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**THE NECESSITY OF AN ECONOMIC MANAGEMENT OF THE WATER:
SOME PROMINENT EXAMPLES**

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**INTRODUCTION: THE PROBLEM OF WATER AND THE NECESSITY
OF ITS MANAGEMENT**

The water has turned into an economic good, widely desired, expensive and limited, whose management is becoming a problem of long-range in a planetary scale. The current *crisis of water* does that 1,500 million of people have no access to drinking water and that 3,000 millions have no plants for the treatment of it. The result is that every day 30000 people die by the absence of pure water and 18 million of children under 14 do not go to school because they are forced to spend all the day carrying water, frequently in distances higher to five kilometres. The lack of balance between the necessities and the geographic availability and the seasonal hydrologic is every time more frequent, so, securing its reserves to an universal level has been converted in an important battle for the twenty-first century.

Since the 70s, the shortage of water has been more prominent due to the long droughts, and according to a report of the World Bank in 1995, 30 countries which comprise the 42 percent of the world population, experience a chronic shortage of water that threatens their agriculture, their industry and the health of the population. This situation of shortage will keep on extending gradually and it is expected that, for the year 2025, three billion of people of ninety countries will have to confront severe problems of water supply. The existing imbalance between needs and availability conducts to the phenomena of overexploitation and of degradation of the reserves, even tensions among the concurrent users to regional level, when not among the States. Even when water abounds, it holds to the contamination and the waste, aggressions that put in danger the provision and the ecological sustainability. The 80 percent of the rivers of France are contaminated due to an excessive use of the water and many rivers no longer carry their water to the sea. The water of the ground is being finished and contaminated, and now water should be extracted in more remote and deeper places, what invariably enlarges the prices.

Obviously, the water which is object of our interest is the fresh one, employed mainly for use and human consumption, and represents only the 0,65 percent of the water of the planet, so that, when we speak of economy of the water, we understand that the scope of study is girded to, mainly, fresh water, scarcer, and vital for our survival and development, without reducing the importance of salt water, that represents approximately the 97 per cent of the water of the planet. The fresh water is found in its greater part retained in the land and stored in the aquifers, and represents the 97,54 percent of the total reserves of the water of the planet, representing the continental superficial water only the 1,50 percent of the total fresh water.

Of these first and simple data, we already can infer that the water is a good of first necessity, more limited of what we would be able to be thought and which demand grows in a worrying rhythm, not for the increase of the world population, but because to such increase in absolute terms, a spectacular and incessant increase of the demand per person can be added in a general way in all the countries.

Therefore, the water constitutes a good of great importance in which various opinions and interests flow, such as strategic, eco-biological, political, economic, sociological, cultural, etc. The degree of sensitizing of the citizens to this respect is notable upper to that which can be appreciated in other environmental themes, exactly by the quantity of

variables that rotate around water in any type of human social organization, from the most advanced and complex, to the primitive and supposedly backward.

In these conditions, today the hydrologic planning and the hydraulic politics should be done thinking about that the circumstances and the needs have changed drastically, so that, the problems are not the same and that what lacks by doing is not only the repetition or extension of what it already done. Currently, the planning and management of the water, understanding the conservation, reassignment and preservation and improvement of the quality, should assume a greater importance, and not because of it we have to underestimate the road travelled through, in many aspects, it presents doubtless auspicious conditions as starting point.

The need of an adequate planning and management of the resource, derives from a set of questions that cause, as already has been indicated, serious controversies around the water. Its economic nature –good scarce– and, at the same time, its condition of public good and not private presents problems as for the application of the laws of market as the only mechanism in the administration of the water and as for the criteria of appraisal. Set against the criteria of Pareto –efficiency– applied to the role of the water in the gross national product or the principles of maximization converted sometimes in dogmas, the equity is contrasted, the protection of the public interest –the protection and environmental conservation–, an interest that sometimes has not coincided with the global benefit, but with that of some specific sector.

In countries of Africa, Asia, Central America and South America, and in some states of what was the Soviet Union, the governments lack the necessary financial resources to do the essential investments in the drilling of wells, the maintenance of the public installations of water, it enters up aqueducts and the provision of sanitary services in the areas densely populated or rural more remote. Because of it, those countries have determined to put part of their services of provision in hands of large multinational companies. The water has become into an attractive merchandise, instrumental for the eating and economic security of any State. Its importance and that of an adequate management to basic structural level is such that, of being not produced a universal recognition that the water is common property of all the alive beings on the land and not a merchandise that can be sold or privatized, in a four or five lustrums the lacks of the drinking water will be extended all around the planet, without including the negative consequences: The climate change.

The relative importance of the different uses of the water in the countries in development shows that such countries have direct dependence hardly marked of this natural resource. Only because of it, the sustainable management of a scarce resource as the water, is vital for the welfare and the perspectives of development of people in this type of countries. For M. Falkenmark there are four causes that explain the shortage of water, whose knowledge will permit us to carry out a wiser management of the resource: 1) the dry climate (pattern of atmospheric conditions or of the weather of a zone); 2) the drought; 3) the draining (dried of the floor because of activities such as the deforestation or the excess of grazing); 4) stress of water (low availability of water per capita on account of the growing number of dependent people of the relatively fixed levels).

