IANAS-UNESCO

The Inter-American Network of Academies of Sciences & UNESCO International Hydrological Programme

Hosted by
The US National Academy of Sciences

IANAS-UNESCO-IHP Workshop
Water Quality in the Americas

PROGRAM
Arnold & Mabel Beckman Center
Irvine, California
September 3-5, 2015

This meeting is organized under the UNESCO-IHP International Initiative on Water Quality (IIWQ) and in the framework of the UNESCO-IHP Activity "Addressing Water Quality Challenges to Improve Water Security". Established by endorsement of UNESCO Member States at the IHP Intergovernmental Council of UNESCO at its 20th session in 2012, the Initiative provides a platform to mobilize and promote scientific knowledge, research and science-based policies to respond to water quality challenges, including safe water, wastewater and sanitation issues, towards ensuring water security for sustainable development. It is a comprehensive scientific cooperative programme to address water quality and wastewater issues in a holistic and integrated manner. It also aims to facilitate collaboration on water quality and wastewater issues among researchers, practitioners, policy–makers and other stakeholders in both developed and developing countries.

The IANAS Water Program incorporates 21 countries with experts (focal points) specialized in different aspects of water resources and their management. This Workshop in coordination with IHP of UNESCO is dedicated to one of the most important issues, Water Quality in the Americas, component determinant for proposing important management solutions for the present state of water resources

United Nations Educational, Scientific and Cultural Organization
International Hydrological Programme
IANAS INTERAMERICAN NETWORK OF ACADEMIES OF SCIENCES
NATIONAL ACADEMY OF SCIENCES
Rosenberg International Forum on Water Policy

Important Notice: All presentations will be recorded. Once the doors are closed we will not open them until the next session. We apologize for this inconvenience

About the Panel (Please see more information about the participants at the end of the Program)

Thursday September 3

Evening Session: Opening and Conferences. Huntington Conference Room

7:40 Meeting at the lobby of the Beckman Center

8:00 Transportation to the Orange County Water District Facility

9:00 to 12:00 Visit to the Plant

12:00 Return to the Beckman Center and lunch

13:00 to 13:30 Registration Table for the Workshop Free Public Access (Limited Occupancy)

13:55
Welcome words from the IANAS Co-Chair
Michael T. Clegg. Foreign Secretary of the US National Academy of Sciences (2010-2102) UCI Emeritus Professor

14:00 to 14:10
Opening of Workshop
Katherine Vammen, IANAS Water Program Co-Chair and **Blanca Jimenez,** Director of the Division of Water Sciences Secretary of the UNESCO-IHP International Hydrological Program (Skype Presentation).

14:10 to 14:30
Sarantuyaa Zandaryaa, Division of Water Sciences and International Hydrological Programme (IHP), UNESCO.
Addressing Water Quality Challenges to Enhance Water Security and Support the Post-2015 SDGs

15:00 to 15:10
Session 1: The quality of surface and groundwater resources
Chairs: **José Tundisi (Brazil)** and **Ernesto González (Venezuela)**

15:10 to 15:30
"High rates of contamination by enteric viruses in surface water from Southern Brazil"
Fernando Spilke (Brazil)
Although neglected in routine analysis of water, enteric viruses are often found in surface hydric bodies. We have conducted large studies along the Sinos River Basin (SRB) and other watersheds in Southern Brazil investigating viral contaminants in water. Enteric viruses from different species were found in rivers and streams, indicating fecal contamination from different sources and proving the inefficiency of the wastewater treatment. No significant correlations between the concentrations of indicator bacteria and physicochemical pollutants and the concentrations of viruses were found. This situation is most likely found in many places of Latin America.

15:30 to 15:50
"Climate Change, Water Pollution and Eutrophication in Brazil: Case Studies" José Tundisi (Brazil)
The water scarcity in the southeast Brazil in the last two years, (2013. 2014) as a result of climate changes, deforestation, impacts on the watersheds, enhanced a rapid deterioration of the water quality of surface waters, towards eutrophication. Increasing temperatures of surface waters and changing rainfall patterns resulted in the dominance of cyanobacteria in several reservoirs impairing sources of water supply increasing the cost of treatment and the vulnerability of the populations to toxicity of water. Case studies will be presented.

