2013 | SECOND QUARTER

ICID NEWS

Managing Water for Sustainable Agriculture

MESSAGE FROM
THE PRESIDENT

Dear friends and members of ICID,

It is almost a year back that we met at Adelaide, Australia for the Irrigation Conference and 63rd IEC meetings. We will be meeting again after a little longer period of 15 months for the 1st World Irrigation Forum and the 64th IEC meeting this year at Mardin in Turkey. During the last one year, I could attend some international conferences/ workshops and visit National Committees of Canada, India, Italy, France, Turkey, USA, South Korea and Thailand.

National Committees are the real backbone of the Commission and their strength is ICID's strength. Recently, I accessed the websites of some National Committees and was very pleased to know that most of them have organized a variety and interesting activities. Some National Committees have brought out series of books in local language on technologies and experiences related to agricultural water management, history of irrigation and drainage development; while some others have organized conferences, workshops, and international training courses in collaboration with other international organizations. I am also pleased to see that some National Committees have signed the Memorandum of Understanding (MoU) with other National Committees for technical cooperation and exchange of visits of experts in each other's countries. This is a very welcome activity. I would also like to heartily welcome National Committees of Sri Lanka, Zambia, Zimbabwe and Malawi for reactivating their membership during this year.

I am also glad to apprise you that the new initiatives of ICID launched at the Adelaide meeting are progressing very well. We just have about four months to go from now to the 1st World Irrigation Forum (WIF). Many international organizations and top experts have agreed to participate and share their experiences during the event. The second meeting of the Steering Committee of the 1st WIF will be held in Ankara on 5th July. The Technical Committee is busy in reviewing and finalizing the papers submitted to the Forum. You will be kept updated about the developments through ICID website (www.icid.org) and the Forum website (http://www.worldirrigationforum.org/en/).

During 11-15 May, I attended the 49th Board of Governors meeting of the World Water Council and the Kick-off meeting of the 7th World Water Forum (WWF7) held at Daegu in South Korea (see picture). On this occasion, I met colleagues from the Korean National Committee (KCID) and was happy to know that the KCID has initiated various preparations towards hosting of the 22nd Congress on Irrigation and Drainage and the 65th IEC meeting next year.

I have also participated in the recently held 2nd Asia Pacific Water Summit held at Chiang Mai, Thailand. The Summit highlighted the issue of water, food and energy nexus. It was reiterated that water security is the base of food security and energy security. It was recognized that the irrigation infrastructure not only caters to stabilizing of food production but also has multiple purposes. The 'Chang Mai Declaration' has called Heads of State and Government 'to promote efficient use of water resources while taking into account basic human needs, in particular by improving irrigation systems' among others. To realize this, it is essential to increase irrigation water use efficiency and water productivity to cope with water shortage, food shortage, energy shortage, ecosystem degradation, and climate change. There is a need to evolve an appropriate policy and investment plan for rehabilitation or modernization of existing irrigation systems in each country. This issue provides a summary of the outcomes of the two workshops on the subject organized jointly by FAO and CNCID in March 2013. We need to go a long way in involving all stakeholders.

Best regards,

Yours truly

Gao Zhanyi

Dr. Gao Zhanyi
President of ICID

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INSIDE

ASSESSING THE ECO-EFFICIENCY OF PADDY RICE IN NORTH-EASTERN THAILAND USING LIFE CYCLE ANALYSIS

Rice feeds more than 3 billion people globally. Approximately 75% of the 150 million ha of rice harvested worldwide are irrigated. Rice farming provides a staple food and income to large number of small farmers and also diversity of ecosystem goods and services but at the same time impacts negatively on the environment. Rice production requires large quantity of resources, and contributes to pollution in all environmental compartments, including the atmosphere, due to formation of methane under flooded conditions. Dr. Sylvain Perret and Mrs. Kwansirinapa Thanawong at Asian Institute of Technology (AIT), Bangkok used Life cycle analysis (LCA) approach and economic-ecological efficiency indicators in assessing environmental impacts of rice cropping on global warming potential. A brief:

The rice-environment-poverty nexus

In Thailand, rice is grown on some 10 million ha of land and is the world's 6th largest rice producer and the largest exporter. Half of the rice production originates from the North-eastern region (Isaan), the poorest of the country. Most of its farming population consists of seasonal, subsistence rice growers who sell production surplus and rely on multiple livelihoods. Also, increasing scarcity of farm labour afflicts the farm operations. Rice is grown in Isaan mostly as low land rainfed and irrigated during the wet season. The rainfed rice although has low yields but produces high-quality, high-value varieties of fragrant rice.

