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Full-value chain Optimised Climate User-centric Services for Southern Africa

Building a climate service for hydro-power ressources: Application to Mpatamanga project in Malawi

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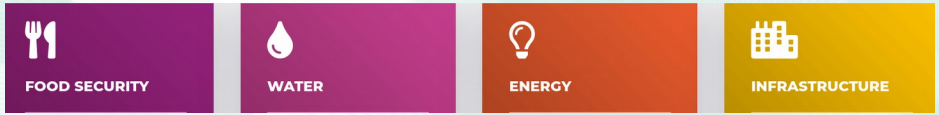
A H2020 project (2020-2024)

- Developing sustainable tailored Climate Service in the Southern African Development Community (SADC) region.
- Eigth case studies for:
  - Four sectors:



  - Five countries: Malawi, Tanzania, South Africa, Mozambique and Mauritius

- EDF leads case study N°7 on Water and Energy in Malawi:

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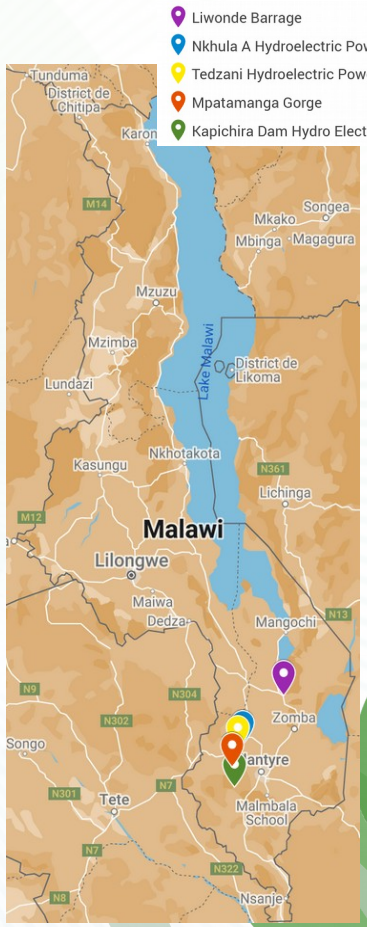
Energy & Water in Malawi

Country contexte

- The country heavily relies on hydropower, which is projected to be increasingly exposed to large climate fluctuations:
  - In Malawi, total generation capacity is 439 MW (~88 % from hydroelectricity)
  - Current Access Rate 10.8% (Rural: 1% Urban: 46%) → 30% by 2030
- **Case study 7 focuses on the impact of climate change on the hydro-power resources for the Mpatamanga project in Malawi, a one billion cost project which will increase by 80% the total installed generation capacity of the country (350 MW). EDF has signed on September 2022 a binding commercial Agreement to undertake the co-development of the Mpatamanga hydropower project together with the Government of Malawi, the International Finance Corporation (IFC) and Scatec.**



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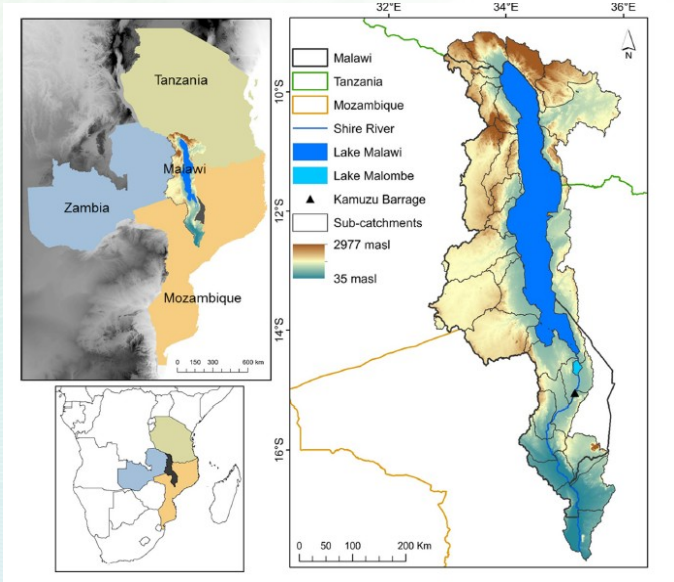
Energy & Water in Malawi

The hydro-climatic contexte

- **Shire river outlet:**
  - Lake Malawi provides 80-90% of waterflow
  - Shire river catchment provides 10-20% of waterflow
- **Lake Malawi level**: below 471.5 m a.s.l --> no discharge
- **Lake Malawi water contribution :**
  - 55% : Malawi
  - 41% : Tanzania
  - 4% : Mozambic

Bhave et al., J. of Hydrology (2020)



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Energy & Water in Malawi

State of the art

Bhave et al. (2020): By 2030 : one model over six predicts a water level below the lake discharge threshold.

