes, there are ☐ No, there aren't ☐ No Idea

21. In your opinion, do you think the water and land use plans in force (1/100000, 1/25000, 1/5000, 1/1000 can ensure the protection and management of the water resources at the local and regional scale in terms of implementation policies?
☐ Yes, there are ☐ No, there aren't ☐ No Idea

22. In the works of your institution / team in the basin, how was the data on the physical plan decisions of the area is obtained?

From the printed sources	☐
From talks with the institutions (which institutions)	☐
TÜİK (Turkish Statistics Organization)	☐
Other	☐

a. Which data on the physical plan resolutions of the area have been required (population projections, urban growth data (population projections, urban growth ratios etc)? / and from which organizations have these data been obtained?

Organizations	Population – water supply projections …	Urban growth ratios	Proposal development housing areas	Other
İBŞB (İzmir Metropolitan Municipality)				
Provincial Directorate of Public Works and Settlement				
Province Special Administration				
The relevant local administration				
The relevant planning authors				
Other				

23. In what level did you evaluate the physical plans of the settlements in the basin while conducting your works throughout the basin?
☐ Quite Sufficient ☐ Sufficient ☐No Idea ☐ Little sufficient ☐ Insufficient

24. Was there any approach from your side on the discussion or opinion request with the relevant organizations about your basin decisions? (If there was, can we obtain the topics or texts of these papers)
☐ Yes, there was ☐ No, there wasn't ☐ No Idea

25. Are there any guiding principles used by your institution for the local and regional integration of the land use planning and water resources management?
☐ Yes, there are ☐ No, there aren't ☐ No Idea
If yes what are they?

26. What can be done for the success of the success of the integration of the land use planning and water resources?a) What do you think about the sufficiency level of the laws and regulations on the protection and management of the water resources? b)Which subjects do you think should be reconsidered and improved?
☐ Quite Sufficient ☐ Sufficient ☐No Idea ☐ Little sufficient ☐ Insufficient

27. What are the most important gaps or incompliance you determined in the legal base or planning practice for the integration of the land use planning and water resources management? Please specify.

28. Do you know the current "*Water Pollution Regulation Notice of the Methods and Principles on the Works to Determine Special Provision*"? Please specify two subjects that you find positive / missing in this regulation
☐ I know very well ☐ I know ☐ I know a little ☐ No Idea/ I don't know

29. What do you think about the adequacy of the technical and human infrastructure of the governorship, district governorship and relevant units as well as the local administrations in the basin in the protection of the water resources?

Organizations	**Level of Sufficiency**				
	1 Quite Sufficient	Sufficient	3 No Idea	4 Little Sufficient	5 Insufficient
a. Central organizations					
b. Local administrations					

APPENDIX D

INTERVIEW QUESTIONNAIRE FOR LOCAL AUTHORITIES

1. What types of environment problems have been experienced in the Küçük Menderes River Basin?

Environmental Problems	
a. Water Pollution	☐
b. Soil Pollution	☐
c. Shortage of drinking water supply	☐
d. Shortage of irrigation water supply	☐
e. Low agricultural productivity	☐
f. Flood	☐
g. Low ground water	☐
h. Stalinization	☐
i. Deterioration in the Ecosystem	☐
j. Erosion	☐
k. Other	☐

2. Specify the priority order (level) of these environmental problems that you face in your district or within the borders of the municipality.

Environmental problems	**Priority**				
	1 (Very low)	**2**	**3 (Medium)**	**4**	**5 (Very high)**
a. Water Pollution					
b. Soil Pollution					
c. Shortage of drinking water supply					
d. Shortage of irrigation water supply					
e. Low agricultural productivity					
f. Flood					
g. Low ground water					
h. Stalinization					
i. Deterioration in the Ecosystem					
j. Erosion					
k. Other					

3. Specify the level of impact of the following factors behind the environmental problems in the Küçük Menderes River Basin.

Factors	**Impact Level**				
	1 Very low	2	3 Medium	4	5 Very high
a. Rapid growth of population and lack of infrastructure					
b. Wrong land use decisions and practices					
c. Environmental pollution caused by agricultural activity					
d. Environmental pollution caused by industrial activity					
e. Lack of coordination between local administrations					
f. Lack of integrative water management plan on the basin					
g. Lack of clear definition of the tasks and responsibilities on the protection water resources in the basin					
h. Other					

4. [For the protection of the water resources and basin, the future decisions should be taken by coordination and consensus in an inclusive platform attended by relevant organizations and individuals. There should be meetings covering the basin to ensure this coordination and consensus]. Were there any meetings held in the last five years on the protection of water resources and basin together the local administrations and the relevant public organizations included in the basin?
☐ Yes ☐ No ☐ I don't know

5. If your answer is "Yes", how often do you meet with these organizations in the basin?
☐ Frequently ☐ Usually ☐ Rarely ☐ Other.....

