



UNITED NATIONS
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UNU-INWEH

Institute for Water,
Environment and Health



ANNUAL REPORT 2018



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Environment and Health**

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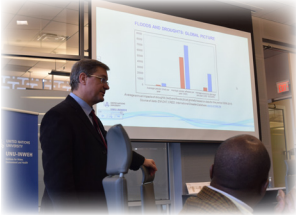
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ABOUT UNU-INWEH

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 and programmes are located in 12 countries and address a range of critical development issues. UNU-INWEH responds to regional and global water issues, supporting the efforts of countries and development professionals worldwide to meet UN Sustainable Development Goals. The UNU-INWEH team engages in water initiatives that help developing countries reduce poverty and ensure environmental sustainability.

UNU-INWEH's vision is to:

create a world free of water problems where sustainable human development, environmental health and security are assured for all.

UNU-INWEH's mission is to:

help resolve pressing water challenges of concern to the United Nations, its Member States, and their people. It does this through critical analysis and synthesis of existing bodies of scientific discovery; targeted research that identifies emerging policy issues; application of on-the-ground scalable science-based solutions to water issues; and global outreach activities.

UNU-INWEH is linked to key processes in the UN system, and represents the UN University in UN-Water – a cross-agency group in the UN and international partners working on water and sanitation issues globally. Its UN status gives UNU-INWEH direct access to national governments and related policy processes.

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

The 2018 was a year of extraordinary global water events. The High-Level Panel on Water (HLPW) composed of 11 sitting Heads of State, released its outcome document with key recommendations on how to avert global water crisis. The UN General Assembly launched a new UN Decade of Action (2018-2028) under the theme 'Water for Sustainable Development'. And the High-Level Political Forum (HLPF) reviewed the progress with several Sustainable Development Goals (SDGs), including the 'water goal' - SDG6.



UNU-INWEH was directly involved in all these events. The Institute was engaged in shaping HLPW 'data initiative'. We were on the core team that produced UN-Water SDG6 Synthesis Report presented at the HLPF and participated directly in several events of the HLPF. From February 2018, the Institute assumed responsibility, together with UNDESA, to coordinate the UN-Water Task Force to implement the UN Water Action Decade. We finalised the development of our flagship tool - the SDG Policy Support System (PSS) - designed to help UN Member States improve their planning for national SDG6 targets. As part of the PSS initiative, we worked closely with national partners to implement it in five geographically and institutionally diverse countries - Costa Rica, Ghana, Korea, Pakistan and Tunisia. SDG-PSS is now ready for roll-out in more countries in the coming years with the potential to positively influence millions of people.

In 2018, we diversified our work on gender and water. Among other areas, the SDG PSS now explicitly includes Gender as one of the six components required to ensure that the progress to achieving water-related SDGs is truly sustainable; and our new web-based diploma-level course on global water security explicitly includes gender as a core value.

UNU-INWEH expert staff provided direct technical input to methodologies for two specific monitoring indicators for SDG6; the guidelines that emerged or emerging from these efforts target all 193 UN Member States. More than 30 new publications were produced in 2018 – the majority internationally peer-reviewed. Our capacity development programme hosted 30 in-house trainees, and staff participated actively in several dozen international and regional water-related science and policy events. We worked to support science-policy bridging with such major Canadian research programs as FloodNet and Global Water Futures. We also worked with over ten Canadian partners to analyse approaches for Canada to play a more prominent role on the global water stage. A new, long-term UNU-INWEH-McMaster University collaboration agreement was signed this year.

We are pleased to present this report of 2018 activities and achievements to demonstrate how UNU-INWEH grows toward its target of being a stronger institute that informs and influences thinking and action in the global water arena.

*Vladimir Smakhtin, Director
United Nations University
Institute for Water, Environment and Health*

MESSAGE FROM THE CHAIR OF THE INTERNATIONAL ADVISORY COMMITTEE

In 2018, much of the world turned its attention to the advancement of the Sustainable Development Goal 6 (SDG6) - achieving water security, protecting water-related eco-systems and ensuring safe and affordable drinking water for all. UNU-INWEH was at the heart of these efforts, advancing global policy-relevant water research, contributing to major UN events and outputs like High-Level Political Forum (HLPF) and SDG6 Synthesis Report, and working closely and directly with several UN Member States to help accelerate their progress towards specific national water targets. The Institute also strengthened its partnerships with its host, McMaster University, and with major water-related research networks in Canada and around the world. The International Advisory Committee was pleased to see the progress being made in all these areas, in line with UNU-INWEH's current Strategic Plan. It welcomed the Institute's focus on strengthening gender analysis in all its research.



During 2018, the IAC said a fond farewell and thank you to Ania Grobicki, who moved on to a new role as a Deputy Director of the Green Growth Fund. At the close of 2018, the IAC also said good-bye to Roberto Lenton, Distinguished Fellow at the Daugherty Water for Food Global Institute, University of Nebraska. UNU-INWEH and the IAC are very grateful for Roberto's strategic and scientific advice over the past seven years.

