ICID NEWS
Managing Water for Sustainable Agriculture
2012 | FOURTH QUARTER

Message from the President

Dear friends and members of ICID,

The time flies so quickly, and it is approaching the end of this year when I write this message. For ICID this is a very special year with water and food security as the theme of World Water Day and for many other key water events around the world.

These events discussed and highlighted the importance of water and water management for food production and created an awareness of various challenges to achieve food security and need to revitalize and improve irrigation and drainage infrastructure and services.

This year ICID has played an important role in many global and regional events and endeavored to identify the underlying problems and consequent challenges, seek understanding and solutions, and promote cooperation and development. ICID and many National Committees have actively organized related conferences and technical visits. I am glad to know about many workshops and activities organized by our National Committees and the progress on cooperation among National Committees. China Training Centre on Irrigation and Drainage organized an 'International Advanced Workshop and Training on Irrigation and Drainage' in Beijing in September 2012.

I am extremely glad for successfully organizing the thematic priority 2.2 "Contribute to food security by optimal use of water" of the 6th World Water Forum together with FAO. Nine major solutions and targets were identified and presented under the thematic priority 2.2. This year the 63rd IEC meeting of ICID was hosted by the IAL/Australian National Committee, and the 11th International Drainage Workshop was hosted by the Egyptian National Committee, and ICID Water for Food Sub-forum was hosted during the 8th Yellow River Forum.

This year ICID embarked upon launch of several historic decisions, such as admission of individuals, institutions and companies as direct members, organization of World Irrigation Forum, etc. This was made possible with your active support. The preparation of the 1st World Irrigation Forum (WIF) is in full swing with a great support from host National Committee (TUCID) and DSI. The Organizing and Technical Committees have been established. The theme and sub themes of the 1st WIF have also been identified and developed and a "Call for Ppapers" has also been circulated to National Committees and International Organizations. The objectives of the first WIF are:

(a) support multi-disciplinary discussions towards the solution to water management in agriculture,

(b) exchange latest irrigation and drainage policies, innovations and technologies,

(c) develop liaison, collaboration among various national, inter-national institutions, organizations and private sector working for irrigated agriculture, and

(d) explore and formulate concrete inter-disciplinary proposals and advocate political commitments.

I encourage you all to visit ICID website for getting updated information in time and contribute papers. I am confident that with your active involvement and support we will have a great and successful WIF.

This year ICID could strengthen/ reinforce the cooperation with other international organization. ICID members actively participated in various conferences and other events organized by WWC, FAO, ADB, IWMI, IFAD, United Nations, UN-Water, SIWI, UNESCO and other organizations and institutions, such as 6th WWF, FAO workshop on 'Revitalizing Irrigation and Agricultural Water Governance in Asia Pacific',

ADB's first 'Asian Irrigation Forum', UNESCO-IHE Board of Governors meeting, UN Rio+20, IFAD's 35th Session of Governing Board Meeting, World Water Week, India Water Week, The 5th McGill Conference on Global Food Security, 17th UN-Water Meeting, 5th International Yellow River Forum, 6th General Assembly of WWC, etc. In the preparatory process of the 1st WIF, we have got active support and involvement from FAO, IWMI, GWP, ADB, AWC, UNESCO-IHE, the World Bank and IFPRI, etc.

Finally, I am very glad to inform you that ICID was elected as the member of Board of Governors of World Water Council during its 6th General Assembly held in Marseille from November 18-19, 2012. WWC is working on developing a strategic vision for the future of water. ICID will closely work together with international water related community to promote sustainable water management and irrigated agriculture towards food security and poverty alleviation.

Yours truly

Gao Zhanyi

Dr. Gao Zhanyi
President of ICID

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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.

IN THIS ISSUE

Challenges of Irrigation Development in Brazil

L. N. Rodrigues, Embrapa Cerrados, Brazil, and L. C. Tollefson, Canada, Vice President, ICID

Land, Water and Climate

The Brazilian agribusiness sector is one of the most dynamic in the world. Significant production and productivity gains have been made over the last two decades making it one of the top food suppliers for the world. Agribusiness in Brazil is responsible for 33% of the GDP, 42% of the exports and 37% of the jobs.