6. [For the realization and success of the works on the protection of the water resources, this coordination and consensus process should be managed by an effective executor.] Which organization coordinates these works in the Küçük Menderes Basin? Specify the effectiveness level of this organization?

Organization	**Effectiveness level**				
	1 Very low	2	3 Medium	4	5 Very high

7. There are some works on the protection of water resources and basin in the Küçük Menderes Basin. Do you have any information on this matter?
☐ Yes ☐ No ☐ No Idea
b. If yes, please specify these works?

8. Please list the organizations which ensure the protection and water resources and basin in the Küçük Menderes River Basin.

Organizations	**Effectiveness level**				
	1 Very low	2	3 Medium	4	5 Very high
a. Ministry of Environment and Forestry – Provincial Directorate					
b. DSİ					
c. Ministry of Public Works					
d. İBŞB- İZSU General Directorate					
e. Province and District Directorates of Agriculture					
f. Province Special Administrations					
g. Municipalities					
h. Unions for Taking Services to Villages					
i. Küçük Menderes Basin, Union of Environment and Infrastructure					
j. Other					

9. Are there any contradictions / discrepancy / disharmony on any subject related to water basins in the Küçük Menderes Basin?
☐ Yes ☐ No ☐ No Idea

10. If your answer is yes, which of the following is among the contradictions / discrepancy / disharmony occurring in the basin?

Project and practice differences	☐
Division of labour	☐
Sharing limited resources	☐
Communication	☐
Complexity of the tasks and responsibilities	☐
Lack of common values and views	☐
Objective differences	☐
Perception differences	☐
Specialization differences	☐

11. Is there any incompliance or discrepancy between the protection and land use planning of the water resources in the Küçük Menderes River Basin?
    ☐ Yes ☐ No ☐ No Idea
12. If yes, what are they? How do you solve these contradictions, conflicts and discrepancies? Can you solve them?

Conflict details						
Name						
Definition						
Parties						
Time						
How is it solved?	Conciliation	Mediation	Negotiation	Stocktaking	Facilitation	No Solution

13. As the District / Municipality what kind of works did/do/will you do for the protection and management of the water resources together with the official organizations, local administrations, non governmental organizations under the central administrations?
14. Specify the success levels of the following conditions throughout the works for the protection of the water resources in the Küçük Menderes River Basin.

In the works carried out in the basin so far	**Success Level**				
	1 (Very low)	**2**	**3 (Medium)**	**4**	**5 (Very high)**
a. The tasks and responsibility areas on the protection of the water resources in the basin have been clearly defined.					
b. Sufficient coordination is provided between the local administrations and central in the works related to the protection of the water resources of the basin.					
c. Sufficient coordination is provided between the local administrations in the basin.					
d. Sufficient coordination is provided between the people or the organizations carrying out the protection and the physical planning works of the water resources in the basin. (during the preparation of 1/100.000 scale Environment Layout Plan + 1/25000 İKNİP plan + 1/500 land use plan)					
e. Secure data-information exchange and distribution are ensured in the works carried out in the basin.					
f. Together with the works in the basin, the awareness and support of people for the protection of the water resources increased.					

15. [The basic issues in the protection of water resources are water supply and water quality, waste water and recycled water evaluation, flood protection and management, basin management, restoration of the habitats, land use planning and water management.] Please specify the titles of the strategic action and projects participated in or executed by your district/municipality for the protection of the water resources in the Küçük Menderes River Basin, the names of the partners involved in the production and implementation process of the project in the basin, the names of the projects that you find important and the stages of the project?

Function areas	Project number	Project name	Stakeholders	Stage
Water supply and water quality		1. 2.		
Waste water and recycled water evaluation		1. 2.		
Flood protection and management		1. 2		
Basin management and habitat protection and restoration		1. 2.		
Land use planning and water management		1. 2.		

16. Specify the municipality with which your District / Municipality carries out joint works and meetings for the protection of the water resources in the Küçük Menderes River Basin in line with the following topics.

17. Do you believe that the people are sufficiently included in the process of water resources management in the Küçük Menderes River Basin?
☐ Yes ☐ No ☐ No Idea

18. How many meetings were held in your District / Municipality (by yourself) to ensure public participation for the protection of the Küçük Menderes River Basin?
☐ None ☐ 1-3 ☐ 4-6 ☐ More

19. Which of the following groups did participate in the meetings in your District / Municipality to ensure public participation for the protection of the Küçük Menderes River Basin and what are the participation levels?

