

## DEVELOPING A WATERSHED INSTITUTION FOR INTEGRATED WATER MANAGEMENT

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### Introduction

Integrated Water Management is one of the most imperative environmental subjects of the present era, as water, this vital natural resource, has limits and boundaries to its availability and suitability for use. The massive increase of human population in combination with the graduated increase of needs per person in water, due to the rising standards of living, the increase of consuming needs and the development of technology, contribute to the restriction of available water sources and to their contamination. The emerging change of climate makes more intensive this phenomenon. Concerning not only the present needs, but also the needs of future generations, there is a redefinition of our objectives with regard to the use of water. This new approach is inspired by the idea of the viable management of water resources. Basic objective of Completed Water Management is protection of the water quantity and quality, through a process of adaptation the water demand and water supply that take place inside a field of continuous collaborations and conflicts among the users of water.

The European Water Framework Directive (WFD) 2000/60/EC constitutes a legislative incarnation of this new approach about the protection of water. Basic innovation of this European Directive is that the river basins are determined as geographic units in which the management plans should be applied. WFD requires that all inland and coastal waters within defined river basin districts must reach at least good status by 2015 and it defines how this should be achieved through the establishment of environmental objectives and ecological targets for waters. The result will be a healthy water environment achieved by taking account of environmental, economic and social considerations (<http://www.euwfd.com/index.html>). This European Directive was harmonized after a big delay in Greek legislation via the Parliament Law 3199/2003 and the Presidential Law 51/2007 by placing certain bases and decisive points of water policy. One of the basic principles of the new legislation is the decentralizing tendency in the management of water. More precisely, it encourages acts about the public information, the consultation and the multi-attendance of all the stakeholders of the river basin (CWA, 2008).

In that basis, the present paper aims to indicate that the foundation and operation of a watershed institution with specific characteristics, such as legal substance, material and technical infrastructures, scientific sufficiency etc, can act as the coordination of the stakeholders network and in general level as a crucial organization for the viable management of a river basin. The Alfeios River basin in Peloponnisos (Greece) was selected as a case study due to its significance as a natural resource and ecosystem. Since this river satisfies a great variety of uses (domestic supply, irrigation, energy, recreation etc) the proposed institution will have the opportunity to consider a multi variety of parameters and could act as a model for application on other river basins.

### The Alfeios River Basin

#### *Introductory information*

The basin Alfeios River constitutes one of the major hydrologic basins of Peloponnisos in Greece. The extent of basin is about 3,660 km<sup>2</sup> (drainage area), and includes the Prefectures of Achaia (10%), Iliia (30%) and Arkadia (60%). Alfeios River is the longest river in Peloponnisos and has a plenty hydrologic network. Actually, this river springs from the Arkadian Mountains as also from western side of mountain Taygetos, crosses the plain of Tegea, the plateau of Megalopolis and the valley of Olympia and discharges in Kyparissiakos Gulf. During its trip, a lot of smaller rivers meet Alfeios River, such as Lousios, Erymanthos, Ladon, Enipeus etc. Due to its extent and its plenty hydrologic network, the Alfeios basin presents complex physiography and geomorphology and a significant variety of ecosystems (DNR, 2003).

The specific characteristics of the basin are responsible for the intensive presence of human activities in that area as far as urbanization, farming, (agro)industrialization, manufacturing, tourism and other are concerned (Manariotis, Yannopoulos, 2004). All this human activities have had an important impact on the river network shape, on the valley floor morphology.

Besides the morphological impacts of the river network shape, there are also serious negative impacts on the quality and quantity of water (surface and underground), caused by human activity (Yannopoulos, Manariotis, 2006).

