

ICID NEWS

MANAGING WATER FOR SUSTAINABLE AGRICULTURE



MESSAGE FROM THE PRESIDENT

Dear Colleagues,

In the month of April 2018, I visited Beijing where Chinese National Committee (CNCID) and ICID have successfully organized a Training Program for Asian Young Professionals on Performance Assessment of Irrigation Systems; and Workshop on “Innovations in Irrigation Technologies” from 9-13 April 2018. Secretary General Ashwin Pandya and Executive Director HarishVarma joined me as training resource persons among others. The training program was attended by two young professionals from Democratic People's Republic of Korea.

Most would agree that life-long learning is necessary as we deal with the impacts of a fast-changing climate and more so on water resources for agriculture. Our academic and research institutions are producing significant new knowledge that needs to be shared with working professionals, who may not have the time and resources to go back to universities, and that is where short-duration training programs render useful services. Similarly, ICID's Young Professional e-Forum (IYPeF) plays a key role in facilitating networking and knowledge sharing among young professionals. I am glad to report that

starting this year, ICID has taken the lead to organize a series of webinar dedicated to young professionals and is completely managed by the IYPeF members. This group has now grown in numbers having 300+ active YPs.

We are nearing the 8th Asian Regional Conference scheduled from 2-4 May 2018, Kathmandu, Nepal on the theme of “Irrigation in Support of an Evergreen Revolution” hosted by the Nepal National Committee, ICID (NENCID). I hope you have registered your participation to this important event held in the Himalayan city. The organizers have made elaborative arrangements and included very attractive program including technical / study tours. Considering the importance of this event, Hon'ble Prime Minister, Mr. K.P. Sharma Oli has agreed to grace the event and address the gathering along with other invited dignitaries. I will take this opportunity to welcome you at Kathmandu.

As I wrote in the previous issue about the upcoming 8th World Water Forum (WWF8), it successfully concluded last month and ICID was well represented in various technical sessions and events. I was invited to be a panelist in the FAO-led side event on ‘Water Accounting’ wherein experts shared their views on water scarcity and the need for better water measurement. A White Paper on Water Accounting for policy makers was officially released by FAO as a World Water Council (WWC) Member Initiative. ICID has also contributed significantly to this paper. ICID, as a partner and member, also participated in various WASAG activities during WWF8 and presented its views in meetings of the WASAG working groups on Sustainable Agriculture Water Use and Communication Strategy for WASAG.

Additionally, WWC and ICID jointly hosted a ceremony to recognize three water management systems – two from

Japan and one from Iran – selected under the World Water System Heritage (WSH) program. These systems reveal ancient wisdom on water management and have valuable lessons that are relevant even today. This was the first edition of the WSH Program and I hope similar recognitions will continue in future.

Agriculture is not only about food, it also provides feed, fibre, fuel, and several raw materials for cosmetic and pharmaceutical industries. Over the last few decades, bio-fuels being less polluting are gaining acceptance in transportation systems around the world. However, we need to ensure that physical resources for maintaining food security are not diverted for such crops.

Vice President Dr. Brian Wahlin participated in the Water for Food International Forum organized by Daugherty Water for Food Institute (DWFI) on Farmer-Led Irrigated Agriculture at the World Bank, Washington-DC, USA. I believe, it is very timely that the farmers, as ultimate custodians of more than 75% of the freshwater now take the driving seat and steer us towards a sustainable path of growth and development.

Last but not the least, I must also recognize the role of women in agriculture, water, health, sanitation, and development as last month we celebrated the International Women's Day on 8th March. They represent half of our human resources and I urge you all to please join me in saluting them.

With regards,

Felix Reinders
President, ICID



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Build a Smart Water Future: Count and Account for Water

Domitille Vallée*

On the occasion of the 8th World Water Forum (WWF8), the World Water Council (WWC) and FAO released the White Paper on ‘Water Accounting for Water Governance and Sustainable Development’ and its accompanying policy brief. These documents are outputs of the WWC Member initiative led by FAO with UNESCO-IHE, UNESCO-WWAP, IWMI, ICID and DWFI.

The White Paper <<http://www.fao.org/3/I8868EN/i8868en.pdf>> contributes to the work plan of the Global Framework on Water Scarcity launched at the Marrakech Climate Conference in November 2016, and is the result of a large consultation process that involved experts from around the world who contributed ideas and examples.

