Principle Concern: Water Conservation and Rational Water Use

V.A. Dukhovny, V.I. Sokolov, H. Manthrithilake, N. Mirzaev

Efficient and effective use of the water diverted from water sources should be planned and conducted according to two directions. It is clear that water use by direct water users is the first and, likely, most arresting aspect for water saving activity. However, there is another direction that shouldn't be out of attention of actors in the water sector. High reserves are in hands of managers in the water sector due to mismatching of water demands and supply, as well as due to the instability of flow rates in any water management system.

A key objective of IWRM is to achieve the potential water productivity based on "the norms of water consumption under applying advanced methods of water use" or "the promising level of technologies in water-consuming sectors." Practical findings of some projects (the WUFMAS, Best Practice, IWRM-Fergana etc.) implemented in the region over the period of 1997 to 2004 demonstrate that it is quite substantively to achieve potential water productivity. On the basis of the experience and results of these projects the following recommendations can be made regarding large-scale dissemination of water saving technologies in the region:

1. Improving the system of water resources monitoring and assessment;
2. Introduction of the progressive water charging system applying incentive stepped tariffs and penalty sanctions for each cubic meter of water used in excess of planned rates etc.;
3. Revising all water use standards based on the scientifically-founded computer programs "ISAREG" and "CROPWAT" [32] that enable us to computerize the water use planning process and, at the same time, to take into account characteristics of different infrastructure and water availability in various years as well as to provide a basis for effective adjustment of water consumption rates depending on different water availability;
4. Based on these water consumption rates, it needs to revise water use limits that are overestimated in most cases causing extensive organizational water losses, excessive expenses, and increase in drainage rates;
5. Developing the zonal indicators of potential water productivity, and on their base granting of preferences to water users that provides the achievement of these indicators, in the form of reduction in taxes or fee for water services;
6. Creating the system of pilot water saving projects, as a primary measure to demonstrate rational water use;
7. Application of water rotation and other organizational measures and technologies to control water losses or unproductive water use at the field level (short-length furrows, careful land leveling, alternative furrow irrigation etc.)
8. Introduction of the state-of-the-art irrigation technique and methods; and

9. Establishing an extension service for water users providing a technical assistance in rational water and land use and in achieving potential productivity of water and land resources.

Along with organizational and engineering measures for water saving, high implications consist in water demand management that is based on the state policy aimed at rational water resources use and includes the following actions:

- Establishing the legal basis for water use and supporting water users;
- Introduction of the economic incentives for water saving by water management organizations and water users at the State level;
- Implementing the curricula that include water saving issues starting with school education;
- Motivating the pioneers of water saving by means of dissemination of their knowledge and creating of their positive image;
- Training of water users, including study tours;
- Manufacturing equipment, instruments, and appliances to promote effective water use; and
- A state support of procuring water meters for water users;

The introduction of advanced and ecologically sound technologies should base on the thought-out mechanism providing the enabling environment (with applying financial, organizational, legal, and engineering tools). Low rates of introduction of these technologies were mentioned even in the European Water Directives. There are a few causes for this situation:

- Ecologically sound and state-of-the-art equipment, for example, for biological sludge removal based on in-built micro-filtration modules is very efficient and has longer operational life (dozens of times in comparing with existing equipment), however, does not meet the present requirements to an internal rate of return. *To put this equipment into practice it is necessary to provide specific discounts or incentives for investors, for example, at the rate of cost of additional water resources that are received as a result of applying this water treatment technology (in opposite case these funds would be confiscated by the State at more considerable rates);*
- Introduction of water saving technologies for domestic purposes (faucets, shower-bath appliances, lavatory pans etc.) enables to reduce water consumption per capita up to 100 l/day. However, if all water users reduce their consumption, then a capacity of water treatment plants is not completely used. Therefore, *an extent of the introduction of water*

saving technologies is to be adjusted to the actual needs and alternative measures in that way when investments into water saving should less than investments into developing water treatment facilities without implementation of measures for water saving;

- Usually, in the process of bidding for Works, the contract is awarded to bidders that proposed the least bidding price. However, as a rule, a new technology cannot be cheaper existing one, but it is more profitable regarding long-term and environmental aspects. *It means that bidding criteria should be changed in favor of publicly profitable decisions*; and

- Water prices established on the basis of complete reimbursement of all operational costs plus profit unlikely will facilitate the introduction of more advanced and ecological sound decisions because they are based on the normative volumes of water consumption and treatment and specific current technology. Therefore, *municipalities interested in conservancy should cover a part of expenses related to the introduction of ecologically sound technologies*.