15:50 to 16:15
"Eutrophication of reservoirs in Venezuela" Ernesto González (Venezuela)
Venezuelan reservoirs showed different degrees of eutrophication, with the most enriched located in unprotected drainage basins. Systems could be separated according to low (<20µg/l) and high (>20µg/l) total phosphorus concentrations. Results showed a significant linear relationship between phytoplankton biomass and nutrients (phosphorus and nitrogen). Mitigation of eutrophication should be based on an improved management of the drainage basins, rather than simply that of the reservoirs themselves.

16:15 to 16:30 Coffee Break

16:30 to 16:50
"Contamination of surface waterbodies due to storm water in extreme hydrological events in Panama: La Purisima Storm Case" José Fábrega (Panama)
In recent years, stronger effects in water quality of extreme hydrological events on surface waterbodies have called the attention of scientists and public officials as well. A brief introduction of some hydrometeorological historical data, and projections for Panama will be presented. Then, we will discuss the Pursisima case,a major storm that affected Panama in 2010. Finally, some conclusions and lessons learned will be discussed.

16:50 to 17:10
"The Present State of Application of Aquatic Macro-invertebrates as Bioindicators in the Americas" Gabriel Roldan (Colombia)
The use of aquatic macro-invertebrates as bioindicators began in Europe in the decade of the 70's. Its adaptation and application in Latin-American began in the 90's. This presentation evaluates the current state of knowledge in these countries. All the countries show different levels of application, being most advanced Colombia and Central America.

17:10 to 17:30
"Threats to drinking water sources in Uruguay" Jimena Alonso (Uruguay)
With 98% coverage of access to safe water supply, the Uruguayan population highly values the quality of drinking water. Therefore, public concern about the consequences of agricultural, industrial and urban activities on the trophic status of rivers and lakes, is gaining strength and—although to a lesser extent— also the presence of viral and bacterial contamination in groundwater.

17:30 to 18:00 Q&A Session. Please pass your written questions to the Chairs of the Session

18:00 End of the Session September 3rd The Workshop will continue working the following day: Friday September 4th at the Beckman at 9:00

Friday September 4

Morning Session: Book Presentation and Public Conference. Auditorium Beckman Center

8:00 to 8:45 Registration Table for the Workshop

9:00 to 9:20
"Importance and Achievements of IANAS"
José Tundisi (Brazil) Co-Chair Water Program IANAS

"Urban Water Challenges in the Americas. A Perspective from the Academies of Sciences"
Katherine Vammen (Nicaragua) Co-Chair Water Program IANAS

(Please write your questions on the card)

9:30 to 10:20
"Lessons from the Great California Drought" **Henry Vaux, Jr. (USA)**
California is suffering thru one of the severest droughts on record. The drought is worse than in the past partly by virtue of recent economic and demographic growth contributing to water use patterns that are probably not sustainable in any event. The persistent overdraft of ground water is one example. The lessons from this drought are not new but are more compelling due to increasing pressures on water supplies and water management practices that ignore the essential aridity that characterizes the state.

10:20 to 11:00 **Q&A and Raffle of 10 IANAS Books**

11:00 to 11:20 **Coffee Break and Please proceed to the Huntington Conference Room**

11:30 to 11:40
Session 2: Water pollution: effects, control and prevention
Chairs: **Katherine Vammen (Nicaragua)** and **Gabriel Roldán (Colombia)**

11:40 to 12:00
"The water crisis in Colombia: A chemical and biological perspective"
Jesús Tadeo Olivero Verbel (Colombia)
Water pollution and supply is a growing problem in Colombia. Global warming and deforestation threaten water resources, and pollution from mining, sewage and industries are compromising water quality. Government, academia and citizens must work together to improve this situation and preserve human health and the environment.

12:00 to 12:20
"Threat of pesticide contamination of water sources in Grenada and the wider Caribbean region"
Martin Forde (Grenada)
Within the Caribbean region, given the importance of the agricultural industry over the past 400 years and on into the present, many classes and types of pesticides have been extensively used for herbicide and insecticide control reasons. There is mounting evidence showing exposure to pesticides, however, the monitoring of water sources for pesticide contamination is currently not taking place.

