



WATER AND THE SUSTANABLE DEVELOPMENT GOALS (SDGs)

This panel set the stage for the entirety of the World Water Congress with their discussion about the six Sustainable Development Goals (SDGs) as they relate to water. SDGs are a list of priorities for the United Nations and various countries to focus on while constructing policies in the future. A recurring belief among the panelists is the need to approach the 6 SDGs horizontally and connecting, rather than vertically in separate silos. The panel focused specifically on how SDG 6 affects all SDGs. SDG 6 is written as: "Ensure availability and sustainable management of water and sanitation for all." Three pillars interact within SDG 6: Society, Economy, and Environment. Every action taken to benefit one SDG will have a domino effect, both positive and negative, on other SDGs. Preferably, policy addressing one SDG should work in synergy with other SDGs, rather in conflict.

A great example of this interaction is found in Latin America with the construction of the third largest wastewater treatment plant in the world. This treatment plant ensures cleaner water within streams. However, regional farmers view non-treated waters as being more beneficial for crop production than treated water. Although there are more economically benefits for the farmers, and more ecological beneficial to the environment, it created a social problem within the farming communities. This is an example of the interaction, not only with the multiple SDGs, but the interaction of society, economy, and environment.

To be more successful in reaching goals, SDGs must focus not only on the governments, but on the private sector as well. Doing so, SDGs must work in and out private businesses.

Inside companies, bottom line is affected by increasing the efficiency of supply chains. Outside a company, entire water basins are affected by working across institutions, public and private, where efficiency is gained. Businesses may know and understand their water risks, but it is important to help businesses to implement changes.

Further, there are vertical challenges to address in addition to these horizontal challenges. The SDG's scale is global, yet the SDG's impacts are individual. Likewise, water is global issue but it is a local resource. The same interactions of the social, economic, and environmental pillars work on both, local and global scales.

Ultimately, a successful implementation of all six SDGs, will require scientists and policymakers to work together. Nations will be more successful in achieving the SDGs by 2030 if there is cooperation between the scientific and policy spheres and if they approach the SDGs as



PROGRAM

Tuesday May 30rd

Hours	Salon Gran Cancun	Cozumel 1	Cozumel 2	Cozumel 3	Cozumel 4	Cozumel 5	Xcaret	Salon Isla Mujeres	Coba
9:00 - 10:30		RS-4 Building Capacity	SS-55(A): Shared Waters of North America: Scientific water resources assessment	RS-7. Water Security in a Changing World: Climate Change	SS-75. Peace for Water: The Global High Level Panel on Water and Peace's Vision	SS-71. Making investments on multi-purposse water infrastructure fit to finance	SS-60: Capacity building in the water sector: Creating and developing training centers for waters professionals	R2-23. Water Ecosystems and Physical Regimes: Groundwater Resources	SS-10: Smart Water Management (SWM): Bridge to WGG & SDGs - the technological innovation needed for "Water for all"
10:50 - 12:20	HLP: Water and Climate								
12:40 - 14:10	HLP: Water and Business								
Lunch*									
15:30 - 17:10		RS-37. Water Sanitation and Health	SS-55(B): Shared Waters of North America: Policies and Issues on Transboundary Water Resources	RS-9. Water Security in a Changing World: Conflict and Cooperation	SS-41(A): Water Security in the Americas	SS-61: The Legacy of COP22: Implementing the Global Climate Action Agenda in the water sector	SS-27: Case Studies in the Challenges of Water Sharing Between "Upstreamers" and "Downstreamers"	RS-19. Water Policy and Governance: Transboundary Aquifers Law and Policy	
17:20 - 18:50		RS-12. Water, Sanitation, and Health: Ensuring Drinking Water	SS-55(C): Shared Waters of North America: Integration of Science and Policy Cooperation	RS-13. Water Policy and Governance: Economics of Water Governance	SS-41(B): Water security in the Americas	SS-46: Building a Green Infrastructure Agenda for the Latin American Water Sector	RS-17. Water Policy and Governance	SS-73. The First Asia International Water Week: Asia Solution for Water	





The XVI World Water Congress seeks to assure global water availability through sustainable management

Roberto Ramírez de la Parra, General Director of CONAGUA, acknowledges Mexico's commitment to the international community by serving as the venue for this high-level meeting on water development in collaboration with the International Water Resources Association (IWRA) and the National Association of Water and Sanitation Companies (ANEAS)- the premier meeting on the link between science and policies.

He highlights that this meeting congregates the world's leading specialists on water resources of all sectors from 70 countries. The meeting will contribute to the global objectives and strategies related to the sustainable development goals in relation to the United National 2030 Water Agenda, which remarks the need to assure water availability and sanitation through sustainable management.

After opening the congress remarks, the secretary Rafael Pacchiano Aleman highlighted the importance of governments taking decisions based on the best available scientific knowledge. This approach ensures that environmental challenges will be faced in a proper direction, especially climate change, which particularly affects availability of water resources. Patrick Lavarde, IWRA president, says that one of the main purposes of the congress is to compile experiences, promote discussion and present ideas about water policy and science in hopes of governmental adoption and implementation.

The IWRA president delivered the XVI special award to ANEAS president, Ramon Aguirre Diaz and Roberto Ramirez de la Parra, General Director of National Water Commission of Mexico - CONAGUA.



Quintana Roo Governor, Carlos Joaquin Gonzalez, indicated the importance of strong relationship between scientists and politicians to assure a more stable future in water resources management.

Other attendee at the congress was Municipal President of Benito Juarez, Remberto Estrada Barba.

Towards a special issue of water international on the OECD principles on Water Governance

This Special Session highlighted the need to share the responsibility of water governance and to look across scales and across sectors. The Organization of Economic Co-Operation and Development (OECD) began the session with a discussion on an upcoming special issue article in the Journal of Water International on the OECD Principles on Water Governance. The OECD Principles on Water Governance is a multi-stakeholder driven process backed by the Ministries at the OECD Ministerial Council Meeting, and endorsed by 42 countries and 140+ major stakeholder groups. These principles aim to bridge science and policy through working with governments and ministries, with the goal of achieving good governance. The special session highlighted the benefit and need for water practitioners to publish their lessons learned from using the OECD principles. This necessary practice takes policy lessons to the academic platform to provide a necessary dialogue for water governance.

The special issue article on the OECD Principles on Water Governance is a two-part edition that gives stakeholders the opportunity to share their anecdotes on water governance in the framework of these principles.



The articles In this issue aim to

- (I) foster the science-policy interface in practice
- (II) provide a tangible output for closer cooperation between IWRA and the Water Governance Initiatives (WGI) and
- (III) provide a scientific-base to the principles.

The first section allows authors to discuss the stakeholder engagement in science-policy processes. Articles cover the implementation gap in water services, economic incentives for water governance, and water governance as social learning. The second section gives lessons from the practice of OECD principles on flood protection, existing frameworks in Europe, Asia Pacific, Africa, and the Americas, and water governance in France. As an example, during the session an article was presented by Pierre-Alain Roche. He evaluated water governance in France and milestones to IWRM from 1964-2016, in which he believed that "France failed by progressing a lot". Water governance in France was driven by the decentralization of water and changing periods of concerns.

Discussions following the session considered IWRA as an appropriate concept that considered not only governance but management, especially when considering the process of engaging the public. Other topics included the need to be flexible with the means to good governance and the idea that often the top down approach does not work within water governance.

... of innovative water
... responsible authorities, knowledge
... and relevant stakeholders



Innovative Water Resources Management and Green Development in China

There has been a change of development mode in China, aiming for integrated development through the adoption of eco-friendly and science-based policies. The central government is prioritizing water conservation by improving control over water consumption and by adopting frameworks such as environmental flows, ecological regulation through water demand management and the joint operation of reservoirs, and ecological compensation with protector-beneficiary compensations, for instance. The orientations for the development of new policies are: Ecological Health, Economic Development, and Water Resources Sustainability. The focus on regulation has led to the enforcement of water permits management, establishment of water drawing quotas, renovation of pipelines and water serving tools for water use efficiency. There has been an increase in non-traditional water sources such as reuse, recycled and desalinized water, and the change in the development mode is mirrored in numbers and policies such as:



The Speakers highlighted the policies adopted by the Central Government of China to ensure control of water management in the country and promote the country's transition to a sustainable development mode. To justify the change, Speakers discussed how China accounts for 20% of water availability in the world, but faces several challenges related to:

- ◆ **Water shortages due to uneven spatial distribution of water resources;**
- ◆ **Water pollution as a result of increased load in the natural resources due to human activities;**
- ◆ **Ecological damage with climate change and increasing water supply**
- ◆ **Flood and drought**
- ◆ **Rivers dry up**

52% increase in water reuse in Beijing;

- ◆ **8 million hectares of farmland with water efficient irrigation developed,**
- ◆ **Progressive water pricing for industrial use;**
- ◆ **Rewarding system for water saving actions;**
- ◆ **Establishment of River Chiefs System for river management and engaging provincial, municipal, county, and township governments with the promotion of information sharing and work supervision. The system aims for "One policy for one river and One policy for one lake" practices.**



Water Policy and Governance management

During the Presentation of the Online Training Course on the Greening of Water Law : Implementing Environment-friendly Principles in Contemporary Water Treaties and Laws, three of five modules were explored. This online training was organized as a result of The First International Environment Forum for Basin Organizations which was created in 2014 by UN Environment (formerly UNEP) in Nairobi 2014. Modules A, C, and E were explored during the sessions. Module A covers the Greening of Water law, including the trends and risks involved. This includes competition and conflicts over shared freshwater resources and international water law regarding the non-navigation uses of international watercourses. Module E answers the question: What is groundwater, and how does it function? Module C explores the obligation to prevent, reduce, and control pollution in international law. The group exercises of the training course are based on the basin agreements. The exercises involve drafting recommendations to solve the disputes, after learning about the water law in the region. It brings to light the sources of problems, which include a lack of communication with the local communities and lack of respect for the national laws.