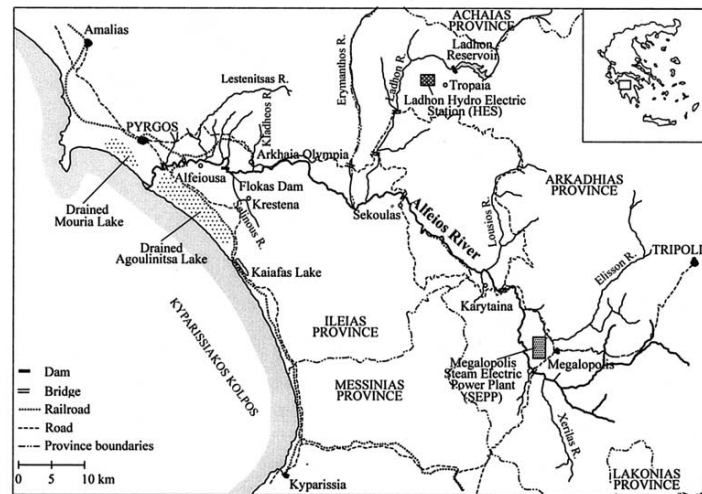


Figure 1: The Alfeios River Basin (Source, Manariotis and Yannopoulos, 2004)

### ***Involved management institutions***

One could raise the question about who is/are the responsible administrator(s) about the management of human activities in the Basin of Alfeios River that could watch, oversee, control, guide and coordinate all this activities, in order they would have the minimal negative effect on the ecosystem of the basin. The truth is that there are plenty of institutions involved in the management of that area, at several administrative levels (region, prefecture, and municipality). First of all, the Alfeios River Basin is extended in the administrative area of two Regions (Region of Western Greece and Region of Peloponnisos). The above Regions, and more precisely the Water Agency of each Region, are responsible for the protection and management of the Alfeios River basin, according to the Law 3199/2003. However, these Agencies are newly established services (beginning of operation in 2006) and they are characterized as "under-staffed" as far as human potential and technical infrastructure are concerned. Also, varying legal weaknesses prevent these Agencies to apply the goals of the European Water Framework 2000/60/EK. Hence, till now, there is doubt if the River Basin Management Plan of Alfeios, along with the Program of Measures will be approved up to 31/12/2009.

Beyond these two Agencies, there are several addresses-agencies-directorates that are involved more generally and indirectly with subjects of water resources and water protection, as one can see in Figure 2.

Comparing their role, one could claim that there are several problems among the involved stakeholders groups, some of them are referred in Table 1.

<b>Table 1: Arising Problems</b>	
1	Competence among this institutions
2	Diversity in the approaches and the objectives that are placed from each participating
3	Chopping of total responsibility
4	Absence of horizontal follow-up and support of interventions
5	Confusing abundance of legislative provisions with regard to the management of water

For all these reasons, difficulties in the guarantee of a united approach are created, obstacles in the approval of programs are emerged, and decision-making stops being convenient.

