2014 | FIRST QUARTER

ICID NEWS

Managing Water for Sustainable Agriculture

MESSAGE FROM THE PRESIDENT

Dear Members and Friends of ICID,

First of all I wish you all the best in the spring time of 2014. Spring is the critical time to make and implement planning for the whole year. As we know that during last several years ICID has organized various events and identified the solutions to promote sustainable agricultural water management to increase food production. Such as during the WWF6 in 2012, ICID and FAO organized the Theme 2.2: Contribute to Food Security by Optimal Use of Water; at the First World Irrigation Forum (WIF1) in 2013, we highlighted interaction among Policy, science and society, Financing irrigation and Integrated water management with the main theme as "Irrigation and drainage in a changing world: Challenges and opportunities for global food security". Now, it is the time for us taking actions to implement the solutions which have been identified.

To implement the solutions, we need to mobilize all resources and activate all stakeholders. I do hope that you can pick up the ideas and opinions from the WIF1. To keep adequate communication among decision makers, investors, farmers and engineers and researchers is so important for a successful agricultural water management project. We should pay more attention to hear the voices of farmers and other stakeholders. The network of ICID covers more than 100 countries, and each country with different development stage and natural conditions. Therefore, for the irrigation related professionals working in different countries and organizations should work out practical approach and roadmap to implement the identified solutions.

It is quite natural that at various international conferences the participants from countries with different developed stage always have different interests, focus and opinions. We should take the advantages of these events to learn and share knowledge and technology from each others. On other hand, we should also use the platform of regional and national conferences to discuss regionally and nationally highlighted issues. For the developing and least developed countries the involvement of decision makers and governments are more important to promote implementation of solutions. Therefore, for the National Committees of ICID, should do their best to invite the related governments officers and decision makers, system managers to attend the events organized by ICID and disseminate the documents and outcomes from our various conferences.

In 2014, ICID is going to have two main events, the 12th International Drainage Workshop from 23 to 26 June at St. Petersburg, Russia, and the 22nd International Congress on Irrigation and Drainage and 65th IEC Meeting from 14 to 20 September at Gwangju Metropolitan City, Republic of Korea. Please reserve your time to attend these two important events. On 24 February 2014 our Korean National Committee (KCID) hosted a preparatory workshop for the 22nd Congress of ICID. I attended the workshop with Secretary General Avinash Tyagi and I am happy to inform you that the preparation of the 22nd Congress of ICID is going on smoothly. With the active support of the Korea Rural Community Corporation (KRC) and Gwangju Metropolitan City, Republic of Korea, National Organizing Committee (NOC) has worked hard and made great progress in the preparation of the 22nd Congress of ICID. Taking this opportunity, I would like to express our thanks to KRC and NOC, Gwang Metropolitan City, and leaders and members of National Organizing Committee for their great efforts and contribution for preparing the 22nd Congress of ICID a grand success.

The theme of the 22nd Congress of ICID is Securing Water for Food and Rural Community under Climate Change. We will further explore the questions and solutions for the sustainable development of agricultural water management for achieving global food security under changes. This is a very important topic, and we are look forward to discussing how to take actions to cope with climate changes in the topics under the main theme and sub-themes of the 22nd Congress of ICID.

After the 22nd Congress of ICID the World Water Forum 7 (WWF7) will be held in April 2015 in Daegu-Gyongju, Republic of Korea. The focus of the WWF7 will be from solutions to implementation. WWC just held its 51st Board of Governors meeting and the 2nd Stakeholders Consultation Meeting of WWF7 from 27 to 28 February in Gyeongju, Republic of Korea. Secretary General Avinash Tyagi, Chair of ICID Task Force for WWF7, VPH Shinsuke Ota and myself attended various sessions. Once again, water for food is highlighted and the Theme 2.1 of WWF7 is on Water for Food. As a member of Board of Governors of WWC, ICID will play a key role with related international organizations and partners. We need your active involvement in collecting ideas and developing the theme.

I believe that we will have an excellent and successful year of 2014 implement our planning. I look forward to seeing you in various opportunities. Once again I wish you a successful year in 2014.

