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ICID News

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# Message from the President

Dear Friends,

Given the current population growth, accompanied by climate and land use changes, today most countries are facing unprecedented pressure on their water resources. The global population is growing fast, and the estimates show that, with current practices, the world will face a 50% shortfall between forecasted water demand and available water supply by 2050. Furthermore, chronic water scarcity, hydrological uncertainty, and extreme weather events (floods and droughts) are considered as some of the biggest threats to the global prosperity, stability, and food security.

The most common misconception is that people believe water is replenishable and will be around us forever. History tells us that hundreds of rivers ran dry and some disappeared. This highlights another misconception about the use of the word sustainability <https://shorturl.at/otQY7>.

In the minds of some people, sustainability is not time dependent, but the truth is that it is. As water resources are rainfall, and rainfall varies temporally and spatially with varying frequencies and intensity, no one is guaranteed to receive the same amount at the same place and at the same time. Therefore, practically, there is no sustainable water resource but there is sustainable management of the resource by using it efficiently to last longer for an intended period. Sub-Saharan Africa, thousands of years ago, was under the rainy geological era, while Europe was under the Ice Age era. Now, the aquifers under the African deserts of Egypt, Libya, Chad, Sudan, etc. that were filled up during that rainy era are not renewable anymore under the reduced or no rainfall at present.

To narrow the gap between water demand and water availability, proper water management is necessary. Most of the rainwater is wasted even though it is one of the most precious natural resources. In fact, historically, humans had developed some techniques to conserve the available water resources by building small bunds, water tanks, and check dams, for water harvesting and storing rainwater for food production. Large dams are now the most common structures, and they are on the increase. However, dams have some issues related to safety and impact on communities and environment <https://shorturl.at/xHK12>.

Water authorities and farmers can play an important role in water conservation by using suitable techniques, like rainwater harvesting. Authorities should allow farmers to harvest rainfall-runoff water during river high flows and store the water for dry /low flow periods.

Ancient water management systems, harvesting and conservation at Mandu in Madhya Pradesh State, India; has a rich history dating back to the 6th century and is also known for its impressive architecture. One of the most prominent water conservation features in Mandu is the elaborate system of step wells, which are designed to collect and store rainwater during the monsoon season, providing a reliable source of water supply throughout the year. One notable example of a step well in Mandu is the Nahar Jharokha, a rectangular well built with beautiful arches and chambers which served as a crucial water source for the inhabitants of Mandu. The well was designed in a way that the rainwater would flow into it, and a network of underground channels, and distribute the water to various parts of the city. Among the most prominent dialogues of recent times, ICID discussed and has had an exchange of views on the study of water security in the administrative territory of Uzbekistan, which is crucial for

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the achievement of sustainable development goals for most countries. Some of the key points are highlighted in this issue.

Another solution to narrow the gap between water demand and supply is by using non-conventional water resources. Non-conventional water resources are becoming more and more in use and became part of the planning in several countries. However, some guidelines are needed. The Working Group on Non-Conventional Water Resources for Irrigation is launching new guidelines in the 74th IEC meeting in November, Vizag, India. Earlier this year, I took part in bringing out the FAO-AWC Guidelines <https://rb.gy/xmcny> and in co-publishing a book on Using Saline Water for Irrigation <https://shorturl.at/gmpx8>. Authorities should also put in place policies to allow the use of non-conventional water resources and provide guidelines to farmers on the best practice to use such waters.

Ministries of agriculture should also provide farmers with recommendation on the most efficient water use crops, best crop rotation, most drought tolerant crops, most heatwave tolerant crops, etc. Irrigation authorities should advise farmers on the exact crop water requirement, how much water to apply and when to irrigate <https://icid-ciid.org/icid_data_web/2wasag_ragab.pdf> and <https://rb.gy/38yjv>. Authorities should also advise on the most efficient irrigation systems to use, and provide loans to farmers to adopt new efficient irrigation systems, such as subsurface drip, Ultra Low (pressure and energy) Drip Irrigation (ULDI), Variable Rate Irrigation (VRI), Centre Pivot systems, and Nano (semi-permeable tape) Irrigation, to provide automated irrigation networks. The policy should also aim at increasing the water productivity within the Water-Energy-Food Nexus <https://icid-ciid.org/icid_data_web/cww2022_nexus_president.pdf> so that we produce "more crop per drop per kilowatt per unit of land".

Also, to narrow the gap between water demand and supply, we need to adopt water saving approaches "Accelerating Solutions to Solve the Problem of Water and Sanitation, Saving Water-Saving Live <https://www.youtube.com/watch?v=STWrY68zpIY>.

In addition, we need to modernize the irrigation sector to be fully automated and equipped with sensors and minimize losses by seepage, leakage and evaporation <https://icid-ciid.org/icid_data_web/Ragab%204thGeoAfrica.pdf>.

The 24th International Congress on Irrigation and Drainage with the theme "Innovation and Research in Agricultural Water Management to Achieve Sustainable Development Goals" was held from 03-10 October 2022 in Adelaide, Australia, organized by the Australian National Committee of ICID <https://icid-ciid.org/event/detail/25>. The two questions i.e., Question 62 "What Role can Information and Communication Technology Play in Travelling the Last Mile" and Question 63 "What Role is Played by Multi-Disciplinary Dialogue to Achieve Sustainable Development Goals?" were discussed and, as a result of intense deliberations the outcome of Congress is given in this issue.

Further, the ICID family benefitted from the presence of the Hon'ble Minister of Jal Shakti Mr. Gajendra Singh Shekhawat, Government of India, who addressed the gathering during the 24th ICID Congress and shared the experiences of India and talked about the numerous challenges the world is facing in the water sector ranging from rapidly increasing population, urbanization, climate change, water quality, rapidly depleting groundwater.

ICID celebrated its 74th Foundation Day on 24 June 2023 and organized a webinar on 26 June 2023 on the theme "Role of Modern Irrigation in Global Food Security". The webinar was well appreciated and attended by the ICID family, representatives from National Committees/work bodies, and Young Professionals. <https://rb.gy/dt69l>.

The current heatwaves, droughts, and forest fires across some parts of Europe with over 40°C in many parts that made July to have the highest record in temperature led the UN Secretary General to change the term "Global Warming" to "Global Boiling". Climate crisis-induced floods and droughts are increasingly affecting communities across the world <https://rb.gy/tbbhw>.

In recognition of extreme events such as the tsunami that hit several Asian countries, ICID organized a Webinar on 19 April 2023 On the topic "Adaptation, mitigation, early warning systems and the integrated management" were discussed <https://icid-ciid.org/inner_page/233>. In addition, the topic Impact of Climate change on Lowlands was also discussed in another webinar organized on 22 December 2022 <https://www.youtube.com/watch?v=W9LvXVjZZjI&list=PLWpC78hTAxrXMUzE89A6y_FzbioBxU69r&index=38>.

The toll on human suffering is in terms of health-related issues and living costs. This makes it crucial for well managed responses from respective governments to prioritise, accelerate, and scale up their response mechanisms. A new perspective named EPIC (Enable, Plan, Invest, Control) Response, which offers better management of hydro-climatic risks was introduced during the workshop on "Improving Flood and Drought Governance by Applying EPIC Response Framework". The EPIC Response Report jointly prepared by the World Bank and Deltares (Netherlands) in collaboration with the Global Water Partnership (GWP) and the World Meteorological Organisation (WMO), provides a systematic and comprehensive tool for identifying gaps, constraints, challenges, and opportunities for enhancing a government's flood and drought risk management programmes. More details are covered in this issue of ICID News.

