



# How Private Land Matters in Flood Risk Management

COST Action LAND4FLOOD

## KEY POLICY MESSAGES

- Flood water can be stored in the catchment, upstream of cities, or in the cities themselves.
- In all three areas, the affected land is often privately owned.
- Hence flood risk management - including prevention and resilience - should be based upon land management.

**Flooding on private land**  
LUDWIGSHAFEN, 2016, DE, Martin H. Hartmann

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Traditional Flood Defence  
DESSAU, 2002, DE, Thomas Hartmann

## FLOOD RISK MANAGEMENT NEEDS RETHINKING

**Floods are one of the most significant hazards worldwide.** The estimated damage of the 2013 river floods in Central Europe alone was € 12.9 billion. Climate change is increasing the frequency and intensity of floods.

Traditional measures against river floods — dikes, mobile barriers, and dams — provide limited protection because (1) the design thresholds of this “grey infrastructure” are inadequate for very extreme events that are becoming more frequent; and (2) the security provided by the infrastructure stimulates increases in the value of property at risk. Similarly, the use of flood recurrence intervals, such as one in a century, and sharply delineated inundation zones in flood risk maps both contribute to complacency.

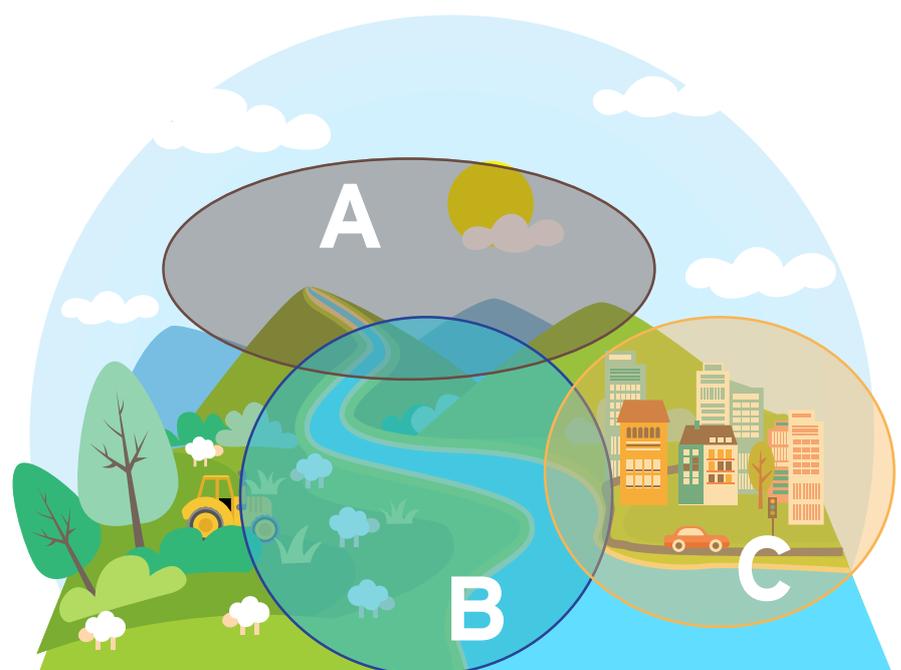
In 2017, the COST action LAND4FLOODS started to explore the relationship between land and floods to help better prepare society for these increasing flood risks.

## A COMPREHENSIVE BASIN-WIDE APPROACH IS NECESSARY

A more comprehensive and basin-wide approach to increased resilience through enhanced flood retention is needed to

complement traditional measures for flood retention and resilience. Flood waters can be stored in three segments of a river basin (figure 1):

- (A) in the catchment, before the water reaches rivers;
- (B) along rivers upstream of cities; and
- (C) in resilient cities.



**Figure 1**  
Flood waters can be stored in three segments of a river basin: (A) in the catchment, before the water reaches rivers; (B) along rivers upstream of cities; and (C) in resilient cities.