➔ need to be updated with the latest climate projections
➔ need to use a multi-hydrological modeling framework

FOCUS-Africa SC7 :

- Future water resources sustainability in a climate change context.
- Impact of future water needs (share with agriculture) on the lake level.
- Evaluate the risk that the lake level drops (sustainably) below the critical threshold.

Bhave et al. (2020)

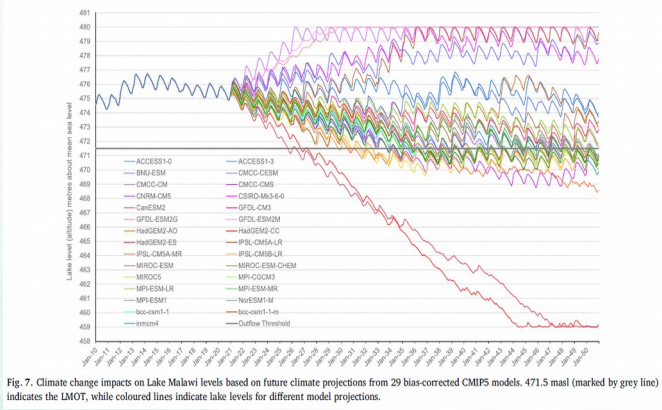
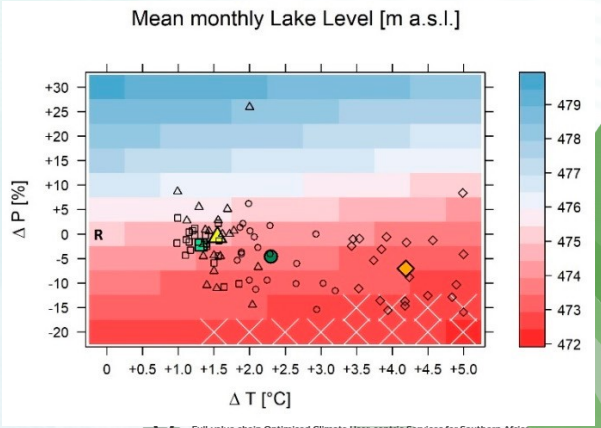