In recognition of women's role in agriculture, ICID successfully organized a webinar on "Empowering of Women in Agricultural Water Management". The webinar attracted eminent scientists and was well attended <https://www.youtube.com/watch?v=R_Mi4Ju65q8&list=PLWpC78hTAxrXMUzE89A6y_FzbioBxU69r&index=41>.

Lastly, I extend a cordial invitation to all the water and agriculture professionals, stakeholders, academic and research institutions, and international organizations to be part of the 25th ICID Congress and 74th International Executive Council Meeting being organized in November 2023 at Vizag, Andhra Pradesh, India and make it a grand success.

Looking forward to receive the ICID family and other water and agriculture professionals at Vizag, Andhra Pradesh in November 2023. Come and enjoy the Indian hospitality as well as experience the rich nature, culture, and tourist attractions.

With warm regards and wishing you all the best,

**Prof. Dr. Ragab Ragab**
President, ICID

# The Adelaide Statement, 2022


The 24th International Congress on Irrigation and Drainage with the main theme "Innovation and Research in Agricultural Water Management to Achieve Sustainable Development Goals" was held from 03-10 October 2022 at Adelaide Convention Centre, Adelaide City Australia, organized by the Australian National Committee of ICID (IACID) and Irrigation Australia Limited. The Congress was attended by about 2000 delegates from 64 countries including exhibitors, students and Young Professionals.

Based on the 149 papers presented orally and through posters from more than 40 countries for the Congress and Special Sessions, the participants discussed the two Questions i.e., Question 62: What Role can Information and Communication Technology Play in Travelling the Last Mile (i.e., The Greater Adoption of Research Outputs)? and Question 63: What Role is Played by Multi-Disciplinary Dialogue to Achieve Sustainable Development Goals?.

In addition, various Symposia, Special Sessions, international workshops, various side events and training were organised, including:

- Symposium on 'Integrated Approaches to Irrigation Management in Future';
- Special Session on 'Developing the future tools for managing the uncertainty in irrigation water supply;
- Two training workshops for Young Professionals;
- International workshops by multiple working groups of ICID; and

**11th N.D. Gulhati Memorial lecture for International Cooperation in Irrigation and Drainage,** entitled "Putting People at The Heart of What We Do" was delivered by Hon. Karlene Maywald, South Australian Water Ambassador and former South Australian Minister for Water Security, and former Chair of the Australian National Water Commission.

As a result of intense deliberations, the following outcome in respect of Congress Questions 62 and Question 63, has emerged.

**Question 62: What Role can Information and Communication Technology Play in Travelling the Last Mile?**

- Information and Communication Technologies (ICT) may already provide (and perhaps, underutilised) pathways to support the uptake of research outputs related to irrigation and drainage, but more can be done to expand the use of these tools.
- Many new technologies and innovative approaches are becoming available to allow users to efficiently and effectively use irrigation water. However, the integration of these new and innovative technologies in both routine irrigation practice and the extension of research output continues to lag behind.
- Opportunity exists to better understand the interests, motivations and impediments to adoption as exhibited by target beneficiaries, and to design with and for each community, pathways to facilitate the adoption of research. It is not about 'One Size fits All', ICT allows for better targeting of information and process.
- The performance of methodologies and experimentation in a test framework and its success is validated only if issues of

uptake and implementation are addressed.

- Software development in the sector has identified the importance of end-user-based validation in the areas of programming, the functionality of interface and reliability but this identification needs to be carried through to practice.
- Socioeconomic aspects influencing the utilisation of social media are an important aspect of knowledge dissemination under diverse situations but appear inadequately considered and incorporated in the early phases of R&D or project development. (These tools are not an add-in but a fundamental aspect of the research).
- The developmental status of a region/ country may affect the use of social media in the adoption of appropriate resources but mobile phones can be found almost everywhere and direct targeting of end-users may be an option to pursue.
- There is a need to address gender and community issues when integrating new technologies into the irrigation communities
- Water trading has not been explored fully in a worldwide manner, especially where such trading may be a powerful tool for policy implementation rather than primarily as a mercantile scheme in its own right. The role of ICT in water trading paradigms is lacking widespread recognition.
- While there are project-specific experiences on the aspects of water trading, systematic adoption of these experiences in dealing with future uncertainty needs further attention.

**Question 63: What Role Is Played by Multi-Disciplinary Dialogue to Achieve Sustainable Development Goals?**

- Multidisciplinary approaches, though recognized at theoretical and policy levels, still lack full-scale application. A greater commitment to multi-disciplinary dialogue needs to be enacted by all involved through a change in mindset and remain under-utilized.
- Irrigated agriculture has the potential and needs to impact across the full spectrum of 17 SDGs.
- The global population is predicted to increase by 2050 and beyond. Current patterns of production and consumption worldwide can involve significant waste of resources and may damage vital natural ecosystems unless multiple objectives are dealt with simultaneously.
- The community has played a critical role in driving actions on the ground and stakeholders who were not familiar with SDGs were able to understand and implement concepts with suitable capacity development.
- The perception of irrigation water as an environmental problem has to be transformed into irrigation water as part of the solution. Otherwise, regulators and political leaders are likely to be influenced by perceptions and therefore impose unwise constraints on irrigated agriculture to the detriment of food production.
- Consultative processes amongst stakeholders viz. farmers, irrigation RD&E departments, water supply utilities, development agencies and local authorities can result in favourable outcomes for the reallocation of water resources under scarcity conditions.
- Multi-disciplinary management interventions work better towards obtaining sustainable management of watersheds and river basin health.
- A range of models spanning from individual on-farm irrigation investments to regional scale mappings is applied for decision support systems.
- There is a critical need for a continued focus on capacity development among stakeholders in the agricultural and water management sectors. However, the need to communicate the values and challenges of agricultural water management beyond immediate stakeholders is also acute.
- The irrigation and drainage professionals must communicate more effectively with broader society to maintain the "social license to operate". This is relevant for all economies be they developed or developing.
- Essential roles are: enabling an exchange of understanding about the concerns and objectives of different stakeholder groups, providing a venue for capacity development and providing a basis for a shared vision of the future of the sector in the community involved.

At the end of the ceremony, the Australian National Committee of ICID provided a vote of thanks to the ICID members and all the participants of the 24th ICID Congress and 73rd IEC meeting.

# Welcome Address: Mr. Gajendra Singh Shekhawat

## Hon'ble Minister of Water Resources (Ministry of Jal Shakti), Govt of India, during the 24th ICID Congress, Adelaide, Australia, 2022

Hon'ble Minister of Jal Shakti Mr. Gajendra Singh Shekhawat. Government of India addressed the august gathering and shared the experiences of India and talked about the numerous challenges the world is facing in the water sector ranging from rapidly increasing population, urbanization, climate change, ensuring water quality, rapidly depleting groundwater, etc. Irrigation itself is the biggest user of water, consuming more than 70% of the water used by all the sectors put together. The water use efficiency in the irrigation sector is reported to be around 40%. It is therefore imperative to bring water use efficacy, adoption of new techniques to irrigate the farmlands, sustainable use of available water resources, recharge of groundwater and rejuvenation of steams rapidly becoming extinct for addressing the challenges of the irrigation sector.

India is home to 18% of the world's population and 18% of the world's livestock population, but possess just 4% of the freshwater resources of the world. This availability also varies throughout the year as most of the rainfall that India receives is limited to the 3-4 months of monsoon.

