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SOCIO POLITICAL ASPECTS OF THE WATER USE EFFICIENCY IN THE MEDITERRANEAN REGION

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SUMMARY - The socio economic implication for the water use sustainability are here analyzed throughout economic, environmental, political, and social connections. The analysis highlights the active role of farmers in water productivity improvement. Farmers are involved in water efficiency through the water users associations and their capacity building. Improvement of water productivity can be obtained through on farm techniques which require rained and levelled lands, and a series of appropriate agro-techniques. In conclusion, to assess the water use improvement, some indicators are proposed.

Key words: water use sustainability, water productivity, water users associations, farmers' capacity building, water use improvement, water use indicators

INTRODUCTION

Water is the lifeblood of the biosphere constantly moving across borders between the atmosphere, the land, the ocean and back again. Today the most accessible parts of renewable freshwater resources have already been exploited.

The dominant problem which will be strongly evident over the next future is the imbalance between the increasing demand for water to meet humanity's needs and the available water resources. Freshwater is approaching the limit everywhere in the word and the majority of the Mediterranean countries could face in the next future a period of chronic water shortage with many arising problems concerned as the reduced freshwater per capita availability, the increasing competition among the different water users and the water deterioration.

Water shortages are caused by different factors in different countries: it may come from participation and runoff fluctuation, from an increased people and environmental water consumption or from infrastructures constraints. As an example of the first factor in our country - located in Mediterranean basin - during the last 30 years, a general trend of precipitation decrease and a reduced resource recharge were observed. The precipitation reduction is manly occurring during the spring-summer period when the water requirement for annual food crops is highest.

Water is useful for household use, it is a critical input for industry but it is fundamental for growing food crops in the arid and semiarid areas. Irrigated crops are essential to stabilize the crop production, to produce more food, to save land cover in arid countries that can reduce desertification risk and to increase the food production per hectare reducing the wasteful use of soil resource.

In many Mediterranean countries, irrigated agriculture contributes a high proportion of gross domestic income and a larger fraction of food production; it can be then considered as a stabilizing factor in rural economies, assessing food security, improving nutrition and health and raising livelihoods of rural people.

Irrigated agriculture is considered the main user of water accounting for 50-80% of global water consumption but domestic and industrial uses grew four fold between 1950 and 1995 compared with just over a doubling of water used by agriculture. Continued rapid growth of non-irrigation water use and the higher cost of developing new water resources threaten the availability of irrigation water to meet growing food demand.

A crucial and urgent question for the whole world, and in particular for the Mediterranean area, is therefore to fulfil the needs of all water users and on the same time achieving the allocation equity of available water resources in the different sectors according the social economic exigency of the people.

To face the growing scarcity of water resources the international debate was focused on increasing current water use efficiency and on the promotion of a more efficient use of water resources by different users.

Following is a discussion of several economic, social and environmental issues which are most relevant to the irrigated agriculture of the Mediterranean area and their involvement on water use improvement.

SOCIO ECONOMIC IMPLICATION FOR THE WATER USE SUSTAINABILITY

Economic connection

Many debates on the water policy focused the matter on whether water is purely an economic good or whether it is also a social good. Should water be priced on economic criteria alone or should irrigation water be priced more cheaply for the farmers?

The real cost of water supply is raising as a result of the rapidly increasing urban population and the growing scarcity of clean water.

Despite increasing water scarcity and the wasteful use of existing water supplies, water is not generally treated as a illimitable resource.

In most countries water is considered as a free commodity and both domestic and irrigation water users are provided with large subsidies on water use. The failure to recognize the market value of water has led to wasteful and environmentally damaging uses of the resource. Managing water as an economic good is an important way of achieving an efficient and equitable water use and of encouraging conservation and protection of water resources.

However water supplied to rural people at a cost lower than market one is of great benefit for them. Achieving such goal is to be considered a priority for a proper economically, socially and environmentally sound water management.

Water pricing possibly conflicts with the idea of water services as a basic right of all individuals. The high cost of measuring and monitoring water use where infrastructures and institutions are weak can also be a major constraint in implementing water pricing.

