



Compensation for Flood Storage

KEY POLICY MESSAGES

- Vulnerable downstream areas benefit from upstream flood retention services.
- Flood storage is land intensive. It often infringes on private land use rights.
- Compensating for flood storage requires mechanisms that link those who provide flood retention services and those who benefit from them.

Danube Flood, Lower Austria
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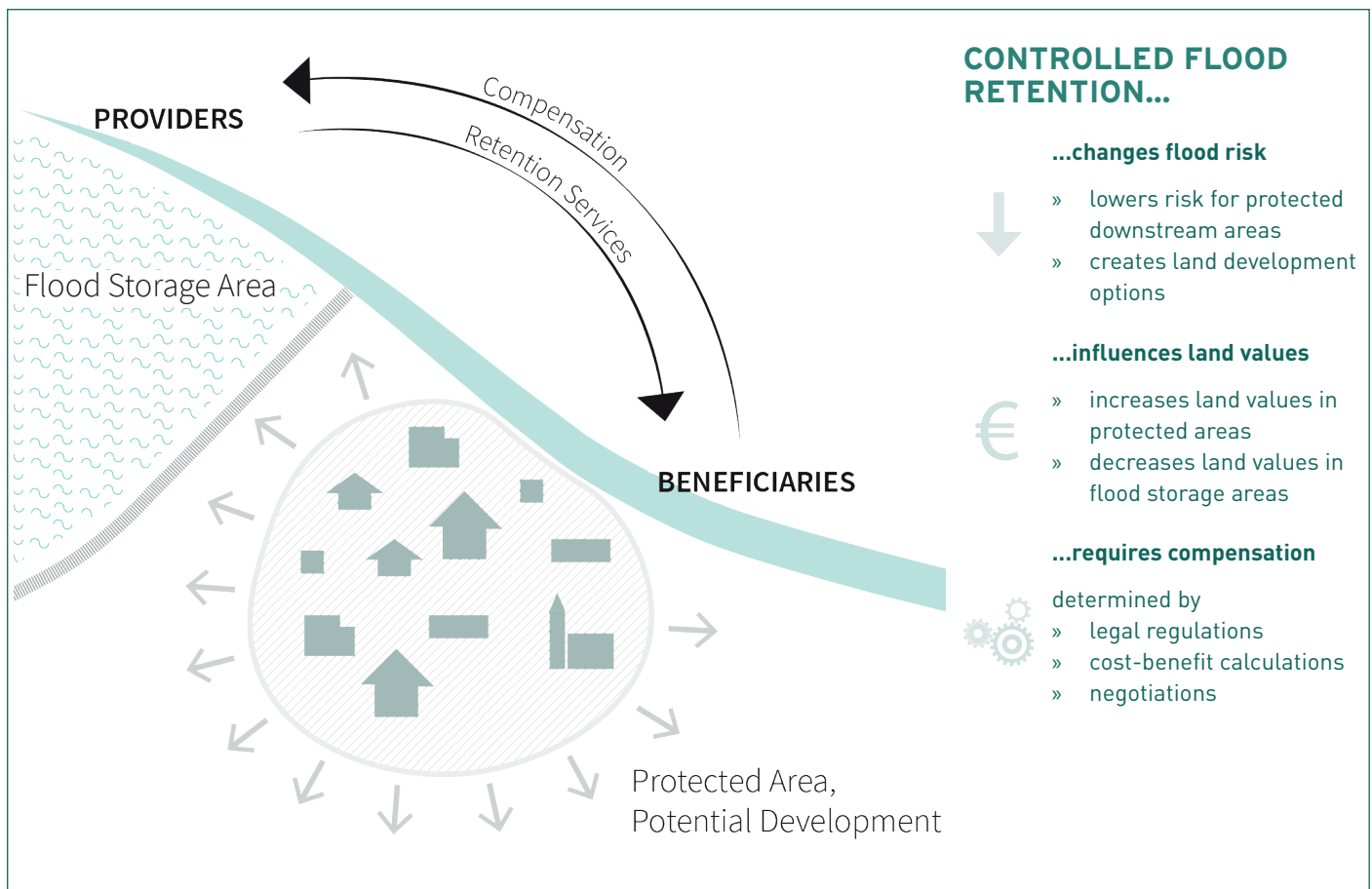
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FLOOD RETENTION LOWERS FLOOD RISK