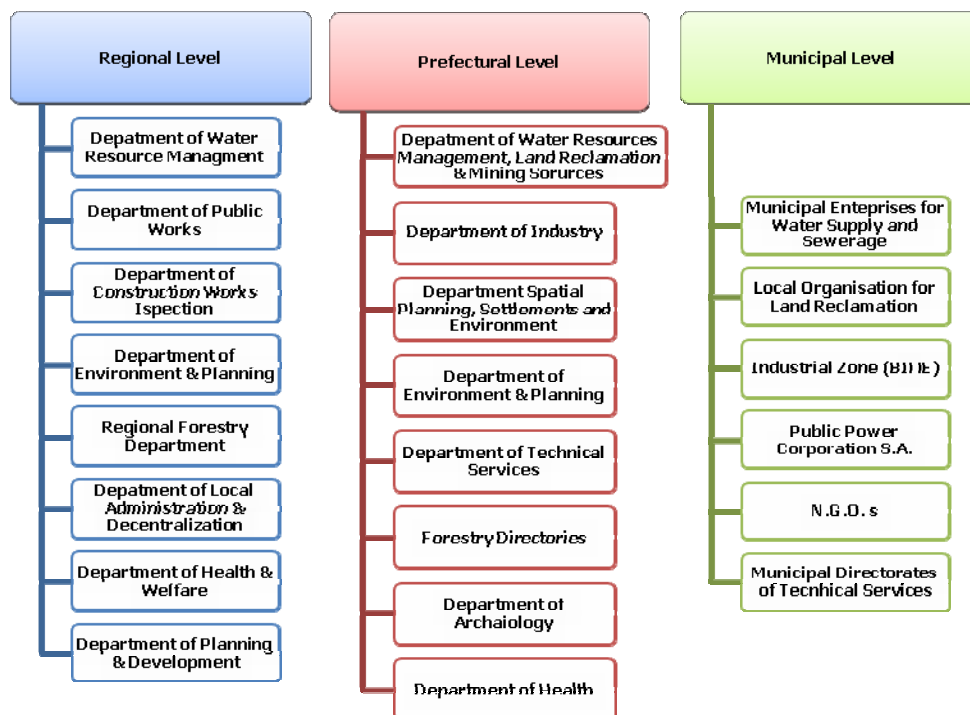


Figure 2: Involved Stakeholders Groups of Study Area

### The Central Watershed Institution

Taking into consideration, the weaknesses of regional, prefectural and municipal institutions concerning the management of water resources in Alfeios Basin, in the present work the foundation of central institution is proposed. This institution will have the competence to determine the policy of the basin management and devolve power to responsible authorities, but also it will supervise the application of this policy. The viable and balanced growth of the region, the protection of ecosystems and the reception of the most optimal environmental, economically and socially solutions in emerging problems are the three fundamental aims of this institution, as indicated in Figure 3.

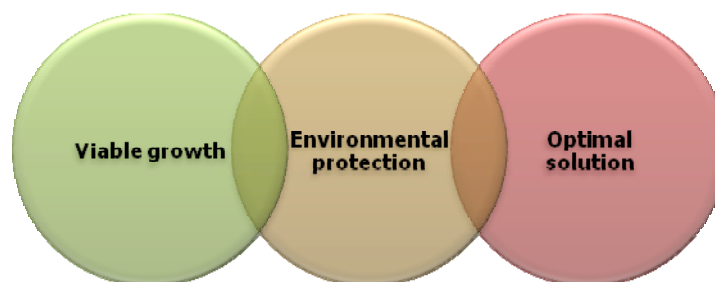


Figure 3: The Goals of the Central Watershed Institution

### The Role and Initial Conditions

Of course, it is clarified from the beginning that, the role of the central institution is not to abolish the action and the operation of remaining institutional agencies, which are related with the water policy. On the contrary, the roles of this central institution are those that are described in Table 2.

Table 2: The Roles of the Alfeios Watershed Institution	
1	Co-ordination of action by all interested/involved parts in the basin of Alfeios
2	Scientific and multi-parametric research about water questions
3	Finding the most optimal environmental, social and economical solution (effective decision-making), through participative frames

So, via this Institution, an effort about covering the emptiness and weaknesses of several administrative agencies is emerged.

Certain initial conditions that will determine and strengthen the existence of the central institution are described. The legal framework under which the Watershed Institution will be established is necessary to be published in order to justify (legitimize) its existence and its recommendation. The Law 1650/86 and Law 2742/99 partially ensure the conditions for establishment and operation of relevant bodies and institutions. It is important to be mentioned that the Watershed Institution should act and perform its roles as a neutral body in politics. Otherwise, if it depends on public and local government agencies, it could not bring arbitration roles in complete self-reliance and independence (Podimata, 2009).

### ***The Board***

The Alfeios Watershed Institution needs to be managed by a Board, which essentially will manage the affairs of the body. This Board has the highest authority in the institution and its role has to do with setting the guidelines and the necessary decisions for carrying out the duties and responsibilities of the institution. The Board of Directors should be composed by representatives of all involved/interested parties. The presence of all representatives, gives participants the opportunity to consider all dimensions of the problem and understand any different views on the same subject and to enable the production of cooperative solutions. Thus, a fair representation of the Board concerns representatives of public administration and local government representatives who act as technical advisors (such as local academic and research institutes-centers), representatives of non-governmental organizations and representatives of individuals, including agricultural associations, industries and tourism businesses.

