Hydro Resilience

CITIZEN AND OPEN SCIENCE FOR CLIMATE ADAPTATION

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Intergovernmental Hydrological Programme

Flanders
State of the Art

Background

Human-induced climate change is affecting weather and climate extremes worldwide and causing changes in the atmosphere, ocean, cryosphere and biosphere leading to widespread adverse impacts on people and nature. These conditions have exposed people to reduced water security and negatively affected food security and ecosystem services.

Despite advances in climate and water sciences, there is still a significant gap between information availability and its uptake by stakeholders. Although there is abundant data and information available on the potential impacts of climate change, there is a lack of expert knowledge on the user side, which limits the development and implementation of effective adaptation strategies at the local level. There is also an opportunity to bring communities more on board to manage their climate risk through citizen engagement and to ensure that vulnerable communities can benefit from climate science foresight.

To address these challenges, a new project was developed called 'Hydro-Resilience: Citizen and Open Science for Climate Adaptation' to pilot citizen and open science applications for climate risk management and to support water management under climate change uncertainty.

Objectives

The project aims to improve the ability to forecast hydro-climatic extremes, such as droughts and floods, and to develop, test and evaluate the use of citizen and open science methodologies to build water resilience against climate change and improve water management in pilot countries of Sub-Saharan Africa and Latin America.

In particular, it aims to

- Enhance capabilities on hydro-climate vulnerability and water resilience management
- Promote knowledge generation and validation through citizen and open science
- Support the implementation of bottom-up approaches to climate change adaptation using Climate Risk Informed Decision Analysis (CRIDA)
- Supporting hydro-climatic risk management strategies and policies in pilot countries

Activities

HYDRO-RESILIENCE WILL BE IMPLEMENTED THROUGH FOUR PILLARS FOCUSING ON A SET OF DIFFERENT ACTIVITIES:

1. Hydroclimatic Vulnerability, Monitoring and Early Warning

- Establish a repository of Open Source and Open Access hydroclimatic vulnerability and hazard assessment approaches
- Move towards high-resolution, community-based, Open Source and Open Access flood and drought monitoring and early warning systems

2. Knowledge Co-generation through Open Hydrology and Citizen Science

- Piloting of Internet-of-Things (IoT) sensor networks
- Pilot Open Hardware applications through capacity building
- Support Open-Source software development and repositories
- Open Hydrology seminar and capacity building
- Citizen Science Toolbox development and case study implementation
- Support the establishment of Open Data Platforms (IHP-WINS)
- Engagement of Artificial Intelligence applications in Open Hydrology
- Best practices and lessons learned on Citizen and Open Science for water resources management

3. Building climate change resilience through bottom-up approaches (CRIDA)

- Support CRIDA case studies in Latin America and Africa
- Establish Open Source and Open Access tools for CRIDA
- Provide Open Learning opportunities for CRIDA

4. Support hydro-climatic risk management strategies and policies

- Development of policy briefs exploring Citizen Science, Open Science and CRIDA implementation
- Outreach events focusing on the discussion of challenges and opportunities related to the implementation of Citizen Science, Open Science and CRIDA
- A high-level science policy session on the state of the art of Citizen and Open Science as a tool for enhancing water-climate resilience

Expected Partners and Stakeholders

The project seeks to engage a diverse set of stakeholders for its implementation and further development, including academic and governmental partners in pilot countries engaged in water resources management climatic risk management. The project will particularly involve its Water Family of UNESCO Chairs and Category I and II Centers.

Linkages to IHP-IX and other agendas

The project will be implemented under the Ninth Phase (2022-2029) of the Intergovernmental Hydrological Programme (IHP) "Science for a water secure world in a changing environment". The Hydro-Resilience project will particularly target the following Priority Areas:

Priority Area 1: Scientific research and innovation

- Output 1.9 Development and sharing of new technologies using earth observation, Artificial Intelligence, and Internet of Things to increase their use in hydrological planning and assessment as well as monitoring and distribution networks

- Output 1.10: Conducting and sharing of research on integrating citizen science in the hydrological to improve understanding of the water cycle enabling science-based decision making

Priority Area 3: Bridging the data-knowledge gap

- Output 3.3 Comparing and validating open access data on water quantity, quality and use and their sharing by the scientific community supported for sustainable water management

Priority Area 4: Integrated water resources management under conditions of global change

- Output 4.8 Development and sharing of methodologies and tools in mainstreaming global changes within water management by the scientific community supported for improved planning by decision makers at all levels

Priority Area 5: Water Governance based on science for mitigation, adaptation, and resilience

- Output 5.5: Capacities of the scientific community and decision makers strengthened on new frameworks and tools to underpin water governance and build resilience and by developing CRIDA case studies

Furthermore, the project is focused on the Sustainable Development Goal 6 (SDG6) on 'Clean Water and Sanitation' and SDG13 on 'Climate Action', and has linkages to SDG11 on 'Sustainable Cities and Communities' and SDG 17 on 'Partnerships for the Goals'. Hydro-Resilience is also a contribution to the Sendai Framework for Disaster Risk Reduction.

Coordination

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