2013 | THIRD QUARTER

ICID NEWS

Managing Water for Sustainable Agriculture

MESSAGE FROM THE PRESIDENT

Dear friends and members of ICID,

ICID mega event - the First World Irrigation Forum (WIF1) and the 64th IEC meetings to be held in Mardin, Turkey is just a few days away. Most of you are readying to attend this exciting maiden Forum. The WIF1 with the main theme of 'Irrigation and drainage in a changing world: challenges and opportunities for global food security' will discuss the technical issues related to integrated water management approaches for sustainable food production, financial issues related to mechanisms for investments in irrigation and drainage, especially in new technology development and application, and policy issues on roles of stakeholders, partnership and interaction among different sectors.

I am also pleased to see that there is an active involvement of our national committees, international organizations and other stakeholders not only in the technical contributions but also in the organization of the WIF1. As we know, irrigation is the largest water user, sharing about 70% of total world water supply. Most of the large irrigation schemes serve multiple purpose like hydropower production, water supply to municipal, drinking and industrial uses. It is necessary to evolve better policies for integrated management and shared investment on the rehabilitation and modernization of irrigation systems which is a key factor for sustainable development of irrigated agriculture and achieving food security.

All those policies and strategies towards increasing water use efficiency and water productivity supports adoption of modern technologies, reforming management institutions and implementation of irrigation system modernization works. ICID national committees have a lot to share and learn from each other. At the same time, we should learn valuable lessons from all those ancient irrigation schemes which are still functioning satisfactorily. During the First World Irrigation Forum, participants will have opportunity to share and learn historical experiences on sustainable water management during the international workshop on 'Water Wisdom and Sustainability'. Furthermore, the current issues such as coping with draught and water scarcity and impact of climate change will be addressed through workshops on 'Developing Management Strategies for Coping with Drought and Water Scarcity' and 'Workshop on Management of Water, Crops and Soils under Climate Change'. Another major attraction of the Forum is the organization of more than 20 side events on various interesting topics by different institutions from across the world.

I encourage all our national committees, members and other participants to contribute their rich experience and get actively involved in this maiden and exciting event of the ICID. Our host, the Turkish National Committee (TUCID), with full support from the General Directorate of State Hydraulic Works (DSI) has fully geared up to receive the delegates and make their stay comfortable and safe. Turkey is uniquely geographically located as a bridge between East and West. The Country is bestowed with the rich ancient and modern cultural heritage. Mardin is one of the most ancient cities of Upper Mesopotamia dating back to 4500 BC. There will be many interesting technical and sightseeing tours for the delegates and accompanying persons.

Participants will see not only Turkey's modern irrigation and agriculture, but also explore the rich history and culture of the country.

Last but not least, I look forward to hearing your ideas and suggestions for further enriching the Commission's contribution to the irrigation community worldwide. ICID already has opened its door to all stakeholders through direct membership. I encourage all those private organizations, institutions, and individuals involved in improving agricultural water management to join ICID's endeavour.

I look forward to seeing you all in Mardin

Best regards,

Sincerely yours

Gao Zhanyi

Dr. Gao Zhanyi
President of ICID

ICID•CIID
www.icid.org

Inside

New Eco-friendly System of Rice Production in Chao Phraya Delta of Thailand

Rice is the principal crop of Thailand and is grown on about 10 million hectares or about half of the country's arable land and contributes about 20 percent of gross domestic products from the agricultural sector. More than 3.7 million farmer households are involved in rice production. The past governments introduced a system of guaranteed rice price that encouraged farmers to increase their income by growing more crops per year. The traditional continuous round the year planting of rice has caused not only serious water shortage but also high cost of cultivation and adverse environmental impacts. Engr. Chaiwat Prechawit, Vice President of ICID provides a brief about the Thai Government's initiative to surmount the situation by introducing a new system of rice cultivation in the Chao Phraya Delta.

Conventional rice cultivation

In Thailand, rice is mostly cultivated in the wet season and only on a small area in the dry season. However, in areas having adequate water storages like the Chao Phraya basin, farmers usually grow two successive crops of rice, making three crops a year or at least 5 crops per 2 years. Farmers usually plant their crops at different time periods as per their own convenience leading to different growth stages of the crop in the same area, creating difficulties in efficient irrigation. As rice is grown all the year round, water from reservoirs has to be released continuously, at times disparity between outflow and the inflow into the reservoirs. This situation may not be problematic in wet years, but in dry years when reservoirs have low storages, it affects the water supplies to municipal, domestic and other non-irrigation uses.