Traditional wisdom in water conservation from India also reflects the commitment shared by the communities over centuries for the judicious management of water resources. Indian Government recognizes that sustainable use of water is only possible if water management is holistic. By recognizing the importance of this tenet, in 2019, the visionary Prime Minister of India Shri Narendra Damodardas Modi brought various activities related to water under one umbrella under the Jal Shakti Ministry. This has given greater synergy and coherence to water management in India and the government is committed to investments of more than US$ 210 Billion by 2024 in the water sector.

He highlighted the new initiatives taken by the Government of India to improve the quality of life of its 1.3 billion people:

- Flagship irrigation development scheme 'Pradhan Mantri Krishi Sinchai Yojna' national scheme to provide 'assured irrigation to every farm' and 'more crop per drop' in a focused manner.
- The comprehensive aspects of irrigation development include farm management of water, Command Area Development and Micro Irrigation.
- Enhancing the efficiency of existing dams; focussing on the safety of dams in letter and spirit, and implementing unique Dam Rehabilitation and Improvement Program.
- Atal Bhujal Yojana – A national scheme for making invisible groundwater visible and creating water aware communities.
- National aquifer mapping and management program of India to achieve source sustainability for drinking water, sustainable groundwater management and improved irrigation facilities.
- Launching of the Jal Shakti Abhiyan in 2019 which involved millions of people in water conservation and recharge.
- The ambitious national river-linking perspective plan of India and the recent commencement of Ken-Betwa River interlinking project.
- The Namami Gange Programme with the twin objectives of effective abatement of pollution, conservation and rejuvenation of one of the largest and most sacred rivers of India, the Ganga. It has created a paradigm shift in the approach to river rejuvenation, pollution abatement and in bringing a holistic approach to river basins.


- Focus on recycling and reuse of grey water and a national framework on safe re-use of treated water.
- Efforts for achieving SDG-6 to 'ensure availability and sustainable management of water and sanitation for all'. Firstly, under the Swachh Bharat Mission, over 105 million toilets were constructed, transforming the behavioural pattern of more than 600 million Indians since 2014. Secondly, to achieve universal coverage of safe and reliable drinking water by providing Functional Household Tap Water Connection to more than 193 million households by 2024 - well before the target set by world for 2030.
- To create robust ecosystem for water management focusing on implementation of micro irrigation, pipe distribution network, SCADA systems and IoT applications in irrigation.

Hon'ble Minister Mr. Gajendra Singh Shekhawat pointed out that ICID, in 72 years of its existence, has emerged as a global leader and a think tank in the field of irrigation and drainage.

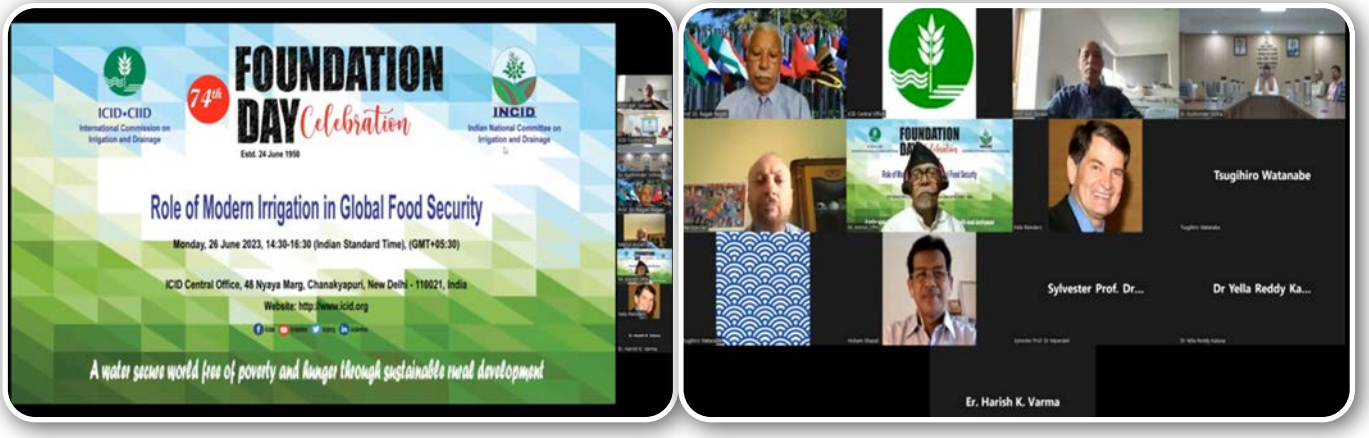
Through various Congresses, forums, workshops, conferences and seminars, ICID has enriched the knowledge of a vast range of stakeholders and motivated hundreds of professionals.

He emphasized that India truly believes in the concept of 'Universal brotherhood & Collective wisdom', and has always contributed to the betterment of humankind. India has played an active role in such collaborative scientific endeavors. Considering this very fact, India has been hosting the Secretariat and headquarters of ICID in New Delhi since its inception. ICID has been a prestigious organization to work with for many Indian Governmental officials and experts.

As the speech drew to a close, he reminded that India will be hosting the 25th ICID Congress & 74th IEC Meeting which will be organized in the beautiful city of southern India, Vishakhapatnam during November 2023. On behalf of the Government of India, he took the opportunity to extend a special welcome to his audience in advance. He mentioned that along with showcasing unique case studies in the irrigation and drainage sector, the participants will also be privy to the cultural heritage and various aspects of the world's largest democracy and ancient civilization.

Finally, he extended his sincere thanks to the Australian National Committee and Irrigation Australia for organizing the mega event and closed with speech with the salutation Jai Hind!!!

## 74th ICID and INCID Foundation Day Celebration




ICID and its Indian counterpart, the Indian National Committee on Irrigation and Drainage (INCID), celebrated their 74th ICID and INCID foundation days on June 26, 2023. As part of the celebration, an international webinar on the theme "Role of Modern Irrigation in Global Food Security" has been organised. The 74th ICID and INCID Foundation Day was successfully organised in virtual mode and was attended by more than 150 professionals from around the world. Secretary General Er. Ashwin B. Pandya welcomed all the participants, National Committees and introduced the speakers. He also delivered a brief note about the developments and achievements of the ICID in irrigation and agricultural water management, including yield prediction, flood control, etc. The event marked the participation of President Prof. Dr. Ragab Ragab; Prof. Emeritus A.K. Gosain, IIT Delhi; President Hon. ICID and WASAG Chair Er. Felix Reinders; Dr. Marco Arcieri, Secretary General, Italy National Committee on Irrigation and Drainage; Er. Kushvinder Vohra, Chairman, INCID; Vice President Dr. Tsugihiro Watanabe (Japan); Dr K Yella Reddy; Vice President Dato. Hj. Nor Hisham bin Mohd Ghazali (Malaysia); and Vice President (Hon) Mr. Amron.

The webinar was held in sessions. The Inaugural session was addressed by Prof. Dr. Ragab Ragab, who made a presentation on 'ICID and the Role of Modern Irrigation in Global Food Security'; Special session by guest speaker Prof. Emeritus A.K. Gosain, IIT Delhi, who made a presentation on the topic 'An Integrated Water and Agriculture System for Drought and Flood Early Warning'; and lastly general discussions by National Committees.