In turn, the shortage of water is intensified for the prolonged droughts and if the warming of the land takes place in the terms predicted and on the ones that, practically, already nobody doubts, the persistent droughts can be more current in some regions of the globe.

To the shortage of water, the spendthrift and unsustainable employment of the resource can be added, for which are necessary measures for a sustainable employment of the water, which carry the humanity to behave, in some questions, with identical criteria to that of the animal world keeps in mind for the management of the limited resources. On the other hand, to the shortage and to the bad administration other forces are added that complicated the situation and oblige to a more sustainable use of the water in the future: it is a matter of the growth of the population and of the demand; of the uneven distribution or access, what signifies that some countries obtain portions of the resource than others; and of the exhaustion or degradation to the fountains that the people has free access without control.

THE STARTING POINT IN SPAIN

In Spain, the interest for all the relating to the management of the water is not exactly new; in fact it is one of the countries of our environment that has shown a greater worry by the administration of the water resources, from remote times, having generated during centuries a certain culture of the water. Without doubt, the natural conditions of our country, with an uneven distribution of haste (the predominant dry Spain against the minority humid one) have contributed to this situation.

In Spain, a long civil hydraulic engineering works tradition exists. During the epoch of the Roman domination, the water supply to the urban nuclei required executions that have arrived up to our days in good conditions (aqueducts, collectors and channels), even some of them are still in use. The subsequent Arabian bequest was especially important because of the system of irrigations that has remained without large variations until today to a large extent of the rural zones of our country. Likewise, besides the acquaintance and ancient Court of Water of Valencia, it fits to mention other legal milestones in this matter, like the Code of Water of the King Jaime of Aragón, in the 12th century, or the Law of Water of 1879, that contributed in a remarkable form, during more than 100 years, to rationalize the uses of the water.

Without stop recognizing the interest shown during the epoch of Illustration, is without any doubt, from the last section of the 19th century, with the current of thought *Regeneracionista*, headed by Joaquín Costa, when starts in Spain an authentic public policy of large hydraulic works that has marked the model of management of the water that is now hardly questioned. The *Regeneracionismo* intended to endow to the hydraulic political of an almost absolute significance as basic instrument of social reform and modernization of the country, like starting point for structural political changes and, especially, as solution to the agrarian question.

In this way we arrive to an epoch which has been called of expansionist economy of the water, oriented to the construction of hydraulic large works with a triple objective: *a*) to assure the general provision of water in good conditions for the population and industry; *b*) to guarantee the food production by means of the development of the irrigations, and *c*) to facilitate the production of electric power. With these sights, during the first half of the last century an intense hydrologic planning activity was carried out.

At present, the Law of Water of 1985 is still operative, and defines the mode, way, procedure and character of the plans, having derived in the controversial National Hydrologic Plan approved in 2001 (whose partial abolition has been one of the first measure attacked, with urgent character, by the actual Government), as well as in the different Hydrologic Plans of Cuenca, approved in 1999. The goal of the law is the regulation of the Hydraulic public domain and of the use of the water, being declared as state competence of the hydrologic planning.

One of the main features of the law was the so called unit of management, considering so much public the superficial water as the subways; while the previous regulation considered the groundwater like privative of the owner of the ground on the one that surfaced. The fresh water is catalogued like a natural resource of public character, whose use and employment on the part of all the citizens is only subordinated to a general interest, so that, its use will be controlled by the State, it will coordinate the management carried out by the Central Government and the different Autonomous Administrations.

Regarding the National Hydrologic Plan, it had as antecedent the White Book of the Water, of December 4, 1998, in which basic data of the water in Spain were compiled, an estimation of the foreseeable evolution of the uses of the water resources, as well as the diagnostics of the main problems.

At the present moment, to extend us in speaking of the National Hydrologic Plan is high risked, since it is subject to a political discussion of such virulence that the majority of the opinions poured to favour and against it, are suspects of an objectivity lack defendant for both parts. In any case, the announcement of an urgent elimination of one of the key pieces of the same one (the transfer of the Ebro) that was supposed symbolized, among others things, the Spanish national cohesion and of the autonomous interterritorial solidarity

seems that can dilute such plan, in final, it was directed to examine the global situation of the basins to detect the possible lacks that could be located in some of them to articulate solutions, among them, the transfer of resources among basins was contemplated. Concretely, it was considered negative, without doubts, the Hydrologic Basin of the Segura, appreciating that the situation would be able only to be surpassed increasing the external contributions that at present receives. Other basins included a situation of partial structural shortage in their territory according to the climatology, arriving the case of the Basins of the Júcar and South to be approached to the negative situation of Segura one. In the other extreme, it was identified like system with surplus that of the Basin of the Ebro and the macrosystem of the head and medium course of the Tajo, and were qualified as apt to be areas to transfer resources towards the loss-making systems. Other systems with surplus were that of the Basin of the Duero and North, but the geographical difficulties and location ruled out them as origin of transfer. The advance of the proposed alternative of the present Government seems that passes for the installation of several desalination plants, the saving by means of the improvement of the management of the water and the promotion of the recycling.