Moreover, continuous and mono-cropping of rice does not provide the required rest to soil and also depletes the soil nutrients excessively forcing farmers to apply more chemical fertilizers. The other disadvantages of continuous cropping include formation of hard and dense soil structure making the ploughing and other farm operations difficult, increasing menace of harmful insects and pests, especially brown plant hoppers as there is no dry period to eliminate them and they can hide and feed in the rice paddy. Due to high demand for rice seeds, there used to be the shortage of good quality, pest/disease resistant seeds. Continuous ponding of the rice fields emits methane thus contributing to global warming. Rice field ecosystem is also damaged due to intensive application of chemicals (fertilizers, insecticides, and weedicides), which not only eliminates nature's beneficial insects that help control pests but are also harmful to human beings.

New rice farming system

Officials from the Ministry of Agriculture and Agricultural Cooperatives visiting farmer's field

The objectives of the Thai Government's New Rice Farming System Project are to promote effective water management both for wet season and drought mitigations. Attempt is made to complete the rice planting in a short period, follow a uniform operation and maintenance schedule and to extend the irrigation as per the water availability. Suitable crop rotation is introduced so as to improve the deteriorating soil condition. Overall, it tries to reduce the cost of rice production by using appropriate technological interventions with due care to the environment.

In the current year, total area targeted under this new system of rice planting is 240,000 ha comprising 112,000 ha of mung (green gram) beans, 24,000 ha of other crop after rice, 24,000 ha of legumes and 80,000 ha of rice spread over 13 provinces of Chao Phraya basin. The Royal Irrigation Department has set up 4 cropping systems with 18 variations according to the topography and the operation and maintenance needs of the projects.

The project involves many committees from various agencies of the Ministry of Agriculture and Agricultural Cooperatives such as Rice Department as the leading agency, Irrigation Department, Department of Agriculture, Land Development Department, Office of Agricultural Economics, Land Reform Department, etc. From the project area, the committees will be from the provincial governor and its staff together with various agencies, local administration, farmer organizations, and the private sector. These committees will not only supervise the implementation of the project but also support the linkage to the market.

Benefits of the project

With the new system of rice cultivation, an overall reduction of about 15% in the cost of rice production could be achieved due to proper use of fertilizers, pesticides, reduction in fuel for pumping, etc., while 20% higher rice yield over the conventional practice was obtained. This led to reduction in the import of other crops such as soybean, peanut, and corn for livestock feeding and also in the chemical fertilizer and pesticides. Although there was a reduction in the dry season rice area of about 1.52 million rai (253,000 ha), but the gross yield increased from 6.472 million ton/ ha to 6.530 million ton/ ha. As a result, the reduction in the import of fertilizers was about US$3.51 million and in other chemicals US$19.68 million, besides significant saving in water use. There was also improvement in the paddy ecosystem, returning of natural enemies of harmful crop pests, etc.

Vice President Engr. Chaiwat Prechawit can be contacted at <chaiwat.prechawit@gmail.com>.

Better Governance for Improved Water Management*

L. Tollefson[1], H. El Atfy[2], T. Facon[3] and A. Kerc[4]

Introduction

Irrigated agriculture is undergoing rapid change and is facing issues related to climate change, population growth, consumption patterns, competition for resources and cost of development. The challenge is whether water availability for irrigation along with rainfed production will be sufficient to meet the growing food demand and improve global food security. Traditionally governments have been responsible for developments in the irrigation sector through planning, design and construction of projects. Trends toward decentralization, fiscal crisis and growth of the private sector have lead government to divest some of its role to user organizations and the private sector. This has been known as the participatory approach to irrigation management and has been adopted widely by many countries with a range of institutional arrangements.

Many irrigation and drainage schemes worldwide perform below their capacity. To modernize and improve this capacity will require innovation and technical advancement but in addition issues of policy, governance, management and institution must also be addressed. As unanimously agreed, the water crisis is mainly a crisis of water governance. Consequently, the dialogue on effective water governance aims at bringing together as many stakeholders as possible to examine water governance systems and, where required, plan action strategies to improve them.