During the inaugural session, Prof. Dr. Ragab Ragab talks about the last 74 years of the journey of ICID, including its establishment, its network of professionals, its dedicated vision for the worldwide food and fibre supply, developments in water resources management, and current challenges, including population burden by 2050, food demand, increasing water demand, increasing global energy demand, and the impact of climate change in the most vulnerable section of the world. During his presentation, he also talked about "Climate Change Impact on Water Supply for Irrigation, supported by the case studies of Brazil (The Impact of Climate Change on

Surface and Groundwater Resources in the Tapacura Catchment) and UK catchment studies of the water bodies. The presentation also covers: (i) Future supply vs. demand under climate change; (ii) Water harvesting scales and development; (iii) Underground dams in Brazil; (iv) Improving water efficiency; (v) Crop water requirement determination; (vi) The issue of deficit irrigation; (vi) Soil moisture sensor technology; (vii) Selection of crops and field management; and (viii) the interface of biotechnology to improve the survival of vulnerable crops.

In the special session, guest speaker Prof. Emeritus A.K. Gosain, IIT Delhi, made a presentation on the topic "An Integrated Water and Agriculture System for Drought and Flood Early Warning." During his presentation, he talked about the status of water in the context of India in terms of the parameters of (i) River Basin (ii) failing groundwater tables (iii) Availability of water (iv) Contamination of biodiversity (v) Integration through the scientific base includes (a) developing river basin development plans and (b) a model base. All these actions require specific models to be deployed. (vi) Portal base data storage and studies to integrate the water and agricultural aspects in a river basin and real-time streamflow. (vii) SWAT stream hydrological model status (viii) input, or the crop simulation, includes crop phenology, irrigation application, fertiliser and pesticide application, and growing period. His presentation was additionally supported by the Mahanadi River basin, which shares two large populated provinces of India named Chhattisgarh and Odisha.

In the last, INCID Chairman Er. Kushviner Vohra addressed the august gathering and talked about the structure and function of INCID in reference to India. He delivered a brief note about the upcoming congress event, which is to be held in November 2023 in Vizag, Visakhapatnam, and Andhra Pradesh. He also talked about the preparation for the upcoming congress, which will be held after 57 years in India. He also highlighted the important details for the upcoming 25th Congress, which include registration portal access, exhibition sale activity, accommodation booking, website details, and a call for papers. At the end of the webinar, the session is followed by a question-and-answer session from all participants of the national committees. In the exchange of good gesture Secretary General thanked all the participants from the National Committee and audience to make the ICID and INCID foundation day a remarkable and successful. For the complete access to the Foundation Day programme, please visit: https://icid-ciid.org/inner_page/238

## Ancient Water Management System – Harvesting and Conservation at Mandu in Madhya Pradesh, India

Mandu, also known as Mandavgad, is an ancient city located in the present-day state of Madhya Pradesh, India, lies the ruins of a 1,400-year-old civilisation ruled by numerous dynasties, including the Mughals. Cocooned in these ruins, at 633.7 metres above sea level, is also a sophisticated and need-based water harvesting system. The parched little hilltop town in Madhya Pradesh, traces its roots to the Paramara dynasty in the 8th century CE. It has a rich history

dating back to the 6th century and is known for its impressive architecture and ancient water conservation systems in place. The reason why the water management techniques at Mandu are relevant in contemporary times is because we are running out of water. Many cities are quickly running out of groundwater and are now heavily-dependent on tanker supply for their water needs. The Mandu city was designed in a way that efficiently managed water resources, showcasing the remarkable ingenuity of its builders.

One of the most prominent water conservation features in Mandu is the elaborate water harvesting techniques which catered to the needs of the people in those times, still continue to serve those who live in the city. The water management system at the fort complex at Mandu comprised of about 1200 water tanks (Step wells) are spread across 70 monuments in the fort complex, locally known as "Baolis" which collected rain water during the monsoon season, providing a reliable source of water throughout the year, to the rest of the fort through different channels. However, over the years now, water conservation techniques are visible in only 700 water tanks across five of these monuments. The step wells had intricate staircases leading down to the water level, allowing easy access for the residents to fetch water.

One notable example of a step well in Mandu is the Nahar Jharokha, which is a rectangular well built with beautiful arches and chambers. It served as a crucial water source for the inhabitants of Mandu. The well was designed in a way that the rainwater would flow into it, and a network of underground channels, known as 'Nadis,' would distribute the water to various parts of the city.

The Roopmati Pavilion, a famous structure in Mandu, also played a role in water conservation. It was strategically located near the Rewa Kund, a large reservoir built to store rainwater. The reservoir had a catchment area that collected rainwater, which was then channelled into underground tanks and wells. Another example of water conservation in Mandu is the construction of large lakes or tanks, such as the Sagar Talao and the Kapur Talao. These lakes were built to capture and store rainwater, ensuring a continuous water supply for the city. The lakes not only served as reservoirs but also added to the scenic beauty of Mandu.

In addition to these structures, Mandu had an extensive system of underground water channels and canals that transported water to various areas. These channels, known as 'Bawdis,' were constructed with meticulous precision to maintain a steady flow of water. One of these monuments is also the most iconic and visited spots in the city — the Jahaz Mahal (Ship Palace) built in the 15th century by Ghiyas-ud-din Khilji. The Jahaz Mahal is surrounded by two artificial lakes called the Munj Lake and Kapoor Lake. These lakes, on either side of the fort, are connected by a canal that ensured equal distribution of water in the two lakes when it rained heavily. When both lakes fill up during the monsoons, the Mahal looks like a ship sailing in the sea, thus the name, Jahaz Mahal.

The Munj and Kapoor tanks were interconnected through an arched underground channel, which exists even today. As the rainfall was not equally distributed and the terrain was undulating, the water level in the two tanks was not always equal despite the underground balancing system. So, a causeway between the tanks was

laid out at the water level. These two channels ensured equal distribution of water between the two tanks.

To meet the drinking water requirements, there are two wells called Ujala and Andheri Baolis (bright and dark wells respectively). The bright well is in the backyard of the Jahaz Mahal, while the dark well is inside the palace itself. The 265-feet-deep Ujala well has two flights of steps leading to water level. There are a few pillars and landings inside the well for the convenience of water carriers. There is also a pulley system in the well. It is believed that bullocks were used to operate the pulley. The Andheri well was used more as a cooling plant for the rooms in the palace. Besides, there are three tunnels which connect the well to the royal bathroom called Hamam Ghar. The first passed above a cooking stove for hot water. The second tunnel was meant for steam and the third supplied cold water.

The water conservation methods employed in Mandu were not only functional but also showcased the architectural brilliance of the time. The city's planners and builders recognized the importance of water conservation and developed innovative techniques to address the water needs of the population. Today, Mandu stands as a testament to the ancient wisdom of water conservation and continues to inspire and educate visitors about the importance of sustainable water management.

Two swimming pools one in the shape of a Koorma or Tortoise and the other in the shape of a flower are a part of the Jahaj Mahal. Located at two different levels, these are the best examples of how it can integrate the aesthetics with the practical needs of the water. What amazes the visitors is that they could not only store water well but channel it in such a way that they could easily afford a water luxury like swimming pools. The swimming pool on top has channels with curvaceous designs leading to the pool which is a lovely way to channel the water which were filled with sand to filter the water. It is also belief that channels helped slow down the flow of water into the pool. Whatever may be the reason, but our modern architects learn from this aesthetics.

Champa Baodi is a unique large well, fed by rainwater. The inside of Champa Baodi is square while its wall is round with niches in it. The innovation lies in building multiple stories of living apartments surrounding this round wall. Believe it or not, there are four stories of living quarters of the palace surrounding this. The final level is almost at the level of Munj Lake. The buildings stay cool because of the Baodi next to them. The long corridors allow the circulation of air. What an intelligent way to store water and make it work as an eco-friendly air conditioner. The name Champa comes from the fact that this Baodi was surrounded by Champa or Magnolia trees. Can you even imagine the air being made fragrant naturally? Ancient Hindu Baodi is opposite to the Jahaj Mahal lies a deep and steep Baodi belongs to the times of Parmar Kings or may be even earlier.