Water Ecosystems and Physical Regimes

During the panel on National Water Reserves Program in Mexico: Allocation of Water for the Environment and Accomplishment of Multiple SDGs, the key message was that ecological flow needs to be a part of public policy consideration in basin management. This need is expected to be filled and justified in other parts of the world through Mexico's National Water Reserves Program, where they consider ecological flow in basin management through developing water reserves. In 2005, the Alliance between WWF—Fundación Gonzalo Rio Arronte was created to propose new water management models in Mexico. In developing a new model, the Alliance aimed to address the following question: how will we strengthen Integrated Water Resources Management in order to avoid water scarcity and conflicts in Mexico? The approach aims to develop water reserves in order to provide water for future generations. A water reserve is a volume of the total water availability that can be allocated in a basin restricted for a specific purpose. The National Water Reserves Program is Mexico's effort to develop sustainable water resources for future generations. Recognizing that public policy does not typically consider ecological flow, an objective of developing the new model was to acknowledge environmental science when considering protecting water for the future.



Water Security in a Changing World: Alternative Sources of Water

Alternative sources of water that were discussed in this panel were desalination and waste water treatment. Speaker Ziolkowska, who presented on "Desalination Technology in the US: Potentials for Economic Growth and Sustainable Water Supply" talked about the development of a geospatial system in desalination. The main challenges of desalination are the cost is not economically feasible for agriculture, it produces CO2 and salt run-off in environmental perspective, and issues with getting permits for desalination plants in institutional perspective. Speaker Jessica Rodrigues Pires da Silva who presented on, "Boosting direct potable reuse: measures to be taken to help shorten the knowledge gaps and uncertainties surrounding this technology" mentioned that using wastewater as an alternative source of useable water. Most vulnerable communities have only a single source of water, which are climate dependent; waste water treatment plants, a steady source, is not climate dependent and relatively cheap (using the above process).

The ways of improving success of waste water projects are: altering language to market the idea to the public better; evaluating economic feasibility; and choosing the best technology for your specific situation.



Water Security in a Changing World: Conflict and Cooperation

In this panel, the key theme was transboundary water conflicts must be solved by cooperation between countries. Without cooperation, nations cannot reach mutually beneficial solutions.

The panelists discussed several examples of conflicts between nations.

Bolivia and Chile have had a transboundary dispute over the water flowing from the Silal, as it is known in Bolivia, or the Siloli, as it is known in Chile. Neither country wishes to obtain the science behind the transboundary water course in which they fight, because the science may determine ownership over the water in a way one country would refuse to accept.

The United States and Mexico have shown great examples on conflict and cooperation with transboundary water issues in the Rio Grande and Colorado Rivers. However, drought has been a source of tension around the Rio Grande.

The Nile River supports Egypt's economy, yet 80% of the Nile's head waters come from Ethiopia, which has not owned its own water for decades. Until the recent political unrest in Egypt, the country had veto power over any dam built on the entire Nile River. This produces problems for Ethiopia, a country with a growing population that has a need for building dams. Ethiopia has continued building the dam, resulting in a power shift in that may knock Egypt from the top.



Torgny Holmgren Executive Director, Stockholm International Water Institute (SIWI)



What areas of sustainable development, as it relates to water, need the most attention in order to help achieve international peace?

I think it is about how countries cooperate jointly, I think that is the most important part. Water can connect countries that might enter into a conflict.

From a water angle, I think across the board the SDGs are important. As I mentioned in the forum, it is very important that we link the different SDGs together. Otherwise we will end up in silos.

What positive impacts have you seen since the inception of the UN's Sustainable Development Goals?

I have seen, from my own country, a tremendous interest from business, at least the big businesses that have the capacity. They have actually appointed different members of their senior management teams to be advocates, or at least a spokesperson for different SDGs. At least some of the businesses are

focused and giving priority to the SDGs and system development. City mayors, business leaders, and we need to also get the small businesses and medium sized enterprises. I think citizens of society are more or less there. But at the same time, governments or institutions like ours need to reach across the SDGs.

What is one way to bridge the gap between science and policy?

We arrange the world water week every year. We bridge, we bring in scientists, 500 of them, and policy makers. I think it is also to reach out to these different communities. Scientists can be very smart and on top of knowledge, but if they cannot explain it to policy makers, if they cannot interact, I think they miss an opportunity. At the same time, I think, policy makers need also to be more aware and interested to get access to science and what is coming out of science. There is a divide between science and policy making, and we need to bridge that gap, through events like this.

Gina S. Warren on "Modeling for Small Hydropower: Policy and Technology"

What is the Barefoot Project?

It is a project in India; an example where local government brings in Women, grandmothers (only for women) and trains them to install and maintain solar power. There is another project in Pakistan called the technical education and vocational training authority, which is a program that trains local workers to install and maintain small hydrological power. The project increases jobs in the area, increases access to energy, and the costs/benefits are completely local.

How would you suggest bridging science and policy?

We need think-tanks and NGOs that have economists, lawyers, policy makers and scientists all in one place. There is a huge gap in wanting to implement hydro power and the science behind the feasibility of implementing a hydrological system on a small river.

How does the water-energy nexus play into the way society sees water?

For rural electrification, the main use for water has been for agriculture. This means there has historically been a conflict of using water so as not to infringe on agricultural use. Small hydro is a non-consumptive use of water so it can peacefully co-exist with agriculture while providing power to an area.

Is lack of data more widespread than people know?

YES, lack of knowledge and data are two main areas where we need improvement. This plays into communities who may be against providing access to power. The benefits for electrification are that women have free time to learn and are not spending all their time gathering wood for cooking and water for drinking.





Since 2013, "water supply crisis" has been annually identified as one of the top three risks to business performance. Thus, the need to address risks such as flood damage and unreliable supply is obvious to businesses. There are many challenges that hinder businesses effective contribution to the water sector. Those challenges include understanding region specific adequate technologies, governance capacity, and infrastructure for sharing knowledge and information.

One solution may be water stewardship as a response strategy. Since most companies are not prepared to engage in catchment-based collective action on water, companies must enhance their understanding of water uses in the catchment where they operate in order to develop into a more sustainable water user. In India, adopting smart agriculture helped one million farmers reduce 20% water use. In Brazil, companies launched a commitment letter to mayors in the São Paulo.

Innovation in the water sector may need to be taken slower due to the risk adversity of the public, investment cycles that often work under a 5-10 year timeframe, and the cost-benefit that is not always apparent. Innovation in the business sector will require modern, innovative, and customized technological solutions suitable to the diverse socio-economic requirements.

Cases from Asia, Central America and Africa highlighted how businesses are responding to water innovation. K-Water has improved utility management systems in an effort to pro-actively respond to climate change. Mexico City has engaged in public investments for water security to the growing metropolitan region. Mexico City has an ultimate goal of doubling the existing water network to supply water for all. The city of Nairobi is managing existing water infrastructure with the support of development aid, as financial resources remain a key challenge for the public sector. The focus in Nairobi has been in investing in programs to improve the capacity of the water utility by welcoming professionals and collecting data on the field to enhance performance and build trust with clients. Nairobi is also targeting new water sources, such as reuse and groundwater to improve the resilience and reduce the costs of services.



Pierre-Alain Roche

What is the declaration?

"The declaration is a collective answer on how the 1,000 participants at the XVI World Water Congress plan to bridge science and water policy."

"It is a very simplified message collected from all of the communities gathered at the Congress."

Why is the declaration important?

The WWC is one of the most important world meetings that will explicitly address the water issues from the point of view of "bridging science and policy." This declaration is the best opportunity to call for evidence-based policies and provide solutions to build bridges between science and policy in our communities.

Why should people participate in creating the declaration?

"If we wish to find a consensus on this declaration we must all participate in the open discussion held on Wednesday night. Discussion on the declaration will wrap up tomorrow, Wednesday, and on Thursday we will write the proposal."