Flood retention plays an increasingly prominent role in the portfolio of flood risk management strategies. For example, the EU Floods Directive (2007/60/EC) mandates that flood risk management shall promote the “improvement of water retention as well as the controlled flooding of certain areas in the case of a flood event” [Art. 7]. Reconnecting floodplains for natural flood retention is an important measure to improve the ecological status of rivers. But their effect in extreme flood events is limited because natural floodplains often fill up before the flood peak occurs (see Fig. 2). By comparison, technically controlled flood storage more effectively influences flood waves because the retention area is optimally filled to cap the flood peak (Munich Re, 2014). In order to maximise the retention benefits, flood storages need to be located as close as possible to the areas that are to be protected.

COSTS AND BENEFITS OF FLOOD STORAGE

Flood storage demands large areas of open land (mostly farmland) and usually infringes on existing property and land use rights. In the event of flooding, these areas are purposely flooded to alleviate downstream flood risk (see Fig. 1). Landowners, usually farmers, bear

- **direct costs:** e.g., reduced crop yields, damage to drainage systems; and
- **indirect costs:** fall in land value because of foreclosure of development options.

Downstream areas benefit from the flood retention services provided upstream. Private homeowners, commercial businesses, public institutions or infrastructure operators **benefit directly** from reduced flood risk. Landowners of flood-protected land, both agricultural and still undeveloped, also **benefit indirectly** from flood storage. Previously flood-prone areas are now located outside of flood hazard zones and are thus legally suitable for development - usually resulting in a significant appreciation in land value (cf. Table 1).

Figure 1: Compensation for flood storage builds on the reciprocal relationship between the providers and the beneficiaries of retention services.

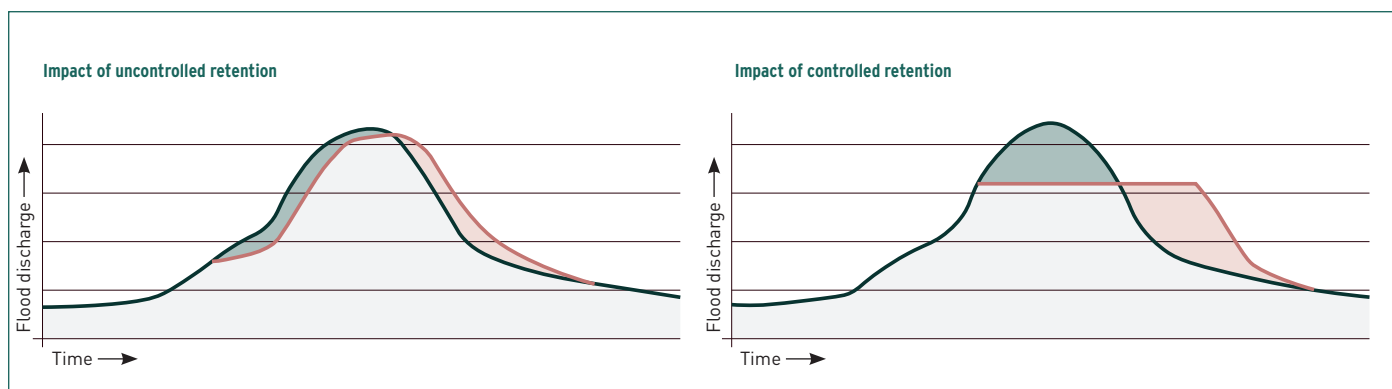


Figure 2:
The two hydrographs show the impacts of uncontrolled and controlled retention on flood volume (green area=without retention; red area=with retention). As indicated by the red line, uncontrolled flood retention mainly results in a temporal translation (delay) of the flood wave, while controlled flood retention also significantly reduces the peak discharge (Munich Re, 2014).