The White Paper is the result of a consultation process that involved 370 people in an online discussion (June-August 2017) contributing ideas and examples, and case studies. The draft content of the Paper was defined by an expert group (members in the shown picture except Olcay Unver) comprising Marco Arcieri (ICID); Gonzalo Espinoza (IHE-Delft); Jippe Hoogeveen (FAO); Bruce Lankford (UEA); Christopher Neale (DWFI); Livia Peiser (FAO); Lisa Rebelo (IWMI); Sahdev Singh (ICID); Domitille Vallée (FAO); and Olcay Unver (FAO).

The white paper on water accounting for water governance and sustainable development recently launched in Brasilia (WWF8, 21 March 2018) makes the case for a systematic adoption of water accounting to address today problems and adapt to tomorrow problem. It states ‘we cannot plan and manage what we do not measure’ and that water accounting is an essential step for water governance reform. Many reasons are being advocated to justify why water accounting is needed, what benefits it brings and how it could support sustainable development. However, the global review done to prepare this white paper— literature review, online discussion— reveals that there is still very limited use of ‘water accounting’ around the world and when it is used, it is often done as part of a project, a research. Rare are the cases, where it’s use is institutionalized, for example, in Australia that uses national water account for water allocation between sectors, among other uses. Additionally, the white paper insists that you do not need to measure everything and that even if you cannot measure, you can accept a



Group of experts who participated in the meeting at FAO Headquarters, December 2017

level of uncertainty and carry out water accounting.

The broad definition proposed by FAO in its source book (FAO, 2016¹) describes well the concepts: “Water accounting refers to the systematic study of the hydrological cycle and the current status and future trends in both water supply and demand. Beyond the simple accounting of volumes and flows, it also focuses on issues relating to accessibility, uncertainty and governance of water. Water auditing goes a step further than water accounting by placing trends in water supply, demand, accessibility and use in the broader context of governance, institutions, public and private expenditure, laws, and the wider political economy of water in specified domains”. This approach incorporates quantitative rigour of water accounting with a wider social process and dialogue driven analysis of water governance with ‘auditing.’

Water Accounting is not new and have been a topic of discussion for many years. Countries have always done some form of water balance or water assessment to plan, design project, decide on allocations. Already in the 1980s, the search for green accounts led some countries, such as France to design “Natural Resources Accounts” both physical and financial. The UNDESA built on that country approach

to systematize its Environmental-Economic Accounting for Water (SEEAW) and developed it as a comprehensive water accounting system with the objective of standardizing concepts and methods in water accounting (UNSD, 2012).

A new spark in the 1990’s let various countries to implement basin level (ex. Loire valley in France, Brantas catchment in Indonesia, etc.) or country level accounting (examples - Cyprus, Malta). In the recent years, water accounting efforts were brought to large river basins – Nile, Okavango, Helmand- and efforts were also put in accounting water in large aquifers. Local level water budgeting revealed imbalance between resources and demands particularly when cities grow faster than anticipated or private irrigation flourish uncontrolled. The United States, India, China, Morocco, South Africa among others will have many examples to share related to these local hotspots. However, the recent water crisis observed in many of these countries showed that even with the knowledge, the situation was left to evolve towards crisis as recently witnessed in Cape Town (South Africa), or with the thirst demonstration in Zagora (Morocco). Data availability and uncertainty have always been one of the bottlenecks for doing a full quantitative assessment. Changes in the policy and institutional

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Farmer-Led Irrigated Agriculture: Seeds of Opportunity

Dr. Brian Wahlin*

The Water for Food International Forum was held on 29-30 January 2018 at the World Bank headquarters in Washington, D.C, USA. The focus of the international forum was farmer-led irrigated agriculture. It was hosted by Robert B. Daugherty Water for Food Global Institute and the World Bank Water Group. The forum was attended by participants from over 30 different countries and had several thematic sessions.

The forum focused on improving water and food security, and livelihoods for smallholder farmers in developing countries, particularly Africa, by intensifying and expanding sustainable irrigated agriculture. Participants explored the investments needed and the necessary enabling environment for enhanced agricultural production, including strong partnerships, linkages to market support, capacity and technical training, and the role of the private and public sectors.