12:30 to 13:00 **Box Lunch and Picture of the Group at the Garden: IANAS, UNESCO UCI Students & Faculty**

13:10 to 13:30
"Wastewater Treatment: Opportunities and Challenges" **Banu Ormeci (Canada)**
This presentation will discuss the challenges we face in treating municipal and industrial wastewaters, and will also highlight the emerging technologies and approaches that can help to minimize environmental pollution.

13:30 to 13:50
"Impacts of climate change in a lake life expectancy due to sedimentation and prevention and control measures: Lake Amatitlán, Guatemala" **Manuel Basterrechea (Guatemala)**
Lake Amatitlán a highland lake (surface area 15 km^2, 1,188 masl) located south of Guatemala City, has been severely impacted by human activities and natural disasters. In 2010, during the tropical cyclone Agatha, two days after the explosion of Pacaya volcano, sediment loads increased two-fold. In 2012, a bathymetric survey was conducted and sediment cores were retrieved to better understand the sediment input and to estimate the lake's loss in storage capacity over time. Climate change impacts will be exacerbated by increasing demographic pressures and unregulated settlements in the Lake Amatitlán watershed. Therefore, immediate management actions and adaptation strategies are urgently needed to protect the sedimentation and the disappearance of Lake Amatitlán.

13:50 to 14:10
"High Sewage Contamination of Dominican Urban Groundwater"
Osiris de Leon (Dominican Republic)
The lack of a sanitary sewage system in the city of Santo Domingo, has meant that for decades, groundwater from the large coral aquifer has been used as sanitary sewage which steadily increases the bacterial contamination in the subsoil turning it into a germ bomb that will eventually explode in the form of a waterborne disease epidemic.

14:10 to 14:30
"Measures of adopted prevention and control of the quality of surface and groundwater in El Salvador"
Julio Cesar Quiñonez (El Salvador)
Effects on the quality of surface water and groundwater due to industrial and domestic wastewater, based on research and institutional monitoring programs, highlighting some measures and sanitation projects for adopted control, regulation and prevention, and a proposal for environmentally sustainable sanitation management.

14:30 to 14:50 **Coffee Break**

14:50 to 15:00
Session 3: Special water quality issues (natural contamination, emerging contaminants, mining and industrial pollution, contamination through oil sand mining)
Chairs: **Martin Forde (Grenada)** and **Banu Örmeci (Canada)**

15:00 to 15:20
"Occurrence and fate of emerging pollutants in Mexico City's water sources and wastewater"
José Elías Becerril Bravo (México)
In recent years there has been increasing concern over the so called "emerging pollutants" such as pharmaceuticals and personal care products, surfactants, flame retardants, industrial additives, steroids and hormones and disinfection by-products. These substances have been shown to be released to the environment detected in the monitoring studies in fresh water, groundwater and drinking waters. These contaminants are not regulated but are candidates for future regulation depending on research on their potential health effects and monitoring data regarding their occurrence. In spite of the serious water problem of Mexico City (seepages in the sewerage system, importation of drinking water from other basins, aquifer overexploitation leading to soil subsidence), concentrations of the target emerging pollutants were not higher than reports for other urban areas in developed countries. **SpP: Presentation will be in Spanish. Power Points will be in English*

15:20 to 15:40
"Waste, Water and Disease" **Ricardo Izurieta (Ecuador)**
This presentation will share information related with emerging and remerging water and waste water pathogens in the Americas. The most recent water-borne outbreaks will be discussed in the context of their environmental, cultural and socioeconomic determinants. Special emphasis will be placed in the lessons learned during the 1991 cholera epidemic in Latin America and the reemergence of this pathogen during the 2010 epidemic in Haiti.

15:40 to 16:00
"Lake Cocibolca (Nicaragua): Possible Impacts of the planned interoceanic canal on future potential uses"
Katherine Vammen (Nicaragua)
The interoceanic canal planned in the Central American country, Nicaragua, will cross the largest tropical lake of the American Hemisphere, Lake Nicaragua. The canal is being projected to traverse Lake Nicaragua as a 105km stretch of a total of 280km.planned. This presentation will explain the possible impacts of the canal on this fragile lake ecosystem and the potential of this resource for the future development of Nicaragua.