Water governance challenges

Water governance is a complex process as it combines several interrelated aspects: social, economic, environmental and political empowerment. In the absence of good and adequate policies, laws, institutions and governance, one would expect a serious negative impact on the sustainability of water resources. Improved governance, on the other hand, will lower operation costs and make a significant contribution to create a favourable environment to increase investments and ensure that investment is used correctly and efficiently.

The challenges of water governance are enormous when it comes to bureaucratic implementation, public participation, sustainable management of water resources, and the provision of water services. Varying interpretations of integrated water management, competing interests among different sectors stakeholders, power dynamics, and lack of capacity building are just some examples of the challenges involved.

It is worth noting that water decisions are anchored in governance systems across three levels: government, civil society and the private sector. Facilitating dynamic interactions – dialogues and partnerships – among them is critical for improving water governance reform and implementation. There are a number of critical challenges to participatory water governance like - fragmented decision making, lack of reliable information, poor access to information, focus on technological solutions, limited stakeholder participation or representation, lack of accountability and transparency. New research increasingly shows how corrupt practices are detrimental to sustainable water use and service provision. Corruption ultimately limits the scope for improving poor people's livelihood opportunities.

Effective water governance

There is no single model of effective water governance. To be effective governance systems must fit the social, economic and cultural particularities of each country. Nevertheless, there are some basic principles or attributes that are considered essential for effective water governance: approaches adopted should be open and transparent, inclusive and communicative, coherent and integrative, equitable and ethical; while performance and operation should be accountable, efficient, responsive and sustainable.

Governance becomes 'effective' or 'good' when conditions of equity, accountability, participation, transparency, predictability, and responsiveness prevail. Governance is a complex product of social-political interactions in which various societal actors are involved at different levels. The government's role should be that of an activator and facilitator, rather than a top-down manager. Important aspects of the government's role include formulating national water policies and legislation, enacting and enforcing the legislation, and encouraging and scrutinizing the private sector.

Achieving good water governance cannot be undertaken hastily using blueprints from outside any given county or region. Good governance needs to be developed to suit local conditions– the social, economic and cultural particularities of the region.

Concluding remarks

Irrigation and drainage face many challenges but also provide opportunities to assist global food security. Modernization and improvement of irrigation is occurring worldwide at varying rates and degrees. This alone will not address the issues of water and food security. Policy, management, institution and governance are also key areas which need to be considered and addressed. Improved water governance and management are imperative if the needs of current and future generations are to be met in a sustainable manner.

---

* Excerpt from the Background paper "Policy, Science and Society Interaction" submitted or the First World Irrigation Forum, Mardin, Turkey

1 Vice President, ICID, Canada, E-mail: laurie.tollefson@agr.gc.ca

2 Arab Water Council, Cairo, Egypt

3 Food and Agriculture Organization of the United Nations (FAO), Bangkok, Thailand

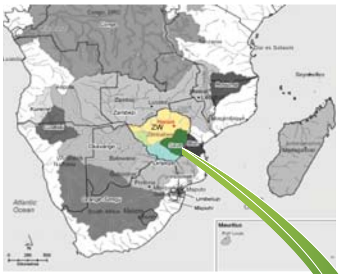
4 Turkish Water Institute, Istanbul, Turkey

Irrigation Development for Improving Food Security in Zimbabwe: Challenges and Opportunities