Best regards to all of you

Yours truly

Gao Zhanyi

Dr. Gao Zhanyi
President, ICID

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Inside

Financing Water for Agriculture

This article presents the extracts of the report of ICID Task Force on Financing Water for Agriculture (TF-FIN) established in 2007, under the leadership of Vice President Dr. Gerhard R. Backeberg, which was primarily set up to broaden the scope of analysis and to clarify concepts and approaches on financing irrigation, by taking stock of various experiences through a cross-country analysis of policies, strategies, current situations, mechanisms and practices regarding irrigation financing. The TF helped to gain a better understanding and insight of the required investments in agricultural water, and the beneficiaries of these investments; the presently available financing mechanisms and constraints for maintaining or improving physical irrigation capacity; and the expected changes and innovations for more appropriate financing mechanisms to enable sustainable water use for food production.

The irrigation sector has contributed to increase and stability in food production in the past and it is expected to remain the chief contributor to global food security in the context of sustained demographic growth. The sector has long been characterized by massive public financing of infrastructures, refurbishment works, operation and maintenance, and water-related services to farmers. While publicly-funded and managed irrigation systems have helped ushering in the green revolution in certain parts of the world and thereby reducing hunger and improving food security in many developing countries, they fall far short of expected agricultural performances and financial feasibility, and often contributing to environmental degradation. At the same time it is now widely accepted that water management for agriculture must be approached in a holistic way. This starts from the national water system, through the river basin and irrigation scheme system up to the farming system. The inter-relationships are particularly relevant to the question of sustainable financing of water for agriculture, specifically for the development of irrigation schemes.

Apparently, three broad mechanisms are applicable for financing of public investment in irrigation schemes. These are:

- Taxation of products to fund investment in irrigation: e.g., rice production in Thailand and a percentage of income from cultivated crop production in Iran;
- A combination of water use charges and explicit recognition of transfer payments or subsidies for irrigation from general taxes, as in the case of Australia; and
- Reliance on collection of water use charges to cover O&M costs and a part of capital costs as in the case of India, while in South Africa the proposed policy option is full cost recovery through water use charges, disregarding all other sources of taxation.

Farmers are not the only beneficiaries of irrigation infrastructure but also, the suppliers of various inputs that are incrementally used by the farmers for irrigated farming; the processors of farming products; and of course the consumers of food. In general it can be stated that for any irrigation development there will be direct beneficiaries (farmers) and indirect beneficiaries (consumers and other businesses in the food value chain). Therefore, investments in irrigation should be funded through a combination of water use charges and taxes. Presently available financing mechanisms are basically a combination of water use charges and different forms of direct and indirect taxes. Where loans are taken up for investment in irrigation, these can be paid back only through water use charges, betterment levies or taxes.

It is important to acknowledge that basic economic principles of supply and demand also apply to water used for irrigated food production. However, the provision of water should be treated as a quasi-collective good or service (in contrast to the purely private or purely collective good or service). Consequently the focus should be on the cost of the infrastructure and the cost of the service to supply water. In order to recover these costs, the focus should be on user charges, which are levied from direct beneficiaries and different types of taxes which are collected in the economic system.

On the other hand the financial costs consist of broadly defined fixed cost (capital and interest as well as maintenance and administration) and variable cost (operation and repairs). One of the challenges is to accurately quantify these costs for investment and operation and to find an acceptable basis for levying these costs from farmers in order to effectively manage demand and encourage conservation. As such there is need for establishing the cost of water supply services and setting appropriate levels of water use charges so as to recover at least some of the cost directly from irrigation farmers.

As the water use charges can only be set in relation to the direct and indirect taxes that are levied from farmers as beneficiaries of projects for investment in irrigation schemes, the focus should be directed at finding the balance between water use charges and different forms of taxes that are levied to cover the full cost of water supply. This is necessary because in cases where water use charges are set at full cost recovery levels, it will, inevitably, lead to double charging or taxation and may threaten the financial feasibility and economic viability of irrigation farming.

The appropriate changes to financing mechanisms for sustainable water use and food production are to recover O&M costs through water use charges, levied directly on irrigation farmers. These charges can be area based or volumetric or a combination thereof. For assessment of the extent to which capital costs are recovered, it is important to undertake a fiscal impact analysis. The different sources of revenue to cover fixed capital cost are:

(a) betterment levies; and/or

(b) direct and indirect taxes generated as a result of the irrigation development.

Different objectives are usually followed with implementation of water use charges as a policy instrument. These are mainly to (1) balance the budget; and (2) influence water user behaviour. In order to balance the budget, a comparison has to be made between capital and recurrent expenditure (-); loans (+) and instalments (-); user charges, betterment levies and taxes (+). To the extent that the budget does not balance, transfer payments from general taxes will be required. In the instance of a surplus on the budget, it implies that additional income is generated by the irrigation development. The key argument in influencing water user behaviour is that a signal is provided to farmers about what it costs to supply water.