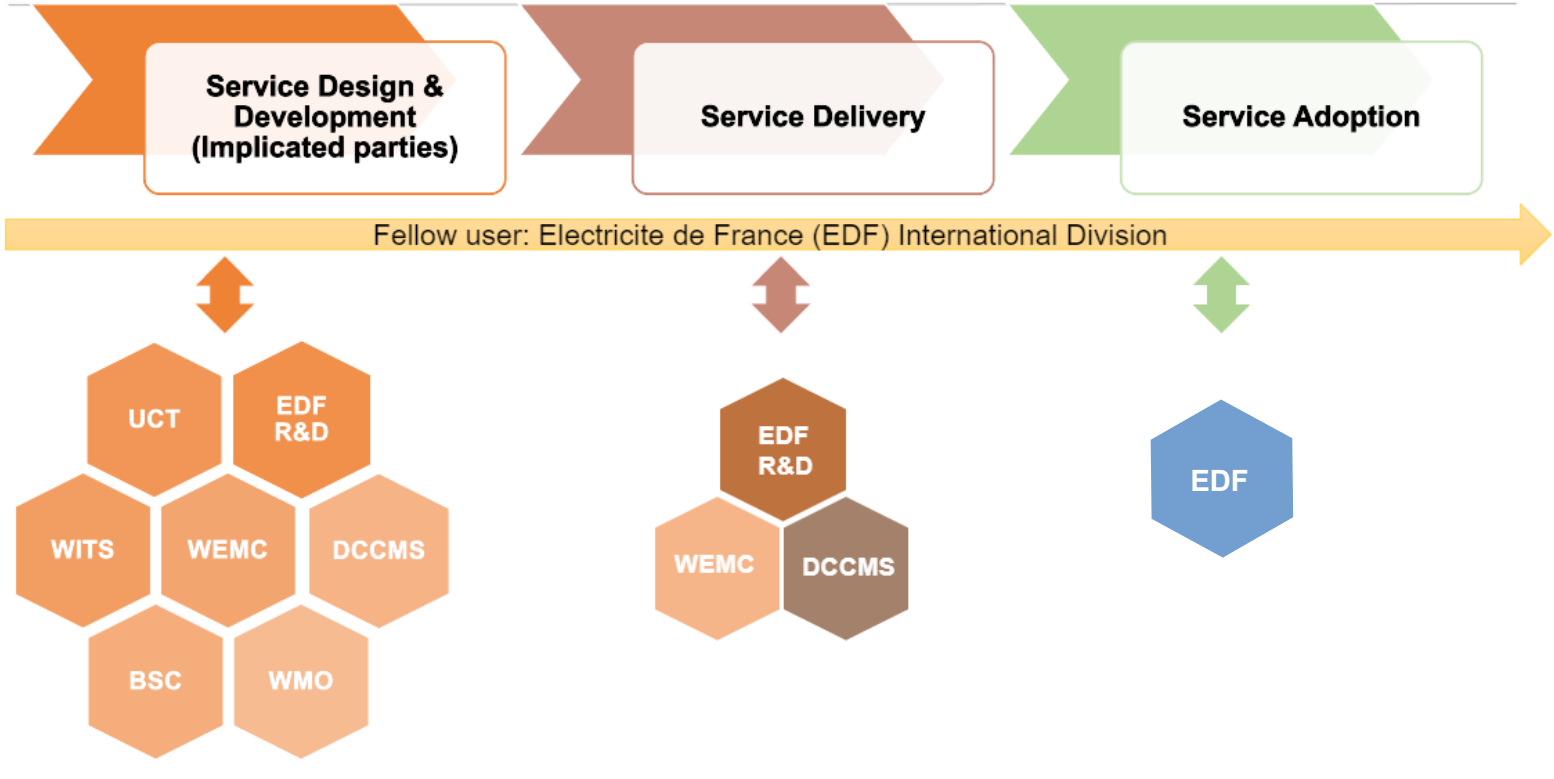
Fig. 7. Climate change impacts on Lake Malawi levels based on future climate projections from 29 bias-corrected CMIP5 models. 471.5 masl (marked by grey line) indicates the LMOT, while coloured lines indicate lake levels for different model projections.

➔ Mtilatila et al. (2020)



Energy & Water in Malawi

The frame-work



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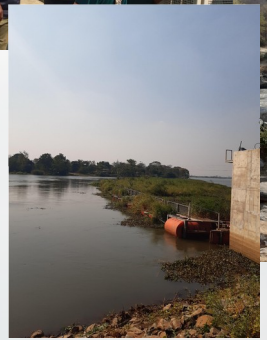
The field mission

Malawi : 02-08 October 2022

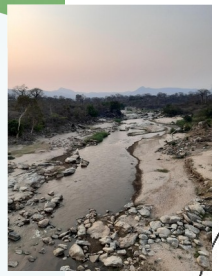
Meeting with stakeholders

Field visits



The field mission

Learnings : Water-Energy-Food nexus



WATER

Droughts

Energy poverty

Reduction of hydroelectric power generation

Deforestation (charcoal)

