

# SUMMARY REPORT

# **First** **WORLD IRRIGATION FORUM**

28 September - 3 October 2013  
Mardin, Turkey



**TUCID•SDTMK**

Turkish National Committee on  
Irrigation and Drainage (TUCID)



**ICID•CIID**

**INTERNATIONAL COMMISSION ON IRRIGATION AND DRAINAGE (ICID)**



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Hosted by:



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**Turkish National Committee on Irrigation and Drainage (TUCID)**

International Commission on Irrigation and Drainage (ICID), established in 1950 is the leading scientific, technical and not-for-profit Non-Governmental Organization (NGO). ICID, through its network of professionals spread across more than a hundred countries, has facilitated sharing of experiences and transfer of water management technology for over half-a-century. ICID supports capacity development, stimulates research and innovation and strives to promote policies and programs to enhance sustainable development of irrigated agriculture through a comprehensive water management framework. The mission of ICID is to stimulate and promote the development and application of the arts, sciences and techniques of engineering, agriculture, economics, ecological and social sciences in managing water and land resources for irrigation, drainage, flood management, for achieving sustainable agriculture water management.

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# Foreword



With the growing concern about water and food security, management of water and land resources has been an increasingly challenging task being faced by the development agencies around the world. The development processes in various domains have become highly interdependent stemming from the multitude of factors, such as the growing scarcity of water, quality degradation, growth of population coupled with increasing urbanization, climate uncertainties, etc.

Irrigation, over the centuries has helped in mitigating the impacts of climate variability, achieve reasonably stable food production in order to reasonably meet the growing needs of the population, for over the last sixty years. However, irrigation has been blamed for water shortages, severe environmental damages, excessive irrigation resulting in water logging, soil salinization, water pollution resulting from application of fertilizers and pesticide, displacement of people and increased social inequality.

International Commission on Irrigation and Drainage (ICID), with the mission to support sustainable agriculture production around the world, has been facilitating interactions among several actors, who are engaged in agricultural water management. As we know, irrigation is the largest user of the water, with a big share of as much as 70 percent of total water supply in the world. Most of the irrigation schemes serve multi-purposes like hydropower production, water supply for municipal, drinking and industrial usage.

ICID has been associated closely and working with other international organizations to draw the attention of other water sector stakeholders towards the inter-linkages that are related with agriculture water management at several World Water Forums (WWFs). ICID had been closely involved in conducting and organizing discussions on “Water and Food” at WWF4 in Mexico in 2006, WWF5 in Istanbul in 2009 and WWF6 in Marseilles in 2012. These

interactions were found very useful, however, at the same time, they also exposed the limitations of this mechanism to draw a focussed attention and engagement of other stakeholders on irrigation management issues as their attention was deviated by the events / sessions (at these forums) related to their core interest.

There has been a rapid realization among the ICID fraternity over the last few years that the future agriculture production against a highly variable and uncertain climate will have a strong bearing on how effectively and efficiently the world uses irrigation water, and that the path to food security, water security and adaptation to climate change that passes through multi-stakeholder market place rather than solely through engineering design chambers. This has resulted in taking a call for engaging stakeholders more closely, giving birth to the idea of World Irrigation Forum (WIF).

Conceptually, the Forum is designed on the pattern of the World Water Forums, organized by the World Water Council and most importantly, supplementing its objectives. In order for the WIF to complement the debate at WWFs, it has to follow the triennial cycle of events of ICID and sit neatly within the WWFs. Considering that ICID Congresses follow the cycle of 2011, 2014, 2017 ..., it was necessary to fit in the WIF in the triennial series of 2013, 2016, 2019 ... etc. The proposal was therefore presented to the International Executive Council of ICID in Adelaide, Australia at its 63rd meeting in June 2012 where, it found and experienced an enthusiastic support from all the IEC members.

The daunting task of organizing the First World Irrigation Forum within a short notice of fifteen months, by the Turkish National Committee of ICID (TUCID), with the great tradition of organizing grand events such as WWF5 under the leadership of Mr. Akif Ozkaldi, Chairman of TUCID. The core group consisting of,



Vice President Huseyin Gundogdu, President Hon. Bart Schultz and Secretary General Avinash Tyagi set the ball rolling under the overall guidance and support of the Steering Committee, International Technical Advisory Committee and the National Organizing Committee.

The First World Irrigation Forum (WIF1) with the main theme of 'Irrigation and drainage in a changing world: challenges and opportunities for global food security' discussed various issues related to integrated water management approaches for sustainable food production, financial issues related to mechanisms for investments in irrigation and drainage, especially, in the advanced technology development and application, policy issues on roles of stakeholders, partnership and interaction among various sectors.

I was pleased to find and experience the active involvement of all the National Committees of ICID, experts from international organizations, including the other stakeholders. With the participation of over 700 delegates from 62 countries and 13 UN/ International organizations dealing with agricultural water management and representing the government agencies, universities, research institutions, national and regional projects, independent consultants, private companies and farmers;

resulting in very lively and open discussions, the First World Irrigation Forum can be considered to fulfil its objectives successfully.

The present report shows a brief outcome of the various sessions, sub-themes, side events, roundtables and panel discussions. These outcomes and the feedbacks that the ICID community took home as a result of discussions with various stakeholders, would help them realign their agenda towards more realistic issues and concerns in order to meet the emerging challenges and convert them into opportunities.

I am sure these outcomes will also go a long way further on enriching the deliberations at the 7th World Water Forum in S. Korea. The discussions will be further taken forward during the Second World Irrigation Forum scheduled in 2016 in Chiang Mai, Thailand.

Gao Zhanyi,  
President, ICID

February 2014



# Preface



During the first visit to the Central Office in New Delhi as President of ICID in April 2012, Dr. Gao Zhanyi had shared numerous ideas with me, which had an underpinning desire to propel ICID as a professional international network that is seized of the new challenges of development particularly, addressing food security and water security. One among these was his vision to provide a platform to various stakeholders who are involved in irrigation management.

After initial consultations, the concept was developed into a proposal and was presented at the 63rd International Executive Council (IEC) meeting of ICID that was held in June 2012 in Adelaide Australia. The proposal won an overwhelming response from experts as well as the IEC members. However, the most challenging part was to organize the inaugural edition of the World Irrigation Forum along with the 64th meeting of IEC in September/October 2013 in Mardin. Our potential host of the 64th IEC, the Turkish National Committee (TUCID), though initially reluctant to replace the scheduled 7th Asian Regional Conference, accepted the challenge of organizing the First World Irrigation Forum within the short notice of fifteen months.

Mardin was chosen the venue for the inaugural World Irrigation Forum for two reasons. Firstly, the region served as the cradle of irrigated agriculture that saw the human race transform from hunters to gatherers. Second, it represents a typical backward region suffering from water stress, waiting to be catapulted into a developed area with the advent of irrigation water, brought by the GAP project.

Discussions with our technical partners: Food and Agriculture Organization (FAO), International Water Management Institute (IWMI) and Asian Development Bank (ADB), who have been our close collaborators in various World Water Forums in addressing the water

and food issues, welcomed the idea of World Irrigation Forum and encouraged the further process through active participation. A number of other UN and international organizations supporting the efforts of their member countries in better agricultural water management, have very enthusiastically supported the idea of organizing an Irrigation Forum. Various other international organizations with whom ICID had collaborated in the past, such as the Global Water Partnership (GWP), International Crops Research Institute for the Semi-Arid-Tropics (ICRISAT), International Food Policy Research Institute (IFPRI), World Bank (WB), Arab Water Council (AWC), International Fund for Agricultural Development (IFAD), World Meteorological Organization (WMO) also expressed the need for such a Forum.

Successful organization of the First World Irrigation Forum within a short period of 15 months is a proof of the leadership Mr. Akif Ozkaldi, Chairman of Turkish National Committee on Irrigation and Drainage and Director General of General Directorate of State Hydraulic Works (DSI) and the dedicated work of his team. This seemingly difficult goal could be achieved due to the patronage provided by Prof. Veysel Eroglu, Minister for Forestry and Water Affairs and the guidance of the members of the Steering Committee under the co-chairmanship of Mr. Akif Ozkaldi and President Gao Zhanyi. Members of the National Organizing Committee under the chairmanship of Mr. Yakup Başoğlu put all the plans towards action to make the Forum a success.

Experts from various partner organizations, under the overall guidance of the International Technical Advisory Committee (ITAC) headed by President Hon. Bart Schultz, helped to review the technical program and the papers submitted, chaired the sessions, delivered keynote

addresses, organized side events and participated in the exhibition enthusiastically. On behalf of ICID, I express special thanks to our partners, FAO, IWMI, Global Water Partnership, Asian Development Bank, World Water Council (WWC), UNESCO-IHE, IFPRI, ICRISAT, International Center for Agricultural Research in the Dry Area (ICARDA) and AWC to dream with ICID and be together with other partner International Organizations such as IFAD, WMO, and European Development Bank and work enthusiastically to make the Forum a success. We are particularly thankful to IFAD for sponsoring a number of young irrigation professionals associated with their various irrigation related projects and also for facilitating the participation of some representatives of the farmers in the Forum.

The tremendous contribution of colleagues from TUCID, DSI and M/s DEKON, the logistics firm and other National Partners: Ministry of Forestry and Water Affairs, Ministry of Food, Agriculture and Livestock, SUEN, SYGM, and the GAP Project is highly appreciated and acknowledged. It is through their hard work and support, various stakeholders were able to gather in Mardin and undertake deliberations.

But, for the vision and support of the ICID National Committees, who supported the idea of President Gao Zhanyi with an open mind, coming out of their disciplinary and institutional boxes and discussing the issues in an open mind, the outcomes of the Forum would not have

been as successful. Particularly, the hard work put in by the members of ITAC, the leaders of the teams developing the Background Papers, Chair of various sessions, General Rapporteurs, teams coordinating the International Workshops, has enriched the Forum. Side events were the main attraction of the Forum organized very ably by the team headed by Mr. M. Sait Tahmiscioğlu.

On behalf of all the participants, I express my sincere thanks to the people of Mardin, its Governor Dr. Ahmet Cengiz and Honourable Minister of Interior, Turkey HE Muammer Guler to accept them in their traditionally multicultural and peaceful city and make them feel at home. I am sure, all the participants enjoyed the excellent culinary as experienced during the gala dinners; the history of the region exposed through the social and technical tours; and culture of the region as expressed through the cultural programs presented at the Forum.

Without the active support of the sponsors, it would not have been possible to organize the Forum successfully.

Avinash C. Tyagi,  
Secretary General, ICID

February 2014





# Reminiscence



Turkey, one of the founding members of International Commission on Irrigation and Drainage since 1954, has a strong belief in its mission of sustainable agriculture development in the world through comprehensive irrigation management techniques. The Turkish National Committee of ICID (TUCID) has therefore been actively promoting and hosting ICID events with a vision to enhance cooperation among countries. The proposal to host the 7th Asian Regional Conference along with the 64th meeting of IEC of ICID in September 2013 in Turkey was a step in that direction. However, TUCID delegation was surprised during the 63rd IEC meeting held in Adelaide, in June 2012, when the ICID President Dr. Gao Zhanyi, instead of 7th Asian Regional Conference, proposed to organize the First World Irrigation Forum in 2013. Though it was a challenging task, my colleagues at DSI, after having successfully organized the Fifth World Water Forum in 2009 in Istanbul were confident and ready to mobilize our joint resources to make use of the opportunity to host the historical beginning of the World Irrigation Forum. I foresaw a number of benefits of organizing WIF1 for my colleagues in DSI, engaged in water resources management in general, and Irrigation and Drainage sector in particular; for the region as well as for Turkey.

One of the biggest regional development schemes in the world and the largest and most comprehensive enterprise ever carried out in Turkey, the Great Anatolian Project (GAP) in southeastern Turkey, is a perfect embodiment and a showcase of how water resources development can trigger comprehensive regional development. The work that was initially planned predominantly as a large-scale water resources development project was later transformed into an integrated multi-sectoral regional development programme. GAP took the philosophy of sustainable human development into account and represented a comprehensive regional development effort based on

multi-sector, integrated and sustainable development approach, targeting the full-fledged development of the region. The participants at the WIF1 were able to get a glimpse of this philosophy put into action through special side events, films and study tours.

The region of Southeastern Anatolia extends over wide plains in the basins of the lower Euphrates and the Tigris, including the administrative provinces of Mardin, Siirt, and Sanlıurfa, among others. Mardin, which is the center of the Assyrian culture and has witnessed history for thousands of years, was selected exclusively to host first WIF. Mardin undergoes decline in groundwater and energy shortage during the irrigation season. Therefore, under GAP, water is being brought to Mardin from Atatürk Dam through a main channel, more than 220 km long running through great Şanlıurfa tunnels, having a capacity of 200 cumecs and will irrigate 100,000 ha agriculture land of Mardin.

Exposure of more than 300 participants from Turkey, particularly belonging to the General Directorate of State Hydraulic Works (DSİ), and working in GAP, through their interaction with international experts from about 62 countries has widened their perspective thus enabling them to serve the region better. I am thankful to my colleagues in DSI and TUCID, who under the guidance of Mr. Yakup Başoğlu, Chairman of the National Organizing Committee have once again shown their organizational skills and made the Forum a success. My colleagues in DSI and other water institutes worked side by side distinctly proving the integrated approach that Turkey is taking in the water sector under the leadership of Honourable Minister of Forestry and Water Affairs, HE Prof. Veysel Eroğlu. Under his patronage and the active support of Governor of Mardin Mr. Mehmet Beşir Ayanoğlu, Mayor of Mardin Dr. Ahmet Cengiz and Rector of Mardin Artuklu University Prof. Serdar Bedii Omay, the participants experienced the



age old tradition and hospitality of the people of Mardin. The Choir of Mardin Trainers, playing the grand 'Inter-Religious Multi-Sound Music' presented a glimpse of the religious harmony in the Mardin civilization.

We also took the initiative to make the First World Irrigation Forum environmental friendly not only by minimizing the use of paper prior to and during the Forum- a step forward towards carbon foot prints, but also by planting one sapling each in the name of all the participants who attended the Forum, witnessed by the participants through video-link with the forebay area of Ataturk reservoir during the Inauguration ceremony. In addition to this, the ceremony also witnessed the inauguration of the canal project by HE Prof. Veysel Eroğlu also through live video link.

High quality technical discussions and deliberations at the Froum were made possible due to the commitment of the International Technical Advisory Committee under the Chairmanship of Prof. Bart Schultz, and the support of many other international and Turkish experts. The link established by ICID Vice President, Dr. Huseyin Gundogdu, between ICID on one hand and the Turkish experts on the other was instrumental in effectively implementing the decisions taken by the Steering Committee. I particularly appreciate his efforts. The support provided by ICID Central Office under the leadership of Mr. Avinash Tyagi, the Secretary General, streamlined a number of complicated issues.

With the active participation of a number of private companies as well as regional, national and international institutions, the delegates were exposed to various capabilities available in Turkey regarding planning, development and management of irrigation and drainage. I am also thankful and obliged to our sponsors from private sector for their support in various activities at the Forum. I am sure that they are benefited from the international exposure.

Considering the limited accessibility to Mardin, as it does not fall on the main air corridor, we anticipated a maximum of 600 participants to attend the forum. But to our surprise due to the tremendous interest towards the Forum among the people within and outside Turkey, the gathering exceeded the capacity, giving organizers some tough time, especially on the first two days. I would like to thank the event organizing company M/s Dekon for their untiring efforts in providing logistic arrangements. Sincerely, I believe that WIF1 brought very important outcomes for our region, our country and for the entire irrigation and drainage community.

Akif Ozkaldi  
Chairman, TUCID, and  
Director General, DSI

February 2014



# Acknowledgements

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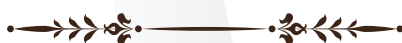
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# Introduction



## Background

Growing food security concerns due to the demographic pressure, combined with increased competition for water and erratic climatic condition have once again brought forward the importance of irrigation for increasing food production. The increasing pressure on natural resources, particularly on land and water, stemming from complex water-food-energy linkages, makes it clear that the increase in food production cannot be achieved through mono-disciplinary approaches.

“Irrigation” has served successfully as a tool that has helped usher Green Revolutions during 1970s and 80s in many parts of the world. Any attempt to bring in second Green Revolution in parts of the world, which remained untouched the first time round, Africa for example, has to be based on the effective application of this tool. Irrigation also serves to restrain the acute fluctuations in food production preventing the price shocks in the world food market especially during climatic extreme: droughts. Thus, expansion of irrigation has become more critical in all its forms and terms, requiring inputs from all the stakeholders and actors working within the irrigation and agriculture sector.

Under the sharp decline in per capita water availability due to increased population and increase in water demand for domestic, manufacturing, commercial, and industrial purposes; it is imperative to devise policies for integrated water management with special focus on reducing the use of water in agriculture through better irrigation management practices. The key to sustainable development of irrigated agriculture lies around modernization of irrigation systems. Therefore, policies and strategies reframed to increase water use efficiency and water and land productivity have to support financial mechanisms, reform management institutions and implement modern technologies that serve the irrigation system for the benefit of irrigation farming community, particularly the small farmers.

Agriculture water management community through its network of ICID National Committees share good practices and learn from each other's experiences. Concerted efforts that have been made over the years to get various stakeholders involved in agriculture water management by broad basing the National Committees, which provide a multi-stakeholder platform at national level have been successful, but only partially. World Irrigation Forum, is another step in this direction to widen the scope of this sharing and learning by engaging the stakeholders at the global level.



## Objectives

To fulfill ICID's mission and objectives of contributing to food security, ICID is making this attempt to bring together the representatives of all stakeholders involved in irrigation of all types and at all scales from around the world on the platform of World Irrigation Forum (WIF). With the mission to stimulate and promote irrigation, drainage and flood management, the basic aim of the Forum is to provide a platform to all those who are involved in managing scarce water resources for agriculture to meet the challenges of eradicating hunger, malnutrition and poverty. The objectives of the WIF, therefore, are:

- Support multi-disciplinary discussions towards the solution to water management in agriculture in the 21<sup>st</sup> century;
- Exchange latest irrigation and drainage policies, innovations and technologies;
- Develop liaison/ collaboration among various national / international institutions/ organizations/ private sector working for irrigated agriculture;
- Explore and formulate concrete inter-disciplinary proposals; and
- Advocate political commitments.

## Scope

Given the imperative of meeting the challenges for stabilizing food security and water security, irrigation is once again gaining the lost ground as a major development tool. However, under the current context of continual changing financial patterns of open market economy, advances in technologies and the developing social patterns, the policies for irrigation management have to adapt accordingly. In the broader context of limiting natural resources, climate change, improving standards of living and consequent consumption patterns, perceived inefficient performance of irrigation in the past, the International Technical Advisory Committee (ITAC), under the chairmanship of President Honorary of ICID, Prof Dr. Bart Schultz, appropriately selected the main theme of the First World Irrigation Forum as 'Irrigation and drainage in a changing world: challenges and opportunities for global food security'. The Forum addressed the main theme following three distinct tracks as

### Sub-Theme 1: Policy, Science and Society Interactions

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



### Sub-Theme 2: Challenges and Developments in Financing Irrigation and Drainage Sector

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

### Sub-Theme 3: Integrated Water Management Approaches for Sustainable Food Production

- Water-Food- Energy Nexus
- Challenges of sharing water among the sectors (Domestic, Industry and Agriculture) in consideration with increasing population and climate change
- Irrigation and Drainage for the environmental sustainability

During the Forum, the technical working groups of ICID opened up discussions on the topics covered under their mandate, with other stakeholders by organizing three International Workshops. During the international workshop on 'Water Wisdom and Sustainability', the participants got the opportunity to share and learn historical experiences on sustainable water management. The workshops on 'Developing Management Strategies for Coping with Drought and Water Scarcity' and 'Management of Water, Crops and Soils under Climate Change' addressed the current pressing issues such as coping with drought and water scarcity and impact of climate change. Another major attraction of the Forum was the organization of 23 side events on various interesting topics by different national and international institutions from across the world.

The Forum was able to attract a variety of stakeholders that included policy makers, irrigation experts,



young professionals, researchers, academicians, and representatives from the international scientific community, non-governmental organizations, private sector companies, consultants and farmers, among others.

### The report

This summary report presented herein brings out the highlights of the First World Irrigation Forum, benefitting particularly those who could not make it to Mardin. It consists of the printed copy along with a DVD inserted in the pouch attached to inside of the back-cover.

Section 2 briefly outlines the curtain raiser function during the inauguration of the First World Irrigation Forum with the welcome addresses by the host and the organizer and the opening speeches by the Ministers. The 'award ceremony' of the first World Irrigation and Drainage Prize instituted by ICID as also been briefly presented therein. Section 3 of the report presents different perspective from various stakeholders on the main theme of the forum- 'Irrigation and drainage in a changing world: challenges and opportunities for global food security'.

Section 4 presents the proceedings of the various sub-themes under which the main theme was discussed. For each sub-theme, there is a brief of the background paper prepared by a panel of experts circulated among the participants before the Forum. This is followed by the brief keynote addresses delivered by international experts. Based on the technical papers presented in each of the sessions and the panel discussions at the concluding

session of the sub-themes, outcomes that emanated from each sub-theme have also been presented.

Section 5 outlines the discussions and outcomes of the three International Workshops while section 6 presents the outcomes of one Round Table and two Panel Discussions. Section 7 brings out, in brief, the proceedings of the side events organized by various international and national organizations that attracted various stakeholders. The detailed presentations made at the side events are provided in ICID web site. Section 8 brings out the overall outcomes of the First World Irrigation Forum discussed and deliberated at the thematic wrap-up session of the Forum. Section 9 present glimpses of the International Exhibition and various social and cultural activities. Section 10, 11 and 12 presents glimpses of social and cultural activities, accompanying persons' tours and the field visit.

Annexes (1-6) at the end, provide a list of various technical papers and short communications presented at respective sessions of the sub-themes and the workshops. The final program of the First World Irrigation Forum, as organized, is given in Annex 7 while a consolidated list of side events is provided in Annex 8.

The DVD enclosed in the sachet provided on the inside of the back cover provides full length background papers, keynote addresses, all technical papers submitted at the Forum along with the addresses during the curtain raiser function. The full contents of the DVD are given in Annex 9.





# MARDİN ARTUKLU ÜNİVERSİTESİ



## Curtain Raiser



### Inaugural Ceremony

The grand opening of the First World Water Forum took place on Sunday, 29th September, 2013 in a splendid setting of the famous Artukulu University, Mardin, Turkey. Attended by over 700 participants including young scholars, farmers, academicians, engineers, and the irrigation managers drawn from different disciplines and from different countries, the Turkey's various Ministers and Departments and a few media personnel and other artistes.

Providing the serene note to the opening ceremony, the Choir of Mardin Trainers played the grand 'Inter-Religious Multi-Sound Music' famous for its own individualistic style. The rendition was followed by projection of a Short Film that brought home the tremendous efforts that Turkey has made in the water and allied sectors, helping the growth of irrigated agriculture in the past few decades.

The participants to the Forum were welcomed by the dignitaries. Summary of the speeches are available from page 6 onwards. The full text of the speeches is made available in the attached DVD.





## Welcome by Mr. Akif Ozkaldi, Chairman, TUCID

The assembly was welcomed by Mr. Akif Ozkaldi, the Director General of DSI Turkey and the President of Turkish National Committee on Irrigation and Drainage (TUCID). He recalled the fact that the city of Mardin is well known as one of the most ancient civilizations of the world. The first WIF main theme was chosen as “Irrigation and Drainage in a Changing World - Challenges and Opportunities for Global Food Security”.



Mr. Akif Ozkaldi referred to the possibility of the world population reaching 8 billion by 2025 and about 10 billion by 2050 and suggested that the world might have to face one of the most important problems of the near future, ‘Food Security’. He pointed out that in order to meet the needs of the future, the productivity need to be doubled

in the next 50 years. He also lamented for the majority of society not being aware of the problem that water could be a ‘hindrance factor’ in assuring sufficient food production in future.

Moreover due to the global warming appeared in the middle of the century, irrigation water will be needed more than ever in arid and semi-arid regions. The problem of water scarcity due to decreased precipitation and increased irrigation water demand can be resolved to some extent by utilizing modern irrigation systems, by saving water and by supplementing ground water and treated waste water to surface water resources. Particularly, the drip irrigation system is very promising and by providing the farmers the kind of equipment cheaply could help in saving and using water consciously. He expressed his belief that the World Irrigation Forum whose main theme is based on “Irrigation and Drainage in the Changing World” would contribute in increasing this awareness.

Mr. Akif stressed that one of the most important targets of the Forum is to provide solutions that would be accepted and supported by majority with the goal to accomplish an innovative, transparent, participatory, and fair synthesis as well as to take concrete steps. Mr. Akif thanked all, especially the organizing committee and ICID central office staffs for their cooperated and coordinated work during the past one and half year in realizing this Forum.

## Welcome by Dr. Ahmet Cengiz, Governor of Mardin

The Governor of Mardin, His Excellency Dr. Ahmet Cengiz, welcomed the distinguished guests from around the world as well as from within Turkey and introduced the city of Mardin with its excellent culture and tradition. The city felt proud and privileged to host the First World Irrigation Forum amidst the beautiful settings.

The Governor informed that the province of Mardin located in the south eastern region of Turkey is an ancient one embodied with a rich 65000 year-old history. The fabric of the city is unique and rare to be seen elsewhere in the world. Mardin is one of the most important cities of the Mesopotamia region and is home for many monotheistic religions. It remains as the center of the Assyrian culture. In addition to the mosques, there are many churches and monasteries in Mardin. The people of Mardin believe in different religions and speak different languages and have been living in peace.

The Governor informed that half of the population of Mardin is engaged in agriculture. He pointed out that out of 889,000 ha of agricultural land, about 41% is assigned for dry farming, 36% for irrigable farming and the remaining



23% for wet farming with cotton and corn as main crops in the irrigable lands. In addition, fodder plants, cereals, sunflower, fruits and olive are also grown. He pointed out that due to use of ground water as the main source for irrigation, there is large depletion of ground water and energy shortages during irrigation periods. GAP (South Eastern Anatolia Project), which remains as one of the most important projects of turkey, will irrigate about 100,000 ha land of Mardin.

Dr Ahmet Cengiz urged the guests to enjoy the ancient city endowed with a splendid history and Mesopotamian culture by visiting the admirable ancient monuments and tasting the delicacies unique to Mardin. He concluded

with a hope that the Forum will contribute to their city, region besides all the participant countries and the whole humanity.

### Welcome address by Dr. Gao Zhanyi, President, ICID



ICID President Dr. Gao Zhanyi, welcomed the participants on behalf of ICID fraternity consisting of irrigation experts from 100 countries covering about 86% of the world irrigated area. He pointed out that agricultural production that takes place in a total farmland of 1500 million is largely rain-fed and only a fraction is provided with supplementary irrigation. Out of the total farmland, 73% of land does not have any water management system. If the production of the farmland with water management system producing 55% and the rain-fed farmlands producing 45% are considered, the importance of irrigation and drainage is reflected. At the same time it lays onus on irrigation as a tool to increase food production and ensure water security.

He pointed out that food security and water security are highly interdependent. The solutions that have emerged in the recent years due to meetings and conferences for solving water and food security problems are to increase in water use efficiency in irrigated agriculture, increase in sustainable productivity, lower the cost of water management, increase water storage to support irrigated agriculture and multipurpose use, promote sustainable ground water development, promote safe use of non-conventional waters in agriculture and aquaculture, increase rainfed land productivity; enhance support to small holder farmers, and develop regional visions.