This message is clearly brought across by both the fixed and variable component of the water user charge. Typically a large proportion (up to 80%) of the costs is levied on an area basis. The choice of a charging system, the structure and level of water use charges is again only possible if a calculation or an estimate has been made of tax revenue. In practice, this exercise is more complex, but therefore even more essential, where the operation of public irrigation schemes is transferred to water user associations (WUA) where it must be clearly specified which of the above expenditure and revenue items must be accounted for in the budget of the WUA.

The requirements for successful implementation of cost recovery are firstly, that these water policy objectives must be aligned to the development objectives in agriculture. Secondly, a balance has to be found between the policy objectives of efficiency (increasing the productive use of water and reducing water wastage with irrigation); equity (trade-offs between rural and urban, agricultural and industrial, small-scale and large-scale farming development); and sustainability (sufficient incentives for investment in farming and food production in response to market demands). It should be acknowledged that by its very nature, agriculture uses relative large volumes of water for relative low value production of raw materials in the food value chain. If the water use charges and taxes are set too high, farming will not be profitable and therefore not sustainable. This will typically be the case where full cost recovery is set as an objective while disregarding taxes as a source of revenue. Above all, the requirement for policy formulation on cost recovery is therefore transparency: Government should take a conscious decision and clearly state whether the objective with development of an irrigation scheme is to generate additional tax revenue or whether socio-economic development in rural areas is promoted with transfer payments or subsidies from the rest of the economy.

Irrigation is expected to remain the chief contributor to global food security while using fewer resources in a context of sustained demographic growth. In order to achieve household and national food security, attention should be given to the entire spectrum starting from small-scale subsistence farmers to large-scale commercial farming enterprises. Considering the impact of infrastructure development on various natural resources, improvement of efficiency and productivity of land and water should receive priority over expansion of irrigation.

The most effective approach to satisfy the requirements of applying water use charges as a policy instrument is a two-part charge: The fixed cost and the betterment levy are levied against the land while a volumetric charge is based on average variable cost for the full water allocation. Where practical consideration should be given to introducing tiered or block-rate charges to supply additional water above the official water allocation per ha or per farm. Finally, the key issues are clear public policy objectives by government; coherent water use charges and benefit taxes; and incentives for farmers to make productive use of irrigation water.

Challenges and Developments in Financing Irrigation and Drainage Sector

ICID News 2013 (Fourth Quarter) has provided a summary of the key outcomes of the Strategy Sub-theme on Policy, science and society interactions as part of First World Irrigation Forum (WIF1) held at Mardin, Turkey from 29 September to 5 October 2013 to our readers. In this edition, a brief outcome of the sub-theme on 'Challenges and developments in financing irrigation and drainage sector' is provided to our readers.

Background

Financing irrigation and drainage is really a broad issue, of which each main component requires a specific analysis regarding- investment, operation, maintenance, renewal, rehabilitation and modernization, ancillary services like training. Questions, and thus answers, differ for financing infrastructures and for paying for water service.

Collective irrigation infrastructures, like other large hydraulic systems, are generally part of land development, and as such depend upon national policies and development strategies, and collective projects require coordination, planning and financing. They are therefore usually financed by governments, acting in their own name or giving public institutions the responsibility for planning, design, construction and operation.

Potential for involving private sector in financing irrigation schemes through so called PPPs does exist, but investing is risky, and 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.

Identifying and recognizing multiple uses of water may be very helpful to mobilize the necessary funds for financing irrigation projects, at both construction and maintenance stage

Farmers are generally ready to pay for using water provided the fee is affordable. But this willingness to pay largely depends on the farmers' faith in the capacity of the service provider to provide the said service of the required quality and quantity.

Optimization of water service costs can be achieved through an adequate combination of public, private and end users respective skills and capacities One of the issues that need to be addressed is whether farmers are or are entitled to be remunerated for the ecosystem services they provide.

Challenges and Developments in Financing Irrigation and Drainage Sector

Financing for irrigation and drainage is essentially a part of sound agricultural water management and agricultural development generally, as both contribute to environmentally sustainable and equitable economic growth in developing

countries. Irrigation and drainage financing must be seen in a completely changed context, drawing lessons from the vast experience with past irrigation and drainage investments but now keeping farmers at the center stage as the clients.