In January 2019, Michael Small takes over as Chair of the International Advisory Committee. Michael is a Distinguished Fellow at the Asian Pacific Foundation and Fellow at Simon Fraser University's Morris J. Wosk Centre for Dialogue. Also joining the International Advisory Committee in January 2019 will be Dr. Akissa Bahri, Professor at the National Agricultural Institute of Tunisia (INAT) and Dr Lisa Schipper, Environmental Social Science Research Fellow in the Environmental Change Institute at the University of Oxford, UK.

It has been a real honor for me to serve as the Chair of the International Advisory Committee for the past four years and to support the Institute's vitally important research on water, environment and health challenges. I leave confident that UNU-INWEH is in good standing, internationally visible and well positioned to continue making unique contributions to addressing global water crisis and specific water challenges faced by individual UN Member States.

*Margaret Biggs
Matthews Fellow in Global Public Policy,
Queens University, Ontario, Canada*

PROJECT HIGHLIGHTS

Supporting water-related Sustainable Development Goals (SDGs)

The water-related SDGs– especially SDG6, that calls for clean water and sanitation for all – are well-elaborated and vital for our future. But for many countries, how to organise and prioritise the delivery on these ambitious targets is less clear. Helping countries set up plans and mechanisms to reach SDG6 goals is UNU-INWEH's flagship initiative.

Through this project, UNU-INWEH aims to provide expert support to UN Member States to formulate and achieve their national SDG6 water and sanitation targets. It is put in action as a partnership with UNDESA-UNOSD, Korea's Ministry of Environment, and Korea Environment Corporation, and with researchers and policymakers from five countries – Korea, Pakistan, Tunisia, Costa-Rica and Ghana. The project's key product is the SDG6 Policy Support System (PSS) – a platform that brings together data and information from a range of tools and translates them into a 'fit-for-policy' evidence framework that helps countries plan more effectively.

In 2018, SDG6 PSS was customised for use in national institutional and policy contexts. It is now in use by the governments of the 5 project countries to ensure accelerated progress towards national SDG6 targets. SDG PSS offers multilingual tutorials and user guides (English, Spanish and French). Its 2018 project workshop brought together participants from the partner countries to review progress and discuss next steps. The meeting was supported by Global Affairs Canada in Ottawa and hosted at their premises. With the current pilot phase completed, the PSS platform is now set for rollout in more countries, with potential positive impact on millions of people particularly those with inadequate water supplies and sanitation facilities.



Participants of the SDG-PSS Workshop in Ottawa, Canada, September 2018

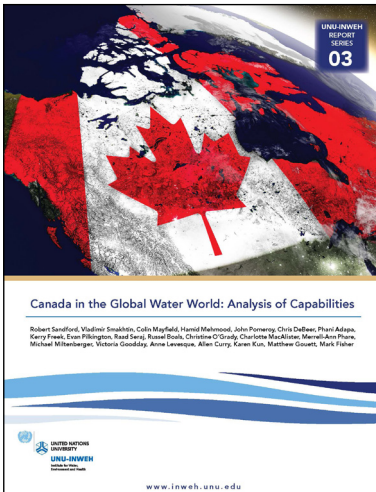
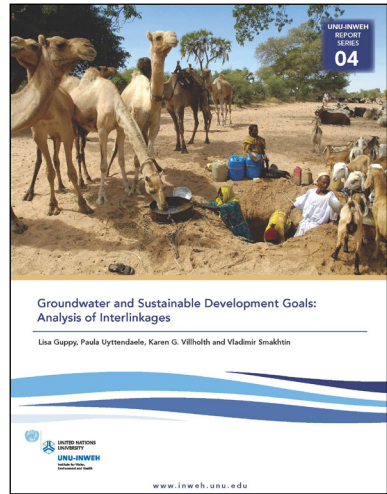
In addition to advancing the SDG6-PSS tool, UNU-INWEH gave technical input to methodologies for SDG6 monitoring indicators 6.4.2 - water stress (custodian agency – FAO) and 6.3.1 - safely managed wastewater (WHO / UN-HABITAT). This was a collaborative effort with IWMI, UN Environment and UNESCO. The results are summarized in published guidelines that target all 193 UN Member States.

The UNU-INWEH policy report 'Groundwater and Sustainable Development Goals: Analysis of Interlinkages', highlighted the significant role that groundwater plays in sustainable development. The report presents detailed analysis of the links between groundwater and the SDG targets and suggests a structured approach to improve the visibility of groundwater in the SDG framework, as it continues to develop.



"Over 50 SDG targets have links with groundwater, and yet they were not made explicit in the SDG framework. This needs to change if groundwater management is to be truly sustainable".