President Gao Zhanyi surmised that most of the existing large and medium irrigation systems have already been in

use for more than 40 to 60 years. During the initial stages the only purpose of the system was to irrigate, however, after many years of operation, with the development of other socio-economic activities, most of these schemes turned to multi-function supplying water for irrigation purpose, for industrial purpose, for domestic use and also for eco system. Therefore, he pointed out that for the sustainable development, we have to include our stakeholders.

He emphasized that the major actors of water management not only include Government, agents and farmers, though they play vital role, but also include the research institutes, universities and schools, bankers and donors, contractors, manufacturers, international organizations, NGOs and consultants and farmers' associations. According to President Gao, ICID has taken the initiative to organize World Irrigation Forums in order to bridge the gap between these stakeholders. The objective of the World Irrigation Forum is to increase involvement and partnership of stakeholders and bridge the gap between natural science, social science, researchers, and decision makers, producers and customers.

President Gao Zhanyi thanked the participants and hoped that with their support we will have a successful First World Irrigation Forum and will achieve our objectives as well.



## Message from World Water Council – Prof. Dr. Dogan Altinbilek, Vice President

On behalf of the World Water Council and its President Benedito Braga, Prof. Dr. Doğan Altınbilek, Vice President, expressed his appreciation to the organizers for having invited World Water Council to be a part of the First World Irrigation Forum. He praised TUCID and ICID for organizing the pioneering event in Mardin which is a part of the Fertile Crescent in historical upper Mesopotamia.

Dr. Altınbilek recalled the green revolution of the 1960's and 1970's which provided a major increase in food production worldwide was basically possible because of secured water provision through irrigation to compensate the variability of climate. In the following two decades after the 70's, the use of irrigation increased by 1/3 and grains productivity almost doubled in 3 decades from 1960's to early 90's.

Highlighting the challenges to be faced in future Dr. Doğan Altınbilek cautioned that despite of all productivity advances achieved in the past, additional efforts need to be made by the scientific and the political communities to find adequate solutions to face the challenges posed by increase in world's population. as producing food and sustaining quality of life will largely depend on reliable water resources.

He pointed out that groundwater is certainly a strategic and an invaluable source of water for irrigation and for many other purposes, but has proved almost impossible to regulate. Viewed in this perspective, he emphasized that water security would emerge as a key element to ensure the basic needs of human and ecosystems. He warned that if business continues as usual, the world may face a level of water scarcity that may lead to a decrease in food production.



Dr. Altınbilek recalled that the World Water Council's mission is to promote awareness, build political commitment and trigger action on critical water issues at all levels to facilitate the efficient development and use of water in all its dimensions on an environmentally sustainable basis. One of the Council's major accomplishments is in its contribution to increasing awareness of global water issues and to political mobilization through World Water Forum. He conveyed his expectations that the outcomes of World Irrigation Forum will be part of the agenda of the 7th World Water Forum to be held in Korea in 2015.

Dr. Altınbilek informed that the World Water Council is proposing a 'Pact for Water Security' for various works related to water in order to bring water and agriculture higher in the political agenda of Governments worldwide. Organizers of First World Irrigation Forum, ICID and DSI are both members of the Board of Governors of World Water Council and as well as the partners of 'Pact for Water Security'. Dr. Doğan Altınbilek concluded his address wishing a great success to the Forum.

## Speech by H.E. Hamit Bakirci, Minister for Environment and Natural Resources, TRNC

The visiting distinguished dignitary, H.E. Hamit Bakirci, Minister for Environment and Natural Resources, from Turkish Republic of Northern Cyprus (TRNC), spoke of the water cooperation between his country and Turkey. The Minister informed that his country had so far used water from underground sources that had resulted decrease in the resources, decrease in the quality of products and increase in the cost for those involved in the agriculture. Turkish Cypriot people who are keen to continue producing world-class quality agricultural products and have always felt the need for good quality water.

The Minister informed that the "Century Project", with the aim at building dams in TRNC and the Republic of Turkey and installing submarine water supply pipes, is a new freedom of Turkish Cypriot Community after the 1974



Peace Operation. At the end of this project the productive lands will come to life, he continued and said that their agriculturalists' and farmers' input costs will fall and the process will yield high quality products. He thanked the architect of the project, Honorable Minister Veysel Eroğlu and those in the Fosterland, for sharing a commodity regarded as one of the most sacred in the world.

He expressed his gratitude to Minister Veysel Eroğlu and General Directorate of State Hydraulic Works, for bringing

together all the concerned stakeholders at this Forum. He was looking forward to the opinions and scientific assessments that come out of this Forum. In this era, he pointed out that correct utilization of water should be considered at least as precious as petroleum products or may be more. In this aspect, he hoped that the opinions and scientific studies proposed and presented in this Forum, organized in the beautiful Anatolian city of Mardin, will be very important.

### **Speech by HE Mr. Muammer Guler, Minister of Interior, Turkey**

Honorable Minister of Interior, Turkey, Mr. Muammer Guler welcomed the participants to Mardin, the city of tolerance, which has witnessed thousands of years of history. He hoped that the guests who have arrived here for first WIF will have great time in this ancient city and will get an opportunity to discover the Mardin's historical profile. He pointed out that global water crises caused by increased population growth and water demand are at the top of the agenda. As a candidate country for the membership of European Union, Turkey is going to deal with water issues like all other countries in Europe in the near future.

Honorable Minister pointed out that huge investments have already been made in Turkey both in irrigation and energy during the last 11 years. GAP which is one of the important projects is very important for Mardin as it is included as the beneficiary of the project. Irrigation over 100,000 ha is seriously going to add value to this region, he pointed. He expressed his gratitude to the Minister of Forestry and Water Affairs and DSI for constructing Ilisu Dam in Mardin, the second biggest dam of Turkey after



Atatürk Dam which will greatly contribute in boosting the regional economy.

Minister Mr. Guler sincerely believed that first WIF will have important outcome for Mardin region, Turkey and the world. He wished for the success of first WIF and expressed deep gratitude to contributors, participants and all guests.

### **Inaugural Speech by Prof. Dr. Veysel Eroğlu, Minister of Forestry and Water Affairs of Turkey**

Honorable Minister of Forestry and Water Affairs of Turkey, Prof. Dr. Veysel Eroğlu welcomed all the participants from around the World and sincerely wished that they would enjoy Mardin's cultural and historical sites during their stay in the city of tolerance, peace and brotherhood.

He pointed out that food security has become a critical issue because of decreasing water resources. As such it is indeed required to discuss the wide range of water issues and also to find a way to resolve existing and possible future water crisis. Water management is one of the most critical areas in terms of impacts of global warming and climate change. He expressed his belief that World Irrigation Forum is going to provide us opportunities to address this dilemma.

Prof. Dr. Eroğlu informed the gathering that Turkey is not a water rich country and is not a water poor country

either. Water is enough for us all if measures on water resources management are taken wisely, he pointed. Otherwise in near future, there might be a shortage of water. Efficient water management depends on supplying equal water resources to all human beings and living creatures. Because of this, Turkey is making a real effort to manage water judiciously. Minister informed that in recent years Turkey is applying modern irrigation techniques. He pointed out that Turkey has started using sprinkler and drip irrigation methods and is remodeling many primitive irrigation projects, transforming them into totally closed systems through rehabilitation.

He recalled that Turkish Government has carried out some of the most important irrigation investments in the history of the Republic. Around 18 million hectares of



land has been opened for modern irrigation. GAP project is expected to irrigate another 1.58 million hectares of land. In addition to these projects, the KOP (the Konya Plain) Project, Eastern Anatolian Project and the Thrace Development Project will also be completed. Turkey is planning projects considering the whole river basin as a unit, the Minister informed. In the last 10 years, Turkey has also rehabilitated 650 streams for flood prevention.

Honorable Minister emphasized the need of collecting water by constructing reservoir. He informed that Turkey has completed 232 big dams and is also giving due importance to small and big ponds for meeting the water need of animals, villages and towns. He informed that a project of constructing 1000 ponds in 1000 days, which might seem crazy, has been initiated and it is expected that 334 of the ponds would be opened for operation by this year end. He pointed out that it is also very important to meet the water demands of big cities. For this the Government has set big goals for the capital city Istanbul, where water is proposed to be brought from 7 dams on 7 hills around Istanbul from a distance of about 150 km in the west.

Honorable Minister drew attention to the water scarcity in Africa. He informed that DSI in collaboration with Turkish International Aid Agency (TIKA) has provided water to 1.3 million people in Africa and further studies are being continued. He pointed out that Turkey is very sensitive to this problem and has contributed more than 2.5 billion dollars to the poor countries of Africa.

He informed that in order to deliver water to Mardin, great tunnels, the Şanlıurfa tunnels, have been constructed to bring water from the Atatürk Dam through a huge channel, which is an artificial river. Honorable Minister invited the participants of the first WIF to join via telecast to the opening ceremony of Mardin Main Canal at the storage construction site and the plantation ceremony at Ataturk reservoir in the fore shore areas. The main canal which is 221 km long and has the carrying capacity of 200 cubic meters per second is proposed to convey irrigation water from Ataturk Dam to Mardin plains. The second tele-link enabled the Forum participants to witness the planting of trees in the fore shore area of Ataturk reservoir where more than 600 plants were planted, each one in the name of the participants of the Forum.



## Award of World Irrigation and Drainage Prize

Mr. Peter Lee, Chairman of the Jury and the Honorary President of ICID announced the winner of the First World Irrigation and Drainage Prize, 2013, instituted by ICID with the objective to promote sustainable irrigation and enhance agriculture production in order to achieve food security around the world. He pointed out that the sole intention of WID Prize is to recognize work of the dedicated professionals and institutions who have actively contributed to the development of Irrigation and Drainage ensuring increased agricultural production at national, regional and international level.

Mr. Lee informed that the Jury consisting of eminent personalities from the field of irrigation and drainage affiliated to various international organizations went through a very difficult task of evaluating various nominations and to choose the winner. On behalf of the Jury and entire ICID fraternity, Mr. Peter Lee announced the award of the first World Irrigation and Drainage Prize to Prof. Victor A. Dukhovny, from Uzbekistan, for his unique contributions in the development of agricultural water management over last fifty-seven years.

in management of water resources in the Aral Sea Basin and advocated for inter-state collaboration for responsible use of water in the basin. He is recognized internationally across water sector for his expertise in the field of irrigation and drainage and for continuing research and exchange of ideas in its development.

His Excellency Prof. Dr. Veysel Eroğlu, Minister of Forestry and Water Affairs, Turkey, presented the trophy and Dr. Gao Zhanyi, President, ICID handed over the Cash Prize of US\$ 10,000, sponsored by Ministry of Water Resources, People's Republic of China, to Prof. Dukhovny.

Accepting the First World Irrigation and Drainage prize, Prof Dukhovny dedicated the award to thousands of those with whom he has worked for over 57 years of his career in the field of irrigation and drainage. He pointed out that during this period, the sector has gone through tremendous changes. He indicated that the ability of the



In the initial stages of his career, Prof. Dukhovny encompassed leadership and best practices in construction and development of irrigation in the Central Asian steppes incorporating several innovations in drainage technology gained through field research. He served as Director of the Central Asian Scientific Institute on Irrigation for more than twenty years. During this period he contributed to changes

sector in order to contribute continuously towards the wellbeing of human race depends on our ability to adapt irrigated agriculture to meet the growing demand of water in all other sectors of economy. The full text of the acceptance speech is provided in the DVD attached to this report.

### Vote of Thanks by Avinash Tyagi, Secretary General, ICID

Secretary General Avinash Tyagi on behalf of the International Commission on Irrigation and Drainage (ICID), along with its National Committees, thanked all the participants for being part of the First World Irrigation Forum through which “Irrigation and Drainage” is being re-launched as a tool for adapting to climate change.

He expressed his sincere thanks to HE Muammer Guler, honorable Minister of Interior, Turkey; HE Prof. Dr. Veysel Eroğlu, Honorable Minister of Forestry and Water Affairs; HE Mr. Hamit Bakırcı, Honorable Minister of Turkish Republic of Northern Cyprus for gracing the occasion and sharing their thoughts.

Successful inauguration of the First World Irrigation Forum within a short notice is a proof of the leadership of Mr. Akif Ozkaldi, Director General of DSI and of his dedicated team at TUCID, and M/s Dekon and other National Partners: Ministry of Forestry and Water Affairs, Ministry of Food Agriculture and Livestock, SUEN, SYGM and the GAP Project for their tremendous contribution and support to various stakeholders who have gathered in Mardin. SG expressed special thanks to its partners and other International Organizations for working enthusiastically in shaping the Forum.

Secretary General congratulated Prof. Dukhovny on receiving the First World Irrigation and Drainage Prize, and thanked the International Jury, through its Chairman President Hon. Peter Lee, for assiduously going over



nominations of a galaxy of eminent persons who have dedicated their lives for the cause of the Irrigation and Drainage sector. He expressed his sincere thanks to the Ministry of Water Resources, People's Republic of China for sponsoring the Prize.

Secretary General requested the experts to come out of their disciplinary and institutional boxes and invited them to participate in technical deliberations and to have open dialogue with all the stakeholders. He invited the participants to churn their minds to come out with ideas and suggestions that the ICID fraternity would like to take home and incorporate them in their activities. He wished them a very fruitful and enjoyable stay.



## Bringing together different perspectives

Presiding over the First Plenary Session, President Dr. Gao Zhanyi expressed his satisfaction at the inaugural of World Irrigation Forum as various stakeholders have been invited who will be participating in the deliberations. He invited the representatives of farmers, research organizations, international scientific community, industry and the irrigation managers to express their perspectives and vision on **“The Irrigation and Drainage in a Changing World: Challenges and Opportunities for Global Food Security”**.

1. Irrigation Managers: International Commission on Irrigation and Drainage (ICID)
2. Farmers: International Fund for Agricultural Development (IFAD)
3. Research Organizations: International Water Management Institute (IWMI)
4. Industry Representative: M/s Dolsar Engineering, Turkey
5. International Scientific Community: World Meteorological Organization (WMO)



### Irrigation Managers Perspective

Increasing global demand for food, degenerating water resources, increasing concerns regarding environmental quality and planning under potential climate change with its increasing variability and uncertainty, poses various kinds of challenges by making the development process more complex. There is a call to address the issues of efficient use of water in agriculture, particularly the irrigated agriculture, which is the major user of freshwater worldwide.

Agriculture water management, particularly its irrigation and drainage aspects requires transparent and inclusive participation of all the stakeholders for efficient, equitable and environmentally sustainable use of the water resources and to avoid potential conflicts due to increase

in demands and degeneration of resources. Managing water efficiently requires all the facilitators: water planners and managers, research institutions, agriculture extension service providers, the industry on one hand and various water users, particularly the farmers, on the other to work together as stakeholders, and actively cooperate in managing and protecting common water resources.

Further the dwindling share of water allocated to agriculture management against the backdrop of increasing demand of water for drinking purpose, for energy and industrial sectors and for maintaining a healthy environment, requires that all the stakeholders take a fresh look at various options of augmenting the supply, that is, to reduce pollution of water bodies, and their development





models and processes. For such participation, it is essential that all the stakeholders are fully informed about various aspects of water resources and use.

Often it is pointed out that in order to bring about this paradigm, necessary data, information and knowledge is lacking and if available, are confined to institutional silos only. At the same time it is an accepted fact that irrigation and drainage sector has not been fully benefitted from the progresses made in science and technology over the years. As a result not enough engineers, technicians and extension services workers are available to meet the growing demand. Sprinkler and drip irrigation systems have brought technology closer to the farmers to a certain degree but with inadequate backstopping to fulfil their operational needs. Uses of technologies such as remote sensing, climate predictions and so on, have not penetrated enough, particularly in developing countries.

Irrigated agriculture provides the most reliable and assured means of crop production. Presently, irrigated agriculture

produces 40% of the world's food supply from 20% of the cultivated land worldwide. Irrigation and drainage have played a major role in increasing food productivity over the past few decades, and is accredited for the successes during the 'Green Revolution' and for the eradication of famines in Asia. But irrigation is also blamed for water shortages, severe environmental damages like excessive irrigation causing water-logging and soil salinization, pollution due to fertilizers and pesticides practices, displacement of people and increased social inequality.

Management of water and land resources that is equitable and sustainable is an increasingly challenging task due to a multitude of factors – such as growing water scarcity and quality degradation, population growth coupled with increasing urbanization, climate uncertainties, etc. It is therefore imperative to grow more food with less water.

"The Future We Want", an outcome of the Rio+20, recognizes the need to maintain natural ecological processes that support food production systems. In



order to understand how irrigated agriculture can meet these aspirations under the increasing food demands in the 21st Century, a review of the policies, techniques, and their implementations for a more sustainable water management under limiting natural resources, both land and water, under competing financial resources is required. For a sustainable agriculture water management, an in-depth understanding of the implications of population growth, changing demographics due to urbanization, and frequent extremes due to climate change on irrigation management, is necessary to ensure a steady growth in Global Food Production.

As such, within the next few decades, irrigated agriculture will be facing challenges like enhanced investment in infrastructure, good governance, robust institutions, smallholder agriculture, more water storages, public-private partnership, capacity building of irrigation managers and farmers, effective transfer of technology from research institutes to farmers' fields, etc.

The theme of the 1st World Irrigation Forum has, therefore, been aptly chosen as "Irrigation and Drainage in a Changing World: Challenges and Opportunities for Global Food Security".

## Farmers Perspective

### Need for better Farmer- Engineer understanding

Abdel Waheb, Egypt



Today, it is my great pleasure to be in front of you to give a speech in this wonderful gathering. I am acting my capacity not only as a chairman of El-Rash El-Gharbya Water Board, as a vice chairman of the Euro- Mediterranean irrigators community, but also as smallholder family farmer, as a water user from one of the most water scarce areas in the world and dignified Water User representing millions of Egyptian smallholder irrigation farmers who want to change and improve their livelihoods for a better future of their families and children.

Egypt has one of the oldest, efficient and well-organized agricultural water management that can contribute not just in primary production in the fields but also in the related services upstream. For irrigation, there are a variety of stakeholders engaged in jobs like manufacturing, distributing and servicing pumps, drip irrigation kits, land levelling and drainage equipment, etc.

I would like to talk about the importance of the cooperation between the water users / irrigators and the water

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Water users are key players in the game, not an audience.

management authorities. The management side could be the government, the private sector or the regulators. In many countries, this kind of cooperation does not exist because either there is no will or need from the water users or there is opposition from the management side, or there are both. I would like to assure you that this kind of cooperation could be of great benefit for social and economic aspects of any country.

Food Security, as we are discussing in this conference is based on reliable and affordable irrigation and drainage services by dedicated irrigation agencies. But this will not be a reality without the farmers, who are organized in WUAs. The water users are a key player in the game and not just an audience. When the government of Egypt and the Dutch government started to implement the Water Board's projects in the late 90s, we came to understand the importance of our role. This partnership was not just limited to the management of the water usage, but was extended so as to promote stronger social bond and environmental awareness among the people.

To work with the government was not at all easy. The system is not good because of the lack of accountability, affordability and accessibility. Local government officials at the lower cadres often demonstrate a corrupt attitude, looking for additional income-tipping "baksheesh" which favours the head farmers but penalizes the tail farmers in the branch canal. We have also not to blame the government always because there are plenty of rotten apples amongst the more powerful farmer also.

I have to say also that complementarities between engineers and farmers are highly important. If you ask me and my WUAs to tell the truth –farmers need water on time and in right quantity, otherwise we cannot do farming. We (WUAs and Engineers) work together for same target/aim: to provide food at an attractive price for farmers and at affordable prices for cities. Help us to grow from individual farmer action (participation) to collective yet competitive farmer institutions, here I'm asking for help but on cost-sharing basis yet with accountability.

In order to work and learn together each one needs to be accountable to the other. If the farmers know how much

water there is, we can grow crops accordingly. We farmers need to be strong together amongst ourselves (from marwa to mesqa to branch canals and further up), for this we need to establish a union to be stronger against the others.

We both own information and knowledge which the government still considers secret although these information are readily available on the internet, so be truthful about data that goes from a District to Government. We as WUAs can provide them with real data and help engineers in verifying and updating. We need to break the secrecy.

## Asian Women in Agriculture Sector

Ms. Zahida Detho, Pakistan



Women of Pakistan play major role in agricultural production, raising livestock and participate in all operations related to crop production. Rural women in Pakistan carry out these tasks in addition to their normal domestic chores. Obviously, these women work longer than men. Surveys have revealed that a woman works 12 to 15 hours a day on various economic activities and household chores. As crop production is not sufficient to meet subsistence needs of the households, men have traditionally sought employment in the non-farm sector. As a result, women have to take over a substantial burden of the work in agricultural production. Moreover, dramatic growth rates in cotton production have generated tremendous demand for female labour especially for picking, etc.

In Pakistan, livestock is an important component of farming systems. It accounts for 26.4% of all the value of agricultural production. A rural woman in Pakistan works 15.50 hours a day, spending 5.50 hours in caring for livestock, but provides only 50 minutes for the care of her own children. Women involved in caring and rearing of livestock and poultry, carry out wide range of tasks such as making feed concentrates, feeding, collecting fodder,

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Despite the rhetoric on women's participation, a review of evidence from South Asia shows that female participation is minimal in water users' organizations.

grazing, cleaning animals and their sheds, making dung cakes, collecting manure for organic fertilizer, as well as milking, processing and marketing of animal products (making ghee, selling eggs, etc). In Pakistan, women are responsible for 60% to 80% of the feeding and milking of cattle. Women are playing a crucial role in rural poultry farming.

In term of Participatory System the widespread trend to transfer irrigation management responsibility from the state to “communities” or local user groups has, by and large, ignored the implications of intra-community power differences for the effectiveness and equity of water management. Gender is a recurrent source of such differences.

Despite the rhetoric on women's participation, a review of evidence from South Asia shows that female participation is minimal in water users' organizations. One reason for this is that the formal and informal membership criteria exclude women.

The balance between costs and benefits of participation is often negative for women because complying with the rules and practices of the organization involves considerable time costs and social risks, whereas other ways to obtain irrigation services may be more effective for female water users. More formal participation of women can strengthen women's bargaining position as resource users within households and communities. Policies & Planning should be focused In order to support effective and equitable agricultural and rural development.



### Game Changers for Irrigated Agriculture – Do the Right Incentives Exist?

Jeremy Bird, Director General, IWMI



This First World Irrigation Forum gives us a chance to take stock and assess how irrigated agriculture is performing and its role in meeting future demands for food, fiber and feed by 2050. For many developing countries the rates of increase in demand will be far higher than these average figures and some may have to double their crop and livestock production to nourish rapidly expanding populations.

The challenge is to meet goals on eradicating poverty hunger and improved nutrition simultaneously, while also improving and addressing the significant environment impacts. We know what is technically and agronomically possible. On the other hand, we still see fundamental problems of low water efficiency (even if measured at basin scale), low water productivity, degraded lands and depleting water resources particularly groundwater.

Performance of major surface irrigation systems in many countries are stuck in a cycle of poor performance, deferred maintenance and rehabilitation. In some system attempts to introduce modern operational concepts were ineffective in part due to limited appreciation of the complex institutional set up, and also due to the low status and budgets assigned to operations and maintenance, the presence of perverse incentives in the system and lack of appropriate incentives for change.

None of this is new to us. We appear to be talking about many of the same issues and challenges now as thirty years ago, but with an increasing number of bright spots where change is happening and we have a far better understanding of the underlying constraints, inter-linkages, causal factors and socio-economic conditions. Yet overall, we are still looking for a significant breakthrough at a time of ever increasing pressures on the resource.

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Incentivizing recovery of irrigation service fees and area expansion aims at restoration of the accountability loops between the farmer and irrigation manager.

To some extent the discussion on rainfed and irrigated is artificial as they are two ends of the same continuum. All land is rainfed and some of that receives additional moisture through various forms of irrigation or water harvesting, some where there is sufficient water to attain the full potential yield of the crop and other areas where the available water supply will not be sufficient but result in higher yields nevertheless. Yields in rainfed areas have been shown to increase significantly with improvements in soil moisture conservation management, rainwater harvesting and applications of limited water at key growth stages. Yet from an institutional perspective we often treat agricultural lands outside of formal irrigation systems differently with separate irrigation and agriculture agencies thereby polarizing policy development and government support measures. IWMI research under the AgWater Solutions project demonstrated this clearly in Ghana, Zambia and Tanzania where the project highlighted the importance of the so-called informal irrigation sector and facilitated policy changes to support the increasingly important smaller scale irrigation operations

There still remains a considerable role for irrigated agriculture in meeting future food challenges and maintaining a vibrant rural economy. Some of the technological changes previously rejected as impractical and new technological innovations that make use of marginal waters can also be very helpful. To close the yield gap in the underperforming systems requires the adoption of new approaches and creative thinking. It is clear that there has to be ‘more with less’.

The limited opportunity for horizontal expansion in most countries coupled with increasing competition for water means that growth needs to come from existing land and water resources. Hence there is need for sustainable agricultural intensification that can produce more output from the same area of land (and volume of water) while reduces negative impacts and concurrently increases contributions to natural capital and the flow of environmental services. The CGIAR’s programme that aims to ensure productive and efficient use of resources covers rainfed and irrigated systems, re-use and recycling of wastewater particularly for peri-urban agriculture, basin

management and use of information systems in decision-making.

Evidence of success comes from the recognition within many governments at the highest level that these issues need to be addressed and resources are required to do so. For example, both India and China are committed to achieving water savings and productivity improvements in their current five year plans and reverse ecosystem degradation. Part of the confidence also comes from a growing body of evidence that new innovative solutions are being introduced, providing hope that previously intractable problems may be overcome.

Incentivizing recovery of irrigation service fees and area expansion aims at restoration of the accountability loops between the farmer and irrigation manager.

- (a) Maintaining productivity with less water:
- (b) Raising awareness of the role of urban agriculture:

- (c) Turning waste into a safe resource:
- (d) Bangladesh - Smart Cards promote equitable distribution:

Rethink the incentives these examples provide a degree of confidence that game-changers to achieve sustainable intensification of agriculture are indeed possible in the irrigation sector. They focus mainly on the aspect of getting more with less. There is still a long way to go to replicate, adapt and develop approaches to take such ideas to scale and increase productivity within existing agricultural water management contexts. Recovering degraded land and water resources also requires a significant change in mindset and new incentive structures to be devised. Reductions in fertilizer use through substitution with re-used organic waste products are important but represent only a part of a wider campaign needed to ensure more prudent use of chemical fertilizers and pesticides.

## Industry Perspective

### Let's Use the Benefit of Being Together

H. Irfan Aker, Dolsar Engineering, Turkey



The world is producing more food per person in human history than ever before. The agricultural resources and the technology are available for providing food to the increasing population to ensure that the food is produced where it is needed and in a manner that sustains the livelihoods of the rural poor. However, the governments have to dedicate themselves for narrowing the gap between poor and rich people. The regional differences have to be eliminated by dedicating more resources to undeveloped regions and poor people. Specific development projects have to be put in use in these poor and undeveloped areas.

The world's natural resources have been threatened by global warming, excessive use of natural resources, high erosion risk, unexpected floods, excessive use of forest and forest fires, drought and population increase. Farming areas cannot be increased easily. We are trying to increase

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Increasing irrigation efficiency and giving more emphasis to water management at the river basin and farm level will contribute positively to the production of electricity.

agricultural production by irrigation, by introducing more input to soil and by applying high technologies.

Water secures food production all over the world to sustain crop production. Most of the water resources are used for irrigation and electric energy production. There is fierce competition among sectors for acquiring enough water on time and in right amount. Like many other countries, water scarcity is becoming a major issue in Turkey. Some irrigation projects are reducing the energy production in hydropower plants because of the excessive water use in farming. Every drop of irrigation water is reducing hydro electric energy production in the river basins.