As it has been shown with the present clash of the proposals of previous governments and that of the present government of the nation, the discussions around the concepts and of the economic implications as last criteria of the activity at the moment of taking decisions, can be become polemics useless if they forget that are the political decisions the ones that, in last instance, are going to define the objectives. The problems of the water are frequently related to the political decisions, even with the conflicts to be able. The recent refusal of the new Spanish Government to the transfer of the Ebro in favour of the desalination plants does not seem to be exclusively motivated by economic-environmental worries, but they seem to rest also in political balance derived from the complex Spanish autonomous state.

There it has been a lot of haste and enough improvisation in the abolition of the transfer of the Ebro with the pretext of technical studies that justified their impossibility set against the viability of alternative projects that seem to be centred in the construction of desalination plants that, among others objections and uncertainties, they require a high energetic demand that only would be able to be seen mitigated, to a middle and long time, by new technologies that use the sun to promote the process. The operation of the desalination plants with renewable energies is an utopia, at least temporary, so much that the applications of these energies to the desalination can be ready to obtain large amount of water.

The desalination continues being, at this moment, the most expensive of the options to obtain drinking water, for which if it is would have effects on the necessary infrastructures in the rates, the water would be paid to price of gold. The alternative of the construction of fifteen desalination plants along the mediterranean foresees a contribution of 1063 annual cubic hectameters to Catalonia, Valencia, Murcia and Andalusia, 621 of which, will be product of the desalination and the remainder, will be the result of measures centred in the savings, the efficient use of the resource and the stop of the demand. What seems clearly around the pros and contras that presents the alternative of the desalination set against the option of the transfers of the basins, is that are the political decisions and not the technician-economic, the ones that overturn to a side or another the faithful one of the scale. An employed argument in favor of alternative projects instead of the transfers, is that the development of the basin assignor in the case of the Ebro, especially of Aragon and Catalonia, would be seen comprised, at the same time that would not remain guaranteed the circulation of the environmental volume downstream of it takes of derivation and the maintenance of the associated ecosystems, just as requires the Executive Framework on Politics.

It is evident that the argument that can be employed to justify some or other options can receive different interpretations and appraisals since their social, environmental, technical or economic perspective. Sometimes, even are employees like missile that intend to deprive of disarm to the contrary. In every case, the principle of recovery of the prices for the obsession of the price of the water should be applied to any of the alternatives, keeping in mind the need to tie any solution to an adequate management for the demand

and the recycling of the resources. Exactly, as further on we will see, the new Water Framework Executive represents an ambitious and innovator approach with a view to the management of the water, for which it is necessary to include politics fixing the price of the water that reflect all the prices, environmental or of infrastructures, guaranteeing the general principle of whom contaminates pay.

Finally, to point out a fact of interest as for the effective civil participation in matter of hydrologic planning, that the supreme consultative organ in matter of water is the National Counsel of the Water, that counts on a various representation of all the sectors interested or affected by the water resources, such as users, ecological organizations, investigators, administrations, etc.

The fundamental worry of the model of management applied up to now has consisted of trying to enlarge the offering of available water resources to attend the demand in constant growth of the same. The environmental considerations remained in the background and at no time the importance to moderate the incessant demand was underlined sufficiently or at less to limit its galloping growth. To illustrative title, agrees to recall that, in our country, for the Law of Water of 1879 some forecasts of freshwater consumption of 50 liters were handled per person per day; for the Municipal Statute of 1924 rates of 200 liters were utilised per person and day in the case of urban zones and 150 liters in the case of rural zones; the recent and controversial National Hydrologic Plan has shuffles the quantity of 300 liters per person and day.

THE INCAPACITY OF UNTAINABLE OF THE CURRENT SPANISH PATTERN

Our society has gone evolving so that the increase of the needs of consumption surpasses the capacity of regeneration of the natural resources so that we find ourselves designed to a situation of permanent deficit of water that is absolutely unfeasible.

The tourist, industrial, urban development, as well as other new uses, and the traditional one of the water in the agriculture of irrigation, have left themselves to feel in the quantity and, above all, in the quality of the coastline and continental water. Though at the present moment sufficient global resources exist, the problem situates in the availability, that is to say, to have water at the necessary moment, in the place required and in the adequate conditions. At present and looking to the future, the demands in each hydrographic unit approach or, even surpass, the available resources.