16:00 to 16:20
"Arsenic and Boron Natural Contamination of Rio Mauri (Bolivia and Peru)" **Fernando Urquidi (Bolivia)**
The Mauri River is a 214.8 kilometers long watercourse that runs through Perú (97.8 km) and Bolivia (117 km), and has a 7,183 square kilometers watershed. There are evidences of heavy arsenic and boron natural contamination caused by several hot water springs which makes its water unfit for human consumption.

16:20 to 16:40
"Natural Contamination by Arsenic and other metals in Peru" **Nicole Bernex (Peru)**
Outcomes of the Conference on water and natural arsenic organized by the National Academy of Sciences will be presented. The book brings together the results of the different studies carried out by 14 leading researchers, as well as the roundtable and the workshop results. The Conference helped to share knowledge and strengthen interdisciplinary working groups, in order to overcome gaps and difficulties in a so complex thematic as Arsenic, Water and Health in the Peru.

16:40 to 17:10
"Oil Sands: Development and Water Impacts" Banu Ormeci (Canada)
Development of oil sands has rapidly increased in the past decade in Canada. The process of extracting, processing and transporting bitumen requires extremely large quantities of water. This presentation will cover the water and environmental impacts of oil sands development, and steps that are necessary to protect the quality and quantity of water resources.

17:10 to 17:30 Q&A Session. Please pass your written questions to the Session's Chairs

17:30
End of the Session September 3rd
The Workshop will continue working the following day: Friday September 4th at the Beckman at 9:00

Saturday September 5
Morning Session: Opening and Conferences. Huntington Conference Room

9:00 to 9:15
Session 4: Institutional, economic and social aspects of water quality management
Chairs: **Nicole Bernex (Peru)** and **Henry Vaux (US)**

9:10 to 9:30
"Managing Water Quality: Lessons from Toronto"
Michael D'Andrea (Canada)
Development and urban growth within the City of Toronto and surrounding regions has resulted in intense pressure on the ecosystem, the alteration of the hydrologic cycle and impacts on the natural environment. The wet weather flow discharges from combined sewer overflows and storm sewers contributed to the designation of City of Toronto as a polluted "Area of Concern" in the Great Lakes Basin, in 1987 by the International Joint Commission. A comprehensive Wet Weather Flow Master Plan was developed to address these impacts. The watershed based Plan was developed using a hierarchical approach to stormwater management, starting with source, followed by conveyance and finally end-of-pipe controls. The presentation will include an overview of the Plan development, and the current status of its implementation.

9:30 to 9:50
"Aspects of the interjurisdictional management of water quality in a fluvial course and watershed in Argentina" Raul Lopardo (Argentina)
The objective of this contribution is to comment the legal and institutional frame for the interjurisdictional management of water quality in Argentina, with particular emphasis in the River Plate local coast, taking into account its international condition, and the Matanza-Riachuelo Basin, under the responsibility of several jurisdictions (national, provincial and municipal) controlled by requirements from de Supreme Court of Justice.

9:50 to 10:10
"The New Standards of Environmental Quality for Watershed Management in Chile"
James McPhee (Chile)
"In 1994 Chile passed its first environmental protection legislation. Since then, the overall consensus is that the country's environmental conditions have improved. However, the current knowledge of our environmental systems indicates that the prevailing approach of limiting emissions from individual polluters is insufficient for maintaining the health of our ecosystems. Recently, a series of "Secondary Standards", or environmental quality standards, have been proposed for a few Chilean river watersheds. This presentation will review this change in paradigm and highlight the challenges associated with the new standards application."

10:10 to 10:20 Coffee Break

10:20 to 10:40
"The social nature of water quality in Mexico" Maria Luisa Torregrosa (Mexico)
We will address the issue of water quality in Mexico from the perspective of the social nature of water in the sense that society produces the quality of water with the culture, knowledge, practices, ideas, meanings, values and potentials that gives it, and confront it with the unilateral institutional construction of what is water quality.

10:40 to 11:00
"Water Quality Management in Honduras: Cultural, institutional, economic and social aspects"
Marco Antonio Blair (Honduras)
A quick focus on changing both institutional and legal frameworks, with emphasis on the management of water quality for human consumption, and its interaction to cultural, institutional, economic and social aspects, in Honduras. A case study.