In the present paper we propose the following structure of the Board by making a prior separation of members. Hence the Board will have a) regular members, which are the backbone of the body of the Board and really take part in all meetings during the decision making, b) thematic members that participate as supportive institutions in particular subjects and provide a specialization in the handling of various problems-issues, and c) special members, which are exceptionally qualified to testify to the emerging problems in several terms-topics that fall outside the regular thematic categories (Figure 4).

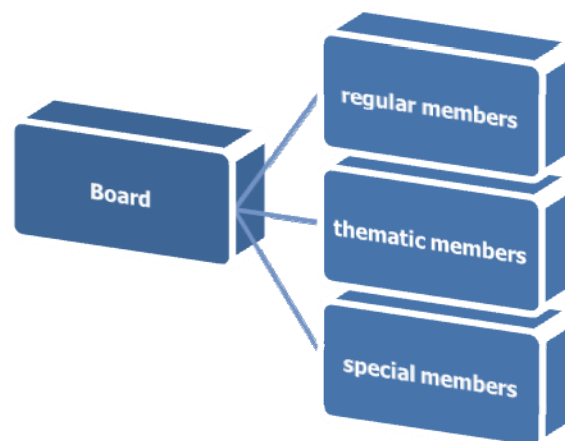


Figure 4: Structure of the Board

Eleven people should participate in the body of regular members. The number 11 is a critical size as the body is neither small nor big number. This will enable eleven different approaches for selecting the best solution. In that body, the representatives of the members shown in Figure 5 will take part in the regular meetings (once a month).

On the contrary the thematic members (< 6 representatives) and special members (< 3 representatives) will participate in the Board upon recommendation of the regular members and their participation depends on the special and technical subjects / problems or problems identified locally within the basin.

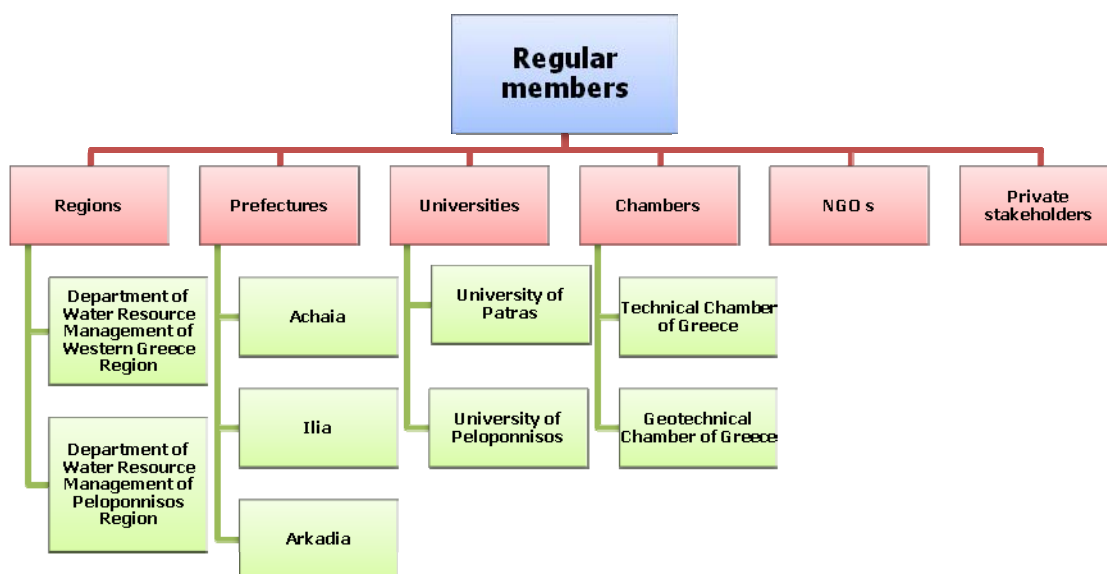


Figure 5 Organizational chart of the Regular Board

### *The Departments and the Supporting Groups*

Beyond the body of the Board, the Alfeios Watershed Institution should be organized by three departments that have a supportive role in the implementation/performance of the decisions taken by the Board. In Table 3 there is more information about these Departments.