In terms of available water quantity the accounts are not clear since time ago; the subterranean aquifers are found overexploited, the river beds have been seen progressively diminished, and the traditional humid zones suffer droughts of difficult recovery. In terms of quantity, the situation is worrying enough; the agricultural, industrial, and demographic pressure has enlarged the general degradation of water, reducing in this manner the availability of water in acceptable conditions for its consumption by the own company that degrades it.

It is curious that being our country treated as one of the States with smaller index of birthrate of the world, the demographic pressures are one of the factors that complicate the correct management of the water. Analyzing the question, it is observed that it so much to the growth of the native population in absolute terms, that is not given in prominent figures, but the disorderly urban activity throughout the national territory, with special attention to the coastline zones. It fits to consider that, aside from the inhabitants counted in Spain, we receive along the year a great amount of millions of tourists, that in their great majority concentrate on zones located in the coastline stripe. Such population bears, especially in summer period (during which the renewal of water resources is lower by the shortage of rains and the grater incident of the phenomenon of the evaporation), some needs of consumption higher the ones that would be normal for the stable and traditional population of those areas.

More still, not only the affluence of foreign tourists has caused this situation, but the own Spanish people acquire a second residence in these coastline zones, so, it has involved an urban activity in the Nature not predicted by such general invasion. Besides the increase of the number of consumers, is verified that the water consumption per capita is greater, so

that we can conclude that we are consuming more and of worse quality than in the past. To a large extent, this situation is due to that, to the traditional uses of the water, human consume, agriculture, industry, other modern uses are added that have gone arising, as the ones related to the world of leisure, of recreational cut.

In a next future, basing on the increase of the population and of the level and quality of life, the needs will continue growing, being coded in the triple of the present, and not only in quantitative, but also qualitative terms, since there will be to intensify the referred demands, that already have begun to be considered, as the recreational and environmental uses, the dilution of poured, the demands of minimum volumes, etc. The detection of eventual situations of deficit through the decision of the available resources and its comparison with the demands, in each zone and in each moment, is the final objective of every hydrologic planning that itself prided. The water is a scarce good, complex in itself, and given its economic importance, is destined to be situated in the centre of many territorial, economic and social conflicts. With a view toward the worrying symptoms of deterioration that suffers the ecosystem, the biosphere, the economic fact associated to water takes each time greater importance, being necessary the employment of accounting and economic instruments.

THE COMMUNITY FRAMEWORK IN THE POLITICS OF WATER

The European Union is in charge of devising and defining the new regulation of environment and to be assured that the Member States apply the measures adopted. Their fundamental objectives can be summarized in promoting the sustainable development and the environmental efficiency, as well as to work to improve the quality of life of the citizens by means of the increase of the level of environmental and sanitary protection, and to promote the fair use and the transparent management of the common environmental resources. In the last thirty years, the EU has experienced noticeable advances in the establishment of a system of controls of the environment. The Treaty of Amsterdam, that went into effect in 1999, collected explicitly the principle of sustainable development, directing that the protection of the environment should be a component of all the community policies from then. Subsequently, the Sixth Program of Environment (2001–2010) gave a new strategic approach to the community policies in this field, establishing with clarity the objectives to pursue during this decade and indicating the measures that should be adopted to manage such objectives in the marked time.

Definitively, it can be affirmed that the European Union has adopted as one of their identity signs the protection of the environment for the sake of achieving a model of authentic Sustainable Development, promoting a set of initiatives inside and outside the community that have permitted to be it erected like the champion of this cause in the international forums. Logically, the water occupies a fundamental place in this environment, what has been translated in a very noticeable activity on the part of the EU.

The sustainable management of the hydrologic resources requires an important technological and scientific effort that cannot be carried out without a multidisciplinary and international cooperation of the one that is fully conscious the EU. The need to understand the complex mechanisms of the natural cycle of the water, to evaluate the media of safeguards and to protect the quality of the resources, to develop the technologies of control and of cleansing more adequate and less burdensome, to fight against the waste, etc., are efforts that Europe carries out through teams of different European countries and of the remainder of the world. Conscious that the technologies of the water constitute an auspicious market for the economy and the employment. In spite of being a scout in the world panorama, the situation of the water in Europe is considered for the own European Commission very far from being satisfactory: the phenomenon of the shortage does that a third part of the continent reach not the minimum thresholds by inhabitant, not only in the mediterranean regions but also in some north countries, very populated and industrialized. In these conditions, the pressure exercised by a growing demand of water causes an overexploitation of the local reserves in numerous regions, up to the point that the 60

percent of the European cities exploit excessively their resources of phreatic water, the reason why also the 50 percent of the wetlands is found in state of risk.

The International Conference on the Water and the Environment celebrated in Dublin in January of 1992 with the aid of 113 countries, called the attention to the international community that the shortage and the abusive use of the fresh water presents a growing and serious threat for the sustainable development and the protection of the environment. The health and the human welfare, the alimentary security, the industrial growth and the ecosystems that of it depend are in danger, to be not that the management of the water resources and of the floor will be performed in a more efficient form in the present decade that in the past. As a consequence of the requests done to the European Commission on the part of the other common institutions, an important legislative instrument arises of obliged fulfillment through the execution of concrete transpositions for each one of the Member States as is the Executive. After three years of proposals and negotiations, the Executive Framework of Water was approved (DMA), that intends to advance in the common legislation about the water, to guarantee its ecological quality, to group the different local regulations and to constitute a common reference from which to develop other normative instruments or plans.