“ You are encouraged to participate in the open discussion for the preparation of the Cancun Declaration which will take place on Wednesday from 7:00 to 8:30 pm on Cozumel 5. ”

PROGRAM

Wednesday May 31st

Hours	Salon Gran Cancun	Cozumel 1	Cozumel 2	Cozumel 3	Cozumel 4	Cozumel 5	Xcaret	Salón Mujeres	Coba
9:00 - 10:30		RS-24. Water and Sustainable Growth: Irrigation	SS-26: Reflecting on Regulating Water Security for Unconventional Gas and Oil	RS-34. Water Quality Management	SS-35(A): Multi-disciplinary perspectives on the Grand Ethiopian Renaissance Dam (GERD) and the future of water resources management and development in the Eastern Nile Basin	SS-76: Towards a Green Infrastructure in Latin America and the Caribbean	SS-65(A): Water Security and Climate Change - Challenges and Opportunities in Asia	RS-14. Water Policy and Governance: Economics of Water Governance	RS-21. Water Policy and Governance: Transboundary Aquifers on the Mexico-US Border
10:50 - 12:20		RS-30. Water Quality: Contaminants of Emerging Concern	SS-30 Social Sciences approach to supporting stakeholder engagement for water policy development	RS-26. Water Policy and Governance: Regional and International Law	SS-35(B): Multi-disciplinary perspectives on the Grand Ethiopian Renaissance Dam (GERD) and the future of water resources management and development in the Eastern Nile Basin	SS-77: Achieving Water and Sanitation SDGs in Latin America and the Caribbean	SS-65(B): Water Security and Climate Change - Challenges and Opportunities in Asia	RS-41. Water and Sustainable Growth: Water-Food-Energy Nexus	SS-53: The Draft Articles on the Law of Transboundary Aquifers - Moving forward until the next UN General Assembly session
12:40 - 14:10	HLP: Integrated Water Resources Management								
14:10 - 15:30 *Poster Session									
15:30 - 17:00			SS-25(A): Water Quality Management - identifying opportunities for policy reform	RS-6. Water Security in a Changing World: Climate Change		SS-48: Two Countries, Nine States: Colorado River Cooperation in a Complex System	SS-16(A): What next for water law and policy? Recent developments, future challenges and potential opportunities	SS-21(A): Water security and global-change adaptation: bridging science and policy	SS-34 (A): Bridging Stakeholders' Knowledge and the 8th World Water Forum Thematic Framework
17:20 - 18:50		RS-18. Water Policy and Governance	SS-25(B): Water Quality Management - identifying opportunities for policy reform	RS-32. Water Ecosystems and Physical Regimes	SS-17: Empowering Young Water Professionals through Engagement in Global Water Community	RS-29. Water Security in a Changing World: Cooperation on the Mexico-US Border	SS-16(B): What next for water law and policy? Recent developments, future challenges and potential opportunities	SS-21(B): Water security and global-change adaptation: bridging science and policy	SS-34 (B): Bridging Stakeholders' Knowledge and the 8th World Water Forum Thematic Framework
19:00 - 20:30						Open Discussion - Preparation of Cancun Declaration			



High-Level Panel: Water and Climate

The purpose of this Panel was to first consider how to further promote the importance of water management in the COP process when dealing with the challenges posed by climatic changes- a particular focus was given to climate change adaptation. Then the Panel considered the implementation of the Global Climate Action Agenda through different projects, and proposed recommendations for future actions to be taken. The Panel was intended as part of the broader process that aimed to bring together key actors to further build an alliance for water and climate change issues, positioning itself as a key stepping stone between COP 22 and 23, and leading to the 8th World Water Forum.

The first speaker, Tom Soo, the Executive Director of the World Water Council, explained how collaborative thinking is central to shaping approaches to climate resilience. Jose Carrera, Vice-President of the

Development Bank of Latin America (CAF), shared the perspective of Climate Change Adaptation in the Latin American context, providing examples of climate change adaptation actions in Peru and Mexico. Considering the variety of issues faced in water allocation and water management, a crucial question was raised: how can COP 22 support these challenges? Then Jean-François Donzier, the Executive Secretary of the International Network of Basin Organizations, explained the significance of trust between basin level organizations to achieve sound water management. He stated that we are still facing problems of extreme climate phenomenon such as droughts, and water issues are now starting to be comprehensively considered. However, he concluded that there are tools to adapt from the effects of climate change.

The need for business sector considerations was addressed by Jason Morrison, CEO of the Water Mandate UN Global Compact. Involving businesses in local climate change adaptation also benefits these businesses, through return on investments. Examples were provided of partnerships between corporations and communities which have been hit by water resources issues stemming from the effects of climate change. There have now been many pilot projects that have showcased success in these business partnerships. The next step is to increase the scope and scale of such projects.

// Fresh water is a time bomb, on the way to crash. //

Jean-François Donzier, Executive Secretary, International Network of Basin Organizations

Shared Water of North America: Policies and Issues on Transboundary Water Resources

This three-part session on transboundary waters in North America highlighted the current cooperative efforts as well as opportunities for future collaboration in science and policy. The session was organized by the Geological Survey of Canada (GSC), University of Arizona Water Resources Research Center (WRRC), New Mexico Water Resources Research Institute (NMWRRI), Texas Water Resources Institute (TWRI), and North American Research Partnership: US-Canada Governance.

The key themes discussed throughout the sessions included:

- Future actions include the desire to exchange more information to develop trust and ensure aquifer protection and water rights;
- Importance of aquifer recharge in the future for transboundary aquifers and to mitigate extreme water stress;
- There might not be official agreements, but nations are cooperating by science, which is a form of collaboration and may represent an agreement by nature;
- Importance of the international joint commission (IJC) and International Boundary Water Commission (IBWC) as organizers of future events such as a groundwater summits and information sharing for North America.
- Future steps include connecting surface water and groundwater resources in North America.
- Importance of bringing multiple perspectives to the table to discuss transboundary aquifers including legal, policy, and science.



The first session highlighted the current technical advances and limitations in hydrogeological modeling for transboundary aquifers on both the US-Mexico and the US-Canada borders. This session also emphasized the need to determine physical relationship between surface water and groundwater resources not only in modeling but in policy and management as well.



The second session discussed the policies and issues on Transboundary water resources. As transboundary aquifers continue to be assessed and recognized, there will be an emergence of new hydrologic and political boundaries. This potential conflict may be preemptively reconciled through collaborative binational efforts.



The third session reinforced the theme of congress of "Bridging Science and Policy" by stressing the necessary working relationship between both scientists and policy makers for shared groundwater resources. Information sharing was suggested to be the foundation and bridge for future work in groundwater sharing and management.



Special Session 75: Peace for Water: The Global High Level Panel on Water and Peace's Vision

This session examined water as a tool for peace and reconciliation.

The session presented the purpose of the Geneva Water Hub's Global High Level Panel-Secretariat. The panel addressed transboundary conflicts by identifying legal, economic and institutional mechanisms to promote transboundary cooperation.

Dr. Alvaro Umaña Quesada explained the various themes of the panel's work. The key message was that all countries should negotiate and implement effective agreements, while focusing on efficient strategies based on the unique characteristics of a particular region.

Dr. Mara Tignino, Director of the Platform of International Water Law, presented water as both a weapon, and as a necessity protected by humanitarian laws. Water is sometimes considered to be a strategic asset in war, as the lack of drinking water can kill as many people as bombs. Water is also strategic because if there is not enough water, energy production can be affected; if there is too much, there is a risk of flooding. The world should consider the general principles of international humanitarian law and the necessity of caring about water and human rights during conflicts.

The session came to the conclusion that a clearer view of the details of any regions involved in conflicts over water is most urgently needed.



Building Green Infrastructure for the Latin American Water Sector

This session addressed the following questions: Why is green infrastructure important? How is green infrastructure being implemented in Latin America? What are the key gaps in opportunities to implementing green infrastructure?

How can we work together to address these gaps?

Implementation of green and blue infrastructure is essential to improve the resilience of cities and redefine the relationship between citizens and water. Green infrastructure includes forest conservation, river bank protection, sustainable agricultural practices, and wetland and glacier protection. Green infrastructure projects can substitute conventional infrastructure in some cases and complement it in others.

Several cities in Latin America face a water paradox, which means that those cities are threatened by both an excess and lack of water. One example is the Mexico City. The government of Mexico City is developing a strategy to improve the city's resilience through a network called 100 Resilient Cities (100RC). In 2013, Mexico City was chosen to be a member of the 100RC network and in 2016 they began to develop projects with along with 100RC. In accordance with these projects, the Mexico City government has focused on developing space transformation. Space transformation is an improvement, through the implementation of green infrastructure, of public spaces with the objective of mitigating floods, raising collective consciousness, and increasing infiltration. All those actions will affect the city's water culture and promote a new relationship between people and their water.





Water Security in the Americas

Water security is a fundamental element for achieving peace, social cohesion and poverty reduction. This is the main reason why the UNESCO definition is the only one that gained global agreement.

The idea that water security is an outcome of water governance drove the session. To achieve water security, regions ought to consider integrated management and strengthen their institutions. In many countries, legislation is obsolete and fragmented and there is a general lack of access to financial mechanisms to improve management. As an example, Latin America is a region with heterogeneous climate conditions. Yet, the region is quite homogeneous in terms of the current state of water security; sufficient resources exist but are poorly managed. This is a pity for a region that was able to demonstrate its capability in meeting and exceeding the Millennium Development Goals.

It was established that there is a clear need in the Americas for a Hemispheric Observatory on Water Security- a

multilateral observatory with an integral vision to analyze and suggest strategies to protect and conserve water for sustainable management. This observatory will rely on countries' information to contribute for strategic decisions with a long-term perspective. Presence in the media is also relevant since many politicians are more reactive to news than to research studies.

Building on the successful experiences, the second session showed relevant developments on integrative platforms of digital information on open access from the Instituto Panamericano de Geografía e Historia (IPGH) and the Inter-American Development Bank (IADB).

This digital tool will provide information for quantitative simulation of hydrology and climate change. This will allow assessment of the potential impacts of climate change on water flows and infrastructure and support the design of adaptive projects and strategies.

Smart Water Management (SWM): Bridge to WGG & SDGs - the technological innovation needed for "Water for all"

This special session emphasized the contribution of Smart Water Management (SWM) to new approaches in policymaking, as an innovative concept that needs to be considered in order to adapt to and resolve future water and energy crises. SWM monitors water distribution, consumption and quality as well as offers a way to work towards the implementation of the SDG 6. Different examples of SWM were presented, such as Sponge Cities in Asia, which use urban rainwater as an innovative source of water in large cities. SWM should be a way to serve public interest and operate a drift from innovation to progress. The ultimate limit to SWM lays in communication possibilities, which excludes some rural areas in developing parts of the world. In the developed world, difficulties lay in the infrastructural gap that can exist in rural areas, where even though water facilities are efficient, they cannot be adapted to the newest technologies.



