FUTURE CLIMATE FOR AFRICA

Impact Stories

Informing long-lived decision making in the Lake Victoria basin through provision of a plausible range of future lake level and outflow changes

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Project:
HyCRISTAL

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IMPACT

Use of the climate models CP4-Africa and P25 have increased the plausible range compared with CMIP alone, showing unique value of these simulations. Given these models have high resolution and a realistic lake (at least in current climate) and so are 'highly plausible', this evidences a chain of impact from IMPALA through HyCRISTAL to HyTpp and its stakeholders.

The results highlighted the risks of changes that stakeholders must incorporate into decision-making. HyTpp outcomes and analysis was shared with the World Bank and its consultants. The World Bank shared it at a Lake Victoria workshop and preliminary current-climate analysis was shared at the 2018 HyCRISTAL meeting. Full current and future analysis was shared at the next meeting with stakeholders that included Kampala city authorities, the Ministry of Water in Uganda and the East African Community.

THE CHANGE STORY

Lake Victoria is one source of the Nile and it provides major fisheries (which are important both to local livelihoods and the national economies), is a key transport route between three major countries of the East African community and the Lake outflow provides a major hydropower source. The lake is unusual in that it is the largest tropical lake in the world and is largely fed by on-lake rain (not rivers) and largely emptied through evaporation (not rivers). The evaporation and lake-land circulations mean the lake triggers rain over the lake at night, making it a unique coupled hydrological-meteorological system.

Funding was obtained through the HyTpp project (funded by DFID through the Corridors for Growth Trust Fund administered by the World Bank) to analyse plausible future changes in lake levels and outflows and how future abstractions might change these. These have been shared with relevant stakeholders working with the World Bank and will be shared more widely through HyCRISTAL communication activities and peer-reviewed papers.

HyCRISTAL has made several contributions to HyTpp;

1. Contributions of expert guidance/writing,
2. Provision of CMIP data over the lake for analysis within HyTpp,
3. Analysis of CP4-Africa & P25 model data (from IMPALA) over the lake,
4. A platform to share outcomes with wider stakeholder networks at annual HyCRISTAL meetings,
5. Geographical Information System (GIS) mapping of potential impacts of possible future lake-level increases.

HyCRISTAL

FCFA area of change 1:

Enhancing scientific knowledge and prediction of African climate and new understanding of the resulting impact on the robustness of future climate change scenarios.

FURTHER RESOURCES

Understanding future river flows in Lake Victoria Basin

LEARNING

Other similar projects should clearly engage with decision makers early and repeatedly to ensure user relevance and ideally use both stress-testing and plausible scenarios.

Two limitations of the 'plausible range' analysis are (as understood from project conception) (1) for a stochastic system such as Lake Victoria, how unlikely is 'implausible' and (2) when all climate models are fundamentally limited by their physics, how to account for possible global climate change beyond the CMIP, or CMIP+CP4-Africa range. Although (1) can be dealt with effectively by understanding user needs, (2) is more challenging.

HyTpp has revealed research priorities in this area. Beyond the question of the changing regional hydroclimate – a grand challenge of climate science, improved predictions require: (1) ensembles of well-evaluated coupled lake-atmosphere models, (2) improved understanding and predictions of future inter-annual variability, in particular successive wet years, which are responsible for rapid and large lake-level rises, (3) improved observations and monitoring are needed to force and evaluate models.

Fundamentally, predictions of changing lake-level are limited by global climate model predictions ("wetter or drier"), rather than for example future abstraction. HyCRISTAL work shows this requires both future-centric process-based model evaluation leading to observational-constraint and development of model physics and dynamics.

Future Climate for Africa's Areas of Change are:

1. Enhancing scientific knowledge and prediction of African climate and new understanding of the resulting impact on the robustness of future climate change scenarios.
2. Strengthening scientists' capacities to develop decision-relevant climate information.
3. Increasing the capacities of users/decision making bodies/institutions to appropriately integrate climate information within medium-term decision-making.
4. Approaches that support co-production of decision-relevant climate information and enable channels for on-going dialogue between the providers and users of climate information.
5. Identifying social, political, behavioural and economic barriers to the use of climate information in long-term decision-making, working to elicit solutions which support effective integration of climate risks within decision making across scales, sectors and social groups.
6. Approaches to climate science research and climate-sensitive risks within medium-term decision making which enable active participation and address the specific concerns of women and marginalised groups.

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