Dr Lisa Guppy, Senior Researcher:
Water and Policy



In another focused study, UNU-INWEH led a team of 21 experts from 12 Canadian organisations in the first critical analysis of the capacity of Canada's water sector to meet water-related SDGs, and help others meet them. The study 'Canada in the global water world: analysis of capabilities': examined were Canadian water education and research, investments and experiences in water technology and governance. Several avenues to elevate Canada's profile on the global water stage were recommended.

Promoting unconventional water resources and technologies

UNU-INWEH is taking a leadership role in improving the understanding and potential of non-conventional water – an area that can bring new or underutilized water sources to many countries that are faced with increasing water scarcity. This comprehensive global initiative consistently evaluates current knowledge on these sources and examines how and where they could be applied to help countries meet their 2030 water targets. Unconventional sources include, but not limited to, desalination of sea water; tapping into deep groundwater; physical transportation of fresh water by various ways across long distances; cloud seeding and fog water collection. The project progressed significantly in 2018, producing a range of policy-relevant products – including 5 journal articles, 4 presentations at international events and initiating the global expert community of practice.



Participants of the UNU-INWEH -led session on Unconventional Water Resources during 2018 World Water Week, Stockholm, Sweden , August 2018



"Since fog water systems eliminate the need to both travel for water and use unsafe water sources, women's health is expected to improve".

Kayla Lucier, Water Without Borders Graduate, 2018

The study on integrating gender and fog water collection demonstrated the potential to improve the lives of women and girls in low- and middle-income

communities and countries by freeing time for their education and other pursuits and bringing improved health outcomes.

The first ground-breaking global assessment of high-magnesium waters and soils, by the UNU-INWEH led team of 9 experts from 6 countries, revealed the negative impacts of these waters and soils on the environment and agricultural production. The study advocated for innovative financial mechanisms to allow calcium-supplying amendments in affected areas and cautioned that it is highly unlikely that extreme poverty can be eradicated, and SDGs met in water-scarce areas unless the issue of underperforming land and water resources is adequately addressed.

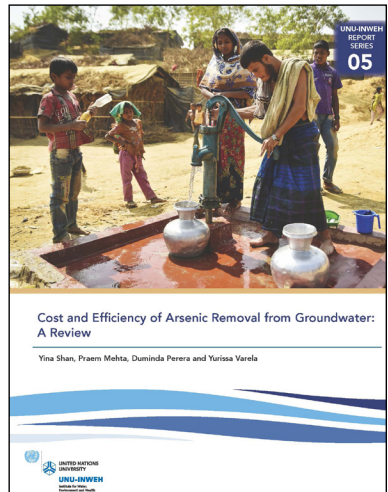
Managing water-related health risks

This project contributes to microbial and chemical hazards' alleviation in drinking water, assists in the eradication of neglected tropical diseases, and improves health systems resilience. The key output in 2018 was the report *'Cost and efficiency of Arsenic removal from groundwater: a Review'* – the result of collaborative work with McMaster University and University of Ottawa.



"The missing link for today's arsenic removal challenge is the ability to translate research evidence and laboratory-level successes into quantifiable and sustainable impacts on the ground".

Yina Shan, MUST Programme, 2018



Hundreds of millions of people worldwide are exposed to arsenic-contaminated drinking water, leading to significant health complications and social and economic losses. A wide range of technologies already exist to remove arsenic from water, but their widespread application is limited. The report gives a quantitative summary of costs and effectiveness

of a range of arsenic remediation technologies, which can serve as a preliminary guideline for selection of the most cost-effective remediation option for specific locations. The study claims that remediation actions resulting in water with arsenic concentrations much higher than WHO's standard, are hardly acceptable, as continuing exposure to higher levels of arsenic ingestion is harmful for humans. Such action effectively shifts the attention from the origin of the problem to addressing the impacts and postpones the solutions.

Managing Water Resources Variability and Risks

This project contributes to increased resilience and preparedness to a range of natural and human-induced water-related risks and disasters, by men, women, communities, UN Member States, local governments and the private sector. In 2018, the project focused on global analysis of the state-of-the-art of Flood Early Warning Systems (FEWS), in partnership with McMaster and Ottawa Universities and WMO. A detailed questionnaire on FEWS state-of-the-art was circulated globally. The analysis of responses is the basis for a thought-provoking report that aims to answer questions such as: overall, have FEWS have made the world a safer place; how good is FEWS value for money; and what are FEWS contributions to Sendai Framework targets and SDGs. The report will be released in 2019.

UNU-INWEH partnered with the Canada-wide FloodNet research program led by McMaster University - to help FloodNet researchers identify policymakers' needs in flood disaster risk reduction and build their skills in effectively communicating research results to policymakers. During the FloodNet-UNU-INWEH research-into-use workshop, a team of 20 FloodNet researchers extracted policy-relevant messages from their technical work and created 5 research-to-policy tools, published at the end of the session.