Any attempt to reduce the environmental impact of rice production or to expand irrigated rice area should take into account the consequences with respect to economic performances such as changing yields or income, and labour requirements. In view of plans to extend irrigation in Isaan, there is a need to understand the comparative advantages of controlled irrigation vs. rainfed cropping (uncontrolled irrigation during the wet season) in both environmental and economic terms.

Irrigation expansion in the Isaan region can only be achieved through further exploitation of the Mekong and its wetlands, incurring potential destruction of ecosystems and harmful environmental impacts. Also, pesticide–related toxicity and eutrophication of surface waters are becoming major concerns.

This rice-environment-poverty nexus calls for improved sustainability of rice farms and for reduced environmental impacts and resource use of rice systems, while sustaining the yields and income of farmers and the country's position as a top producer and exporter.
A workable approach to sustainability at the farm level consists of evaluating whether producers are making efficient use of resources and minimising environmental impacts while achieving their economic objectives. Economic-ecological efficiency, known as eco-efficiency (EE), is suggested as an operational concept.

A study of rice eco-efficiency

The eco-efficiency of a product or service is represented by the ratio i.e. "Value / Environmental influence"; its analysis

requires indicators of both techno-economic and environmental performances. Life cycle analysis (LCA), an approach to assess environmental impacts, has recently emerged as a potential contributor to eco-efficiency analysis in agriculture.

LCA is a structured, systematic, standardised method for quantifying the emissions, resources consumed and environmental and health impacts that are associated with the production and use of goods and services. There are two key stages in LCA: the inventory (LCI) and the impact assessment (LCIA). LCI takes stock of all processes, emissions, resource consumptions, inputs and outputs related to the provision of a good or service. Such inventory is then converted into impact indicators, as per impact categories (LCIA). LCA takes into account different stages in a product's life, from the extraction of raw material, over production phases, up to farm gate in most agricultural applications.

In view of the prevailing situation, issues and prospects, this research aimed at assessing the eco-efficiency of rice cropping systems. It compared the advantages of rice production under controlled irrigation and rainfed conditions. Indicators of techno-economic performances were combined with environmental impact indicators based upon life cycle analysis, including energy and water use. Data were collected in 2010 at the farm level in 43 diverse rice cropping systems of Lam SieoYai Basin, according to 3 cropping systems, namely wet-season rain-fed (Rw), wet-season irrigation (Iw) and dry-season irrigation (Id) systems.

Wide-ranging techno-economic performances and environmental impacts were observed, while cropping practices were found to be homogeneous. Differentiation of systems originated mostly from differences in yield, which were mostly impacted by water supply. Yields varied from approximately 2.6 t/ha in Iw systems to 2.4 t/ha in Rw and 2.2 t/ha in Id systems. The results highlight the low performances of Id systems in all criteria. Id systems require irrigation, while the two other systems rely primarily on rainfall. Id systems require more energy and labour, due to increased water management needs. Overall, the productivity of most production factors was found to be higher in Rw and Iw systems. Emissions proved relatively similar across all systems, with the exception of CH_4, which was markedly lower in Rw systems due to specific water and organic residue management. Id systems systematically emitted more nitrates, phosphates and pesticides into water sources. Rw systems showed the lowest environmental impacts per ha and per kg of paddy rice produced. The average global warming potential (GWP) was 2.97 kg CO_2-eq per kg rice in Rw, 4.87 in Iw, and 5.55 in Id.

Table. Eco-efficiencies (net income per environmental impact) of rice cropping systems in North-east Thailand (2010) (Thai Baht per unit of environmental impact, median values)

Impact category	Unit	Rw	Iw	Id
Global Warming Potential	kg CO_2-eq	0.886	0.594	0.272
Eutrophication	kg PO_4-eq	32.883	36.569	15.254
Freshwater Eco-toxicity	kg 1,4-DB-eq	9.362	9.610	4.097
Water Use	m^3	0.995	1.081	0.456
Land Use	Ha	6,252	7,593	3,307
Energy Use	MJ	0.361	0.386	0.157

Eco-efficiency indicators were calculated as per impact category. Table shows that Rw and Iw systems were significantly more eco-efficient than Id systems in all impact categories. Rw significantly performs better on Global Warming Potential (GWP). Although drawn from one single year (2010) dataset, which was a favourable wet year, results highlight the overall similarity in sustainability of rainfed systems compared to irrigation in wet season. Conversely, irrigation in dry season results in high environmental impacts, poor techno-economic performances and low eco-efficiencies.