The new common framework of action in the scope of the politics of water establishes that the water is not a commercial good as the others, but a patrimony that one must protect, to defend and to treat like such. It considers, therefore, the water as an ecosocial active more than a factor of production and centres its interest exclusively in the problems of the preservation and improvement of the quality of the water and of the aquatic environment, that would be called model of sustainable growth. In this new pattern of concessions and authorizations for the exclusive use should be subordinated to the objectives of quality, the prices not only incorporate the associated direct prices, but also the opportunity price and that of the possible damages to the environment. Likewise, the prices should contribute, in an adequate way, to the maintenance of a correct service of water to all the users, although it permits to the countries to lend hydraulic services to an accessible price for who need it.

The politics of water that will be presented in the next years will be very influenced by the DMA, since the objective of the European Executive is to obtain the good ecological state of the bodies of water for the year 2025; but already, since they come into force, that took place in December of 2003, there are limits and obligations for the Member States of the Union, as for example the immediate prevention of the deterioration of the bodies of water and the reduction of the wastes contaminant. The most important limit, predicted for 2008, is the elaboration of the drafts of the Hydrologic Plan of Basins and its approval before 2009, together with a Program of Measures to reach the objectives, that are totally different to the ones that up to now had been formulated and where the environmental component will be the centre of the worries. For it, the public participation should be effected, promoting the active participation of all the parts interested that acquire a fundamental importance, and that for the year 2006 should be planned on the part of the Administration. Without any doubt, the public debate and the civic participation as instruments of public politics can collaborate efficiently in a better taking of decisions. Finally, the Executive assures the active participation of all the interested parts in the management of the water, included NGO and local communities.

Nevertheless, the good direction taken by the EU with the approval of this Executive, some critical voices have denounced a series of incoherences that are going to complicate the achievement of the environmental objectives proposed (certain confusion in the prices recovery notion, the principle of whom contaminates pay, etc.).

THE NEW CULTURE OF THE WATER: TOWARDS A NEW PATTERN OF MANAGEMENT

At present, a perception of the water in a more extensive sense comes through social and doctrinal environments, that integrates the water in the environment of the one that is obtained and of the one that takes part; a vision that would be able to call ecosystematic

and that intends to generate a new culture of the water, a new perspective of the economy of it.

This presents the problem of the economy of the water from a less physical and more associate-economic point of view. It considers that the predominant culture of the water up to the present time has been based on an idea of physical shortage of water in some zones, based as well on the idea of a growing demand and a structural deficit that demanded the construction of large infrastructures of reservoir of transfer among basins with a view to enlarge the supply, judging the water as a public good, in the bad sense of enabling a careless use of the industrial and agricultural sector, and a set of inefficient public concessions, with interested interferences and scarce participation of citizenship.

On the contrary, the new culture of the water promotes the basic idea of economic shortage, generated socially, reckoning that we should not speak so much of demand, but of consumption, and before adopting constructive initiatives to enlarge the supply, it should be promoted the management of the resource (to redefine the present operation of the infrastructures, to detect possible savings, improvements), to study the water inside its territory, to consider the water as an ecosocial active, as an authentic natural patrimony, what implies that the users should pay for it and not alter its quality, to distinguish the authentic farmers of other people who have possession of lands or investment, the need to imply the population in a participatory and public debate.

In the past and up to recent epochs, the human beings adapted their conditions of existence to the availability of water, being established in zones with access to water resource in quantity and sufficient quality to satisfy their needs, so that the water was perceived like a free good, not an economic one.

Subsequently, and mainly after the Industrial Revolution the plan changed, growing the population to such rapid rhythm and to be concentrated on urban nuclei not prepared to satisfy the water needs of its inhabitants with the facility of the old smaller populations. It began the sensation of shortage of the water parallel to the overexploitation and contamination of the same one, that caused the idea of advance, in the sense that there was to respond to an incessant increment of the demand of water with a continuous increase in the collecting and exploitation of water resources, although it implied the execution of expensive and complex infrastructures of doubtful economic profit in some cases.

In this way we have arrived until today, moment in which a change in the pattern of management of the water is imposed urgently. It seems that the social sensibility is reacting against the deficient administration of the water resources, maintained during too much time. Likewise, it seems that is reaching its end and the expansionist idea of the economy of the water to lead to a more connected perception with the good administration of the resources, that passes for questioning and revising the procedures and media of management of the cycle of the water used up to now. In short, an integrative vision of the water in its environment, like piece of an ecosystem of the one that cannot be divorced, without suffering fatal alterations.

