



UNITED NATIONS
UNIVERSITY

UNU-INWEH

Institute for Water,
Environment and Health



ANNUAL REPORT 2019



UNITED NATIONS
UNIVERSITY

UNU-INWEH

Institute for Water,
Environment and Health

Cover images: Shutterstock

Download at: <http://inweh.unu.edu>

ISBN: 978-92-808-6100-6

UNU-INWEH is supported by the Government of Canada
through Global Affairs Canada.



Global Affairs
Canada

Affaires mondiales
Canada

TABLE OF CONTENTS



1 About UNU-INWEH



2 Director's Summary

3 Message From The Chair of the International Advisory Committee

4 Year Highlights



9 Selected Publications

12 Selected Events



15 Lecture and Seminar Series

16 Capacity Development

18 Media



19 International Advisory Committee

ABOUT UNU-INWEH

UNU-INWEH is one of the United Nations University (UNU) institutes, an academic arm of the UN. The University's 13 research and training institutes are located in 12 countries and address a range of global development challenges. UNU-INWEH specializes on water for development, working, primarily, with countries in the Global South, and addressing water issues of global significance. Water is the entry point to all UNU-INWEH's activities, including environment and health. The Institute addresses primarily continental water resources challenges.

UNU-INWEH works to bridge the gap between the wealth of evidence and research that exists on water resources, and the practical needs that political leaders and decision makers in low- and middle-income countries have. UNU-INWEH is linked to key processes in the UN system, and represents the entire UNU in UN-Water – a cross-agency group in the UN and international partners working on water and sanitation issues globally.

UNU-INWEH's research has a diverse range of stakeholders, including politicians and policymakers in developing countries, concerned with water, health and environment issues; donors and implementing agencies from the North and the South; scientific community in water-related research institutions and academia; UN agencies and other international and regional organizations and networks; host country and national partners in Canada, media; and civil society.

UNU-INWEH was established in 1996, as a public service agency and a subsidiary body of the UNU. Its operations are secured through long-term host-country and core-funding agreements with the Government of Canada. The Institute is located in Hamilton, Canada; its facilities are supported by McMaster University.

UNU-INWEH is the only Institute in UNU that focuses entirely and solely on water issues. It is also the only entirely water-focused UN entity in Canada.



DIRECTOR'S SUMMARY

In 2019, UNU-INWEH continued on its path from strength to strength. As of the end of 2019, the Institute provided normative support to over 20 countries in the Global South to accelerate the progress towards SDG6 (water and sanitation) by working directly with national governments and research partners. UNU-INWEH's on-line SDG6 Policy Support System (PSS) – the Institute's flagship tool - is now available in three UN languages, with associated training courses. Continuing integration of the PSS into national policy processes in these countries can, in time, benefit over 300 million people. And over the next 3 years, we plan to roll PSS out in over 30 more countries, primarily of the Global South.



UNU-INWEH partnered with the University of Kinshasa of the Democratic Republic of Congo in the new IDRC-funded project on gender-sensitive analysis of climate and water driven conflicts and migration in the Congo River Basin. Launched in May 2019 in Kinshasa, this unique 3-year initiative is expected to generate regional and global insights on how to alleviate such conflicts and their gender-related consequences.

UNU-INWEH continued to coordinate, together with UNDESA, the UN-Water Task Force for implementation of the UN Water Action Decade, starting preparations for the UN Conference on the Midterm Comprehensive Review of the Decade in 2023. The Institute provided major and direct expert input to the methodology that estimates environmental flow requirements in the context of the monitoring indicator SDG 6.4.2 (water stress). The guidelines that emerged from this work and launched in early 2019 by the lead agency- FAO - target all 193 UN Member States.

UNU-INWEH generated around 1600 media stories in 2019 - i.e. approximately one third of the entire UNU - in 85 countries, in 23 languages with a potential reach of 1.4 billion people. The international media attention to our assessment of the current state of global desalinated water and brine production alone was unprecedented. Overall over the year, UNU-INWEH published over 40 journal articles, books and reports. Our capacity development programme hosted close to 30 in-house trainees, and our staff participated in many international and regional water-related science and policy events.

The characteristic feature of the past year was increasing collaboration with other UNU sister centers – UNU-FLORES and UNU-EHS (Germany), UNU-INRA (Ghana), UNU-IIGH (Malaysia), UNU-IAS (Japan), UNU-CRIS (Belgium). The modalities of this collaboration range from joint participation in international events to collaborative fundraising. The “UNU water network”, uniting some 20 experts throughout several UNU Institutes, has been formally launched in late 2019, and we are looking forward to strengthening this new initiative in the years to come, to help address the global water crises with UNU water expertise - combined.

I am taking the opportunity to extend our appreciation to our donors, partners and friends, as well as to UNU-INWEH staff and trainees for their commitment.

*Vladimir Smakhtin
Director: UNU-INWEH
Hamilton, Ontario, Canada*

MESSAGE FROM THE CHAIR OF THE INTERNATIONAL ADVISORY COMMITTEE

It is a pleasure to introduce this first Annual Report from UNU-INWEH since I assumed the Chair of the International Advisory Committee from Margaret Biggs at the start of 2019.



UNU-INWEH is small but highly influential UN-affiliated institution, based in Canada but with a global reach. Its focus is on enabling decision-makers in government, industry and civil society to better understand the complex interactions between freshwater resources, environment and human health. It is an inherently inter-disciplinary institution that brings together expertise from many different academic domains to focus on critical issues for members in the UN system in meeting the Sustainable Development Goals. It is a truly international one in the composition of its staff, its global networks and outreach, and the applicability of its research. At the same time, UNU-INWEH has been very successful in being visible and relevant to the interests of its Canadian academic home at McMaster University, to the wider community of water researchers in Canada and to Canadian policymakers. I have very much enjoyed getting to know its people and its work in the past year.

This past year was one of significant turn-over in UNU-INWEH's International Advisory Committee. In addition to myself as the new Chair, three distinguished new members came on board as well – Akissa Bahri (National Agricultural Institute of Tunisia), Lisa Schipper (Environmental Change Institute at the University of Oxford), and Christophe Cudennec (National Higher Institute of Agronomic, Horticultural and Landscape Sciences, France). They bring a breadth of scientific, policy and geographic expertise to the Committee that will greatly strengthen our ability to advise and assist the Institute in achieving its mandate.