Key message

Comparing controlled (irrigation) and uncontrolled (rain-dependant) water supply in paddy rice production shows interesting results and marked differences. First, there are marked differences in practices, yields and environmental impacts across all systems at local level. Extension services and agricultural policies should recognize such diversity and avoid one-fits-all recommendations. Second, controlled irrigation during dry season shows the lowest yields, the highest costs and resources use, the highest environmental impacts. This calls into question, the government's plans to expand irrigation areas in the North-East of Thailand, while farmers tend to cultivate only during the wet season. Third, national policies on climate change mitigation should consider the need for change in water management in paddy fields, towards temporary drying periods, and the promotion of rainfed paddy rice when and where possible. Such system values carbon-equivalent emissions significantly higher than others, which paves the way for financial incentives to farmers who minimize climate change and environmental impacts with sound water management practices.

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FUTURE OF IRRIGATION MODERNIZATION AND STRENGTHENING REGIONAL CAPACITY FOR IRRIGATION REVITALIZATION

In Asia Pacific region due to transforming economies, the agriculture and irrigation sectors need to become more innovative, adaptive and forward-looking. In that context, capacities are to be continuously updated and performance of irrigation systems regularly assessed and adapted. The FAO and other international organizations have been advocating irrigation modernization in the Asia region, especially in the large-scale public irrigation systems by drawing a new roadmap into both existing systems improvement and new systems development.

Two regional workshops viz., "Irrigation revitalization in the Asia & Pacific region: Technical approach and future roadmaps" and "Strengthening regional capacity for irrigation revitalization and agriculture water governance: A capacity development agenda for Asia and Pacific" were held from 4 to 6 March 2013 at Nanjing, China. The workshops were jointly organized by the FAO and the Chinese National Committee on Irrigation and Drainage (CNCID). The workshop brought together about 60 representatives from 16 countries and representatives from international organizations. The following is a summary of the main outcomes of the workshops which were derived from the reports as prepared by Thierry Facon, Senior Water Management Officer of FAO and his Team.

The workshop on Future of Irrigation Modernization was inaugurated by Mr. Yan Guanyu, Deputy Director General, Department of Irrigation, Drainage and Rural Water Supply, China, Dr. Gao Zhyani, President, ICID, and Mr. Thierry Facon, Senior Officer, Regional Office for Asia and the Pacific, FAO

Irrigation Modernization

'Irrigation modernization is a process of technical and managerial upgrading (as opposed to mere rehabilitation) of irrigation schemes with the objective to improve resource utilization (labor, water, economics, environmental) and water delivery service to farms' (FAO, 1997). The Mapping System and Services for Canal Operation Techniques (MASSCOTE) has been used for developing modernization plans for implementation as part of investment projects and programmes and as a capacity development tool in China, India, Kyrgyzstan, Morocco, Pakistan, and Sri Lanka.

The objectives of the irrigation modernization workshop were to review the users experience on irrigation modernization, in particular the practical use of MASSCOTE tool in the region, and to propose improvements / redesign of the tools towards MASSCOTE 2.0 and planning the next steps; and strategize and discuss relevance of national guidelines for transforming the irrigation sector, including policy, strategy and investments. The workshops brought together about 60 participants from government departments, academic and research institutions from 16 countries - Australia, China, India, Indonesia, Iran, Kyrgyzstan, Malaysia, Nepal, Pakistan, Philippines, Sri Lanka, Tajikistan, Thailand, Turkey, Uzbekistan, and Vietnam; and representatives from international organizations such as IHE-Delft, IRRI, IWMI, ICARDA/ICBA, besides FAO and ICID.

Key outcomes

It was recognized that national ownership and a demand-driven approach are keys for the sustainability of MASSCOTE interventions. The workshop participants confirmed the relevance of a tool like MASSCOTE to support the irrigation modernization strategies. There is a considerable demand for MASSCOTE application in South East Asia, South Asia and Central Asia. A number of countries are planning to make the use of MASSCOTE mandatory. Meeting this demand implies to develop organizational and individual capacities for training on MASSCOTE while promoting an "accreditation process of organizations" and a "certification process for individuals" on MASSCOTE. These processes will contribute to achieve a critical number

of certified trainers with the appropriate set of knowledge, skills and attitude required for the task.