Brazilian agriculture is exposed to wide climatic variations ranging from severe drought to heavy rains. Irrigation therefore has a significant role in the assured crop production. Due to its large size and varied topography, the climate of Brazil has a wide range of weather conditions, i.e. tropical, subtropical and semi-arid. Precipitation levels vary widely however, most of Brazil has moderate rainfallbetween 1,000 and 1,500 mm per year and two well defined seasons. Climate is just one of many challenges that Brazil faces as it attempts to expand and modernize its agricultural system

FURROW IRRIGATION MANAGED BY SMALL FARMER IN AN AREA IN THE SAVANNAS

Brazil is capable of increasing its agricultural production without jeopardizing the environment. It has about 12% of the planet's available water resources and a potential irrigated area of 30 million hectares. This includes only areas where irrigation can be sustainably developed and excludes the areas of high ecological value in the northern region. In the savanna areas, which occupy 24% of Brazil´s territory, the potential for irrigation has expanded substantially in recent years, following recent advances in soil management and irrigation techniques applicable in that region.

Irrigated Agriculture

In Brazil, withdrawal of freshwater for agriculture is 61%, 18% for industry, and 21% for municipal and domestic uses. The irrigated area in Brazil is currently 5 million hectares (about 9.8% of the total cropped area) and is responsible for 16% of the total agricultural production and 35%of agriculture income. Irrigation in Brazil is however, somewhat inefficient, compared to potential levels of efficiency that could be achieved.

Irrigated agriculture in Brazil is divided into public and private schemes. Public irrigation systems depend on water supplies that have been developed using Government funds. Private schemes have been developed by individuals or companies. It consists of many forms of irrigation ranging from small to large-scale, and from simple to highly sophisticated irrigation. There has been a great diversity of performance between the public and private irrigation sectors. Public irrigation has generally tended to progress slowly and fall short of performance expectations while private irrigation, especially in recent years, has expanded more rapidly providing higher profits.

Modern Irrigation Technology

Currently, in Brazil share of area coverage by different irrigation methods/systems is - 19% center pivot, 30% conventional sprinkler, 10% localized; 11% furrow; 24% flood and 6% others. Use of irrigation techniques differs within regions; for example in the south, rice paddies represent more than 90% of agriculture and use flood irrigation.Modern irrigation methods, which often have higher water use efficiency and require less labor are preferred by large farmers in the Cerrados for crops such as wheat, soybean, maize, and cotton and by the producers of vegetables and fruits near the metropolitan areas in the northeast. Due to the water scarcity in the northeast there is a large increase in the use of micro-irrigation equipped area. In recent years, surface irrigation area has decreased and sprinkler irrigation for grain production and micro-irrigation for fruit and vegetables has increased. Water use efficiency is estimated at 40-65% for surface, 60-85% for sprinkler and 78-97% for micro-irrigation methods.

Competing Water Demand

The inefficiency of irrigation has caused Brazilian society at times to question the importance of irrigation. The increase in competition for the use of water among several sectors of society implies the need to use the water resources in a more efficient way to guarantee the sustainability of production in different sectors. In some regions of Brazil, especially those where there has been excessive and little organized growth of irrigated agriculture, there are already conflicts for the use of water, which are associated with an unequal distribution of this resource.

In the São Francisco River Basin, for example, studies indicate potential conflicts in the use of water, with the main players being energy generation and agriculture. In the Verde Grande river basin, an important tributary of the São Francisco River, the demand for water for irrigation corresponds to 88% of the total demand for water in the region. In the Paraiba do Sul basin there have been reports of several conflicts. These and other conflicts which have taken place in Brazil, indicate the necessity to organize the use of water, through the definition of protocols which can be realistically obeyed by the water users.

Irrigation Management

The range of crops grown under irrigated conditions is diverse (rice, corn, soybean, regular

bean, orange, etc.) and varies from region to region. Irrigated sugarcane is particularly important in the Cerrados region. It has been projected that during the next 10 years, both sugarcane and its processing industry will demand 423m3/s of water representing 49%of the current total discharge used by irrigation in Brazil. This fact demonstrates the importance of good irrigation management and analyzing irrigation in the context of the watershed carefully watching other users, like energy production. The development of agro-energy and irrigation are not only water intensive, but also strategic for the agriculture sector and for Brazil, warranting adequate planning with respect to land and water allocation.