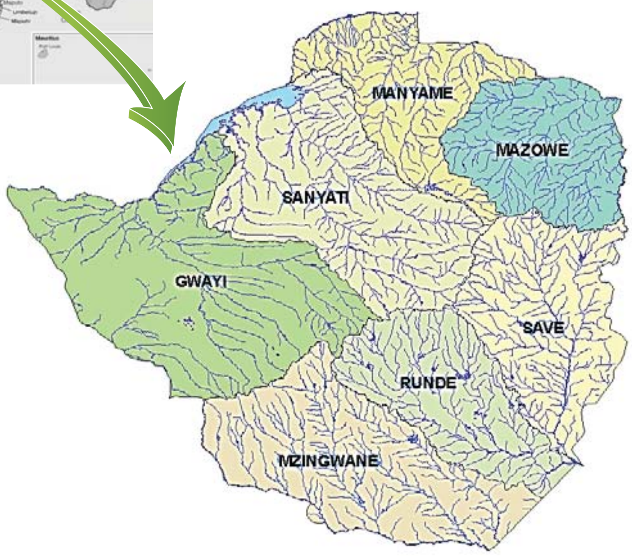
Zimbabwe is a low income country as classified by the World Bank. Water for agriculture plays a crucial role in advancing the economy and improving the standard of living and health of Zimbabweans. Issues such as reducing costs of production and prices of agricultural produce, marketing of produce, linking irrigation and drainage to water supply and sanitation in an integrated manner, and improved irrigation service delivery need to be addressed to achieve the food security. As part of its five-year strategic plan to 2017, the Zimbabwe Committee on Irrigation and Drainage (ZwCID) is actively participating in addressing these issues and in the implementation of emerging solutions. Eng. Thubelihle Thebe, Secretary, ZwCID provides a brief on the challenges and opportunities of water resourcesand irrigation development in Zimbabwe.

Land and water resources

Zimbabwe is a land-locked country in Southern Africa covering 39 million hectares, of which 11 million ha are arable. The total annual renewable water resources were estimated as 20 km^3/year (12.26 km^3/year as internal) of which an estimated 4.21 km^3/year (21.05%) are presently withdrawn. As per the Zimbabwe National Water Authority there are about 2200 dams, of which 260 are classified as large dams. Of the large dams 250 are owned by the government. The bulk of the water used for irrigation is stored in the large dams. With an estimated population of 12.97 million inhabitants, the per capita water availability is 1540 m^3/capita/year indicating a water stress situation. The apportionment of freshwater withdrawals is estimated as - agriculture (79%), domestic (14%), and industry including mining (7%).



River basins of Zimbabwe



Zimbabwe is divided into seven catchments for the management of water resources. Mzingwane catchment in the Limpopo Basin is the most developed catchment in terms of water storage as a proportion of surface water runoff. Approximately 85% of its total annual renewable surface water is diverted and stored, whereas only a relatively small fraction of this stored water that is allocated for agricultural purposes is utilized by the smallholder farmers mainly due to the water pricing mechanism that compels users to pay for an allocation that they might not be fully and efficiently utilized.

Groundwater resources are mainly used for potable water supplies in rural areas. There are two major aquifers in Zimbabwe viz., the Nyamandlovu aquifer and the Lomagundi aquifer, where large-scale commercial farms use the water mainly by sprinkler irrigation systems. The Nyamandlovu aquifer also augments the municipal water supply for Bulawayo and there is a need for fair and equitable access to the water resources. Alluvial aquifers that represent the overlap of surface and groundwater resources are also an important resource for irrigation supplies, especially in the low rainfall areas such as the Mzingwane and Gwayi catchments of Zimbabwe.

The Southern African Development Community (SADC) has established several trans-boundary watercourse commissions for the management of shared watercourses. It is necessary to streamline irrigation and drainage on the regional scale through the Southern Africa Regional Irrigation Association (SARIA).

Irrigation and drainage

Zimbabwe has created an irrigation potential estimated at 220,000 ha. Of which approximately 136,000 ha have functional irrigation systems. With the utilization of trans-boundary waters within regional protocols, the irrigated area could reach up to 2 million ha with the bulk of the area being in the Zambezi basin.

Drainage systems on agricultural land cover approximately 75,000 ha. The bulk of the irrigated and drained area comes from sugar plantations in the south-eastern parts of Zimbabwe where approximately 40,000 ha are irrigated mainly using surface irrigation methods. Average yield of sugarcane is about 105 tonnes per hectare. Presently, only about 7000 ha of wheat were irrigated in Zimbabwe owing to various factors such as high costs of production and unreliable electricity supplies. The other major crops grown under irrigation are citrus, vegetables, tobacco, and maize. The country is experiencing a deficit production of cereals and other food crops such as potatoes.

Smallholder irrigation

Irrigation directly and greatly improves food availability and stability of supply in Zimbabwean smallholder irrigation schemes and also improves access to food through income generation.

