

Summary of the Intervention of the Water Program of IANAS in the 8th World Water Forum

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The Water Program of the Interamerican Network of Academies of Science (IANAS), with the contribution and special support of the Academy of Sciences of Brazil and the International Hydrological Program (IHP) of UNESCO, participated in the 8th World Water Forum (WWF) organized from the 18th to 23th of March in the city of Brasilia, Brazil. The Water Program of IANAS prepared a special session on “Urban Water Challenges in the Americas” on the 21st, as part of the Regional Process component of the WWF.

The session was coordinated by Dr. José Galizia Tundisi, of the Academy of Science of Brazil and the International Institute of Ecology (IIE). Speakers and Panelists were the Director of the International Hydrological Program of UNESCO, Dr. Blanca Jiménez; the Co-Chair of the Water Program of IANAS, Dr. Katherine Vammen; Dr. Ernesto González, representative of the Academy of Physical, Mathematics and Natural Sciences of Venezuela and Director of the Institute of Experimental Biology of the Central University of Venezuela; and Dr. Nicole Bernex, member of the Academy of Science of Peru and President of the Geographical Society of Lima.

Results of the recently published book of IANAS, **Urban Water Challenges in the Americas: A perspective from the Academies of Sciences** were presented, which analyzes the specific situation of water resources in urban centers of 20 countries from North America, Central America and South America. This book is unique because of the participation and contributions of over 120 authors, all experts in different aspects of water sciences. The book can be downloaded without cost, in English or Spanish from the web page of IANAS: http://www.ianas.org/docs/books/Desafios_Agua.html and http://www.ianas.org/docs/books/Urban_Water.html.

In her presentation of the Urban Water Challenges in the Americas, Blanca Jiménez emphasized that the urban population of the Americas is 82% which is the highest urbanization coverage worldwide and the continent has abundant renewable water resources which represents 33% of the world's water. In spite of this, there exist great disparities in available drinking water: 25 million people have no access to improved drinking water sources and 106 million do not have access to improved sanitation. Most of these live in periurban slums and rural areas. There is a high variability of conditions in the Americas to secure access to water between countries, regions and islands, which have different conditions with arid and semiarid territories. It was stressed that cities are, today, the engine of economic development in most countries, therefore the water cycle, the multiple uses and the water security in urban areas are fundamental for development and economic sustainability.

The representative from Peru, Nicole Bernex, concentrated on the influence of climate change on the water situation in urban centers. She emphasized the growing vulnerability of cities related to their water resources due to the impact of extreme events and natural disasters which has been estimated as “a loss of 520.000 million US\$ (according to the World Bank and GFDRR, 2016) in

worldwide consumption and has forced 26 million people into poverty every year. Just in Peru in 2017, the impact of “El Niño” meant a daily loss of 20 million dollars”. This structural vulnerability in the cities of the Americas has been demonstrated in all country chapters of the book Urban Water Challenges in the Americas. She also underscored the pressure from urbanization on natural resources especially water, the consequent degradation of natural ecosystems, the greater severity of extreme events, the growing vulnerability of urban centers and the necessity to restore the natural connectivity which is a fundamental condition to water security in cities. Even higher levels of vulnerability in periurban regions of metropolitan areas and middle-sized towns increases poverty and together with low investment in sanitation has heavy impacts on human health. in cities. As a concrete recommendation for improving water management in urban centers under strong climate change impacts, she proposed: “Upstream it is key to initiate a process of restoration of ecosystems with revegetation and conservation of soils, flood control and protection of water channels, management of river banks and more. Downstream it is important to improve actions for the elimination of erosion into channels and improvements in urban drainage systems”. At the end of her intervention she called on all to accept their human responsibilities and stressed that it is “our human obligation to face the challenges of extreme events and revert vulnerabilities by generating knowledge, exercising science and its popularization to keep our cities secure and sustainable”

