

Strategic and Operational environmental planning of aquatic resources in Thessaly basin in Greece

E. KOUTSERIS¹, P. DIOUDIS², AG. FILINTAS²

¹ *Department of Planning and Regional Development,
University of Thessaly,
38334 Volos,*

² *Department of Farm Machinery & Irrigation,
T.E.I. of Larissa,
Periferiakos Larisas-Trikalon, 41110 Larissa,
GREECE.*

Abstract: - Face up the old 5th Environmental Action Program (EAP) of 1994 and the new 6th EAP for the sustainable development in 2001, we confront strategically and operationally in E.U. the management problem of aquatic resources in regional and watershed level. The present paper concerns the strategic and operational environmental planning for aquatic resources in Thessaly basin in central Greece and also their protection against pollution and exhaustion, as it comes, from different national-operational water resources programs and plans which are already made. The aforementioned aim is implemented from research of goals, actions and proposals, which depicts the problem of aquatic resources management, their pollution, the connection with agricultural activities and the dealing with the water problem. Primarily it is presented a general view of the water situation-problems in Thessaly basin, water resources pollution and the management problems through rational managing and protection of aquatic resources. Also, the prevention of natural water-involved disasters is explored which leads the planning compass to the need for a new strategic and operational scheme for environmental management of aquatic resources and for the institution of new water policy actions and measures in Thessaly basin in central Greece.

Key-Words: - environmental planning; strategic and operational management of aquatic resources and water policy actions; integrated operational regional plan.

1 Introduction

In 1994, the 5th EAP program pursued the incorporation of the environmental policy with direct and short-term interventions in their management, in other policies focused upon the ten environmental problems or issues or goals, in four financial sections. In 5th EAP it is defined the political pursuits and the recognized goals which had to be achieved by 2000. The intervention sections of the 5th EAP were the financial aspects and it had direct and short-term interventions in their management: Industry – Energy – transportation – Agriculture – Tourism. One out of ten goals of the 5th EAP was the water management and the civil environment [1].

In May 2001, a new announcement was approved by the E.U. strategy for sustainable development, where all the goals were defined for a long-term development and which focused mostly on four sectors giving the E.U. priorities until 2010: Special attention is paid on four subjects, dealing with handling of climate changes, nature and

biodiversity, environment and health, management of natural resources and waste. A great importance is given specially to aquatic resources [10]. In order for these goals to be achieved, the following action lines were proposed: improvement of environmental legislature application, cooperating between market and citizens and improvement of the incorporation of environment protection in other community policies [2, 3].

2 Problem Formulation of Thessalian Aquatic Resources

From the above mentioned a question is arised upon the present article: *which could be the goals in the new strategic and operational management of natural and aquatic resources, actions in a Greek Region, like Thessaly?* To answer the above question, we must first give a overall view of the water conditions in Thessaly, as it is depicted in various national water resources planning programs and studies which were conducted so far and they all

instate the water resources management problem. Afterwards we present the pollution and problems dealing through a rational management and protection measures against pollution and exhaustion of the natural resources in Thessaly. We continue with the prevention of natural water-involved disasters and antiflooding protection.

Finally we end up with the need and goals for a new strategic and operational planning for environmental management of aquatic resources and for institution of water policy actions in Thessaly.

2.1 A general view of aquatic resources problems in Thessaly basin in Greece

Greece contains relatively sufficient and with high quality, characteristic-quantities of aquatic resources but simultaneously it deals with major problems such as their effective management. The basic reasons which cause problems in the water utilization in the country are:

a)the inequal spatial distribution of aquatic resources, b)the inequal spatial distribution of demand by water users, c)the inequal distribution of demand in time, d)the biggest consumer of usable water which is agriculture (87%), e)the morphology of the country, f)the dependence of North Greece upon the surface drainage rivers, g)the big coastal line (15021Km) and h)the many islands of Greece with inadequate aquatic resources [2].

While a relative board of “management aquatic sources of the country” made by the recent “operational environmental program of sustainable development” (EP.PER.S.D. 2006-2013), [2], we encounter five aquatic departments with deficiency or on the limits of demand and offer. Thessaly is one of these departments. In the present state’s profile we encounter problems which concern the managing situation of the waters in national level: like “the inadequate monitoring of usages and users of waters and the lack of coordination between the administrators. The random utilizations of isolated aquatic resources while we have lack of incentives – antincentives for the economy of waters especially in agriculture. The lack of political cost upon the water which reflects the rarity of this source”. Special interventions in the boundaries of legislature appear in Thessaly in nitrogen concentrations of the groundwater resources.