In the recent seminar relating to the state of the art of irrigated agriculture in Brazil, the participants indicated irrigation management as the main topic for research, while the capacity building was the main factor for the development of irrigation. Agricultural research is carried out at the national level by the Brazilian Agricultural Research Company (EMBRAPA). The Company has a number of research and experimental stations throughout Brazil, many of which are involved in irrigation related activities. In order to work more on these emerging issues, the Nucleus of Reference and Innovation in Irrigation and Water Resources (NURII) was launched. NURII was formed with the partnership between Embrapa, the National Water Agency, the UNESCO-HIDROEX Foundation and the Secretariat the State of Minas Gerais for Science, Technology and Higher Education. The objectives of NURII focus on four pillars viz., information, capacity-building, research, and innovation. Its creation emanated from the need not only of governmental institutions but also of agricultural producers to have a focal point and with the specific objectives: (i) to concentrate and filter information for its transfer and training, (ii) to define and propose priorities for research, (iii) to integrate results,(iv) to consolidate protocols for certification with respect to adequate use of water and to improve grant criteria, and (v) to identify needs with respect to the development of equipments and instruments.

Study projections indicate that irrigation in Brazil, even in the most pessimistic scenario, will continue to increase. It is important, however, that irrigation be managed in a sustainable manner. In coming times water conflicts are likely to be seen in several places. Water management strategies therefore must be implemented and a more integrated management adopted to avoid water conflict expansion and a decreasing livelihood in rural communities.

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CENTER PIVOT IRRIGATING REGULAR BEANS PLANTED IN MINIMUM TILLAGE

COFFEE TREES BEING IRRIGATED BY CENTER PIVOTS

Growing Rice with Center Pivots

Messrs Werner and Herbert Arns from Brazil have jointly received the ICID WatSave Technology Award 2007 for their work on water savings in growing rice using center pivot sprinkler system instead of the traditional surface irrigation, where the fields are flooded with water over the growing season. They have succeeded in reducing irrigation water use by over 50%, besides increase in yields, crop rotation, minimum tillage, and overall reduction in the rice production cost. For further details at <http://www.icid.org/nl2007_4.pdf>

Agriculture Drainage: Success Story of Egypt

Dr. Ashraf El Sayed Ismail, Deputy Director, Drainage Research Institute, National Water Research Center, Egypt

ENHANCING WATER QUALITY OF DRAINAGE WATER USING A WEIR

Introduction

Drainage of agricultural lands has proven to be a worthy investment in both irrigated and rainfed agriculture around the world. The functions of the drainage system are not limited to safeguard for agriculture production but also include mitigation and control of soil erosion, waterlogging, soil salinity, salt water intrusion, floods, damage to infrastructure and community properties, health risk and protection of archaeological sites. Salinization affects about 20-30 million ha of the world's irrigated land. Of the 1500 million ha of cropped lands of the world, only about 14% is provided by some form of drainage. Of the 300 million ha of area equipped for irrigation, about 20% has been equipped with drainage. The total area needing artificial drainage may be estimated as 300 million ha mainly in the arid and tropical humid zones of the developing countries (Nijland et al 2005). With the current estimated drainage improvement programs globally less than 0.5 million ha are covered annually, which is inadequate to keep pace with the current growth of drainage affected areas. This article provides an overview drainage development, present issues and challenges for research in Egypt.

Drainage in Egypt

In Egypt, drainage system was introduced at the end of the 19th century when perennial irrigation was introduced. Implementation of modern drainage systems was initiated in the sixties and reached its full thrust by the beginning of the seventies. The target was to cover all the irrigated lands of the country with effective drainage systems consisting of subsurface field drains, main open drains and drainage pumping stations. Egyptian Public Authority for Drainage Project (EPADP) was created in 1973 by Presidential Decree No.158. It is vested with all the necessary power over the financial, administrative and technical aspects of implementation, operation and maintenance of drainage systems. Egypt was pioneering in applying cost recovery to recover the investment costs of the subsurface drainage systems. Drainage objectives are changing from the sole objective of increasing productivity to the multiple objectives of increasing agricultural production; drainage water reuse for irrigation and fish-farming; domestic water disposal; and environmental management.