A smallholder irrigation scheme refers to an irrigation scheme that is located in the 'Communal Lands' that are held under the' Traditional Land Tenure System' and are collectively owned and managed by a group of farmers who reside in that area and are allocated land within the scheme command for irrigation purposes. The average land area allocated to the farmers is about 0.5 ha and ranges from 0.1 ha to 1 ha. The farmers are responsible for various farm operations on their plots as part of the broader activities of the group. Smallholder irrigation schemes accounts for 35,000 ha comprising about 15,000 ha by smallholders with less than 1 ha and about 20,000 ha by those farmers having less than 3 ha farm area. Approximately 80% of these smallholder irrigation schemes are equipped with surface irrigation systems with 20% being under drag-hose and semi-portable sprinkler irrigation systems. The major constraint for increasing the irrigated area has been the limited availability of finance.

Among the drivers for increasing of the water stress in Zimbabwe are - increasing population particularly in urban areas and subsequent increased food demand. Consequently, the return flows of water through wastewater discharges are high in peri- urban areas. An estimated 6000 ha are irrigated using wastewater under both direct and indirect wastewater irrigation typologies. The challenge is in integrating the safe use of returned water for food production in water resources management taking into account the social, economic, and environmental issues pertinent to the practice. Use of wastewater for irrigation provides an opportunity for improved food security.

The increase in the availability of nutritious food in rural areas is attainable through smallholder irrigation schemes that receive support mainly from the government and development partners. It is the mandate of the government to ensure national food security and the ZwCID is committed

Eluhlaza farmers at redwood cabbage field

to provide the full support to the government in fulfilling its mandate of hunger free Zimbabwe.

Users pay the government through the national water authority for abstracting water from the government-owned dams and the fee that they pay includes a charge for a unit of raw water and required levies. In the case of privately-owned dams, the users simply pay a levy to the government and the sub-catchment council that locally administers water. All charges are dependent on the amount of water allocated to the user per year and accrue regardless of usage. This presents interesting challenges especially in the smallholder irrigation sector.

Institutional challenges

Farmers need to be capacitated to tackle the challenge of water allocation and pricing. This capacity development could be done through training and knowledge sharing among farmers under an organized framework such as a single-sector or multi-sector water user associations. The representation of farmers (mainly those from rural and peri-urban areas) has been found to be poor in the sub-catchment councils that administer water locally. This needs to be accompanied by revisions in the government's agricultural water pricing policies. The opportunities for low-cost small-scale irrigation and sustainable wetland utilization need to be explored as means to fully contribute to the household and community food security.

In Zimbabwe, there are different government agencies responsible for water, irrigation, and agricultural extension. The role of these agencies at times overlaps or is not clearly defined resulting in lack of accountability on the institution responsible for irrigation and drainage service delivery. In some instances, the water authority handles water storage, water allocation and distribution to farmers. The government has largely developed and maintained water resources and smallholder irrigation schemes, whereas private companies and individuals have developed their on-field irrigation systems.

Engr. Thubelihle A. Thebe can be contacted at <tathebe@gmail.com>.

About Zimbabwe Committee on Irrigation and Drainage (ZwCID)

Zimbabwe joined ICID in 1955. The Zimbabwe Committee on Irrigation and Drainage (ZwCID) is a public voluntary organization bringing together various stakeholders in Zimbabwe's irrigation and drainage sector to further the objects of ICID and is presently mainly sponsored by the Government of Zimbabwe. The Office Bearers of the ZwCID for the period 2013-2016 are: Dr. Conrade Zawe (Chairperson); three Vice-Chairpersons (Dr. Simon Madyiwa, Dr. Isiah Mharapara, Mr. Mawira Chitima); Mrs. Soneni Nyamangara (Treasurer); Dr. Hodson Makurira; Eng. Martin Ager; Eng. Vavavirai H. Choga; Mrs. O. Nyanhongo; and Eng. Thubelihle A. Thebe (Secretary).