Increasing irrigation efficiency and giving more emphasis on water management at the river basin and farm level will contribute positively to the production of electricity. Planners, design engineers, decision makers and farmers have to contribute jointly in these issues. The efforts of government organizations can not alone overcome these issues and as such the farmer participation should also be increased. Without the farmer participation, it is not possible to achieve successful water management at the field level. Government organizations and private sector

have to work jointly for bringing the wealth to the poor people.

The theme of the 1st World Irrigation Forum is “Irrigation and Drainage in a changing world: Challenges and opportunities for global food security”. Many topics will be discussed during this forum, such as; Policy, Science and Society Interactions. These topics will concentrate on irrigation organizations, public relations and interrelation between water users and government organizations. The private sector was not involved with these subjects widely in many countries until now. The expectation is that government organizations, non-government organizations (NGO’s), private sectors and water users’ associations will spend more time and resources for coordination and collaboration between all parties and stakeholders. We

believe that at the end of this forum we will have some different types of examples of the irrigation and drainage practices from different parts of the world.

All government agencies and users’ have to increase participatory irrigation management and optimum use of land and water in every single corner of the world in the future. The participation of the youth to these kinds of activities and their involvement at the early stages is very important. I hope this first World Irrigation Forum would have great success with the participation of all the stakeholders and the Forum will end up with some implementable decisions and create a path for all the involved parties’ common future. We are very glad to see you as our guests from all over the world in this ancient territory and Mardin city.

## International Scientific Community Perspective

### Climate Services for Agriculture Water Management

Bruce Stewart, WMO



Agriculture productivity is largely dependent on water availability to the farmlands, a function of the climate at a given location. However, the climate variability at its extreme gives rise to the situations when the water available is either too much resulting in floods or is too little resulting in drought. To ensure food and water security it is important to understand and deal with such situations. Climate change is expected to increase the frequency and intensity of the most severe weather related hazards in the decades to come.

Climate variability has a major influence on extreme meteorological events and associated natural disasters. It is significant to note that while the number of disasters and associated economic losses has increased steadily from the 1950’s to 2005, the reported loss of life has decreased by a factor of 10. In the past five decades, reported loss of life has decreased dramatically as a consequence of the development of multi-hazard early warning systems in

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Long-term adaptation to climate change is an imperative and must be based on adequate climate information.

a number of high-risk countries. This is due to advances in meteorological hazard monitoring and forecasting combined with more effective and coordinated flood and drought preparedness and planning at national to local levels.

Long-term adaptation to climate change is an imperative and must be based on adequate climate information. Weather and climate information must be connected in a seamless manner, from the short-term to the long-term, and from forecasts to predictions of scenarios. Most users deal with weather and climate information in a seamless manner, which would greatly help them to meet all their weather and climate information needs through a ‘single window’; NMHSs can effectively provide such a single window.

Weather and climate services, with forecasts from seasonal to decadal time scales, can contribute in strengthening adaptation to climate change informing long-term investments and strategic planning, for instance, on development of new codes of practice and the retrofitting of irrigation infrastructure to withstand more frequent and severe floods and droughts; reservoir operations; and irrigation scheduling.

The World Meteorological Organization through its National Hydrological and Meteorological Services, in close collaboration with the various UN and other



International Organizations has decided to establish a Global Framework for Climate Services (GFCS). GFCS builds on five components: User Interface Platform (UIP); Climate Services Information System; Observations and Monitoring; Research, Modelling and Prediction; and Capacity Building, with particular attention to the most vulnerable countries. Climate information and services fostered by the GFCS are needed for risk assessment, multisectoral and adaptation planning, EWS and preparedness to respond to emergencies. Climate information must be provided in the form of a service, in such a way as to assist decision-making by individuals, communities, organizations, countries.

Climate change adaptation requires a faster fluid path from research to applications, from science to humanitarian use, and from data to decisions. Climate services often do not reach the people who need it to make “on-the-ground” decisions. UIP under GFCS thus promotes mainstreaming of climate information into the decision-making process. With good bridging between science and action, good use will be made of the many products and services that are already available and as a result good guidance on the greatest need for new products and services will emerge.



## Main Theme and Sub-themes

Irrigated agriculture is undergoing rapid change and is facing issues related to climate change, population growth, consumption patterns, competition for resources and cost of development. The challenge is whether water availability for irrigation along with rain fed production will be sufficient to meet the growing food demand and improve global food security or not. Given this new paradigm the main theme of the Forum **“Irrigation and Drainage in a Changing World: Challenges and Opportunities for Global Food Security”** was appropriately divided into three sub-themes:



### Sub-Theme: Policy, Science and Society Interactions

Sub-Theme: Policy, Science and Society Interactions was introduced in a plenary session co-chaired by Dr. Willem Vlotman and Prof. Akuzum. Dr. Thierry Facon and Dr. Ding Kun Lum took the responsibility as rapporteurs to the plenary session.

In the plenary session the sub-theme was introduced through the “Background Paper” prepared by L. Tollefson, H. El Atfy, T. Facon and A. Kerc and made available to the participants in advance. The background paper was presented by Mr. Laurie Tollefson, followed by the Keynote address by Prof. Roberto Lenton. Brief summary of the background paper and the Keynote address are given in the following paragraphs. The full text of the background paper and the keynote address are made available in the DVD attached to this publication.

More than 50 papers and 8 short communications were received under the sub-theme covering following areas:

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

Selected 11 papers and some of the short communications were presented during three parallel sessions and discussed therein. The parallel sessions were extremely well attended. In addition to the papers presented orally many of the submitted papers were presented as Posters. The list of full papers submitted and presented at the Forum can be seen in Annex 1. The full text of all the papers and the short communications is provided in the attached DVD.

At the final parallel sessions, the General Rapporteurs from each of the parallel sessions presented the outcomes of their respective sessions.

A panel discussion was organized with the co-chairs of each of the parallel session under the sub-theme as panellists

Mr. Felix Reinders as the convenor. Following conclusions from the sub-theme were recorded by rapporteurs Dr. Thierry Facon and Dr. Ding Kun Lum and were presented in the Outcome.

## Background Paper

### Policy, Science and Society Interaction

L. Tollefson, H. El Atfy, T. Facon and A. Kerc



Water management is unique and influences every aspect of human wellbeing with links to socio-economic development, safety, human health, the environment and cultural and religious beliefs. Irrigation and drainage faces many challenges but also provides opportunities to assist global food security.

Modernization and improvement of irrigation is occurring worldwide at varying rates and degrees. Much is being accomplished through innovation and technical advancement. However, to modernize and improve the capacity will require not only innovation and technical advancement but also addressing issues of policy, governance, management and institution. Improved water governance and management are imperative to meet the needs of current and future generations in a sustainable fashion.

Good governance must be developed to suit local conditions and fit the social, economic and cultural particularities of the region. To strengthen governance and management of water requires education, capacity building, organizational development, etc. The government role should be that of a facilitator or activator rather than a top down manager. It is responsible to formulate national water policies and legislation, enact and enforce the legislation and encourage and scrutinize the private sector.

The recognition of innovation-extension-irrigation and drainage services nexus is also crucial for allowing the sector to achieve economic, social and environmental

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Policy development must be sensitive to local conditions, adaptive to user needs, have a flexible institution structure and allow for institutional learning and change.

sustainability along with food security. This encompasses the whole range of agricultural water management practices including genetics and agronomy, technological, institutional and policy innovation along with innovation in knowledge, management and diffusion systems.

In many countries, irrigation and drainage agencies and agricultural support systems have been slow to adapt to the technology for transformation of farming systems. To a large extent, the information technology revolution has not yet fully reached the irrigation and drainage sector. This is however, changing rapidly.

For irrigation and drainage management, it is critical to enable adoption of farm level innovation, that is, the adoption of service oriented management along with incentives for innovation and performance of irrigation and drainage staff. Extension workers however, only reach a small portion of communities, and seldom have a background in water management, irrigation equipment, and horticulture or dry-season cultivation. They are often trained to support farmers in staple crop production but lack the skill and experience required to support irrigated, market-oriented crop production and sales. Capacity building can serve as the basis for developing a broad constituency to effect the changes in governance and policy and the sectoral reforms that are essential.

At the same time agricultural water management related policies, strategies and investment programs must include incentives and support for dynamic innovation and knowledge management systems. These systems should be pluralistic and include government institutions, civil society and private sector organizations. Substantial public investment will be needed for these systems to reach and respond to the needs of the smallholder and poorer farmers.



Policy development must be sensitive to local conditions, adaptive to user needs, flexible with institution structure, and allow institutional learning and change. Trends toward decentralization, fiscal crisis and growth of the private sector have led governments to divest some of its roles

to user organizations and the private sector. Stakeholders must be supported to provide their perspective of problems, solutions, interests and preferences during participative decision making.

## Keynote address

### Irrigation in the 21<sup>st</sup> Century: Reflections on Science, Policy and Society

Prof. Roberto Lenton



In thinking about what irrigation might look like in the decades to come, it helps to recognize how much the context for irrigated agriculture and attitudes towards irrigation and drainage have evolved over the last half century. Fifty years ago, during the 1960s and 1970s, the world was in the midst of a “golden era” of irrigation development, when there was a rapid increase in total irrigated area and a consequent strong emphasis on design and construction. By contrast, the 1980s and 1990s saw a significant slowing down in the rate of irrigation expansion in much of the world, and the beginning of a shift in attention towards the management of irrigation to improve the performance of irrigated agriculture and the returns on irrigation investment. This slowing down of global expansion in irrigated area is likely to continue with a concentration of new irrigation investments in areas where water and land are available and other conditions are particularly conducive.

Going forward, I have no doubt that the context for irrigated agriculture will keep on changing again, probably much more than that in the last half century. I believe that in the next few decades irrigated agriculture in many parts of the world will be affected, at least to some extent by four global forces.

- Increasing pressure on irrigation to achieve some more demanding and productive agriculture;
- Increased tendency for irrigation investments to be market driven;

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We will need to do a much better job at attracting the world's best natural and social scientists to the field, and developing creative arrangements for innovative breakthrough research”.

- Reality of climate variability and change; and
- Water, food and energy means.

In the light of these pressures, there have been increased calls for “re-inventing” irrigation in the 21st Century. Undoubtedly, these pressures will result in more attention towards improving infrastructure and technology to boost reliability and performance, more investment in water control and measurement, more transfer of irrigation water to other uses, and greater attention to impacts assessment and accounting. While currently these pressures are being felt mostly in the large food exporting industrialized countries, where intense competition for water is leading to a re-allocation of water for industry as well as for ecosystem services, over time these pressures will be felt elsewhere too.

Given these new realities, it is appropriate to consider their scientific, policy and societal implications. What types of science will we need to ensure that irrigated agriculture can lead the way towards a more water and food secure future? What kinds of policies and institutions will be required to help manage these shifts in ways that are economically sound, socially equitable and environmentally sustainable? What forms of societal linkages and interactions among stakeholders will we need to deal with the new realities?

Irrigated agriculture is the quintessence of a complex field of study lying at the intersection of the social and natural sciences, involving people, water, agriculture, energy, environment, institutions, and businesses, all interacting in ways that are far from being well understood. Developing the technological, social, institutional and policy innovations needed to address the increasing complexities of 21st Century, irrigated agriculture will require the best of science, and from a diverse set of disciplines and perspectives including agricultural science and water resources/irrigation engineering, natural

resource economics, political science, rural sociology and anthropology, public health, water law, business administration, and information science, to name just a few.

But for this to happen, “we will need to do a much better job at attracting the world’s best natural and social scientists to the field, and developing creative arrangements for innovative breakthrough research”. Multiple pathways are needed, from demand-driven research aimed at solutions to specific problems to more basic and fundamental research aimed at maximizing opportunities for scientific breakthroughs in the longer term by making connections among scientific fields and bringing understandings developed in other fields to bear on irrigation matters and finding imaginative ways to draw on and make connections between disciplines, particularly between the natural and social sciences. Field research to gain first-hand knowledge of what actually happens in practice is also crucial.

The changing landscape of irrigated agriculture in the 21st Century will undoubtedly express itself differently in different parts of the world but four overarching “big ticket” areas can be singled out as a springboard for discussion.

- (a) Ensuring sustainability of groundwater resources in regions where groundwater irrigation is extensive and where groundwater resources are in danger of being overdrawn
- (b) Managing water storage for irrigated agriculture
- (c) Sorting out the tension between environmental and agricultural uses of water
- (d) Providing incentives for the adoption of water-efficient irrigation technologies and practices.

In many irrigated areas, farmers and irrigation system managers have limited incentives to conserve water, as a result the inefficient and unsustainable practices persist. Supply chains and financing and technical assistance systems should aim at the adoption of innovations to conserve water.

Taking into account the new realities and complexities of irrigated agriculture we will need to be more inclusive and do a much better job at bridging disconnect among stakeholders. Partnerships around specific problems can play an important role in building bridges and promoting trust. Well-structured dialogues and discussion forums can also help.



## OUTCOMES

1. Even though irrigation schemes are generally inefficient, they do ensure food security, employment, and wellbeing in many developing and transition countries. There is a big positive impact on the society where irrigation schemes are implemented.
2. It is essential to take lessons from previous mistakes (gaps in the delivery of plans, performance of schemes, scaling up and sustainability) and introduce better techniques.
3. Irrigation and drainage sector should take full advantage of the very rapid technological

advances that have taken place during the past few years in some areas like information and communication technology, satellite imagery, and development of new adaptable, flexible irrigation systems.

4. Irrigation and drainage must change, innovate and open to other sectors and actors to effectively contribute to ensuring food security, reducing poverty and sustaining growth while sustainably managing natural resources in a rapidly changing context.

5. This will require the best of science, a focus on practice, dialogues and partnerships among stakeholders and disciplines, empowering farmers and the private sector, improved governance adapted to local contexts, effective policies and institutions, service-oriented management and enhanced participation. Farmers should be involved from the planning stage of projects.
6. There is a need to turn irrigation and drainage into an exciting career that attracts the younger generations.
7. Incentives and support must be provided for pluralistic innovation and knowledge management systems, in recognizing that promotion of technologies such as drip is multi-faceted and requires adaptation according to context.
8. Change processes should respect the conservation of essential human, cultural and natural values important to rural communities.
9. Market-based approaches can be effective in bringing affordable and adapted innovation to the poor but public investment will be needed to respond to the needs of poor and small farmers.
10. Role of farmers as innovators and adaptors of technologies and major investors in irrigation should be recognized to take irrigation forward.
11. Innovation is not just about technology. Innovation is equally important in O&M of institutions, management systems, water accounting systems and in business models that local entrepreneurs use.
12. Research and knowledge financed by public funds should be a public good and not intellectual property protected, which would hinder its dissemination and uptake by private industry.

### Sub-Theme: Challenges and Developments in Financing Irrigation and Drainage Sector

Sub-Theme: Challenges and Developments in Financing Irrigation and Drainage Sector, was introduced in a plenary session co-chaired by Dr. Willem Vlotman and Prof. Akuzum, Dr. G. Backeberg and Ms. Pooja Kapoor took the responsibility as rapporteurs to the plenary session.

In the plenary session the sub-theme was introduced through the “Background Paper” entitled “Financing Irrigation” prepared by François Brelle and Etienne Dressayre. The paper was made available to the participants on the website of the Forum one month in





advance and along with the abstracts of the papers were made available at the time of registration. The background paper was presented by Mr. Laurie Tollefson followed by a Keynote address by Dr. Uma Lele. Brief summary of the background paper and the keynote address are given in the following paragraphs. The full text of the background paper and the keynote address are made available in the DVD attached to this report.

Twenty papers and one short communication were received under the sub-theme covering following areas:

- Roles of water users, governmental organizations, and private sector in the development of Irrigation and Drainage;
- Financing mechanisms for investments in new technology, and construction, rehabilitation and modernization of irrigation infrastructure; and

- Partnership of various stakeholders in financing the Irrigation and Drainage sector

Selected nine papers and the short communication were presented during two parallel sessions and discussed therein. In addition to the papers presented orally, many of the submitted papers were presented as Posters. The list of full papers submitted and presented at the Forum can be seen in Annex 2. The full text of all the papers and the short communications is provided in the attached CD.

At the last parallel session, the Rapporteurs from each of the earlier parallel sessions under sub-theme, presented the outcomes of their respective sessions. The outcomes were discussed by a panel consisting of co-chairs of the parallel session to arrive at the consolidated outcome presented in the paragraphs below.

## Background Paper

### Financing Irrigation

François Brelle and Etienne Dressayre

The high level panel on the post-2015 development agenda, in its report sent to the Secretary General of the United Nations on May 30th, 2013, stated that ensuring food security and good nutrition be considered among major goals (ranked 5th), along with ending poverty and achieving universal access to water and sanitation. The panel suggested that 'increase agricultural productivity with a focus on sustainably increasing small holder yields and access to irrigation' be considered as a target.

It remains strategic to extend irrigated areas and thus to create new irrigation systems, and drainage if necessary, to restore or improve existing schemes so that they will offer a better service than at the original one when more water resources were available. Researchers must intensify their works on how to increase production that is more sustainable but uses less water. In other words, irrigated agriculture involves large and long term investments including water resources, so it must bear the corresponding costs.

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. Less costly infrastructures often generate more current operation and maintenance expenses. Technology costs more in investment, but allows significant savings of water.



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Potential for involving private sector in financing irrigation schemes through PPPs does exist, but investing is risky, and private sector involvement in irrigation may be sought only under conditions, especially as

regards risks.

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. Contracting with a private company / consortium through long term concession, although risky for the operator, should be a good way towards sustainability, as the contractor is interested in the financial results of the contract, and therefore in the performance of the service, on which the farmers' willingness to pay relies.

Proper financing know-how and equipment at field level, especially as regards small and very small farms, is a condition for success of collective systems and is therefore a key issue. The mechanisms for individual investments, especially in case of large estates, are comparable to those found in any economic activity.

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. Initial investment and physical asset management financing should therefore not be considered separately. Financing investment in irrigation collective schemes must therefore (i) be significantly public, (ii) trans-sectorial and (iii) include both bearing the cost of initial installation of the project and necessary amortization / renewal costs.

Sustainable management of these infrastructures means that care is taken for them to ensure irrigation service durably, that is to say (i) ensuring long term maintenance, (ii) adapting the systems to changes in water demand, and (iii) improving efficiency.

Provided the fee is affordable, farmers are generally ready to pay for having water. But this willingness to pay largely depends on the quality of the water service and

on the farmers' faith in the capacity of the one who bills the service to provide the said service at the required quality. Empowering Water User Associations (WUA) for operation, maintenance and fee collection is an attractive alternative to public management and delegation to private company. Optimization of water service costs can be achieved through an adequate combination of public, private and end users respective skills and capacities.

Many examples may lead to conclude that solidarity between usages may help achieving sustainability, as irrigation is not compelled to be economically autonomous when 'related water service' can contribute to equilibrate its operating account. Such solidarity should exist between different uses of water, or between big and small customers of irrigation service.

One of the issues that need to be addressed but not covered in this paper is whether farmers are or are not entitled to be remunerated for the ecosystem services they provide. That raises the question as to who should pay, for instance, when treated waste water is used for irrigation. Should it be the farmer as non-conventional water resource end-user or the polluter, i.e. the people who produce waste water?

## Keynote address

### Challenges and Developments in Financing Irrigation and Drainage Sector

Dr. Uma Lele



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.

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Although agriculture must be an engine of growth, vital to economic development, environmental services and central to rural poverty reduction, this centrality of agriculture for development is doubted by many policy makers in developing countries.

Increase in investments – public and private - were the foundation of the Green Revolution in India, Pakistan, and in much of the rest of Asia. Latin America and Sub-Saharan Africa with large expanses of land and relatively little population pressure remained largely rain fed. The current challenges are due to the second generation problems of the Green Revolution and also as a result of radical changes in the “external” global environment including policies of OECD countries.

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 because along with increased irrigation growth, increased urbanization and industrialization have increased inter-sectorial competition for land and water. 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. When combined with mobility of international capital and energy demand, biofuel production possibilities in both advanced countries and developing countries will influence the economics of investment in irrigation. Increasing resilience and stability of agricultural production due to the increasing climate risks has now assumed highest priority. Clearly irrigation and drainage can play a critical role in increasing stability and resilience, provided the design of those investments takes into account climate change impacts, and adaptation and mitigation needs.

Although agriculture must be an engine of growth, vital to economic development, environmental services and central to rural poverty reduction, this centrality of agriculture for development is doubted by many policy makers in developing countries, and, in influential donor circles who see agriculture as a declining sector. 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.

Private financing has become a topic of much interest in recent years and much of it has focused on international finance. Domestic private finance has not received much attention. Farmer financing is by far the largest share of finance and has received the least attention. Further, data on private financing are limited, fragmented and hard to interpret.

What is interesting furthermore is that the lions 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. This includes farmer investments in 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.





It is therefore clear that investments in irrigation and drainage have so far come from four different sources. Domestic and international - both public and private (including farmer investments) together with complementary investments in other sectors have contributed to its growth. It is hard to predict what form this investment will or should take in future and what will cause it to materialize.

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.

At the final parallel session of the sub-theme Dr. Gerhard Backeberg convened a panel discussion with the co-chairs of each of the sessions as panellists. The conclusions of the parallel sessions under the sub-theme were presented by the rapporteurs and following conclusions were recorded by the convenor and rapporteur Ms. Pooja Kapoor.



## 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 turnover 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.

### Sub-Theme: Integrated Water Management Approaches for Sustainable Food Production

Sub-Theme: Integrated Water Management Approaches for Sustainable Food Production was introduced in a plenary session co-chaired by Dr. Dogan Altinbilek and Mr. M. Gopalakrishnan. Ms. Pooja Kapoor took the responsibility as rapporteurs to the plenary session.

In the plenary session the sub-theme was introduced through the "Background Paper" prepared by Dr. Charlotte De Fraiture, Dr. Aynur Fayrap, Dr. Olcay Ünver and Dr. Ragab Ragab. The presentation of the background paper was followed by a keynote address by Dr. Thierry Facon on behalf of Dr. Olcay Ünver. Brief summary of the background paper and keynote speech are given in the following paragraphs. The full text of the background paper and the keynote address are made available in the DVD attached to this publication.

About 40 papers including 3 short communications were received under the sub-theme covering following areas:

- Water-Food- Energy Nexus
- Challenges of sharing water among the sectors (Domestic, Industry and Agriculture) in consideration with increasing population and climate change
- Irrigation and Drainage for the environmental sustainability

Selected 12 papers and some of the short communications were presented during three parallel sessions and were discussed therein. The parallel sessions were extremely well attended. In addition to the papers presented orally many of the submitted papers were presented as Posters. The list of full papers submitted and presented at the



Forum can be seen in Annex 3. The full text of all the papers and the short communications is provided in the attached DVD.

Based on the outcomes of each of the sessions, a panel discussion was organized with Dr. Willem Vlotman as the

convenors and the co-chairs of each of the sessions as panellists. The outcomes of each of the parallel sessions under the sub-theme were presented by the rapporteurs and following conclusions were recorded by rapporteur Dr. Prathapar Sanmugam.

## Background Paper

### Integrated Water Management Approaches for Sustainable Food Production

Charlotte De Fraiture, Aynur Fayrap, Olcay Ünver and Ragab Ragab



Agricultural production needs to be expanded in order to feed a growing and increasingly rich and urban population. Environmental concerns related to over exploitation and poor management of water resources are growing. Loss of vital ecosystems services in some areas may threaten the sustainability of the land and water resource base on which agriculture depends. This implies that water in agriculture, and other sectors such as industry, domestic and tourism, needs to be used much more efficiently and productively. At the same time demands of water for food security and that for energy need to be balanced.

Principles of Integrated Water Resources Management (IWRM) are succinctly described as the desired maximization of the 3 E's: Economics, Equity and Environment. Because these three objectives are not always achievable simultaneously, water management needs to involve trade-offs more often than usual for maximization. Greater pressure on water resources and, hence, stronger interconnectivity between sectors sharing these resources, calls for new, integrated approaches to agricultural water management. It is necessary to explore the links between water, food, energy, and climate.

It is necessary to analyse the role of irrigation and drainage in food production and in providing other ecosystems services that are essential for the sustainable use of natural resources. Just looking at water isolated from food

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In water stressed regions, demands from water for food security and water for energy need to be balanced. This implies breaking disciplinary boundaries and encouraging greater cooperation from planning to implementation.

production would miss important developments outside the water sector that determine the sustainability of agricultural water management. Integrated approaches are not only necessary to ensure sustainability but also to ensure higher benefits per unit of water. At the same time integrating food production with other ecosystem services provided by irrigation and drainage not only contributes to sustainability; it also leads to much higher economic benefits.

Irrigation and drainage potentially provide important ecosystems services. Though its primary goal is food production, other provisioning services are also included like the provision of fish and wood (from trees along canals and water bodies within and outside the command area). Regulating ecosystems services are, among others, groundwater recharge, flood and sediment retention, and carbon sequestration. Potential supporting ecosystems services include erosion control, accumulation of soil organic matter, recycling of soil nutrients, and supporting species diversity by providing a habitat to flora and fauna.

Climate change policies also indirectly affect water allocation and use. For example, because of high energy prices, concerns over GHG emissions and geo-political considerations, several countries set bio fuel targets as part of their energy/climate policy. Bio energy is expected to increase the demand of agricultural produce, in order to increase the supply of transport fuels (i.e. bio-fuels). Production of bio fuels takes substantial amounts of water and leads to reallocation of land and water resources.

The state, use and management of water resources are also heavily impacted by other externalities such as decisions and actions taken in other sectors. Policies on water to allow the use of poor quality water in agriculture, in cooling power generation towers, for example, reduces



the pressure on freshwater resources. As 'water sharing between sectors' is not a straight-forward, mechanical process, the collective outcome of water's externalities has elevated the level of challenge from that of making decisions within the 'water box' to dealing with the mechanisms through which the above work, and the mechanisms that address these.

Approaches to water management that integrate the provision of food, energy and other ecosystem services

are essential to balance the multiple demands on increasingly scarce resources. These approaches require breaking disciplinary boundaries and encouraging greater cooperation from planning to implementation.

While the recent water, food and energy nexus discussions indicate a positive change and a shift from recognition of a fact towards addressing it, much remains to be done. It is therefore imperative to address the challenges of collaboration across sectors.

## Keynote address

### Integrated Water Management Approaches for Sustainable Food Production

Dr. Olcay Ünver (Read out by Dr. Thierry Facon)

Water overarches the complex land, food and energy nexus as it is essential to sustain life and to meet the multiple demands of society's endeavours. To help understand the nexus better, it is important to keep certain facts in mind. Though agriculture uses only 11 per cent of the world's land surface, it is currently the largest user of water, accounting for about 70 per cent of total withdrawal on the global scale mainly through irrigation. The food production and supply chain also accounts for about 30 per cent of the total global energy demand. Estimates suggest that by 2050, global food production will need to be increased by as much as 60 per cent. Achieving such a dramatic increase is a steep challenge, especially in view of low productivity --in the poorest countries productivity can be as low as one-fifth of the potential.

However, experience from the past shows that economic growth does not automatically ensures food security. According to some assessments, 870 million people are



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Irrigation technologies have an important role to play in moving towards food security for the growing global population.

undernourished, many of them because of a lack of access to food. Hunger can persist in the midst of adequate national and global food supplies. In this light, increasing food production is not sufficient on its own to achieve food security and eradicate hunger. Efforts to promote food production must be complemented by policies that enhance households' access to food.