11:00 to 11:20
"The Necessary Relationship between Terrestrial and Coastal Waters during the Maintenance of Environmental Services in Marine Ecosystems. An Economic Approach"
Daniela de las Mercedes Arellano Acosta (Cuba)
Management of surface and groundwater existing in watersheds that discharge in the sea and their impacts to coastal ecosystems like mangroves, seagrass beds and coral reefs. These ecosystems support important economic sectors in coastal communities. According to the terrestrial water availability for water users, managers of this resource must take into account the volume of water needed to be delivered to the coastal zones to maintain the needed environmental services of marine ecosystems.

11:20 to 11:40
"Pastaza, largest river wetland complex and Ramsar site, integrating statutory and customary law"
Nicole Bernex (Peru)
Rimachi Lake with over 790 km² belongs to the Pastaza River Wetland Complex (Loreto, Peru), the largest Ramsar Site in the entire Amazon. Nearly 30 000 indigenous people (mainly Kandoshi) are living there. At the end of the 1990, the lake was strongly affected by overfishing and climate change processes. The Peruvian government gave its management in concession to Kandoshi Communities. Primarily, they eliminated fishery activities of the Ministry of Fishing; secondly they banned fishing for 2 years. Consequently, the Rimachi has recovered its fish populations and actually, with the help of WWF, Kandoshi people protect their lake and organize their own fishing activities. Through a strong cooperation between indigenous authorities and public ones, the first indigenous fishing plan has been approved by the Peruvian Government.

11:40 to 11:50 Q & A Session. *Please pass your written questions to the Session's Chairs*

11:50 to 12:30
Closing (summary of discussions, conclusions, closing speeches, etc.) Chairs of all 4 sessions present already prepared summary and conclusions of their session of 5 minutes each.

Recommendations and Future steps: Cooperation with UNESCO and preparation of the publication "Water Quality in the Americas" and other proposals.

13:00 to 14:00 Lunch at the Beckman

14:00 End of the Workshop

Bios of the Participants

The organization acknowledges and is grateful with the presence of UCI Graduate and Under-Graduate Students from the Outreach Research Training and Minority Science Programs (MSP) at the Ayala School of Biological Sciences, University of California Irvine.

Argentina

Raúl Antonio Lopardo Email: rlopardo@ina.gob.ar

BS in hydraulic engineering and civil engineering (National University of La Plata, Argentina). PhD in physics from the University of Toulouse, France. President of the National Water Institute. Professor at the National University of La Plata School of Engineering. Full member of the National Academy of Exact, Physical and Natural Sciences, the National Academy of Engineering and the Academy of Engineering of the Province of Buenos Aires. National Focal Point of the InterAmerican Network of Academies of Sciences (IANAS) Water Program.

Bolivia

Fernando Urquidi-Barrau Email: erurquidi@gmail.com

BS in Geological Engineering. MS in Industrial Business Administration. MS in Security, Defense and Development. PhD in Applied Geo-Chemistry. Full Member of the National Academy of Sciences of Bolivia. National Focal Point for the InterAmerican Network of National Academies of Sciences (IANAS) Water Program.

Brazil

José Galizia Tundisi Email: tundisi@iie.com.br

is a retired full professor of Environmental Sciences at the University of Sao Paulo, São Carlos, campus, São Paulo State. He is at present, President of the International Institute of Ecology at São Carlos. He is a full Professor of Environmental Quality at the University Feevale, Novo Hamburgo, Rio Grande do Sul. He was President of the National Research Council of Brazil, (1995-1999); Member of the Scientific Committee of ILEC, (Japan) for 20 years; he is a member of the staff of the Institute of Ecology Germany (Excellence in Ecology) since 1991. He was co-chair of the IANAS Water Programme (with Dr. Blanca Jimenez Cisneros) and chairman of the IAP Water Programme. He has 350 published papers and 35 books. He is a member of the Brazilian Academy of Sciences and a member of the Third World Academy of Sciences.

Fernando Rosado Spilki Email: fernandors@feevale.br

Holds a Veterinary degree (DVM , 2001) and Master's in Veterinary Sciences (2004) from the Federal University of Rio Grande do Sul, Brazil. He earned his PhD in Genetics and Molecular Biology from State University of Campinas (2006), Brazil. Dr. Spilki is now Professor at Feevale University, Novo Hamburgo, Brazil and his main research focus is on the detection and characterization of enteric viruses from human beings and domestic animals in water samples.