Participants of the Floodnet-UNU-INWEH research into-use workshop, McMaster University, Hamilton, February 2018

UNU-INWEH was the key contributor to the World Water Development Report 2018: 'Nature based solutions for water', that was launched at the World Water Forum in Brazil and at the Stockholm World Water Week (SWWW). The Institute coordinated the production of one of the report's 6 chapters – the chapter on "Nature based solutions For Managing Water-Related Risks", in collaboration with IIASA, IWMI, UNCCD, WBCSD and WMO.

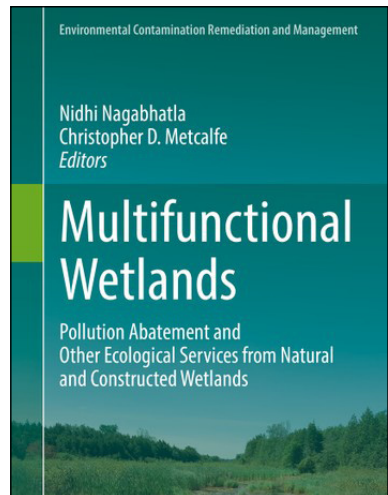


Panel discussion at the UN-Water-led event on the launch of the WWDR 2018 at the World Water Week 2018, Stockholm, August 2018.

Promoting Water Security

This project aims to strengthen technical and institutional capacity of UN Member States on how to put Water Security into action. This includes developing policy-relevant science-based tools to quantify water security, address water-related drivers of human migration as a global developmental challenge and unpacking the UN water security framework looking at wetland ecosystems' services and water as a peace-building tool.

In 2018, UNU-INWEH completed compiling and editorial work on the monograph 'Multifunctional Wetlands: Pollution Abatement and Other Ecological Services from Natural and Constructed Wetlands' – published in the new Springer Series on Environmental Contamination, Remediation and Management. UNU-INWEH authors also directly contributed 4 chapters to this book and published several web articles for its launch on World Wetland Day and World Water Day. The book was an attempt to unpack a big 'known unknown' – the role that wetlands, both natural and constructed, play in water management, with the main focus on pollution abatement. Presented in multiple case studies from around the world, the book is a call to action for better information sharing on the ecosystem services that wetlands provide. The Book was launched at the World Water Week 2018 in Stockholm, Sweden.



In collaboration with the Ministry of Environment and Water of Bolivia, UNU-INWEH examined 3 facets of water pricing: (1) economic aspects—the multiple processes through which water is conceptualized and priced; (2) analysis of water pricing effects on water consumption; and (3) the potential of water pricing as a water security tool.



"Water pricing is central to public policy discourse in many countries witnessing, competing, and conflicting water allocations and use".

Dr Nidhi Nagabhatla, Senior Researcher: Water and Ecosystems

through which water is conceptualized and priced; (2) analysis of water pricing effects on water consumption; and (3) the potential of water pricing as a water security tool.

KEY STAKEHOLDERS / AUDIENCE

UNU-INWEH's research has a diverse range of stakeholders broadly grouped into:



Politicians and policymakers, including members of parliament, ministers, policy advisors, and key government officials at the national and local levels, primarily in developing countries, concerned with water, health and environment issues



Donors and development partners active in water, health and environment, including NGOs and implementing agencies from the North and the South



Scientific community in water-related research institutions and academia (North and South)



UN agencies (and networks, such as UN-Water), other UNU Institutes and programmes, and international and regional organizations and networks



Host country and national partners and stakeholders in Canada



Media, especially key journalists looking for authoritative new information on science and development issues related to water, health and environment



Water-related industries and private entrepreneurs.



General public and civil society



Participants of the symposium, 'Science, Youth and Sustainable Development', part of the 'Water and Climate Dialogue Series', August 2018

UN AND OTHER POLICY LINKS

UNU-INWEH was a key contributor, providing coordination and original content, to the UN-Water Synthesis Report on the global progress towards SDG6. The Report was launched at the High-Level Political Forum (HLPF) and at UN Headquarters in New York.

The UNU-INWEH team also presented at several side events of the HLPF including sessions on (1) technical aspects of SDG6 Synthesis Report; (2) water and migration and (3) outcomes of the High-Level Water conference in Dushanbe in June 2018 - representing UN-Water Chair.

The team also contributed one of the six chapters of the UN 2018 World Water Development Report (WWDR) on Nature Based Solutions to water challenges. UNU-INWEH's engagement as a significant contributor to this Flagship UN-Water product began in 2017. This close relationship continues for future studies: UNU-INWEH has contributed to a chapter of WWDR 2019, and to work also started on WWDR 2020 on Water and Climate Change, where the Institute leads or co-leads writing of several chapters.