COMPENSATING FLOOD RETENTION SERVICES

The provision of land for flood storage may only be realised if landowners are compensated. Different solutions based on legal expropriations or individual negotiations are possible, such as land swaps or buyouts. In principle two types of compensation approaches can be distinguished:

I. Community-based compensation: In line with the community-pays-principle the compensation costs are allotted to the general public. Those providing land for flood retention services are compensated by public authorities, such as municipalities or state governments.

II. Beneficiary-based compensation: In line with the beneficiary-pays-principle, those benefiting directly or indirectly from flood retention services pay (at least part of) the compensation costs to those providing land for flood storage.

ORGANISING THE COMPENSATION FOR FLOOD STORAGE

In the case of community-based compensation public authorities determine or negotiate with landowners which costs, direct or indirect, of providing land for flood storage are to be compensated. On the basis of (cost-benefit) assessments by civil engineers and other technical experts, the public authorities offer compensation or develop a compensation agreement. This may consist of:

I. One-time or yearly payments to compensate for the provision of flood storage and/or

II. Payments in the event of flooding to compensate for flood-related losses.

In the case of beneficiary-based compensation public authorities also have to negotiate with the beneficiaries of flood storage to determine how much each is to contribute to the compensation scheme.

	ACTORS	ROLES AND RESPONSIBILITIES
PROVIDERS	(tenant) farmers, landowners	provide land for flood storage, receive compensation for (direct and indirect) losses
BENEFICIARIES	private homeowners, businesses etc.	benefit from hazard and risk reduction, pay compensation on the basis of averted flood damage (flood risk)
	landowners	benefit from options for land development, pay compensation on the basis of land value appreciation
INTERMEDIARIES	civil engineers	provide technical expertise, assessment of (direct and indirect) costs and benefits
	public authorities	represent public interests (e.g. reducing flood risk reduction and keeping public expenditures low), coordinate interests and negotiate compensation scheme

Table 1: Overview of the types of actors, their roles and responsibilities in compensating flood storage.

FLOOD COMPENSATION IN PRATICE

In practice, community-based flood storage compensation prevails over beneficiary-based compensation. Within the COST Action “Natural Flood Retention on Private Land” scientists and practitioners visited two flood storage projects in Austria and studied the corresponding compensation mechanisms. In a workshop setting the participants engaged with municipal authorities and local actors to learn about the political and administrative process of organising flood storage compensation.

DETERMINATION OF COMPENSATION PAYMENTS

Flood retention services are compensated differently in the two municipalities. In the first municipality property owners in 100-year flooding areas were included in a water cooperative. Contributions to the cooperative were defined based on their individual benefit from protection measures due to damage reduction. Together with provincial and federal funds the beneficiary contributions finance the construction and maintenance costs of the flood storage project. Upstream landowners are compensated for both direct costs such as flood damage and indirect costs such as land depreciation.

In the second municipality, agricultural landowners are compensated from public funds as well as from revenues from zoning building land in flood-protected areas (indirect benefits). Homeowners who are direct beneficiaries from damage reduction do not contribute to flood storage compensation.



POLICY-RELEVANT CONCLUSIONS

- **Organisational frameworks facilitate landowner involvement:** cooperatives, associations and other organisational frameworks are powerful tools to engage affected landowners and provide a legal basis for structuring compensation processes.
- **Compensation for flood storage is complex:** the negotiation of flood storage compensation takes time but transparent cost-benefit evaluations can contribute to improving local ownership of protection measures and fostering risk awareness.
- **Scale and context matter:** there are no one-fits-all solutions; compensation schemes need to be sensitive to the specific needs of the actors involved and local/regional conditions, such as the distribution of risks and land uses.

REFERENCES

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