Table 3: Administration of the Alfeios Watershed Institution		
1	Department of Secretariat Administration	which has the responsibility to support and cover all types of administrative needs of the body
2	Department of Planning, Management and Research of the basin	which has the responsibility to promote and implement all those measures that are necessary for integrated and efficient management
3	Department of Information and Promotion	which is essentially the part that seeks to enhance and promote the protected area, as well as to promote programs to attract sponsorship for securing financial resources

The presence of the three Departments would support the role of the Body of the Board (Figure 6). Of course, a Director of these Departments is proposed in the present model, as the Director will be responsible for the effective functioning of the Watershed Institution by controlling and defining the responsibilities of each department.

Beyond the Body of the Board and the Departments, a scientific supporting body is proposed to participate in the Watershed Institution. This body will be consisted by groups of persons (expert consultants) with appropriate technical qualifications and expertise. These groups will form the supporting organs of the Watershed Institution as they will have an advisory role and they will provide adequate scientific support to the Board. These supporting groups are in fact scientific committees, which contribute in solving particular technical problems and in proposing suggestions and improvement measures. So, they are not entitled to vote in the meetings of the Board but they reinforce the decisions of the Board, as these decisions have already been "filtered" by the expert consultants. Of course, the random selection concerning the invitation of the expert consultants is not the most efficient way. The Director of the Departments and the academic representatives of the Board could help in the invitation of the suitable scientist. A frequently updated register of the experts' consultants could also help a lot in the procedure of invitation. The use of the Internet by working groups (forum) can significantly reduce the time of conclusion of the meetings, at least in the preparatory stages of discussion (Podimata, 2006)

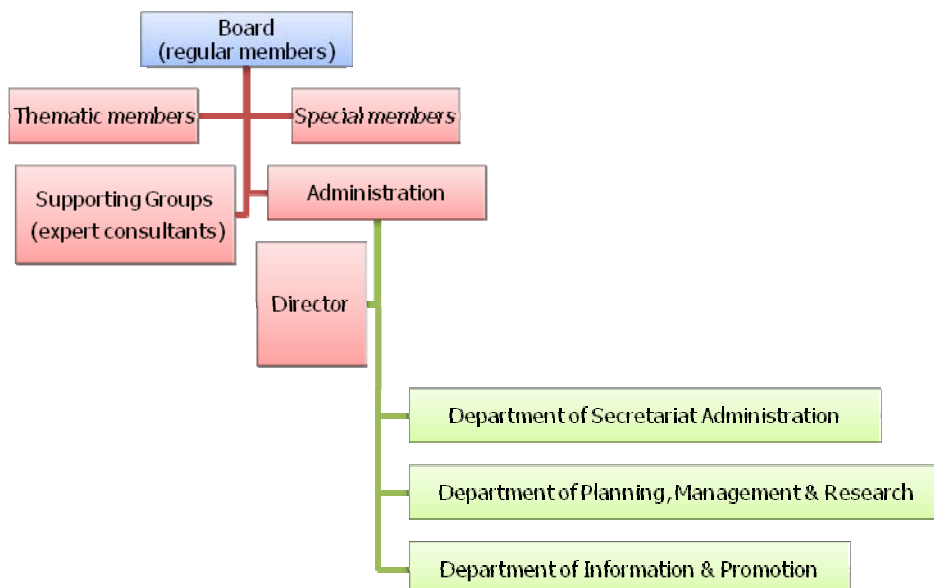


Figure 6: Organizational chart of the Watershed Institution

### ***The Headquarter and Financial Means***

Beyond the above structures, Alfeios Watershed Institution needs to have adequate infrastructure to accommodate and complete its work. Its headquarter should be in a place that can serve all three prefecture (Achaia, Arcadia and Ilia), Given the fact that most of the geographical area of Alfeios Basin covers the districts of Arcadia and Ilia, the choice of headquarter must be made between these two prefectures. The selection of Ancient Olympia is supported because:

- Alfeios river is connected in the minds of most people in Ancient Olympia
- Ancient Olympia is widely known around the country as well as globally, due to the history and culture that distinguishes it, and
- Ancient Olympia is located about in the midway of the river.