Water use planning and management needs to be integrated into national economy recognizing the vital role of water for satisfaction of basic human needs, food security, poverty alleviation and ecosystem functioning and taking into account the special conditions of non monetary sectors of economy.

The increasing water scarcity due to raising of non agricultural water demand will result inevitably in the transfer of water from agricultural use to higher value household and industrial uses.

Many national agricultural policies have long recognize agriculture's special role in delivering environmental good and services: the sustainable agriculture preserves and protects the environment, the regional economic vitality and the rural livelihoods. The concept of multifunctional agriculture recognizes important potential benefits of agriculture in addition to the food production. Water use by agriculture can therefore be considered through a multifunctional lens considering the function that are specific to water. Water becomes more valuable than if is considered as merely an input to the agricultural production.

Water used for agriculture provides a range of services to society of which food production is only one.

Cultivated lands allow a greater rain water infiltration in the soil with the consequence of raising recharge potential of the groundwater. Indirect benefits are the flow derived from aquifer recharge during irrigation.

Economically efficient use of water resources is not necessarily eco-sustainable. Every unit of resource used today is at cost of forgone use of a unit tomorrow. Sustainability can be therefore interpreted as a requirement that human well being does not decline trough time.

The standard procedure for the economic valuation of the water resources usually do not account for irreversible impact such an exhaustion of water. Under some circumstances account need to be taken of the uncertain future losses that might be associated with potential irreversible change.

Some protection to the interest of posterity can be offered through the imposition of the safe minimum standard. This mechanism, closely related to sustainability, is incorporating the precautionary principle into decision-making as the water resources available in future has to be equivalent to that available at present.

Environmental connection

The growing social development will necessarily increase pressure on the water resource. Increased efficiency and reduction of waste water as well as a proper valuation of the resource will reshape the structure of the development and reduce the environmental effects.

According to ecocentric position the human water economy is a subset of nature's water economy and intimately depend on it. From these perspectives water allocation priorities need reversing so that the human needs and ecosystem health requirements are met first and only then should water flow the other uses. However the sustainability way is not clear-cut and as water become increasingly scarce a strong and effective mechanism for sharing the available resources renewal, equitable amongst different sectors and users become vital.

Environmental demand of water is the amount of water necessary to ecosystem life, to enable water resource to maintain the balance between water amount of surface and groundwater, to regulate pollution, to maintain existing wetland.

The volume of water supplies and their functions are determined by the abstraction of water, by the recharge of water resources and by the hydrological system balance. The quantity of water that is available for use in any particular period is equal to effective runoff i.e., the difference between total precipitation and the amount lost through evapotranspiration , plus the stock of freshwater stored on the surface or underground. The sustainability rule, at least at the national level, is therefore that total water demand should be not higher than effective runoff.

Water should be considered an integral part of ecosystem and sustainable water resource development and management should be achieved at global and regional scale developing an integrated basin wide hydrologic agronomic economic model for efficient water allocation and water use efficiency. An integrated approach to land, water and ecosystems at basin scale is needed to make it possible to maximise multiple benefits. This involves the assessing all water costs and benefits to society as a whole as well as to individual stakeholder.

The basin water efficiency improvement is difficult to be verified because much of the water “lost” from irrigation system is reused downstream. Relatively high increase in basin efficiency can be achieved in countries in which renewable water supply infrastructures are highly developed, while smaller increases are foreseen in areas where water supply facilities are relatively underdeveloped.

The inefficient use of increasingly scarce water resource has a deleterious impact on the land environment; water logged and salted lands, soil erosion, declining and contaminated aquifers are the consequences of this poor management. The external costs as those from water logging, salinization and oil erosion have to be therefore incorporated into economic price of irrigation water.

In many arid and semiarid areas water is no longer abundant and the high economic and environmental costs of developing new water resources impose limits on supply expansion. As a result the role of water withdrawals in irrigated agriculture and food security has to be received substantial attention in future.