In sakes to maintain that attitude of responsible administration, a set of fundamental questions should be redefined, like the priority of the uses of the water, to ban the particular interests in short-term which mortgage the general interest in long-term, to impact in the need of implication of all the eagerness to collaborate in the preservation of the natural water resources, that are more fragile than some people misinformed can even imagine.

At this point, we would agree to recall the distinction among three fundamental aspects of the economy of the water: cost of the water, that would be the economic investment of the works carried out so that the water arrive at its recipient (with inclusion of the repayment of the installations, financial expenses and of maintenance); value of the water, that expresses the utility that the water supposes for the users (aforesaid in monetary terms); price of the water, or quantity of money that the user pays by the quantity of water used. According to the system of management that will be employed, the price will approach more to its value (case of the market of water) or, on the contrary, it will approach more to its cost.

A system of efficient metering should reflect the cost of the water in a complete sense, that is to say financial cost (direct), environmental cost (damages and deterioration)

and cost of resources (exhaustion, price of opportunity for another user), so that the price of the water should equal the global value that the users pay for all the services related to the water, included, of course, the environmental cost.

We are not going to deny that it is not easy to determine with precision the prices that will allow us to organize the system of a correct metering, but any intent of approximation will be better than the passiveness, that in this case turns out to be destructive for the resources.

Aside from the metering, the new pattern of management of the water should not disdain possible punctual solutions to concrete local problems, since the processing of the management of the water does not unknown the cultural, social and natural particularities of the different zones where problems of special gravity are presented. In that sense, the experiences (some quite imaginative) carried out in different parts of the world, such as:

– The Law of groundwater management of Arizona in 1980. It was a matter of a problem of imbalance between the volume of extraction and that of refill, by overexploitation for agricultural uses and a growing population. The state government requested to the federal one helps to attack a complex work of transfer with the idea to enlarge the supply. The federal government conditioned such aids to that first they attacked the root of the problem: the disproportionate use of the water. The objective to reach the equilibrium between extraction and refill for the year 2025 is presented in first place. Secondly, the maintenance of the urban expansion and water waste reduction in gardening in adverse climate. And finally in third place, the gradual reduction of the agricultural activities.

– The shoals of water in California. After some years of drought, the state government prompts the creation of some shoals of water that could acquire water from farmers that compromised to cultivate in exchange for an attractive price for both parts, or to authorize the extraction of groundwater in exchange that the extractors bandage the same volume of superficial water, or buying water to the local swamps. The sale was done to farmers that showed to have cultivated in the previous years and only a proportional quantity to the estimations handled by the Department of Water, according to surveys carried out previously with farmers and attending to a set of priorities based on critical needs.

– The markets of water in Tenerife. The groundwater in the island of Tenerife supposes the 91 percent of the fresh water used (without including the bottled water for human consumption). It is an exclusive resource which is commercialized through the market's system. The water is obtained of wells and galleries and is stored in rafts that exploit the Water Communities composed by private shareholders. Also private shareholders channels communities exist, that charge a canon by the transportation of the water. It is supposed that the private initiative should be more efficient than the public management in this field, but although the system has gone functioning in an acceptable way, each time voices of protest by the lack of transparency are raised, in which some abuses are detected against small owners and users on the part of the large shareholders. On the other hand, the shrinkages in the transportation of the water are assumed for the buyers of such water, but the frequency and the value of it have caused the suspicion of the damaged. Finally, the Insular Counsel of Water has intervened in the market by means of the figure of a public company (Balten) to which the users can buy water in similar conditions to that of the private businessmen, with the objective to eliminate the cunning of the shrinkages.

Without any doubt, examples as these have not turned out to be the universal panacea, but they reflect an effort by fighting against the resignation, a form of reaching that is very commendable and they can serve as inspiration to other projects.

CONCLUSIONS

In spite of the importance of water as main fluid of the ecosphere, the water is one of the worst negotiated resources; we squander it, we contaminate it and we pay too much little by having it available, stimulating in this way a greater waste and contamination of a resource that, although potentially renewable, does not have replacement. It seems clearly,

therefore, that the moment of change has arrived; it is going to require a combination of measures and procedures, without rejecting solutions that can turn out to be useful and beneficial in some cases, until reaching a positive pattern of management of the water.

A sustainable focus for the management of the water passes necessarily by a change in the present mentality, centred in the cleaning of in the payment of the contamination by a vision overturned in the prevention of the contamination. This implies, among others measures in the case of the water, to reuse the residual water instead of pouring it, to recycle the solvents contaminants for its recycling instead of pouring them, or to reduce the toxicity or the volume of the contaminants replacing them for other more harmless materials.

Likewise, for a change of mentality in the management of the resources will be produced or of the assembly of resources that constitute the environment – water, air, ground and life – , we have to begin accepting that they form an all interconnected, so that, without an integrated procedure of the management of the resources and of all the forms of contamination, we will continue deviating the environmental problems from one part of the environment to another.

