

## OBJECTIVES AND CHALLENGES OF WATER DEMAND MANAGEMENT

Dumitru Florin FRONE<sup>1</sup>, Simona FRONE<sup>2</sup>, Mirela STOIAN<sup>3</sup>

<sup>1</sup>University of Agricultural Sciences and Veterinary Medicine, Bucharest, 59 Marasti, sector 1, 011464, Bucharest, Romania, Phone: +40 21 318 25 64/232, Fax: + 40 21 318 28 88, E-mail: [dffrone@yahoo.com](mailto:dffrone@yahoo.com)

<sup>2</sup>Institute of National Economy, at the Romanian Academy, 13 Calea 13 Septembrie, sector 5, 050711, Bucharest, Romania, Phone: +4021/318.24.67, Fax: +4021/318.24.71, Email: [simona.frone@yahoo.com](mailto:simona.frone@yahoo.com)

<sup>3</sup>Bucharest Academy of Economic Studies, Faculty of Agrifood and Environmental Economics, 5-7 Mihail Moxa St., District 1, Bucharest, ROMANIA Postal Code 010961; Tel. +4.021-231.79.63/ extensions 111 and 112, Email: [stoian\\_mirela\\_ase@yahoo.com](mailto:stoian_mirela_ase@yahoo.com)

**Corresponding author:** [dffrone@yahoo.com](mailto:dffrone@yahoo.com)

### Abstract

*As we try to point out again in this paper, water is one of the most important and scarce environmental resources, with some particular characteristics that raise serious challenges for a good management and sustainable development. First we define the concept of Water Demand Management, as a part of a Sustainable Water Management, along with stating some of its main recent political and economic issues and objectives in the European Union. Here, agriculture has been identified as a major sustainable water management issue in the implementation of the Water Framework Directive (WFD). The scarcity of the water resource has become a concern only in more recent studies, reflecting the shift from the engineering perspective of increasing supply to satisfy demand, to the economic perspective of also managing demand through price to efficiently allocate the existing quantity of water supply. Therefore, as a first conclusion, economists should try to find the best theoretical and practical approaches to deal with these challenges, expressing awareness on the fact that water is no longer a free public good, but a rare and valuable economic good.*

**Key words:** sustainable development, water demand management, Water Framework Directive (WFD), Water Scarcity & Drought (WSD)

### INTRODUCTION

While most of the old challenges of water supply, sanitation and environmental sustainability remain [1], new challenges such as : water scarcity and increasing water demand due to global population growth, environmental-intensive production and consumption behaviour, adaptation to climate change, rising food and energy prices, rising R&D costs of water systems and ageing infrastructure are nowadays increasing the complexity and financial burden of water management.

The scarcity of the water resource has become a concern only in more recent studies, reflecting the shift from the engineering perspective of increasing supply

to satisfy demand to the economic perspective of also managing demand through price to efficiently allocate the existing quantity of water supply.

Over the past thirty years, droughts have dramatically increased in number and intensity in the EU; the total cost of droughts over the past thirty years amounts to 100 billion Euro [2].

### MATERIAL AND METHOD

In order to emphasize the actual objectives and the challenges of water demand management, we define the concept of Water Demand Management, as a part of a Sustainable Water Management, along with stating some of its main recent political and

economic issues and objectives in the European Union.

Here, agriculture has been identified as a major sustainable water management issue in the implementation of the Water Framework Directive (WFD)[2].

## RESULTS AND DISCUSSIONS

The Brundtland report did not address the water issue particularly; however, we may agree with a definition of sustainable water consumption stating that "water consumption should meet basic needs for water servicing without jeopardizing the ability of future generations to meet their water needs and while protecting the water need of the environment" [3].

Water is a limited and scarce natural resource (freshwater resources form less than 1% of the total water in the globe) essential to life, which behaves rather differently from other elements of the biosphere, since for water no choice exists between resources.

Therefore, although water resources are renewable, water systems can be so degraded that they are potentially lost, and the ecosystem can be dependent on a minimum quantity and quality of water to the threshold below which they are damaged.

It seems that the only choice to be made in sustainable water management is how to allocate water, and finding the most efficient way of using it.

Sustainable Water Management is an Integrated Water Resources Management (IWRM) (as it has been defined by the Technical Committee of the Global Water Partnership) namely "a process which promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems."

According to some expert studies and outcomes from the Water Resource Institute, the number of people living in water scarcity countries will represent 13-

20% of the global population by the year 2050, so water might become a major determinant of the structure, trade, socio-economic development and growth prospects of national economies.

Since water becomes a rare good, the need to control the deterioration of water quality is translated into water legislation, enabling countries to state the purposes and objectives of their water policies.

As a result of this pressure imposed by sustainable water quantity and quality management problems, a new area of water policy has emerged in Europe, through the adoption and implementing plans for the Water Framework Directive (60/2000/EC). The prime objective in the new policy era is defined as the sustainable use and management of water resources [4] and the implementing of WFD aims at promoting effective policies to confront the degradation of water resources on the one hand and the intensified water scarcity on the other.

In 2007, the European Commission adopted a Communication on Water Scarcity & Drought (WS&D) which identified several policy areas that had to be addressed if Europe was to move towards a water-efficient economy. In order to address and mitigate the challenge posed by water scarcity and droughts, it is essential to improve water demand management [5].

Demand management is defined as the development and implementation of strategies aimed at influencing demand, so as to achieve efficient and sustainable use of a scarce resource, namely water.

It is important to keep in mind that, besides efficiency, water demand management should promote social equity and environmental integrity.

Demand management strategies mainly consist of non-structural measures such as economic and legal incentives to change the behavior of water users and the creation of the institutional and policy environment that enables this approach [6].