Coincidentally, as many of the new IAC members stepped into their role in 2019, the Institute was formulating its new strategy for the next five years. It was a good opportunity for IAC members to assist UNU-INWEH management and staff in this process. The new strategy is now complete, and in 2020-2024, UNU-INWEH will focus on four main directions: accelerating the implementation of water-related SDGs, activating a technology revolution for water security in the Global South, advancing gender equality for effective water management; and managing water and climate-related risks. All these are addressing the important global water challenges, and we very much look forward to working with the Director and his staff in the coming year and beyond.

*Michael Small
Fellow, Morris J. Wosk Centre for Dialogue
Simon Fraser University
Vancouver, British Columbia, Canada*

YEAR HIGHLIGHTS

Helping countries achieve their national water goals

The progress towards achieving SDG 6 on water and sanitation globally is slow. To help speed it up, UNU-INWEH is leading a multi-partner effort to bring data and information from a range of international and national tools and translate them into a “fit-for-policy” evidence and enabling environment that accelerate the achievement of SDG 6 at the national level.

“As we roll out our PSS in more countries every year, some participating countries become sub-regional hubs of PSS experience themselves. It is like a chain reaction”.

- Guillaume Baggio, Research Associate, UNU-INWEH



Developed and tested in partnership with 5 countries (Costa Rica, Ghana, Pakistan, Republic of Korea, and Tunisia), the on-line version of SDG 6 Policy Support System (SDG-PSS) was launched in March 2019. Since then, 19 additional countries (Egypt, Jordan, Saudi Arabia, Morocco, Kenya, Tanzania, Madagascar, Mozambique, Kuwait, Bahrain, Armenia, Bangladesh, Cambodia, Iran, Mongolia, Sri Lanka, Tajikistan, Turkey, and Viet Nam) have started using the tool formally through their participation in regional workshops for the Asia and Africa regions, and subsequent effort to contextualize the tool nationally. The use of SDG-PSS (which has become the de-facto flagship tool of UNU-INWEH) is available in three languages – English, French and Spanish – and has the potential to positively influence around 80 million people with inadequate drinking water supplies and around 240 million without improved sanitation facilities in these countries. The number of people indirectly benefiting from such use of SDG-PSS is expected to grow substantially as about 10 more countries from Latin America and Caribbean region are expected to start using this tool in the first half of 2020. In subsequent years, UNU-INWEH is planning to roll out the SDG-PSS in over 50 countries in total. To support the growing community of users of SDG PSS, UNU-INWEH also launched a 2-hour e-course that provides training on how to use the tool. The course is available in English and French and targets primarily water practitioners from countries that are engaged in contextualizing SDG PSS for national needs.

Tapping *aqua incognita* globally

UNU-INWEH makes continuing effort to alleviate global water scarcity by unpacking the potential of unconventional or emerging water sources and technologies, whether these are various forms of atmospheric water harvesting, or seawater desalination. UNU-INWEH's analysis of the state of desalination and brine production (see Jones et al, 2019), demonstrated, for the first time, that the world produces, in desalination facilities, -already much more desalinated water than originally thought, and more waste stream (brine) than desalinated water itself. The estimates suggest annual desalinated water production at 35 billion m³, while the associated brine at 51.7 billion m³ per year, 50% greater than the previous perception of 1:1 ratio between brine and desalinated water. Although desalinated water can extend water supplies beyond what is available naturally from hydrological cycle, innovations in research and practice are needed to reduce the volume of brine, as well as use it in economically viable and environmentally friendly ways. This study

“Water sources alternative to river flow or rain, are already widely used in many countries. Some of them, like desalination of sea water, if developed in environmentally acceptable ways, can essentially end the world's growing thirst”.

- Manzoor Qadir, Assistant Director, UNU-INWEH



received unprecedented media attention including at BBC, National Geographic, Science News, and Scientific American, Bloomberg, with around 1000 media stories in 21 languages in 82 countries with a potential online reach of over 800 million people. Follow-up attempts are now in progress to set

"We are pleased to join forces with UNU-INWEH to bring the unconventional water sources into the orbit of circular water economy"

- Edeltraud Guenther, Director, UNU-FLORES



up a Global Desalination and Brine Alliance to promote the idea 'Nothing goes back to desalination sources'. The Alliance may be formed based on institutional partnerships with research, policy, and private sector to promote efficient brine management technologies with additional water and revenue streams, and to roll out promising technologies for large-scale applications. Several institutions have shown interest in this development including University of California, Berkeley, USA; UNEP; RWTH (Rheinisch-Westfälische Technische Hochschule) Aachen University, Germany; University of Gabes, Tunisia; Cape Research Centre, South Africa; KMX Membrane Technologies and Valo Environmental, Canada. In November 2019, UNU-INWEH and FAO organized the meeting of water experts and a first large international Symposium devoted solely to the topic of unconventional water resources and technologies; this significantly raised the visibility of unconventional options in the context of alleviating global water scarcity.

Influencing Canadian water policies

UNU-INWEH worked closely with the largest Canadian water research program - Global Water Futures (GWF)- to influence Canadian water policies. A high-level policy session in Ottawa was organized on the need for a National Water Commission and a National Water Security Centre. The event was attended by some 50 high-level officials including cabinet ministers, members of parliament from all parties, federal government representatives, and a wide range of Canadian water experts. A summary of UNU-INWEH's earlier published analysis of Canadian water sector capabilities to meet the SDG 6 domestically and for the Government of Canada to help others abroad to do the same through targeted aid – was presented at the meeting. Subsequently, GWF and UNU-INWEH published a position report that outlined a range of specific challenges and opportunities for research, practice and leadership in achieving SDG6 in Canada.

Robert Sandford, the EPCOR Water Security Chair at UNU at UNU-INWEH has been the advisor and rapporteur of the Manitoba Collaborative Leadership Initiative. He helped guide and chronicle one of the most successful breakthroughs on reconciliation with First Nations in Canada

"In 2019, we managed to bring political leaders and civil society one step closer to the understanding that Canada is not entirely water secure, and that there is no time to relax...".