The prejudices should not be acceptable in the common business of the rational management of the water, in the framework of the desired sustainable development. It does not mean changing it all, rejecting the previous simply because it comes from the past, but of redefining it without fear to many questions, evaluating it with open mind, in a dispassionate and objective form, with all the options that could be appear.

In this new flexible pattern of management different alternatives can be conceived, among the ones that would be able to be acceptable the controversial desalination plants, in those cases in which clearly they appear like the most respectful and efficient option, since the environmental point of view.

Does neither it seem that some possible transfers of water resources among basins should be ruled out completely, although the complexity and size of this type of works require, without any doubt, of an extensive degree in agreement between all the economic and social sectors implied, including a transparent and clear plan of recovery of prices, formally assumed by the beneficiaries of such transfers, besides give priority to the environmental respect as soon as to minimize the impact on the river bed of the basins assignors and its estuaries.

In any of the different alternatives of change that can be introduced, it should be present a great amount of prudence: need that comes vouched for many criticisms, reasonably justified that have done to changes without any explanation and not reflexively praised. Many examples would be able to be cited, emphasizing for their proximity the imprudent intent of identifying the present agricultural exploitations of the southeast zone with the mediterranean traditional irrigations. The justification of these last is due to that developed in zones with availability of water, by trying river fertile plain of flood of mediterranean rivers, or by including small springs, so that it was a matter of adapted zones to the agricultural function by the following reasons:

- 1) to have renewable water resources through the natural cycle of the water;
- 2) to include fertile floor by nutrients contributed in the periodic floods;
- 3) to have a relief fundamentally plain adequate to cultivation;
- 4) to configure a general system that permits the recycling of the flow of water and nutrients to be connected to the river system and associated ecosystems.

REFERENCIAS BIBLIOGRAFICAS

- AGUILERA KLINK, F. (2002) *Los mercados de agua en Tenerife*. Bakeaz. Bilbao.
- AGUILERA KLINK, K. (2001) *Valor, uso y precio del agua: La protección de los recursos hídricos y el papel del análisis económico en la Directiva 2000*. En GRANDE, N; et al [coords.] Una cita europea con la nueva cultura del agua: La directiva marco. Perspectivas en Portugal y España (II Congreso Ibérico sobre planificación y gestión de aguas). Institución Fernando el Católico. Zaragoza.
- ARROJO AGUDO, P. [coord.] (2001) *El Plan Hidrológico Nacional a debate*. Bakeaz. Bilbao.
- ARROJO AGUDO, P. (2001) *Hacia una nueva racionalidad económica en la gestión de aguas*. En GRANDE, N; et al [coords.] Una cita europea con la nueva cultura del agua: La directiva marco.