Sources of growth in irrigation have been quite different. Early investment in water management in the 1970s was in dams. Dams have made a significant contribution to economic development with considerable benefits. With the improved agricultural practices including precision agriculture and use of technologies like drip and sprinkler irrigation systems, there exist tremendous opportunities to reign in water use with a razor sharp focus on water use efficiency and total productivity in agriculture.

Irrigation and drainage investments today must be seen in this wider context of vision that water saving and management uses multi-disciplinary, multi-sectorial approach. The ability to trade freely and predictability in food will critically influence domestic incentives for food and agriculture including investments in irrigation and drainage.

Biofuels have also increased the opportunity cost of land and water in developing countries, including the lands which were previously considered degraded and of little value.

In South Asia, the growth has been largely through ground water exploitation funded largely by farm households in the form of tube wells as supplemental irrigation to the public sector formal irrigation systems, whereas the growth in China has been mainly through the expansion of the formal irrigation system. Long gestation period of canal systems was one major driver for tube-well boom in command areas in South Asia. Another is energy subsidies. But the most important is the ability of tube wells to provide on-demand irrigation round the year.

What is interesting furthermore is that the lion's share of "private investments" , both in China and India, consists of farmer investments. Farmer investments have never been estimated systematically before, and indeed not even considered explicitly in the irrigation investments, as we do in this paper providing some estimates of farmer investments for these two giant countries.

FAO study estimates that nearly 80 percent of all capital formation in agriculture comes from farmers, and the kind of an enabling environment the government provides makes a huge difference to the incentive for the private sector including farmers to invest in agriculture including water management. Putting farmers at the centre of future irrigation investments and achieving results on water management on the ground in a sustainable way is the key factor in future investment decisions.

An important consensus that seems to emerge from irrigation experts is to modernize, not rehabilitate, the old irrigation systems. Therefore an important question coming forward is how to establish an appropriate enabling policy and institutional environment, including public –private partnerships, for irrigation modernization, given that private investments seem to be so closely, and not surprisingly, correlated with public investments.

Certainly future food and energy prices will influence the incentives to invest in irrigation and drainage sector. Yet, what form the irrigation development will take in the future—whether large or small dams, surface irrigation or tube wells, public or private investments - will influence future investment decisions and would thus vary greatly among countries depending on the nature of their water resources, political, institutional and legal systems and technological options, and not the least the performance of their irrigation system.

Outcomes

1. Financing for irrigation and drainage must be considered as part of sound agricultural water management and agricultural development, as both contribute to environmentally sustainable and equitable economic growth in developing countries.
2. Financing irrigation and drainage poses complex challenges of reconciling private profit with collective good of managing natural resources sustainably. This complexity calls for more sophisticated role for governments, communities as well as for a socially responsible private sector.
3. Investments in Irrigation and Drainage in the past have come from either Domestic or International Public and Private (including farmer investments), along with complementary investments from other allied sectors. It is hard to predict in what form the future investments would materialize. As such it is important to seek new approaches by keeping a flexible outlook.
4. While future food and energy prices will influence incentives to invest, these will also depend on the shape the irrigation will take in the future and will vary greatly among countries depending on the nature of their water resources, political, institutional and legal systems and technological options.
5. While creating a favorable climate for investments, it will also be necessary to develop a reliable data system for water resources and make the information readily available in public domain besides establishing a performance management culture in public irrigation systems.
6. It will also be necessary to raise Irrigation Service Fees (ISF) in order to ensure that the operating turn-over of an irrigation system is at least 10-12 percent of capital investment and at the same time it will be necessary

to link Operation and Maintenance budgets of irrigation systems to their Irrigation Service Fee collection performances.

7. Recognizing multiple uses and users, and a collective responsibility to ensure financial sustainability of the irrigation infrastructure, it is desirable to levy fees on direct as well as indirect beneficiaries to get more recovery of investment into irrigation and drainage schemes.

8. Establish and levy a 'conjunctive use' charge on groundwater irrigation within the command area (especially in Asia where groundwater use within command areas is rampant).

9. Provide system managers strong incentives to organize Water User Associations, enter in to service contracts with WUAs and allow WUAs to retain a portion of ISF collection for repair and maintenance of the distribution system.