About 5.8 million feddans (2.4 mha) were provided with pipe drains till the end of March 2012 with a total costs of 3.3 billion Egyptian pounds (US$ 550 million), while the target area is 6.4 million feddans (2.7 mha). At the same time about 8 million feddans (3.4 mha) are provided with open drains. The World Bank has been the main financing agency supporting drainage projects in Egypt since 1970. The techniques and technologies used in the drainage practices were continuously developed on the basis of the latest advances in the world and were adopted to suit the local conditions. The EPADP not only implements new projects, but also undertakes rehabilitation of old drainage networks, which are 25-30 years old and are no longer functional. The Authority is also working on making standards to determine the need for

rehabilitation with annual rehabilitation rate for about 75,000 feddan (31,500 ha). The target area to be rehabilitated by the year 2012 is 1.2 million feddans (0.5 mha).

Another development of land drainage in Egypt by the end of the century is the introduction of synthetic envelope materials as a more effective alternative to the natural granular materials. Plastic tubes are rewrapped with synthetic envelopes at the factory. Laser controlled machines are used to improve the quality of drain depth and grade. Achieving this goal takes more than just introducing technology and therefore there is a continuous effort to improve the quality of work (Abdel Dayem, 2004).

Future Research Agenda

The Drainage Research Institute (DRI) of National Water Research Center was created to carry applied research on physical and hydrological aspects of drainage; optimal design criteria, material, and machinery for drainage system construction and installation; and socio-economic and environmental impacts of installed systems. DRI has researched introduction of new construction materials, site investigation methods, design criteria, new subsurface drainage systems (modified system), and solution to drainage in problematic areas and soils, maintenance and rehabilitation criteria, and adoption of new technology in installation, inspection and maintenance. Further works and research agenda related to drainage would include issues and measures to meet landscape interventions and environmental challenges such as:

- Review design criteria considering maximizing net economic yield of crops, contributing to irrigation water saving and minimizing the pollutant loads,
- Testing and selecting suitable drain envelope for protecting drain pipes especially in calcareous soils,
- Review drainage design criteria for the new reclaimed areas especially in calcareous soils,
- Review and investigate the application of modified and control drainage, and
- Assess the idea of association of drainage stakeholders.

Agricultural drainage is one of the core activity areas of ICID and a Working Group on Drainage (WG-DRG) has been functional in this area since three decades. ICID, under the overall guidance of WG-DRG has been organizing a series of International Drainage Workshops (IDWs) since 1978. The 11th International Drainage Workshop on "Agricultural Drainage Needs and Future Priorities" in the series was organized by Egyptian National Committee (ENCID) in cooperation with National Water Research Center (NWRC), and the Egyptian Public Authority on Drainage Projects (EPADP) in Cairo from 23-27 September 2012. Summary and outcome of the 11th IDW is available at <http://www.icid.org:8080/summary_11idw.pdf>.

LAYING OF A MAIN COLLECTOR IN UPPER EGYPT

Financial Challenges

The present model for financing the subsurface drainage projects entails additional financial burden to the Government. It is recommended to develop a new model so that a farmer can get loan directly from banks while the Drainage Authority can handle only planning, design and supervise construction activities.

The Ministry of Water Resources and Irrigation (MWRI) conducts a yearly maintenance program for irrigation and drainage systems to sustain and improve the hydraulic performance and conveyance efficiency of the system. This requires remodeling and dredging of both irrigation and drainage channels through yearly maintenance plan. The MWRI also takes care of the disposal of dredged material. The dredged material is used for land filling in irrigation improvement and bank stability projects. The dredged material could be a valuable resource if recycled to meet the demand of filling material for some other projects, leading to reduction in cost of the maintenance program for drainage systems.

The life expectancy of the covered drainage system is limited to 20 years. Expanding the life time of the system would remarkably reduce the overall cost and improve the economic feasibility. There is a potential to increase the life expectancy up to 40 years through improving the pipe material (polypropylene), improving envelope and filter material and better maintenance program.

Discharge of industrial and domestic effluent, which includes high suspended matter into surface drains would lead to high sedimentation rate accentuating the need for remodelling the drain cross section more frequently. Monthly charges should be paid as part of the license permission for any effluents discharging into the surface drain. This might contribute in improvement of the drainage system hydraulic performance, the water front of the drain and finally in improving catchment landscape.