- Perspectivas en Portugal y España (II Congreso Ibérico sobre planificación y gestión de aguas). Institución Fernando el Católico. Zaragoza.
- ARROJO AGUDO, P. [coord.] (2004) *El Agua en España. Propuestas de futuro*. Ediciones del Oriente y del Mediterráneo. Madrid.
- AYALA, F.J. e IGLESIAS, A. (2000): *Impacto del posible cambio climático sobre los recursos hídricos, el diseño y la planificación hidrológica de la España peninsular*. Revista El Campo. BBVA. Madrid.
- AZQUETA OYARZUN, D. (1999) *Política y valor económico del agua*. En CASADO RAIGÓN, J.M. y AZQUETA OYARZUN, D. [comps.] *Lecturas de economía y medio ambiente*. Consejo General de Colegios de Economistas de España. Madrid.
- AZQUETA OYARZUN, D. (2002) *Introducción a la economía ambiental*. McGraw-Hill. Madrid.
- BALAIRON PEREZ, L. (2000) *Gestión de recursos hídricos*. Ediciones de la Universidad Politécnica de Cataluña. Barcelona.
- BARCIELA LOPEZ, C y MELGAREJO MORENO, J. (2000) *El agua en la historia de España*. Publicaciones de la Universidad de Alicante. Alicante.
- BLANQUER CRIADO, D. (2002) *El golf. Mitos y razones sobre el uso de los recursos naturales*. Tirant Lo Blanch. Valencia.
- BRUFAO CURIEL, P y LLAMAS, M.R. [eds.] (2002) *Conflictos entre el desarrollo de las aguas subterráneas y la conservación de los humedales: Aspectos legales, institucionales y económicos*. Fundación Marcelino Botín. Santander.
- CAMPOS PALACIN, P y CASADO RAIGÓN, J.M [coords.] (2004) *Cuentas ambientales y actividad económica*. Consejo General de Economistas. Madrid.
- CASTAÑO FERNÁNDEZ, S y MONTESINOS ARANDA, S [coords.] (2002) “ISLA” *Land and Water Management in mediterranean islands using earth observation data. Final report*. Ediciones de la Universidad de Castilla-La Mancha. Cuenca.
- DELACAMARA ANDRES, G. (2002) *La política ambiental de la Unión Europea: Anhelos de una acción coordinada*. En AZQUETA OYARZUN, D y CASADO RAIGÓN, J.M. [coords.] *Estudios sobre Política Ambiental en España*. Consejo General de Economistas de España. Madrid.
- EMBED IRUJO, A. et al [ed. lit.] (2000) *Código de las aguas continentales*. Lex Nova. Valladolid.
- GARCIA GARCIA, M.J. (2003) *Técnicas preventivas de protección ambiental en el régimen de uso y utilización del dominio público hidráulico*. Thomson-Aranzadi. Cizur Menor (Navarra).
- JIMENEZ SHAW, C. (2003) *Régimen jurídico de la desalación del agua marina*. Tirant lo Blanch. Valencia.
- LOPEZ CAMACHO, B. (1993) *La gestión del agua*. En NAREDO, J.M. y PARRA, F. [comps.] (1993) *Hacia una ciencia de los recursos naturales*. Siglo XXI de España Editores. Madrid.
- LOPEZ GALVEZ, J; NAREDO, J.M. [eds.] (1997) *La gestión del agua de riego*. Fundación Argentaria. Madrid.
- MARTINEZ FERNANDEZ, J. (2001) *Los trasvases entre cuencas: Una forma polémica de gestión del agua*. En GRANDE, N. et al [coords.] *Una cita europea con la nueva cultura del agua: La directiva marco. Perspectivas en Portugal y España (II Congreso Ibérico sobre planificación y gestión de aguas)*. Institución Fernando el Católico. Zaragoza.
- MARTINEZ FERNANDEZ, J. y ESTEVE SELMA, M.A. [coords.] (2002) *Agua, regadío y sostenibilidad en el Sudeste ibérico*. Bakeaz. Bilbao.
- MARTINEZ GIL, F.J. (1997) *La nueva cultura del agua en España*. Bakeaz. Bilbao.
- MINISTERIO DE MEDIO AMBIENTE (2000) *Libro Blanco del Agua en España*. Centro de Publicaciones, Secretaría General Técnica del Ministerio de Medio Ambiente. Madrid.
- MORENO MOLINA, A.M. (2004) Las “sanciones” al Estado incumplidor del derecho ambiental europeo: España y sus aguas de baño. *Revista Interdisciplinaria de Gestión Ambiental*(año 6, nº 64): 1-20. Madrid.
- NAREDO, J.M. [dir.] (1997) *La economía del agua en España*. Fundación Argentaria. Madrid.
- PEREZ DE LAS HERAS, M. (2002) *La cumbre de Johannesburgo: antes, durante y después de la Cumbre Mundial sobre el Desarrollo Sostenible*. Mundi-Prensa. Madrid.
- PEREZ-DIAZ, V. et al. (1996) *Política y economía del agua en España*. Círculo de Empresarios. Madrid.
- PEREZ ZABALETA, A. (2001) *Las sociedades del agua en España: Un nuevo instrumento para la construcción de obra públicas*. En GRANDE, N. et alia [coords.] *Una cita europea con la nueva cultura del agua: La directiva marco. Perspectivas en Portugal y España (II Congreso Ibérico sobre planificación y gestión de aguas)*. Institución Fernando el Católico. Zaragoza.
- PEREZ ZABALETA, A. y SAN MARTÍN GONZALEZ, E. (2004) *Recursos hídricos y contabilidad verde*. En CAMPOS PALACIN, P. y CASADO RAIGÓN, J.M [coords.] *Cuentas ambientales y actividad económica*. Consejo General de Economistas. Madrid.
- SAENZ DE MIERA CARDENAS, G. (2002) *Agua y economía: Hacia una gestión racional de un*

recurso básico. Ediciones de la Universidad Autónoma de Madrid. Madrid.

SAN JUAN ESTRADA, J.F. y GARZON GARZON, E. (2002) *Aprovechamiento del agua de lluvia caída en las cubiertas de invernadero*. Instituto de Estudios Almerienses. Almería.

SIMON, S. et al. (2004) Contabilidad ambiental: Identificación, valoración e información de los aspectos medioambientales en las cuentas anuales. *Revista Interdisciplinar de Gestión Ambiental* (año 6, nº 62): 1-7. Madrid.

SUMPSI VIÑAS, J.M. et al. (1998) *Economía y política de gestión del agua en la agricultura*. Ministerio de Agricultura, Pesca y Alimentación-Mundiprensa. Madrid.

TAKEUCHI, K. (2002) *Future of reservoirs and their management criteria*. En BOGARDI, J.J. y KUNDZEWICZ, Z.W. [eds.] Risk, reliability, uncertainty, and robustness of water resources systems. Cambridge University Press. Cambridge, U.K.

TYLER MILLER, G. Jr. (2002): *Introducción a la Ciencia Ambiental (Desarrollo sostenible de la Tierra: Un enfoque integrado)*. Thomson, 5ª ed. Madrid.

Надійшла до редколегії 26.04.05