Trends and Drivers in Farmer-led Irrigation

The session of the forum defined farmer-led irrigation and its position in the irrigation landscape. It also explored significant trends in the economic, demographic, geographic, and policy facets of farmer-led irrigation in Africa.

Some of the concepts discussed in this session included the potential of solar power for pumping irrigation water, the need for improving conveyance systems, and the importance of developing programs to involve young people. In addition, collaboration between the public and private sectors is crucial in order to develop sustainable small stakeholder farms. Inadequate public-sector investment and coordination is a major obstacle for agriculture in Africa. As a result, many small stakeholder farmers do not have access to the necessary resources. In the past, the private sector has avoided investing in agriculture in Africa because of the perceived risks involved. Removing the obstacles to the risks is the key. There are four major problems that Africa will face in the future: water scarcity, conflicts over resource (e.g., land and water), youth unemployment, and climate change.

Most World Bank projects have focused on large scale projects. There is also a need to focus on small scale projects (i.e., farmer-led irrigation) because the impacts of small scale projects can be as significant as the impacts of large scale projects. Future policies should



consider small scale, farmer-led agriculture and there should be more support for rural infrastructure such as roads, rail, and shipping. Assistance to farmer-led agriculture should also be provided in the areas of pest management as well as groundwater management. Financing for small scale agriculture should have longer terms (e.g., micro financing). There should also be a push to engage and empower women in small scale agriculture as well as more training on nutrition. Providing these services will help increase the income to small scale farmers.

High Tech for Inclusive Growth

Panelists discussed various types of hard and soft innovation that has worked in different parts of the world (e.g., irrigation systems, apps, pay-as-you-go models, adapted energy provision models, etc.). The discussion focused on the opportunities and constraints surrounding technology adoption.

Traditionally, Africa has been left behind with regard to technology in irrigation. However, that actually puts Africa in an advantageous position moving forward as they can now implement new high-tech systems more efficiently because it is more efficient to install new implementations from scratch rather than to rehabilitate already existing systems. Some of these new technologies include rain water harvesting, pumps and tube wells, drip irrigation systems, control sensors, smart phone apps, and solar power pumps. It is important that these new technologies be

applied in the proper place and for the proper use.

Center pivots are typically considered for use only in large-scale productions as center pivots cannot serve smallholder farmers. However, there is a new concept called the 'shared pivot'. This concept allows multiple smaller holders to share the same center pivot. Research is ongoing regarding the technology, financing, market linkage, and institutional support and mentoring that would be needed to make these shared center pivots a reality.

Many smallholder farmers in Africa rely on drilled shallow wells for water. Thus, there is a need to train the farmers for operation and maintenance of these pumps. In addition, solar pumping is relatively cheap and could make water more accessible by providing a way to pump more of Africa's groundwater resources.

Many of the smallholder farmers in Africa are women. Thus, there is a strong need for specialized skill development for both women and the youth in Africa in order to support smallholder farmers.

Drip irrigation has a high potential for use on small farms in Africa. However, it has yet to catch on strongly. The three most important factors holding drip irrigation back in Africa are:

1. Lack of peer influence (a farmer is more likely to install a drip system if his neighbor has installed one and has had success with it).

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2. Full benefits of drip irrigation are not fully understood by the farmers.
3. Price is too high (which indicates there is a need for financing channelized towards smallholder farmers).

Recommendations for Africa with regards to new technology include:

1. Re-discover agricultural development and food security policies, strategies, and programs that are 'irrigation smart'.
2. Integrate farmer-led, high-tech irrigation into the agricultural value chains to enable markets and profit motives to drive adaptation and adoption.
3. Expand research and development of high-tech irrigation systems by partnering with commercial enterprises to enable the commercialization and scaling-up of high performance technologies and associated practices.

The Links to Strong Support: Inclusive Supply Chains and Financing

This session examined the role of various supply chain actors in the development of farmer-led initiatives, addressing questions such as:

- How are supply chains and financing tools being adapted

to ensure the poor, the women, and the youth can benefit from farmer-led irrigation solutions?

- What steps are involved in feasibility studies and developing viable business models?
- What financing options are available and how can we make them sustainable?