10. A genuine attempt at hiving off some successful irrigation systems as autonomous Farmer Irrigation Companies is called for.

11. Beginning with these changes and intensifying them where they have already been underway, would attract more public and private funding, including farmer resources to water management and would improve prospects for sustainable and equitable use of water resources in agriculture.

A detailed version of the Summary Report of the ST-Finance is available at: http://www.icid.org/wif1_sumreport.pdf

Drought Early Warning

Avinash C Tyagi

Early warning system and drought management

In the past, droughts resultant disasters have been managed through impact assessment, response, recovery, and reconstruction activities to return the region or locality to its pre-disaster state. Preparedness, mitigation, and prediction/early warning actions have found very little attention. Because of this over-emphasis on crisis management, societies have moved from one disaster to another with increasing vulnerability and little reduction in risk.

As incidence of drought increases globally, greater attention needs to be directed to reducing risks associated with its occurrence through the introduction of planning to improve operational capabilities and mitigation measures that are aimed at reducing drought impacts.

Drought early warning systems essentially consist of the monitoring and drought forecasting. They form an essential component of an integrated approach to drought management.

Monitoring of the present situation based on various relevant parameters form the core of any early warning system. The monitoring system has to be based on certain indices that characterise the various aspects of impacts of the drought in the effected region. Due to the slow and creeping nature of drought hazard, it is important that a precise definition of drought – acceptable and useful to all users – is universally accepted by all stakeholders to avoid any confusion whether or not a drought exists and, if it does, its degree of severity.

In most situations, the existence of drought is recognized only when it gets reflected through its impacts on the ground leaving little or no time to mitigate its adverse impacts. A monitoring system when supported by a forecasting and prediction of hydro-climatic variables can be useful in warning the onset in advance, thereby providing sufficient time for implementation of the drought mitigation plans. The set-up for various aspects of drought monitoring, early warning, development of decision making tools, dissemination of information vary according to the administrative set up of each country.

A drought early warning system requires regular inputs from research institutions and close coordination between various local and national agencies and sharing of not only data and personnel but also resources, including the financial resources to fund such a multi-institutional activity. Very clear understanding of roles, responsibilities and commitments from various agencies involved, supported by rules and regulation in tune with the national legal and administrative set up is called for. The administrative set up to manage day to day functions should be suited to the operational requirements.

Meteorology respects no administrative boundaries. Due to the very nature of the meteorological elements that are to be monitored and predicted, early warning systems can benefit from global and regional cooperation. World Meteorological Organization provides such a platform for global and regional collaboration where countries share the required information and techniques. The regional collaboration is unfortunately not so forthcoming and special efforts have to be made to incorporate hydrological parameters in the early warning systems.

Drought early warning for water management

A reliable assessment of water availability and its outlook for the near and long term is valuable information in both dry and wet periods. During a drought, the value of this information increases. Hydrological drought early warning helps in meeting these challenging situations based on monitoring and prediction of meteorological and hydrological drought indices.

Hydrologic Drought Indices (HDI) based on hydrologic parameters form the basis of monitoring hydrologic conditions for water management. A hydrologic drought early warning system should ideally monitor and predict: meteorological information, soil moisture information, reservoir storage position, river flows, ground water levels, extent of wetlands and lakes, snow cover, and water temperatures.

The operational constraints in obtaining the required hydrological data for a given hydrologic unit for monitoring and prediction of hydrologic drought have to be kept in view while selecting HDI. The indices have to be based on more conveniently sized units which are nearly homogeneous hydrological regions. Homogeneous hydrologic units such as the command area of an irrigation project spread of an aquifer or a river basin may be hydrologically more appropriate in order to take emergency measures. These subdivisions may be useful in drought management since they may allow drought stages and mitigation and response options to be regionalized.

Hydrologic drought indices (HDI) for assessing the severity of droughts has to be different than that used for early warning purpose and depends on the purpose such as: reservoir operation and water allocation; Irrigation Management and scheduling; water supply for drinking water sources; and cooling water supplies etc.

Under drought situations the water storages have to be managed wisely. The phased response such as rationing during emergency situations, it is important to pre-assess the vulnerability of group of users and systems as the impacts of drought may vary significantly from one area to the next, depending on the sources and uses of water in the hydrologic unit and the degree of planning previously implemented.