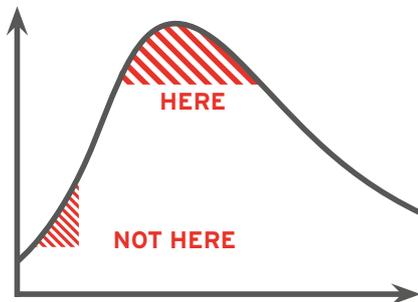
## RETAINING WATER IN THE CATCHMENT

### Nature-based solutions build on services of ecosystems

- A catchment area is the biggest ecosystem of a river. This requires ecosystem management, not just hydraulic engineering.
- Knowledge of the hydraulic effects of decentralized retention is still limited and the effects are very location-specific. This requires a careful case-by-case investigation of each context.
- Nature-based solutions are not designed for extreme flood events, but they can have substantial effects on local smaller and medium floods.

In the catchment, flood risk management entails nature-based solutions that can retain water before it reaches the streams and rivers: reforestation, certain agricultural land use practices, decentralised collection of rainwater, diversion to wetlands or peatland, or development of small scale buffer zones. These measures are also multi-purpose: they can provide additional services such as groundwater recharge, biodiversity enhancement, or increased recreation opportunities.

## FLOOD STORAGE ALONG THE RIVERS



■ Figure 2  
Cut flood peak in the right moment.

### Start with the land, not with hydrological engineering

- Flood retention levels are political. Although alternatives can be calculated to great precision, the determination of a flood recurrence period demands democratic decision-making.
- Flood storage measures require involvement of landowners as well as the usual haggling amongst administrative bodies.
- This involvement requires a strategic use of land policy instruments that consider social and cultural constructions of property and other context-specific features.



Resilient City  
LUDWIGSHAFEN, 2013, DE, Martin H. Hartmann

Flood storage cuts off the peak of a flood wave by diverting waters **at the right moment**, commonly onto fertile agricultural land in floodplains. Therefore, the greatest challenge is getting impacted landowners on board by linking private loss with social benefits of flood storage.

## RESILIENT CITIES

### Resilient cities require landowner action

- Cities must take individual risk perceptions of landowners seriously. The different rationalities involved require responsive communication.
- Landowners need to be triggered to initiate action. Policy must use insurance, but avoid moral hazards, and balance financial schemes between prevention & recovery.
- Landowners must work towards a societal and political consensus about risk-sharing and responsibilities between homeowners, the municipality, the state, and market parties such as insurers.

Flood resilient cities can be **flooded with minimal damage**. Cities are not meant to be inundated, so physical adjustments need to take place on private land, where the most damage from flooding occurs. **Homeowners** can adopt relatively modest and cheap measures to make their residences more flood-resilient, but they commonly fail to do so due to a lack of awareness.



## PRIVATE LAND USE REQUIRES PRIORITIZING LAND MANAGEMENT

The technical and hydrological conditions for the options mentioned above are relatively well known, but they all claim more land than traditional measures. This land is already being used for other purposes and is often **privately owned**. Interventions in uses of private land — either owned individually or communally owned. Mobilizing private land for temporary flood storage means coordinating different actors and institutions in water management, essentially including landowners (individual or communal) in management plans. This complicated, time-consuming and expensive process is an afterthought in conventional flood risk management, which usually deals first with technical and hydrological issues. . A central need for flood retention and resilience is to **prioritize land management**.

This policy brief is a **collaborative effort of the members of the LAND4FLOODS** (Natural Flood Retention on Private Land) COST action that emerged from the FLOODLAND network, an independent research-driven network of academic and practitioners interested in how to make land available for flood risk management ([www.land4flood.eu](http://www.land4flood.eu)).



**Flooding along the river Ruhr**  
SCHWERTE, 2008, DE, Uwe Gruetzner (TU Dortmund)

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**Flooding in the hinterland**  
SCHLECHING 2013, DE, Harald Hartmann

## FURTHER READING

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Authors: **Thomas Hartmann** (Wageningen University & Research, NL) and **Lenka Slavikova** (J.E.P. University Ústí nad Labem, CZ)  
Editor: **James E. Nickum**  
Layout: **Nathalie Lyon-Caen**

## INQUIRIES

[thomas.hartmann@wur.nl](mailto:thomas.hartmann@wur.nl)  
[lenka.slavikova@ujep.cz](mailto:lenka.slavikova@ujep.cz)  
[office@iwra.org](mailto:office@iwra.org)