Ernesto Gonzalez, from Venezuela, concentrated on analyzing the contributions of the urban water book related to the importance of ecosystems and biological perspectives for urban centers. He mentioned several initiatives, highlighted in the book, such as the creation of urban parks dedicated to integrating citizens into nature in certain natural and semi natural environments, terrestrial and aquatic. A very recent example is the creation of Urban Parks for the Protection, Recreation and Environmental Education in the city of São Carlos in the state of São Paulo in Brazil; also, the example of Linear Parks in the city of Medellín, in Colombia. He added that the development of biotechnology of aquatic plants (*Eichhornia crassipes*, *Typha dominguensis*, *Lemna sp.* and others) can be used as alternative systems for the treatment of domestic and industrial waters constructed with a design to remove organic material and nutrients. Such initiatives were documented in Brazil, Colombia, México, Perú and Venezuela. These aquatic plants when installed in the entrance and around waterbodies such as lakes and reservoirs, act as biological filters to mitigate eutrophication processes. He also mentioned the rehabilitation of the banks of rivers and streams such as the example of the Linear Parks (a successful model of the micro basin of La Presidenta in Medellín), which allows the restoration of ecosystems and increases quality of life inside of urban centers. “The main challenge is to focus on the efficient use of water in cities (for example in the re-use of water), improve the treatment of waste waters, use ecotechnological methods combined with programs for environmental education”. Of course, it is necessary to direct public investment to the treatment of rivers and urban ravines to preserve our water resources. Protecting the urban biodiversity is another initiative that improves quality of life of urban populations. Improving and extending green areas will contribute to the control of floods, protection of watersheds and water sources and have a strong effect on water quality and its availability in urban centers.

The book of Urban Waters was designed not only to analyze problems which need to be met in the cities of the Americas, but also to motivate the search for solutions and recommendations

directed especially to decision-makers which involve the introduction of certain measures to improve the quality of the environmental and of water resources in cities which additionally include ways to evade future problems in securing the access to sufficient water with adequate quality for the population. Katherine Vammen emphasized that there are topics of great priority which require the development of strategies, not only inside of city borders but also in surrounding watersheds. Five priority topics were considered important in developing plans of action to improve water resources in cities: 1) the management of water should involve improvements in surrounding watersheds which guarantee an integral treatment of water for cities; 2) the management and protection of groundwaters are equally important as surface waters for cities due to the growing urbanization, which constantly creates more extensive impermeable areas and consequently reduce recharge to urban aquifers; 3) it is necessary to develop special strategies to improve the access to water and water treatment in periurban zones that have not been dealt with in water management plans in the past in cities; 4) introduce measures to reduce the vulnerability of cities in extreme climatic events as mentioned above by Nicole Bernex; and 5) In all Latin America countries, it is necessary to reinforce a heavy effort to treat wastewater. Lack of wastewater treatment has a large ecological, economical and human health impact in urban regions of Latin America. It also impairs water re-use producing enormous water losses due to discharge of waters with deficient quality. This is a very relevant action to mobilize countries, states and municipalities.

In general terms and considering the complete water cycle and all its complexity in urban regions, **cities have to rethink their strategy**. A systemic approach articulating rural and urban areas, economy, education and human health, water availability and quality has to be introduced in order to face the complex problem of water challenges of urban areas in the Americas including adaptation to impacts of global changes. The road ahead points out to integrated water management including biogeophysical, social and economic processes.

