LANDEX

Improving landscape resilience by integrating measures to adapt and mitigate hydrological extremes

Water4All
Water security for the planet

Abstract

It is critically important to protect society from the effects of floods and droughts, which will occur more frequently in future due to climate change. LandEX aims to improve landscape resilience to hydroclimatic extremes – both floods and droughts – by spatially optimising a suite of adaptation measures in the landscape. Knowledge gaps addressed by LandEX include:

I. How different (Nature Based Solution; NBS) measures can increase water retention in the landscape and, thus, mitigate floods and droughts at the same time;

II. How their spatial location determines their effectiveness at the landscape level, and

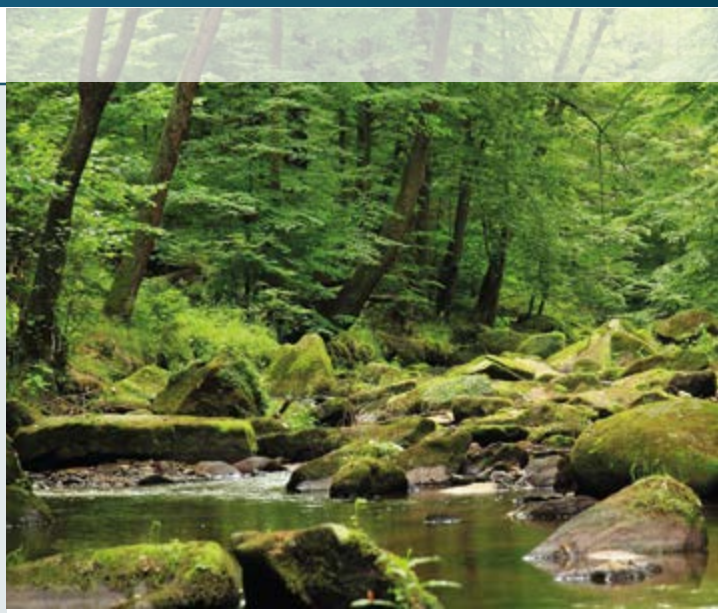
III. Potential synergies between a network of different measures distributed throughout the landscape to mitigate both floods and droughts.

LandEX uses the concept of hydrological connectivity to design spatially-explicit adaptation scenarios which retain water from wet periods to be available during dry periods. To quantify scenario effectiveness at the regional scale, LandEX uses connectivity-based spatially distributed hydrological modelling. This approach is tested in 5 study areas in northern and southern Europe. LandEX works closely with local and regional stakeholders, as it is crucial to co-design such adaptation scenarios to ensure their feasibility and adoption and to incorporate them into regional spatial planning.
LandEX aims to achieve the following objectives, addressed in specific Work Packages (WP):

- WP1: Investigate in each study area (i) the current hotspots for flood and drought occurrence; (ii) how existing flood and drought mitigation measures perform and/or why they are not effective, both technically and socioeconomically; and (ii) potential synergies of (NBS) measures to mitigate both floods and droughts, using the concept of water retention landscapes.
- WP2: Co-design spatial adaptation scenarios of feasible and potentially effective suites of measures in the landscape, in close collaboration with local stakeholders.
- WP3: Quantify the effectiveness of the adaptation scenarios (from WP2) on floods and droughts using spatially explicit hydrological models.
- WP4: Develop a tool to support managers in optimising landscape resilience to hydroclimatic extremes and to visualise scenario outcomes through an online map interface.
- WP5: Stimulate co-learning between the 5 study areas by enabling exchange of experiences with different sets of innovative adaptation measures.

While building on previous experience within the consortium (e.g. modelling, stakeholder relations), LandEX contributes to important innovation: we explicitly seek measures that can work for both floods and droughts in a synergistic way, so that their combined effect is more than the sum of their parts. This is highly needed, as only a limited number of measures can be implemented in an area. In addition, our approach focuses on using NBS to affect hydrological connectivity: i.e. measures that slow the flow of water in the landscape can retain water from wet periods to be available during dry periods. Quantifying the effectiveness of multiple measures is not often done in a spatially explicit way, while by doing so, their (spatial) interactions and feedbacks are taken into account, which is needed to detect synergies between different types of measures at various locations in the landscape. We use spatially-explicit hydrological models to assess the effectiveness of multiple configuration of measures. Finally, the co-creation of the spatial adaptation scenarios by groups of multiple stakeholders incorporates the socio-economic feasibility of the measures and helps overcome institutional barriers.

LandEX consortium partners have great experience with floods and droughts, mitigation measures, including NBS, hydrological modelling and stakeholders participation in projects. In addition, consortium partners have collaborated in earlier and ongoing projects.



Project coordinator: **Jantiene BAARTMAN**

WAGENINGEN UNIVERSITY - THE NETHERLANDS

Project partners

- AGENCIA ESTATAL CONSEJO SUPERIOR DE INVESTIGACIONES CIENTIFICAS - SPAIN
- FCIENCIAS.ID - ASSOCIACAO PARA A INVESTIGACAO E DESENVOLVIMENTO DE CIENCIAS - PORTUGAL
- KUNGLIGA TEKNISKA HOEGSKOLAN (KTH) - SWEDEN
- NIBIO - NORSK INSTITUTT FOR BIOOKONOMI - NORWAY

Funding organisations

NWO (THE NETHERLANDS) / AEI (SPAIN) / FCT (PORTUGAL) / FORMAS (SWEDEN) / RCN (NORWAY)

Duration

3 years

Contact

Jantiene BAARTMAN
jantiene.baartman@wur.nl

KEYWORDS

Landscape resilience
Co-design spatial adaptation scenarios
Hydrological modelling
Floods & droughts
Mitigation measures
Nature-based solutions