Since 1960, the extent of land under irrigation has doubled. As estimated, there are currently 300 million hectares of irrigated land worldwide. The direct and indirect power



requirement of irrigation necessitates higher electricity consumption. But the demands don't stop there. The indirect energy demand is substantial for operating farm machinery, for manufacturing fertilizers, and so on. The bottom line is that agriculture is heavily dependent on the energy sector.

Policies to ration farm power supply can be a way to encourage farmers to use water more sparingly. Modernization of existing canal irrigation systems may also encourage farmers to reduce their groundwater use.

But agriculture is not only about energy consumption, it can also help to generate energy, through bio fuels. From a developing country perspective, bio fuels have the potential to provide a clean alternative energy source to fossil fuels. However, the optimism regarding bio-fuels has to be balanced against increasing concerns over their economic viability and actual implications for socio-economic development, food security and environmental sustainability. The potential impact of bio-energy production on water resources is of major concern, especially where bio fuel crops are to be grown on irrigated land. The water requirements for bio fuels produced from irrigated crops can in fact be much greater than those for fossil fuels.

According to a recent report as much as half of all the food produced in the world – equivalent to two billion tonnes – ends up rotting in landfills as waste every year. Avoiding food wastage and implementing other efficiency measures now can free up water, energy and land resources that will be critically needed to meet future food demands.

Irrigation technologies have an important role to play in moving towards food security for the growing global population. We will need to make more common use of knowledge-based precision irrigation along with deficit irrigation and wastewater reuse. In combination, these three techniques form a solid platform for sustainable intensification of agriculture. Keeping in mind that crops often take up only half of the irrigation water applied to them, priority should be given to better designing of mechanical irrigation systems for greater water efficiency. Efficient measures can be applied at all stages along the agri-food chain, for example at the farm. Water and energy management can meet in securing socio-economic development. If water, energy and food security are to be simultaneously achieved, decision-makers must consider the impacts of their actions beyond their own sector or sectors and ensuring close linkage between water, food, energy and land.



## OUTCOMES

1. Water, food, energy and climate are not only linked but interdependent on each other. Water management, if undertaken in isolation would leave important developments outside water sector - food and energy production in particular.
2. Agriculture is found to be the largest contributor to non-CO<sub>2</sub> GHG emissions and it is suggested that its mitigation is possible through improved water management.
3. Ecosystems services which are directly not visible such as ground water recharge, reduction in soil erosion, biodiversity support, flood retention and carbon sequestration - but do contribute towards environment, need to be identified.
4. Green economy is well dependent on food-water-energy nexus but it cannot be easily achieved just by optimizing energy, water and food use.
5. Supply Chains - water supply chain, energy supply chain, and food supply chain have to be used for better understanding of the interdependency of food, water and energy in order to map out the flow of resources and goods with the objectives to improve the physical and/or economic environment of the chain.
6. In order to cope with climate change it should be recognized that the impact is highly variable and not universal.
7. There is need to integrate the government departments for EIA assessment so as to make work countable and to reduce administrative confusion.
8. Establishing effective governance structures and clear policies to facilitate the integrated management of energy, water, and agriculture systems is an essential requirement.
9. As conflicts about sharing of water among the countries located in international river basins, as also between users in different sectors have become global issues, it is suggested that water security should be put on agenda of UN Security Council.





## Workshops

Experts from various National Committees of ICID comes together annually under various working groups to exchange experiences and technics under a defined mandate. Some of the topics covered by these working groups are environment, climate, drought, flood management etc. At the WIF1, three working groups took advantage of the presence of experts from other international organizations and organized International Workshops on: (i) Water

wisdom and sustainability; (ii) Developing management strategies for coping with drought and water scarcity; (iii) Management of water, crops and soils under climate change. The technical contents of these workshops were managed by the experts of the respective working groups. Around 40 papers were received. The brief of discussions at these workshops are presented in this section.

### Water Wisdom and Sustainability

Water wisdom of the past which was gained in a period of hundreds of years, can be regarded as a unique and irreplaceable gift from our ancestors to present generation who faces the great challenge of ensuring sustainable development. In this context, the workshop on Water Wisdom and Sustainability organized on 2 October 2013 and chaired by Dr. Kamran Emami, covered topics such as: Water wisdom of the past; Wisdom and knowledge management; Using the traditional methods for creative and modern innovations in water engineering; Re-learning the lost knowledge; and Comparison of traditional methods with modern technology in rural areas.

In all 11 Papers were presented at the workshop. Gist of the best three papers are presented in the following paragraphs.

*Nobumasa Hatcho and Yutaka Matsuno* in their paper "Historical Water Sustainability: Lessons to Learn from Japanese Experiences" bring out the historical agricultural water development and management practices in Japan,

taking account of economic, social, and environmental factors. In achieving economic sustainability, or productivity and stability, technological innovation always plays important roles. However, technology can only be a necessary condition for achieving productivity in terms of food production. Without proper governance structure to manage and maintain the system, it would not lead to sustainable development. Similarly, the fruit of development should be shared among the stakeholder of development to ensure necessary participation for operation and maintenance of a system and investment for future rehabilitation and modernization, the authors pointed out.

The authors have advocated establishment of some mechanism of benefit sharing to motivate people to participate and cooperate. With successful development, population will increase and resource constraints will follow. The mechanism of sharing limited resources and conserving these resources will be an important



governance mechanism for sustainable management. The authors advocate that the production frontier needs to be expanded through technological innovation without resorting to further exploitation of limiting resources, particularly land and water and the wisdom of people to overcome these challenges factored in.

*Abbass Jangi Marani, Hadi Ramezani, Mehrzad Ehsani* in the Mojen case study, presented as a paper entitled ‘Lessons Learned from Traditional Community on Participatory Irrigation Management’ observed that the special climatic conditions in Iran and limitation of water resources made the Iranians tactfully find methods for water supplying, conveying, distributing, operating, maintaining, managing, and especially preventing water loss. They also observed that in traditional irrigation systems the social farming units were able to operate and maintain the traditional systems. In one of the oldest examples of participatory irrigation management called Mojen on Pishdeh River, the farmers’ community had applied very traditional system of operation as the main available water resources named “block System” since 1963. Water was distributed in a tranche of 10 days between each block.

Since 1963, procedure of water distribution in this irrigation scheme improved in order to prevent water losses. In fact, structural reform on water distribution in Mojen irrigation scheme has resulted information of a new public irrigation and agriculture company with entire water users and beneficiaries as the main stakeholders. For optimum usage of limited water and increasing the irrigation efficiency in the scheme, Water Users Association had constructed modern irrigation infrastructure with the financial support of the government. Managing board of company is elected

for a two years period and authorized to specify water fee at the beginning of each water year. The collected water fee covers all expenses of operation and maintenance of irrigation system. As such, this traditional WUA is independent from any subsidies, national law on water fees, and some other laws issued by government.

“Kurit Historical Dam: an Illustrating Example of Water Wisdom” was presented by *Kamran Emami and Sonbol Hemati*. Kurit dam near Tabas, Iran, has regulated the Kurit River for irrigation for 600 years and can be considered as a symbol of sustainability. The arch-gravity dam is especially remarkable for its extraordinary height of 60 m. This was to remain a world record for any type of dam from 1350 until early 20th century. Despite the fact that the dam was built 600 years ago, it still serves as an illustrating example of harmony with floods, sustainable development, coping with uncertainties and water wisdom. The authors point out that the overtopping resistance of arch masonry dam was vital to its safety. The periodic sediment flushing through a 22-meter high intake tower increased the useful life of the dam substantially and ensured sustainable development. Kurit dam has experienced the Tabas earthquake in 1978 with a magnitude of 7.8 without even minor damage. In view of the structural, geological and hydrological uncertainties plus technical limitations, stage construction was resorted to and has been instrumental in increasing the useful life of the dam. In view of uncertainties caused by climate change and ever-increasing importance of cost effectiveness in dam’s construction and operation, Kurit dam could inspire many water engineers from all over the world.

## OUTCOMES

In view of the challenges of water crisis in 21<sup>st</sup> century, water engineers and scientists must accept the challenge of sustainable development to ensure that they meet the needs of the present without compromising future generations. They should translate sustainable development into the concepts of designing, operating and maintaining water resources and water projects.

With today’s sophistication, the time step for a typical data to wisdom process may be in order of weeks or months in industrial cases; but in the context of water engineering, the time step may be a year or a decade or a century. Against this backdrop, the water wisdom of the past achieved in the course of centuries can be regarded as an irreplaceable gift from the previous generations.



The workshop was held in two sessions on the afternoon of October 2, 2013. The session was conducted by Co-Chairman Mr. Mohammad Sadeqh Jafari from Iran, who while opening the session, emphasized the need to distinguish between drought and water scarcity. Drought is a description of a natural phenomenon describing conditions where for a period of time precipitation is below the historical average for a location. Scarcity is related to human activity, and describes a condition where the water available for human use is less than requirements or customary levels of enjoyment. Hence, scarcity occurs even in humid regions, when the spatial or temporal distribution of available water is not adequate to meet human needs with the current water-use patterns and infrastructure.

Out of the 18 Papers received for the workshop, seven papers were orally presented. In addition, Dr. John Metzger of the Global Water Partnership presented an introduction to the Integrated Drought Management Program being implemented by World Meteorological Organization in collaboration with GWP, together with many other international organizations.

The paper on “Drought Related Studies Conducted in Taiwan Beyond 1990’s” by *Jan Ming-Young and Cheng Chang-Chi* provided a description of the geographical, climatic infrastructure and population characteristics that result in conditions of water scarcity in a humid climate. The variability of precipitation appears to be increasing in recent years, with higher flood peaks and more frequent water shortages. Taiwan’s response constitutes three phases: i) Scientific investigations; ii) Infrastructure, administrative efforts to increase water availability; iii) Work on long-term efforts to accept and cope with climate change.

In their paper “Recent Trends of Drought Conciliation and Agricultural Water Use in Japan”, *Takanorio Nagano and Akihiko Kotera* described Japan’s historical use of irrigation for rice production. Water rights were historically performed with oldest paddies served earlier in times of shortage. Adjustments in times of shortage were made on a local basis, between paddies in close proximity. The New River law of 1966 created a local Drought Conciliation Council with the guiding principle of ‘Drought Conciliation with Mutual Respect’. Conciliation actions can include limitation on diversions, rotation of water use, and reuse of drain water. Typically a conciliation action is triggered when reservoir contents are 20% to 30% lower than usual for a given time period. They cautioned that predicted future reductions in snowpack, even in the face of predictions of increased annual rainfall, indicate an uncertain future.



*Clarke Ballard, Neville Garland and Jim Foreman* presented “Management of Drought in the Southern Murray-Darling Basin, Australia, from 1996/97 to the Present”. Mr. Ballard informed that the Southern Murray-Darling Basin which includes half of its irrigated area and two state capital, lies in three states, with complex water sharing agreements. This physical structure and the presence of water trading have created many complexities in water accounting. From 1996/97 through 2010/2011, the basin suffered an unprecedented drought and associated water scarcity. Mean precipitation for that period was approximately half of the long-term mean. Storage mitigated the effects of the drought for a period of time, but by 2007/2008 the scarcity effects were severe. Effects upon the environment were also severe.

“Drought Management Strategies of the Water Resources Agency, Taiwan – A Case-Study at the National Level” by *Tien Chiao-Ling, Cheng Chang-Chi and Jan Ming-Young* described the working relationships between the Water Resource Agency and Council of Agriculture of the national government, and local irrigation associations and local water companies. The strategy presented by Mr. Cheng was the preparation of a tiered response chart based on irrigation-water availability.

In their paper on “Hydrologic Drought Index Based on Traditional Pasten System” by *Waluyo Hatmoko, R. Wahyundi Triweko and Iwan K. Hadihardaja*, Mr. Hatmoko discussed the differences between drought and other natural disasters, which make response to drought especially difficult. He pointed out that there are no any directly observable structural changes such as collapsed buildings or washed-out roadways that typically mark other natural events. It is therefore important, he pointed out that “If we have an index, we can know when we are in a drought, and how strong it is. Then we can decide action.” Based on this premise he described efforts to develop a drought index based on the traditional Pasten



system of Indonesia. The Pasten rating is based on “Factor K,” which is the ratio of supply to demand. Supply is quantified by the quantity of stored water in the reservoir system, and demand is calculated based on hectares of crop and meteorological consumptive use requirements. The conclusions of the study were that the constructed index was useful to index the intensity of a drought, but not its duration or expected end point. The applicability of this index in other basins remains to be ascertained.

Mr. Chang Jo Oh presented his paper on “Korea’s Drought Status and a Case-Study For Drought Overcome in 2012”. He described that the per capita precipitation in Korea is 1/6 of the worlds’ average. Temporal distribution of rainfall is highly non-uniform, with 74% of the annual precipitation occurring by heavy rain storms in June through September. Mr. Chang described responses to the drought of 2012 which included: Physical re-distribution of water using pumps and temporary pipelines; Delivery of fresh water to dilute the salinity of one water-supply source, Lake Busan; and Well-drilling and dredging to provide access to additional water supplies.

The paper presented by *Ramana Gowda, P. Krishnamurthy, N. Suresh Naik and K.P. Asha* entitled “Rehabilitation of Irrigation Systems – Networking of Irrigation Systems to Mitigate Drought for Sustained Agriculture Production in Karnataka, India” informed that climate change is affecting local water availability in India, and that the government is responding by investing in infrastructure. They described a project where an irrigation system network was extended to link isolated storage tanks with an existing irrigation system based on two large reservoirs. Results include an increase in irrigation of approximately 30%, and increase

in crop production of 40% to 80%, and an increase in aquifer recharge by 40%.

### Integrated Drought Management Program



Dr. Metzger described the Integrated Drought Management Program (IDMP) as a joint initiative between his organization with the Global Water Partnership and the World Meteorological Organization. The IDMP is intended to be an adjunct to the existing Flood Management Program with focus on: Mitigation; Preparedness; and Prediction and early warning. It is intended to be a program that shifts the focus from being reactive to proactive. It is a multiple-stakeholder paradigm designed to be a mechanism for sharing knowledge among stakeholders and building capacity of stakeholders. The objective is to support stakeholders so that they can mitigate, prepare for, and predict drought and scarcity. The program has two main thrusts: To develop tools, and to build capacity. Demonstration projects exist in Central Europe and in Africa, and are planned for south Asia.

## OUTCOMES

Explicit strategies and implicit in the case studies presented by the presenters include the following:

1. Develop the capacity to predict the beginning, duration, and end of a drought or scarcity;
2. Continue to develop water resources, including development of supplemental groundwater supplies supported by recharge;
3. Manage water use and demand through better crop management;
4. Modify water allocation rules and protocols during times of scarcity;
5. Develop community based negotiation mechanisms in order to physically redistribute available supplies during times of scarcity; and
6. Provide water-trading mechanisms in advance of times of drought or scarcity.

The workshop was organized on October 2nd, 2013. Seventeen contributions both oral and posters were presented. The workshop was chaired by Dr. Ragab Ragab.

The workshop recognized the impact of climate change on water resources, food and feed production. The change in rainfall and increase in temperature is leading river and reservoirs to run dry, plus high evapo-transpiration rate subsequently increasing irrigation requirement and water demand for agriculture. Risk and vulnerability assessments and analysis for probability of occurrence of extreme events are needed to better manage water supply and demand. Adaptation to climate change measures included, better prediction and early warning, adoption of proactive rather reactive approach, reducing water losses in the irrigation network, using high efficient irrigation systems, using drought tolerant varieties, using poor quality water, recycling water for multiple use, improving land management and methods of cultivation (e.g. dry rice), policies on water supply and demand management especially during extreme events, increasing water supply and optimizing water demand and raising farmers awareness of the climate change impact and supplying them with simple guidelines on how to cope with changing climate.

*Budi I. Setiawan, Arief Irmansyah, Chusnul Ariftsugihro Watanabe, Masaru Mizoguchi, and Hisaaki Kato* in their paper on “Characteristics of CH<sub>4</sub> and N<sub>2</sub>O Emissions under Various Groundwater Levels in SRI Paddy Field” reported considerable increase of yields and water productivities by reducing water level and by reduction in greenhouse

gas emission from conventional paddy fields. A program was initiated to measure methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O) emission in paddy fields following System of Rice Intensification (SRI) since 2008. The results showed that lower groundwater level produces lower soil moisture and pH but higher soil temperature, and complicates behaviours of CH<sub>4</sub> and N<sub>2</sub>O. In some cases, lower soil moisture increased CH<sub>4</sub> and increased N<sub>2</sub>O, but in general CH<sub>4</sub> and N<sub>2</sub>O emissions varied considerably with soil pH, moisture and temperature. It was noticed that lowering groundwater level had reduced biomass production, yield and water productivity without any significant impacts on greenhouse gas emission. In conclusion, maintaining groundwater level to condition soil moisture closer to saturation is advisable practice of water management in SRI Paddy Fields.

“Effect of SRI Water Management on the Mitigation of Greenhouse Gases” by *Joongdae Choi, Guenyeob Kim, Woonji Park, Suin Lee, Dongkyun Yoon and Sunjoo Kim* described an experimental field plot study performed in 2011 to measure the effect of SRI paddy water management in Korea on greenhouse gas (GHG) emissions. Experimental treatments implemented were conventional paddy cultivation, conventional paddy cultivation with SRI water management regime, and conventional cultivation with two forced mid-season drainages. Each treatment was replicated. GHG emissions (CH<sub>4</sub> and N<sub>2</sub>O), rice yields, and other relevant variables were measured and analyzed. Trial results indicate that SRI water management in Korean paddy farming could significantly decrease the crop



irrigation water requirements and GHG emissions into the atmosphere. SRI water management method could apparently mitigate global warming and climate change.

“Integrated Assessment of Projected Climate Change Impacts on Maize Production in the Central Free State, South Africa,” by *Y. Beletse, W. Durand, O. Crespo, M. Jones, W. Tesfuhuney, S. Walker, C. Nhemachena, M. Teweldemdhin, and D. Cammarano*, presented projected future changes in climate for South Africa which showed an increased frequency and severity, increasing the risk of crop failure and food insecurity in the region. The study was conducted in Mangaung district, in the Free State Province. Simulated results indicated that the growers in the Mangaung district will experience an 8 % yield loss for the early century period 2010-2040. This yield, however, seems to decrease much more radically in the mid-century period (2040-2070) with yield losses of up to 60% of the present. It is projected that only 4% of all the farms would gain from climate change; or equivalently, that 96% would lose. The results imply that maize production will be adversely affected by changes in climate in the future in the region and commercial farmers will be affected most which will have major implication to food security in the region.

*Yong-Jun Lin, Kuo-Chen Ma, Po-Chia Chen, Yih-Chi Tan, and Keshav R. Adhikari* in their paper “Water Supply Strategy Due to Climate Change: A Case of Shihmen Reservoir In Taiwan” showed that the reservoir is over time affected by increased frequencies of water shortage on the one hand, and sedimentation and overflows on the other, due to unpredictable cycles of droughts and typhoons necessitating heavy repair and maintenance costs. Using hourly rainfall from GCMs of A1B scenario, it was found that maximum of reservoir inflow of 48 hours of 200-year return period (16847 cumecs) of baseline is larger than that of A1B scenario (12617 cumecs). On the other hand, the total volume of reservoir inflow shows the opposite trends, the total volume of reservoir inflow of A1B scenario (229386 m<sup>3</sup>) is larger than that of baseline (226560 m<sup>3</sup>). Based on historical data (1963~2008) of sediment deposition, the estimated sediment deposition of Shihmen Reservoir of 2039 was about 1.43\*10<sup>11</sup>m<sup>3</sup> which is about 1/3 of its design effective storage (3\*10<sup>11</sup>m<sup>3</sup>). That makes dredging impossible and may induce severe water shortage.

According to *Eun-Mi Hong, Jin-Yong Choi and Won-Ho Nam* from Korea, the occurrences of the extraordinary low and high temperature, severe rain storm, and snow events have been increased in the abnormal climate background, as reported in their paper “Modelling and Analysing of Soil Moisture Characteristics by Climate Change in Upland Area

of Korea”. As the crops in upland get water for the growth through soil, it was reported that soil moisture is the important and crucial factors and any changes affecting soil moisture are related to the drought as well as crop productions. In this study, the possibilities to available water for upland irrigation, and soil moisture characteristics affected by climate change were analysed by soil moisture modelling considering currently representative crops and cropping systems in upland regions. It is expected to be able to analyse evapo-transpiration changes, shortage or excess of soil moisture on upland agricultural areas. Also according to these results, it is possible to show future drought vulnerability for raising crops. In addition, it is also expected that the results can be used for making irrigation guidelines of upland cultivation in abnormal weather conditions.

“Potential of Underutilised Crops in Adaptation to Climate Change: Example of Bambara Groundnut and Pearl Millet” by *Sue Walker, Asha Karunaratne and Zaid Bello* investigates under-utilised or alternative crops to enhance the crop productivity and nutritive value available to the communities, as well as to promote crop diversification. Two examples of under-utilised crops were discussed, namely Pearl millet and Bambara groundnut, which are both hardy and drought resistant, both hold potential for introduction into South Africa which will become drier in future climate change scenarios. The downscaled climate scenarios were used to test the biomass, yield and water use performance of both crops for future climates. Bambara groundnut landraces that originated from hot and dry climates reportedly adapted better to dry and hot conditions in present and future climates. Pearl Millet did not show such suitability.

The research study “Diverse Scenarios of Impact and Adaptation of Global Changes on Water Resources and Agricultural Practices”, presented by *Suman Sijapati, Shreedhar Maskey, Uttam Timilsina, Ezee GC, Susheel Acharya, Basu Timilsina and Prem Lasiwa* clearly revealed that the farming community is experiencing the impact of global climatic changes in different ways. Based on their available resource base, the way they perceive and are impacted by the changes also differs from one agro-ecological zone to another. However, they also seem to have developed their own mechanism of adapting to their particular agro-ecological context (climate, land slope, water availability, etc). They are using different techniques like selecting appropriate crops, shifting the cultivation timing, and even changing the traditional practices (methods of irrigating, weeding, fertilizer application, etc.) to cope up with the external changes.

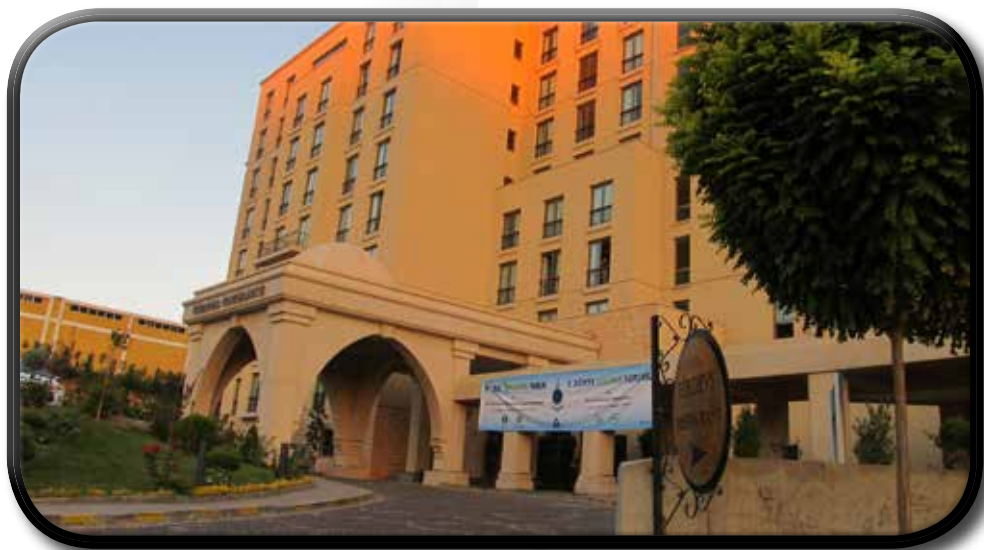




### OUTCOME

It was obvious from the presentations with global evidence that the climate change is a fact not a fiction and the scepticism about the climate change is reversing to believing in. The current extreme weather events of drought, floods, hurricanes, tornados, and cyclones are becoming regular visitors more than ever. In agriculture industry, the impact is visible through the change in sowing and harvest dates, length of growing season, water availability for irrigation, evapo-transpiration and the shift in agro-climatic zones. The papers presented

covered a wide range of climate change impact and offered solution to counter the impact through adaptation and mitigation measures. These covered the introduction of new water management techniques (e.g. SRI for Paddy Rice), new drought tolerant crops (e.g. Bambara groundnut), reducing greenhouse gases (NH<sub>4</sub>, N<sub>2</sub>O) through lowering the groundwater table, and reservoir management. The results also indicated that farmers are now familiar with the changing climate and are adjusting their activities accordingly.





# Roundtable and Panel Discussions

## Round Table: Policy Issues in Irrigation and Drainage

By 2025, water management will be a very different issue because of the rapid changes in traditional drivers like population, urbanization and industrialization but also due to factors that the water profession has never considered before, issues like globalization, free trade, information and communication revolution, immigration within and between countries, and advances in science and technology in non-water sectors which would have profound impacts on the water sector and on which the water sector would have very little control. While hunger and poverty prevail, both water and food security will be high on the political agenda. For many countries with insufficient water storage capacity, there is a need for creating additional storages as a part of its food and energy security agenda.

Traditionally governments have been responsible for developments in the irrigation sector through planning, design and construction of projects. Trends toward decentralization, fiscal crisis and growth of the private sector have lead government to divest some of its role to user organizations and the private sector. This has been known as the participatory approach to irrigation management and has been adopted widely in many countries with a range of institutional arrangements.

Modernization and improvement of irrigation is occurring worldwide at varying rates and degrees. This alone will not address the issues of water and food security. Policy, management, institution and governance are also key areas which need to be considered and addressed.

The round table was expected to throw light on policies and practices at international, national and local levels that will help achieve water security, food security, energy security and environmental sustainability.

**Chair:** Mr. Jeremy Bird, DG, IWMI

**Facilitator:** Prof. Dr. Doğan Altınbilek, VP, WWC

**Rapporteur:** Dr. Suresh Kulkarni, ICID

**Participants:** Dr. Aiguo Wang, Director General, Irrigation and Drainage, China  
Mr. Akif Ozkaldi, DG, DSI, Turkey  
Mr. Shiv Kumar Sharma, Director General, Deptt of Irrigation, Nepal  
Dr. Hafied Ghany, Indonesia  
Prof. Bart Schultz, Rijkswaterstaat, The Netherlands  
Dr. Rudolf Cleveringa, IFAD





In many of the developing countries, the policies to undertake irrigation schemes are being favoured and linked to regional development strategy in economically backward areas, so as to raise income and prevent migration of rural population to urban area. In Nepal, the Government has two major objectives in irrigation development, namely poverty alleviation and achieving food security. The situation in developed countries is slightly different where the water is treated as a part of ecosystem and water quality control and monitoring is given greater emphasis with a vision to control non-point source pollution from agriculture.

To cope up with the growing water demand by various sectors, Governments in countries such as Turkey India and others are also promoting development of non-conventional sources, groundwater, inter-basin transfer of water schemes, etc. Governments also intend to decentralize irrigation management from provincial level to district and further to village levels. They are therefore promoting PIM through Water User Associations but still there are some issues needing attention. At the same time Governments are also encouraging private sector investment in cash crop farming. For IFAD, rural water security has been the main focus. It aims to promote the pro-poor governance through strong local institutions, promoting dialogue between civil society and private sector.

These policies are implemented by undertaking large irrigation schemes such as GAP project in Turkey to supporting construction of small storages at farm level. One of the major focus of the policy is to increase water use efficiency leading to water saving in irrigation. Today, the water saving in irrigation is practised on large scale

farms in China totalling 20 million ha of irrigated area , similarly operating low cost, small-scale micro irrigation systems in Nepal where they have been found to be useful for generating additional farm income and thus alleviating poverty of small holders.