- Robert Sandford, EPCOR Chair for Water Security



as a step toward restoring the health of Lake Winnipeg (Canada's sixth largest lake) and, potentially, other watercourses across Canada and around the world. After having little or no contact for over 150 years, municipal Mayors and Reeves and First Nations Chiefs of this central region of Canada established a framework for cooperation that committed them to working together indefinitely into the future. The Memorandum of understanding signed by 35 leaders, is a formal signal to the Federal and Provincial governments, and industry, that this group will now speak as one voice on intractable regional environmental issues. This model is now being promoted elsewhere in the world where Indigenous peoples can be part of the process towards meeting the SDGs.

Resolving water-migration-gender nexus

UNU-INWEH partner with the University of Kinshasa (Democratic Republic of Congo- DRC) in the new IDRC-funded project “Gender-Sensitive Analysis of the key dimensions in Climate and Water driven Conflicts and Migration in the Congo river Basin”. This initiative is focusing on the issues of large-scale water- and climate-driven migration of indigenous people (Mbororo pastoralists) in central Africa. These communities have entered northern countries of the Congo basin - DRC, Central African Republic and Cameroon - and multiple episodes of land and water conflicts have been recorded. The migratory movement has increased over the past two decades, triggered by continuing degradation of water resources and by climate variability, which is also acknowledged by the African Union. The project focuses on the most vulnerable groups – women and girls – and aims, amongst others, to enhance knowledge of hydro-climatic factors that influence migration and conflicts and improve climate adaptation and conflict resolution strategies in the region. The project had an inception meeting in May 2019 in Kinshasa attended by over 50 participants - local, regional and global- with stakeholders from government, cultural and community organizations, and researchers. The project will run until 2021 and is part of the UNU-INWEH continuing work on global and regional water security.

“We hope that our collaborative work in the Congo Basin will generate lessons that will have positive implications for alleviating conflicts associated with water-driven migration globally”

- Nidhi Nagabhata, Principal Researcher, UNU-INWEH



UNU-INWEH also partner with McMaster University to examine the state of menstrual health management (MHM) in Humanitarian Response Plans (HRPs) that are released annually by the UN Office for the Coordination of Humanitarian Affairs (UNOCHA). Poor MHM

“The lack of universal policy surrounding the implementation of menstrual health management in a crisis has implications not only for women’s health and dignity, but also for a country’s overall development”.

- Panthea Pouramin, consultant, 2019



practices lead to reproductive tract infections and skin irritation, overall stress and diminished dignity, all such consequences further aggravated by involuntary migration. It was found that currently, the HRPs lack a universal policy around the provision of MHM in a humanitarian context and there is a significant temporal and spatial variation between countries that mention MHM-related dignity kits and terms. Overall, only a few countries have adopted dignity kits to address women’s unique needs in a humanitarian context, others intend to, and yet others do not address MHM at all.

The Institute’s growing work on water, gender and migration was presented at numerous events during the year including the World Summit “Leaving No One Behind” in Geneva, organized WaterLex, and a special UNU-INWEH led session at the World Water Week on water-driven migration, conflict and human security, together with sister Institutes -UNU-FLORES and UNU-IAS, as well as FAO and UNESCO.

Challenging the status-quo in water research and education

UNU-INWEH carried out two global assessments – of water-related education and water-focused research. They estimated, amongst others, that while water research is published in over 80 countries, the USA and China account for one third of it. At the same time, about 70%

of the academic journals that carry research on water are published in just four countries — USA, UK, Germany and the Netherlands, and only 2% are in China. All 15 countries leading in publications per million population are among the world's wealthiest. Wealthy nations are also home to the highest-quality schools, with 38 out of the top 50 for Excellence in Water Resources being in North America and Europe and others – in Australia, China and Taiwan. Overall both assessments quantitatively illustrated that post-secondary education and research that aim at tackling the global water crisis are neither located in nor focusing on the poorer, developing countries where the needs for water education and research are critical. Assessments also pointed out that water research potential remains in its own “box”, as long as its impact is assessed by papers published and cited by other researchers, rather than by successful practical applications and development outcomes. Both assessments call for reducing this “alarming” imbalance between resources and needs, which impedes the search for solutions to crucial water challenges and slow down the progress towards water-related SDGs globally.

“Despite all the research in the past decades that have gone into resolution of global and regional water challenges, hardly any of them have been removed from the global development agenda to date. This needs to change”.

- Hamid Mehmood, Senior Researcher, UNU-INWEH



Alleviating water-related risks

The UNU-INWEH team synthesized information and suggested ways to address several chronic water-related risks and hazards that continue to affect millions of people throughout the world. The Institute advocates for complete eradication of arsenic from drinking water by 2030. This should be an essential goal in global water development agenda, and yet, globally, nearly 140 million people are still affected by arsenic-contaminated groundwater, the majority is likely being female and children, even though relevant statistics are hard to find. UNU-INWEH published a policy brief that provides a road map to policymakers of affected countries for the complete eradication of arsenic in drinking water by 2030 and initiated the consultations with policy actors on possible implementation of the plan.

UNU-INWEH also conducted the assessment of disaster risk and water security-related challenges in small island developing states (SIDS) focusing on how disaster risks are perceived and addressed in the SIDS, analyzing the current status of water security in SIDS using an indicator-based approach, and assessing gaps and needs in institutional and policy arenas that can facilitate adaptation and resilience building in SIDS. This synthesis noted that the number of disasters in SIDS is increasing at a higher rate than the global average, and that most SIDS are already water scarce. These factors combined will reduce SIDS adaptive capacity, resources, and resilience. The synthesis suggested, amongst others, that SIDS can increase their resilience by building cross-sectoral cooperation and data sharing between national agencies and ensuring that development agencies understand the specific needs of SIDS.