The following are a selection of concrete recommendations directed especially to national and city decision-makers, professionals and technicians working in policymaking and their enforcement in municipal areas of urban centers:

- Considering the water cycle in urban areas in the Americas, it is of relevance to **rethink the strategy of urban water management**. Water management has to be strongly connected with Science and Technology in order to advance in improving the efficiency in the multiple uses of water and introduce new technologies for control, monitoring and water re-use. Water re-use in cities is a fundamental process in order to improve the efficiency and close the water cycle.
- Assure economic measures which benefit investment programs in water and sanitation. It is important to stress the reform and creation of improved systems of drainage along with integrated management of surrounding watersheds to urban centers (reforestation, revegetation and management of soil use among others).
- Strengthen the regulation and control of water services to accomplish the continuity of access to water for the population. This will definitely help to reduce many diseases transmitted by aquatic vectors.
- Improve education and training to update professionals and technicians in sanitation and hygiene at all levels of governance in urban municipalities and the whole urban population

(community leaders, city officials, professionals focused on watershed management and water services and all citizens). New technologies for education such as internet, seminars and conferences by authorities via skype whom also encourage a vast involvement with schools (students and school teachers).

- National governments should give priority to support and create financial programs for the evaluation and regulation of contaminants in drinking water systems and urban water resources.
- National, regional and municipal authorities should make special efforts and mobilize programs to improve and introduce sanitation systems that guarantee the reduction of contamination of water resources and improvement in health of the population in cities which should include periurban areas. Considering that only 20% of wastewater is treated in Latin America cities, technologies for treating wastewater must differ in project, costs, and efficiency; it is recommended to carry out an evaluation in each case on what type of wastewater treatment plant should be utilized for each specific urban site and region. Decentralized wastewater treatment is another important possibility that should be evaluated, for certain metropolitan areas and midsized towns.
- Another important solution for water management and water supply is the combination of the use of ground water with surface water in order to slow down the pressure on the dominant use of either surface or groundwater sources.
- In areas where groundwater is the principal source of water for the urban center and surrounding areas, it is important to stress the reduction of impermeable surfaces in urban centers and these measures should be adapted in the strategic planning for the further development of the city.
- Information flow, such as communication in water science and water planning should enhance people's involvement and promote the environment as a cultural value. A strong data base of information on water quantity and water quality should improve the decision-making process with public participation.
- New legislation on water resources management in the urban areas should enforce all of the above actions.

The World Water Forum was an excellent opportunity for the scientific community to share their concerns about the **situation of water in cities of the Americas** and to offer recommendations to meet these challenges of the management of water in urban environments. It is important to look for further opportunities of interchange with decision-makers in the cities of the Americas.

Blanca Jiménez, Director of IHP emphasized in her intervention that the Water Program of IANAS is a network with the objective of generating knowledge and specialized capacity in water sciences in the Americas. The program has and is working to reach the vision of the original founder, Dr. José Tundisi, which sees the program as a civic goal of the scientific community in contributing to the improvement of problems which challenge society in the management of water and particularly in "guaranteeing the adequate access to water and sanitation and the efficient management of aquatic ecosystems which are especially important to assure human health, environmental sustainability and economic development as a benefit to the population. This

challenge is in clear accordance with the Sustainable Development Goal #6 (SDG6), which recommends the intense collaboration of science to guarantee achievement of the goal”.

The audience was informed that the Water Program has also prepared a summary of the book, **Urban Water Challenges in the Americas: A perspective from the Academies of Sciences** which is specially directed to decision-makers and was published on World Water Day in this present year 2018 on the web page of IANAS. The summary is now available for download: <http://www.ianas.org/docs/books/wb05.pdf> y <http://www.ianas.org/docs/books/wb06.pdf>

The interventions of the panelists were followed by comments and questions from several members of the public which reached more than 100 participants in the session. Prof. Tundisi synthesized the most relevant contributions of the session and made an urgent call to action with the following closing words:

The next 20 years will be crucial in the water management of urban waters in the Americas. Specially in Latin America the water crisis (drought, floods, deforestation, water borne diseases, lack of wastewater treatment, lack of sanitation) will have high impact on the economy and human health with reflections on water security and sustainability of urban ecosystems.

Urgent actions are needed! International cooperation should speed up, improve the process and enhance the management. Capacity building of water managers, technician’s seminars and conferences for decision-makers responsible for water management in urban areas should improve the new concepts and its applications in cities.

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