The locating of the above problems appears in the weakness section of the SWOT analysis and the delay to the enforcement of the national low. 3199/03 which coordinates with 2000/60/E.U. and with the “summarized proof of cohesion –

symbolism of the strategy and the priorities with the national and European priorities of the present operational program [2].

In the spirit, that the prevention cost is much smaller than the rehabilitation cost, in 2003-4 a voluntary group of the Region, as working team “natural environment” (WTNE) in Natura 2000 and SPA (special protection areas) have actualize a ‘Regional environmental strategic plan of sustainable development of Thessaly’ (RESP of SD in Th) [4]. From the general conclusions of this plan, we can recall: “In conclusion, in order to sustain the programming horizon of 2010, the productive ability and viability in Thessaly and its residents, we demand as first priority the completion of the plans, based on the surface aquatic resources in Thessaly (Smokovos, Karla, Girtoni, etc). Also the application of rational management systems of surface and groundwaters and irrigation systems and the adequate function of their management, with parallel interventions of actions programmed and administrative measure of sustainability of the irrigation areas, measures of bans and control of drills, reforming of cultivations and activities, extensively in agricultural and stockbreeding production systems, especially in the plains and the application of cultivation and ban systems. These measures are also required to establish the sustainable function of Pinios River and its parallel torrents [4]. In another point, we underline the lack of administrative measures. There isn’t any planning and irrigation program, and as a result, problems are created, in farmers, and the state services involved (TOEB). The lack of administrators in similar areas is common sight. Everything that has been highlighted, in periods of lack in rain, (drought) are becoming more intense, with “unconceivable ramifications” [5]. Also, in the frame of regional planning and its proposals for the time horizon 2006-2017, we encounter another proposal for the waters: From an effective in 2006 to integrated management of aquatic resources: in 2017 [6].

Especially, as far as the 2000/60 regulations are concerned, we must report that so far “its coordination with the Greek legislature (low. 3199/2003) is completed, also the legislature upon programs and measures for four regions is completed, too, and the implementation managing plans in river basin level in three regions as well. It is noted that for the implementation of the total demands of the regulation, we are short in a major number of actions which must be taken in future time [2]. After that, one can see how some areas are presented and how we can prevent, through protection the degrading of Thessalian aquatic

resources with some other kind of water management.

2.2 The lack of water and the pollution problems in Thessaly dealing through a rational management and a strategic protection planning of aquatic resources

The quality of surface waters is in general good state. But as it is stated, in the EP.PER., 2000-2006 “for the confrontation of the pollution problem in surface waters in the Thessaly Region, biological process systems must be constructed in smaller communities. Also, the polluting industries must be forced to apply biological cleaning systems to their waste disposals, while all others which can, must connect to the already present and functioning facilities of the city’s biological cleaning unit” [1]. But as it is confirmed, by the new EP.PER.S.D. 2006-2013, all the above aren’t already completed in agriculture [2]. However, according to the reg. 91/676/EU “for the protection of waters from pollution caused by agricultural activities”, Thessaly is characterized as a sensitive zone (Greek law 99652/1906/99). This constitutes all measures taken very useful for the land protection, and as the “codes of good agricultural practice” and the action program for their promotion and application.

In accordance with the National Net of monitoring the quality of surface waters, which functions since 1998 and it was organized by the Ministry of Environment, Regional Planning and Public Constructions (Y.PE.XO.DE), it systematically monitors the quality of surface waters in the country side. This National Net offers an evaluation of the chemical situation and the timely fluctuation of certain water quality points, but it doesn’t include the biological points of quality and as a result the classification of waters is unperceivable. In the aquatic surface of the Region of Thessaly the net includes 42 sampling points which cover a big part of the total area of Pinios River and its parallel torrents. The total number of the ground water sampling points for concentration inquiry are 30 and the frequency of sample taking is seasonal [4]. Supplementary studys are being made even by the Ministry of Agriculture and others [7, 8, 10, 17]. This net is being reconstructed according to the demands of reg. 2000/60/EU and according to the calculations results [2]. After one registration of the shortages and weaknesses of legislature coming from RESP of SD in Thessaly, some measures are proposed to deal with the problem of the rational management and the protection of the aquatic