Irrigation and Drainage for Environmental Sustainability*

Charlotte de Fraiture[1], Aynur Fayrap[2], Olcay Unver[3] and Ragab Ragab[4]

Introduction

Irrigation and drainage played a major role in food production and productivity increases over the past decades and is accredited for the successes during the 'Green Revolution' and eradication of famines in Asia. But irrigation is also blamed for water shortages, severe environmental damage like excessive irrigation causing the groundwater table to rise and soil salinization, pollution due to fertilizers and pesticide application, displacement of people without proper compensation and increased social inequality. Major rivers such as Yellow, Colorado, Murray Darling, and Indus are over-committed and some dry up during several months of the year due to over-abstraction. Groundwater levels are declining in many countries. Consequently, alternative approaches to water management for food production are called for to achieve the triple goal of increased food production, equitable access and environmental sustainability.

Environmental impacts of water use in agriculture

Water use in agriculture has adverse impacts on the environment. Excessive water application in irrigation can lead to losses due to surface runoff and deep percolation. In some cases, these losses may be reused elsewhere, in other cases they are irrecoverable due to saline sinks or high costs. Low irrigation efficiencies may lead to problems such as waterlogging, high water table, salinity and alkalinity.

Use of poor quality irrigation waters such as drainage water, saline groundwater and untreated wastewater, adversely affects the environment. The most damaging effects of poor-quality irrigation water are excessive accumulation of soluble salts and/or sodium in soil.

Agricultural water use can affect the environment not just by reducing the amounts of water available, but also by polluting water, altering river flow patterns, and reducing habitat connectivity. Maintaining or restoring environmental flows can be a real challenge where economic growth and development intensify the competition for water resources.

Approaches to minimizing adverse environmental impacts

On-farm water management practices, improved water distribution (e.g. canal lining or using pipe lines) and infrastructure (such as pressurized pipe systems and using modern irrigation systems such as sprinkler and drip) can reduce the avoidable water losses. Proper drainage minimizes problems of waterlogging, rising water tables and soil salinity.

The use of poor quality waters in irrigated lands requires the control of soil salinity by means of leaching and drainage of excess water and salt. Training and extension are a prerequisite to ensure fields are properly irrigated and efficiently drained. Controlled drainage keeps the water table high during the off-season when crops are not growing.

An obvious approach to minimizing adverse environmental impacts of irrigation is to reduce the amount of water withdrawn for crop production. Improvements in water productivity are necessary to attain increased food production and food security goals while at the same time safeguarding the environment.

Irrigated agro-ecosystems (such as irrigated rice fields) tend to maximize agricultural production (e.g. rice and shrimps together in paddy rice fields) but when managed well they can provide other - often unintended services, such as erosion control through terracing, flood retention, sediment retention, groundwater recharge and birds' habitat. The economic value of ecosystem services may be substantial and are sometimes larger than the value of crops. Paddy fields contribute to climate change through methane emission. Alternative water management practices such as alternate wet - dry irrigation or aeration through mid-season drainage reduce methane emissions.

Integrating different benefits, such as food production, groundwater recharge, flood retention, biodiversity and carbon sequestration, in the framework of agricultural water management requires breaking down disciplinary boundaries between, among others, engineers, ecologists, agronomists, economists, hydrologists and climate scientists.

Concluding remarks

Water and land management decisions often involve trade-offs. Loss of vital ecosystems services in some areas may threaten the sustainability of the land and water resource base on which agriculture depends. Approaches to water management that integrate the provision of food, energy and other ecosystem services are essential to balance the multiple demands on increasingly scarce resources. The question however remains as how to actively manage water for both food production and environmental benefits and what incentives could be implemented to ensure the right balance.

---

* Excerpt from the Background paper "Integrated water management approaches for sustainable food production' submitted for the First World Irrigation Forum, Mardin, Turkey

1. Prof. of Land and Water Development, UNESCO-IHE, Delft, the Netherlands, E-mail: c.defraiture@unesco-ihe.org

2 Agricultural Engineer, General Directorate of State Hydraulic Works, Ankara, Turkey. E-mail: aynurf@dsi.gov.tr

3 Dy Director, Land and Water Division, FAO, Rome, Italy, E-mail: olcay.unver@fao.org

4 Vice President, ICID, Centre for Ecology and Hydrology, CEH, Wallingford, UK, E-mail: rag@ceh.ac.uk

Financing Irrigation Water Management, Operation and Maintenance*

François Brelle[1] and Etienne Dressayre[2]

Financing irrigation and drainage is a broad issue encompassing major components like initial investment, operation, maintenance, renewal, rehabilitation, modernization, and ancillary services like training requiring a specific analysis. In this respect, the questions which need to be answered are:

- What should be the contribution from states or public authorities, in other words from all taxpayers or citizens?
- What could be the role of private sector, either for financing, building and/or operating, in which cases and under what conditions?
- What should and can be the contribution of the water users?
- How to address the issue of financing water resource conservation?
- Which other conditions should be fulfilled for the financing mechanisms to succeed?