“Most of the 38 SIDS in the world are rather fragile, and they struggle to find sufficient funding to put their development plans, programs, and policies into action”

- Jana Gheuens, 2018 UNU-INWEH intern



UNU-INWEH partnered with McMaster and Ottawa Universities, as well as with UNESCO International Centre for Water Hazard and Risk Management (ICHARM) to assess availability and status of existing flood early warning systems (FEWS) around the world. Over 50 countries responded to the survey that the team conducted on various aspects of FEWS including

risk knowledge, monitoring and forecasting, warning dissemination and communication, response capabilities, investments into FEWS, their operational effectiveness, benefits, and challenges associated with FEWS development. It was pointed out that the number of causalities associated with flood disaster declined since 2000, while 50% of currently operating FEWS were established over the same period, and hence this decline may be attributed to the overall disaster risk reduction effort, of which FEWS are an integral and significant part. The team recommended to coordinate global investments in FEWS development and standardize investment reporting, establish an international hub to monitor the status of FEWS in collaboration with the national responsible agencies and develop a comprehensive, index-based ranking system for FEWS according to their effectiveness in flood disaster mitigation.

“We aim to provide guidance to UN member states on ranking FEWS and continuously improving them. It is essentially about developing and implementing universal standards for such systems and through this – reducing flood risks to communities”.

- Duminda Perera, Senior Researcher, UNU-INWEH



Serving the UN

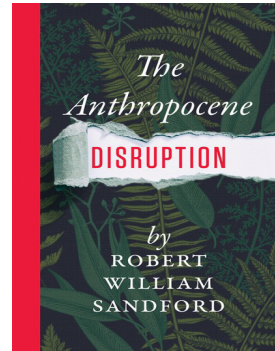
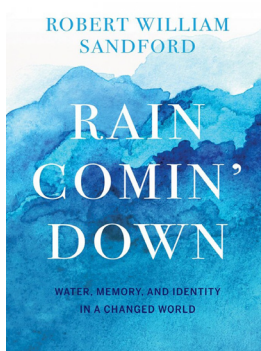
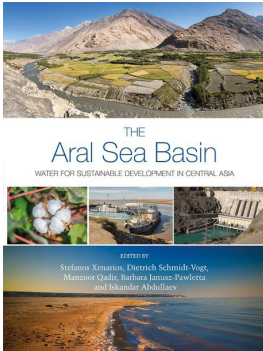
UNU-INWEH represents UNU in UN-Water – a network of some 30 UN agencies and 40 international partners who work on various aspects of water and sanitation. In 2019, UNU-INWEH continued to co-lead (together with UNDESA) the UN-Water Task Force (TF) that supports implementation of the UN Water Action Decade 2018-2028. Some 16 UN agencies participate in this TF, whose role is to assist UN Member States in defining their contributions to the Decade. UNU-INWEH participated, speaking on behalf of UN-Water, in high-level event on “interlinkages between water and climate action” in March. The event, held at UN HQ, not only supported the implementation of the Decade, but also fed into subsequent High-Level meeting organized by the President of the UN General Assembly on the theme “Climate and Sustainable Development for All”. UNU-INWEH is also part of the preparatory process of the 2023 UN Conference on the Midterm Comprehensive Review of the Implementation of the Decade. A special event to initiate discussions among Member States, stakeholders, and the UN system on how to plan for this high-level 2023 UN Conference was held in November 2019 at UN HQ.

As in previous years, UNU-INWEH, together with other UNU sister centers has made its contribution to the UN 2018 World Water Development Report (WWDR) with the theme “Leaving no one behind”. UNU-INWEH maintains strong ties with several dozen UN agencies and UN-Water partners. The types of partnership and collaboration include joint proposal submissions, cooperation on research papers and reports, joint workshops and project work, provision of advisory services, participation in UN-Water Task Forces and others.

One highlight of the 2019 was UNU-INWEH's primary expert contribution to the FAO-led process of inclusion and quantification of the concept of “environmental flows” into the monitoring methodology of the indicator 6.4.2 (“water stress”). The Guidelines that emerged from this were launched in January 2019. This is the first time in the history of the “environmental flow” concept that it received explicit attention in a global policy document that target and can potentially benefit all 193 UN Member States. The tool is continuously improved by participating partners, and the capacity of national agencies to use it is being developed.

SELECTED PUBLICATIONS

Books and book chapters



Amarnath, G, Alahacocon, N., Pani, P, Chockalingam, J., Mondal, S., Matheswaran, K., Sikka, A., Rao, K.V., Smakhtin, V. (2019). Development of a System for Drought Monitoring and Assessment in South Asia. In: Mapedza, E., Tsegai, D., Bruntrup, M. and McLeman, R. (Eds.) Drought Challenges: Policy options for developing countries. Elsevier Series "Current Directions in Water scarcity research", Vol 2; p 133-161

Connor, R. Uhlenbrook, S. Miletto, M., Koncagul, E., Hada, R. Dhot, N. Avellan, T, Nagabhatla, N. (2019); Strategies and response options for inclusive development - Chapter 10. In: "WWAP (UNESCO World Water Assessment Programme). The UN World Water Development Report "Leaving no one behind". Paris. UNESCO. p 146- 155

Djumaboev, K., Anarbekov, O, Holmatov, B., Hamidov, A., Gafurov, Z., Murzaeva, M., Sušnik, J., Maskey, S., Mehmood, H., and Smakhtin V. (2019) Surface Water Resources ,in "Aral Sea Basin: Water for sustainable development in Central Asia – Earthscan. p 25-38

Murtaza G., M. Zia-ur-Rehman, I. Rashid, and M. Qadir. (2019). Use of poor-quality water for agricultural production. In: Dagar J., Yadav R., Sharma P. (Eds). Research Developments in Saline Agriculture. Springer, Singapore. p. 769-783

Nagabhatla, N., Avellan, T Pouramin, P., Qadir, M., Mehta, P., Payne, J., Stefan, C., Hülsmann, S., Abrate, T., Teruggi, G., Pischke, F., Oakes , R., Ceola, S., Cudennec, C., Deregibus, I., and Kuisma, S. (2019) Physical and Environmental dimensions- Chapter 2. In; "WWAP (UNESCO World Water Assessment Programme). The UN World Water Development Report "Leaving no one behind". Paris. UNESCO. p 44-57