resources of Thessaly, as well as solutions for the present problems [4]. *Weaknesses and shortages in legislature:* In the regulations decided of the four Thessalian prefectures, very few things are dealing with the utilization of surface waters despite the fact that every year a great land extend is irrigated with surface water, and big or small constructions for the utilization of surface waters are made, not only by community individuals but also by state administrators (communities). Consignally, for the over-pumping control and the fighting of expenditure in the use of irrigation water, it is mandatory to gradually establish (in 3-5 years time) in every drill or water concentration a measurement of provision, with which we constitute the control of the total consumption of water every year possible. The lack of rational and complete management for the totality of waters especially in Thessaly, tempts a lot of technicians to seek outside help and mostly outside the Pinios river basin. The method which concentrates the most advantages is the technological enrichment of ground water aquifers. Because, it can store up huge quantities of water in natural basins, it decreases the lack of evaporation, it implements simultaneously the anti-flooding protection, it alters the lacking quantities in real water concentrations and not only “available quantities” and finally it isn’t antagonistic with the application of other methods. So the big problems of Thessaly, spread by the increased water demand of cities like Volos and Larissa, and the solution of river Aheloos diversion, becomes unique “The irrigation of 2.4 million acres in Thessaly and the increase in the water dynamic of Pinios river is considered to improve the quality and quantity of the underground waters” [3, 9, 10].

Finally, the pollution of aquatic resources and especially in Pinios river basin, is of major importance in Thessaly and this problem is more intense in East Thessaly than in the West and specially in the parallel small points of forest torrents as of major biodiversity between the unified and ecological poor area of mono-cultivations [6, 9]. The first priority still remains to be the intensely problematic areas like Karla in Thessaly and certain islands. The expenditure of establishment which comes up for the new administrators of managing aquifer resources is optional expenditure [1, 4].

3 Problem Solution - Results and discussion

To deal with the problem of unreasonable usage of aquifer resources and their waste, made by farmers

or other users, the control and police of the usage is obligatory either by the constitution and creation of a special force or service, or by the appropriate incorporation and organization of the already existing services, in cooperation with the local administration. This is effective by the measurement which will take place at the beginning and at the end of the irrigation period. The case of overconsumption e.g. over 10-20%, which is permitted to anyone (based on the area and cultivation), will result in strict fines (e.g. 100-200% extra of what is the cost of the irrigation percentage of the TOEB area).

It is obvious that the non-application of the law and the weakness of the mechanisms which are supposed to check this phenomenon, the usage of the surface waters and the construction of facilities for the utilization of surface waters without a license by individuals or administrators without the basic programming by the state are possible. So we propose as measures the following.

3.1 Solutions for the problem of rational management, strategic and operational protection planning of the aquatic resources in Thessaly basin

A. Expression of political will in every level with certain measures. Such measures can be exemplified [9]: 1. Legislature and decisions. 2. Confirmation of law application and decisions by the local water administrators (TOEB, DEYA, etc). 3. Organizational measures and use of police – facilities constructions and utilization of aquatic resources. 4. We can come across regional units, which have been afflicted more than others.

Us an additional application of methodology with the definition of “environmental sensitivity: as a first phase (pre-selection, prescreening – scoping, new choices, screening) in the areas which have the biggest environmental problems and afterwards with an increase of the sample’s number as a second phase [5].

B. Administrative measures – techniques (installation – establishment of measurements in pumps), 1. Utilization facilities and transfer of surface aquatic resources (river Aheloos, lake Karla, lake Smokovos, etc) enrichment plans of underground aquatic resources [10]. 2. Continual information – education of farmers in ways of economizing irrigation water [10]. 3. Creation of an administrator center of managing Thessaly’s aquatic resources.

Given all the above problems and the weaknesses mentioned above, and the safe prediction that in the future the usage of waters which have to be satisfied, will have gradually a more intense antagonistic trait (irrigation, energy, agriculture, environment) and it is critical and obligatory for Thessaly, to create a mechanism (technical – administrative – financial) which will face all the upcoming problems.