UNU-INWEH also co-coordinated the UN-Water Task Force (TF) on the planning of new UN Water Decade (2018-2028): "Water for Sustainable Development", together with UNDESA. In 2018, the TF produced an Action Plan for the Decade. This Plan was presented to the world by the UN Secretary General at the Decade launch in New York in March. Subsequently, UNU-INWEH and UNDESA were asked to coordinate the UN-Water TF on the actual implementation of the Water Decade over the coming two year. Some ten UN agencies are involved in this TF, whose role is to assist UN Member States in defining their contributions to the Decade.

In running its programme, UNU-INWEH maintains working relationships with some 40 national and international partners in some 20 countries and with several dozen UN agencies and UN-Water partners. The types of partnership and collaboration range from individual partnerships, to joint proposal submissions, cooperation on research papers and reports, joint workshops and project work, providing advisory services, participation in joint Task Forces, development of new curricula etc.



High-Level Political Forum (HLPF) at UN Headquarters in New York; the Session on SDG6 progress

SELECTED PUBLICATIONS

Alodah, A. and Seidou, O. (2018). The adequacy of stochastically generated climate time series for water resources systems risk and performance assessment. *Stochastic Environmental Research and Risk Assessment*: 1-17.

Amarnath, G., Simons, G. W. H., Alahacoon, N., Smakhtin, V., Sharma, B., Gismalla, Y., Mohammed, Y., Andriessen, M. C. M. (2018). Using smart ICT to provide weather and water information to smallholders in Africa: The case of the Gash River Basin, Sudan. *Climate Risk Management*, 22: 52-66.

Basara, B.N. and Perera, E.D.P., (2018) Analysis of land use change impacts on flash flood occurrences in the Sosiani River basin Kenya, *International Journal of River Basin Management*, 16: 179-188.

Brennan, C.P. Parsapour Moghaddam, P., Rennie, C.D., Seidou, O. (2018). Continuous prediction of clay bed stream erosion in response to climate model output for a small urban watershed. *Hydrological Processes*, 32(8): 1104-1119.

Drechsel, P., Danso, G. K., Qadir, M. (2018). Growing opportunities for Mexico City to tap into the Tula aquifer (Mexico) - Case Study. In: Otoo, M. and Drechsel, P. (Eds.). *Resource recovery from waste: business models for energy, nutrient and water reuse in low- and middle-income countries*. Oxon, UK: Routledge – Earthscan: 698-709.

Eriyagama, N., Smakhtin, V., Udamura, L. (2018). Centralized versus distributed reservoirs: an investigation of their implications on environmental flows and sustainable water resources management. *Proc. of the Int. Association of Hydrological Sciences*, 379: 43-47.

Fitzgerald, S.K. (2018) The role of constructed wetlands in creating water sensitive cities. In: Nagabhatla, N., and Metcalfe, C. (Eds.) *"Multifunctional Wetlands: Pollution Abatement and Other Ecological Services from Natural and Constructed Wetlands"*. Springer, p. 171-206.

Gado Djibo, A., Seidou, O., Saley, H., Philippon, N., Sittichok, K., Karambiri, H., Patrel, J. (2018) A Copula-based approach for assessing flood protection overtopping associated with a seasonal flood forecast in Niamey, West Africa. *Journal of Geography, Environment and Earth Science International* 15 (3): 1-22,

Guppy, L., Uyttendaele, P., Villholth, K. G., Smakhtin, V. (2018). *Groundwater and Sustainable Development Goals: Analysis of Interlinkages*. UNU-INWEH Report Series, Issue 04. United Nations University Institute for Water, Environment and Health, Hamilton, Canada. 23 pp

Karimov, A.K., Smakhtin, V., Karimov, A. A., Khodjiev, K., Yakubov, S., Platonov, A., Avliyakov, M. (2018). "Reducing the energy intensity of lift irrigation schemes of Northern Tajikistan- potential options," *Renewable and Sustainable Energy Reviews*, vol. 81(P2): 2967-2975.

Lucier, K.J., and Qadir, M. (2018). Gender and community mainstreaming in fog water collection systems. *Water* 10 (10): 1472 (8 pp).

Maufer, M.M.M. and Perera, E.P., (2018) Floods and countermeasures impact assessment for Metro Colombo canal network, Sri Lanka. *Hydrology*, 5(1): 11 (20 pp)

Metcalfe, C., Nagabhatla, N, and Fitzgerald, S.K. (2018). Multifunctional wetlands: Pollution abatement by natural and constructed wetlands. In: Nagabhatla, N., and Metcalfe, C. (Eds.). *"Multifunctional Wetlands: Pollution Abatement and Other Ecological Services from Natural and Constructed Wetlands"*. Springer, p. 1-14.