Canada

Banu Örmeci Email:Ormeci@carleton.ca

Prof. Banu Örmeci completed her MS and PhD in Civil and Environmental Engineering at Duke University (North Carolina, USA). She is a Professor and Canada Research Chair in Wastewater Treatment Engineering in the Department of Civil and Environmental Engineering at Carleton University (Ottawa, Canada), and is the recipient of numerous research, teaching, and mentoring awards. She has an internationally recognized research program on wastewater and biosolids treatment, and she is the chair of the IWA(International Water Association)Sludge Management Group. Currently is the National Focal Point for the Inter American Network of Academies of Sciences, Water Program for Canada.

Michael D'Andrea Email: mdandre@toronto.ca

Is the Executive Director of Engineering & Construction Services for the City of Toronto, where he is responsible for the engineering design and construction of the City of Toronto's municipal infrastructure. Previously, Michael was the Director of Water Infrastructure Management for Toronto Water. Michael earned a master's degree in civil engineering from Western University. He has worked in engineering consulting and with the Ontario Ministry of the Environment before joining the City of Toronto in 1997.

Chile

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BS in civil engineering from the University of Chile, PhD in hydraulic resources engineering at the University of California – Los Angeles (UCLA). Associate Professor in the Department of Civil Engineering and Associate Researcher at

the Advanced Mining Technology Center (AMTC) in the School of Physical Sciences and Mathematics at the University of Chile. Currently is the National Focal Point for the Inter American Network of Academies of Sciences, Water Program for Chile.

Colombia

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BS in biology and chemistry from the University of Antioquia (Medellin, Colombia), MS in Science from the Kansas State Teachers College (Emporia, Kansas) and PhD in Science from the University of Kassel (Germany). Currently Corresponding Member and Publications Director of the Colombian Academy of Exact, Physical and Natural Sciences, as well as Member of the Limnology and Water Resources Research Group of the Catholic University of the East (Rionegro, Antioquia, Colombia). Currently is the National Focal Point for the Inter American Network of Academies of Sciences, Water Program, for Colombia.

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BS in Pharmaceutical Chemistry from the University of Cartagena (Cartagena, Colombia),MSc from the Industrial University of Santander (Bucaramanga, Colombia) and PhD in Pharmacology and Toxicology-Environmental Toxicology from Michigan State University(USA). Corresponding Member of the Colombian Academy of Exact, Physical and Natural Sciences, Director of the Ph.D. Program in Environmental Toxicology and Vice-President for Research at the University of Cartagena (Cartagena, Colombia).

Costa Rica

Hugo G. Hidalgo Email: hugo.hidalgo@ucr.ac.cr

Research fellow in surface water hydrology, with a special interest in hydro-climatology. BS in civil engineering from the University of Costa Rica (1992). MS in science (1998) and PhD in Civil and Environmental Engineering with specialty in Water Resources (2001) from the University of California, Los Angeles. Currently a professor at the University of Costa Rica, School of Physics. He coordinates the Master's Degree Program in Hydrology and is the National Focal Point for the Inter American Network of Academies of Sciences, Water Program. Presently is deputy director of the Geophysics Research Center at the University of Costa Rica.

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BS in Chemistry, University of Costa Rica, Coordinator of Water Quality Laboratory in the Center for Environmental Contamination of the University of Costa Rica. Research member for studies of environmental contaminants, characterization of surface waters, for drinking water and irrigation, and also studies of metals in surface, groundwater and sediments. Participation in analytical quality control intercomparison tests.

Cuba

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BS in Geophysical Engineering from the Technical Institute, José A. Echevarría, La Habana. PhD in Geological Sciences from the University of Carolina in Prague, Czech Republic. Research Assistant. Director of project UNDP/GEF, related to biodiversity conservation in the SabanaCamagüey Ecosystem, Cuba. Agency of Environment, Ministry of Science, Technology and Environment. Focal Point for Cuba of the IANAS Water Program.

Dominican Republic

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BS in Geological Engineering and Mines from the Pontificial Catholic University Madre y Maestra, Santo Domingo, Dominican Republic. Posterior formation in geology, hydrogeology and environmental sciences in the Instituto de Pesquisas Espaciales in Sao Paolo, Brazil (1994), in the University of Campina, Brazil (2000), in the Polytechnical José A. Echeverría, Habana, Cuba (2002), in the Latin American Faculty of Social Sciences(FLACSO) (2003) and studies in Geophysics in the Kansas Geological Service of the University of Kansas in USA (2004). Focal Point for the Dominican Republic of the IANAS Water Program.