### Conclusion

The water management system at Mandu was a need as rainwater was its only source of water. How beautifully the people of the place saved every drop of rain that landed on this hilltop – one can see and to believe it. The water Management System at Mandu comes in the form of 1200 tanks of different sizes and shapes. Most of them are still intact and can be seen full of water, if one will go during the monsoon season to witness some of the interesting water bodies of this heritage place. There is so much to learn about for the current water management/ water conservation/water harvesting professionals/ authorities from across the world from this ancient water management system/planning and practice. Hopefully, more will learn from this ancient wisdom practiced in India.

## New Territorial Water Security Assessment Method: Navoiy, Samarkand and Khorezm provinces of Uzbekistan

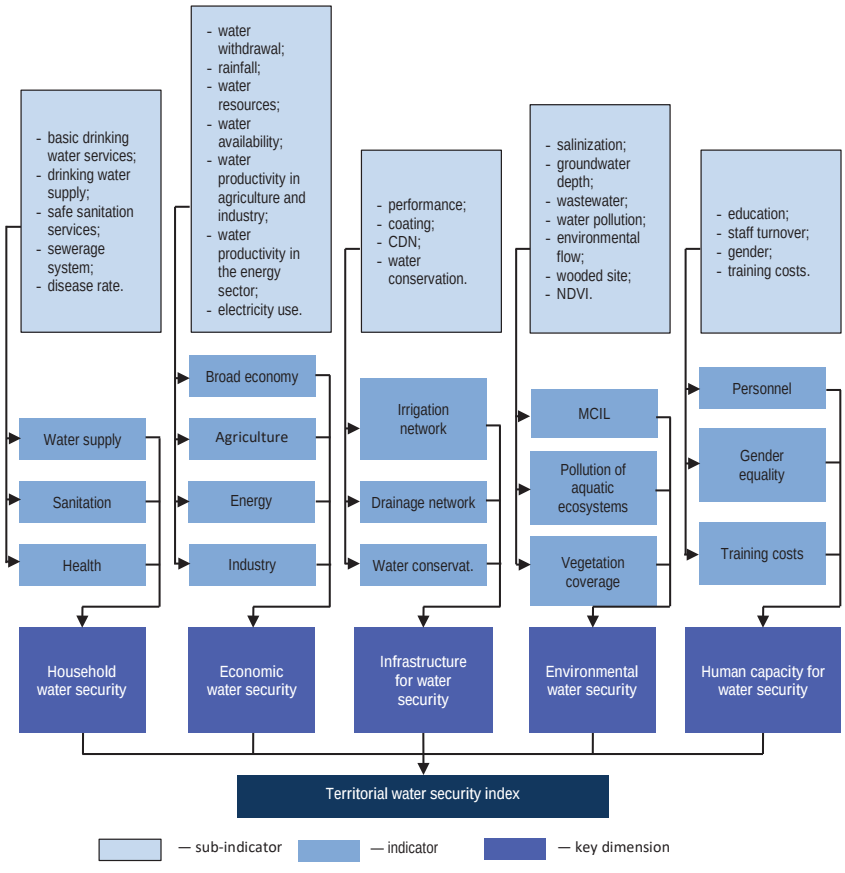
***In 2021-2022, the Scientific Information Center of the Interstate Commission for Water Coordination (SIC ICWC) in Central Asia at the request of UNESCO developed a methodology for the assessment of water security in administrative territories of Uzbekistan. The authors adapted the indicators proposed by ADB by taking into account the territorial characteristics of water management in Uzbekistan and targets set in national strategic documents on agriculture, forestry, water, green economy and other related areas. The authors adapted the indicators proposed by ADB by taking into account the territorial characteristics of water management in Uzbekistan and targets set in national strategic documents on agriculture, forestry, water, green economy and other related areas. Territorial water security assessment methodology comprises of five key dimensions: (1) household, (2) economy, (3) ecosystem, (4) infrastructure, (5) human capacity. Each dimension is characterized by a set of indicators and sub-indicators (Figure). The territorial water security is assessed as the composite result of five key dimensions scored from 1 to 5: critical (1), inadequate (2), engaged (3), effective (4), and model (5). At index 1, the water situation is critical and a large gap exists between the current state and the acceptable levels of territorial water security. At index 5, the territory has a profound water security level.***

## Case studies: Water security in Navoiy, Samarkand and Khorezm provinces of Uzbekistan

Water security in Navoiy, Samarkand and Khorezm provinces of Uzbekistan from 2010 to 2020 was assessed as pilot cases. Data sources included the State Statistical Committee, the Ministry of Water Management, the Center of Hydrometeorological Service of Uzbekistan as well as Meteocenter and Global Environmental Flow Information System.

Results. From 2010-2020 the overall water security index in Navoiy, Samarkand and Khorezm provinces of Uzbekistan was at an "engaged" level. There is a downward trend in the index in Navoi (0.12) and Samarkand provinces (0.39), while in the Khorezm province, the index improved (0.49) from "inadequate" to "engaged" level. The decrease in the overall water security index was mainly due to a decrease in human resources in all three provinces. Also, in the Samarkand and Khorezm provinces, household water security has worsened, and in the Samarkand and Navoi provinces environmental water security has deteriorated.

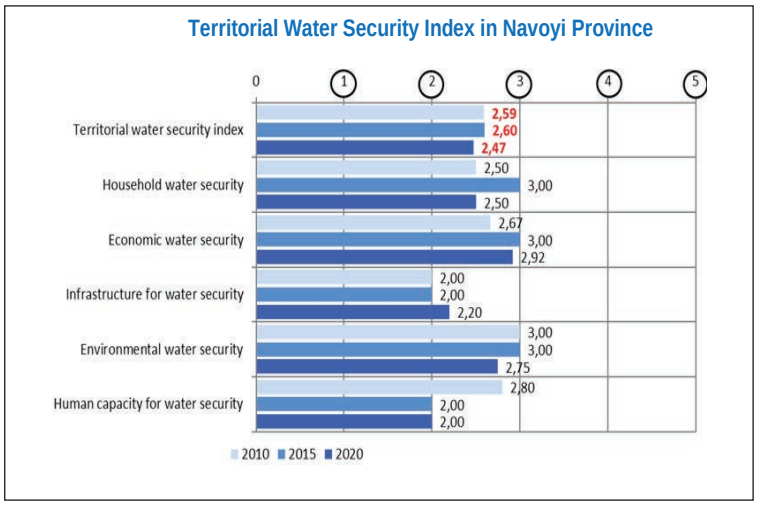
Figure: Structure of Water Security Index