“If we also consider the serious problems and the weakness we encounter in solving them, since the drought of the years 1977, 1989 and 1991 – 1992 and since the floods of Karditsa (1994), and in addition the imminent construction of route change plans of the upper side of Aheloos, then all the above confirm the need of creating a united administrator center for the managing of aquatic resources in Thessaly” (Kalfougios et al 1999 in [4]). Fortunately the “de-nitrification” program is already approved by the certain European committee, reg. 2078/92 and by the Ministry of Agriculture in the land of Thessaly is applied [6, 10, 11, 17]. All the above show, the unification need for all administrators and the designing of Ministries and Regional, and that the first priority is the direct implementation of the managing plans (qualitative and quantitative monitoring of the water resources of river basins).

3.2 The prevention of natural water-involved disasters and the antiflooding water protection

From all the national operational programs for the anti-flooding constructions, the one which is of a great priority is for those concern areas with high danger of water flooding occurrences and for areas with great concentration of floods.

The prevention is a part of Planning. The same is categorized rather as Program (ex. Ante), than as a plan, as an immediate planning. The specialized sciences, which deal with these disasters, mention a direct and danger and a decrease in environmental disasters through the alteration of natural phenomena, with a strategy including environmental control, so as to come up with prevention (not excluding the alteration in human behaviour). So the first clues are addressed to controlled measurement research, while the behaviour with the altered fluctuation human mortality becomes a quite difficult problem.

As methodologies in preventing disasters we often use: a watershed of units, the GIS mapping of a possible disaster for a specific area, the

categorization of the disaster in scales, the use of various maps, the microzone categorization, the disaster models, the digital simulator, and the "Delphi" technique which is an evaluation method of obtaining what could be considered an intuitive consensus of group expert opinions [10].

Finally, the combination of the 'citizens training' and the mechanism of crisis management (Strategic Point and Plan), are the demands made for the prevention of the disaster. Also, in the Planning of the prevention we include with a long term goal, and the dealing with rivers basins, either with other activities, or with some other principles, that concern the protection, the hydraulic convention and the best spatial utilization of the water. Simultaneously, we connect the needs, characteristics, the qualities and complexities of the population, the productive activities and the utilization of water. From the eighth chapter of RESP of SD in Th, we conclude as follows [4, 12, 13]: An example of prevention and warning which was presented in the RESP of SD in Th, PLAN was that of the "technical decision procedure".

In a large scale and one in complete Programming / Planning we must follow the stages: *1. Programming of prevention and warning* ⇒ *2. Planning of modesty and readiness for problems* ⇒ *3. information, monitoring and planning* ⇒ *4. plan* ⇒ *5. evaluation,* ⇒ *6. application.*

For the small scale it could be based in the consecutive stages and the alternative solutions based on pre-arranged goals, locating the problem and evaluating the information, according to the relation: goals ⇒ problem ⇒ information's evaluation ⇒ methodology of Planning for the plan.

So, from all the above national operational programs and Regional plans it comes out that the anti-flooding water protection addresses to more specialized fields of expertise, which are concerned with other disasters also and with the diminishing of environmental disasters. Secondly, it refers to the alteration of natural phenomena, with the strategy of environmental control, so as to achieve prevention [4].

3.3 The need for a new strategic and operational scheme for environmental management of aquatic resources and for institution of water policy actions in Thessaly basin

From RESP of SD in Th., we can conclude that the need of a new strategic management of natural and aquatic resources and policy actions in Thessaly

which are analyzed in other papers with all the reached conclusions: priorities, goals, until 2010 ([3, 4, 13, 14]) are:

- A. Interventions on demand, usage and water management.
- B. Interventions on the creation of team activities on economy of surface waters.
- C. Intervention on the creation work for storage of surface waters.

Priorities of goals until 2010: Sufficient and qualitative water supply of urban centers and settlements of Thessalian countryside by "Institution of waters management in Thessaly". Guarantee of minimal necessary environmental benefit for viability in the natural system of Pinios River and its tributaries by "Barrier in the extension of private drillings and in the over pumping of underground waters" and substitution of >1000 millions m³ of ground water reserves of over pumping in the period 1985-2000.

Ways of confrontation: 1) Stopping the spread of private individual drillings and the overconsumption of ground waters, 2) Replacement of the >1000 million m³ of ground water reserves of overconsumption of the time period of 1985-2000. 3) Maintenance of viability of rural exploitations by new actions of natural rehabilitation of agricultural regions.

The suggested measures [14]: 1) Testimonies and confirmations for sanctions of a two year-program, for regions with bans and restraining orders for drillings and legalization of the excavations.