Also, beyond the required administrative-scientific support and infrastructure, Alfeios Watershed Institution should have financial means (Figure 7) to achieve its sustainability, as the operation of the Institution will provoke costs (associated with the workplace and the costs of workplace settings, pay staff, taxes, telecommunications, etc.). On the contrary, the revenues should be covered by a) Subsidies from the state (i.e. Ministry of Environment, Ministry of Rural Development and Food, Ministry of Development, other ministries, corporations or legal persons of the wider public sector relating to finance protection of the natural environment) b) Europeans programs, c) Fees from the performance of surveys and studies, d) Grants,



Figure 7 : Financial Means of the Alfeios Watershed Institution

donations, legacies, d) Benefits for the environmental development of the area and e) Fines resulting from breaches in protected area of the river basin. At this point it should be noted that several areas within the basin of the river Alfeios are introduced to a system of protection, which creates the right conditions and for the Watershed Institution to participate in financial assistance programs of the area.

### ***The toolbox***

The Alfeios Watershed Institution which has a coordinating role must be the manager of an organized network of information and communication. This network will enable Board to take into account all elements of the dynamic system of the river basin river in several levels (institutional, technological, economic, social and environmental), in order to make effective decisions on integrated water resources management of the Alfeios basin. The networking (institutional bodies, natural or legal persons and other stakeholders) is crucial to the smooth functioning of the Watershed Institution. All kinds of stakeholders (farmers, tourist activities, agro-industrial activities, local authorities, public services, ecological organizations etc) should involve in that plan via the network (Manariotis and Yannopoulos, 2006). Of course, the procedure of evolving a lot of stakeholders is not an easy effort and more even difficult is to manage this network, as conflicts between stakeholders over management goals and the means to accomplishing those goals are inevitable, and resource management professionals are often ill-prepared to facilitate constructive dialogue to resolve these conflicts (Bonnell and Baird 2005). A web gateway can ensure the provision of communication and information exchange among the stakeholders.

Also, the escalating need to manage large volumes of data at spatial level has led to the development of Geographic Information Systems (GIS) that have the ability to share information with the help of thematic maps that can be combined using appropriate mathematical models and produce complex and supervisory mapping, which allows a graphical interface with user interaction that can serve as tool of decision making. These thematic maps give a more layman's view of the problem without affecting the 'scientific' part of the overall process. This gives the possibility of presenting the results to the general public with an accessible and understandable manner. Hence, the Alfeios Watershed Institution could be the administrator of the network by being the center of management of registry data between different services via the toolbox of GIS. In this way, the Institution will serve the true needs for enriching the database with information, while serving the needs of other network partners to exchange information.

### **Conclusions**

In Alfeios River Basin there is strong environmental degradation due to human activities developed in the area (urbanization, tourism, agriculture, construction etc). An analysis of stakeholders that are involved (directly or indirectly) in the management of Alfeios Basin showed the weakness of the Greek system to adapt and create an integrated basin management, as there is lack of cooperation and lack of common vision among stakeholders.

Through this paper, the establishment and operation of a central management structure, with coordination between water users in the study area, is proposed as a solution. It is essentially an effort to operate a Watershed Institution with an administrative role in the management of Alfeios River. This Institution should have the principles the responsibilities and the toolbox (ie network, GIS) that are mentioned above. But most important is the fact that it has the legacy to devolve responsibilities and power to the involving authorities of the Alfeios River Basin. One can also recognize that the final decisions of the Institution are not purely technical, but it are also political, as the management of a basin is related to the spatial organization, urban or other land use planning and environmental protection.

Finally, it is crucial to mention that the proposed model recognizes the diversity of functions of the river basin and the need to achieve multiple objectives through equity schemes of the social partners. This means that the management of a river, although dependent on science and technology, still, is primarily a social process. The participation of local actors and social groups are critical because the maximization of citizen participation in shaping the terms of the protection increases the social acceptance and leads to successful implementation of management measures. Especially with regard to reconcile competing-conflicting interests among water users within the basin, through the Alfeios Watershed Institution, agreement and consensus will be achieved.

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