Profit and capital growth are the primary incentives for the private sector. The public sector needs to keep this in mind as they look to partner with the private sector to assist the smallholder farmers. Thus, it is best to look for hybrid private sector solutions for the smallholder farmers. These are private sector solutions that are normally applied to large scale farms that can also benefit the smallholder farmers. Some of the perceived risk in investing in irrigation by the private sector could be mitigated by looking at different financing schemes such as blended financing.

Financing and training will always provide job opportunities. Thus, there is the need for training opportunities such as workshops on maintenance of equipment. There is a need to understand the limitations of the users as this will improve the value chain. It is also important for the public sector to subsidize women and youth.

Irrigation is an improvement of rainfed farming. With the increased popularity of solar pumps, providing irrigation water to smallholder farmers in Africa is becoming easier. Farmers can use these pumps to grow high value crops in the off season. Then, during the rainy season, the pumps can be used as a backup system. Thus, solar pumps appear to be a crucial resource for smallholder farmers in Africa. Still, these pumps need to be low cost in order for the farmers to afford them.

The Way Forward

Participants agreed that the knowledge is the way forward and it includes understanding the resource base (i.e., a water budget of the watershed). That knowledge also includes understanding what is happening on the small farms. In addition, small farms need to be part of the solution. Research and development is needed to formulate policies as well as develop new technologies for small farms. Farmers also need more knowledge, so training programs are essential as well as an institutional support system. Providing these services will help increase resilience for the smallholder farmer.

Through technology and policy, it is important to lower the risk of entry for smallholder farmers. The private sector is key for the smallholder farmer.



Water and Biofuel

Kim Trollip*

This article is based on the research work led by the University of KwaZulu-Natal (UKZN) and funded by the Water Research Commission (WRC), South Africa. The research aimed to answer - Are biofuels the answer to an energy-scarce future? Do we have enough water resources in order to grow biofuels? These are some of the questions addressed in the feature published in 'The Water Wheel', November/ December 2016 issue. To access full version of the article, please visit <<https://goo.gl/9afhi1>>

Biofuels remain a viable option in South Africa, despite being a water-scarce country – but there are a number of provisos. For example, we need to cultivate sustainable, water-efficient feedstocks and make viable decisions regarding land use change. Land use change that threatens the cultivation of food, or has a negative impact on biodiversity, or significantly reduces the availability of water to downstream users, should certainly be avoided. This is the conclusion of an eight year-long study that will guide amendments to existing biofuel-related policy, as well as help the biofuel industry plan the way forward. The



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project has ensured that more precise knowledge is now available on water use and what biofuel crops can be considered (based on highest water use efficiency), the geographic location of suitable production areas for each crop and potential impact on streamflow reduction. Producing crops for biofuels is definitely still an option, with crops for bioethanol being more water use efficient. The study has also concluded that water availability (and not land availability) will determine limits for biofuel production potential in rain-fed areas of South Africa.

WRC Executive Manager for Water Utilisation in Agriculture, VPH Dr. Gerhard Backeberg, urges actors in the public and private sectors to study the available research output in order to improve the biophysical basis for a sustainable biofuels industry in South Africa.

Key messages to Stakeholders

The project output will benefit different end-users in various ways. It will assist the Department of Energy (DoE) to revise the country's biofuel production potential; the Department of Water and Sanitation (DWS) to assess the streamflow reduction potential of selected feedstocks in sub-catchments; and it will help biofuel manufacturers to identify and target areas where feedstocks should be cultivated and the preferred location of processing facilities by using the land suitability maps. The knowledge is of great use to agricultural extension officers to advise emerging farmers on which crop is best adapted in a particular farming region. Water use planners can now be guided by water use efficiency estimates of crops towards making the most beneficial use of available water resources.

Six private companies have already approached the DoE with proposals to set up biofuel manufacturing plants in South Africa, according to Richard Kunz of UKZN and WRC project leader. Collectively, these companies would be able to produce some 1.3 billion litres of biofuel annually – three times the conservative target of 400 million litres initially suggested by the Biofuels Industrial Strategy back in 2007.

Kunz believes the strategy is overdue for revision and recommends that the Biofuels Task Team (responsible for revising this policy document) take cognisance of the research findings contained in the studies funded by the WRC. "Policymakers should promote the sustainable production of biofuels in South Africa. Foremost, feedstock should be cultivated under rain-fed conditions. In the Cradock region, the planned irrigation of grain sorghum

and sugar beet for biofuel production needs to be re-evaluated. Irrigation water should rather be used for food and feed production, not fuel production."