Asia Water Council and the 1st International Water Week

In order to resolve water problems in Asia, the first Asia International Water Week (AIWW) has been introduced and will be hosted this September in Korea. This event will welcome people and originations from around the world to share data, knowledge, case studies and solutions on world water issues as well those specific to Asia.



Water Sanitation and Health: Ensuring Drinking Water

Water is vital for human health. Water is an essential and necessary component for all aspects of life, including drinking and providing adequate hygiene and sanitation. Unfortunately, the provision of these two services can be expensive and difficult to attain and maintain, particularly in rural areas where communities are far from centralized service areas. In this panel, speakers considered drinking water allocation case studies in Chile, as well as two different parts of Mexico (Oaxaca and San Luis Potosi).

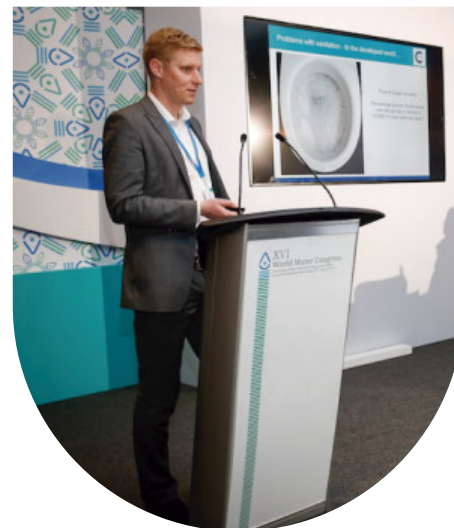
The first speaker analyzed the efficacy of water and land use planning processes in Chile. Mr. Cristian Palma Infante and his colleagues created a qualitative and quantitative approach to analyze the connection between water planning and land use planning to see if each plan took the other into

consideration. This approach is useful for objectively determining the level of integrated planning for water and could have interesting implications in other places.

Moving from Chile to Mexico, Juan Carlos Tejeda-Gonzalez presented his work on how to improve integrated drinking water planning for rural areas in the Altiplano. This research involved a strategic environmental assessment of the planning process for areas that are underserved by the government. Based on this research, it was determined that stakeholder engagement at the local level has the potential to create lasting, community-driven solutions.

However, currently achieving meaningful stakeholder engagement is difficult in Mexico, where necessary forums for such engagement are not always available.

These case studies all managed to effectively weave in the importance of bridging the gap between science and policy by focusing on the importance of institutional, legal, and social aspects of water delivery services for human health.



Water Policy and Governance

An interesting session on policy and governance of water resources discussed how changes in policy have an impact on people, their welfare, and how they perceive the environment around them. It was noted that utilizing evidence based research will lead to better decision making. The focus and input of the research cannot only be data and decisions, but the stakeholders as well. Understanding what drives individuals to make decisions will enhance policy construction because these changes are influenced by the same drivers that influence individuals.

Governments can utilize private organizations, such as the Center for Expertise in Waters (CREW) in Scotland, to help develop policies around specific issues. When an issue arises or becomes apparent in a community, Scotland uses an outside

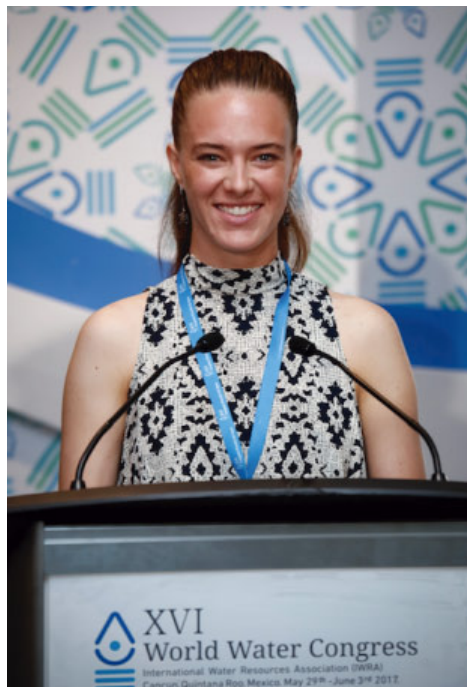
agency (CREW) to help quickly develop a range of policy options dedicated to addressing the issue at hand. Artificial intelligence and models can also be used to mimic human decision-making. These decision-making tools are transferable in scale, but the data is different.

It was established that policymakers need to recognize local needs. While the process for developing policies is transferrable, the data differentiates on local levels. This means there is likely not a one size fits all option for policy makers. Instead, they need to rely on scientific evidence/data to tailor their policy options to particular local issues. This works vice versa as well. Some differing local issues are addressed with one policy but not every issue needs its own tailored policy- one policy can address many issues.

Finally, it was emphasized that each policy change will have an impact on communities, and science needs to follow up on how these changes occur.



Lindsey Aldaco-Manner Texas A&M graduate student.



Do you believe the cities examined in your research (Dallas, San Antonio and Houston), are working in the right direction, and will it be enough?

"Yes, I think they are making significant conservation programs, especially SAWS. They are doing extensive outreach activities, because they are under some water stress. I do think there needs to be a more science-based approach to quantifying the water, which they are still lacking. However, their conservation programs in general are reaching the public. There is general conservation being shown, but there is no evidence of it being a result of these programs. Conservation could be coming from industry. We don't know."

What is motivating the consumer to conserve water?

"Water users are more likely to conserve if they were aware of a common water conservation goal they could be working toward and its broader impact on society. But if you are in an area that maybe does not have a water stress, there is less of a motivation."

Also economics plays a major role. People are driven by the dollar. If there is an incentive of 'Hey, if I use less water, I will save money,' economics is a huge driver. Those are the biggest ones."

Did any of your studies show that economics was the driver at all?

"The biggest evidence was in the automatic metering information. When they are shown on their bills, or they have it right on their phones. That was shown in Houston—they were one of the biggest users of this technology. [The meter] shows their utilities and how much water they are saving. But that is for the individual homeowners. That is not for those who are going to these educational programs. It is on a household level."

Victor Arroyo

**Senior executive Operative Innovation and knowledge management direction.
Development Bank of Latin America**

Many Multi-purpose Infrastructure projects become trapped in the planning phase and are not completed. Why is this, and how can this be combated?

Normally, multi-purpose infrastructure projects or multi-purpose water projects are very large. So, they need a large amount of financing. The process to obtain this financing is very complex. When you have private participation, every stakeholder has different interests, whether they are the energy sector, agribusiness, development or commercial banks. Additionally, every financial institution has different approaches. Environmental and social aspects are also added to the equation. This makes everything very complex. We need strong institutions to bring all stakeholders to a common position.

How can conflicting interests be managed?

You have to develop at the state level, a common view and a common model of managing water resources. Every sector needs water. Agriculture, mining, cities, and tourism needs water. So, the

economic development model of the country needs to be taken into consideration when you design your water resources management model. A country can distribute equally or with preference to a certain sector. This must be developed at the state level.

What role does science play in Multi-purpose Infrastructure Projects, and how can countries address gaps between science and policy?

Water resources management needs data. Data is available in developed countries, but often not in developing countries. In many developing countries they do not have enough meteorological or hydrological data to create a model. This data is very important to plan where the infrastructure will be constructed and how water resources will be managed. Countries need to develop this data, but they also need to construct alliances with other institutions and universities who could provide data from global technologies that are currently used. For example, in the United States, there are observations of

meteorological phenomenon from satellites. So, data is available but it is not always known by these developing countries.



Integrated Water Resources Management

The purpose of this high-level session was to highlight the place of Integrated Water Resources Management (IWRM) in the 2030 Agenda for Sustainable Development by revitalizing the concept of IWRM. The goal is to deliver results that are accounted in the SDGs and lives across the globe with scale and speed. With political and community stakeholder engagement as well as proper data acquisition and sharing, it is possible for IWRM to provide an over-arching planning and management framework for the SDGs.

The session began with remarks from the Director of the IUCN Global Water Programme on the evolution of IWRM and featured four new strategies. These include:



- ◆ High-level policy and strategy setting to put in place agreed high-level policies and goals;
- ◆ Pragmatic problem solving that complement strategy setting to meet stakeholder priorities at all levels;
- ◆ Operating mechanisms that bridge strategy setting and problem solving, focusing on action;
- ◆ Monitoring of progress, goals, and targets by using data tools for transparency, trust, and accountability.

Other key concepts from the opening remarks included the need to think about IWRM beyond the basin scale with a scope that can encompass other models and national issues. Torkil Jonch Clauson, moderator of the session, continued the dialogue by allowing panelists to share the successes and potential paths forward in implementing IWRM across the globe. Brazil was highlighted as a steward of using IWRM concepts in the face of drought, while the Itaipu Dam could serve as an IWRM turnkey to good transboundary water governance.

A highlight of the dialogue was recognition of the need to adapt the current framework in order to successfully achieve the goals. There needs to be an effective strategy to dynamically catalyze and manage change at all levels and to operate mechanisms that bridge strategy setting and problem solving. This strategy needs to be paired with robust education and outreach efforts that integrate not only civil society but the political class as well. Water practitioners also need to rethink IWRM across disciplines and scale by thinking of the SDGs each as a system connected with other disciplines such as water, food, energy, and health.

The concluding remarks called for the need to have meaningful data in the scope of IWRM for proper implementation and to work on communication to get policymakers to make science-guided decisions. Good progress in IWRM development will come in time for the 2030 Agenda for Sustainable Development.