Nagabhatla, N., and Metcalfe, C. (Eds.). (2018). *Multifunctional Wetlands: Pollution Abatement and Other Ecological Services from Natural and Constructed Wetlands*. Springer. 305 pp

Nagabhatla, N., Springgay, E. and Dudley, N. (2018) Forests as nature-based solutions for ensuring urban water security. *Unasylva*, 69 (250): 43-52

Otoo, M., Gebrezgabher, S., Drechsel, P., Rao, K.C., Fernando, S., Pradhan, S.K., Hanjra, M.A., Qadir, M., and Winkler, M. (2018) Defining and Analysing RRR Business Cases and Models. In: *Resource Recovery from Waste: Business Models for Energy, Nutrient and Water Reuse in Low- and Middle-income Countries*. Oxon, UK: Routledge – Earthscan: 16-32

- Qadir, M., Jiménez, G.C., Farnum, R.L., Dodson, L.L., and Smakhtin, V. (2018). Fog water collection: Challenges beyond technology. *Water* 10 (4): 372 (10 pp)
- Qadir, M. (2018). Addressing trade-offs to promote safely managed wastewater in developing countries. *Water Economics and Policy* 4 (2): 1871002 (10 pp).
- Qadir, M., Schubert, S., Oster, J.D., Sposito, G., Minhas, P.S., Cheraghi, S.A.M., Murtaza, G., Mirzabaev, A., and Saqib, M. (2018). High-magnesium waters and soils: Emerging environmental and food security constraints. *Sci. of The Total Environment* 642: 1108-1117;
- Sandford, R.W. (2018) *Quenching the Dragon: the Canada-China Water Crisis*. Rocky Mountain Books, Canada. 168 pp
- Sandford, R. W., Smakhtin, V., Mayfield, C., Mehmood, H., and 17 more authors. (2018). *Canada in the Global Water World: Analysis of Capabilities*. UNU-INWEH Report Series, Issue 03. United Nations University Institute for Water, Environment and Health, Hamilton, Canada. 32 pp
- Shan, Y., Mehta, P., Perera, D., and Varela, Y. (2018). *Cost and Efficiency of Arsenic Removal from Groundwater: A Review*. UNU-INWEH Report Series, Issue 5. United Nations University Institute for Water, Environment and Health, Hamilton, ON, Canada, 20 pp
- Sittichok, K., Seidou, O., Gado Djibo, A., Rakangthong, N. K. (2018). Estimation of the added value of using rainfall-runoff transformation and statistical models for seasonal streamflow forecasting. *Hydrological Sciences Journal* 63(4): 630-645.
- Smakhtin, V. (2018) *Ecosystems in the Global Water Cycle*. In: *The Quest for Water - UN Chronicle Vol: LV* (1)
- Smakhtin, V., Nagabhatla, N., Qadir, M., Guppy, L. Burek, P. Villholth, K., Mccartney, M., Pavelic, P., Tsegai, D., Fedotova, T., Teruggi, G. (2018) *Nature based solutions (NBS) For Managing Water-Related Risks, Variability and Change – Chapter 4*. In: *United Nations World Water Assessment Programme/UN-Water. (2018). The United Nations World Water Development Report 2018: Nature-Based Solutions for Water*. Paris, UNESCO. p. 64-78.
- Soto Rios, P., Deen, T., Nagabhatla, N., and Ayala, G. (2018). Explaining water pricing through a water security lens. *Water*, 10 (9): 1173 (20 pp).
- Thupalli, R., and Deen, T.A. (2018) *An investment strategy for reducing disaster risks and coastal pollution using nature-based solutions*. In: Nagabhatla, N., and Metcalfe, C. (Eds.) *"Multifunctional Wetlands: Pollution Abatement and Other Ecological Services from Natural and Constructed Wetlands"*. Springer, p. 141-170.
- Yang, J. Yang, Y.C.E., Khan, H.F., Xie, H., Ringle, C., Ogilvie, A., Seidou, O., Gado Djibo, A., Van Weert, F., Tharme, R. (2018). Quantifying the Sustainability of Water Availability for the Water-Food-Energy-Ecosystem Nexus in the Niger River Basin. *Earth's Future*, 6: 1292-1310.
- Yongabi, K., Nagabhatla, N., and Soto Rios P.C. (2018) *Phytoremediation and eco-models using Indigenous macrophytes and phytomaterials*. In: Nagabhatla, N., and Metcalfe, C. D. (Eds.) *"Multifunctional Wetlands: Pollution Abatement and Other Ecological Services from Natural and Constructed Wetlands"*. Springer, p. 253-274.
- Xenarios S., Smakhtin V., Sehring J., Schmidt-Vogt D., Tsani S., Hannah C. and Michalena E. (2018) *Water-Energy-Food Nexus and Environment in Central Asia*. In: Carmona-Moreno C., and Dondeynaz C. (Eds) *" EC Position Paper on Water, Energy, Food and Ecosystem (WEFE) Nexus and Sustainable Development Goals (SDGs)" Publications Office of the EU*.
- WHO - UN-HABITAT. (2018). *Progress on safe treatment and use of wastewater: Piloting the monitoring methodology and initial findings for SDG indicator 6.3.1*. Geneva: World Health Organization and UNHABITAT. License: CC BY-NC-SA 3.0 IGO.