Irrigation infrastructures, like other large hydraulic systems, are generally contributing to land development, and as such depend upon national policies and development strategies. They are therefore usually financed by governments through the public institutions. Initial investment and physical asset management financing therefore should not be considered separately. The recent development for irrigation services brings obvious opportunities but also challenges that have to be understood and tackled for involving the private sector in financing irrigation development and/or management.

The storage dams, most often serve the multipurpose of hydropower production, water supply to urban area and industries, besides irrigation. Thus identifying and recognizing multiple uses of water may be very helpful to mobilize the necessary funds for financing projects, at both construction and operating stage. Initial investment and physical asset management financing therefore, should not be considered separately.

As regards irrigation infrastructures, a major question must be raised: who benefits from irrigation development and who should pay the cost? Irrigation projects do more than bringing water to farmers. They contribute to the livelihood and prevent migration of the rural populations to city suburbs.

Whether water users should be billed as per the principle of 'full cost recovery' and is such a principle really relevant? It is asserted that food prices may not be high enough for farmers – especially small holders in developing countries – to make a minimum profit after having paid all the expenses necessary for their production.

The cost of operation and maintenance is usually ensured by setting up and enforcing appropriate pricing of water service. There is also a 'sustainability cost' (SC) of irrigation schemes, including water resource conservation. The SC is less than full cost as it does not include initial investment cost, but allows long-term asset management as it include operating costs, routine corrective (repairs) and preventive maintenance and sustainable modernization and renewal costs.

Farmers' willingness to pay is largely depends on the quality of the water service. Empowering Water User Associations (WUAs) for operation, maintenance and fee collection is an attractive alternative to public management and delegation to private company. Optimizing water service costs could be achieved through an adequate combination of public, private and end users respective skills and capacities. It is strongly believed that only by directly charging beneficiaries for the water they use will enhance their sense of responsibility and ensure their eventual partnership in the irrigation scheme.

A potential for involving private sector in financing irrigation schemes through so called PPPs does exists, but is risky. Private sector involvement in irrigation may be sought only under conditions, especially as regards risks, which must be fairly distributed between public and private partners.

Because the market prices of agriculture produce are rarely high enough for farmers – especially small holders in developing countries – to make a minimum profit after having paid all the expenses necessary for their production, the water service is often priced below its marginal cost, or at 'Sustainability Cost' (SC) only.

Last but not least, water resource conservation has a cost, and thus someone has to pay for it. Monetary transactions can be helpful to regulate the equitable use of the said common good. Many countries, especially in Northern Europe, have set up taxes on water abstractions. South Africa and Australia have made the choice of water markets, which may establish the incentives to refrain from over-consumption and to support improving infrastructure operating efficiency. In both cases, strong regulation is the only way for equitable sharing of the resources.

---

* Excerpt from the Background paper "Financing irrigation" submitted for the First World Irrigation Forum, Mardin, Turkey

1 Vice President, ICID - Président, AFEID, Directeur Technique Ingenierie de la Société du Canal de Provence, France, E-mail: afeid@irstea.fr

2 Administrateur AFEID, Directeur de Projets, France, E-mail: etienne.dressayre@brl

ICID•CIID

International Commission on Irrigation and Drainage (ICID) was established in 1950 as a scientific, technical and voluntary not-for-profit non-governmental international organization. The ICID News is published quarterly by ICID Central Office, New Delhi, India.

EDITOR

Dr. Suresh A. Kulkarni
Executive Secretary
ICID, 48 Nyaya Marg
Chanakyapuri, New Delhi, India
Tel: +91-11-2611 6837/5679
E-mail: icid@icid.org