PROGRAM

Thursday Jun 1st

Hours	Salon Gran Cancun	Cozumel 1	Cozumel 2	Cozumel 3	Cozumel 4	Cozumel 5	Xcaret	Salón Mujeres	Coba
9:00 - 10:30		RS-16. Water Ecosystems and Physical Regimes	SS-58(A): Training in Hydro-diplomacy: Legal and Institutional Aspects of Water Resources Governance – From the International to the Domestic Perspective	RS-27. Water Policy and Governance: Law	SS-72: Cooperation and Exchange of Experience in Water Resource Management and Adaption to Climate Change	SS-33(A): Resilience of coastal watersheds in Latin America and the Caribbean	SS-54: Water Futures and Solutions	RS-33. Water Quality: Managing Contamination	
10:50 - 12:20		RS-31. Water Quality Management	SS-58(B): Training in Hydro-diplomacy: Legal and Institutional Aspects of Water Resources Governance – From the International to the Domestic Perspective	RS-25. Water Policy and Governance: Integrated Water Management	SS-43: Hydropower Development and Reservoir Operation	SS-33(B): Resilience of coastal watersheds in Latin America and the Caribbean	SS-36: Water stress and demographic dynamics	RS-15. Water Ecosystems and Physical Regimes	
12:40 - 14:10	HLP: From WEF Nexus to WEF+Health +Education Nexus								
Lunch*									
15:30 - 17:00	IWRA Awards								
17:20 - 18:50		SS-74: Getting to a Water Security Framework: Breaking it Down to Build it Up	SS-52: Offshore Aquifers – Why Should We Care ?	RS-22. Water Ecosystems and Physical Regimes: Groundwater Resources	SS-8: Charges vs. buyback: who pays for water ecosystems restoration?	SS-64: Towards an Integrated Water Management by Sub-basin: Mainstreaming of Science and Policy	SS-38: Water security issues for developing countries in changing environment	RS-28. Water Policy and Governance: Law	

The dress code for the gala is business casual. Keep in mind that the event is held at the Mandala Beach Club and will be outside under a canopy on the beach.

Towards a Green Infrastructure in Latin America and the Caribbean

This session highlighted the importance of green infrastructure in Latin America.

Latin America holds an abundance of water resources, but faces challenges in its water infrastructure functionality. Green infrastructure can complement conventional gray infrastructure to increase functionality and adapt to the effects of climate change. In addition, Latin American countries need to address a number of management issues, including effective land-use planning, better inventories of water resources, water management by basin, and risk management against natural disasters.

In order to better implement green infrastructure, Latin American countries need to build alliances with international organizations to gain access to scientific data and knowledge. Effective communication between nations is key to successful green infrastructure projects. In addition, policy makers should gain more financial support from major water users, increase civil society participation, and build a stronger water culture in order to achieve rational and efficient water use.

The nexus between food, energy, and water was also discussed at the session. This nexus affects all aspects of society, including politics, economics, and health. In addition, good ecological practices are important to manage resources. A key idea espoused at the session was that good ecology is good business because good ecological practices can improve ecotourism and maintain ecosystem services.

Suzanne Ozment, of the World Resources Institute (WRI), explained WRI's goals and interests related to green infrastructure. WRI is interested in green infrastructure because it can improve water quality, regulate hydrologic cycles, mitigate flow variance, reduce erosion, improve energy security, preserve biodiversity, protect coastlines, and sustain livelihoods.

Achieving Water and Sanitation SDGs in Latin America and the Caribbean

Technology can be a catalyst for delivering information directly to decision makers to bring stakeholders together. Good progress has been made in Latin America and the Caribbean. However, different generations still face the same problems on water services and sanitation. In the region, many people still need to travel and carry water because there is not a delivery mechanism in place.

These issues can only be resolved by strengthening water governance and modernizing the water framework for data collection, analysis, and dissemination. Many efforts have been made from the national to international level. Internationally, UNESCO has been developing WINS (Water Information Networking System)—a

technology to support decision makers and major stakeholders. This system is a key tool in the implementation and monitoring IHP VIII activities. The main objectives are to eradicate poverty and improve data collection. The system is gratis, and it has diplomatic immunity. All data will be available in agreement with the government, which makes it available at the local, regional, and international levels.

Water education for stakeholders, including civil society, and decision makers, will be instrumental in building capacity to implement SDG 6. The citizen forum has been a platform for stakeholders to engage in a ongoing dialogue online.





Multi-disciplinary perspectives on the Grand Ethiopian Renaissance Dam (GERD) and the future of water resources management and development in the Eastern Nile Basin

The Grand Ethiopian Renaissance Dam (GERD) is located on the Blue Nile River in Ethiopia, and once completed will be the largest hydroelectric dam in Africa—the seventh largest in the world. While the project will provide a significant source of energy to Ethiopia, downstream countries have raised concerns as to how the dam will impact their use of water from the Nile River. Egypt, a country which relies heavily on the waters of the Nile, has in the past requested that Ethiopia cease the construction of the dam. In response, Ethiopia has denied that negative impacts would occur in Egypt upon completion of GERD. Despite this request and other countries' concerns, the completion of GERD is soon expected to happen in 2017. While providing a solution that fully satisfies all parties and special needs was considered in the discussion as "not feasible", the focus of this special session aimed to address limiting risks, the duty of negotiating in good faith, and the need to develop trust

amongst the involved parties. While transboundary issues are mainly addressed from legal frameworks, the significance of this special session was its presentation of science on reservoir development and hydrological flow models: providing a fundamental component to inform policy on the risks issues associated with GERD—the perfect bridge between science and policy.

The first session highlighted the legal framework involved in the history of the dam, as well as future policy principles in addressing issues of the GERD. Salman Salman reported that the Nile Basin Cooperative Framework Agreement (CFA) has been signed by six key countries that the Nile impacts, and that future work of the CFA should aim to develop equality within all Nile states. Seray Yihdego emphasized the importance for future cooperation among states to negotiate in 'good faith', or to seek the benefits of its downstream users as well.

The second session discussed scientific principles for application in risk management as well as identifying action items for cooperation. Researcher Kevin Wheeler presented key findings on reservoir development for multiple countries that are possible with GERD. Furthermore, his perspective was pertinent to the conversation in offering that cooperation of GERD issues must shift to 'risk-based' thinking. While risk is an obvious factor when developing such a large infrastructure, the key question that needs to be addressed is - What is an acceptable amount of risk? Panelists affirmed that addressing significant risk or harm was of greatest concern of this transboundary issue. Dr. Baimu Richard Paisley called for a need for sharing data and information agreements amongst Nile countries.

The engagement of conversation amongst speakers, panelists and the audience bookmarked this session as a think tank for action items in addressing issues associated with the Grand Ethiopian Renaissance Dam.

Two Countries, Nine States: Colorado River Cooperation in a Complex System: Cozumel 5 15:30

Twelve million inhabitants along the U.S. - Mexico border are reliant on shared water resources. Management is vital across borders to ensure human health, economic development, and environmental sustainability. Within this area, the Colorado River not only offers a spectacular management challenge by crossing nine states and two countries, but also a stunning example of successful binational cooperation. During this special panel, high-level policy makers from both countries gathered to talk about the success of Minute 319 under the 1944 Water Treaty and the ongoing negotiation of Minute 32X for the joint management of the Colorado River Delta.

This incredible feat of binational cooperation has been evolving since 2000, when IBWC/CILA first committed to studying the negative impacts on the environment. Panelists described the

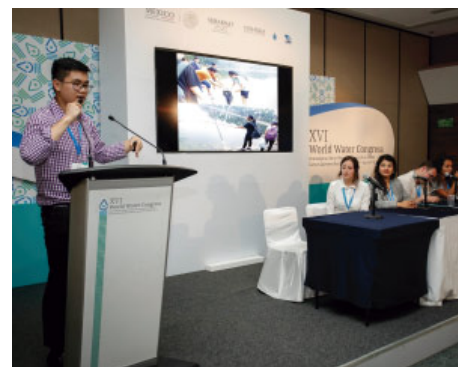
evolution of this cooperative effort by highlighting all that has been accomplished since the implementation of Minute 319. This agreement created a joint management structure, allowing for more flexible storage of water allocations and timing of pulse flows. As a result, both countries built in strategic drought contingency planning, which has heightened resilience to water stress, while also allocating water for the Colorado River Delta. Most notably, this is the first global example of two countries agreeing to allocate shared water for the environment.



Empowering Young Water Professionals through Engagement in Global Water Community

An important discussion in this Congress centered around the role of youth in global water resources discussions. It emphasized that the involvement of young professionals is crucial in developing sustainable water policies. Muhammad Wasif Bashir Babar, the advisor of the Pakistan chapter for youth, stated that water is the most important component of all SDGs and that he believes young professionals have the enthusiasm and energy to contribute to these SDGs. Networks of youth should be further developed, and indeed, Alice Colson provided an announcement of IWRA's forthcoming Young Professional Chapter. To provide evidence of youth's important involvement, four young professionals shared their experiences and work on water related issues such as climate change, community based water quality monitoring and the Water Youth Network. An example of a youth project

is the "YouKNOW" platform, which was established to bring young people working on similar projects in different parts of the world together and give them the chance to exchange ideas. It was encouraged that young people join the process and help provide creative solutions for water problems, including fresh perspectives in the upcoming World Water Forum.





Water Security and Global-change Adaptation: Bridging Science and Policy

Global climate change affects the Americas unevenly. This double session explored different approaches in 6 countries across the American continents, as well as England, to address threats to water security caused by climate change.