Soil depletion

Irrigation

ENERGY

Increasing evaporation

Use of fertilizer

AGRICULTURE

Increasing temperature

Sedimentation

Soil erosion

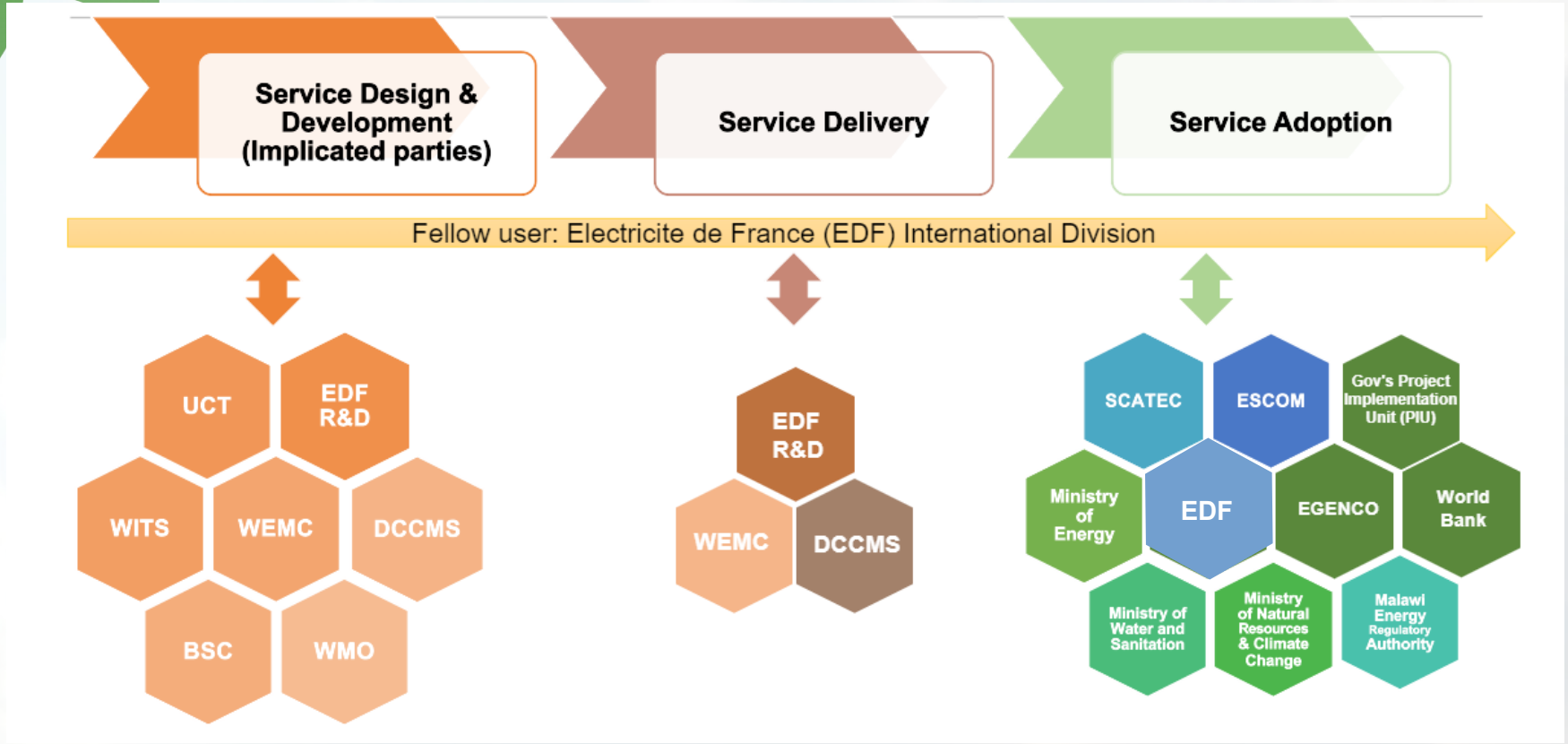
Water quality

Weed boom Water hyacinth

Heavy precipitation

Energy & Water in Malawi

The updated frame work



Energy & Water in Malawi

The climate service

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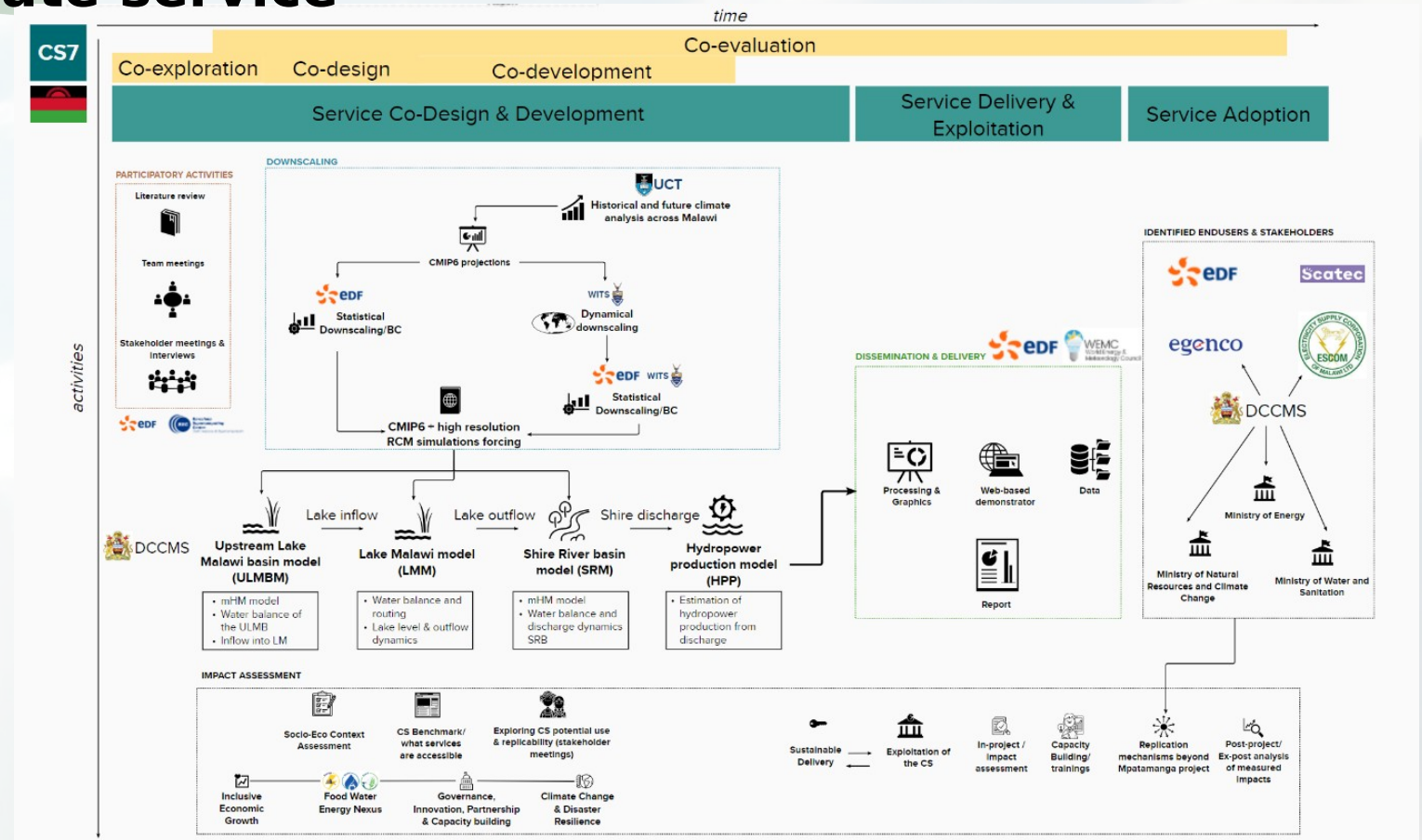

Conclusions

➔The country mission was fundamental to understand the local context and the real needs for the climate information.

➔It allowed us to identify the strong interconnections between the different socio-economic sectors and the need to build a climate service that take into account all these aspects in order to be useful for all end-users and not only the energy sector.

➔Training the local stakeholders to use and to maintain the climate service is also very important for the prosperity of the climate service beyond the lifetime of the European project.

THANK YOU


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List of hydropower station in Malawi

Hydroelectric station	Type	Capacity (MW)	Year completed	River
Kapichira	Run of river	128	2014	Shire
Nkhula A	Run of river	24	1966	Shire
Nkhula B	Run of river	100	1980	Shire
Tedzani I	Run of river	20	1973	Shire
Tedzani II	Run of river	20	1977	Shire
Tedzani III	Run of river	52.7	1996	Shire
Tedzani IV	Run of river	18	2020	Shire
Wovwe	Run of river	4.35	1995	Wovwe
Mpatamanga	Reservoir	350	2025	Shire