Drought early warning and seasonal hydrologic predictions have the potential to improve agriculture water use efficiency with the irrigation authorities making use of the outcomes of the EWS and help explore the possibility of participating in these stakeholders' forum at the national level. Judicious irrigation water supply from multi-purpose reservoir under drought conditions can be crucial in managing drought situation and limit the adverse impacts on various economic activities. Reservoir operation supported by short term to long-term hydrological forecasts, combined with soil moisture monitoring of the command area, can play a crucial in irrigation scheduling and saving of precious water storage.

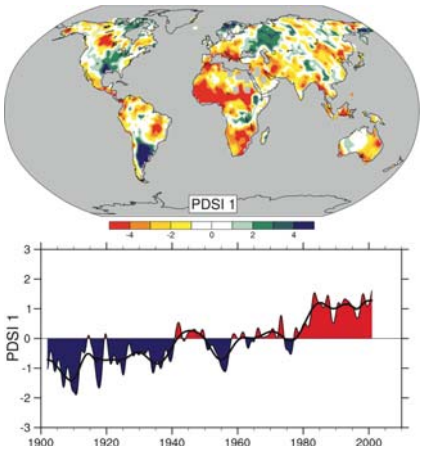
Reservoir operations under drought situation not only require monitoring but also prognostic information about stream flow potential in the coming season to develop proactive strategies such as restrictions and hedging. An operating policy that can effectively respond to developing drought situation should be based on observations of all the available hydrologic indicators. A decision has to be made as to what the optimal operating policy should be for the severity level identified based on the Early Warning System.

Challenges facing Early Warning Systems

Early warning systems for drought face numerous challenges. First, data and information required for monitoring various drought indices are collected by various states, national and local agencies in climate, water, environment and economic domains. Similarly, various institutions that have the potential to make use of the monitoring products and where decision making can benefit hail from many sectors, departments and administrative set ups. Decision making requires integration of monitoring information with seasonal forecasts, to provide decision makers with a comprehensive picture or representation of current conditions and future outlooks. Bringing all these stakeholders to share the real-time information, process them and make them available to various users requires close coordination between meteorological, hydrological, and agricultural services. Further efficient delivery systems must be developed to get information in the hands of decision makers in a timely manner.

First of all the ownership of early warning information should be clearly defined and the EWS information must be made accessible and deliver a clear, consistent message that is easy to interpret, so that decision makers can act on this information. Early warning information is most likely to be used if it is trusted. And it is most likely to be trusted if the decision makers have a stake in the system and really understand it.

Increasing world wide drought



Source: IPCC, 2007) Palmer Drought Severity Index (PDSI).

For most areas, drier (red and yellow) conditions have progressively increased over the century with a huge jump from 1880 to 1985. Droughts are more common for much of the world.

The greatest challenge facing many EWS is how to ensure that their information is taken seriously by decision makers and acted on to ensure a timely relief response. There are a number of ways of strengthening this link. Decision makers are always looking for more certain and quantitative information as they have the tendency to delay a response until there is hard evidence of a crisis, ignoring genuine early warning. To counter and dilute this factor a phased response could be promoted by the EWS.

Third, potential users of climate information must be educated on how that information can be applied to reduce the risks associated with extreme climatic events such as drought. Improved communication between the developers and users of products must be established so that products are better suited to user needs and users understand how this information can be applied in the decision process.

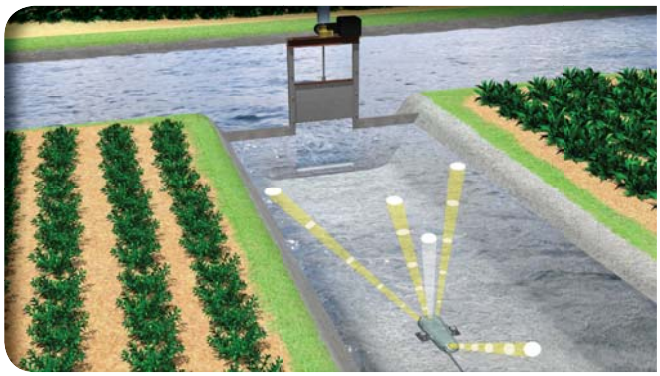
International Commission on Irrigation and Drainage (ICID) is working together with World Meteorological Organization (WMO) to encourage water managers and climate service providers in different regions and at national levels to collaborate towards establishing regional and national drought early warning systems to deal appropriately with drought hazards. First such attempt is being made in South Asia in collaboration with International Water Management Institute (IWMI) and Global Water Partnership (GWP).