"The highest priority areas for poverty alleviation and rural development exist in KwaZulu-Natal and the Eastern Cape. Thus, biofuel-related policy should encourage and incentivise the use of currently unproductive arable land in these two provinces, for feedstock cultivation. Furthermore, the use of highly productive arable land for biofuel production is not recommended. Such land should rather be used for food production."

Biofuel policy needs to cap or limit the volume of biofuel production in South Africa. The higher this target volume, the greater the impact on the country's available land and water resources. South Africa's biofuel production potential is limited by the need to minimise the impact of large-scale feedstock cultivation on the country's water resources.

Rolling out biofuels in South Africa: Considerations

The petroleum industry has stated that compared to bioethanol, it is easier and cheaper to blend biodiesel into the fuel supply chain. However, the research shows that biodiesel production in South Africa requires far more land area than bioethanol production. For example, an additional 3000 ha of land is required to cultivate sufficient feedstock to produce 1 million litres of biodiesel from soybean (i.e. 3180 ha), compared to the same volume of bioethanol produced from sugarcane (i.e. 180 ha). Thus, if the availability of arable land in a particular region or province is limited, then the cultivation of bioethanol feedstocks should be preferred. To meet the feedstock production and supply demands, the companies would require a total area of arable land of 2.3 million hectares. According to a 2012 Department of Agriculture report, South Africa has about 2.5 million hectares of underutilised arable land.

"From the research to date, we now know that, to be sustainable, biofuel feedstock production must take place only under rain-fed conditions, and these crops must be grown in rotation with food crops such as maize and wheat," says Kunz. "With the support of training and resources, the production of biofuel feedstocks must also be promoted in rural areas where agricultural crop production is non-existent or sub-optimal. The production of these crops must strive towards the most beneficial use of available water resources."

The research also shows that some crops are more efficient users of water than others. For example, crops that contain sugar (e.g. sweet sorghum) are more water use efficient than feedstocks that produce starch (e.g. grain sorghum). In addition, the water use efficiency of sugar crops (e.g. sugar beet) is much higher than crops that produce vegetable oil (e.g. soybean). The study maps highlight the spatial variability in water use efficiency, which may help to guide land use planners in striving towards the most beneficial use of the country's available water resources.

The reports highlight two crops which may negatively impact the availability of water to downstream users, especially if grown on a large scale in catchments that are already water stressed. Thus, the DWS will find the database of simulated reduction in streamflow generation useful in deciding which crops may need to be declared as stream flow reduction activities.

The researchers also looked at areas of South Africa where biofuel feedstock would grow under rain-fed conditions. They found that large parts of Mpumalanga, KwaZulu-Natal and the Eastern Cape were best suited to sugar beet planted in September, where at least 6 t/ha dry matter production was attainable. According to Kunz, a coastal section of the Eastern Cape would yield the "largest crop per drop" of 2 kg to 2.5 kg of dry matter production per cubic metre of water used. However, sugar beet is particularly prone to fungal disease when cultivated in hot and humid areas.

Looking Ahead

The current new project considers the economics of feedstock production by smallholder farmers, as well as developing guidelines to advise emerging farmers on agronomic practices of feedstock cultivation. It focuses on two feedstocks in particular, namely grain sorghum and soybean, selected by the DoE as reference feedstocks to determine the pricing framework for bioethanol and biodiesel production.

Role of ICID

To address this important issue ICID established a Task Force led by VPH Laurie Tollefson (Canada) in 2010 which was renamed as Working Group on Water for Bio-Fuel and Food (WG-BIO-FUEL) in 2016. At present, Dr. Fuqiang Tian (China) is the Chairman of the Group. For more information, please visit http://www.icid.org/wg_bio_fuel.html

World Water System Heritage Program

The World Water Forum 8 -the world's largest water event- was successfully held in Brasilia, Brazil from 18 – 23 March 2018 with over 8,000 participants and 40,000 visitors from around the world. More than 10 Heads of State, including the President of Brazil, H.E. Michel Temer, President of Hungary, H.E. János Áder, President of Senegal, H.E. Macky Sall, South Korean Prime Minister H.E. Lee Nak-yeon, alongside CEOs of fortune 500 companies, among many others attended this mega event to participate in high-level panel meetings and several sessions to discuss the future of water security for the next three years.