Sandford, R. (2019). Rain Comin' Down, Water, Memory and Identity in a Changed World. Rocky Mountain Books. 336 pp

Sandford, R. (2019). The Anthropocene Disruption. Rocky Mountain Books. 168 pp

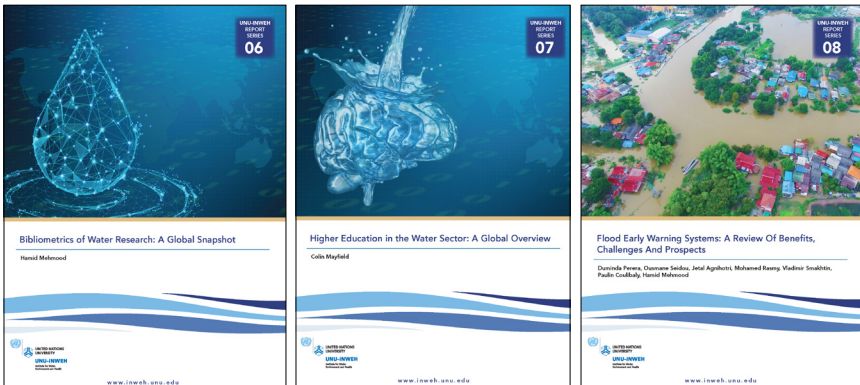
Scott, C.A., F. Zhang, A. Mukherji, W. Immerzeel, D. Mustafa, L. Bharati, H. Zhang, T. Albrecht, A. Lutz, S. Nepal, A. Siddiqi, H. Kuemmerle, M. Qadir, B. Bhuchar, A. Prakash, and R. Sinha. 2019. Water in the Hindu Kush Himalaya. In: P. Wester, A. Mishra, A. Mukherji, A. B. Shrestha (Eds) The Hindu Kush Himalaya Assessment — Mountains, Climate Change, Sustainability and People. Springer Nature Switzerland AG, Cham, Switzerland.

Xenarios, S., Schmidt-Vogt, D., Qadir, M. Janusz-Pawletta and Abdullaev, I. (2019). The Aral Sea Basin: water for sustainable Development in Central Asia. Earthscan from Routledge Taylor and Francis Group. 227 pp. Part of the continuous Book Series on Major River Basins of the World: <https://www.routledge.com/Earthscan-Series-on-Major-River-Basins-of-the-World/book-series/ECMRBW> (Book Series editor- V. Smakhtin, UNU-INWEH)

Xenarios S., Smakhtin V., Sehring J., Schmidt-Vogt D., Tsani S., Hannah C., Michalena E. (2019) Water-Energy-Food Nexus and Environment in Central Asia. In: "Water-Energy-Food-Ecosystems and Sustainable Development Goals" Eds: S. Barchiesi, C. Carmona-Moreno, C. Dondeynaz, M. Biedler. Publications Office of the European Union, Luxembourg, 2018, 147-158 p;

Xenarios, S., Schmidt-Vogt, D., Qadir, M, Janusz-Pawletta, B, Abdullaev, I and Smakhtin, V. (2019) Introduction in "Aral Sea Basin: Water for sustainable development in Central Asia - Earthscan.

Reports



Balvanera, P., Pfaff, A., Viña, A., Frapolli, EG., Hussain, SA., Merino, L., Minang, PA and Nagabhatla, N. Chapter 2. Status and trends; indirect and direct drivers of change. In Global Assessment on Biodiversity and Ecosystem Services. Deliverable 2(c) IPBES secretariat, Bonn, Germany, 31 May 2019. Available <https://ipbes.net/global-assessment>

Dickens, C., Smakhtin, V. Biancalani, R., Villholth, K.G., Eriagama, N. and Marinelli, M. (2019). Incorporating environmental flows into “water stress” indicator 6.4.2: Guidelines for a minimum standard method for global reporting. FAO, Rome, 26 pp.

Mayfield, C. (2019). Higher Education in the Water Sector: A Global Overview. UNU-INWEH Report Series, Issue 07. United Nations University Institute for Water, Environment and Health, Hamilton, Canada.

Mehmood, H. (2019). Bibliometrics of Water Research: A Global Snapshot. UNU-INWEH Report Series, Issue 06. United Nations University Institute for Water, Environment and Health, Hamilton, Canada.

Perera, D., Seidou, O., Agnihotri, J., Mohamed R., Smakhtin, V., Coulibaly, P., Mehmood, H., (2019). Flood Early Warning Systems: A Review of Benefits, Challenges and Prospects. UNU-INWEH Report Series, Issue 08. United Nations University Institute for Water, Environment and Health, Hamilton, Canada.

Schuster-Wallace, C.J., Sandford, R. and Merrill, S. (2019) Water futures for the world we want: Opportunities for research, practice and leadership in achieving SDG6. University of Saskatchewan, Saskatoon, Canada. 35 pp

Water in the World We Want. 2019. SDG 6 Project Final Report. United Nations University Institute for Water, Environment and Health; United Nations Office for Sustainable Development; Korea Environment Corporation; Ministry of Environment, Republic of Korea.

Policy Briefs

Perera, D., Devlin, M., Smakhtin, V., (2019). Arsenic in groundwater: Elements of a National Strategy for Reduction and Eradication. UNU-INWEH Policy Brief N 5. United Nations University Institute for Water, Environment and Health. Hamilton, Ontario, Canada.

Nagabhatla N., Perera, D., Gheuens, J., Wale, C. and Devlin, M. (2019). Managing disaster risk and water security: Strategies for Small Island Developing States. UNU-INWEH Policy Brief, Issue 6. United Nations University Institute for Water, Environment, and Health. Hamilton, Ontario, Canada.

Journal Papers

Abioye, S. O., and Perera, E. D. P. (2019). Public health effects due to insufficient groundwater quality monitoring in Igando and Agbowo regions in Nigeria: A review. Sustainable Water Resources Management, 1-11.