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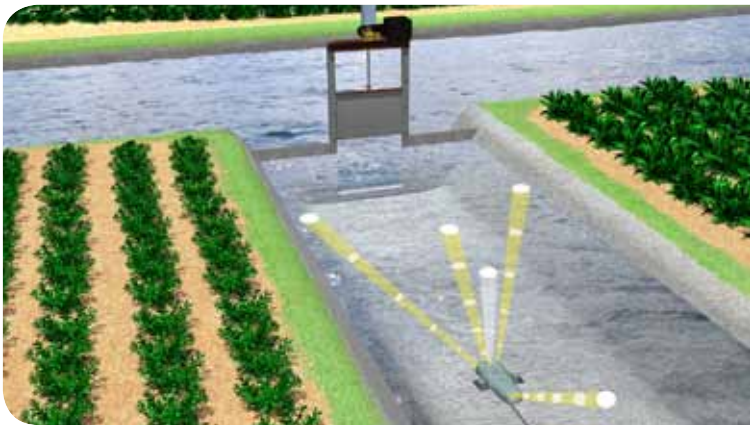
IQ™

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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DujiAngyan Irrigation System: A Heritage of Water Wisdom

Avinash C. Tyagi, Secretary General, ICID

Among the cultural treasures of the world, there is a resplendent pearl – the well-known ancient hydraulic project Dujiangyan Irrigation System. It is famed for its history, civilization and fantastic view and has served as a cradle of river management.

Dujiangyan Irrigation System located on the Minjiang River in the northwest of Dujiangyan City. It was built over 2,200 years ago around 250 B.C. under the direction of Li Bing, the Governor of the Shu Prefecture of the Qin State.

The Minjiang River running across the vast Chengdu Plain,in the ancient times, used to cause devastation along its course. Li Bing had a channel cut through Mount Yulei in the west of the city to divert the river water through canals and irrigate the Chengdu Plains, which made it a "Land of Abundance" with a bumper harvest every year in-spite of recurring droughts and floods in the region. The manmade structure has withstood the test of the time for over two thousand years and has sustainably brought great benefits to the agricultural production through irrigation which has expanded gradually from 126,000 hectares to nearly 660,000 hectares.

The design of the diversion structure is aligned to the nature and makes use of the river morphological characteristics to its full advantage.In the middle of the Minjiang River, a dyke was built to divide the river into two parts: the inner river and the outer river. In order to control the flood and charge the silt, two spillways were built at the end of water-dividing dyke.

The dyke diverts the water of the Minjiang River scientifically and rationally, 40% of which flows into the outer river while 60% remains in the inner river during the flood season, and vice versa in dry season. Besides, 90% of the silt is carried away by the outer river. The Feishayan Spillway discharges flood and silt from the inner river to the outer river. Working in harmony with one another, the three project components constitute a complete and hydraulically efficient irrigation and drainage network, which works automatically to a remarkable degree.

During the long history of the Dujiangyan Irrigation System, a number of effective experiences have evolved such as "Dredging the sand deeper and building the dam lower", "Taking away the capes where the river curves, and digging the middle of the riverbed deep where the river does not curve".These experiences have helped the world to understand the nature and evolve the morphological principles almost two millennia later.

ICID Scholarship to Young Professionals for E-Learning Program of UNESCO-IHE

Effective operation, maintenance and management of irrigation systems, by adopting a user-centered and user-driven approach, also known as Service Oriented Management of Irrigation Systems (SOMIS), is key to the sustainable agriculture water management. UNESCO-IHE offers the SOMIS online course in full distance learning mode spanning four months with a workload of 140 hours (8 hours a week on average). The course is sub-divided into 8 subjects and a paper assignment.

ICID is happy to announce scholarship to two Young Professionals to participate in this e-Learning Program being organized by UNESCO-IHE from 01 Mar 2013 to 05 Jul 2013. The course is designed for mid-level irrigation professionals and water managers who are engaged or aspire to engage into sustainable, service-oriented, and participatory management of irrigation systems. Young Professionals, below the age of forty years from developing countries and countries in transition are advised to apply online before **01st February 2013.**

Further details of the course and the on line form is available at http://www.unesco-ihe.org/Education/Non-degree-Programmes/Online-courses/Service-Oriented-Management-for-Irrigation-Systems

After filling the form on-line, UNESCO-IHE will send a notification by email within 10 working days stating whether or not the application has been accepted. Upon receiving the notification of acceptance of the application from UNESCO-IHE, applicants should send a copy of the notification to ICID Central Office <icid@icid.org> through the Chairman of the National Committee of ICID in his/her home country. The applicants will be intimated of the award of scholarship by ICID Central Office.