[**Author:** *Secretary General, International Commission on Irrigation and Drainage (ICID)*]

IQ™

Pronunciation: /ˌī-ˈky{uuml}/
Function: n
Definition: [i - intelligent q - flow]

a: term used to express the superior intelligence in an acoustic Doppler measurement device;
b: a score on a standardized intelligence test determined by extraordinary data collection capabilities relative to the average performance of other flow meters.



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Mainstreaming Meghalaya via Environment plus Approach

Dr. Arvind Kumar

India Water Foundation (IWF) has been working with Environment-Plus approach for some time now and lays stress on social, environmental and governance aspects. Environment Plus approach is the one that results in general development thereby improving the well-being and social equity, while significantly reducing environmental risks and ecological scarcities. The social aspect includes availability of potable water for all, fair and equitable distribution of water and inclusive and gender-sensitive participation of all stakeholders. The environment approach emphasizes on sustainable use of water and other environment resources along with maintaining equilibrium between economic development, social needs and preservation of environment and ecosystems. Concurrently, it also lays emphasis on enhanced climate change and disaster resilience among all stakeholders.

The governance aspect of the IWF's Environment-Plus approach inter alia includes capacity building of all stakeholders in water and environment sectors at local and community levels, inter-sectoral convergence, basin management and inter-state and international cooperation. Apart from emphasizing on the urgency of Integrated Water Resource Management (IWRM), it also lays stress on water-energy-food nexus approach to ensure water security, energy security and food security. Governance aspect also includes: decentralization in water management, institutional and regulatory reforms, sustainable use and preservation of water resources; balancing different water needs and uses; and democratic participation and stakeholder coordination.

IWF has been working with government of Meghalaya State (India) since 2010 with the object to give this approach a practical shape. Meghalaya is endowed with bountiful water resources. However, due to the monsoon climatic patterns of Meghalaya with very high precipitation concentrated in a few months of the year and limited rains in other seasons, the spatial and temporal distribution of water is uneven. Hence, while the State is generally well-endowed with water resources periodic or local water scarcity and drought occurs.

Moreover, overabundance of water at other times or other locations can lead to floods, which damage crops, property, infrastructure and can lead to loss of human lives. Furthermore, climate change is influencing the hydrological systems and water availability with increasingly erratic and unpredictable rainfall patterns and increased frequency and magnitude of extreme events, such as droughts and heavy rains leading to floods.

IWF's cooperative role has been formalized into partnership and now the IWF is the knowledge partner of Meghalaya Basin Development Authority (MBDA), Government of Meghalaya (India), in the field of management of water resources in the State by virtue of a MoU signed between IWF and MBDA in August 2012.

Meghalaya Government launched its Integrated Basin Development and Livelihoods Promotion Programme (IBDLP) in April 2012 with some inputs from IWF, and IBDLP programme is designed around four pillars – Knowledge Management, Natural resource Management, Entrepreneurship Development and Good Governance and is being implemented in a mission mode through nine missions – Aquaculture Mission, Horticulture Mission, Livestock Mission, Sericulture Mission, Tourism Mission, Forestry and Plantation Crops Mission, Apiculture Mission, Energy Mission and Water Mission. Every mission is designed to leverage the comparative advantage that Meghalaya has in that sector and to generate livelihood opportunities for every household and to accelerate growth.

Most of the features of Environment plus approach have now been incorporated into the Meghalaya State Water Policy and adequate implementation of this policy is beginning to bear fruitful results in various socio-economic fields in Meghalaya. This would help Meghalaya's catapult to national mainstream.

IWF is working with the Government of Meghalaya to develop the adequate capacity for addressing the issues related to water and environment management in a sustainable manner through its Water-Plus and Environment-Plus approaches.

[Author: *President, India Water Foundation and Member, Meghalaya Water Council]*

India Water Foundation (IWF) is a New Delhi-based civil society engaged in generating awareness among the people about water conservation, Health Prevention activities and keeping water, particularly the national rivers free from pollution, promoting rainwater-harvesting and other water related issues.

IWF has joined ICID network as Direct Member and actively involved in our activities.

For more details please visit: http://www.indiawaterfoundation.org

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EDITOR

Madhu Mohanan
Program Officer
ICID, 48 Nyaya Marg
Chanakyapuri, New Delhi, India
Tel: +91-11-2611 6837/5679
E-mail: icid@icid.org