Policy connection

With a continued worsening of water supply and of demand trends, water scarcity could become a ruinous crisis with severe impact on food production, health, nutrition and environment. Solutions to potential water crisis are available through highly selective investments in infrastructures. Water

management has to be planned in relation to key issues of economic efficiency, environmental sustainability and the needs of marginalized and poor people.

Despite the consensus on water policy there is a considerable debate over the practical implementation of any reform. Efficiency is a necessary but not sufficient condition for the social sustainability although determining the standard sustainability is an open question.

Policy makers have recognized the importance of and need to protect water resources and to approach human activity and water resources in an integrated manner where efforts towards a more integrated regime should link the water management to relevant policy network and economic and social systems so that the chances of achieving a cooperative solution or mitigation strategy are maximized. As a management strategy based on the sustainable water resources utilization should have at its core the integrity maintenance of basin ecosystem, managers have to examine changes in hydrological and ecological processes along with the relevant socio-economic driving forces.

An international consensus in policy regarding water efficient use focused the need to adopt an integrated approach to water resources and multi-sectoral view of water use at basin scale. Water saving and water use efficiency improvement in existing irrigation schemes and water supply systems through water management reform and investments in advanced technology and infrastructures are to be achieved. However an appropriate mix of water policy management reform, investments, feasible institutional arrangements and policy instruments to be used must be tailored to specific regions.

Social connection

The positive links between economic efficiency, human well being and environmental health are clear and widely accepted. However in practice the effect on broadly based policy reforms are more ambiguous when applied under imperfect circumstances where the economies do not function smoothly.

Irrigation increases both agricultural production and the productivity of the land. An important fraction of the employment still provided by the agricultural sector is generated by irrigated agriculture. Irrigation is an important element of rural development in dry regions. It represents the most important option to increase farmers income and employment derived by a more diversified cropping system. A reduction in irrigated agriculture would increase the trend of migration from rural areas to urban centres enhancing social conflicts.

In very poor countries food production is vital and in dry areas it can only be achieved through an efficient irrigated agriculture. A substantial decline in irrigated agriculture would make the dry areas very vulnerable in the long term as it would result in land abandonment and high risk of desertification.

A suitable planning investment in the irrigation schemes can alleviate poverty both directly and indirectly through stimulation of the rural economy. Increased food production derived from irrigated agriculture can confer nutritional benefits for farmers, their families and local population. Irrigation can enable multiple cropping which can contribute to a more varied and nutritious diet. Improved nutrition can enhance quality of life, reduce illness, increase labour productivity and improve the scholarship performance.

Irrigated agriculture can also benefit the urban poor by keeping food prices low despite growing demand from increasing population.

As poverty and unemployment may increase pressure on water resources in absence of other economic opportunities, appropriate policy measures can induce changes to generate new economic opportunities thereby alleviating poverty and reducing pressure on the resource overexploitation.

The involvement of beneficiaries in water management and an increasing role for water users through the participation of stakeholders and the promotion of the water users associations are essential to realize optimum irrigation performance.

The participation of all stakeholder to the integrated water resource management is crucial for saving water and its optimum utilisation since it presumes a dialogue between the service provider and the users. The participants have to be aware of what role they are supposed to play and how best they can do that. If they are actively involved in preparing and executing the irrigation management plan, they can notice the rules about how, when and what extent they could be implicated.

FARMERS INVOLVEMENT ON WATER PRODUCTIVITY IMPROVEMENT

Water users associations (wua)

Promotion, development and support of WUAs is likely to be the most effective short and long term solution for affecting farmers participation and for the control of irrigation schemes.

Necessary legal and institutional changes should be made at various levels for the purpose duly ensuring appropriate role for women too.