FIRST WORLD IRRIGATION FORUM

Call for Papers

29 September to 3 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) scheduled to be held from 29 September to 1 October 2013 at Mardin, Turkey. It will include policy makers, experts, research institutions, non-governmental organizations, private sector companies and farmers, among others. The WIF is being organized in cooperation with the host Turkish National Committee on Irrigation and Drainage (TUCID) and in partnership with FAO, IWMI, GWP, ADB and IFPRI.

How irrigated agriculture can meet aspirations of various stakeholders under the increasing food demands in the 21st Century requires systematic review of the policies, techniques, implementation strategies to identify more sustainable water management strategies under limiting natural resources – both land and water- under competing financial resources. The Forum will therefore strive to address under the main theme 'Irrigation and drainage in a changing world: challenges and opportunities for global food security' and sub-themes. In addition other international workshops, special sessions and side events will be organized.

Sub-theme 1: Policy, Science and Society Interactions

1.1 Policy requirements for better governance
1.2 Innovations, extension and improved irrigation and drainage services
1.3 Greater interaction among water users, agents, governmental organizations.

Sub-theme 2: Challenges and Develop-ments in Financing Irrigation and Drainage Sector

2.1 Roles of water users, governmental organizations, and private sector in the development of irrigation and drainage
2.2 Financing mechanisms for investments in new technology, construction, rehabilitation and modernization of irrigation infrastructure
2.3 Partnership of various stakeholders in financing the irrigation and drainage sector

Sub-theme 3: Integrated Water Manage-ment Approaches for Sustainable Food Production

3.1 Water-Land-Food- Energy nexus
3.2 Challenges of sharing water between sectors (domestic, industry agriculture, and environment) in consideration with increasing population and climate change
3.3 Irrigation and drainage for environmental sustainability

Workshop 1: Water Wisdom and Sustainability

Water wisdom of the past and relevant case studies; Wisdom and knowledge management; Water and sustainability; Case studies of sustainable historical water schemes; Using the tradition methods for creative and modern innovations in water engineering; Re-learning the lost knowledge; Synergy and combination of modern and traditional methods; Comparison of traditional methods with modern technology in rural areas

Workshop 2: Developing Management Strategies for Coping with Drought and Water Scarcity

Drought Management Strategies: Quantification or categorization of drought; Predicting or forecasting drought; Drought management strategies under national, water management and end user levels; Implementation of strategies during real drought conditions; Effectiveness of strategies during real drought conditions

Coping with Water Scarcity: Quantification or categorization of water short regions; Concepts and main aspects of water scarcity; new developments and trends in coping with water scarcity in water stressed regions

Rainfall Management/Water Harvesting: Rainfall management tools; Strategies / policies for rainfall management; Effectiveness of rainfall management; Rainfall management effect on surface runoff and stream flow

Workshop 3: Management of Water, Crops and Soils under Climate Change

Quantifying GHG emissions (N2O, CH4 and CO2) and carbon sequestration under current irrigation practices; Developing strategies and technologies for minimizing GHG emissions in water-managed production systems; Use of improved crop varieties to cope with extreme events (floods and droughts); Soil management and tillage practices to adapt to the impacts of a changing climate.

Submission of Papers and Short Communications

Full Papers (maximum of 10 pages of A-4) on the Sub-theme, topics and international workshops are solicited from potential contributors. The papers will go through a review process. Authors of selected papers would be invited to make a presentation in 15 minutes through maximum of 10-15 Power Point slides.

Schedule for submission of papers		
(i)	Submission of abstract(s) of full paper(s) (max. 300 words):	15 January 2013
(ii)	Notification of acceptance of full papers & submission of short communication	28 February 2013
(iii)	Submission of full paper/ notification of acceptance of short communication	30 April 2013
(iv)	Notification to author, as regards oral/poster presentation	30 June 2013

Short Communications (maximum of 4 pages of A-4) on sub-themes and topics are solicited from potential contributors. The short communications should describe new/ promising products (equipment, software, models, management practices, institutional arrangements, etc.). Short communications will be invited to be presented briefly in 5 minutes through 3-5 slides.

Guidelines for authors are available at http://www.icid.org/wif_icid.html. Abstracts / papers / short communication must be submitted online after registering on the following URL: https://www.easychair.org/conferences/?conf=fwif2013. All authors are requested to create a new account on the above URL for submission of their papers by using "sign up for an account".

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