Measures aimed at water saving and increasing water productivity are described in detail below.

It is usually considered that efforts to combat irrational water use within the water management systems consist in improving two types of the efficiency - technical and organizational. It is well known that the enhancement of the technical efficiency can be provided by means of eliminating leakages in water pipes, lining of irrigation canals or replacement of earthen canals by pipelines and flumes etc. to prevent seepage losses. Enhancing the organizational efficiency is reached by means of preventing unproductive irrigation water disposals into the drainage network; idling runs of water through irrigation canals, and unauthorized water diversions, as well as by means of construction of intra-system reservoirs accumulating and storing excessive water supplies and daily regulative basins that smooth the daily unbalancing of water supply and water diversion from the sources. However, substantial attention also should be paid to eliminating lack of uniformity in water distribution between subordinated canals or among water users.

Entropy, which is higher if increase in the number of hierarchical levels and a lesser extent of regulation and limitations take place, is intrinsic to any distribution systems, including water management systems. Increase in deviations from average water supply, as moving away a water source, is also typical for water management systems, and this fact is obviously illustrated in the diagram below (Figure 1.6).

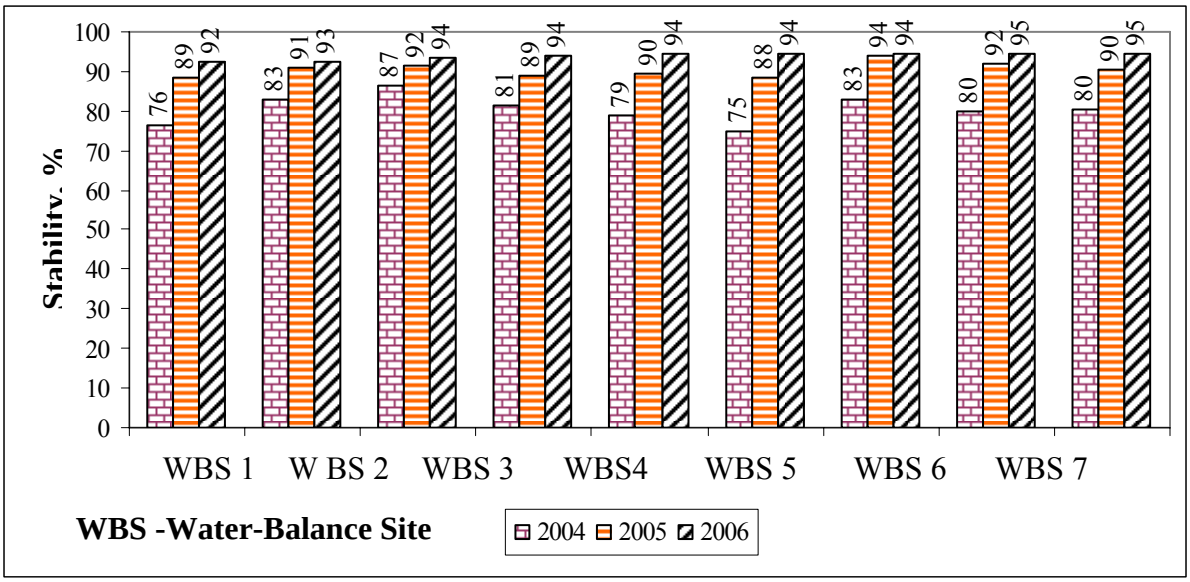

Figure 1.6 The South Fergana Canal: Stability Index of Water Supply during the Growing Season

This figure shows that in dry years the deviations are less considerable due to the enhanced control of water supply and distribution speaking about the extent of operational orderliness. Thus, the task of reducing unproductive water use comes to proper organization and control of O&M activity.