With respect to agriculture, arid areas of the Americas will be subject to decrements to annual rainfall between 10 to 30% depending on temperature increases and changes to inflows and the seasons. These factors will affect hydrogeological models and crop yields.

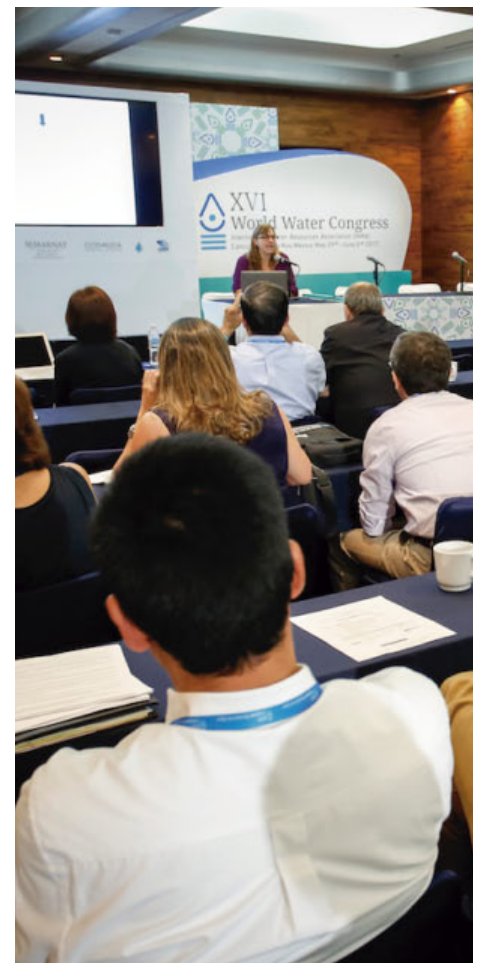
On urban water, challenges arise from growing demand and the threat of rising inequality if important actions are not taken to implement green infrastructure. Successful case studies were discussed to demonstrate how institutions could improve their performance regarding wastewater treatment, desalination, rainwater harvesting, and drought monitoring.

This double session shared great insights on multidisciplinary work in terms of securing the water resources and what actions can be done in different places in arid regions of the Americas. The experts shared important lessons they learned from various projects despite the success of those projects' implementation.



Case studies in Sonora, Mexico, Mendoza, Argentina, the Central Valley of Chile, Northeast Brazil, Peru, and the U.S. states of California and Arizona showed how to address challenges to implementing technology. In addition, active participation and involvement from linked research institutions can help overcome existing problems that will be exacerbated by climate change. Valuable examples of bridging science and policy in arid America were presented. Inclusive work from the academic sector along with policy makers and stakeholders can make a difference and provide insightful examples for interdisciplinary work.

An important lesson learned from this session was that water security is threatened by inaction, especially from inflexible institutions and obsolete legislation.



Water Policy and Governance: Transboundary Aquifers on the Mexico-US Border

Three key messages arose from the morning session on transboundary aquifers on the Mexico-US Border as it relates to water policy and government.

Trust. Before nations can manage transboundary aquifers, there must be transparent communication between all parties and more importantly, the parties must trust one another for the communication to be effective. This is applicable to all transboundary aquifers worldwide, but it is extremely crucial in regards to the relationship between the United States and Mexico following the latest United States presidential election.

Accessible Information. It is clear that more information on aquifer health and water use is necessary. However, disseminating the information to the public and policy makers is just as crucial as gathering the information. This will not only allow policy makers to create policy that reflects accurate science, but



it also provides information to the public creating an environment where the people can become individually invested in aquifer management and health.

Bring Stakeholders Together. To build trust and make information accessible we must bring all stakeholders together. Stakeholders include more than scientists and more than just the United States and Mexico. Local communities have a stake in the outcome of

transboundary aquifer management, which means they need to be represented at the table. Water is primarily a local resource and in Mexico, there is a human right to water which suggests local utility owners need to be at the table with policy makers, scientists, and lawyers. Unfortunately, many panels have agreed that it will take a serious crisis to bring everyone together to discuss a solution.



Water Policy and Governance: Economics of Water Governance

Water projects in Peru, Brazil, Australia, Spain and Chile explored aspects of water markets and their strengths and challenges. In Peru, the Phipiripau Project works with water

producers, using Payments for Ecosystem Services (PES), to reduce water conflicts, with the overarching goal of meeting the needs of water and food in the region. It has been shown to achieve increases in water quality and quantity and soil conservation.

It was established that it is important to consider trade in water security around the world, and as such, virtual water in international water markets needs to be addressed. A study in Brazil examined Free

Trade Agreements (FTA) to determine if water is being discussed in international trade, and agreements do indeed consider water in some capacity. Various terms, such as "agriculture" and "energy" were found to be statistically linked with water in these agreements, expressing the nexus between water, food and energy.

Transaction costs, in relation to water were another interesting topic addressed in this session, specifically to a case in the Murray-Darling basin in Australia. It provided evidence that there is a downward trend in transaction costs over time, suggesting flexible arrangements of these costs in the basin. Further examination of transaction costs could be very useful for policy evaluation in the future.

To finish off this session on economics in water governance, the water conflicts in Chile were explored. These conflicts stem from water scarcity and large scale copper production. The cost of water pumping is increasing and solar mining has been proposed as a response to this issue. Other potential options include trade, hydroelectricity, storage systems and other renewables were discussed; however each has its own limitations.

Clive Lipchin Director of the center for transboundary water management at Arava Institute

Off-grid programs help promote efficient treatment of wastewater so that it can be locally reused in rural communities.



What is the best way to begin implementing off-grid programs in refugee camps?

The best way to begin implementing an off-grid program would be to find an 'Entry Point' by speaking with the controlling agencies and showing policy makers that the program will be suitable in their specific jurisdictions.

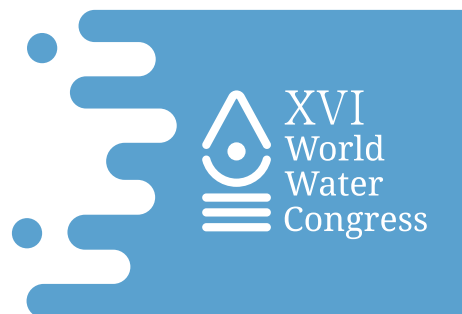
How can we find an "entry point"?

In order to do this, it is important to have well-documented case studies that effectively quantify costs and sustainability—you must show experience and expertise. This communication bridges the science behind the off-grid programs with the policy makers, enabling water conservation in the areas that need it the most.

"It is very important to get the communities within the refugee camps involved and in support of the program. They have to appreciate the opportunities that off-grid programs can provide to them. At the end of the day, the community is the biggest champion of the process.

How can communities practice cooperation over transboundary wastewater in Palestine and Israel?

The reality is that Palestinians and Israelis are in conflict. Furthermore, Palestinian and Israeli communities do not really interact with each other. Interestingly, wastewater is an issue we can use as a bridge. Without effectively treating wastewater, everyone is losing. The Palestinians and Israelis may have a lot of differences, but treating wastewater is an issue that can bring the people together in order to improve the current transboundary wastewater issue in the region.



Jennifer McKay Professor University of South Australia School of Law

Reflecting on Regulating Water Security for Unconventional Gas and Oil.

What is the best way to protect water resources while still allowing hydraulic fracturing?

"The best way is to have a regional water plan that is legally enforceable and addresses point source environmental pollution. It is really back to the 70's in a way. That makes it easier to regulate, because these chemicals are toxic and easy to find. Some of them are, and some of them might not be, but on the balance of probabilities, you should be able to ultimately attach liability. So the best way is to have a regional water plan that has police powers and standards for the wells. There are international standards for well casing and they need to be policed and enforced. These companies will not have enough money to pay for the damages anyway, and [so money] is not the solution anymore. The solution is for them to not make the mistake. Hundreds of industries work that way. It is possible to gain a higher standard if you are going to allow [hydraulic fracturing], which is what you need."

Are the reactions from local communities missing the mark on water resources as it relates to fracking?

"No, what we are seeing is community activism in Australia, and in the US too in parts of California. But in Australia, we are seeing very unusual people getting in bed together. [For example], farmers and environmentalists are united. The epistemic communities who normally do not cooperate are cooperating against this mining. That is a good thing, as long as you are in a democracy."

What are some of the legal unknowns with water and fracking?

"You can't sue [violators]. Even if they cause damage, no one will have enough money to remediate. You potentially destroy an aquifer and a whole farming community for 100 years, or whatever the half-life of these chemicals are, which is probably more than that. It is a very serious business and we would be using the precautionary principle, because we are not sure [of the risks]. We should be saying, ok we don't do it because we are not sure."



Water-Energy-Food Nexus

The aim of this High Level Panel was to demonstrate the extent of the interconnections between the water, energy, and food goal and highlight the lessons learned across various thematic and regional case studies and experiences. It was also centered around exploring possible tradeoffs for implementing the SDGs, and identifying holistic assessment criteria for multiple implementation plans at different scales. The panel further focused on discussing ways in which policy coherence and policy-science communication can be improved across sectors, and across scales.

The HLP brought together experts from diverse backgrounds and organizations including Global Environment Facility, The World Bank Group, Circle of Blue, Water Foundry, International Commission on Irrigation & Drainage, SEI International, Universidad Nacional de Cuyo, Universidad de Zaragoza, and Texas A&M University. The session began with remarks by



Prof Rabi Mohtar from Texas A&M University on the value of the Water-Energy-Food Nexus as a holistic, interdisciplinary, cross-sectoral platform that builds upon strong pillars of IWRM, water productivity, and energy efficiency. He also emphasized the role of the platform as one with equal distance from the water, energy, and food communities, and ways it could catalyze an inclusive dialogue informed by analytics, developed within the scientific community, and communicated among different stakeholders.