Anjum, Z., Pouramin, P., Glickman, T., Nagabhatla, N. (2019). A Synthesis Report Analyzing Menstrual Hygiene Management Within a Humanitarian Crisis, OIDA International Journal on Sustainable Development, Vol. 12 (5): 61-72. Available at SSRN: <https://ssrn.com/abstract=3481936>

Dickens, C., Smakhtin, V., McCartney, M., O'Brien, G., & Dahir, L. (2019). Defining and Quantifying National-Level Targets, Indicators and Benchmarks for Management of Natural Resources to Achieve the Sustainable Development Goals. *Sustainability*, 11(2): 462.

Evans, A. E., Mateo-Sagasta, J., Qadir, M., Boelee, E., & Ippolito, A. (2019). Agricultural water pollution: key knowledge gaps and research needs. *Current Opinion in Environmental Sustainability*, 36, 20-27.

Jones, E., Qadir, M., van Vliet, M.T.H., Smakhtin, V., and Kang, S. (2019). The state of desalination and brine production: A global outlook. *Science of The Total Environment* 657: 1343-1356.

Gheuens, J.; Nagabhatla, N.; Perera, E.D.P. (2019) Disaster-Risk, Water Security Challenges and Strategies in Small Island Developing States (SIDS). *Water* 2019, 11: 637.

Guppy, L., Mehta, P., & Qadir, M. (2019). Sustainable development goal 6: Two gaps in the race for indicators. *Sustainability Science*, 1-13.

Haque, M.M.; Seidou, O.; Mohammadian, A.; Djibo, A.G.; Liersch, S.; Fournet, S.; Karam, S.; Perera, E.D.P.; Kleyhans, M. (2019). Improving the Accuracy of Hydrodynamic Simulations in Data Scarce Environments using Bayesian Model Averaging: a Case Study of the Inner Niger Delta, Mali, West Africa. *Water* 2019, 11: 1766.

McCallum, E.S., K. Nikel, H. Mehdi, S.N.N. Du, J.E. Bowman, J.D. Midwood, K.A. Kidd, G.R. Scott, and S. Balshine. 2019. Municipal wastewater effluent impacts fish communities: a multi-year study involving two wastewater treatment plants. *Environ. Poll.* 252(Part B): 1730-1741. <https://doi.org/10.1016/j.envpol.2019.06.075>

Liersch, S., Fournet, S., Koch, H., Djibo, A.G., Reinhard, J., Kortlandt, J., Van Weert, F., Seidou, O., Klop, E., Baker, C., Hattermann, F.F. (2019) Water resources planning in the Upper Niger River basin: Are there gaps between water demand and supply? *Journal of Hydrology: Regional Studies* 21, 176–194

Minhas, P. S., Qadir, M., and Yadav, R. K. (2019). Groundwater irrigation induced soil sodification and response options. *Agricultural Water Management*, 215, 74-85.

Nagabhatla, N., Hung, N., Tuyen, L., Cam, V., Dhanraj, J., Thien, N., and Swierczek, F. (2019). Ecosystem-based approach for planning research and capacity development for integrated coastal zone management in Southeast Asia. *APN Science Bulletin*, 9 (1). doi:10.30852/sb.2019.537.

Newell, S. L., Nagabhatla, N., Doubleday, N. C and Bloecker, A. (2019), The Potential for Locally Managed Marine Area (LMMAs) as a Participatory Strategy for Coastal and Marine Ecosystems – The Global Commons. OIDA International Journal of Sustainable Development, Vol. 12 (4): 47-62. Available at SSRN: <https://ssrn.com/abstract=3439121>

Shrestha, B.B., Perera, E.D.P., Kudo, S., Miyamoto, M., Yamazaki, Y., Kuribayashi, D., Sawano, H., Sayama, T., Magome, J., Hasegawa, A., Ushiyama, T., lwami, Y., Tokunaga, Y., (2019), Assessing flood disaster impacts in agriculture under climate change in the river basins of Southeast Asia, *Natural Hazards*, <https://doi.org/10.1007/s11069-019-03632-1>

Taing, L., Chang, C. C., Pan, S. and Armitage, N. P. (2019) Towards a water secure future: reflections on Cape Town's Day Zero crisis, *Urban Water Journal*, 1-7 DOI: 10.1080/1573062X.2019.1669190

Taing, L. (2019), Policy implementation considerations for basic services: A South African urban sanitation case, *Water SA*, 45(4), 536-546, DOI: 10.17159/wsa/2019.v45.i4.7533

Williams, S.D., Perera, E.D.P., Smakhtin, V. (2019) Assessing Global Trends in the Status, Causes, and Implications of Ageing Water Storage Infrastructure. Proc of the 2-d International Conference on Natural Hazards and Infrastructure, 23-26 June 2019, Chania, Greece. 12 pp

SELECTED EVENTS

January

- ▶ Launch of Environmental Flow Guidelines for SDG Indicator 6.4.2, FAO, Rome, Italy
- ▶ 30th UN-Water meeting, Rome, Italy

February

- ▶ Waterlex Global Summit “Leaving no one behind”. Geneva, Switzerland

March

- ▶ UN High-level Event “Interlinkages between Water and Climate Action”, NY, USA
- ▶ Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) Knowledge and Data Task force meeting, Bonn, Germany

April

- ▶ Global Environment Facility meeting for Latin America and Caribbean Region, Santa Domingo, Dominican Republic
- ▶ High-Level meeting on strengthening Canadian Water Policies, Ottawa

May

- ▶ WMO Multi-Hazard Early Warning International Conference, Geneva, Switzerland
- ▶ Global Platform for Disaster Risk Reduction (GP2019), Geneva, Switzerland
- ▶ Launch Workshop for the IDRC project “Addressing climate and water driven migration and conflict interlinkages to build Community Resilience in the Congo Basin”, and Gender Workshop with Gender Work team and other partners, Kinshasa, Congo DRC
- ▶ Annual Open Science Meeting of the Global Water Futures (GWF) Program, Saskatoon, Saskatchewan, Canada



Participants of the IDC project launch workshop “Addressing climate and water driven migration and conflict interlinkages to build Community Resilience in the Congo Basin”

June

- ▶ International Conference on Natural Hazards and Infrastructure, Crete, Greece
- ▶ The FloodNet Annual General Meeting, Hamilton, ON, Canada