Some issues of the goals for the farmers of WUAs participation in irrigation management are
- entrust irrigation water management to the actual users
- achieve equity in water distribution as a consequence of community management
- instill in the mind of the beneficiaries the urge to use water economically
- create a relationship amongst the beneficiaries and government officials
- enable the beneficiaries to decide the cropping pattern and the quantity of water to be supplied to crops
- achieve optimum utilization of the available resource
- improve the system performance

Capacity building

Only well informed people are able and willing to participate in decision making procedures. To integrate the knowledge related to sustainable irrigation achievment of rural people training, transfer technology and social development programs are to be implemented particularly enhancing opportunities for poor, women and young in farming. Organized training courses, extension services and rural people association can help the farmers to improve farming management.

For the irrigation water saving purpose, efficiency can be enhanced also by means of appropriate farming practices.

On farm techniques to improve water productivity

To improve the productivity of water used in agriculture and of the crop yield, some fitted farming practices have to be disseminated among rural people with the aim to save water resources and to increase their income.

Some of these farming practices, suitable for the arid areas of Mediterranean Basin, can be appointed as:

Predisposing
Drained lands
Precision levelled lands

Adopting
an early seeding time to escape the drought period
a crop with a shorter cycle length corresponding to a limited water requirement
a low crop density related to a reduced irrigation supply
a fertilization amount adequate to limited available water supply
the minimum tillage to abate the loss of the water stored in the soil
the mulching practice to reduce the evaporation from the soil surface.

Including in cropping pattern:
crop species with deep root such as tree or shrub
crop rotation that allows the soil moisture recharge take place during the fallow period

Performing
a deficit irrigation strategy

ASSESMENT OF WATER USE IMPROVEMENT VIA INDICATORS

Indicators

A decision support system, adopting indicators that can evaluate the results obtained by the irrigation water use improvement and the effective decision steps to be performed, can be assumed.

Indicators can condense the enormous complexity of obtained information and may be applicable to varying temporal and spatial dimension. They are useful to give a clear picture of the issues being assessed and monitored. The indicators provide information on the process in a understandable way and are therefore a mean of communication to policy makers. As the complete adoption of such procedure is very difficulty feasible, the suggestion is to move iteratively from a reduced form procedure towards a comprehensive assessment over time.

Many variables are condensed into indicators which are further aggregated by an index.

As an example here is reported some definition on the water poverty index (WPI) obtained by gathering five indicators calculated on the base of concerned variables.

Indicator	Variables
Resource	available water resources (runoff, surface, groundwater)
Access	extent of resources access for household and irrigation use
Capacity	actual ability of rural people to manage irrigation
Use	the ways in which water is used
Environment	water amounts used for ecology; harmful irrigation

Variable to be achieved to calculate indicators

Some other variables can be handled and aggregated to achieve many other useful indicators; they have been here reported according the different concerned sectors.

Water sector:
Total renewable water resources
Per capita freshwater availability
Total annual volume of irrigation water delivery
Annual irrigation water delivery per unit irrigated area
Total water withdrawal/year
Irrigation water withdrawal/year
Irrigation water withdrawal /ha/year

Economy sector:
Irrigated farms (number and surface, household, water amount used, water source)
Cultivated land/total surface
Total gross annual agricultural production
Total annual value of crop production
Total annual production of irrigated agriculture
Cost recovery ratio
Total cost per person employed on water delivery

Social sector:
Population and population density
Rural people/total population
Agriculture PIL/global PIL
Actual participation in scheme organization by irrigation water users
Actual inclusion of farmers in WUAs
Ability of farmers to function as leaders
Attending trainers to water management courses

Environmental sector:
Water quality: salinity
Average depth to groundwater
Change in water table over time

CONCLUSIONS

- As water use efficiency improvement is a manifold and complex process, an integrated approach relating all components and actors is needed which has to work at the catchments level.
- The agriculture water is to be considered not only as a food production input but also as a provider of ecological good and services and has to be evaluated on the base of non-use value too.
- Efficient use of the irrigation water can save some water amount that can alleviate hunger and poverty of rural people.
- Water cannot be considered an unlimited resource; its efficient use allow to be available in future as much as at present time
- A poor irrigation management can induce water logging, salinization, soil erosion and degradation with a negative environmental impact
- As priority actions: empowerment, capacity building increasing, participation involvement, training courses and association supporting are to be implemented