Ecuador

Ricardo Izurieta Email: rizuriet@health.usf.edu

Dr. Izurieta is Member of the Ecuadorian Academy of Sciences. He received his MD from Universidad Central del Ecuador and after graduation, carried out his postdoctoral training in Public Health and Tropical Diseases. In 1991, he faced the cholera epidemic that spread through Latin American countries as National Director of the Cholera Control

Program in the Ministry of Public Health of Ecuador. In 1997, he was appointed Chief of the Department of Epidemiology and Director of The Vaccine Center of the Armed Forces of Ecuador. During his studies, he has been a USAID Thomas Jefferson Fellow, a PAHO Research Fellow, a Gorgas Memorial Institute Fellow, and a FUNDACYT Fellow. In 2003, Dr. Izurieta was elected Vice President of the Gorgas Memorial Institute of Tropical and Preventive Medicine. He has also been consultant for WASTE International from the Netherlands, for the Stockholm Environment Institute from Sweden, for PAHO, and for UNICEF. Dr. Izurieta is currently an Associate Professor at University of South Florida and Universidad Central del Ecuador, Director of the Donald Price Parasitology Center, and Latin American Liaison and Board Member of the Gorgas Institute of Tropical and Preventive Medicine.

El Salvador

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BS in civil engineering from the José Simeón Cañas Central American University, El Salvador. MS inHydrology (CEDEX, Spain). Post graduate studies in mathematical modeling in hydrology (TechnologicalUniversity of Panama). Advanced International Programme "Management of Hydro Power Development and Use" (Vattenfall Power Consultant AB, SIDA, Sweden-Peru). Consultant in hydrology and hydraulics for various national and international public and private entities. Local assigned researcher and presenter for international IWRA conferences and member of the GWP as a professional in the field of water resources.

Grenada

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Full professor at St. Georges University (SGU), Grenada, within the Department of Public Health & Preventive Medicine and current Director of the WHO Collaborating Center in Environmental and Occupational Health. Dr. Forde has a BSc in Industrial Engineering (University of the West Indies, Trinidad), two Masters degrees, one in Occupational Ergonomics (Dalhousie University, Canada) and another in Environmental Health Management (Harvard University) and a ScD in Occupational Ergonomics from the University of Massachusetts Lowell. His teaching and research activities are centered on environmental health, environmental health management, occupational health, ergonomics, industrial hygiene, and global population health research. Over the past 15 years, he has been the recipient of numerous research and teaching awards. Dr. Forde is the Focal Point for Water for the Caribbean Academies of Science and has since then being conducting research looking at water supply and quality issues such as rainwater harvesting, pesticide contamination of water sources, and emerging water contaminants in Grenada and throughout the wider Caribbean region.

Guatemala

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BS in civil engineering, MS in water resources and PhD in civil and environmental engineering from the University of Iowa, USA. Member of the Academy of Physical, Medical and Natural Sciences of Guatemala. Focal Point for Guatemala of the IANAS Water Program. Private consultant since 1990 for national and international organizations.

Honduras

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BS in civil engineering from the National Autonomous University of Honduras. MS in sanitary engineering from the National Autonomous University of Mexico. MS in Water Resource Management from the University of Newcastle upon Tyne, United Kingdom. Member of the College of Civil Engineers of Honduras, the Honduran Academy of Sciences and the InterAmerican Association of Sanitary Engineering. Focal Point for Honduras in the IANAS Water Program.

Mexico

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BS in sociology from the National Autonomous University of Mexico. MS and PhD in social science with specialization in sociology from El Colegio de México. Professor and researcher at the Latin American Faculty of Social Sciences (FLACSO), Mexico Office. Coordinator of the Mexican Academy of Sciences Water Network. National Focal Point for Mexico in the IANAS Water Program.

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BS in environmental engineering from the Metropolitan Autonomous University, Mexico. PhD in engineering with specialty in treatment and conditioning of water (National Institute of Applied Sciences,France). Principal Investigator at the National Autonomous University of Mexico, Engineering Institute.Coordinator of the Treatment and

Re-use Group. Director of the Water Sciences Division and Secretary of UNESCO's International Hydrology Program. Member of the Mexican Academy of Sciences Water Network and the Inter-American Network of Academies of Sciences (IANAS).

