

Factors Influencing Flooding [BLÖSCHL *et al.*, 2015]

Atmosphere

- **Precipitation** originates in the atmosphere
- Winter flooding in Western Europe is frequently ascribed to **Atmospheric Rivers**, narrow ribbons along which a large amount of moisture is transferred from the subtropics to the mid-latitudes
- Precipitation rates will alter depending on changes in the properties of the **global atmospheric circulation**
- An increase in **air temperature** may result in more small-scale (convective), high-intensity rainfalls as well as in more floods due to snow-melt

Catchments (groundwater aquifers, soil, land surface)

- **Water** from precipitation or snow-melt **seeps into the subsurface** or **runs off on the surface**
- How much water can be absorbed depends on **soil moisture** → the lower the soil moisture, the more water can infiltrate
- Soil moisture is determined by **soil permeability** and **evaporation**
- **Changes in land use**, such as deforestation and urbanization, **reduce evaporation** as well as **infiltration**, thereby contributing to a higher risk of flooding
- However, it is important to consider **catchment size**, since small catchments are more strongly impacted by land use changes than large catchments

River Systems

- The properties of the **river channel** and the **flood plain** impact the flood waves propagating through the system
- **Channel-straightening** results in an **increased velocity** of the flood waves
- **River levees raise water levels** by preventing flood waters to be distributed over the flood plain, and, hence, add to **higher wave speeds**
- River levees also decrease the volume of water that is stored by the flood plain, thereby contributing to **higher flood peaks**

Reference

BLÖSCHL, G., GAÁL, L., HALL, J., KISS, A., KOMMA, J., NESTER, T., PARAJKA, J., PERDIGÃO, R. A., PLAVCOVÁ, L., ROGGER, M., SALINAS, J. L., & VIGLIONE, A. (2015). Increasing river floods: fiction or reality?. *WIREs. Water*, 2(4), 329–344.