## Policy recommendations

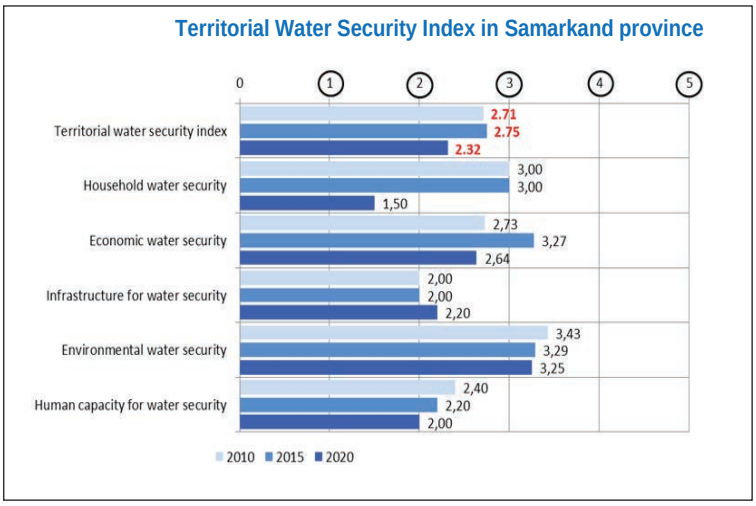
Water security is crucial for the achievement of sustainable development goals in Uzbekistan and its administrative territories. To improve water security in three selected provinces, it is recommended to pay particular attention to the following:

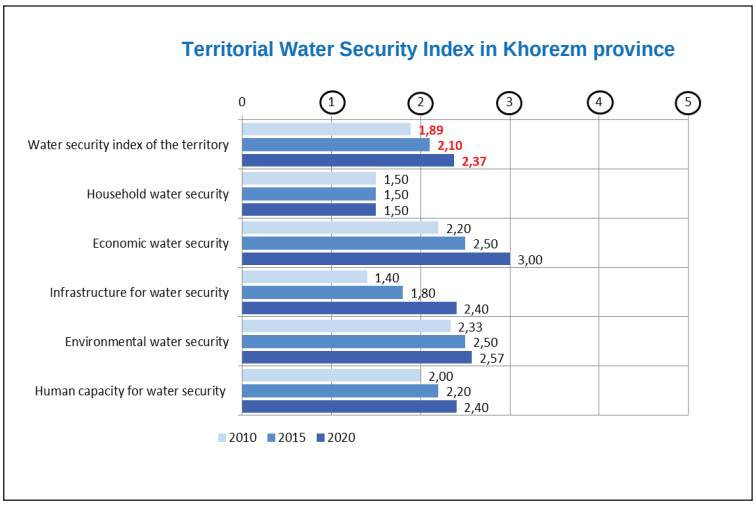
- Increase the quantity of hydrological and meteorological observation points in order to improve water monitoring and accounting, ensure accessibility and transparency of the data on all water security dimensions; it is important to have spatially disaggregated data on all indicators and sub-indicators for more reliable assessment of key dimensions and tracing of their dynamics;
- Against the background of continuous population growth and expansion of residential areas, cities and settlements, it is necessary to take effective measures to radically improve the water supply system. This implies modernization and advanced development of diversion structures, water conduits, pumping stations, distribution units and water supply networks based on the intensive introduction of modern energy- and resource-saving technologies;
- Improve the quality and reliability of safe drinking water and sanitation services, especially in rural and remote areas; reduce water pollution;
- Improve the efficiency and productivity of land and water use to meet the growing water needs of the population and the economy by improving water management and increasing the efficiency of water use in all sectors of the economy;
- Improve flow regulation along the Zarafshan River (Samarkand and Navoyi provinces) and operation of Amu-Bukhara Main Canal for better available water supply in the



Bukhara province and Kyzyltepa district of Navoyi province;

- Improve performance of inter- and on-farm canals, irrigation and collector-drainage systems (reconstruction, rehabilitation, coating, transfer to the private sector) and increase the pace of introduction of water conservation technologies;
- Improve water intake, transportation, equipment and technologies for irrigating crops through the introduction of science-based irrigation regimes and advanced technologies;
- Revisit current irrigation regimes and water allowance zoning, taking into account the changed crop production conditions (crop diversification, sowing of new crop types and varieties for which no irrigation depths were set in irrigation regimes), the meliorative conditions (groundwater bedding), and the introduction of water-saving technologies;
- Re-use collector-drainage water in the zone of their formation thereby increasing the water supply of irrigated lands and reducing polluting discharges into rivers;
- Introduce modern monitoring systems of the ameliorative state of lands, especially the criteria for assessing the critical level of groundwater occurrence (up to 2 m), taking into account the low degree of soil salinization and groundwater mineralization;
- Regulate the extraction of sand and gravel in the channel of the Zarafshan River in compliance with a 300-500 meter water protection zone in order to preserve the ecological state of the reservoir, as well as to prevent a decrease in groundwater level in the Samarkand province;
- Set water protection zones along water sites, including canals, irrigation and collector-drainage networks and also adjacent to other water structures for their operation, reconstruction, repair and rehabilitation and for sound water use, water accounting and performance of other measures;




- Speed up modernization, reconstruction and replacement of irrigation pumping stations and aggregates, as well as introduction of up-to-date energy-saving technologies in order to reduce electricity consumption for water pumping and achieve the target of reduction of annual electricity consumption by pumping stations by 25% until 2030;
- Continuously and regularly invest in institutional and technical capacity of the water sector; education and training of staff should be one of the main priorities of water leadership and local authorities;
- Implement working public private partnership models in water and agriculture to achieve real returns and create incentives to involve the private sector in financing the water sector; in particular, introduce operational public private partnership models for putting into operation of abandoned irrigated agricultural land, with the development of irrigation networks and hydraulic structures and attraction of large industrial enterprizes as private partners;
- Enhance measures for environmental resilience in the context of climate change and increased desertification;
- Increase awareness in the water sector on gender issues and involvement of women in water resources management;
- Promote water cooperation between Uzbekistan and Tajikistan, given the transboundary nature of the Zarafshan River, the main water artery that feeds the Samarkand and Navoyi provinces.

# Improving Flood and Drought Governance by Applying EPIC Response Framework

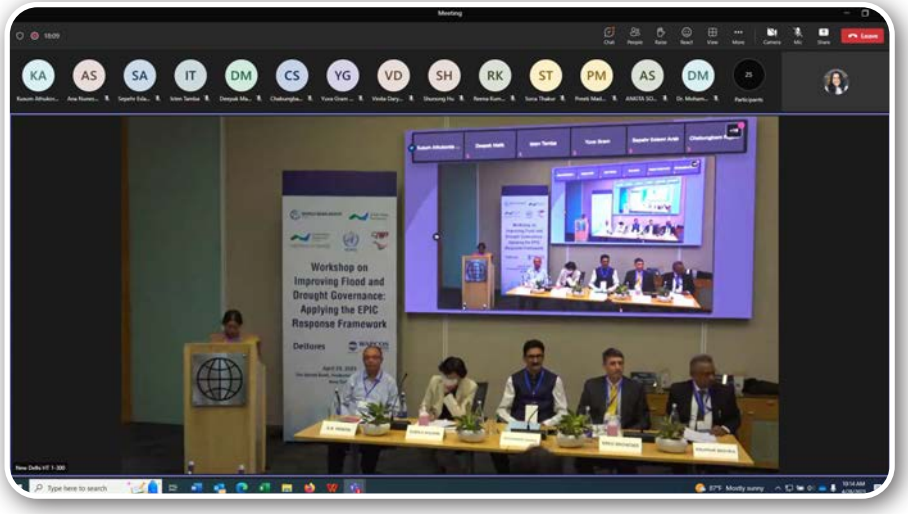
***A workshop on "Improving Flood and Drought Governance: Applying the EPIC Response Framework" was held on 28 April 2023 and organised by the Global Water Partnership in association with the World Bank, World Metrological Organisation (WMO), Deltares (Institute for Applied Research, Netherlands), and India Water Partnership with the participation of the Ministries of Water Resources (Jal Shakti), Agriculture, Irrigation and State Departments of India, Researchers, Academia, Community Based Organisations and Private Sector representing mostly the South Asia region.***

Climate crisis-induced floods and droughts are increasingly affecting communities across the world. The toll on human suffering is two folds, both health-related and the costs on economies which makes it crucial for the respective governments to prioritise, accelerate, and scale up their response mechanisms. In contrast, the Nations could harness the power of water for their development and avoid human suffering, economic losses, and ecological degradation. The key is to understand the hydrological cycle and learn how to embrace the inevitability of floods and droughts, and the drastic alternations between them. It requires innovative governance and risk management approaches that navigate uncertainty, protect communities, economies, and ecosystems, reduces duplication, and improve the efficiency of using public resources.