The first panel covered Global and Regional Challenges with SDGs implementation in reflection of the above issues. Panelists highlighted the need to reframe the language of nexus stresses into a more positive one which focuses on the opportunity for business and for driving economic development, social wellbeing, and innovation. This would allow us to bring to the table stakeholders who are not part of the discussion today. There was also a focus on the objectives of ensuring water and food for all. The existing international instruments, such as SDGs and Human Rights goals, overlap with WEF nexus objectives and facilitate effective resource management.

The second panel further focused on national and local cases and was moderated by Carl J. Ganter from Circle of Blue, who focused on the human face of water and the need for effectively communicating its story. The panelists discussed major challenges for implementing the nexus solutions including poor quality data, lack of proper governance and institutional capacity. There was also a focus on the diversity of the players involved and their different priorities and value systems. Panelists emphasized the need to establish regulatory frameworks and generate incentives to improve the efficiencies across sectors, which will promote more synergies and co-investment.

YOUTH

This HLP panel was unique in dedicating time to a statement representing Youth Organizations with regards to their involvement with the future of Water-Energy-Food Nexus research and implementation. A statement by Amrita Guatam asked for the youth to be included in decisions regarding pushing the nexus discussion and implementation forward. "Achieving WEF is a long-term goal and youth have a role to play".

PROGRAM

Friday Jun 2nd

Hours	Salon Gran Cancun	Cozumel 1	Cozumel 2	Cozumel 3	Cozumel 4	Cozumel 5	Xcaret	Salón Mujeres	Coba
9:00 - 10:30			SS-23(A): Enhancing irrigation productivity and profitability in small scale irrigation schemes lessons from three continents	RS-11. Water Security in a Changing World: Managing Risks	SS-11: Understanding the Forest-Water Nexus: a new global monitoring framework and tool	SS-5: Regulation and Transparency for Water and Sanitation Services in countries with lack of them	SS-62: Towards SDG implementation – ensuring water quality from source to sea	RS-38. Stakeholder Participation	SS-42(A): The scientific underpinnings of global water law instruments: the UN Watercourses Convention, the UNECE Water Convention, and ILC Draft Articles on Transboundary Aquifers
10:50 - 12:20		RS-40. Water and Sustainable Growth: Water-Food-Energy Nexus	SS-23(B): Enhancing irrigation productivity and profitability in small scale irrigation schemes lessons from three continents	RS-42. Water and Sustainable Growth	RS-36. Water Sanitation and Health	SS-67: A “ts’ono’ot” cosmovision: Interdisciplinary science and policy in the Yucatan Peninsula’s sinkholes	SS-44: Sustainable Watersheds: Emerging Economic Instruments for Eater Security	SS-78: Introducing the World Water Data Initiative: How water data can help achieve the Sustainable Development Goals	SS-42(B): The scientific underpinnings of global water law instruments: the UN Watercourses Convention, the UNECE Water Convention, and ILC Draft Articles on Transboundary Aquifers
12:40 - 14:10	Closing Ceremony								
Lunch*									
15:30 - 17:00	IWRA General Assembly								



XVI World Water Congress

International Water Resources Association (IWRA)
Cancun, Quintana Roo, Mexico. May 29th - June 3rd 2017.

Awards



Crystal Drop Award
Salman M. A. Salman



Crystal Drop Award
Hilda Cecilia Tortajada Quiroz



2017 Ven Te Chow Memorial Award
Vijay P. Singh R. Rabi Mohtar accepting on his behalf.



Distinguished Honorary Members
Dogan Altınbilek. Elcin Kentel accepting on his behalf



Distinguished Honorary Members
Lilian del Castillo Laborde



2016 Water International Best Paper Award and 2016 Water International Honourable Mention

Kevin Wheeler, Mohammed Basheer, Zelalem Mekonnen, Sami O. Eltoum, Azeb Mersha, Gamal M. Abdo, Edith Zagana, Jim Hall, and Simon Dadson
For their paper entitled
"Cooperative filling approaches for the Grand Ethiopian Renaissance Dam"



2016 Water International Best Paper Award and 2016 Water International Honourable Mention

Margaret O. Wilder, Ismael Aguilar-Barajas, Nicolás Pineda-Pablos, Robert G. Varady, Sharon B. Megdal, Jamie McEvoy, Robert Merideth, Adriana A. Zúñiga-Terán & Christopher A. Scott
For their paper entitled
"Desalination and water security in the US-Mexico border region: assessing the social, environmental and political impacts"



2015 Water International Best Paper Award

Mirja Kattelus, Matti Kumm, Marko Keskinen, Aura Salmivaara & Olli Varis. Torgny Holgrem accepting on their behalf for their paper entitled
"China's southbound transboundary river basins: A case of asymmetry"

2015 Water International Honourable Mention

S. E. Galaitsi, Annette Huber-Lee, Richard M. Vogel & Elena N. Naumova
for their paper entitled
"Using water insecurity to predict domestic water demand in the Palestinian West Bank"

2014 Water International Best Paper Award

Marian J. Neal (Patrick)
for her paper entitled
"The cycles and spirals of justice in water-allocation decision making"

2014 Water International Honourable Mention to

Katie M. Meehan & Anna W. Moore
for their paper entitled
"Downspout politics, upstream conflict: formalizing rainwater harvesting in the United States"

Water Quality: Managing Contamination

A fascinating session on wastewater treatment highlighted innovative physical methods for treatment as well as important regulatory considerations surrounding managing water quality and chemicals in wastewater. Two separate methods for filtering wastewater were presented by Kristopher Still and Margarita Loredo and Stephanie Wieck presented on limitations of regulatory risk assessments for chemicals.

With the development of enzymes in wastewater treatment sciences, research focused on understanding the complex wastewater environmental impacts from enzyme activity. His findings identified enzymes that are effective in reducing pollutants in wastewater and found that Inherent enzymes' activities vary both spatially and temporally. It was also stressed how important absorption is in effective wastewater treatment and the synthesis and characteristics of a new

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With the development of enzymes in wastewater treatment sciences, research focused on understanding the complex wastewater environmental impacts from enzyme activity. His findings identified enzymes that are effective in reducing pollutants in wastewater and found that Inherent enzymes' activities vary both spatially and temporally. It was also stressed how important absorption is in effective wastewater treatment and the synthesis and characteristics of a new Metal Organic Framework (MOF) was presented for this purpose.

The research that Stefanie presented inventoried chemical products in residential areas of Germany, in order to

characterize effluent to treatment plants and determine to what degree biocidal active substances are entering the wastewater treatment system while not falling under EU regulations. Results found that personal care products and washing products outnumbered biocidal products. These findings suggest that regulations in the EU are not addressing the right products, and that there is an underestimation of risks considered by regulatory agencies. It was thought that it is too complex to manage all of these waste products in current risk assessment concepts, and so a proposed solution was the development and use of more sustainable biocides.

While the presentation of scientific solutions was reputable, discussion of the session led to a conclusion that public education is a must in communities in order to better eliminate products coming into the wastewater treatment plant in the first place.



Water Ecosystems and Physical Regimes

Water quality and quantity are two determinative factors in predicting the resilience capacity of regional ecosystems. An increase in ecosystem resiliency decreases the risk of loss in commodities that any given regional ecosystem provides for human consumption. Inversely, a decrease in ecosystem resiliency increases the risk of loss in commodities. Therefore, it is crucial to understand the effects of water quality and quantity on regional ecosystem resiliencies.

The entirety of the water cycle affects ecology in many ways. Being able to predict rainfall is helpful in developing plans for future water works and the quantity of future water availability. Part of that prediction is a water return period. Localities can utilize annual rainfall data to predict the return periods in tailored increments. Gauss's law is used to find a standard deviation after averaging the rainfall data. From this created normal bell curve, a confidence interval can be established for future water availability timelines.

Further, changes in the quality of the water can diminish or enhance an ecosystem's resiliency capacity. Surface water and aquifers alike are drastically different in water quality. Although aquifers tend to have some capacity to filter contaminants, some aquifers are less capable of doing so and these aquifers are more susceptible to contamination. This diminished water quality will have a negative effect on the regional ecology's resiliency capacity. Generally, a decrease in water quality leads to a decrease in resiliency capacity.



Resilience of Coastal Watersheds in Latin America and the Caribbean

This session stressed the importance of cooperation between stakeholders and researchers in regards to coastal watershed management in Latin America. It also focused on the need for accurate data for evidence-based solutions and policy making.