There was a call from users for simplified versions of MASSCOTE adapted to local characteristics but also for a complete and more practical version to address key issues of climate change adaptation, multiple uses in irrigation systems, drainage and salinity, modeling, economics with an increased focus on farm-level issues and an improved stakeholder consultation process, gender, legal issues, policy and stakeholder consultation processes among others. It was proposed to revisit the prevailing MASSCOTE and prepare a new version MASSCOTE 2.0 that will organize all the existing modules of its family and develop training materials and modules to support the application. It was also felt essential to link the system level to basins as river basin planning is the key to sustainable water resources management; and relevant policies and strategies happening at higher levels.

The workshop enabled to discuss a range of issues (including salinity and drainage, legal aspects and gender, climate change, groundwater, management, field level assessment, policy linkages, etc.) and agree on a number of related improvements and additions that could be made on MASSCOTE tools. The FAO was to start working immediately after the workshop and a proposal for MASSCOTE 2.0 should be available soon for piloting by interested partners.

There is a need to promote an enabling environment by developing national guidelines for irrigation modernization. The community of practice on irrigation modernization should gather a wide range of stakeholders dealing with irrigation, with adequate communication of technical insights to decision makers for the establishment of an enabling policy, legal and economical framework. FAO was invited to play the role of Secretariat as it has recognized technical leadership. ICID, the CGIAR, and UNESCO-IHE will be key partners and will contribute to thematic conversations as representing the "coalition of irrigation and drainage professionals". National level "communities" will enable feedback loops from the field.

More details on the MASSCOTTE methodology and case studies is available online at http://www.fao.org/nr/water/topics_irrig_masscote.html

Strengthening Regional Capacity for Irrigation Revitalization

As per the FAO, capacity development is the process whereby individuals, organizations and society as a whole unleash, strengthen, create, adapt, and maintain capacity over time. It is an endogenous process that involves not only technical aspects but also social, political aspects. The objectives of the workshop "Strengthening regional capacity for irrigation revitalization and agriculture water governance: A capacity development agenda for Asia and Pacific" were to assess capacity building needs, demands, review capacity offers and gaps to be filled to support the future revitalizing agenda on irrigation, define regional capacity building proposals for effective agriculture water governance, discuss a process for accreditation and criteria's for certification of reference centers, and draw a joint roadmap to answer to capacity building requirements for implementing effectively the irrigation revitalization strategy. The key outcomes of the workshop were as follows:

The irrigation profession is in a sorry state. In fact, there is no profession dealing with small-scale agriculture water management. Significant efforts should be put in professionalization for the whole spectrum from small-scale to large-scale irrigation systems, attracting and retaining professionals in agriculture water management but also in other fields (computing, automation, social, environmental, etc.) and outsourcing capacities. In particular there are a number of gaps including service oriented management, irrigation modernization, water accounting and auditing.

The sector needs to modernize the way it looks at water management in agriculture as much as it needs to modernize the systems. There is a need for "capacity development for a wide range of stakeholders at all levels" from decision makers to farmer level. To achieve this, there is a need for tailored training packages, awareness raising activities, dialogues, and exchange within countries and across countries.

There is also the need for "quality" services in assessing and planning modernization systematically. A certification and accreditation process on irrigation modernization will support this effort. Specific standards and requirements have to be defined for the different tools (i.e. MASSCOTE, AQUACROP, CROPWAT, water audits, water accounting, etc.). Attracting the talent required to boost its performance will require an ambitious and attractive project but also much better incentives and rewards.

The FAO is also in the process of establishing Asia/ pacific network of centers of excellence and knowledge center in interested countries to strengthen irrigation modernization and improved agriculture water management. The Nanjing workshops adopted a vision and road map for the continuous development of MASSCOTE as a collaborative enterprise following a web-based, open-source model inspired by eWater Source. There were suggestions for developing modalities of governance, the criteria's and process for accreditations and certification of those centers.