A new perspective was introduced during the workshop named EPIC Response which offers better management of hydro-climatic risks. It considers floods and droughts as different ends of the same hydro-climatic spectrum that are inextricably linked. The EPIC Response Report was jointly prepared by the World Bank and Deltares (Netherlands) in collaboration with the GWP and the World Meteorological Organisation (WMO). It provides a systematic and comprehensive tool for identifying gaps, constraints, challenges, and opportunities for enhancing a government's flood and drought risk management programmes. The tool has also been tested in Assam, India.

The objectives of the workshop are:

- To disseminate the World Bank's flagship report on hydro-climatic risk management: "An EPIC Response: Innovative Governance for Flood and Drought Risk Management"
- Share the EPIC Response Assessment Methodology and its application (Piloted in Assam)
- To present the GWP/WMO's Integrated Drought Management Programme (IDMP) and Associated Programme on Flood Management (APFM)
- Explore governance challenges and generate recommendations for improving flood and drought risk management at the national and State levels in India; and come up with recommendations for improving flood and drought governance.




Dr. Veena Khanduri, Country Coordinator, GWP India was the master of ceremonies and gave the floor to Anupam Mishra, an Honorary Member of GWP India and Director, Commercial and HRD, WAPCOS Limited for opening remarks who expressed the importance of flood and droughts to be managed using the EPIC Response framework. Sumila Gulyani, South Asia Water Practice Manager, World Bank, New Delhi welcomed the audience and informed them that the World Bank as a knowledge bank in India runs nearly USD 20 billion worth of projects. She further expressed that "the increasing frequency and intensity of floods and droughts demand a multi-sectoral approach but an approach which is challenging". She gave two examples from Assam, India and downstream of Brahmaputra in Bangladesh. After the context-setting speech made by Er. Pandya, Regional Council Member, GWP SAS and Secretary General, ICID, Er. Kushvinder Vohra, Chairman, Central Water Commission, Ministry of Jal Shakti, Government of India made the keynote speech. He expressed that "although India's flood and drought forecast is accurate up to 95 per cent the challenge is to develop a comprehensive plan to minimise the profound effect of drought on the country's economy. The plan should include solutions from various sectors such as agriculture, irrigation, meteorology, environment, and the public. The multi-stakeholder approach

is one of the biggest barriers for the nation".

Greg Browder, Lead Water Resources Management Specialist from World Bank presented the EPIC Response Framework. He said that "the days of financing flood and drought risk separately are over. The EPIC Response framework addresses floods and drought within a unified hydro-climatic risk management". He further explained that floods and drought are on either side of the same spectrum and need to be managed within the same governance system. Ana Nunez Sanchez, Expert Advisor, Resilience and Planning Department, Deltares, The Netherlands presented the EPIC Response Assessment Methodology (ERAM Tool). She also presented the innovative application of EPIC Response in the state of Assam in 2023, and projections of future expectations beyond the project.

Valentin Aich, Senior Water and Climate Specialist from GWP presented on the WMO/GWP Integrated Drought Management Programme (IDMP) and the publications and tools of the Associated Programme on Flood Management (APFM). Experience sharing on Integrated Drought and Flood Risk Management based on States perspective was conducted by Giriraj Amarnath, Research Group Leader – Water Risk to Development and Resilience and Principal Researcher, International Water Management Institute (IWMI), Sri Lanka. There were two sessions on national and state perspectives on governance challenges on flood and drought management in India followed by a panel discussion on applying the EPIC framework to improve flood and drought governance in India.

The eminent panelists highlighted various aspects of flood and drought management in India focusing mainly on scientific, technological, administrative, legislative, policy, and institutional dimensions. The panel delved deep into the question of the relevance of the EPIC Response approach for India. It concluded that the EPIC Response framework would be highly useful in the Indian context for improving the management of hydro-climatological hazards. The panel also underlined the need for policy and institutional reforms to create a proper governance ecosystem that will enable such innovative approaches to disaster risk management to be operationalised effectively. This will need integration of the framework with the sustainable development goals. Moreover, at the state and local level, environmental and social characteristics and community participation will be the crucial factors to be considered for the successful implementation of such a governance assessment tool. The closing remarks were conducted by Greg Browder, Lead Water Resources Management Specialist, World Bank, USA.

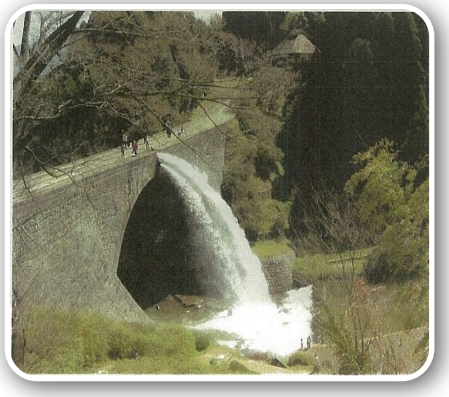
## The Tsujun Bridge, a part of WHIS, was nominated to be a National Treasure of Japan

***In the month of June 2023, Tsujun Bridge, one of the World Heritage Irrigation Structures (WHIS), was confirmed to be nominated as a National Treasure of Japan. Similarly, Shichika-yousui Irrigation System, also a WHIS, was to be nominated as an Important Cultural Property of Japan as well.***

***It is the first Important Cultural Property in Kumamoto Prefecture to receive a National Treasure designation and is also the southernmost building to receive this title in the entire Japan. A National Treasure is the most precious of Japan's tangible cultural properties, and is determined and designated by the Agency for Cultural Affairs.***

### Tsujun Bridge

Tsujun Bridge is located in Yamato Town, Kumamoto Prefecture, and was registered as WHIS in 2014. The bridge is one of the largest stone-built arch aqueduct bridges in Japan. The Council for Cultural Affairs submitted a proposal to the Minister of Education, Culture, Sports, Science and Technology to designate Tsujun Bridge as a national treasure.



A National Treasure is the most precious of Japan's tangible cultural properties, as determined and designated by the Agency for Cultural Affairs. A tangible cultural property is of historic or artistic value, classified either as buildings and structures or as fine arts and crafts. Each national treasure must show outstanding workmanship, a high value for world cultural history, or exceptional value for scholarship.

The bridge was constructed between 1852-1855 in the Edo period as a part of aqueducts equipped with siphons to provide seven villages in the Shiraito Plateau with irrigation water. Tsujun-yousui Irrigation System, a group of irrigation facilities including Tsujun Bridge, is the first WHIS registered in 2014 when the scheme was established. According to the Ministry of Education, Culture, Sports, Science and Technology, this is the first case if a bridge is listed as a national treasure of Japan.

### Shichika-yousui Irrigation System

Shichika-yousui, located in Hakusan City, Ishikawa Prefecture, was also registered as WHIS in 2014. The Council for Cultural Affairs additionally reported to the Minister of Education, Culture, Sports, Science and Technology that this Shichika-yousui irrigation system should be designated as an important cultural property of Japan.