Emphasis on modernization of irrigation systems starting from mains to on-farm levels . Conventional open channel system of water conveyance is being replaced by closed (piped) conveyance system. Farmers are encouraged and financially assisted to adopt efficient water application tools like drip and sprinkler on their farms. Drainage system is provided to prevent salinization of lands due to irrigation. In case of rehabilitation of old irrigation schemes in China, the Government provides 80% share of the cost while the rest 20% is borne by the farmers. Substantial subsidy is provided in the use of sprinkler and micro irrigation systems to the farmers in other countries such as India.

Some of the areas that have escaped policy interventions were also discussed but only to a limited extent as they do not cover all the aspects that require attention. There is a need to build/ develop capacity of irrigation managers, Water User Associations and farmers to handle the modern irrigation methods. Except for few countries such as Indonesia, there has been little or no attention paid to the development of human resources in irrigation sector as there is paucity of trained irrigation managers and staff. International Fund for Agriculture Development (IFAD) investments are directed in capacity building, in developing institutional mechanisms towards accountability and transparency, and in monitoring and evaluating the impacts on livelihoods of farmers.





- Chair:** Mr. Sadrettin Karahocagil, TUCID
- Facilitator:** Dr. Rudolph Cleveringa, IFAD
- Rapporteur:** Mr. Adama Sangare, AMID
- Panel:** Mr. Abdel Wahab El Hadad, Farmer, Egypt  
Dr. Gürhan Demir, DSI, TUCID  
Mrs. Zahide Datho, Farmer representative of WUA, Pakistan  
Mr. Mukhlis Zainol Abidin, Farmer's extension agency, Malaysia  
Mr. Kevin Anderéjewashi, IDE  
Mr. Vedat Timuragaoglu, Farmer Turkey  
Mr. Halil Karahan, Farmer Turkey

Considering that farmers are the most important stakeholders in agricultural water management, an exclusive panel addressing their concerns was organized. The Panel consisting of farmers, representatives of water users' association, government representatives working with farmer associations and managers of government agencies participated in the discussion. The issues under discussions were centered on the needs of farmers and the practices that can be adopted to fulfill these requirements. Discussion also focused on the key roles of farmers in the Green Revolution of the 70s. Turkish farmers referred to their investment and better return from the investment but are compromising with energy cost. Intervention through the top-down approach to irrigation development for small holder farmers, who often face constraints like weak property rights, resource poverty, lack of access

to markets and financial services, and limited ability to tolerate risks, generally face roadblocks like intervention of too many agencies and long delays caused by bureaucratic procedures. Farmers participating in the panel expressed the need for integrating dialog with multifarious agencies and for making access to information. They pointed out that the systems often fails to respond to the needs of farmers. They desired to have access to good services. They would like to have insurance covering risks of crop losses due to weather conditions specifically frost.

Agencies providing services pointed out the need for market access, the constraints related to the protection and competitiveness-related subsidies. It was noted that to organize and deal with large number of smallholder farmers is more complex. Agencies have problems with the elected representatives of the farmers because they do not yet understand the voice and power of farmers.

Farmers lamented that agencies disregard the expertise of farmers and are not always aware of the challenges posed by the land situation. They opined that establishing WUA is the best way to improve agriculture water management since WUA as power can talk to government. They insisted on non-politicization of their organization to avoid political interference in system management and influences of landowners. They regretted that women are scarcely or not at all represented in WUAs. Farmers organizing such groups or managing WUAs require skills not only in terms of administrative and financial management but should also be backed by technical know-how. Most of this technical know-how is expected to be provided by the



irrigation engineers working in irrigation departments who themselves are lacking in exposure to some of the modern technologies.

Farmers were aware of the need for more training on water management aspects, avoiding water loss. Agencies recognize their inability to train and have asked the donors to assist them in providing the services such as farmers' field school, learning routes and farmer to farmer service. Capacity development and training of farmers,

WUA functionaries, and irrigation agency staff is required on continuous basis. There is a need to explore other mechanisms to develop capacity of WUAs to deal with technical issues related to their area of activities.

Farmers concluded that they would like to have access to training programs and exchange of experiences, to participate in research and extension, capacity building of farmers unions. They are aware of the subsidies, but would like to be more independent. All of them would like to have secure access to water on time, in adequate quantity and quality. They expect that they should receive water as per their water rights as a farmer, so they need equitable distribution, reliable water supplies, efficient flows causing less drainable surplus, and as per satisfaction of users.

It was pointed out that farm workers are voiceless as it is landowners who take all the decisions within or outside the WUAs. Farmers conclude that they would like empowerment of (near) landless farm workers and sharecroppers. Farmers want to be included in the decision-making process as full citizens with rights and obligations.

### Panel Discussion: Sustainability of Innovations in Irrigation and Drainage: Industry Perspective

**Chair:** President Hon. Peter Lee, UK Irrigation and Water Forum

**Facilitator:** Dr. Bharat Sharma, IWMI

**Rapporteur:** Mr John Ginnivan, Goulbourn Murray Water, Australia

**Panel:** Mr. Sahin Bekisoglu, Turkey  
Mr. Kevin Andrejezwaski, IDE  
Mr. Adama Sangare, Consultant, Mali

Often it is pointed out that necessary data, information and knowledge for bringing about the paradigm shift required in agriculture water management is lacking and where available is confined to institutional silos. By now, it is an accepted fact that irrigation and drainage sector have not been fully benefitted from the science and technology and rapid advancements in information technology. Although challenges of food security differ from one part of the world to another, the common element which stands out in most countries is the poor governance and the lack of path breaking science and technology thrust in this sector despite tremendous progress in IT, remote sensing technologies, climate prediction and nanotechnology. Use of such technologies has really not penetrated enough, particularly in developing countries. In most cases the industry has failed to deliver these technologies to the farm level.



The panel discussion to ascertain the industry perspective was attended by some 10-15 participants. There was a good level of participation in the discussion, facilitated by Dr. Sharma. The chair-person, Mr. Peter Lee opened the meeting with a brief presentation with the objective to identify the various industry players in irrigated agriculture.

The panel explored the complete spectrum of various private sector players that can play important role in day to day activities of the farmers. Commercial farmers, product chain players: seed, agro-chemicals, credit and advisory services, product harvest and post-harvest processors, marketers; infrastructure chain players: system designers, constructors, analysts, equipment suppliers, water and



energy supply (and recovery) and transport. In this context they might be defined overall as: individuals and corporate entities engaged in manufacture, trade, production and service providers for agriculture.

It was pointed out that farmers come in contact with industry in many ways, for example in product harvesting and handling. Farmers are commonly more concerned about energy before water. Therefore, energy needs to be included while considering sustainability. Farmers need financial help, so credit suppliers also need to be included.

Exploring the various ways in which “industry” might become more involved in ICID activities, the panel expressed that the best way would be to broad base the National Committees by facilitating the participation of industry. Another way in which this objective could be achieved is through the involvement of industry players in ICID as direct members, as individuals or corporate members (where participation through the National Committees is not possible).

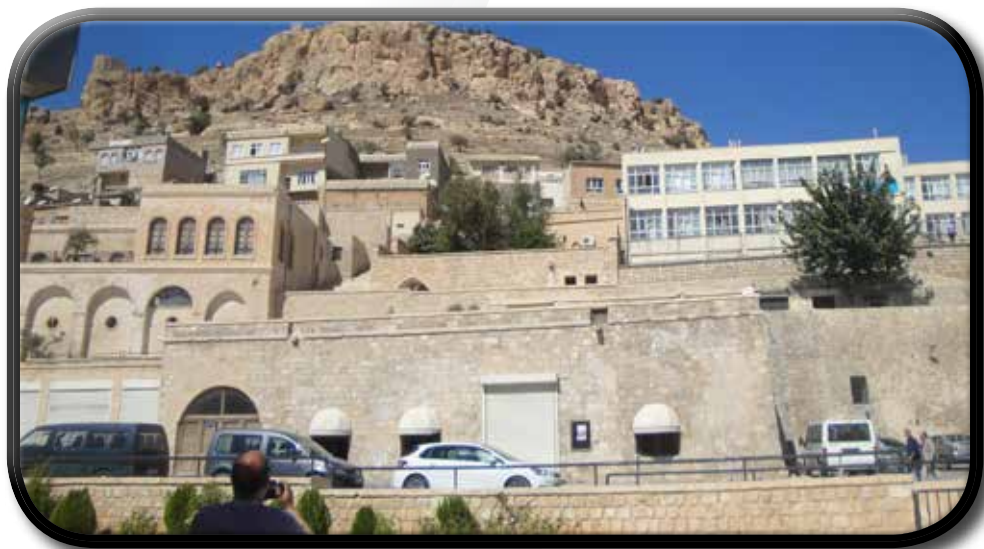
In addition to the conventional roles, industry has the potential to take on new functions (e.g. maintenance) and bring in useful new technologies. Some technology can save significant volumes of water. More investment is needed to bring more irrigation and higher productivity to Africa. One cannot manage water without measurement.

However, one has to keep in mind that there are big differences between countries, and industry needs to be



more involved with National Committees to discuss issues more locally. On the other hand, some local challenges (e.g., scaling up interventions) can be seen to be overcome elsewhere, and ICID can help share this System design needs to be more root-up rather than top-down, and listen to the farmers. Custodians of the environment are also becoming players, especially in more advanced economies. Companies in advanced countries are responding to their customers concerns about sustainability of their product sources around the World and there is an opportunity to involve them in ICID.

The overall conclusion was that that irrigation and drainage community has a pivotal role in ensuring the sustainability of a great industry but we need to get more industry players into ICID to do this more effectively.





## Side Events

Side events were organized in order to provide various national and international organizations and institutions with the opportunity to showcase and share various activities that they were involved in that would enhance the opportunities and enable overcoming challenges. In partnership with water-related international organizations and other partners, ICID has organized 23 “Side Events”

on a variety of topics related to the theme and topics of ICID’s First World Irrigation Forum and these side events presented a spectrum of views and constituted one of the most successful segments of the WIF-1 (Annex 8). The side events were organized by more than 13 international organizations and 10 national institutions. These included five short films.

### Report on Side Events

These 23 side events covered the wide canvas of irrigation, drainage and flood management. Side events showcased Turkish institutions covering subjects ranging from water civilisation, piped irrigation, water powered pumps, ground water, GAP - regional development project, management, up to sustainable irrigation. International organizations also presented various facets of activities they are engaged within irrigation management. The Japanese National Committee of ICID (JNC-ICID), through their side event, presented the future vision of participatory irrigation management. IWMI focused on remote sensing and GIS tools while FAO promoted investment in agriculture water management in Africa through their side events. IFAD focused on intergenerational knowledge transfer in the agricultural water management and brought a number of young professionals engaged in agriculture water management activities from African countries. WMO and GWP presented different perspectives and the globally coordinated activities related to Integrated Drought Management. In the following paragraphs one could find a glimpse of each of the 23 side events covering all important aspects during these events.

The side event titled “Building local frameworks for integrated water resource management in large irrigation systems” was organized in association with Research Institute for Humanity and Nature in Japan (RIHN). The

key speakers during the session were: (i) Dr. Mehmet Ali Çullu (Harran University), (ii) Dr. Takanori Nagano (Kobe University), (iii) Dr. Mustafa Aydoğdu (Harran University), (iv) Dr. Mahmut Çetin (Çukurova University) and (v)

Dr. Erhan Akça (Adıyaman University). The key item deliberated during the event were -- Eco-design and co-production of governance over water resources among stakeholders of large irrigation systems taking into account environmental, social and economic sustainability principles. And the key issues discussed were Water and land resource governance, Upstream and downstream water governance, Water related environmental issues, and Water related socio-economic issues.

The side event on “Use of Remote Sensing and GIS Tools in the Irrigation Commands to assist planning and management” was organized by IWMI. The event was chaired by Dr. Peter McCornick, Deputy Director General of IWMI and the speakers were Dr. S.A. Prathapar, Dr. Bharat Sharma, Dr. G. Amarnath and Mr. Salman Siddiqui, all belonging to IWMI. The key proposals of the event were: Collaboration on sharing ICT (Information Communication and Technology), GIS (Geographic Information Systems) and RS (Remote Sensing) technologies on irrigation performance assessment. The main issues deliberated were: (i) ICT, GIS and RS technologies in Irrigated





Agriculture, (ii) flood modeling and forecast, (iii) assessment of adequacy, equity and reliability of water for ET requirements (irrigation performance assessment), and (iv) irrigated area mapping by remote sensing.

The side event on “Natural and Cultural Protection in Development of Water Resources” was organized by DSI, Turkey. The speakers during the event were: Mr. M. Sait Tahmiscioğlu, Mr. Ahmet Tomar and Mr. İrfan Albayrak. The event deliberated upon the importance of protecting the natural and cultural heritage while, at the same time, achieving the objectives of irrigation and drainage related investments in terms of sustainability. The event highlighted how bats were protected by the construction of an artificial cave when their habitat a natural cave was flooded due to the construction of Havran Dam and how the historical monuments were preserved in the ancient city of Paşa Ilıcaları, when it was flooded by Yortanlı Dam, through innovative projects. Twenty-five persons participated in the event, mainly from academic institutions, DSI staff, private sector, NGOs and government institutions from the provinces of Balıkesir and İzmir of Turkey.

The fourth Side Event addressed the topic “Basin Management and Utilisation of Treated Water for Agriculture”. The event was organized by DG for Water Management, Turkey and the key speakers were Selçuk Coşkun and Güney Can. It was proposed that all the members of the D-8 countries would be requested to undertake the SWOT Analysis as one of the D-8 Water Cooperation activity in line with the one prepared by Turkey. SUEN will send it to D-8 member countries. It is announced during the session that 2nd D-8 Water Initiative gathering is planned to be held in Iran in 2014 with the aim of moving the cooperation in the field of water management among the D-8 member countries one step further and the outcome of panel discussion will provide essential inputs to the D-8 Water Cooperation Meeting in Iran. The panel discussion was based on two presentations. The first presentation “Reuse of Treated Wastewater” was made by Mr. Güney Can. In his presentation, Mr. Can gave some information about the need, opportunities, benefits, techniques and applications of reuse of treated waste

water. The second presentation was made by Mr. Selçuk Coşkun. In his presentation, Mr. Coşkun gave general information about reuse potential of treated waste water. Participants from Government and NGOs from regions such as Middle East (Turkey, Iran), South Asia (Pakistan), Southeastern Asia (Indonesia-Malaysia), and Africa (Nigeria) attended the session.

The Side Event on “D-8 Irrigation Panel” was organized by Turkish Water Institute (SUEN). The key speakers at the session were Mr. Seyed Ali Mohammad Mousavi, Mr. Ekosubekti Moeljono (Indonesia), Dr. Saeed Nairizi (Iran), Mr. Syed Abdul Hamid Bin Syed Shuib (Malaysia), and Mr. Akif Özkaldi (Turkey). Mr. Mousavi, D-8 Organization Secretary General, in his opening speech proposed to the D-8 audience and to the participants to determine the ways to collaborate in the water field. The Panel was divided into two parts and in the first round of the panel, the challenges faced by the D-8 member countries in irrigation and drainage fields were listed by the representatives of the 4 member countries. In the second part, good practices in the member countries to cope with these challenges were presented and cooperation opportunities among the member states were discussed. Mr. Akif Özkaldi, Director General of DSI, listed the challenges in Turkey in irrigation and drainage fields. Dr. Saeed Nairizi, gave some information about the water management in Iran and stated that Iran has much experience in this field. Mr. Eko Subekti Moeljono stated that deterioration of catchment areas is one of the challenges in Indonesia. Mr. Syed Abdul Hamid bin Syed Shuib stated the problems in Malaysia and pointed out that inter-sector water demand is increasing. In the second part of the Panel the good practices in the member countries to cope with the above listed challenges were explained and the panelists also discussed the cooperation opportunities among the member states.

Near Eastern University - Northern Cyprus organized the side event on “Pipeline Project from Turkey to Cyprus: The Importance of Irrigation Water”. The speakers at the event were Prof. Dr. Hüseyin Gökçekuş, Mr. Ayhan Taşkın and Dr. Sevgi Donma. Mr. Gökçekuş emphasized the need for the reassessment of water management policies and



proposed to raise awareness among women and children about importance of water usage. TRNC Pipeline Project is planned to be finished by 7 March 2014. The main issues were addressed through three presentations during the event. In his presentation, Mr. Gökçekuş gave some information about the situation of water, precipitation, temperature and hunger around the world, Mediterranean region and TRNC. Mr. Taşkın in his presentation gave detailed information about the technical properties of the project, pipeline and the included dams. The third presentation was made by Dr. Sevgi Donma who gave information about the regions that will be irrigated by the pipeline project. Participants were from governmental and international organizations from Asia, Africa and Middle East.

WMO organized the side event on “Climate Services to optimize irrigation use and improve farmer management in agriculture”. The presentations during the session were made by Dr. Bruce Stewart (WMO), Dr. Hossein Dehghanisanij (Iran), Dr. Osman Şimşek (Turkey) and Dr. John Metzger (GWP). The event focused on the programmes carried out by WMO as tools in the context of risk management like APFM – (Associated Programme on Flood Management), HELP DESK for integrated flood management, Data Rescue (DARE) and Integrated Drought Management Programme. Er. Avinash Tyagi, Secretary General, ICID emphasized the need for close collaboration strategy between WMO, ICID and GWP and its urgency. There were 19 participants from NGOs, IOs, government institutions and private sector from Africa, Asia, Europe, America and Middle East.

The side event on “Challenges and opportunities for global food security: Inter-generational knowledge transfer in the Agricultural Water Management Sector” was organized by IFAD. The key speakers were Dr. Rudolph Cleveringa and Mr. Federica Franco of IFAD. The event focussed on Junior-Senior Twinning activities on issues identified through SWOT analysis. Uma Lele Foundation, ICID young professionals and UNESCO-IHE have demonstrated their interest to engage in the activities of Junior/Senior

Twinning. The initiatives taken during the event were (i) To give wake up calls for investments targeting young professionals from South and (ii) To meet the considerable demand with an institutional and systematic capacity building service offers. The main issues addressed were: Intergenerational transfer of knowledge and Building up a new generation of agricultural water management expertise. Participants were drawn from consultants, foundations, universities, UN, NGO's, professional associations, government institutions, international finance institutions, representing Asia, Europe, Africa and Middle East.

A panel discussion on “Future Vision of Participatory Irrigation Management” was organized as a side event by JNC-ICID. The key speakers were Yuichi Kobayashi (Japan), Dr. Gao Zhanyi (China), Prof. Dr. Tsugihiko Watanabe (Japan), Dr. Chaiwat Prechawit (Thailand), Mr. Samart Wongchaya (Japan), Dr. Gürhan Demir (Turkey), Dr. Mehmet Ergücen (Turkey), Eng. Naito Kunihiko (Japan), Dr. Abdel Wahab El-Haddad (Egypt), Dr. Sung-Hee Lee (Korea), Mr. Masao Miyazaki (Japan), Mr. Ryoji Koyasu (Japan), and Dr. Masayoshi Satoh (Japan) who acted as facilitator for the panel. Dr. Hüseyin Gundogdu provided the wrap up of the session. The outcomes of the panel discussions formed the key inputs to the outcomes of the first WIF itself, involved in the international context of the UN International Year of “Water Cooperation” and will be utilized in the World Water Forum (WWF7, Korea in 2015), where ICID may act as one of the main player. Dr. Gao Zhanyi, stated in his opening speech that Participatory Irrigation Management (PIM) increased the productivity in Agriculture. Dr. Satoh explained the fundamentals of PIM. The panelists from Thailand, Turkey, Egypt, Korea and Japan made presentations on PIM in their respective countries. The Panel released a declaration presenting key issues at the end of Side Event and recommended that (i) Efficient use of the irrigation water can be realized only when all the facilities are functioning in an integrated way, (ii) For making the approach of PIM effective, basic principles such as farmer participation in decision making, member equity in water





user organizations and role sharing between governments and farmers should be emphasized, (iii) PIM contributes to efficient use of water and (iv) PIM has an effect to make common will and interests of farmers more powerful in the administrative and political decision making processes if small regional organizations are successfully inter-linked. Participants representing farmers, government sector, NGOs, IOs representing East and South Asia, North Africa, Europe and North America attended the session.

A Seminar on “Working together to promote Investment in Agricultural Water Management in Africa (AgWA)” was organized by FAO. The speakers at the Seminar – Mr. Fethi Lebdi (AgWA), Mr. Sheikh Javed Ahmed (AfDB), Mr. Maher Salman (FAO), Mr. Moussa Amadou (ARID) and Mr. Ken Shawa (CAADP) emphasized the need to establish more connections with African countries, allocation of at least 10% of national budgets to the agricultural sector and pursuit of a 6% average annual sector growth rate at the national level. It is stated that the AgWA and COMESA will work together to attain a fully integrated and internationally competitive regional economic community. The main issues discussed during the Seminar were: (i) Set up forums for partners harmonization including the strengthening of AgWA website, (ii) Promote the Agricultural Water Agenda for Africa, (iii) Finalize and disseminate a harmonized results-based M&E framework for use by countries and AgWA, (iv) Facilitate assistance to countries for preparation of national AWM strategies and investment plans, and (v) Commission thematic studies that contribute directly to AgWA’s purpose. The participants were mainly from African countries and Italy representing, ICID, FAO, AfDB and CADDP.

FAO and Euphrates Tigris Initiative for Cooperation (ETIC) organized a side event in the form of a Seminar on “Promoting Sustainable Water Resources Management in the Mesopotamia”. The presentations were made by Mr. Ghani Razaq Dhkeel (Iraq), Mr. Moujahed Achouri (FAO), Mr. Mahmoud Faisal Rifai (ETIC), Mr. Yaşar Yakiş (Turkey), Dr. Amaury Tilmant (Canada), Mr. Shirouk Abayachi (Iraq) and Mr. Maher Salman (FAO) on key

issues such as (a) “Lower Mesopotamia Project” among Syria, Iraq and Iran, as an advanced tool of efficient basin management; (b) Cooperation in the Euphrates-Tigris (ET) Region from historical perspective starting from 1920; (c) the importance of efficient use of waters and needs for better information on water quantity and quality in Lower Mesopotamia Region; and (d) “Support Cooperation on Water resource management in the Lower Mesopotamia (Syria, Iraq and Iran). The Main project components were presented as determination of hydro-economic characteristics, strengthening institutional capacity, enhance cooperation, increasing the understanding of river basin management, developing early warning capacity, improving water quality and implementing pilot projects in each country in Lower Mesopotamia.

General Directorate of Agricultural Research and Policy, Turkey organized a Panel Discussion on “Policy for sustainable water and food security in arid regions-A case study in Turkey”. The Session was moderated by Prof. Dr. Sülayman Kodal and the Panelists were: Mr. Sait Tahmiscioğlu, Dr. Metin Türker, Prof. Dr. Ersoy Yildirim, and Dr. Bülent Sönmez from DSI and Agricultural Faculty, Ankara University. The panel discussions mainly revolved around four key points, namely Policies for sustainable water and food security in arid regions, Land Consolidation and Effects on Water Use, Irrigation Practices in Turkey, and Irrigation policies and supports.

The Panel Discussion on “Optimization of Pipe Network and Evaluation of Energy Potential on Irrigation Projects” was organized by SUFEN Project Co. Ltd. The key speakers during the session were Mr. Kazım Karağaç (SUFEN Project Co. Ltd.) and Mr. Petr Konata (CINK Hydro Energy). The proposals made during the discussion were: (i) Using the linear optimization technique developed by SUFEN and (ii) Replacement of turbines instead of Pressure Reducing Valves. The main issues discussed during the session were: (a) Pressure optimization of Irrigation Network, (b) The optimization of the network according to pressure and cost, (c) Efficiency with variable flow and head and (d) Comparison of linear optimization technique





and DSI software results. There were 35 participants from government and private sector.

The side event on “Monitoring Water Quality for Sustainable Irrigation” was organized by Director General of Water Management (SYGM). The session was moderated by Mr. Mertkan Erdemli – Mr. Maruf Aras and the key panelists were Mr. Hümeýra Bahçeci (SYGM), Mr. Gerrit Vossebelt (the Netherlands – Rijkswaterstaat), Mr. Bekir Yılmaz (SYGM) and Mr. Ayse Bulur (DSI). The main issues discussed in the session were: Water Quality Monitoring requirements as per Water Framework Directive, Applications of the Water Framework Directive in Turkey and Biological Monitoring, EU Twinning Project on Capacity Building on Water Quality Monitoring, National Water Information System and Irrigation and issues about establishing the monitoring infrastructure in Turkey as per Water Framework Directive and determining the status of water. The panel proposed for recovering the costs of systems, spreading awareness for protection of water bodies, establishing of Water Information System of Ministry of Forestry and Water Affairs, implementing the measures to prevent deterioration of the water bodies, and laying down technical specifications and standardized methods for analysis and monitoring of water status. The panel took note of the establishment of monitoring system within 6 river basins in Turkey and the capacity building projects of European Union that were started in Turkey.

The Panel Discussion on “Regional Development Project: GAP” was organized by GAP Regional Development Administration under the chairmanship of President Dr. Sadrettin Karahocagil. The panel discussed issues related to (a) Southeastern Anatolia Project (GAP), (b) GAP Regional Development Administration (GAP-RDA), (c) GAP Action Plan, (d) Economic dimension of GAP, (e) Social dimensions of GAP and (f) Agriculture, environment, culture, tourism and infrastructure projects of GAP. The key recommendation made by the panelists was that the environmental, social and economic sustainability principles must be integrated into water development projects.

A panel discussion on “Evaluation of Alternative Financial Models on Modernization of Irrigation Infrastructure” was organized by Water Management Institute, University of Ankara. The panelists for the session were -- Prof. Dr. Süleyman Kodal, Prof. Dr. Y. Ersoy Yildirim, Mr. Bilgin Telek, Dr. Nüvit Soylu and Mr. Mehmet Ergücen, all from Turkey. The key proposal was to work for deficit irrigation. The important issues came up for discussion were – status and problems of open channel and pressurized irrigation networks in Turkey, the benefits of pressurized irrigation networks, shortage of irrigation water, energy-farmer income problems, and alternative financing models for modernization of irrigation infrastructure.

A special Session on “Uzbekistan” was organized by Temelsu International Engineering Inc. as part of Side Events. The proposals considered during the session were: (i) Financing mechanism should be established for water resources development projects, (ii) Government should support irrigation, drainage and rehabilitation projects and (iii) Local experts should be included in the project teams. The key issue discussed during the session was in the face of climate change and population increase, Central Asia faces significant challenges in securing future access to water and also that at the current rate of population growth in Central Asia, annual renewable water availability is expected to fall down significantly by 2030. It was highlighted that water shortage in upstream countries was contrasted by flooding in downstream countries and that climate change is expected to amplify seasonal and annual variation, posing additional flood and drought challenges.

### **Documentaries Shown as Side Events**

The side event on “Mobile Canal Control: A smart phone application for irrigation canal measurements and control” was organized by Delft University of Technology. The event was addressed by Mr. Peter-Jules van Overloop of Delft University of Technology. The issue that was deliberated upon was how the Mobile Canal Control is going to introduce an innovation that enables intelligent control of irrigation canals by means of only a smart phone. The key theme is inexpensive canal automation of irrigation canals. As the operator (supported by the smart-phone) is still the main element in the operations of the canal hardly any personnel needs to be fired. In the measurement part, image processing and pattern recognition algorithms read the water variables from the pictures. In the control part, Model Predictive Control computes the optimal control actions and optimal route for the operator. Using Mobile Canal Control, irrigation district all around the world can make the transition from manually operated, unmeasured water delivery to a semi-automatic transparent water and data management system. There are multiple benefits: less water is wasted, deliveries can be made more flexible, the water delivery becomes accountable as measurements of water levels and flows become available at a central location. The market name of the system is Mobile Tracker.