In the Asia region, six national institutions have confirmed that they are ready, with the support of their respective governments to take a leadership role in irrigation modernization and are candidates to become accredited as FAO Irrigation Modernization Reference Centers, contributing to the development of MASSCOTE in specific areas of expertise, developing simplified and locally adapted versions of MASSCOTE, accredited to provide capacity development and advisory services in MASSCOTE locally but also throughout the region, as well as a range of other FAO water tools and methodologies, and linking to local national programs, capacity development systems and managing local communities of practice. Any organization may apply to be part of the network of knowledge centers with the recognition of all, or an identifiable part, of its knowledge offer for designation to support capacity development for strengthening of agriculture water management and its governance. The FAO and ICID are exploring the possibility of providing accreditation to the already established two ICID-IRPID Centers at Beijing and Tehran. FAO will be organizing a side event on "Collaborative Centers" at the 1st World Irrigation Forum to be held at Mardin, Turkey in October 2013.

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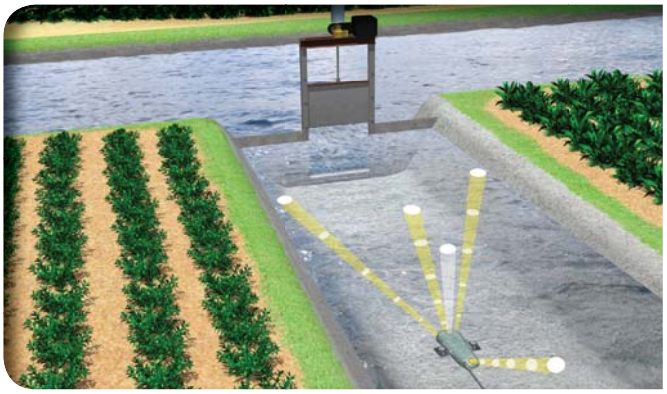
Function: n
Definition: [i - intelligent q - flow]

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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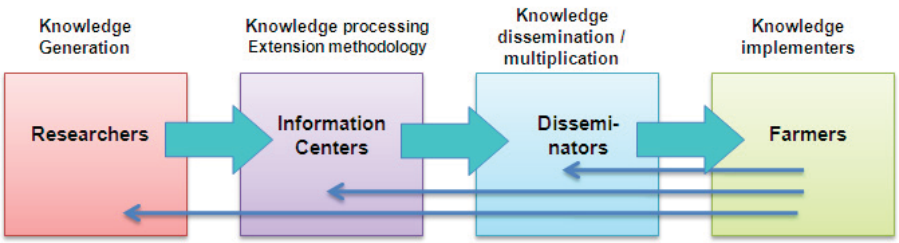
WATER PRODUCTIVITY IMPROVEMENT AT FIELD LEVEL: EXPERIENCE FROM CENTRAL ASIA

With the growing shortage of water for agriculture, coupled with lack of scientific management of the irrigation water both at off-farm and on-farm levels is one of the major concerns in many developing/ emerging countries. In Central Asian countries, after collapse of Soviet Union, there was an adverse impact on irrigated agriculture. In most countries, irrigated area declined drastically. Dr. Shukhrat Mukhamedjanov of Scientific Information Centre of the Interstate Commission for Water Coordination (SIC–ICWC), Uzbekistan provides a brief as how an improved water management at field level in three countries of Fergana Valley viz., Kyrgyzstan, Uzbekistan and Tajikistan could lead to improvement of water productivity.

After reorganization of the agricultural and water sectors in Kyrgyzstan, Uzbekistan and Tajikistan of the Fergana Valley in 1991, these countries have faced range of problems like lack of realistic water use plans, irrigation schedules for each farm, effective water and land management mechanism, water accounting system at farm level, etc. With the funding support from the Swiss Agency for Development and Cooperation (SADC), a Water Productivity Improvement at Plot Level (WPI-PL) project was implemented in these three republics during 2009 to 2012. For the first time, the WPI-PL project adopted a new vision and a strategy for project implementation. All project tasks were performed by the local partner organizations whose activities correspond to the three main areas of the project viz., scientific organization, information centers, and advisory services and having experience in the agriculture and water sector and in dissemination of knowledge to farmers, besides adequate technical and organizational capacity (see Figure). The SIC–ICWC and IWMI were responsible for overall coordination of the project.

Kyrgyzstan has small farms (<1 ha) and so the water is supplied to the group of farms belonging to the command of an outlet. The water is measured at the outlet point and water accounting for each farm is done based on the number of furrows irrigated. The outlet leader, who is selected from farmers, is re-sponsible for water distribution and computation of water charges to be paid by each farmer. He is trained in water measurement and water distribution among farms.