Groups	Participation Level					
	No participation	Very low 1	2	Medium 3	4	Very high 5
Farmers						
People living there						
Non-governmental organizations						
Entrepreneurs						
Factory owners						
Other						

20. Specify the participation level in the water resources management process in the Küçük Menderes River Basin.

Superficial participation (recommendation)	☐
Passive participation (there is no strong dialogue)	☐
Effective participation (effectiveness of powerful classes)	☐
Discussion environment participation (seeking and advocating the ideal)	☐
Resource creating participation (participation in all process)	☐

21. What kind of investments has been done in your district/municipality for the last five/ten years in your district/municipality?

22. In your district / municipality,

		Comment (sufficient insufficient / success)
Is there a treatment plant?	☐	
Is there a rain water collection system?	☐	
Are there flood prevention zones?	☐	
Is there a regular garbage landfill area?	☐	
Are there irrigation processes?		
Organic agriculture works	☐	
Other	☐	

23. a. Are there long term strategies of your District / Municipality focusing on the urban development and sustainable water resources?
    ☐ Yes ☐ No ☐ No Idea
    b. If yes, what are they?
24. Do you know the current "*Water Pollution Regulation Notice of the Methods and Principles on the Works to Determine Special Provision*"?
    ☐ I know very well ☐ I know ☐ I know a little ☐ No Idea/ I don't know
25. What are the two subjects that you find positive / missing in the "*Water Pollution Regulation Notice of the Methods and Principles on the Works to Determine Special Provision*"?
26. While creating the current physical plans of your district or municipality, were there any analysis works on the water resources done?
    ☐ Yes ☐ No ☐No Idea
27. [While performing the works creating policy, strategy development and physical planning throughout the basin, the physical plans of the settlements in the basin should be evaluated and addressed together.] Were there any meetings held with your municipality on this subject.
    ☐ Yes ☐ No ☐No Idea
28. [The application tools required by the environmental management planning should be included in the planning system. For instance the urban growth borders, intensity restriction zones, parcellation standards, impermeable surface limits etc.] What are the land use tools or the planning decisions taken for the protection of water resources?
29. Are there any plan decisions developed for the protection of the water resources that you didn't implement?
    ☐ Yes ☐ No ☐ No Idea
    b. If yes, what are they?
30. How many people in your organization/municipality work only on the protection of water resources?
    ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ More
31. Specify the technical capacity level of your district / municipality.

Technical capacity	Very sufficient	Sufficient	No Idea	Little sufficient	Insufficient
The qualities of the drinking water used within the District / Municipality borders meet the drinking water standards.					
The drinking water qualities within the District / Municipality borders are regularly monitored.					
Technological tools and equipment are used in the works performed.					

32. Specify the percentage of the share that you allocated from the annual income of your organization / municipality to the works for the protection of the water resources.
    ☐ Less than 20% ☐ 20-40% ☐ 40-60% ☐ More
33. a. Did you make any request from the relevant national and international organizations to realize your projects on the water resources?
    ☐ Yes ☐ No ☐ No Idea / I don't know
    b. If yes, were there any feedbacks to your applications?
    ☐ Yes ☐ No ☐ No Idea / I don't know
34. Please list the urgent actions in your opinion to be performed in the Küçük Menderes River Basin.
35. Do the things to be done match with the current physical plans?
    ☐ Yes ☐ No ☐ No Idea
    b. If your answer is no, what are these incompliance / inadequacies?

NOTE:

Specify the author of the physical plans:
Specify the approval year of the plans:
Required documents: Plan analysis report, plan explanatory report, 1/5000 plans

VITA

PERSONAL INFORMATION

Date of Birth	1976
Place of Birth	İzmir
e-mail	rabia.bolposta@gmail.com *or* rabicabol@yahoo.com

EDUCATION

2004 - 2012	**Ph.D. in City and Regional Planning**. İzmir Institute of Technology, Faculty of Architecture, Dep. of City and Regional Planning.
2000-2004	**Master of Urban Design.** İzmir Institute of Technology, Faculty of Architecture, Dep. of City and Regional Planning.
1993-1998	**B.S. in City and Regional Planning.** Dokuz Eylül University, Faculty of Architecture, Department of City Planning.

WORK EXPERIENCE

City Planner	İzmir Metropolitan Municipality-İZSU General Directorate (Since September 2011)
Research Assistant	Izmir Institute of Technology, Faculty of Architecture, Dept. of City and Regional Planning (December 2001- September 2011)
City Planner	Bergama Municipality (29.06.2000 – 10.12.2001)

RESEARCH INTERESTS

Primary Interests	Environmental planning and land use planning with particular focus on water resources management; Land use, regulation and environmental policy and planning.
Secondary Interests	Urban design and physical planning.

PRIZES

2008	Urla – Çeşme – Karaburun Peninsula National Ideas competition (***First place)***
2009	Architectural and Urban Design Competition of Denizli Government Office and Vicinity ***(Consolation prize)***