Managing Water Resources Variability and Risks for Increased Resilience

Empowering water policy and decisions for a sustainable society – the UNU-INWEH initiative for global water-related disaster risk reduction.

The Challenge

Water variability is a major impediment to sustainable development. Natural and man-made interventions trigger water variability, creating catastrophic situations that cause thousands of deaths annually and billions in losses for national economies. The average annual global economic loss from floods and drought is over $40 billion, across all economic sectors. This figure is projected to increase to $200 – 400 billion by 2030, according to various estimates. This is largely due to the increasing frequency and severity of water extremes, attributed to climate change. In addition to floods, droughts and other natural water-related disasters, other real risks to countries’ water resources are the failures of aging water infrastructures, explosions of chemical, biological or nuclear stockpiles, and the potential threats from water-focused terrorism, these emerging risks need to be understood and quantified.

The Solution

Current practices of counteracting and managing increasing levels of water variability, its consequences, and other water-related risks are far from adequate. New approaches are necessary to ensure optimal planning, investment and national risk assessment. At the same time, lessons need to be distilled from previous researches and extreme water events to know why and where specific risk and disaster-reduction interventions worked or did not, what is their effectiveness, the value for money or return on investment of the interventions and the overall value of these activities in terms of sustainable development, in the UN Member States. The range of solutions that policy makers and planners can apply includes (but not limited to):

- Better understanding and quantification of risks related to water variability extremes, and other water-related risks, their potential threats to countries and communities, and assessment of the effectiveness of various risk and disaster reduction interventions;
- Technical and economic appraisal and design of diverse surface-subsurface water storage ‘portfolios’, combining both man-made (‘grey’) and natural (‘green’) infrastructure to manage water resources variability in river basins, with a specific focus on subsurface water storage to manage both floods and drought;
- Mainstreaming the concepts of ecosystem services (ESS), livelihoods diversification, and disease control into planning and management of ‘grey’ water storage, and guiding more investment to these activities;
- Identifying and addressing resource limitations, knowledge gaps and psychological barriers for communities’, local governments’ and other stakeholders’ – that slow implementation of risk reduction strategies.

The Project

The overall goal of the project is to increase resilience and preparedness of men, women, communities, UN Member States, local governments and private sector actors to address a range of natural and man-made / induced water-related risks and disasters. The specific aims that this project will explore include:

- Nature-based scientific solutions that minimize water variability extremes’ (floods and droughts) risks and damages, and to distill policy lessons from past risk-reduction interventions;
- Mainstreaming of the concepts of water resources variability management, innovative water storage interventions into decision making and policies globally and locally;
- Identifying, quantifying and helping mitigate man-made water-related security risks, for example the consequences of aging water infrastructure, mismanagement, various forms of terrorism associated with water, nuclear, chemical and biological accident threats to water resources etc.;
- Identifying capacity gaps in these areas, and addressing them through specifically targeted on-line courses, webinars, seminars, and knowledge-bridging workshops.
Many SDG targets address various aspects of water-related disaster management and variability—either explicitly or implicitly. Apart from SDG 6 (water goal), target 1.5 aims to “... build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to ... shocks and disasters”. Targets 2.4 and 9.1 focus on “…resilient agricultural practices …” and “... resilient infrastructure …” respectively. Target 11.5 aims to “… reduce the number of deaths and the number of people affected ... decrease the direct economic losses ... caused by disasters, including water related disasters, with a focus on protecting the poor and ... vulnerable”. Target 13.1 is to “strengthen resilience and adaptive capacity to climate-related hazards and natural disasters ...”. There are obvious synergies between these targets. Through the provision of data, tools, innovative concepts and critical analysis of the state-of-the-art and gaps, this project contributes to above goals and targets. The project will also position itself to directly contribute to the global targets for disaster risk reduction set by the 2015 Sendai Frame Work for Disaster Risk Reduction.

The project’s approaches and activities include (and are not limited to): i) Synthesis of data and information from global and regional databases, scientific literature, and expert opinions on the issues related to the project scope; ii) Engagement with established and emerging international networks and partners; iii) Co-piloting possible solutions with a range of local partners; iv) Capacity development activities, including online courses, and knowledge-bridging workshops.

Anticipated project outputs include:
- Improved understanding and quantification of economic, environmental and societal risks and benefits associated with water variability and its consequences. Quantification of man-made or man-induced water-related risks;
- Guidance for implementing ESS-based solutions for underground flood harvesting and conjunctive flood and drought management, and an alternative to conventional grey infrastructure;
- Improved overall understanding of the functioning and links between surface and subsurface, natural and built (green and grey) water infrastructure in river basins, ESS that they provide, and their role in supporting flood and drought mitigation, and overall economic and social development under current and future climates;
- Estimates of investments needed to implement water variability interventions in river basins, costs and benefits associated with the impacts that arise from those investments;
- Decision support tools for water-variability related disaster preparedness and response, improved understanding of the vulnerability of communities, economic sectors and countries to these disasters and the risks that are increased by climate change;
- Targeted capacity development programs and scientific publications and presentations to document and disseminate research findings, and capture and share learning;
- International public goods and contributions to UN databases, assessments and safety guidelines, maps and Atlas of water related security threats.

The project will examine the relationship between gender and water variability-related disaster risk reduction. Increasing water variability has differential impacts on how men and women are affected and how they can respond. The project will contribute to women’s capabilities to become more resilient and empower them for preparedness for anticipated water disasters.

The project beneficiaries include policy makers, UN Member States’ officials tasked with water resources development, environmental safety and security, disaster management and climate change adaptation. Development partners – multilateral development banks, bilateral donors, private sector investors, and water-professionals working on disaster risk reduction and overall security – will also benefit from project outputs.

As the project addresses one of the major global development challenges, water resources variability and associated risks, it contributes directly to UNU-INWEH’s mission to help resolve such pressing global water challenges that are of concern to the United Nations, its Member States and their people. The project runs during 2018-2019 and is anticipated to evolve into a larger initiative from 2020.

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