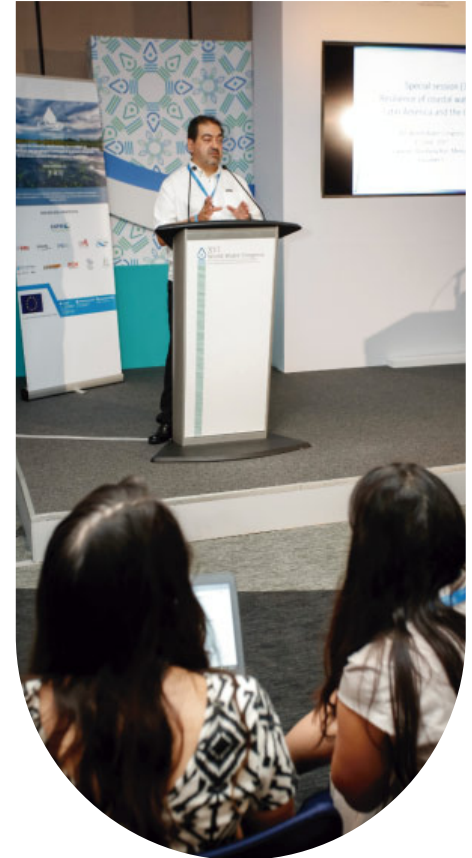
An introduction was given by Dr. Leonardo Piccinetti, who stressed the importance of collaborative work in Waterclima LAC projects. Resilience Assessment has proven to be attractive partly because it provides another way of addressing longstanding and important challenges, such as sustainable development, climate change adaptation, and addressing vulnerability. Reliance Assessment also offers a way to bring different disciplines and perspectives under a single conceptual umbrella.

The second speaker, Dr. Aldo Ramirez, shared his experiences assessing the vulnerabilities regarding water resources in Baja California Sur, Mexico. He stated that water vulnerability should be addressed, and that researchers should investigate how water vulnerability will be enhanced by climate change. He concluded that the scientific consensus on climate change should induce urgent action across the world. However, various uncertainties regarding climate change predictions make water management difficult.

Claudia Galleguillos, from Fundación Chile, presented several case studies of ecosystem services under threat in coastal Latin America. She also presented the perspective of Fundación Chile regarding the valuation of environmental services. Private sector participation should compensate the ecosystem services that are affected by the agricultural sector. Fundación Chile aims to construct a conceptual model of the ecosystem by identifying functions and processes, local problems, and existing management tools.

Dr. Laura Benegas from CATIE (Centro Agronómico Tropical de Investigación y Enseñanza) presented on operational resilience and medium-term planning in Haiti. Good water management and climate change prediction were some of the topics that were addressed. In Haiti, local stakeholders agreed on perceptions and predictions of the effects of climate change. Dr. Benegas also presented CATIE's ongoing work on a Coastal Management Plan (CMP) that will contribute to better social, environmental and economic resource management from local stakeholders.

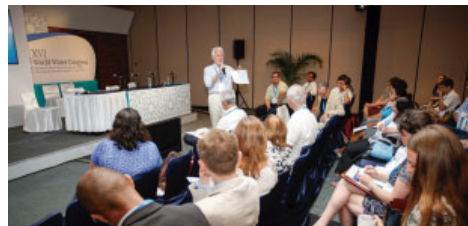
The session concluded with an emphasis on the importance of cooperative work based on evidence that seeks to strengthen local communities. It is expected that current work will inspire similar projects in the future.



Training In Hydro-diplomacy: Legal And Institutional Aspects Of Water Resources Governance-From The International To The Domestic Perspective

According to UN Water, 148 countries have territory that fall within a transboundary river basin. Negotiating across river basins, with upstream, downstream, or co-riparian water users can be complex and often times includes both conflict and cooperation. Therefore, leaders must be able to conduct adequate hydro-diplomacy to manage water for the present and future. In this session, a training series created in partnership with the UNESCO International Hydrological Programme, known as the Hydrodiplomacy, Legal and Institutional Aspects of Water Resources Governance: From the International to the Domestic Perspective, was provided to participants to guide discussions on negotiations and international water law theory and provide practical group exercises. The new training manual is available for negotiators, national leaders, and decision-makers to be able to interpret equitable and reasonable transboundary water treaties. Another goal of the training is to

educate water law practitioners on how to translate international transboundary water laws through the domestic legal framework. International water laws are considered customary whereas domestic water laws are codified and enforceable; a key development for proper transboundary water management. The session ended with a stimulating discussion on the interpretation of transboundary water laws from Zambia, Namibia, and Vietnam. Water lawyers, scientists, and policy-makers with an interest in transboundary water negotiations can follow the Programme for more information or any upcoming training opportunities.



Hydropower Development and Reservoir Operation

Maximizing the potential benefits of water resources in a sustainable way is a major challenge. Currently, hydropower generation constitutes a significant portion of these benefits, especially for developing countries. Hydropower is a domestic and renewable energy source with less environmental impacts compared to most thermal sources.

There are a variety of common environmental constraints to hydropower, such as minimum flows and maximum ramping rates. Transmission system operators, river basin authorities, and hydropower producers need to reach multilateral agreements regarding the implementation of environmental constraints in order to avoid potential social and legal conflicts.

During the session, an analysis of pumped-storage in a multi-reservoir hydropower plant system in the Coruh Basin of Turkey was discussed. Hydropower is the largest renewable energy source to the energy budget of Turkey, which is very important because Turkey is highly dependent on foreign energy sources. Therefore, Turkey will benefit from sustainable and effective operation of pumped hydropower systems.

Although hydropower is highly consumptive due to evaporation, it should not be disqualified as a valuable energy source. After all, dams ensure a consistent water supply between wet and dry seasons. The potential benefits of hybrid systems, such as floating solar panels in the hydropower reservoirs, were discussed. Advantages, such as minimized water loss due to evaporation, and disadvantages, such as deteriorating water quality in the reservoir, were discussed with the audience.



Water Futures and Solutions (WFaS) - A Regional Initiative for the Americas

Where are we going to be in 2050 in terms of water demand and supply? Driven by this question, the International Institute for Applied Systems Analysis (IIASA) initiated a cross-sector collaborative global project called 'Water Futures and Solutions' (WFaS) in 2013. A regional initiative for the Americas, the project aims to progressively reduce the risk of water stress in the future. Since 2013, it has conducted integrated research and modeling towards a water knowledge hub of regional and global frameworks. These will guide policies and practices to ensure water security, through coalitions between scientists and other stakeholders. Frameworks are designed specifically considering how water demand and supply change over time in different geographical locations. The projections from the project estimate up to 2 billion additional people living in the world in 2050 and great increases in water demands in multiple sectors. The successful first phase of the project produced frameworks which help



visualize the water scarcity scenario for multiple countries.

In the discussions of this special session, the participants introduced regional cases as pathways for generating solutions with the WFaS project. These focused on Latin America and community-level initiatives that enhanced water communication, education

and empowerment. Key considerations for the project include how to finance solutions, maintenance of sustainable water infrastructure, the key role of partnerships among multiple stakeholders, as well as the importance of thinking strategically about the role of women and youth in water management.



Charges Versus Buyback: Who pays for water ecosystems restoration?

Even though water systems may be separated geographically and economically, there are underlying similarities that many water scarce regions share. The caveat to this is there is no single policy or economic solution to solve

every water scarcity problem. This panel was focused on economic incentives to help in solving water scarcity issues.

To start, it is important to understand the legal framework in the locality experiencing the water scarcity issues. Some regions do not charge for the environmental and natural resource costs associated with using the water, and only charge for the actual costs of acquiring the water and transporting the water, through infrastructure development and maintenance, to the user. This leaves a

gap in the cost of water as a commodity and what the end user is actually paying for the use of the water. Removing that gap would be one step in moving to a price of water that represents the actual economic value of the resource.

Two other regulatory methods are a buyback program and investments in efficiency, which can be used in conjunction with one another or as singular programs. The buyback program enables the purchase of water from consumptive users to give it back to another user, usually the environment for base flows of surface waters. Investments into efficiency include modernizing irrigation methods to increase the ratio of yield to units of water used, leaving more water for other uses while not affecting the original users' needs. Both methods have their issues. Buyback programs have a problem with measuring the actual environmental benefits received. Additionally, efficiency investments tend to reward poor performing farmers while penalizing users who have already invested in efficiency equipment.

Mark Person Professor & Hydrology Program Head at New Mexico Institute of Mining & Technology



Has an offshore aquifer been developed?

There has not been an offshore aquifer developed as of now, but it is inevitable with population growth. This is not a new idea. The Phoenicians discovered offshore freshwater around 3,000 years ago.

Will offshore aquifers relieve the "water crisis"?

They represent a back up system for coastal systems in times of drought. While there are huge volumes of offshore freshwater, the production of them will not be sustainable because they are not rechargeable. Additionally, development is very costly.

What are the greatest challenges to offshore aquifer drilling?

The economics and legal aspects. Developing offshore freshwater is very costly. We are working on a drilling permit right now for three exploratory wells and it will cost \$9 million. Then you have to run a pipeline to the shore and you may have to build a desalination plant.

Once offshore aquifers are developed and the water is pumped to land, the federal government will want to regulate it. There is also the issue of who owns the freshwater. If the oil industry begins developing freshwater aquifers, there may be a tension with the coastal cities who will likely want the water.



Quianbao Qin Vice Dean of Chinese Society of Environmental Law at Wuhan University



What makes the case of water insecurity in China a unique case?

China is the country with the largest population in the world; because of this large population, water amongst the population is very imbalanced. Qin comments that their bodies of water that are polluted make water even more scarce. "China is experiencing a very intense time of social-economic development," this development is requiring a considerable amount of water, also contributing to water stress.

Are there immediate laws or policies to be implemented in order to relieve water insecurity, especially in drought stricken areas of China?

We are currently revising the environmental pollution control law. "We are revising this law to become more stringent, to increase fines for pollution, and to ensure punishment for violations." Qin affirms that this law will help maintain water quality, providing a better quality source of water for the population.

How is the public in China engaging in environmental litigation in order to improve its water security?

Environmental litigation is "fired by the general public" on behalf of the general public and NGO's. One indirect way the public is involved is when lawsuits are brought to pollutants through NGOs. A direct way that the public is involved is by bringing complaints and discussions before environmental protection agencies.