Important cultural properties are nationally designated cultural heritages that are born in Japan's long history and are indispensable for understanding its history, traditions, and culture. The important cultural properties fall into one of the categories of good design, good technology, high historical value, high academic value, and excellent local characteristics. Shichika-yousui Irrigation System was built in the late Meiji period and recognized by the country for its value in historical excellence.

In the Tedori River basin, irrigation water was drawn directly from the Tedori River in each region, but this did not ensure a stable water supply and water conflicts were constant. The construction of the Shichika-yousui Irrigation System began with the concept of creating a single large water supply system by combining seven water intakes and supplying water to each region from there. The construction was completed around 1903 and has been in use to this day. It is said to be the oldest existing water intake facility in Japan and is highly regarded as a representative irrigation facility of the late Meiji period.

On another note, the facility is located in the Hakusan Tedorigawa Geopark, which was recognized as a UNESCO World Geopark by the United Nations Educational, Scientific and Cultural Organization (UNESCO). The site is recognized as a cultural resource that shows how people have tried to live in harmony with the Tedori River. An official in Hakusan City said, "We are very pleased that the government has recognized the buildings as valuable. We will continue to protect it in cooperation with the local community."

## Revised WatSave Award Scheme

In the existing WatSave Award Scheme following changes were approved by the Managing Board (MB) to ensure larger participation and a fair competition among candidates:

1. In any particular category, a minimum of three nominations may be considered for evaluation purpose. In case of lesser entries, the nominations may be considered for the following year and updated information would be requested from the nominees in next year.
2. It may be under the PoJs purview not to award any nominations despite receiving multiple nominations in a specific category, if the nomination does not confirm to the innovation complying with the ICID Evaluation Criterion or are not up to the mark.
3. After deliberations, MB suggested to delete the words in Annexure I under point a. (iii) WatSave Young Professional Award "or part of the project". The young professionals award is given for water-saving/ conservation work by young professionals (less than 40 years). The work carried out by the Young Professional should have been carried out individually or as a group.

From 2023 onwards the nominations can be considered and evaluated basis on the revised and approved WatSave Awards scheme.

The revised WatSave Awards scheme can be accessed through **https://icid-ciid.org/icid_data_web/watsave_scheme.pdf**

# 25th ICID Congress and 74th IEC Meeting

**1–8 November 2023, Vizag (Visakhapatnam), Andhra Pradesh, India.**

*REGISTER NOW!!!*


***The 25th International Congress on Irrigation and Drainage and the 74th International Executive Council meetings are being organized by the Indian National Committee of ICID (INCID) on the theme 'Tackling Water Scarcity in Agriculture' from 1-8 November 2023 in Vizag (Vishakhapatnam), Andhra Pradesh, India. ICID's triennial Congresses focus on the upcoming issues that need to be addressed in irrigation, drainage, and flood management. The Congresses also provide a platform for reviewing a number of contentious issues concerning the future of irrigation water vis-à-vis increased demands for competitive uses. The Congress aims to provide a platform for irrigation and drainage professionals and a broad range of other stakeholders to share their knowledge and experience in sustainable agriculture water management focusing on irrigation management and its related/integrated aspects.***

During the Congress, papers will be presented and discussed, answering Questions 64 & 65. In addition, Special Sessions, Symposiums, Training, Workshops, and a large number of side events in cooperation with the international partner organizations will also be held as part of this mega event. International Commission on Irrigation and Drainage (ICID) strives for a water-secure world free of poverty and hunger through its mission to facilitate prudent agriculture water management. 'Enabling Higher Crop Productivity with Less Water Energy' is the most cherished goal of ICID Vision 2030. Through its triennial Congresses, ICID provides a platform to exchange knowledge, information and technology solutions for alternative water resources and increasing water productivity through on-farm interventions to tackle agricultural water scarcity.

## Question 64: What Alternative Water Resources could be tapped for Irrigated Agriculture?

The spatial and temporal variabilities in precipitation and water availability call for harnessing the blue water component for different uses. Water use and management in agriculture cross many scales: crops, fields, farms, delivery systems, basins, and nations.

### Sub-Questions:

| | |
|---|---|
| **Q.64.1** | **Developing and Reinforcing Conventional Sources of Irrigation Water** |
| **Q.64.2** | **Tapping Non - Conventional Sources of Water** |
| **Q.64.3** | **Empowerment of Farmers** |

## Question 65: What On-Farm Techniques can Increase Water Productivity?

There are several approaches by which farmers can improve water productivity. Options include those related to plant physiology, which focuses on making transpiration more efficient or productive, agronomic practices, which aim at reducing evaporation, and on farm agricultural-engineering approaches, which aim at making water application more precise and more effective.

### Sub-Questions:

| | |
|---|---|
| **Q.65.1** | **Improving Management of Existing Facilities** |
| **Q.65.2** | **Improved Agronomic Practices and Research / Innovation** |
| **Q.65.3** | **Efficient Application of Irrigation Water** |

### Contact Organizer:

- **Mr. Avanti Verma, Director, Indian National Committee on Irrigation and Drainage (INCID),** C/o Remote Sensing Directorate, Central Water Commission, Department of Water Resources (RD and GR), Ministry of Jal Shakti, Govt. of India, 425(N), Sewa Bhawan, R.K. Puram, New Delhi 110066. Contact at icid.25congress@gmail.com; Website: www.icid25congress.in
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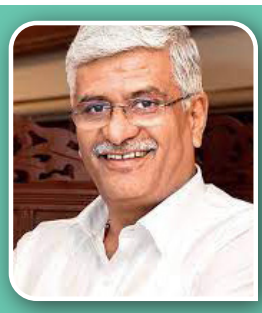
2022 – 4th Quarter & 2023 – Ist and 2nd Quaeter

# ICID News

## Speakers



Hon'ble Minister of Jal Shakti
Mr. Gajendra Singh Shekhawat

Hon'ble Chief Minister of Andhra
Pradesh Mr. Y.S. Jagan Mohan Reddy

Prof. Dr. Ragab Ragab
President ICID

Mr. Mark Smith
Director General, IWMI

Mr. Kenichi Yokoyama
DG, South Asia Dept., ADB

Dr. Daniel Gustafson
Deputy Director-General, FAO

Hon. Ms. Karlene Maywald
Former Minister, S. Australia

Amal Talbi-Jordan
The World Bank

Prof. Vinay Nangia
Research Leader, ICARDA

*and many more...*

## Side Events during the 25th Congress

1. New approaches in agricultural water management capacity building, 02 November 2023, 1400-1730 Hours (TBC) - IWMI. Water Research Commission of South Africa, and University of KwaZulu-Natal
2. Realizing Nexus Gains for Sustainable and Resilient Agri-food Systems, 02 November 2023, 1400-1730 Hours (TBC) - IWMI
3. Modernization of Irrigation Systems by ICID and CNCID, 03 November 2023, 0930-1300 Hours (TBC) - CNCID-ICID
4. Climate action: technology interventions and capacity building of smallholders in irrigated rice-based cropping systems of India, 03 November 2023, 1400-1730 Hours (TBC) - NIBIO, NRRI, MSSRF, OUAT, AAU and IWMI
5. Improving Water Productivity in Dry Areas, 04 November 2023, 1130-1530 Hours (TBC) - ICARDA

For more details: **https://icid25congress.in/side_event.html**

## Register Now!!

**https://icid-ciid.org/registration/**
**OR** Contact **incid-cwc@gov.in**

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