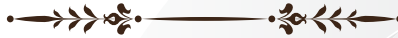
WAPCOS Ltd., organized a panel discussion on “New Technologies for Irrigation Network: Water Powered Pumps” with screening of film and open discussions. The main issues discussed were energy saving, increasing farmers’ income, irrigation on the high elevation agricultural land by using WPP, free of charge irrigation, and providing domestic water supply in rural areas. The proposal made by the session was that WPP required additional research and investments for the increasing efficiency and wider use with the support and contributions from international organizations.

DSI-TUCID organized “DSI Groundwater Session” with film screening and panel discussion. The session was moderated by Mr. A. Faruk Öztan and the panelists were Mr. Nurettin Pelen and Mr. Bünyamin Polat, all from DSI. The aim of the panel discussion was to provide some information on Groundwater potential of Turkey, the law of groundwater in Turkey, usage of groundwater, groundwater irrigations and groundwater cooperatives for the audience.

As part of side events, a Documentary on “Water Civilization in Mesopotamia” was screened on 30 September 2013. The film highlighted the world’s oldest water civilization

in Mesopotamia and how it worked, focusing on Mardin, which is considered as the water culture and the cradle of civilization in Mesopotamia.

A film on “Structural Chemicals for Irrigation Networks” was screened by Duayen Firm on 30 September 2013. The film focussed on advanced technology approached, economic benefits and advantage of using spray systems and its environmental friendliness. The intention was the presentation of benefits and advantages of protecting coating. It was produced by Duayen MS Spray.



# Mardin Forum Statement



## Preamble

The main theme 'Irrigation and drainage in a changing world: Challenges and opportunities for global food security' recognizes that for sustainable agricultural water management an in-depth understanding of the implications of population growth, changing demographics due to urbanisation, and more frequent extremes due to climate change on agricultural water management is required to ensure growth in Global Food Production matches demand. Agricultural water management, especially irrigation, will contribute to sustainable intensification of cultivable lands, within the resilience of ecosystems, and where applicable with rehabilitation of degraded ecosystems. To meet these aspirations under the increasing food demands in the 21st Century requires review, adaptation and modernisation of policies, technologies and management practices under the constraints of finite natural resources - both land and water - and competition among sectors.

Within the context of the Main theme, more than 186 papers, short communications and posters were presented and discussed under three Sub-themes: (1) Policy, Science and Society Interactions; (2) Challenges and Developments in Financing Irrigation and Drainage Sector; (3) Integrated Water Management Approaches for Sustainable Food Production. In addition to the thematic sessions there were: (i) three workshops: Water Wisdom and Sustainability, Developing Management Strategies for Coping with Drought and Water Scarcity, and Management of Water, Crops and Soils under Climate Change; (ii) two Round tables: Policy, Stakeholders; (iii) two Panel

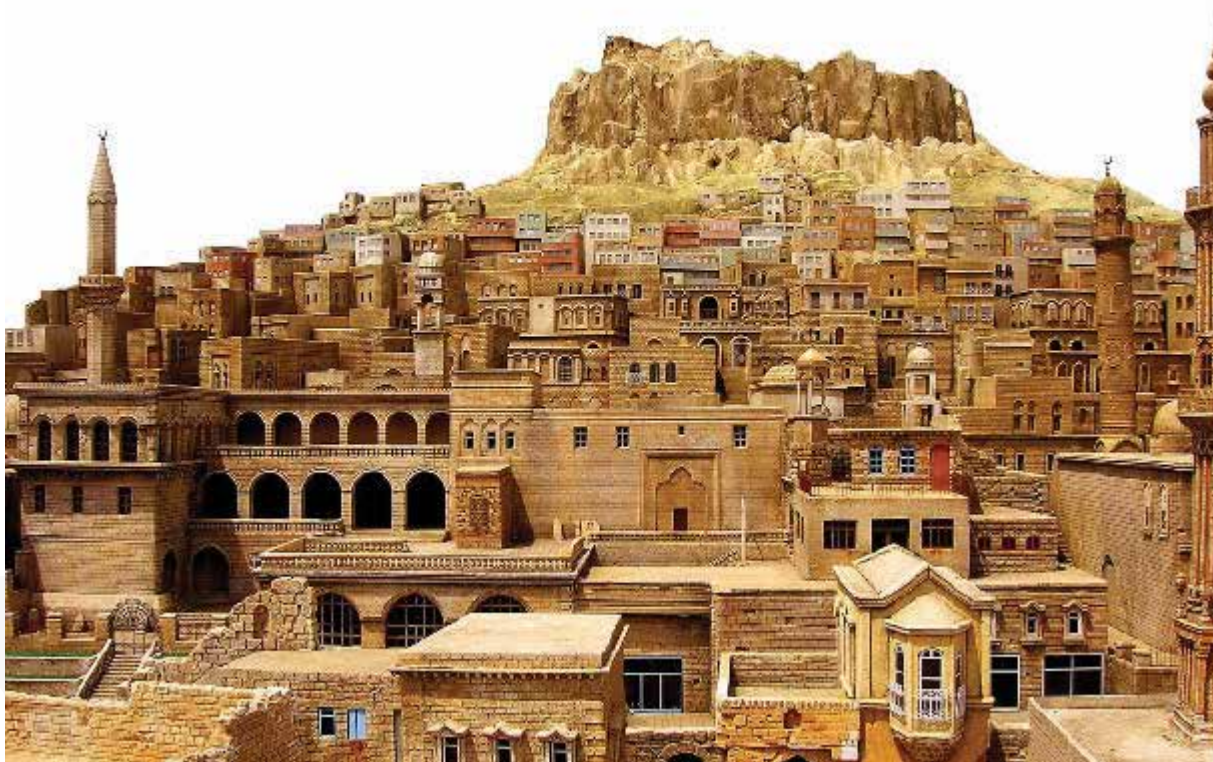
discussions: Farmers, Industry; (iv) 23 Side events; and (v) an Exhibition.

## Statement

As a result of the presentations and discussions at the World Irrigation Forum, the following statements were agreed:

- (i) Development of civilization over the past 5,000 years is closely adjoined with water management problems that have shaped societies and their structures. In the course of the centuries, systems and methods worked out under the various conditions have conclusively demonstrated their pertinent sustainability. Today, the knowledge and structural remains of these methods are not only interesting archaeologically, ecologically and historically, but can also help to solve current problems. The Mardin area shows us an impressive proof of this.
- (ii) As water is becoming an increasingly valuable and vulnerable resource, it needs to be acknowledged that generally water will need to be managed in a better way. This may require revision of water related policies at all levels. Regional water scarcities and environmental requirements need to be considered in developing such policies. Therefore, effective cooperation among the various stakeholders: government authorities, research institutions, managers of irrigation systems, civil societies, local communities, NGO's, businesses etc. needs to be promoted. This will speed up the development and





implementation of effective and sustainable water solutions. Water can be an element of cooperation between riparian countries and needs to be treated as such.

- (iii) Irrigation water delivery is a service to users. High quality and reliable service is a condition for adoption of advanced farm practices by the farmers. Irrigation and drainage face many challenges, but also provide the foundation to maintain global food security. Modernization and improvement of irrigation is occurring worldwide at varying rates and degrees. Much is being accomplished through innovation and technical advances. However, technology alone will not resolve the issues of water and food security. Informed policies, financial management, reorientation of institutions, awareness of local communities and transparent governance require innovation and advances to respond to challenges.
- (iv) Government institutions have central roles to facilitate interaction among the stakeholders in the sector and in providing the framework for agricultural water management activities. They need to assess the needs and roles of different actors, especially of the new generation professionals. If necessary, adjust legislation accordingly and arrange to collect relevant data.
- (v) In the planning and design of water management systems adequate attention needs to be given to how water management activities can most effectively be integrated with farming practices, recognizing the multiple uses to which such infrastructure is put and the broad spectrum of services that agricultural water management systems support. This recognition may also provide new opportunities for financing agricultural water management.
- (vi) The agricultural sector is the principal water user. Therefore, use of equipment and techniques that enable effective use of water in agriculture need to be among the primary targets for ensuring food security of an increasing worlds' population. As presented in the short communications, side events and in the exhibition it is not only innovative modern technologies, but also proven traditional technologies that will play an important role in obtaining optimal benefit of the limited water resources. Information on these options needs to be made publicly available through effective extension services. Capacity building components at various levels need to be included in agricultural water management programmes.
- (vii) Financial institutions need to give priority to countries/stakeholders which need agricultural water management schemes, and to support national and regional development with suitable

financing mechanisms. A range of financing models have already been developed and tested for the agricultural water management sector. Some of these models have proven to be successful whereas failures have occurred in other cases. It is recommended that suitable models will be selected, further tested and evaluated for different local conditions.

- (viii) The concept of sustainability cost as described in the position paper of ICID on Irrigation and Drainage Services: Some principles and Issues towards sustainability (Tardieu, 2005) deserves wider application in practice.
- (ix) The impact climate change may have on water resources, food and feed production is widely recognised. The change in rainfall patterns and increase in temperature may decrease river flows and reservoir storage, increase evapotranspiration and subsequently increasing water demand for agriculture. Risk analysis and vulnerability assessments on the occurrence of extreme events are needed to enable better management of water demand and supply. Adaptation to climate change by proactive approaches, including better prediction and early warning, reduction of water losses, application of highly efficient irrigation systems, cultivation of drought tolerant varieties, (re)use of low quality and waste water, improved land management and

methods of cultivation, appropriate policies for water supply and demand management during extreme events, and concerted efforts to raise farmers awareness of the climate change impacts and the provision of guidelines for farmers on how to cope with changing climate conditions.

- (x) It is important that the Forum results are also made available to farmers, who are the managers of water in the lower distribution system and on-farm.

We hope that by the time of the Second World Irrigation Forum it can be reported that water management for global food production has been such that there is sufficient food for the expected World Population of almost 7.5 billion at affordable prices and that a significant reduction of undernourished people has been achieved.

The participants thank the Government of Turkey and the Turkish National ICID Committee (TUCID) for their initiative and hospitality, as well as the sponsors for their contribution in hosting this highly important First World Irrigation Forum.

Mardin, Turkey  
Tuesday, 1st October 2013









# International Exhibition

The exhibition was inaugurated by HE Prof. Dr. Veysel Eroğlu, Minister of Forestry and Water Affairs, Turkey in the presence of Mr. HE Muammer Güler, Minister of Interior, Turkey; Dr. Gao Zhanyi, President, ICID; Dr. Hamit Bakirci, Minister of Environment & Natural Resources,

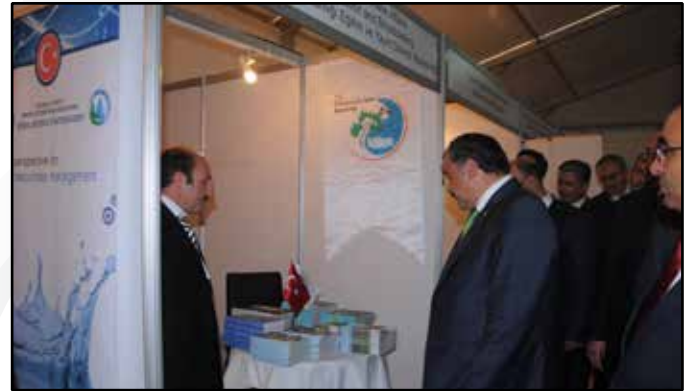
North Cyprus; Dr. Ahmet Cengiz, Governor of Mardin City; Prof. Dr. Doğan Altınbilek, Vice President, WWC; and Mr. Akif Ozkaldi, DG, DSI. A total 20 companies participated in the exhibition which covered around 210 sq m area.



## Exhibitors at Mardin Forum

Area sq m	Company Name
18	<b>DSI</b> General Directorate of State Hydraulic Works - Devlet Su İşleri Genel Müdürlüğü/ <b>TUCID</b> - Turkish National Committee on Irrigation and Drainage Sulama ve Drenaj Türk Milli Komitesi
6	General Directorate of Forestry / Orman Genel Müdürlüğü
6	General Directorate of Nature Conservation and National Parks / Doğa Koruma ve Milli Parklar Genel Müdürlüğü
6	Ministry of Forestry and Water Affairs Department of Education and Broadcasting / ORMAN ve SU İşleri Bakanlığı Eğitim ve Yayın Dairesi Başkanlığı
6	Turkish State Meteorological Service / Meteoroloji Genel Müdürlüğü
6	General Directorate of Combating Desertification and Erosion/ Çölleşme ve Erozyon Kontrolü Genel Müdürlüğü
6	Turkish Water Institute / Türkiye Su Enstitüsü (SUEN)
6	General Directorate of Water Management / Su Yönetimi Genel Müdürlüğü (SYEM)
6	<b>GAP</b> Regional Development Administration/ GAP Bölge Kalkınma İdaresi Başkanlığı
24	Aydiner Group of Companies / AYDINER ŞİRKETLER GRUBU
18	ECE TUR Construction Co. Inc./ ECE TUR İnşaat A.Ş
12	Limak Holding
12	FERNAS Construction Company - FERNAS İnşaat A.Ş
9	Alfar Project /Alfar Proje

Area sq m	Company Name
6	IWMI - International Water Management Institute
9	Troy Engineering Construction WLL / Troy Mühendislik İnşaat A.Ş
9	SONTEK / NEL ELEKTRONİK A.Ş
24	SUBOR BORU SANAYİ TİCARET A.Ş
12	TEMELSU International Engineering Services Inc. / TEMELSU Uluslararası Mühendislik Hizmetleri A.Ş
6	Kolsan Construction Automotive Industries and Trade Inc. / KOLSAN İNŞAAT OTOMOTİV SANAYİ VE TİC. A.Ş.



Work on sponsorship started in March 2013. A company contact list has been prepared by combining the lists coming from ICID, TUCID and DSI. Turkish Companies, TUCID Members, Exhibitors of International Exhibition in Adelaide Australia and 21st ICID Congress in Iran (total number of 679 contacts: 219 TUCID Members and Turkish Companies; 362 ICID Exhibitors list; 78 Adelaide Exhibitors list and 20 Tehran Conference Exhibitors list) have been added to this list.

Sponsorship documents and electronic newsletters were designed through an Advertising Agency to announce Sponsorship Conditions communicated through first newsletter sent to Exhibitors by e-mail in April 2013. Second e-mailing to 582 companies inviting them to the Forum was undertaken during July.

Around hundred companies were invited to Sponsorship Meeting in June 10, 2013. Minister of Forestry and Water Affairs Permanent Secretary, Director General of State Hydraulic Works and 87 company representatives attended this meeting where 25 companies agreed to be part of WIF1 as sponsor or/and exhibitor.

Totally 20 companies participated in the exhibition with 207 sqm area in Mardin after this meeting they included 1 international, 9 domestic company and 10 governmental institution. In addition, 8 local handicraft companies have represented their work of art.

### SPONSORS

- |  |  |
|--|--|
| 1. Diamond Sponsor-Aydiner                     | 12. Forum Bags-Peker İnşaat  |
| 2. Platinum Sponsor-Ecetur                     | 13. Delegate Note Pads and Pens-Temelsu  |
| 3. Golden Sponsor-Limak                        | 14. Advertising in the Final Program Book Center Double Page-İşkaya and Hidro Dizayn |
| 4. Golden Sponsor-Fernas İnşaat                | 15. Advertising in the Final Program Book Full Page-Ceylan İnşaat and Özdemir İnşaat |
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| 10. Shuttle Bus-Bergiz İnşaat                  |  |
| 11. Information Boards and Signalizations-Suiş |  |







# 10 Social Events



## **Mardin Chorus of Languages and Religions Inauguration Ceremony, 29 September 2013 Artuklu University**

Inauguration Ceremony was enriched with the concert of Mardin Chorus of Languages & Religions'. The attendees enjoyed this chorus of peace and indulgence in the city of Mardin during the ceremony held in Artuklu University. The Chorus performed Islamic chants, Syriac chants and Jevgit prayers besides Turkish, Kurdish, Arabic, Armenian and Syriac folk songs, enriched with folkloric shows.

## **Language of Colors Performance Welcome Dinner, 29 September 2013**

The show has started with the famous Janisary Band performance which is world's first Military Band in the history and was followed by Classical Turkish Music. The programme continued with Turkish folkloric dance samples as follows:

- HALAY: a collective dance performed in Middle and South East Anatolia Regions of Turkey.
- HORON: a dynamic folkloric dance type of Black Sea Region.
- EFE: a common dance from the West Coast of Turkey.
- At the final part, world famous Turkish Whirling Dervishes' show took place.











### **Fashion Show**

#### **Farewell Dinner, 04 October 2013, Erdoba Hotel & Convention Center**

Farewell Dinner performances started with Traditional Turkish Couture Show which has been prepared by an institute in Adana, a South Region city of Turkey. It consisted of:

- Display of costumes of Mardin by renowned models accompanied by a famous Mardin folk song Reyhani.
- Display of traditional wedding dresses and Turkish henna tradition which takes place a night before the wedding day.

- Display of modern coutures inspired by traditional dresses from all 7 regions of Turkey by models. This part of the show was enriched with Zeybek dance show which is again a folk dance from the Aegean Cost of Turkey.

### **Dostane Band Performance**

The fashion show was followed by the Dostane Music Band performance, formed by State Artists of Ministry of Cultural Affairs. The band performed multilingual and ethnic songs for nearly two hours.







## Accompanying Persons' Tour



Some of the highlighted tours organized for accompanying persons are:

- Dara Ruins, Kaya Tombs, Water Cistern and Water Depot.
- Elmacı Market and Bakırcılar Market.
- Harran and the visit of Harran Great Mosque and The Castle.
- Kırklar Church, Cumhuriyet Square, Kasımiye Madrassa, Historical Post House, Sakıp Sabancı Museum, Mardin Market, Şehidiye Mosque, Mardin Stone Houses visit.
- Panoramic city tour - Kasımiye Madrash, Mardin Narrow Streets, Ancient Metropolitan Center, Mardin Mezeum, Great Mosqueu, Sabancı City Meseum, Şehidiye Mosqueu
- Sight seeing of 12.000 years old archaeological fields.
- Sight seeing of the cave where Saint Abraham was born
- Visit of Beyazsu, Nusaybin Zeynel Abidin Mosque and Mor Yakup Monastery.
- Visit of Deryul Zaferan Monastery wich has a importance for Syrian Ancient Community.
- Visit of Mor Gabriel Monastery.
- Visit of the birth cave of Abraham
- Visit of the cave where Eyyüp suffered.
- Visit of the Saklı Konak Copper Pieces Meseum.
- Visit of the World's biggest mosaic mezum 'Zeugma'and survey of the mosaics.
- Visit of Urfa museum.







# 12

## Field Visit

A field visit to Southeastern Anatolian Project (GAP) located in Eastern Anatolia region of Turkey between the Euphrates and Tigris rivers is arranged by the DSI at the end of the Forum. GAP is the largest integrated water development project presently under implementation. The project comprises the development of 1.8 million ha of irrigation and the construction of 22 large dams and 16 power plants with a total capacity of 7300 MW. Presently, about 377,000 ha are under irrigation and construction of 16 dams has been completed.

Yaylak Plain Pressurized Irrigation scheme is one of the schemes of GAP project. Water is diverted from the Ataturk reservoir through Yaslica tunnel (about 1.49 Km length and 4.0 meter diameter) to the main pumping station. The main pumping station has 17 submersible pumps with a cumulative discharge of 21 m<sup>3</sup> / sec and pumps water to the Yaylak Main Channel serving 9 pumping stations installed along the canal. The Yaylak Main Channel is 83 Km concrete lined channel having design discharge of 17.08 m<sup>3</sup>/s and the bed slope as 0.0002. The scheme is designed to irrigate 18,322ha benefitting 6000 farmers from 36 villages.

The main canal is equipped with the bivalent downstream irrigation canal gates which are controlled through a

fully automated SCADA system. To prevent flooding in case of closure of the check structure, the side banks of the channel have been raised, appropriately. The system minimizes water losses during the operation. The irrigation water is distributed through 641 km long high pressure pipe network. Water is supplied on demand to farmers through the hydrants having 7 LPS flow rate to irrigate 4.665 hectares. The hydrants are equipped with a pressure gauge and a flow meter. The farmers can irrigate their fields by connecting their sprinkler/ drip system to the hydrant. The major irrigation systems used by the farmers comprises the sprinkler (90%) and the drip (10%).

Water distribution is carried out by the Water Union Organization (WUO). There about 58 staff working under WUO. The DSI is responsible for managing the financial aspects of the WUOs. The water charging is based on the area irrigated. Significant saving in water use has been achieved due to the automation and involvement of WUOs in the system operation. Although, the Government is providing financial support to the farmers in procuring inputs like the fuel and fertilizers, the high energy price remains the main concern of farmers.







**List of Papers, Short Communications, and Posters presented in  
Sub-Theme 1: Policy, Science and Society Interactions**

Sr. No.	Paper No.	Title and author
1	R1.01	<b>Beyond technology and potential: The actors who make drip irrigation</b> Jean-Philippe Venot, Saskia van der Kooij, Jonas Wanvoeke, Lisa Bossenbroek, Harm Boesveld, Margreet Zwarteveen, Maya Benouniche, Marcel Kuper, Mostapha Errahj, Charlotte de Fraiture and Shilp Verma
2	R1.02	<b>Our Voice to Support Irrigation and Drainage</b> Victor Dukhovny
3	R1.03	<b>Innovation, Training and Extension for Irrigation Water Management</b> Gerhard Backeberg
4	R1.04	<b>Design of Regulating Reservoirs within Irrigation Modernization Projects</b> Charles M. Burt
5	R1.05	<b>Background Policy and Methods for Participatory Irrigation Management of Japan</b> Masayoshi Satoh, Atsushi Ishii and Xin Yuan
6	R1.06	<b>Low Cost Drip Systems: Opportunities and Challenges of a Development Model</b> Obad Kofi Tuabu, Harm Boesveld and Jean Philippe Venot
7	R1.07	<b>Construction of Cooperative Agricultural Management Mode Based on Modern Irrigation System</b> Yue Gu and Fan Ye
8	R1.08	<b>Development of a conceptual approach to manage flow to Subak irrigation schemes in Bali, Indonesia</b> Mawiti Infantri Yekti, Bart Schultz and Laszlo Hayde
9	R1.09	<b>Determining Canal Seepage Loss using Advanced Methods</b> Kristoph-Dietrich Kinzli, Matt Martinez and David Gensler
10	R1.10	<b>Low-Cost Stream Gauging Equipment - Topic Area: Modernization &amp; Infrastructure and Services</b> Bryce A. Contor
11	R1.22	<b>Rehabilitation Studies Focusing on Shifting Open Canal System to Piped System in Lower Gediz Basin in the West of Turkey</b> Asli Erdenir Silay, Huseyin Gundogdu and Recep Ozbal
<b>Short Communications</b>		
1	R1.11	<b>Global Dissemination of Micro-Irrigation Technologies to small-holder farmers</b> Kevin Andrezejewski
2	R1.12	<b>Launching Next Generation ICT for Irrigation Information and Advice to Smallholders in Africa</b> Bharat Sharma
3	R1.13	<b>FRUITLOOK : A spatial approach to assess and improve water use efficiency of vineyards and deciduous fruit orchards in South Africa</b> A.S. Roux, C. Jarman and A. Klaasse
4	R1.14	<b>Innovations in polyolefin materials can improve irrigation efficiency and generate wealth for the farming communities</b> Hugo Hammar, Prashant Nikhade, Alessandro Marangoni, Kum Hoong Lou and Umit Corbacioglu
5	R1.15	<b>Re-Engineering of Drip Irrigation Systems, Adapted to Local Conditions in Morocco</b> Maya Benouniche, Margreet Zwarteveen, Marcel Kuper, Ali Hammani and Sami Bouarfa
6	R1.16	<b>Field Performance of Travelling Sprinkler with Controlled Rotation Speed</b> Graziano Ghinassi , Enrico Pezzola
7	R1.17	<b>Intensive Interaction between government functionaries and water users Associations: The Foundation for Participatory Irrigation Management</b> Kota Tirupataiah, Gaddam Jhansi Rani and Tummalacheruvu Katayani
8	R1.18	<b>Don't Use Electric Energy, Diesel Fuel; Use Water Powered Pump</b> Şahin Bekişoğlu

Posters / Papers		
1	R1.19	<b>Investigation of farmer's activities in paddy fields for better irrigation services</b> Toshiaki Iida, Masaomi Kimura, Koshi Yoshida, Naritaka Kubo and Takahiro Yokoi
2	R1.20	<b>Status and Thinking of construction of the high-standards irrigation and drainage engineering in China</b> Meijian Bai, Qunchang Liu and Peifu Jiang
3	R1.21	<b>The Murray-Darling Basin Plan - An Irrigator's Perspective</b> Michael Murray
5	R1.23	<b>Sediment Fluctuation Analysis</b> Lukman Novianti - Melly, Thaha Abd. Wahab, Hamzah Manguluang and Setiawan Agus
6	R1.24	<b>A Strategic Approach to Economic Aspect of Environmental Impact of Irrigation and Crops' Productivity in Himachal Pradesh-India</b> Ashwani Randev and Ashwani Randev
7	R1.25	<b>Governmental Support for Micro Irrigation Pays Huge Dividends – Experiences of Andhra Pradesh, India</b> Yella Reddy Kaluvai
8	R1.26	<b>Billy Troy and Pierre Girard. Supplemental Irrigation for Maize Production during the Rainy Season in Burkina Faso: Lessons from a Pilot Project in the Sourou Valley</b> Rémi Coulibaly, Marine Guyomard
9	R1.27	<b>Changing the rules: Flexibility and adaptability within farmer managed irrigation systems in transition to drip irrigation</b> Saskia Kooij van der, Marcel Kuper, Jean-Philippe Venot and Margreet Zwarteveen
10	R1.28	<b>Wastewater Regulation for Sustainable Agriculture</b> Eman Salama
11	R1.29	<b>Drip Irrigation in Burkina Faso: Multiple Actors, Multiple Rationales</b> Jonas Wanvoeke, Jean-Philippe Venot and Margreet Zwarteveen
12	R1.30	<b>Solar Powered Intelligent Drip Irrigation System for Sustainable Irrigation Services</b> Satyendra Tripathi, Lakshmi N., Saiapoorva U. and A. Vasan
13	R1.31	<b>Integrated water management in Kukadi project by simulation technique</b> Uddanappa Siddamal and Channavir Birajdar
14	R1.32	<b>Pre-Irrigation Participatory Irrigation Management Planning Approach: Süruç Case</b> Ibrahim Sahin
15	R1.33	<b>'Bricolage' as innovation: opening the black box of drip irrigation systems</b> Maya Benouniche, Margreet Zwarteveen and Marcel Kuper
16	R1.34	<b>Management of farmland and terminal irrigation/drainage system to accommodate to the socio-economic change in rural area: A case study of policy development in Japan</b> Kanehiko Shindo
17	R1.35	<b>The New Challenges and New Demands Faced by China's Development of Farmland Water Conservancy</b> Du Lijuan, Liu Changshun and Liu Yu
18	R1.36	<b>Water - Land - Food: Policy support for protection of irrigated command areas from diversion to other purposes</b> Kota Tirupataiah, Mulukuri Chandrasekhar and Parimi Gangadhar
19	R1.37	<b>Optimization process of reservoir water use – stakeholder participation</b> Matjaž Tratnik, Silvana Batič, Franci Steinman, Majda Čerňič Istenič and Marina Pintar
20	R1.38	<b>New PPP model for sustainable management of large scale irrigation schemes in Ethiopia</b> Teshome Atnafie, Francois Onimus and Etienne Dressayre
21	R1.39	<b>Participatory Irrigation Management to cope with Climate Change - Examples of Sri Lanka</b> Masahiko Hiraiwa and H.M. Jayatillake
22	R1.40	<b>Improving operational performance of main irrigation canals using in-line storage operational strategy</b> S. M. Hashemy
23	R1.41	<b>Auto-regulative subsurface pipes - a water saving and environmental friendly irrigation practice</b> A. Dührkoop, Oliver Hensel and Tarik Hartani