2) Support of planning and subsidizing actions of rehabilitation in monocultivating areas of cotton with subsidizing of cereal.

3) The replantation of prairies and retaliation of qualitative stockbreeding utilization in the frame of a complete program for the monocultivating zone of cotton (facilities of health welfare, civilization for the promotion of congregation centres for the rural population).

4) The best solution will demand limitation of monocultivations, and a decrease of 10% of the stockbreeding population in E.U. and an increase of the sheepbreeding which doesn't affect the environment with nitro.

5) This evolution would transform the E.U. from the present state of an exporter to an importer of stockbreeding products and a greater exporter of many cereals. The basic viable solutions could be the complete production, the use of stockbreeding waste, and the utilization of organic fertilizers instead of chemical ones, the creation of pioneering stockbreeding housings, biological agriculture, and the extension of agricultural – environmental

measures of the norm 1257/99(2078/92) of the E.U., which of course, as practices cost more than the traditional agriculture and decrease per unit every supplement they offer to the productivity of the rural section.

6) Research of protection and utilization of water sources of Tembi, Kissavos, Pilio, Velesino, Argitheas – Pindou. Clarification and scientific approval from an interdisciplinary work team.

7) The E.U. which funds the agricultural policy (CAP) and the devastating policies may ask from the farmers to diminish the enterprising activity in the country and to incorporate the environmental costs upon the process of agricultural supplies, on the cultivating methodology and on the prices of agricultural products, but, it must also compensate the cultivators with a recognition of their part, as managers of the environment and administrators who affect the consumers' and citizens' health.

Generally, as it is proved by the above plan: a complete integrating plan is needed for the managing of aquatic, soil and natural resources and activities in Thessaly and a rejuvenation of cultivations for the natural spatial alteration of Thessaly's countryside. Introduction of the principles of the progressive 'full cost recovery' upon the function of the irrigation plans and the extension of the nets, the usage of water and the pollution of the surface and the underground water resources and the other natural resources. Adaptation of agricultural – environmental measures of replacing the forestry actions in rural areas (which is ineffective for our country) with new actions. Promotion of local rehabilitation and products and multi-functional activities for all rural population. Creation of development centers and population congregations in rural areas with access facilities in the civil centers and elevation of living standards and life quality [4, 3, 15].

4 Conclusion

➤ A complete integrating plan for the aquatic, soil and natural sources and actions in Thessaly can serve as the strategic goals are improved in relation with older programs and in co-ordination with the new requirements in demand, use and water management, as well as the interventions for the creation of team works in saving surface waters [16, 10]. These suggested new strategic goals are based on priorities, and they are addressed to a new strategic environmental management of natural, aquatic sources and actions which can come out of a complete operational plan with the following

interventions. The creation of a united administration center for the complete utilization of aquatic resources and a parallel planning and programming of the same actions. Suggested interventions – actions and legal alterations, for the success of the goals for the natural and aquatic resources and actions but especially for the preservation of viability of the agricultural exploitations and methods for succeeding in the new agricultural frame. Suggested axons towards the expertise of an Operational Program/plan for an interprofessional union for the transfer of the present water resources region state to the new environmental and agriculture oriented goals as agriculture is the biggest consumer (87%) of usable water. The new goals are:

➤ The creation of a united administration for the complete utilization of aquifer resources and a parallel planning and programming of the same actions.

➤ Suggested interventions – actions and legal alterations for the success of the goals for the natural, and aquifer resources and actions

➤ Suggested interventions – actions and legal alterations for the preservation of viability of the agricultural exploitations and methods for succeeding in the new agricultural frame.

These goals are coordinated with the old regional planning in Thessaly as following:

From the decline of agricultural employment best adaptation in the market and multi-functionalism in 2006, to the decline of agricultural employment adaptation to the market and the new division of labor in 2017.

From the gradual boosting alteration (modernization, competitiveness) in 2006, to the promotion of alteration, improvement of the peripheral state in the Greek and international distribution of employment in 2017.

From a more balanced interregional progress, with new roles for West Thessaly and the mountain areas in 2006 to a balanced and multi-central interregional development in 2017.

From the interruption of degrading and scarce improvements of environmental conditions in 2006, to the accelerated environmental improvement, a tendency for altering the boosting model with vital elements, in 2017 [6, 10].

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