SELECTED EVENTS

February

- ▶ 28th UN-Water meeting, Rome, Italy
- ▶ FloodNet – UNU-INWEH workshop on bridging flood science and policy. Hamilton, ON, Canada
- ▶ 3d Conference of International Network for Alpine Catchment Hydrology, Zugspitze, Germany

March

- ▶ Expert consultation on global monitoring of SDG 6.3. Geneva, Switzerland
- ▶ Regional consultation meeting on water issues in the Arab region for sustainable development and High-Level Political Forum, Beirut, Lebanon
- ▶ Ajman 5th international environment conference, Ajman, United Arab Emirates.
- ▶ IPCC Cities and Climate Change Science Conference, Edmonton, AB, Canada



Participants of the 5-th Ajman International Conference on Environment, UAE, March 2018

April

- ▶ Expert meeting to assist UN Member States to incorporate environmental flow requirements into SDG indicator 6.4.2 (water stress). Rome, Italy
- ▶ Phosphogypsum working group meeting and International Fertilizer Association (IFA) global technical symposium. Madrid, Spain

May

- ▶ WMO global conference “Prosperity through Hydrological Services”. Geneva, Switzerland
- ▶ 8th GEWEX Open Science Conference: Extremes and Water on the Edge. Canmore, AB, Canada

June

- ▶ 1st International Conference on Water Security. Toronto, ON, Canada
- ▶ FloodNet Annual General Meeting 2018. Quebec City, QB, Canada
- ▶ International Association for Great Lakes Research annual conference. Scarborough, ON, Canada
- ▶ Global Water Futures Inaugural Annual Science Meeting. McMaster University, ON, Canada

July

- ▶ 41st Annual Water, Environment and Development Centre Conference. Nakuru, Kenya

- ▶ High-Level Political Forum (HLPF) on sustainable development. New York, USA
- ▶ The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)- 3d meeting of the Global Ecosystem Services Assessment program. Frankfurt Germany

August

- ▶ 29th UN-Water Meeting, Stockholm, Sweden
- ▶ World Water Week 2018, Stockholm, Sweden



Dr Nidhi Nagabhatla on the panel of the Opening Plenary, Stockholm, Sweden. Photo Credit: SIWI

September

- ▶ InterAction Council meeting. Beijing, China
- ▶ Workshop on Mainstreaming and Implementing the Water-Energy Nexus for Sustainable Development in Africa. Addis Ababa, Ethiopia
- ▶ Inception workshop of the World Water Development Report 2020, Perugia, Italy
- ▶ International Workshop of the Project 'Water in the World We Want'. Ottawa, ON, Canada
- ▶ Mid-term Project Workshop: Achievement of Water-related SDGs; Gyeongju, Republic of Korea
- ▶ High Level Conference on Climate Change Assessment and Adaptation in the Arab Region, Beirut, Lebanon

October

- ▶ International Snow and Ice Conference. Santiago, Chile

November

- ▶ Inception workshop of the World Water Quality Assessment Initiative. Geneva, Switzerland
- ▶ Research Partners Meeting of the GEF-IWEco project: Integrating Water, Land and Ecosystems Management in Caribbean Small Island Developing States. Rodney Bay, St. Lucia, West Indies
- ▶ World Indigenous Law Conference. Windsor, ON, Canada.

December

- ▶ Thriving Earth Exchange Project Launch, American Geophysical Union Fall Meeting. Washington, DC, USA

Another Drop Lecture Series

January: The Cryosphere: Changes and Impacts on the Environment and Human

Speaker: Dr. Gordon Young



February: Hamilton Harbour Remedial Action Plan

Speaker: Dr. Chris McLaughlin, Bay Area Restoration Council (BARC)



September: Water-Related Catastrophes and What They Mean for the Insurance Industry

Speaker: Ms. Laura Twiddle, Catastrophe Indices and Quantification Inc. (CatIQ)



October: Water and Canada's Extractive Industries: Challenges and Opportunities

Speaker: Dr. Sean Carey, McMaster University



November: Communicating Water Issues Using Film and Television

Speakers: Alex and Tyler Mifflin, The Water Brothers



CAPACITY DEVELOPMENT

Water Without Borders 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 programme extends over two- semesters 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 2018.



Water Without Border students on a field trip to Ghana, February 2018

Short-term in-house training programmes

UNU Internships are open to recent graduates or final-stage graduate programme students. Internship gives a first-hand look at the operations of the United Nations. As part of the internship, interns produce a paper/ tool/dataset that contributes to an UNU-INWEH project. Interns are required to make a 3-6month full-time commitment; longer internships are preferred. In 2018,



"The UNU INWEH internship programme mestimulated me to challenge myself and work hard to fulfil my vision and career goals. Reemphasizing the belief that never say we can't before we have ever really tried".