An exclusive Award ceremony jointly organized by ICID and World Water Council (WWC) to recognize three water management systems selected under the World Water System Heritage (WSH) program was held during the opening ceremony on 19 March 2018 at the WWC Pavilion. The recognized systems selected by the International Panel of Judges include: (i) The Genbegawa Irrigation Canal System, Japan; (ii) Sekikawa Suikui Land Improvement District, Japan; and (iii) Sheikh-Bahaei Water Allocation Scroll, Iran. A Citation Plaque and Certificate were presented to the representatives by Prof. Benedito Braga, President, WWC and President Reinders, ICID.

The World Water System Heritage (WSH) program, a joint global initiative by the International Commission on Irrigation and Drainage (ICID) and the World Water Council (WWC) Member Initiative, addresses the need and attempts to provide multi-disciplinary insights in the heritage wisdom from public policy perspectives. The Board of Governors of WWC at its 58th Meeting held in Jodhpur, India, March 2016 approved the establishment of a 'Centre for WSH' as the Secretariat of WSH program and accepted the proposal of ICID to undertake the responsibility as Secretariat and hosting the Centre for WSH. The Centre for WSH would maintain and publish the Register of WSH and in collaboration with WWC Secretariat provide various services and support to the registered systems and national and local governments by mobilizing resources, disseminating the lessons learnt, holding special sessions at World Water Fora, organize technical consultations, and participate in political process.

People-centered institutions and practices have managed water systems for many generations. These management practices have served the mankind in amicably distributing the benefits of water systems among various users and they represent our heritage. These water systems have the potential to open up a new horizon of solutions towards better management, conservation, conveyance and utilization of water resources.

Due to the global variations such as climate change, the exponential growth in technology and the pressure on our natural resources, the relevance of ancient knowledge may appear to diminish, but they continue to provide crystals of wisdom. The need is to be able to identify these crystals and adapt them to the present challenges.

WSH program aims at identifying and preserving the people-centered water management systems, organizations, regimes, and rules as intangible water heritage considered to be of outstanding value to humanity that creates a co-existent social system for humanity and sound environment and giving them recognition.

WSH program is expected to create a roster of World Water System Heritage - that includes data on characteristics of the system within physical, financial and social context; activities undertaken through the system; its historical development; and the wisdom nuggets offered by them. It will also encompass an evaluation of the success of the registered system and may guide in developing better management practices. The main objective includes:

1. Gain/learn lessons from water heritage systems,
2. Disseminate the age-old wisdom gathered through them,
3. Extract new ideas from the wisdom aggregated from the past, and
4. Adapt the knowledge suitably in the present context.

1. The Genbegawa Irrigation Canal System, Japan

A home for the flies and fishes

The "Genbegawa," Genbe River, is an irrigation canal that utilized the waters from the Kohamaike group of springs and was constructed between the late 15th century and early 16th century to grow rice paddy fields. Throughout the entire Edo period (17th



– 19th century), the locals battled for a stable water supply until a water union was established by 13 villages in the area at the end of the 19th century to fairly distribute water supply. At the same time, a water management system governed by a council of regional communities was also established. Ever since the canal was excavated 400 years ago, the local residents have been enjoying a regular supply of irrigation water from the Genbe River.

While the Genbe River had been managed by the union for irrigation purposes, the local communities began to join the union in recent years and this has resulted in a change in the management style. In the beginning, even though the water from the Genbe River was to be used for agricultural irrigation, the watershed residents started to use it for domestic purposes, such as cooking and laundry.

After the 1964 Tokyo Olympics, the upstream area of the river underwent extensive industrialization and groundwater uptake, leading to a dramatic decrease in the amount of spring water. In addition, the urbanization of surrounding cities caused domestic effluent and trash being discharged and dumped into the river. The state of the river deteriorated to such an extent that in 1985, the local land improvement district considered constructing concrete river culverts.