July

- ▶ International workshop “Using SDG 6 Policy Support System to facilitate water-related sustainable development in Africa and Middle East”, Tunis, Tunisia
- ▶ The International Union of Geodesy and Geophysics – IUGG - Montreal, Quebec, Canada



International workshop "Using SDG 6 Policy Support System to facilitate water-related sustainable development in Africa and Middle East", Tunis, Tunisia

August

- ▶ 31st UN Water meeting, Stockholm, Sweden
- ▶ Stockholm World Water Week, Stockholm, Sweden
- ▶ Green Climate Fund Consultation on Climate Change, Agriculture and Food Security, Ottawa, ON, Canada



UNU-INWEH presentation from a Migration session at Stockholm World Water Week, Stockholm, Sweden

September

- ▶ International workshop "Using SDG 6 Policy Support System to facilitate water-related sustainable development in Asia" Daegu, Republic of Korea
- ▶ Korea International Water Week, Daegu, Republic of Korea
- ▶ UN Environment Global Workshop of the World Water Quality Alliance (WWQA), Ispra, Italy
- ▶ Water Future International Conference, Bengaluru, India
- ▶ UNESCO World Water Assessment Program (WWAP) inception workshop for the World Water Development Report 2021. Perugia, Italy
- ▶ Lieutenant Governor of Ontario Symposium on Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) Global Assessment on Biodiversity and Ecosystem Services, Toronto, Canada



International workshop "Using SDG 6 Policy Support System to facilitate water-related sustainable development in Asia"
Daegu, Republic of Korea

October

- ▶ 25th Canadian Conference on Global Health (CCGH) "Water, Sanitation and Hygiene-WASH: a priority in global health care? Ottawa, Canada
- ▶ Amazon Web Services (AWS) Summit, Toronto, Canada
- ▶ World Summit on Artificial Intelligence, Zaandam, Netherlands
- ▶ Sustainability: Transdisciplinary Theory, Practice, and Action' (STTPA) Conference. Toronto, Canada
- ▶ UN High Mountain Summit, WMO, Geneva, Switzerland

November

- ▶ Society of Environmental Toxicology and Chemistry Conference Toronto, Canada
- ▶ Expert Consultation Meeting of the UN-Water Task Force on Unconventional Water Resources, Madrid, Spain
- ▶ FAO First International Symposium on the Use of Unconventional Waters for Achieving Food security, Madrid, Spain
- ▶ Annual meeting of the Operations Team of the Global Water Futures Program; Hamilton, Canada.



Group photo from the 'Expert Consultation Meeting of the UN-Water Task Force on Unconventional Water Resources' and 'FAO First International Symposium on the Use of Unconventional Waters for Achieving Food security', Madrid, Spain

LECTURE AND SEMINAR SERIES

Another Drop Lecture Series

UNU-INWEH continued the Another Drop Lecture series throughout 2019. The series provides an opportunity to present research, policy, and case studies that aid in our understanding of linkages between water, environment, and health. The purpose is to provide the local academic and broader community with an insight into the many and varied challenges faced around the world.

January: Flash Flood Events, Their Prediction, and the Future
Speaker: Dr David Sills, Environment and Climate Change Canada

September: Why Almost Everything (Including Progress on Water and Sanitation) is Better Than We Think it is
Speaker: Dr Colin Mayfield, University of Waterloo and UNU-INWEH

October: Urban-Induced Hydromodification
Speaker: Dr Dilnesaw Chekol, Toronto Conservation Authority (TCA)

November: Thinking Like a Watershed
Speakers: Dr Chris McLaughlin, Bay Area Restoration Council (BARC)



*Dr Dilnesaw Chekol,
Toronto Conservation Authority*



Dr David Sills, Environment and Climate Change Canada

Water and Climate Dialogue Series

UNU-INWEH in partnership with McMaster University hosts a regular seminar series Water and Climate Dialogue. It provides a platform for young scholars and seasoned experts to discuss their research work on water, environment and health topics. In 2019, UNU-INWEH organised eight sessions, welcoming some 31 speakers from 9 countries, with 70% women.



*Dr Tom Gleeson,
University of Victoria*



Venla Niva and Lauri Ahopelto, Doctoral scholars from Aalto University, Finland

CAPACITY DEVELOPMENT

Water Without Borders graduate programme

This collaborative (UNU-INWEH - McMaster University) graduate certificate programme initiated in 2010 is done in tandem with a graduate degree programme from any faculty at McMaster University. It aims to enhance professional and academic development and addresses water issues across geopolitical or disciplinary boundaries. The program extends over two-semester and has three courses: problem-based learning, writing a mini-paper on a water-related topic relevant to UNU-INWEH work and an international field trip to a developing country. Nine new students joined the programme in 2019, and for the first time, the field trip was conducted in Peru (previously in Ghana).



Water Without Borders students on a field trip to Peru, February 2019

Short-term in-house training programmes

UNU Internships are open to recent graduates or final-stage graduate programme students – at either MSc or PhD level. Interns familiarize themselves with the operations of the United Nations at large and produce a paper or a tool that contributes to an UNU-INWEH project. Interns are required to make a 3 to 6 months full-time commitment; longer internships are preferred. In 2019, UNU-INWEH had two interns from two countries—one who was pursuing a masters degree.

Embedded Learning Experience (ELE) programme is designed for early-stage university scholars. It provides an opportunity to assist in live UNU-INWEH projects. ELE placements are normally for 1-3 months. In 2019, eight young scholars from two countries (Pakistan, South Korea) completed the programme.



UNU-INWEH in-house trainees of 2019. From left to right: Talia Glickman (intern), Hyungwook Lee (ELE scholar), and Marvel Ekwuribe (MUST scholar)

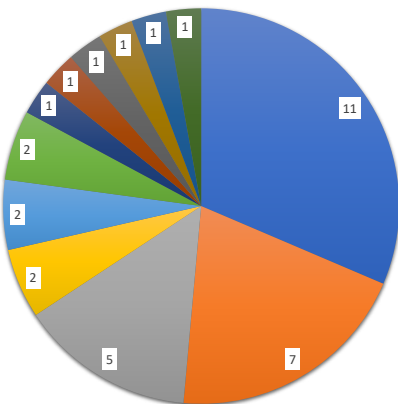
McMaster University Student Training (MUST) programme is specifically designed for McMaster University students from all faculties and departments. It is an opportunity for students to strengthen their skills in water science-policy bridging. Four scholars from geography, environmental studies, philosophy and biological sciences joined the MUST programme in 2019.