24	R1.42	<b>Drought Impact on Freshwater Lens and the Countermeasures for Sustainable Irrigation</b> Kazuhisa Koda
25	R1.43	<b>Evaluation Automated System In Irrigation Network By Use Of INACSEM Model</b> Fatemeh Sadeghi and Mohammad Javad Monem
26	R1.44	<b>Reforms and Institutional Restructuring in Water Sector in Maharashtra State, India- A Step towards Good Governance</b> Ekanath Patil and Sanjay Belsare
27	R1.45	<b>Innovative Participatory Water Management at Waghad Irrigation project, Maharashtra, India- A Success Story in Water Governance.</b> Ekanath Patil and Sanjay Belsare
28	R1.46	<b>Tuning PID Controller Using Genetic Algorithm for Water Level control in Irrigation Canal</b> Sara Jamali and Mohammad Javad Monem
29	R1.47	<b>Suggestion and effect assessment of self-governing by farmers in KOREA</b> Sung Hee Lee and Tai Cheol Kim
30	R1.48	<b>Improvement of Irrigation Services Adopting Technological Innovation - Case Study of Aich Yousui Irrigation Project Adopting U/D Control Gates</b> Naritaka Kubo
31	R1.49	<b>Studies on control methods of Zebra Mussel</b> Seyit Aksu
32	R1.50	<b>Land Consolidation as a Factor for Development of Agricultural Infrastructure in DSI Irrigation Projects</b> Ali Rıza Ceylan, Niyazi Öçalın and Önder Karagöz
33	R1.51	<b>Development of irrigation and reclamation in Uzbekistan</b> Sh. Khamraev
34	R1.52	<b>A Trialogue for Successful Groundwater Governance</b> Johannes Teunis Vahrmeijer, J.G. Annandale, K.L. Bristow, I van der Stoep and M van der Laan
35	R1.53	<b>Irrigation and Producer Organization</b> Nezaket Comert and Erhan Ekmen
36	R1.54	<b>Mobile Canal Control, Canal Automation with a Smart-Phone</b> Peter-Jules van Overloop
37	R1.55	<b>Soil and Agriculture/Land and Agriculture Reform Programmes in the World</b> Sevgi Dolu
38	R1.56	<b>Drainage Works in Şanlıurfa-Harran Plain</b> Nadide Demir, Birsen Öztürk and Hamdi Us
39	R1.57	<b>Relationship between land tenure system and water rights when applying Participatory Irrigation Management</b> Naoya Fujimoto, Junji Koide and Naoko Oka





**List of Papers, Short Communications, and Posters presented in  
Sub-Theme 2: Challenges and Developments in Financing Irrigation and Drainage Sector**

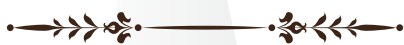
Sr. No.	Paper No.	Title and author
1	R2.01	<b>CEB-Financed irrigation projects in Turkey: 1985-2013</b> Baris Trak
2	R2.02	<b>Development trend of the world's irrigated agriculture and its challenges to sustainable investment</b> Kazumi Yamaoka
3	R2.03	<b>Participatory Irrigation Management in Turkey</b> Gürhan Demir and Canan Şentürk
4	R2.04	<b>Asset Management Procedures for Sustainable Maintenance in Kyrgyzstan</b> Alan Beadle and Martin Burton
5	R2.05	<b>Asset management in Large Scale Irrigation, Financial incentives on Life Cycle Management</b> Leon Wijnker and Anneke Van der Kraan
6	R2.06	<b>Optimising Irrigation Development Process in Slovenia</b> Rozalija Cvejic and Marina Pintar
7	R2.07	<b>Roles of Various Stakeholders in the Development of Irrigation Systems in Ethiopia</b> Zelege Dejen, Bart Schultz and Laszlo Hayde
8	R2.08	<b>Algorithm of estimating agricultural water consumption in great river basins using satellite images</b> Vahid Karami and Leila Eamen
9	R2.09	<b>Financial Remodeling to Meet the Economic challenges in Water Sector of Egypt</b> Ashraf El Sayed
10	R2.10	<b>Project Activities for Sustainable Irrigation Water Use with Participatory Approach in Egypt</b> Koji Kitamura
<b>Short Communications</b>		
1	R2.11	<b>Review of international experiences of PPP in irrigation sub-sector</b> Remi Trier
<b>Posters</b>		
1	R2.12	<b>Optimized Irrigation Water-Distribution Model for Canal Systems</b> Zhang Guohua, Xie Chongbao, Pi Xiaoyu and Gao Hong
2	R2.13	<b>The Observational method in design and construction of conveyance infrastructure: Engineering Grounds and Financial Acknowledgement</b> Mahan Lamei
3	R2.14	<b>Explaining the importance of farmers participation in improving the performance of irrigation networks with system dynamic approach</b> Akram Hatam and Mohammad Javad Monem
4	R2.15	<b>Effects of Different Irrigation Methods on Water Budget and Crop's Economy: Cotton Case</b> Yenikale Akif
5	R2.16	<b>Irrigation as Public Sector Priority Investment- A case study of Andhra Pradesh</b> Kota Tirupataiah
6	R2.17	<b>Irrigation Pricing Strategy for Water User Associations in Ferghana Valley</b> Oytüre Anarbekov and Kahramon Jumaboev
7	R2.18	<b>A Study on Assessment Financial Performance of Irrigation Management</b> Cengiz Koç
8	R2.19	<b>Recovering Investment Costs for Irrigation Facilities put in Operation by DSI</b> Nur F. Sakacı and Şeyda Genç
9	R2.20	<b>Evaluation of the Strategic Partnership Model within Irrigation Schemes in Limpopo Province, South Africa</b> Manoshi Mothapo, Adolph Malatji, Mmbengeni Makhuvha, Jethro Nowata and Tichaona Pfumayaramba



**List of Papers, Short Communications, and Posters presented in  
Sub-Theme 3: Integrated Water Management Approaches for Sustainable Food Production**

Sr. No.	Paper No.	Title and author
1	R3.01	<b>Water, food and energy supply chains managed and improved for a green economy</b> Willem F. Vlotman and Clarke Ballard
2	R3.02	<b>The Impacts of Climate Change on Water Stress Situations in the Yellow River Basin, China</b> Jianxin Mu, Qunchang Liu and Hamza Gabriel
3	R3.03	<b>Systems Approach to Water Use for Food Production and Energy Generation</b> Gerhard Backeberg and Andrew Sanewe
4	R3.04	<b>Agricultural Sustainable Development Strategy for Water Scarce Region</b> Ching-Chung Chang, Gwo-Hsing Yu and Chi-Jui Huang
5	R3.05	<b>Poor Quality Drainage Water – A Valuable Resource?</b> James E. Ayars and Gary S. Banuelos
6	R3.06	<b>Calculation Method Study on Combined Open drains and Pipe drains for Surface Waterlogging and Water Table Controlling</b> Shaoli Wang
7	R3.07	<b>Exploring water and energy productivity under lift and groundwater irrigation in the Syrdarya River midstream</b> Akmal Karimov
8	R3.08	<b>Water distribution management on the irrigation systems based on the resource and energy saving principles</b> Petro Kovalenko and Viktor Popov
9	R3.09	<b>Productivity Enhancement through the Subsurface Drainage - Experiences in Irrigated Project Commands of Andhra Pradesh in India</b> Yella Reddy Kaluvai, Satyanarayana Tammineedi and Boonstra J. Land
10	R3.10	<b>Sustainable Storage Management Through Farmer's Participation</b> Samadhan Sabbinwar, Avinash Garudkar and Dattatray Regulwar
11	R3.11	<b>Early stage results to develop BMPs for rice paddy and upland in Korea</b> Jeongryeol Jang and Youngkweon Cho
12	R3.12	<b>Integrated Water and Nitrogen Management in a Large Scale Irrigated Area in Southern Turkey</b> Hayriye Ibrikci, Mahmut Çetin, Ebru Karnez, Wolfgang A. Flugel, Manfred Fink, Ramon Aragues, Taganoki Nagano, John Ryan and Hande Sagir
<b>Short Communications</b>		
1	R3.13	<b>Lessons from the Progress of Korea's Environmental Impact Assessment in Agricultural Sector</b> Namjoo Heo
2	R3.14	<b>Application of Rs and GIS in Delineating Boundary of Irrigation Development Project in Ghorveh Dehgolan Sub Basin,(Kordestan, Iran)</b> Ahmad Dehmohseni
	R3.15	<b>Sustainability of Farmer Designed Sprinkler Irrigation System in Kalpitty, Sri Lanka</b> Selvarajah Pathmarajah and Anton Benadict Joseph
<b>Posters</b>		
1	R3.16	<b>Yield, biomass and water productivity of soybean under various water conservation techniques in the sub-humid tropical climate of Nigeria</b> Omotayo B. Adeboye, Bart Schultz, Kenneth Adekalu and Krishna Prasad
2	R3.17	<b>Market solutions for agricultural water scarcity management: Water License Trading in Australia's Murray-Darling Basin</b> Andrew Gregson
3	R3.18	<b>Conjunctive Water Management in the Eastern Nile Delta – Egypt</b> Kamal Ghodeif
4	R3.19	<b>Regional Long-Term Water Planning In Mexico</b> Israel Velasco
5	R3.20	<b>New Design for Drip Irrigation System to Maximize from Water Use Efficiency under Desert Environment Conditions</b> Abdelraouf Abdelghany

6	R3.21	<b>Wheat Production in the Arid Regions by Using Drip Irrigation System</b> Abdelraouf Abdelghany
7	R3.22	<b>Researches and Development of Light and Low Energy- Consumption Variable Irrigation System</b> Hong Li, Shouqi Yuan and Qin Tu
8	R3.23	<b>Creating Usable Irrigation Water Use Datasets to Support Adaptation Strategies in Agriculture</b> Rozalija Cvejic, Marjeta Jeric, Leon Ravnikar, Polona Kocevar, Mihaela Svab, Jana Meljo, Ales Bizjak, Sasa Cucek, Mojca Zitnik, Sebastijan Orel and Marina Pintar
9	R3.24	<b>Impact of Climate Change on Paddy Rice Yields and Irrigation Water Requirement in Northern Taiwan</b> Ray-Shyan Wu and Chia-Chi Ma
10	R3.25	<b>Identification of Reservoir Operation Management Policies within the Framework of Adaptation to Climate Change: The Case Study of Seyhan Basin</b> Sevgi Donma, Ş.Pinar Güvel and Bülent Selek
11	R3.26	<b>GAP Organic Agriculture Cluster Project and Agricultural Irrigation</b> Mustafa Kölmek, Nusret Mutlu and Mehmet Murat Candemir
12	R3.27	<b>Performance Evaluation of Moistube Irrigation on Vegetable Crops under Hutton Soils of Gauteng, South Africa</b> Manoshi Mothapo and Aidan Senzanje
13	R3.28	<b>Evaluation of Spatial Distribution Patterns of Ground Water Levels and Salinity Using GIS (Case Study: Iğdir Irrigation Project Area/TURKEY)</b> Aynur Fayrap and Taskin Oztas
14	R3.29	<b>Evaluation of distributed SWAP model in simulating wheat yield production (Case Study: Doroudzan Irrigation and Drainage Network in Iran)</b> Elnaz Norouzi Aghdam, Hossein Babazadeh and Majid Vazifiedoust
15	R3.30	<b>The Characteristics of Water quality of Water System in Agricultural Area Reusing Drainage Water</b> Satoko W. Hashimoto, Kimihito Nakamura, Hironori Hamasaki, Chie Imagawa, Hisaaki Kato and Tsugihiko Watanabe.
16	R3.31	<b>Water Use and Productivity of Sweet Sorghum and Sugarbeet</b> Michael Mengistu, Richard Kunz, Colin Everson, Ian Doidge, Graham Jewitt and Alistair Clulow
17	R3.32	<b>Monitoring the infiltrated nutrient loads in shallow groundwater in greenhouse and conventional farming practices</b> Eun Mi Hong, Jin-Yong Choi and Won-Ho Nam
18	R3.33	<b>Challenges of Water Resources Planning and Management for Irrigation Development in the Lake Victoria basin countries</b> Amandus David Lwena
19	R3.34	<b>Demonstration plots as a tool to demonstrate use of modern agricultural and water management techniques to increase yield levels and ensure sustainability</b> Bahadır Boz and Akbarali Atamirzaev.
20	R3.35	<b>Filling Aral Sea</b> Bahadır Boz, Sina Velioglu and Rayhan Ulvan
21	R3.36	<b>Natural Farming for Sustainable Agriculture and Development</b> Diwakar Raipure.
22	R3.37	<b>Combating Drought in Turkey</b> Bekir Engürülü and Mehmet Ünal
23	R3.38	<b>Drainage &amp; Salinization Problems and Recommendations on Sanliurfa Harran Plain Before and After Irrigation</b> Mustafa Çeliker
24	R3.39	<b>Sustainability of Agricultural Water Management: A Case Study in Southern Turkey</b> Mahmut Cetin, Wolfgang-Albert Flügel, Hayriye Ibrikci Takanori Nagano, Burak Tilkici, Ramon Aragües, Ebru Karnez
25	R3.40	<b>Irrigation Development and Challenges for Drainage Management in Arid and Semiarid Regions</b> James Ayars and Bakhodir Mirzaev





**List of Papers, Short Communications, and Posters presented in  
International Workshop on Water Wisdom and Sustainability**

Sr. No.	Paper No.	Title and author
<b>Oral presentation</b>		
1	W1.01	<b>The sustainability of Suranga irrigation in South Karnataka and northern Kerala, India</b> Darren Crook, Sudhir Tripathi and Richard Jones
2	W1.02	<b>Challenges to Change Farmers Behavior in Using Water (Case Study: Drip Irrigation Application In Temiyang Village - West Java)</b> Elias Wijaya Panggabean
3	W1.03	<b>Sustainability of Agricultural Water Development and Management: Lessons to Learn from Japanese Experiences</b> Nobumasa Hatcho and Yutaka Matsuno
4	W1.04	<b>Sustainability of Irrigation Facilities</b> Ahmet Şeren
5	W1.05	<b>Water Management throughout History in Khurz</b> Hüseyin Demir
6	W1.06	<b>Inspiration from Traditional Knowledge of Water Division Systems in Iran</b> Ali Asghar Semsar Yazdi and Majid Labbaf Khaneiki
7	W1.07	<b>Historical Approach to the Problems Related with the Overuse of Groundwater in “West-La Mancha”, Spain</b> Ricardo Graiño
8	W1.08	<b>Lessons learned from Historical Community on Participatory Irrigation Management in Iran (Mojen as the Case Study)</b> Abbass Jangi Marani, Hadi Ramzani and Merhzad Ehsani
9	W1.09	<b>Engineering and Climate Compatibility Aspects in Traditional Water Storage Structures around Persian Gulf</b> Abbas Akbar Zadeh, Mohammad Riahi and Samira Fartoos
10	W1.10	<b>Kurit historical dam: An illustrating example of water wisdom</b> Kamran Emami
11	W1.11	<b>Water Wisdom in the Past Relevant to Shooshtar Water Structures</b> Sharam Karimi



**List of Papers, Short Communications, and Posters presented in  
International Workshop on Developing Management Strategies for Coping with Drought and Water Scarcity**

Sr. No.	Paper No.	Title and author
1	W2.01	<b>Drought Related Studies Conducted in Taiwan Beyond 1990's</b> Ming-Young Jan and Chang-Chi Cheng
2	W2.02	<b>Recent Trends of drought conciliation and agricultural water use in Japan</b> Takanori Nagano and Akihiko Kotera
3	W2.03	<b>Management of Drought in the Southern Murray-Darling Basin, Australia, from 1996/97 to the present</b> Clarke Ballard, Neville Garland and Jim Foreman
4	W2.04	<b>Drought Management Strategies of the Water Resources Agency, Taiwan - A Case-Study at The National Level</b> Chau-Ling Tyan, Chang-Chi Cheng and Ming-Young Jan
5	W2.05	<b>Hydrological Drought Index Based on Traditional Pasten System</b> Waluyo Hatmoko, Wahyudi Triweko and Iwan Hadihardaja
6	W2.06	<b>Impact of Climate Change on Corn Yields in the Büyük Menderes River Basin</b> Ömer Faruk Durdu
7	W2.07	<b>Water Saving Irrigation Technology in Bangladesh</b> Md. Ahasan Ullah
8	W2.08	<b>Drought Status and a Case Study for Drought Overcome in 2012</b> Changjo Oh
9	W2.09	<b>Rehabilitation of Irrigation Systems - Networking of Irrigation Systems to Mitigate Drought for Sustained Agriculture Production in Karnataka, India</b> Ramana Gowda P., Krishnamurthy N. and Suresh Naik K.P.
10	W2.10	<b>Integrated Drought Management Program (IDMP)</b> John Metzger / Frederik Pischke (GWP's IDMP Project Manager)
<b>Short Communications</b>		
1	W2.11	<b>22% Less Water on Maize with a New Subscriber Decision Support Tool</b> Bertrand Pinel and Marianne Moalic
2	W2.12	<b>Estimation of Available Agricultural Groundwater after Restriction of Exploitation around foothill of Taipei City</b> Po-Chia Chen, Yih-Chi Tan and Hsien-Tsung Lin
<b>Poster presentation papers</b>		
1	W2.13	<b>Drought Assessment of Ankara</b> Hakan Aksu and İbrahim Uçar
2	W2.14	<b>Effects of drip system uniformity and irrigation amount on water and salt distributions in soil under arid conditions</b> Hongjie Guan, Jiusheng Li and Yanfeng Li
3	W2.15	<b>Mitigation of Drought in upper Krishna Basin in India through Mhaisal LIS</b> Hanumant Dhumal, Channavir Birajdar and Kashinath Masal
4	W2.16	<b>Water-carbon coupling modeling and WUE estimation of summer maize</b> Baohong Zhang, Yu Liu and Di Xu
5	W2.17	<b>Research and Application of New Technology in Water-saving Reform Engineering of Large Irrigation District</b> Cheng Manjin, Gao Wenhui and Guo Fuqiang
6	W2.18	<b>Model for Surface Irrigation</b> Jorge Escurra, Robust Hydraulic

**List of Papers, Short Communications, and Posters presented in  
International Workshop on Management of Water, Crops and Soils under Climate Change**

Sr. No.	Paper No.	Title and author
1	W3.01	<b>Water Supply Strategy due to Climate Change: A Case of Shihmen Reservoir in Taiwan</b> Yong-Jun Lin, Kuo-Chen Ma, Po-Chia Chen, Yih-Chi Tan and Keshav R. Adhikari
2	W3.02	<b>Characteristics of CH<sub>3</sub> and N<sub>2</sub>O Emission under Various Water Levels In Paddy Fields</b> Budi Setiawan, Arief Irmansyah and Tsugihiko Watanabe
3	W3.03	<b>Integrated assessment of projected climate change impacts on maize production in the central Free State, South Africa</b> Yacob Beletse, Sue Walker, Wiltrud Du Rand, Olivier Crespo, Weldemichael Tesfahuney, Matthew Jones, Charles Nchamena, Mogos Teweldemedhin and Davide Cammarano
4	W3.04	<b>Effect of SRI water management on the mitigation of greenhouse gases</b> Joong Dae Choi, Gun Yeob Kim, Woon Ji Park, Su In Lee, Dongkyun Yoon and Sunjoo Kim
5	W3.05	<b>Potential of Underutilised Crops in Adaptation to Climate Change: Example of Bambara Groundnut and Pearl Millet</b> Sue Walker, Asha Karunaratne and Zaid Bello
6	W3.06	<b>Diverse Scenarios of Impact and Adaptation of Global Changes on Water Resources and Agricultural Practices</b> Suman Sijapati, Shreedhar Maskey and Uttam Timilsina
7	W3.07	<b>Modelling and Analysing of soil moisture characteristics by climate change in upland area of Korea</b> Eun Mi Hong, Jin-Yong Choi and Won-Ho Nam
8	W3.08	<b>Effects of Drip Fertigation Regime on Yield and Quality of Sugarcane</b> N. Asoka Raja
<b>Short Communication</b>		
1	W3.09	<b>Design and implementation of runoff harvesting basins for supplemental irrigation in the Burkina Faso Sahel</b> Severe Fossi Tuekam, Sewa Da Silveira and Koffi Kokole
<b>Poster presentation</b>		
1	W3.10	<b>Application of Silicon and Nitrogen as measures of soil management for reduction of Green House Gas Emissions</b> Kasthuri Rajamani, Gunti Bhupal Raj and Kota Tirupataiah.
2	W3.11	<b>Adaptation strategies for the changing climate in water managed production system – A case study of direct seeded rice in Andhra Pradesh, India</b> Kakumanu Krishna Reddy, Uday Sekhar Nagothu and Mulukuri Chandrasekhar
3	W3.12	<b>Drainage &amp; Salinization Problems and Recommendations on Şanlıurfa Harran Plain Before and After Irrigation</b> Mustafa Çeliker
4	W3.13	<b>Sustainability of Agricultural Water Management: A Case Study in Southern Turkey</b> Prof. Dr. Mahmut Cetin, Wolfgang-Albert Flügel, Hayriye Ibrikci, Takanori Nagano, Burak Tilkici, Ramon Aragüés and Ebru Karnez
5	W3.14	<b>Irrigation vulnerability assessment on agricultural water supply risk for adaptive management of climate change</b> Won-Ho Nam, Jin-Yong Choi and Eun-Mi Hong
6	W3.15	<b>Climate Change Risk Assessment for Khawee Noi River Basin, Phitsanulok Province, Thailand</b> Somkiat Apipattanavis, Jerasorn Suntisirisomboon, Wachira Sarmwang, Preecha Sukkum and Chitnucha Buddhaboont
7	W3.16	<b>Climate Change and Drought - Water Resources and Irrigation Management: A Case Study With Reference to Karnataka State, India</b> Ramana Gowda P., Krishnamurthy N. and Suresh Naik K.P.
8	W3.17	<b>Changes of Water Management Objectives on Tidal Lowland Agriculture in Anticipation of The Global Climate Change</b> Momon Sodik Imanudin, Robiyanto Susanto and Bistok Simanjuntak



## Detailed Programme

# Theme: Irrigation and Drainage in a Changing World: Challenges and Opportunities for Global Food Security

<b>DAY 1 (SUNDAY, SEPTEMBER 29)</b>		
<b>10:00-12:30</b>	<b>MORNING SESSION</b>	
<b>09:00-10:00</b>	<b>Registration</b>	
<b>09:30-11:30</b>	<b>Inaugural Ceremony - Artuklu University</b>	
09:30-09:50	Inter-Religious Multi-Sound Music (Choir of Mardin Trainers)	
09:52-09:58	Projection of a Short Film on ICID and DSI	
10:00-10:05	Welcome Speech by Mr. Akif Okzaldi, DG, DSI	
10:07-10:12	Welcome Speech by Dr. Ahmet CEZGIZ, Governor of Mardin City	
10:14-10:19	Speech by Dr. Gao Zhanyi, President, ICID	
10:21-10:26	Address by Prof. Dr. Dogan Altinbilek, Vice President, WWC	14:30-15:00 <b>Press Meeting</b> - Erdoba Elegance Hotel & Congress Center Zinciriyi Hall
10:28-10:33	Address by Dr. Hamit BAKIRCI, Minister of Environment & Natural Resources, North Cyprus	15:00-16:00 <b>Bilateral Meetings</b> - Erdoba Elegance Hotel & Congress Center TV Room
10:35-10:40	Address by His Excellency Muammer GÜLER, Minister of Interior, Turkey	15:00-15:30 Coffee break
10:42-10:47	Address by His Excellency Prof. Dr. Veysel Eroğlu, Minister of Forestry and Water Affairs, Turkey	15:30-17:00 <b>PLENARY SESSION II</b> - Hilton Garden Inn Hotel
10:47-11:00	Two Live Broadcasts on:	<b>Sub-Theme 1:</b> Policy, Science and Society Interactions
	(i) Mardin Main Canal Storage Construction Site	<b>Chair:</b> Dr. Willem F. Vlotman, Vice President Hon., ICID
	(ii) Ataturk Dam Afforestation Area (on the occasion of the Forum a tree sapling will be planted in the name of each participant of the Forum by General Directorate of Forestry)	<b>Co-Chair:</b> Prof. Akuzum, Ankara Agri. Univ. (Turkey)
11:05-11:10	Announcement of the World Irrigation and Drainage Prize 2013 by Mr. Peter Lee, Chair of the Jury for WID Prize and Award of the WID Prize 2013 by H.E. Prof. Dr. Veysel Eroğlu, Minister of Forestry and Water Affairs, Turkey & Representative of MWR, PR of China (Sponsor)	<b>Rapporteurs:</b> Thierry Facon (FAO) / Ding Kun Lum (CNCID)
11:10-11:25	Presentation by Prof. Dr. Victor A. Dukhovny, Winner, WID Prize 2013	<b>Opening remarks by Chair</b>
11:25-11:30	Vote of Thanks by Er. Avinash C. Tyagi, Secretary General, ICID	<b>Keynote - Sub-theme 1</b> - Prof. Roberto Lenton (Robert B. Daugherty Water for Food Institute)
12:00-12:30	Inauguration of the Exhibition - Erdoba Elegance Hotel and Congress Center	<b>Background Paper</b> by Mr. Laurie C. Tollefson (CANCID)
<b>12:30-13:30</b>	<b>Lunch break – Erdoba Elegance Hotel</b>	Best Paper - Beyond technology and potential: The actors who make drip irrigation by Jean-Philippe Venot et al.
<b>13:30-18:30</b>	<b>AFTERNOON SESSION</b>	Best Short Communication - Global Dissemination of Micro-Irrigation Technologies to small-holder farmers by Kevin Andrezejewski
13:30-14:30	<b>Plenary session I</b> - Erdoba Elegance Hotel and Congress Center Main Hall	Brief introduction to the Side Events connected to Sub-theme 1 and Discussion
	<b>Chair:</b> Dr. Gao Zhanyi, President, ICID	<b>Closing remarks by Co-chair</b>
	<b>Rapporteurs:</b> Dr. Gurhan Demir (TUCID)/ Dr. Laszlo Hayde (HUCID)	<b>Round Table 1</b> – Ministerial Meeting on Policy Issues - Hilton Garden Inn Hotel
13:30-13:40	Introduction to the Theme – Er. Avinash C. Tyagi, ICID	<b>Welcome Dinner - Hilton Garden Inn Hotel</b>
13:40-13:50	Jeremy Bird, Director General, IWMI	Folkloric Dance Organized by Mardin Municipality
13:50-14:05	Mr. Abdel Wahab El Hassan & Ms Zahida Detho, IFAD	
14:05-14:15	Dr. Bruce Stewart, WMO	
14:15-14:25	Irfan Aker, President, DOLSAR Engineering Ltd.	
<b>14:25-14:30</b>	<b>Closing by the Chair</b>	
		<b>DAY 2 (MONDAY, SEPTEMBER 30)</b>
		<b>09:00-12:30</b>
		<b>MORNING SESSION</b>
		<b>09:00-10:30</b>
		<b>Plenary session III</b> - Erdoba Elegance Hotel
		<b>Sub-Theme 2:</b> Challenges and Developments in Financing Irrigation and Drainage Sector
		<b>Chair:</b> Ian Makin (ADB)
		<b>Rapporteurs:</b> Gerhard Backeberg (SANCID) / Pooja Kapoor (India)
		Opening remarks by Chair – Ian Makin
		Keynote by Ms Uma Lele (GWP)
		Background Paper by Francois Brelle (AFEID) – Presented by Usbrand H. de Jong, World Bank
		Best Paper - CEB-financed irrigation projects in Turkey: 1985-2013 by Baris Trak
		Best Short Communication - Review of international experiences of PPP in irrigation sub-sector by Remi Trier
		Brief introduction to the Side Events connected to Sub-theme 2 and Discussion
		Closing remarks by Co-chair