Nuha Elgindi, Internship Programme, 2018

UNU-INWEH had five interns from three countries pursuing masters and doctoral degrees, enrolled in this programme.

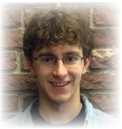
Embedded Learning Experience (ELE) Programme is designed for early-stage scholars enrolled in a university graduate programme. It provides an opportunity to assist in live UNU-INWEH projects. ELE placements are normally for 1-3 months. In 2018, seven young scholars from four countries (China, South Korea, France, Canada) completed the programme.



"Working at UNU-INWEH and meeting scholars from different parts of the world gave me a memorable life experience, and it helped me to set a more definite goal for my career path".

Shu Yu, ELE Programme, 2018

McMaster University Student Traineeship (MUST) Programme, launched in 2018, is specifically designed for McMaster University students from all faculties and departments.



"I found it very rewarding to be able to contribute to meaningful research and policy development and to be welcomed as a valued member of the organisation".

Spencer Williams, MUST Programme, 2018

It is an opportunity for students to strengthen their skills in water science-policy bridging. Five scholars from engineering, health, public policy and biological sciences joined the MUST programme this year.

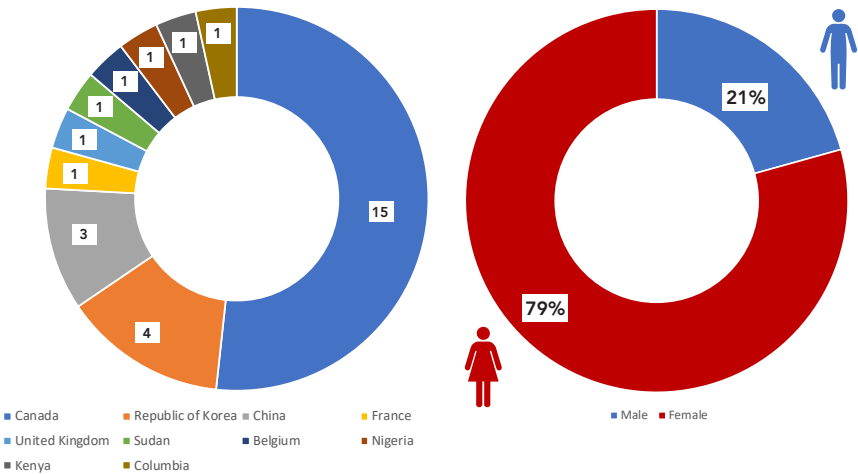
UNU-INWEH in partnership with McMaster University hosts a regular seminar series Water and Climate Dialogue. It provides a platform for young scholars and seasoned experts to discuss their research work on water, environment and health topics. In 2018, UNU-INWEH organised seven sessions, welcoming some 43 speakers from 23 countries, with over 50% women and over 40% - participants from developing countries.



UNU-INWEH event, 2030AfricaWaterSecure, June 2018

On-line learning

UNU-INWEH's on-line Water Learning Center (WLC- <http://wlc.unu.edu/>) offers three courses: Integrated Water Resources Management, Mangroves Management and Global Water Security (from 2019). 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 2018, 13 students from 7 countries were enrolled in the 2018-2019 Integrated Water Resources Management diploma programme, Arab region.



Number of in-house and online trainees by country and gender

INTERNATIONAL ADVISORY COMMITTEE



Participants of the IAC meeting, May 2018, Hamilton, ON, Canada. From left to right: Roberto Lenton (IAC member), Claudia Ringler (IAC member), Ania Grobicki (IAC member), Margaret Biggs (IAC Chair), Vladimir Smakhtin (Director: UNU-INWEH), David Passarelli (UNU Executive Officer, Representing UNU Rector), Manzoor Qadir (Assistant Director: UNU-INWEH)

Ms Margaret Biggs

Matthews Fellow in Global Public Policy, School of Policy Studies, Queens University, Ontario, Canada

Expertise: Maternal and child health, democratic governance

Dr Siegfried Demuth

Director of the International Centre for Water Resources and Global Change, Germany

Expertise: Hydrology, Water resources and climate change; floods and droughts

Dr Ania Grobicki

Water Expert: Land and Water Division; FAO, Rome, Italy

Expertise: Water for cities, industry, agriculture, energy, and the environment

Dr Roberto L. Lenton

Founding Executive Director, Robert B. Daugherty Water for Food Institute University of Nebraska, USA

Expertise: Global development agenda, food security

Dr Claudia Ringler

Division Director: International Food Policy Research Institute, USA

Expertise: Global water modelling and policy; water-energy-food nexus

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 Resource Management



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