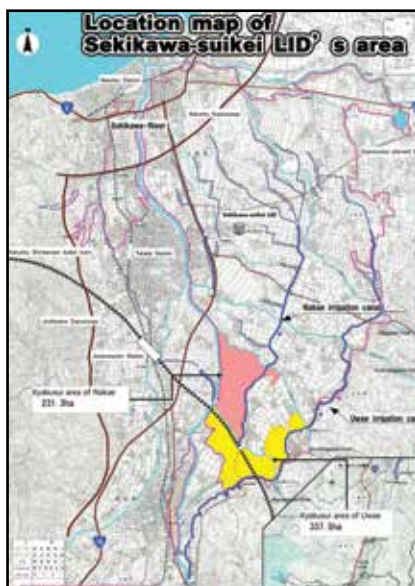


After 1990's, the local residents decided to establish the Groundwork Mishima, after the name of local city. Together with the Shizuoka prefecture, Mishima city administration, experts, residents, companies, and the land improvement district, they held over 200 discussions in a period of three years and finally came up with a plan to turn the Genbe River into a water park. The river improvement works that were mainly conducted by the citizens nurtured their love for their hometown. Their careful daily maintenance has transformed the Genbe River into a clear stream attracting fireflies, dragonflies, and kingfishers, and children now also play and do fishing in it.

2. Sekikawa Suikei Land Improvement District, Japan

Upstream-Downstream Bonds

The Levy Reduction/Exemption System Applied to Kyakusui Area is a system whereby the lower-basin farmers bear the irrigation water cost (administrative and maintenance expenses for agricultural water) incurred by the upper-basin farmers. The districts eligible for reduction/exemption of the water utilization costs are called "Kyakusui Area".



The history of the Kyakusui Area in the Sekikawa Suikei goes back to as early as 1675, following the years in which the existing irrigation canals were dug.

Originally, new canal for developing new rice fields in the lower basin of the Sekikawa River were dug, but such development required the minor irrigation canal existing in the upper basin to be widened to 14 meters. The widening of the canal, however, was not appreciated by the towns located in the upper basin as they had fewer acres of rice fields to irrigate. In such a situation, the towns of the lower basin proposed to the upper-basin towns that "the lower-basin farmers would bear all the irrigation utilization costs to be incurred in the upper basin." The proposal was agreed upon by the upper-basin farmers and they allowed widening of the then existing irrigation canal, enabling the lower basin to be also irrigated.

Since 1675 to date, the above agreed-upon irrigation utilization cost payment system has continued to be handed down from generation to generation, partly by virtue of a customary practice and partly by virtue of the existing agreement. Thus, farmers of both the upper and lower basins have kept administering the agricultural water canal of the river basin in a collaborative, unified manner converting the local district into one of the country's major food supply bases. The collaborative irrigation system has served to strengthen the management base of the affected irrigation canal associations (currently the Sekikawa Suikei Land Improvement District) as an organization that plays an important role in maintaining the widened irrigation canal and farmers' agricultural administration.

3. Sheikh-Bahaei Water Allocation Scroll, Iran

The Water Wisdom

Based on historical facts, the Sheikh-Bahaei Water Allocation Scroll, goes back to a special water distribution pattern or system attributed to the famous scientist and scholar Sheikh-Bahaei. It was set in Safavid Dynasty after the reign of Shah Abbas I (1571-1629), under the regency of Shah Ismail III and was later adapted during the Shah Tahmasp II era to the water needs in this time period.

Today, while changes in the catchment and general socio-economic conditions



have led to changes in the system of water distribution in Isfahan, what was written in the Sheikh-Bahaei Scroll, still remains to be the most acceptable way to allocate water of the Zayandehroud among traditional water users, in particular local farmers. The distribution found in the Sheikh-Bahaei Scroll has been adopted by law 1954 as the main pattern of water distribution in Isfahan region.

This distribution was also referred to by the "Law of Equitable Water Allocation" adapted in 1982. At present, the amount of water distributed is based on time, location and particularly the percentage of water available in the river. This means that based on water availability in the river, the water is allocated among the 33 water shares. As a result, in times of water shortage the process of water distribution has always become a critical issue in the region. As it had been mentioned before in Sheikh-Bahaei Scroll, with regards to changes, like the extension of cultivated lands leading to the development of new irrigation networks, the water distribution system has always been followed consequently. Based on Sheikh-Bahaei Scroll, the adaptive water management in Zayandehroud system mitigates impact of climate change and increasing water requirements.

Hearty Congratulations!! to all the Award Winners...

For more information, please visit: http://www.icid.org/wsh_icid.html



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