An improved water demand management may lead to an increase in the efficiency of water use and/or reduction in water consumption, with several very important

economic and environmental benefits in the medium and long run, such as:

1. reduced costs of water treatment and distribution system capacity (including the capacity of infrastructure for the collection and treatment of wastewater);
2. savings in capital expenditures because of deferred or downsized new water supply projects;
3. energy savings for heating water as well as for pumping and treatment;
4. environmental benefits of reduced withdrawals of water from streams and aquifers which leave more water available to preserve the ecological resources of streams, wetlands and estuaries.

All these issues stress the fact that sustainable and efficient water use represent one of the biggest challenges of the present and the coming decades.

Although in some cases, the target of sustainability may be in conflict or in competition against the efficiency target, we support the statements of Baumann et al., [7] and will try to further argue that, in the case of rare water resources, efficient use and pricing can indeed promote sustainable water use.

Especially the last decade has produced marked improvements in the available “know-how” for planning and evaluation of demand management alternatives.

Taking into account previous experience and stakeholder consultations, an integrated approach based on a combination of options is considered now in the EU as the most appropriate approach for addressing WS&D (water scarcity and droughts), compared to alternatives based on water supply or economic instruments only.

The Communication [5] identified 7 main policy options to address water scarcity and drought issues:

- (1) Putting the right price tag on water;
- (2) Allocating water and water-related funding more efficiently;
- (3) Improving drought risk management;
- (4) Considering additional water supply infrastructures;
- (5) Fostering water efficient technologies and practices;

(6) Fostering the emergence of a water-saving culture in Europe;

(7) Improve knowledge and data collection.

However, the first policy area to be addressed in the member countries is putting the right price tag on water.

Implementing a sensible system of water pricing is one of the major means for efficient water use and the first requirement for the promotion of such use are full-cost prices.

This way, suppliers and regulators using charges for use, metering and educating by increasing the awareness of the user about water conservation, must reduce water demand toward a more efficient and sustainable level [8].

One area of water policy that has become increasingly subject to pricing principles is that of public water supply and wastewater services. Efficient and effective water pricing systems provide incentives for efficient water use and for water quality protection.

They also generate funds for necessary infrastructure development and expansion, and provide a good basis for ensuring that water services can be provided to all citizens at an affordable price.

Agriculture has been identified as the major sustainable water management issue in the implementation of the Water Framework Directive (WFD).

In particular, abstraction of water for irrigation accounts for 24% of total water abstraction in Europe and can be up to 80% in some southern Member-States (EEA, 2009 Water resources in Europe – confronting water scarcity and droughts). Moreover, unlike other sectors like energy production, the majority of the water abstracted is consumed and not returned to the water bodies (c. 70% according to the EEA). Thus, this sector has to be addressed as a priority when considering any action against water scarcity and droughts in Europe.

After the issuance of the Water Framework Directive River Basin Management Plans by the Member States, it is important to look into the effectiveness of the agricultural

measures therein, including their technical, financial and social dimension.

This must be done in close cooperation with the WFD Expert Group on agriculture and with its technical subgroup, the Pilot River Basin network on agriculture, and may be accompanied by more dedicated studies as needed.

On this basis, a database about WFD agricultural measures should be created in order to enhance the exchange of experiences. Also, taking advantage of WISE (Water Information System for Europe), stakeholders may be able to better consider and integrate water and agricultural policies, all over the European Union territory.

The European Commission should ensure that all the available studies which have been carried out regarding options for water savings in agriculture will be taken into account in the preparation of the 2012 Blue Print for European Waters and may launch additional studies if needed.

## CONCLUSIONS

The second principle of Sustainable Water Management states that water development and management should be based on a participatory approach, involving users, planners and policymakers at all levels.

Therefore, as a first conclusion, to enable an efficient and sustainable participatory approach, economists should try to find the best theoretical and practical approaches to deal with the challenges of water demand management, expressing awareness on the fact that water is no longer a free public good, but a rare and valuable economic good.

We believe that addressing water pricing in agriculture, in a dedicated conference, would also be a welcome opportunity to better emphasize the strategic role of this economic instrument for a sustainable and efficient water management, especially in our times of constrained economic and environmental prospects.

## ACKNOWLEDGEMENTS

This paper is supported by the Sectorial Operational Programme Human Resources Development (SOP HRD), financed from the European Social Fund and by the Romanian Government under the contract number SOP HRD/89/1.5/S/62988

## REFERENCES

- [1] Frone D.F. & Frone Simona (2011), Principles of Sustainable Water Management, in Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development”, ISSN 18445640
- [2]EU Commission, Environment General Directorate, 2011, Water Scarcity and Droughts-2012 Policy Review- Building blocks (non-paper)
- [3]OECD, 1998, ‘Water Consumption and Sustainable Water Resources Management’, Proceedings, Paris
- [4] Kaika M. (2003) - European Environment, 2003 - Wiley Online Library
- [5]European Commission, 2007, Addressing the challenge of water scarcity and droughts in the European Union. Communication from the Commission to the Council and the European Parliament, COM(2007)414
- [6] Savenije H. and P. van der Zang, 2002, Water as an Economic Good and Demand Management Paradigms with Pitfalls, IWRA, Water International, Volume 27, Number 1
- [7]Baumann, D.D., Bolond, J.J., Hanemann, W.M., 1998. Urban Water Demand Management and Planning. Mc Graw-Hill, New York
- [8]European Environment Agency, 2000, ‘Sustainable Use of Europe’s Water? State, Prospects and Issues’, in Environmental Assessment Series, 7, Copenhagen