In **Uzbekistan**, the farms are of large size (>50 ha). The water management is vested with Hydro-technician and Agronomists of the Water User Association (WUA) in close consultation with farmers. The Hydro-technician and Agronomist decide the schedule of irrigation water distribution for farms. A flow measuring devices for water accounting is installed at the head of each farm. During the growing period, they monitor crop water requirement and irrigation schedule and provide feedback and information re-lated to irrigation rotation to WUAs. Demonstration of water saving technologies like use of drip



irrigation system for horticultural crops was also organized.

In **Tajikistan**, there are dekhkan farms (midsized peasant farms) having larger area (50-100 ha). The dekhkan farm is divided into small fields between families. The farmers select a person to manage all irrigated lands within the dekhkan farm. Farmers receive irrigation water from WUA or from Farmers Association. In case of Tajikistan, the same approach as in Uzbekistan was proposed, where water management and water use are implemented by two key specialists - Agronomist and Hydro-technician.

The project created a water accounting system for each dekhkan farm, which became the basis for equit-able water distribution and use. The water accounting system enabled charging of water on volumetric basis. Due to application of project recommendations, farmers could not only able to maintain the current productivity (0.3-0.4 kg/m^3), but also improved it further (0.8–0.9 kg/m^3).

The three countries have also experiencing climate change impacts on crop growth. The last decade was characterized with dramatic interchange of damp climate with low temperature and dry years with high temperature. It is therefore of importance to develop a system of efficient water use and capacity building at user's level. Based on the project experience, it was decided to equip all farms within the pilot WUAs with water measuring devices. The project led the way towards an efficient system of water management and water distribution among farms.

Updates

WORLD IRRIGATION FORUM

29 September – 5 October 2013, Mardin, Turkey

ICID is bringing together representatives of all stakeholders involved in irrigation of all types and at all scales under the umbrella of World Irrigation Forum (WIF), an initiative to propel irrigation and drainage to the limelight of policy and decision makers of the world.

The WIF is organized in cooperation with the host Turkish National Committee on Irrigation and Drainage (TUCID) and in partnership with FAO, IWMI, GWP, ADB, IFPRI, IFAD, ICARDA, ICRISAT, Arab Water Council, WWC, World Bank, WMO, UNESCO-IHE, Institute for Water Education, etc.

The main theme of the first WIF is "Irrigation and drainage in a changing world: Challenges and opportunities for global food security" and three sub-themes: (1) Policy, Science and Society Interactions, (2) Challenges and Developments in Financing Irrigation and Drainage Sector, and (3) Integrated Water Management Approaches for Sustainable Food Production. Oral and poster presentations as well as Short Communications will be presented in numerous plenary and parallel sessions.

Besides the above, there will be three international workshops addressing the themes such as 'Water Wisdom and Sustainability', 'Developing Management Strategies for Coping with Drought and Water Scarcity' and 'Management of Water, Crops and Soils under Climate Change'.

The opening ceremony will be studded with a galaxy of Ministers from developing, developed and least developed countries together with international keynote speakers. Delegates will have opportunity to listen to eminent experts in the Water and Food sectors across the world during the plenary session.

Side Events on "Climate services to optimize irrigation use and improve farmer management in agriculture" by WMO, "Challenges and opportunities for global food security: Inter-generational knowledge transfer in the Agriculture Water Management sector" by IFAD, "Participatory Irrigation Management" by JNC-ICID, "Use of remote sensing and GIS tools in the irrigation commands to assist planning and management" by IWMI, "Investment in agricultural water management in Africa", "Promoting sustainable water resource management in the Mesopotamia" and "Collaborative centres" by FAO are the key events not to be missed by irrigation enthusiasts around the world. Organization of Special Sessions, Panel Discussion, Film screening, Have Your Say and some Training activities will make the conference proceedings rich and rewarding.

Another first of its kind is the presentation of the maiden 'World Irrigation and Drainage Prize' to the winning person or institution adjudged by an international jury. An exhibition of equipments, tools, and technology in irrigation and drainage sectors will be held in conjunction with the Forum.

The 'Early Bird" registration for the WIF is available until 1 July 2013. For more information about the programme, registration, accommodation, technical tours, please visit the Forum website: http://www.worldirrigationforum.org/en/. Or contact Turkish National Committee on Irrigation and Drainage (TUCID), Ankara, Turkey at <icid2013@dsi.gov.tr> or <icid@icid.org>

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