09:00-10:30	<b>1st Parallel Session on Sub-theme 1 - Hilton Garden Inn Hotel</b> <b>Chair:</b> Dr. Bruce Stewart <b>Co-Chair:</b> Irena Bondarik (RUCID) <b>Rapporteurs:</b> Dr. Kim, Tai-Cheol (KCID) / Dr. Gurhan Demir (TUCID)				<ul style="list-style-type: none"> <li>Construction of Cooperative Agricultural Management Mode Based on Modern Irrigation System by Yue Gu et al.</li> </ul>
09:00-09:05	Opening remarks by Chair				<b>Short Communications (5 minutes each)</b>
09:05-09:55	Papers (12 minutes each)	11:55-12:25			<ul style="list-style-type: none"> <li>Re-Engineering of Drip Irrigation Systems, Adapted to Local Conditions in Morocco by Maya Benouniche et al.</li> </ul>
	<ul style="list-style-type: none"> <li>Our Voice to Support Irrigation and Drainage by Victor Dukhovny</li> <li>Innovation, Training and Extension for Irrigation Water Management by Gerhard Backeberg</li> </ul>	12:25-12:30			Discussion / Questions
	<b>Short Communications (5 minutes each)</b>	11:00-12:30			Closing remarks by Co-chair
	<ul style="list-style-type: none"> <li>Launching Next Generation ICT for Irrigation Information and Advice to Smallholders in Africa by Bharat Sharma</li> <li>A spatial approach to assess and improve water use efficiency of vineyards and deciduous fruit orchards in South Africa by Andre Roux</li> <li>Rehabilitation Studies Focusing on Shifting Open Canal System to Piped System in Lower Gediz Basin in the West of Turkey by Asli Erdenir Silay, Huseyin Gundogdu and Recep Ozbal</li> </ul>	11:00-11:05			<b>1st Parallel Session on Sub-theme 2 - Erdoba Elegance Hotel</b>
09:55-10:25	Discussion / Questions	11:05-11:55			<b>Chair:</b> Ali Riza Diniz, Deputy General Director (DSI)
10:25-10:30	Closing remarks by Co-chair				<b>Co-Chair:</b> Dr. Ragab Ragab (ICID.UK)
10:30-11:00	Coffee break Poster Presentation (10:30-12:30)				<b>Rapporteur:</b> Ms. Ezee G.C. (NENCID) / Dr. Michael Van Der Laan (SANCID)
11:00-12:30	<b>Plenary session IV - Erdoba Elegance Hotel</b> <b>Sub-Theme 3:</b> Integrated Water Management Approaches for Sustainable Food Production <b>Chair:</b> Prof. Dr. Dogan Altinbilek, Vice President, WWC (Turkey) <b>Co-Chair:</b> M. Gopalakrishnan, SGH, ICID <b>Rapporteur:</b> Ms. Pooja Kapur (India)				Opening remarks by Chair
		11:55-12:25			Papers (12 minutes each)
11:00-11:05	Opening remarks by Chair	12:25-12:30			<ul style="list-style-type: none"> <li>Participatory Irrigation Management in Turkey by Gurhan Demir</li> </ul>
11:05-11:30	Keynote by Olcay Unver (FAO) – Presented by Dr. Thierry Facon FAO	12:30-13:30			<ul style="list-style-type: none"> <li>Asset Management Procedures for Sustainable Maintenance in Kyrgyzstan by Alan Beadle et al.</li> <li>Asset management in Large Scale Irrigation, Financial incentives on Life Cycle Management by Leon Wijnker et al.</li> </ul>
11:30-11:45	Background Paper by Prof. Charlotte de Fraiture (UNESCO-IHE)	13:30-18:30			<ul style="list-style-type: none"> <li>Optimizing Irrigation Development Process in Slovenia by Rozalija Cvejic et al.</li> </ul>
11:45-12:00	Best Paper - Water, food and energy supply chains managed and improved for a green economy by W.F. Vlotman et al.	13:30-15:00			Discussion / Questions
12:00-12:15	Best Short Communication - Lessons from the Progress of Korea's Environmental Impact Assessment in Agricultural Sector by Namjoo Heo				Closing remarks by Co-chair
12:15-12:25	Brief introduction to the Side Events connected to Sub-theme 3 and Discussion				Lunch break
12:25-12:30	Closing remarks by Co-chair				Afternoon Session
11:00-12:30	<b>2nd Parallel Session on Sub-theme 1 - Hilton Garden Inn Hotel</b> <b>Chair:</b> Mr. Felix Reinders (SANCID) <b>Co-Chair:</b> Ms. Aysen Pervin Gungor (TUCID) <b>Rapporteurs:</b> Dr. Jin Young Choi (KCID)/Prof. Aslihan Kerc (TUCID)				<b>3rd Parallel Session on Sub-theme 1 - Hilton Garden Inn Hotel</b>
11:00-11:05	Opening remarks by Chair				<b>Chair:</b> Omer Ozdemir, Deputy General Director (DSI)
11:05-11:55	Papers (12 minutes each)				<b>Co-Chair:</b> Dr. Yohei Sato (JNC-ICID)
	<ul style="list-style-type: none"> <li>Background Policy and Methods for Participatory Irrigation Management of Japan by Masayoshi Satoh et al.</li> <li>Low Cost Drip Systems: Opportunities and Challenges of a Development Model by Obed Kofi Tuabu et al.</li> </ul>	13:30-13:35			<b>Rapporteurs:</b> Ahmet Seren (TUCID/DSI) / Katsuyuki Shimizu (JNC-ICID)
		13:35-14:30			Opening remarks by Chair
					Papers (12 minutes each)
					<ul style="list-style-type: none"> <li>Development of a conceptual approach to manage flow to Subak irrigation schemes in Bali, Indonesia by Mawiti Infantri Yekti et al.</li> <li>Determining Canal Seepage Loss using Advanced Methods by Kristoph-Dietrich Kinzli et al.</li> <li>Low-Cost Stream Gauging Equipment - Topic Area: Modernization and Infrastructure and Services by Bryce A. Contor</li> <li>Rehabilitation Studies Focusing on Shifting Open Canal System to Piped System in Lower Gediz Basin in the West of Turkey by Asli Erdenir Silay et al.</li> </ul>
					<b>Short Communication (5 minutes)</b>
					<ul style="list-style-type: none"> <li>Don't Use Electric Energy, Diesel Fuel; Use Water Powered Pump by Şahin Bekişoğlu</li> </ul>
		14:30-14:55			Discussion / Questions
		14:55-15:00			Closing remarks by Co-chair
		13:30-15:00			2nd Parallel Session on Sub-theme 2 - Erdoba Elegance Hotel
					<b>Chair:</b> Rudolph Cleveringa (IFAD)
					<b>Co-Chair:</b> Helena Aijo (FINCID)
					<b>Rapporteurs:</b> Osman Tikansak (TUCID)/ Dr. Kazumi Yamaoka (JNC-ICID)

13:30-13:35	Opening remarks by Chair	15:30-15:35	Opening remarks by Chair
13:35-14:35	Papers (12 minutes each) <ul style="list-style-type: none"> <li>• Roles of Various Stakeholders in the Development of Irrigation Systems in Ethiopia by Zeleke Dejen et al.</li> <li>• Algorithm of estimating agricultural water consumption in great river basins using satellite images by Vahid Karami et al.</li> <li>• Financial Remodeling to Meet the Economic challenges in Water Sector of Egypt by Ashraf El Sayed.</li> <li>• Project Activities for Sustainable Irrigation Water Use with Participatory Approach in Egypt by Koji Kitamura</li> <li>• Development trend of the world's irrigated agriculture and its challenges to sustainable investment by Kazumi Yamaoka</li> </ul>	15:35-16:35	Papers (12 minutes each) <ul style="list-style-type: none"> <li>• Calculation Method Study on Combined Open drains and Pipe drains For Surface Waterlogging and Water Table Controlling by Shaoli Wang</li> <li>• Exploring water and energy productivity under lift and groundwater irrigation in the Syrdarya River midstream by Akmal Karimov</li> <li>• Water distribution management on the irrigation systems based on the resource and energy saving principles by Petro Kovalenko et al.</li> <li>• Demonstration plots as a tool to ensure sustainability in the Fergana Valley by Bahadir Boz et al.</li> <li>• Irrigation Development and challenges for drainage management in arid and semi-arid regions by James E. Ayars and Bakhodir Mirzaev</li> </ul>
14:35-14:55	Discussion / Questions		<b>Short Communications (5 minutes each)</b> <ul style="list-style-type: none"> <li>• Application of RS and GIS in Delineating Boundary of Irrigation Development Project in Ghorveh Dehghan Sub Basin, (Kordestan, Iran) by Ahmad Dehmohseni</li> <li>• Sustainability of Farmer Designed Sprinkler Irrigation System in Kalpitty, Sri Lanka by Selvarajah Pathmarajah et al.</li> <li>• Participatory design of command area rehabilitation in the Fergana valley by Bahadir Boz et al.</li> <li>• Combined drainage with pressure relief wells in the Fergana Valley by Bahadir Boz et al.</li> <li>• Amu Zang Irrigation Rehabilitation Project (AZIRP) by Mott MacDonald-Temelsu</li> </ul>
14:55-15:00	Closing remarks by Co-chair		
13:30-15:00	1st Parallel Session on Sub-theme 3 - Erdoba Elegance Hotel <b>Chair:</b> Bruce Stewart (WMO) <b>Co-Chair:</b> John Metzger (GWP) <b>Rapporteur:</b> Dr. Suhas Wani (ICRISAT)		
13:30-13:35	Opening remarks by Chair		
13:35-14:25	Papers (12 minutes each) <ul style="list-style-type: none"> <li>• The Impacts of Climate Change on Water Stress Situations in the Yellow River Basin, China by Jianxin Mu et al. Systems Approach to Water Use for Food Production and Energy Generation by Gerhard Backeberg et al.</li> <li>• Agricultural Sustainable Development Strategy for Water Scarce Region by Ching-Chung Chang et al.</li> <li>• Filling the Aral Sea by Bahadir Boz et al.</li> </ul>	16:35-16:55	Discussion / Questions
		16:55-17:00	Closing remarks by Co-chair
		<b>15:30-17:00</b>	<b>4th Parallel Session on Sub-theme 1 - Hilton Garden Inn Hotel</b> <b>Chair:</b> Dr. Willem F. Vlotman, Vice President Hon., ICID <b>Co-Chair:</b> Prof. Akuzum, Ankara Agri. Univ. (Turkey) <b>Rapporteurs:</b> Thierry Facon (FAO) / Ding Kun Lum (CNCID)
14:25-14:55	Discussion / Questions		
14:55-15:00	Closing remarks by Co-chair		
13:30-15:00	Side Events in Parallel		
15:00-15:30	Coffee break	15:30-15:35	Opening remarks by Co-Chair
15:00-17:00	Poster Presentation	15:35-15:55	Presentation of Draft recommendations by the Rapporteurs
<b>15:30-17:00</b>	<b>3rd Parallel Session on Sub-theme 2 - Erdoba Elegance Hotel</b> <b>Chair:</b> Ian Makin (ADB) <b>Rapporteurs:</b> Gerhard Backeberg (SANCID) / Pooja Kapoor (India)	15:55-16:20	Panel discussion convened by Felix Reinders
		16:20-16:40	Comments from the floor
15:30-15:35	Opening remarks by Co-Chair	16:40-16:55	Finalisation of recommendations
15:35-15:55	Presentation of Draft recommendations by a representative of the Rapporteurs	16:55-17:00	Closing remarks by Chair
15:55-16:20	Panel discussion convened by G.R. Backeberg	15:30-18:30	Side Event(s) in Parallel
16:20-16:40	Comments from the floor	<b>17:00-18:30</b>	<b>Round Table 2 - Stakeholders (Industry, Research, Youth and Farmers)</b>
16:40-16:45	Finalisation of recommendations		
16:45-17:00	Closing remarks by Chair		
<b>15:30-17:00</b>	<b>2nd Parallel Session on Sub-theme 3 - Erdoba Elegance Hotel</b> <b>Chair:</b> Dr. Ibrahim Gurer (TUCID) <b>Co-Chair:</b> Michael Van Der Laan (SANCID) <b>Rapporteurs:</b> Mrs. Jianxin Mu (CNCID) / Idil Yilmaz (TUCID)	<b>DAY 3 (TUESDAY, OCTOBER 1)</b>	
		<b>09:00 – 12:30</b>	<b>MORNING SESSION</b>
		<b>09:00-10:30</b>	<b>3rd Parallel Session on Sub-theme 3 - Erdoba Elegance Hotel</b> <b>Chair:</b> Dr. A. Hafied A. Gany, Vice President Hon., ICID (Indonesia) <b>Co-Chair:</b> Dr. Daesu Eo (Korea) <b>Rapporteurs:</b> Taner Kimence (SYGM)/ Nedim Yesil (TUCID)



09:00-09:05	Opening remarks by Chair	13:30-13:35	Opening remarks by Co-Chair
09:05-09:45	Papers (12 minutes each) <ul style="list-style-type: none"> <li>• Early stage results to develop BMPs for rice paddy and upland in Korea by Jeongryeol Jang et al.</li> <li>• Integrated Water and Nitrogen Management in a Large Scale Irrigated Area in Southern Turkey by Hayriye Ibrikci et al.</li> </ul>	13:35-13:40	Presentation of Outcome of Main Theme by Dr. Gurhan Demir
09:45-10:25	Discussion / Questions	13:40-13:45	Presentation of Outcome of Sub-theme 1 by Dr. Willem F. Vlotman
10:25-10:30	Closing remarks by Co-chair	13:45-13:50	Presentation of Outcome of Sub-theme 2 by Ian Makin
09:00-10:30	Panel Discussion (Farmers)	13:50-13:55	Presentation of Outcome of Sub-theme 3 by Dr. Dogan Altinbilek
11:00-12:30	Side Event(s) in Parallel	13:55-14:10	Presentation of Conclusions by Chair: Prof. Bart Schultz
10:30-11:00	Coffee break	14:10-14:25	Panel Discussions (Panellists: Co-chairs of Plenary sessions of the three sub-themes, Discussion / Questions convened by: - John Metzger (GWP)
15:00-17:00	Poster Presentation	14:25-15:00	Adoption of the Conclusions and Outcomes
<b>11:00-12:30</b>	<b>4th Parallel Session on Sub-theme 3 - Erdoba Elegance Hotel</b> <b>Chair:</b> Prof. Dr. Dogan Altinbilek, Vice President, WWC (Turkey) <b>Co-Chair:</b> M. Gopalakrishnan, SGH, ICID <b>Rapporteur:</b> Dr. Prathapar Sanmugam (IWMI)	13:30-15:30	Side Event(s) in Parallel
11:00-11:05	Opening remarks by Co-Chair	15:00-15:30	Coffee break
11:05-11:25	Presentation of Draft recommendations by the Rapporteurs	15:30-17:00	Thematic Wrap-up Session WIF1 - Erdoba Elegance Hotel
11:25-11:50	Panel discussion convened by Willem Vlotman		Presentation of the 1st World Irrigation Forum Statement by Chair, Drafting Team of WIF Statement
11:50-12:10	Comments from the floor		
12:10-12:25	Finalisation of recommendations		
12:25-12:30	Closing remarks by Chair		
11:00-12:30	Side Event(s) in Parallel		
11:00-12:30	Panel Discussion (Industry)		
12:30-13:30	Lunch Break		
13:30-17:00	Afternoon Session		
13:30-15:00	Plenary Session V - Erdoba Elegance Hotel Integrating Session on Main Theme and the Three Sub-Themes <b>Chair:</b> Prof. Dr. Bart Schultz, President Hon., ICID <b>Co-Chair:</b> Dr. Huseyin Gundogdu, Vice President, ICID <b>Rapporteur:</b> Dr. Suresh Kulkarni (ICID)		

## INTERNATIONAL WORKSHOPS

### WEDNESDAY, OCTOBER 2

#### Management of Water, Crops and Soils under Climate Change (WS-3) - Dara Hall

**Chair:** VP Dr. Ragab Ragab (UK)

**Co-Chair:** Dr. T. Watanabe (Japan)

#### Developing Management Strategies for Coping with Drought and Water Scarcity (WS-2) - Dara Hall

**Chair :** VPH Franklin E. Dimick (USA)

**Co-Chair :** Mr. Mohammad Sadegh Jafari (Iran)

**Rapporteur :** Dr. Abraham Mehrari Haile (The Netherlands)

### Thursday, 3 October 2013

#### Water Wisdom and Sustainability (WS-1) - Dara Hall

**Chair :** Dr. Kamran Emami (Iran)

**Co-Chair :** Dr. N. Hatcho (Japan)

**Rapporteur :** Dr. Bart Toussaint (The Netherlands)



## List of Side Events

Title of the Side Event	Type of Session	Organizing Institute	Venue	Time (Hours)
<b>30 September 2013</b>				
Natural and Cultural Protection in Development of Water Resources [3]	Panel Discussion	State Hydraulic Works of Turkey (DSI)	Erdoba Elegance Hotel	09:00 – 10:30
Mobile Canal Control . A smart phone application for irrigation canal measurements and control [6]	Film and have your say and demonstration	Delft University of Technology	Hilton Hotel	09:00 – 10:30
Future vision of Participatory Irrigation Management [11]	Panel Discussion	Japan National Irrigation and drainage Committee (JNC-ICID)	Hilton Hotel	09:00 – 12:30
Optimisation of Piped Irrigation Networks and Energy Potential in Irrigation Projects [15]	Panel Discussion	SUFEN Project Co. Ltd.	Hilton Hotel	09:00 – 10:30
Structural Chemicals for irrigation Networks [19]	Film Screening/ Presentation	Duayen Firm	Hilton Hotel	11:00 – 12:30
Use of Remote Sensing and GIS Tools in the Irrigation Commands to assist planning and management [2]	Special Session	International Water Management Institute (IWMI)	Hilton Hotel	11:00 – 12:30
The D-8 Irrigation Panel [5]	Panel Discussion	Turkish Water Institute (SUEN)	Erdoba Elegance Hotel	13:30 – 15:00
Policies for sustainable water and food security in arid regions [14]	Panel Discussion	General Directorate of Agricultural Research and Policy	Hilton Hotel	13:30 – 15:00
New Technologies for Irrigation Network: Water Powered Pumps [22]	Panel Discussion, & film, have your say	Waterpower Pumps Co. Ltd.	Hilton Hotel	13:30 – 15:00
Special Session "Uzbekistan" [25]	Special Session	Temelsu International Engineering Inc.	Erdoba Elegance Hotel	13:30 – 15:00
Working together to promote Investment in Agricultural Water Management in Africa (AgWA) [12]	Seminar	Food and Agriculture Organization (FAO)	Erdoba Elegance Hotel	13:30 – 15:00
Turkish Northern Cyprus Pipeline Project: Its importance for irrigation [7]	Panel Discussion	Near Eastern University - Northern Cyprus	Erdoba Elegance Hotel	15:30 – 17:00
Climate Services to optimize irrigation use and improve farmer management in agriculture [9]	Panel Discussion	World Meteorological Organization (WMO)	Hilton Hotel	15:30 – 17:00
DSI Groundwater session [27]	Panel Discussion, & Film Screening	DSI-TUCID	Hilton Hotel	15:30 – 17:00
Documentary about Water Civilization in Mardin [18]	Film Screening	Dursun ÖZDEN (Researcher)	Erdoba Elegance Hotel	15:30 – 17:00
Challenges and opportunities for global food security: inter-generational knowledge transfer in the Agricultural Water Management sector. [10]	Panel Discussion, have your say, & round table	International Fund for Agricultural Development (IFAD)	Hilton Hotel	17:00 – 18:30
Multiple-use water services, a way to sustainability whatever the scale water is managed and served [26]	Panel Discussion	ICID, AFEID, FAO	Hilton Hotel	17:00 – 18:30

1 October 2013				
Building local frameworks for integrated water resource management in the large irrigation systems [1]	Special Session	Research Institute for Humanity and Nature in Japan (RIHN)	Erdoba Elegance Hotel	09:00 – 10:30
Regional Development Project: " GAP " [20]	Panel Discussion	GAP Regional Development Administration	Erdoba Elegance Hotel	11:00 – 12:30
Evaluation of Alternative Financial Models on Modernization of Irrigation Infrastructure [21]	Panel Discussion	Water Management Institute , University of Ankara	Erdoba Elegance Hotel	11:00 – 12:30
Basin Management and Utilisation of Treated Waters for Agriculture [4]	Panel Discussion	DG for Water Management of Turkey	Erdoba Elegance Hotel	11:00 – 12:30
Promoting Sustainable Water Resource Management in the Mesopotamia [17]	Seminar	FAO and Euphrates Tigris Initiative for Cooperation (ETIC)	Erdoba Elegance Hotel	13:30 – 15:30
Monitoring Water Quality for Sustainable Irrigation [13]	Panel Discussion	Director General of Water Management (SYGM)	Erdoba Elegance Hotel	15:30 – 17:00



# Contents of the DVD

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## Message from Chairman, TUCID

## Acknowledgements

## World Irrigation Forum: Introduction

## The Curtain Raiser: Welcome

- Inaugural Ceremony
- Award of World Irrigation and Drainage Prize
  - Speech of PH Peter S. Lee
  - Speech of VPH Victor A. Dukhovny
- Vote of Thanks

## Bringing together: Various perspectives

- ICID
- Farmer's (IFAD) - Keynote addresses
- Research (IWMI) - Keynote addresses
- Industry (Dolsar) - Keynote addresses
- International Scientific Community (WMO) - Keynote addresses

## Sub-themes: the discussions and outcomes

### Policy, Science and Policy Interactions

- Background paper
- Keynote addresses
- Oral Presentations
- Short Communications
- Poster Presentations

### Challenges and Developments in Financing Irrigation and Drainage

- Background paper
- Keynote addresses
- Oral Presentations
- Short Communications
- Poster Presentations

### Integrated Water Management Approaches for Sustainable Food Production

- Background paper
- Keynote addresses
- Oral Presentations
- Short Communications
- Poster Presentations

## Workshops

### Developing Management Strategies for Coping with Drought and Water Scarcity

- Oral Presentations
- Short Communications
- Poster Presentations

### Management of water, soil and Crop under Climate Change

- Oral Presentations
- Short Communications
- Poster Presentations

### Water Wisdom and Sustainability

- Oral Presentations
- Short Communications
- Poster Presentations

## Roundtables and Panel Discussions

- Round Table: Policy Issues in Irrigation and Drainage
- Panel Discussion: Farmers' perspective on Irrigation and Drainage

## Second World Irrigation Forum

### An Invitation!

### An Opportunity!!

### An experience!!!

The 2nd World Irrigation Forum will be hosted in Chiang Mai, by the Thai National Committee on Irrigation and Drainage (THAICID) in 2016. Chiang Mai is the centre of irrigated agriculture development in the North. The region will provide the ideal setting to take forward the stakeholder engagement initiated at Mardin.

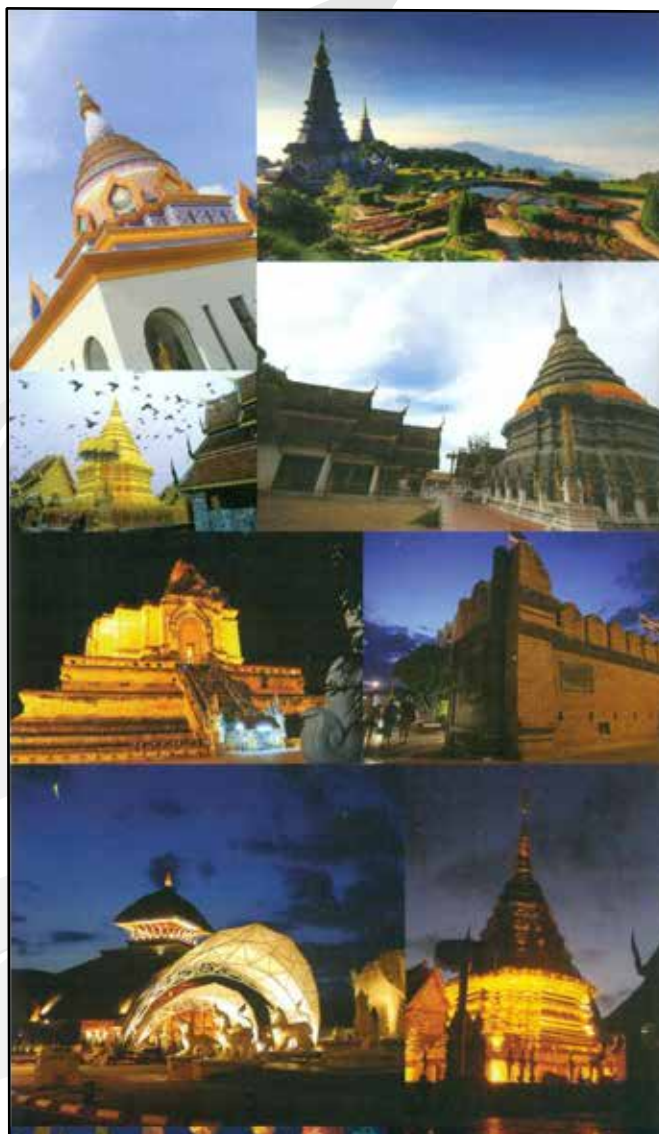
Chiang Mai is regarded as Thailand's "Rose of the North" because of its elegant culture, perfect harmony and exquisite arts and craftsmanship and offers various types of recreational activities in mountainous areas. It provides an opportunity to serve both educational and recreational objectives. We are certain that the northern people will give you a warm welcome and hospitality that will be really memorable.

As one of the leading agricultural countries, Thailand has been the major rice exporter. It is the "kitchen of the world", offering quality food produce for many countries. With 110 years of irrigation development Thailand has the 8th largest irrigated area in the world. Flooding has impeded agriculture development many a times in the past e.g., 1995, 2006, 2010 and 2011. Having foreseen that the world-changing situation will directly result in water-related problems, Thailand has created strategic plans emphasizing food security, through continuous agricultural production, environment preservation, water resources development, and involvement of local people in solving water problems.

As a founder member of ICID, Thailand has always been playing an important role in water management and has been at the forefront in the world. Chiang Mai has in its credit to successfully organizing the 2nd Asia Pacific Water Summit in 2013.

The theme of the WIF2 will be deliberated upon at the 65th IEC in Gwangju so that it provides an extensive stage for all academics and irrigation management experts to share and exchange knowledge to solve the problems and challenges of food security, water scarcity, poor water quality, and in effective use of water.

We hope to see you all at **Chiang Mai in 2016.**



## STATE PARTNERS



## TECHNICAL PARTNERS