José Elias Becerril Bravo Email: jbecerrilb@iingen.unam.mx
Chemical Engineer from the National Autonomous University of Mexico (UNAM); he has a graduate diploma in Engineering and Water Management at École Nationale des Travaux Publics de l'Etat, Lyon, France. He also obtained a Master's degree and Ph.D. in Environmental Analytical Chemistry at the University of Santiago de Compostela, Spain. He is a member of the National Researchers System in Mexico. He has worked for more than 20 years at the Institute of Engineering (UNAM), where he has mainly been involved with integrated water management projects, and in the development and adaptation of analytical techniques in the area of environmental chemistry for emerging pollutants.

Nicaragua

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PhD with specialty in biochemistry and microbiology of water from the University of Salzburg (Paris Lodron), Austria. Specialist in water quality and water resource management. Presently member of research staff of the University of Central America (UCA) in Nicaragua. Deputy Director of the Nicaraguan Research Center for Water Resources (CIRA/UNAN) for 18 years. Founder of the Central American Regional Master's Program in Water Sciences. National Focal Point for Nicaragua in the Inter-American Network of Academies of Sciences (IANAS) Water Program. Co-editor of Urban Waters Challenges in the Americas, IANAS and Co-Chair of the Water Program, IANAS.

Panama

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About the Minority Science Program (MSP)

The Outreach Research Training and Minority Science Programs (MSP) at the Ayala School of Biological Sciences, University of California Irvine, is an orchestrated effort by the National Institutes of Health (NIH) and the School to increase the number of US underrepresented groups (URM) in biomedical research careers. MSP students have received top national awards and academic distinctions.

MSP conceived a 'pipeline' approach, which identifies promising undergraduate students early in their academic careers to foster an interest in ultimately entering PhD programs in the biomedical sciences. MSP won the 2005 Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring (PAESMEM).

MSP participants benefit from early exposure, continuous research training and faculty mentoring. Support is also provided through paid summer and year-round research internships, access to the latest computer technology, tutoring, academic advising, scientific writing, participation at national conferences among many other research training and academic activities.

Furthermore, MSP has established a campus wide, regional and national network of committed faculty and resource programs to facilitate the transition from high school through community college, baccalaureate and master's degrees to Ph.D. careers in biomedical research. MSP also develops relationships with community colleges and K-12 schools and other institutions of higher education, to prepare prospective students for the educational opportunities offered by the School. MSP include, NIH Minority Biomedical Research Support (MBRS IMSD) NIH Maximizing Access to Research Careers (MARC) NIH Minority Health and Health Disparities International Research Training (MHIRT) NIH Bridges to Baccalaureate

Other Participants

IANAS

Michael Clegg, Foreign Secretary of the US National Academy of Sciences (2010-2102), UCI Emeritus Professor and IANAS Co-Chair. **John Boright,** Executive Director of International Affairs of the US National Academy of Sciences, **John Hildebrand,** National Academy of Sciences Foreign Secretary. **Nina Boston,** National Academy of Sciences, **Adriana de la Cruz,** Executive Director, IANAS The Inter-American Network of Academies of Sciences. **Marcos Cortesao,** Program Director Brazilian Academy of Sciences, **Veronica Barroso,** IANAS. **Daniel Moreno Alanís,** Diseño.

UNESCO

Blanca Jimenez, Director of the Water Sciences Division and Secretary of UNESCO's International Hydrology Program; **Giuseppe Arduino,** Section on Ecohydrology, Water Quality and Water Education (SC/HYD/EQE); **Georgette Gobina,** Assistant. **Sarantuyaa Zandaryaa,** Program Specialist at UNESCO- IHP. Post-doctoral degree in Environment and Sustainable Development (United Nations University - UNU, jointly with Tokyo University, Japan), PhD in Environmental Engineering (University of Rome "La Sapienza", Italy). Programme Specialist and Responsible Officer for Water Quality in the Division of Water Sciences and the Secretariat of the International Hydrological Programme of UNESCO in Paris, France. Email: s.zandaryaa@unesco.org

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