On-line Learning

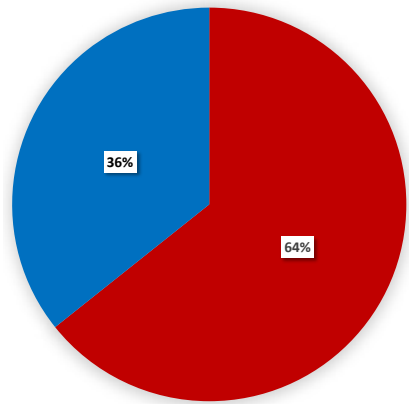
In 2019, UNU-INWEH's on-line Water Learning Center (WLC) offered several courses including Integrated Water Resources Management, Mangroves Management, Global Water Security, Water and Health. A course on SDG Policy Support System has been added to WLC in two languages – English and French. One larger course on the WLC follows a partnership-based approach, working with four regional training centers in South East Asia, Latin America and the Caribbean, Middle East and Sub-Saharan Africa. In 2019, 12 students from 7 countries completed the 2018-2019 IWRM programme from the Arab region, and 7 students from the LAC region.



IWRM programme graduates of 2018-2019, Arab Region



- Canada
- South Korea
- Bahrain
- Egypt
- India
- Saudi Arabia
- Nigeria
- Pakistan
- Kuwait
- UAE
- Oman
- Sudan



- Female
- Male

Number of trainees who are enrolled in an internship, ELE, MUST, WWB, or IWRM programme

MEDIA

- ▶ News articles about UNU-INWEH’s work appeared in **23** languages across **85** countries and territories
- ▶ Total number of articles published online: **1,600** (at **1200** different online news sites; some sites published more than one article)
- ▶ Total “potential impressions” (or potential audience reached, based on news sites’ readership/circulation data): **1.4 billion**



At the Dubai Electricity and Water Authority at Jebel Ali, natural gas is burned to produce electricity and to desalinate seawater for drinking.

PHOTOGRAPH BY LUCA LOCATELLI. NAT GEO IMAGE COLLECTION

ENVIRONMENT

Desalination plants produce more waste brine than thought

There's enough wastewater from the world's facilities to cover Florida a foot deep—here's why that's a potential problem.

The Guardian International edition

pinion Sport Culture Lifestyle More

Prices Asia Australia Middle East Africa Inequality Cities Global development

Is there a beautiful, briny solution to the world's clean water crisis?

▲ Can brine be put to use, instead of being dumped? In the search of a water need to remedy in abundance, as well as recycling water, we explore a potential one that can turn brackish into drinking water.

Desalination is often dismissed as being expensive and inefficient. But advances in tech are now starting to break this...



Climate Changed The Aral Sea Is Dying, Putting 60 Million People at Risk

As climate change accelerates, the fight for global water supplies will only intensify.

By Eric Lipton
November 6, 2019, 10:06 AM EST

The Aral Sea was once the world's fourth largest inland lake. Today, it's the epitome of environmental mispractice.

More than 60 million people in six nations—Afghanistan, Kazakhstan, Kyrgyzstan, Uzbekistan, Tajikistan and Turkmenistan—rely on the rivers leading to the Aral. In the decades since the founding of the Soviet Union, cross-border competition for water, coupled with rapidly accelerating climate change, has made a bad situation worse.

The two rivers that feed the basin, the Amu Darya and the Syr Darya, carry to the Aral about 65% of the water they did before Soviet industrial activity.

SciDevNet Solutions Asia & Pacific

Home Health News

Government Enterprise Communication More

insights

Arsenic in groundwater – no silver bullet

▲ A man walks down the stairs of a brick-lined well near Lake Jibbar. Copyright: Anissa Cassineti/WFP

Speed read

- Arsenic in groundwater threatens 340 million people in 50 countries
- Each year more pick from dozens of arsenic removal methods
- Technology choice important since arsenic contamination found in Thailand

INTERNATIONAL ADVISORY COMMITTEE



Participants of the IAC meeting, June 2019, Hamilton, ON, Canada. Top row left to right: Manzoor Qadir (Assistant Director: UNU-INWEH), Vladimir Smakhtin (Director: UNU-INWEH), Michael Small (IAC Chair), Claudia Ringler (IAC member). Bottom row left to right: David Passarelli (UNU Executive Officer, Representing UNU Rector), Lisa Schipper (IAC member), Christophe Cudennec (IAC member).

Mr Michael Small

Distinguished Fellow at the Asian Pacific Foundation and Fellow at Simon Fraser University's Morris J. Wosk Centre for Dialogue, Canada
Expertise: Global Governance, Foreign Policy, Renewable Energy

Dr Akissa Bahri

Professor at the National Agricultural Institute of Tunisia (INAT), Tunisia
Expertise: Agricultural Water Management, Wastewater Reuse and Recovery

Dr Christophe Cudennec

Professor of National Higher Institute of Agronomic, Agrifood, Horticultural and Landscape Sciences, France
Secretary General: International Association of Hydrological Sciences, France
Expertise: Hydrology and Water Resources

Dr Claudia Ringler

Division Director: International Food Policy Research Institute, USA
Expertise: Global water modelling and policy; Water-energy-food nexus

Dr Lisa Schipper

Environmental Social Science Research Fellow in the Environmental Change Institute at the University of Oxford, United Kingdom
Expertise: Climate Change, Natural Hazards

Dr David Malone, (ex officio)

Rector, United Nations University, Japan
Expertise: Peace and Security

Dr Vladimir Smakhtin, (ex officio)

Director, UNU-INWEH, Ontario, Canada
Expertise: Water Resources, Hydrology



UNITED NATIONS
UNIVERSITY

UNU-INWEH

Institute for Water,
Environment and Health

204-175 Longwood Road South
Hamilton, ON Canada L8P 0A1

1-905-667-5511
www.inweh.unu.edu