Floods, droughts and human mobility: Feedback mechanisms and complex dynamics

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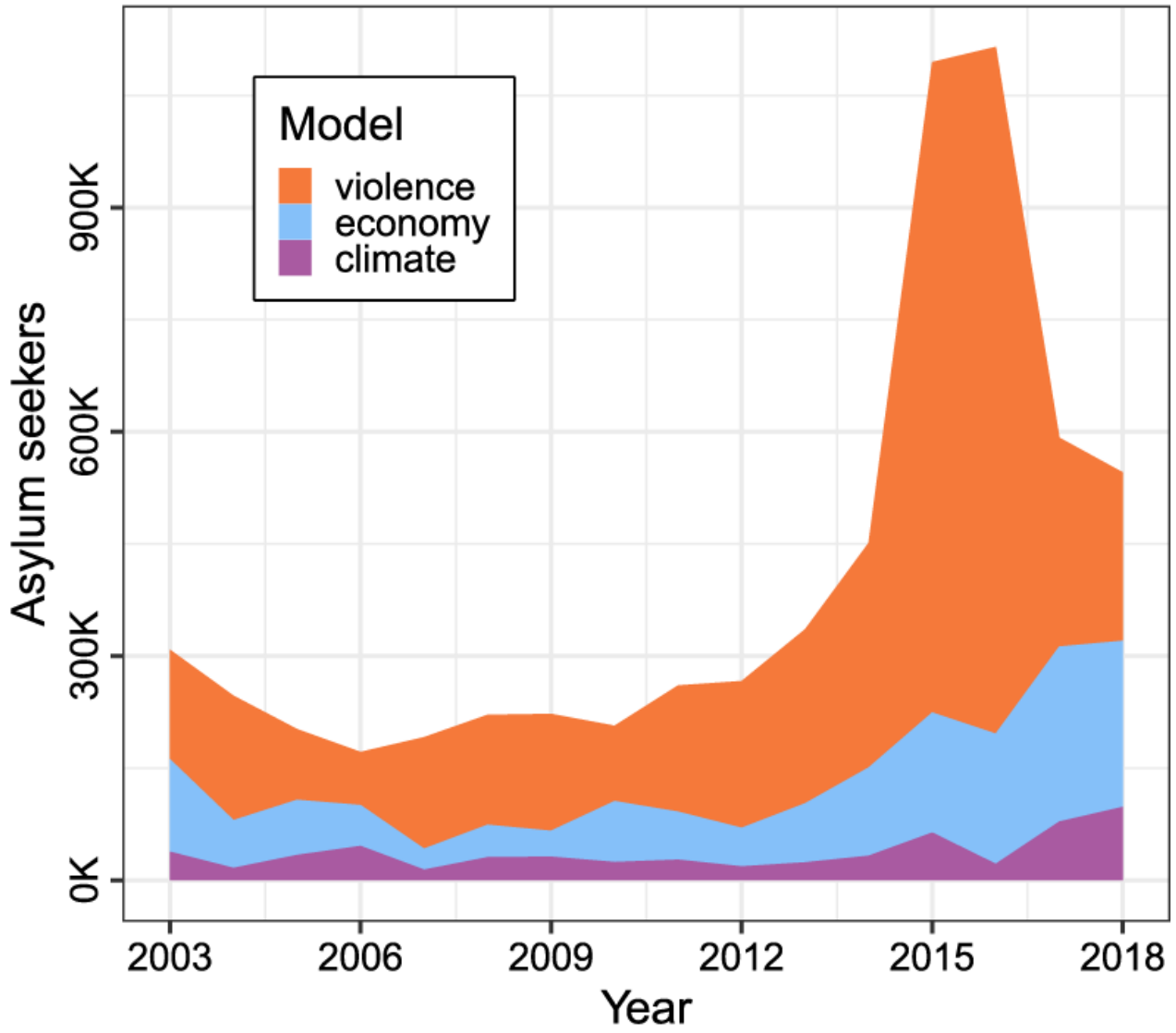
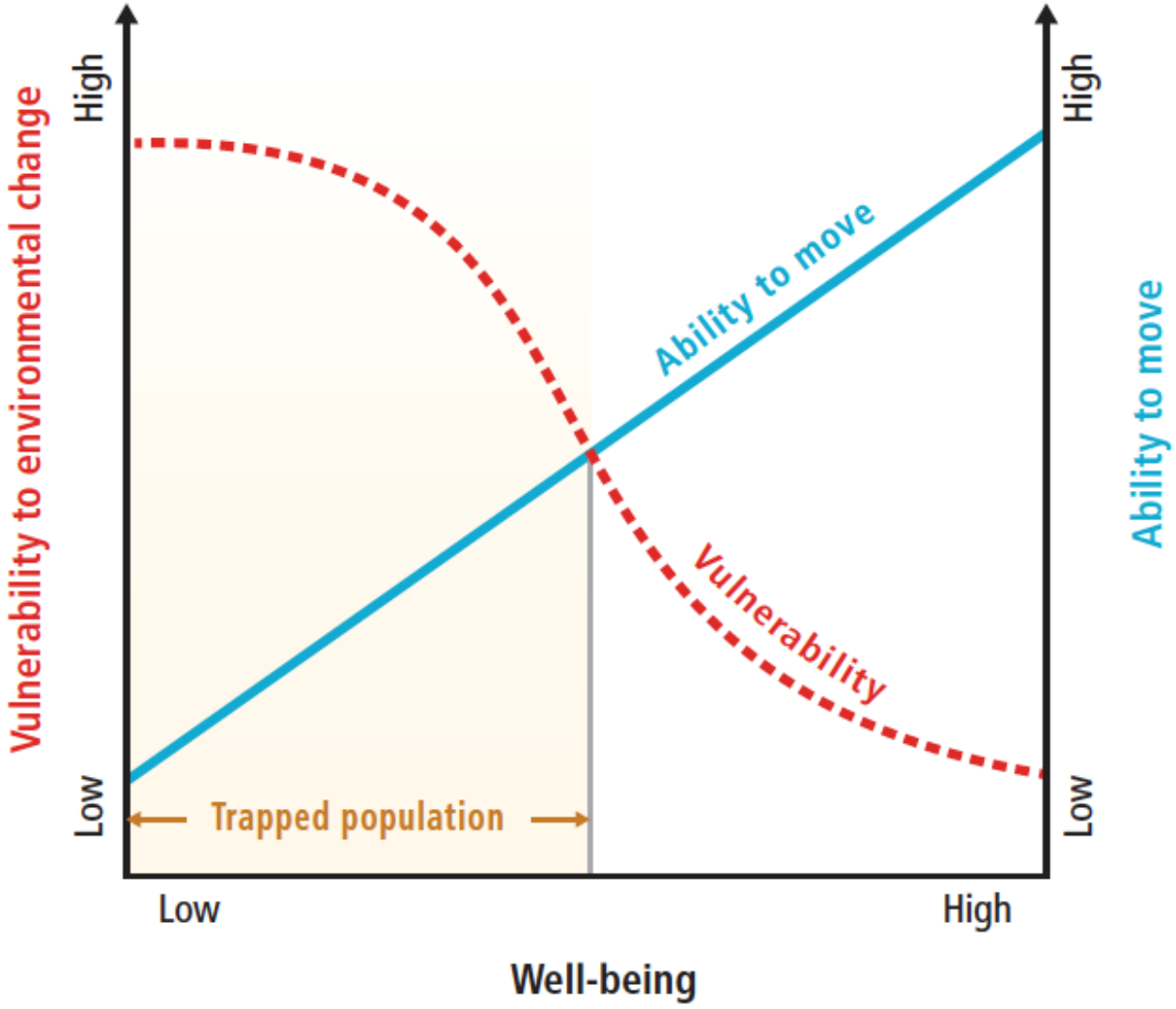
Climate-related mobility rarely involves crossing border



(Schutte et al., *Nature Communications*, 2021)

Most vulnerable groups don’t have resources to move



(IPCC AR5)

Short-term, local and/or rural-to-urban migration (mostly)

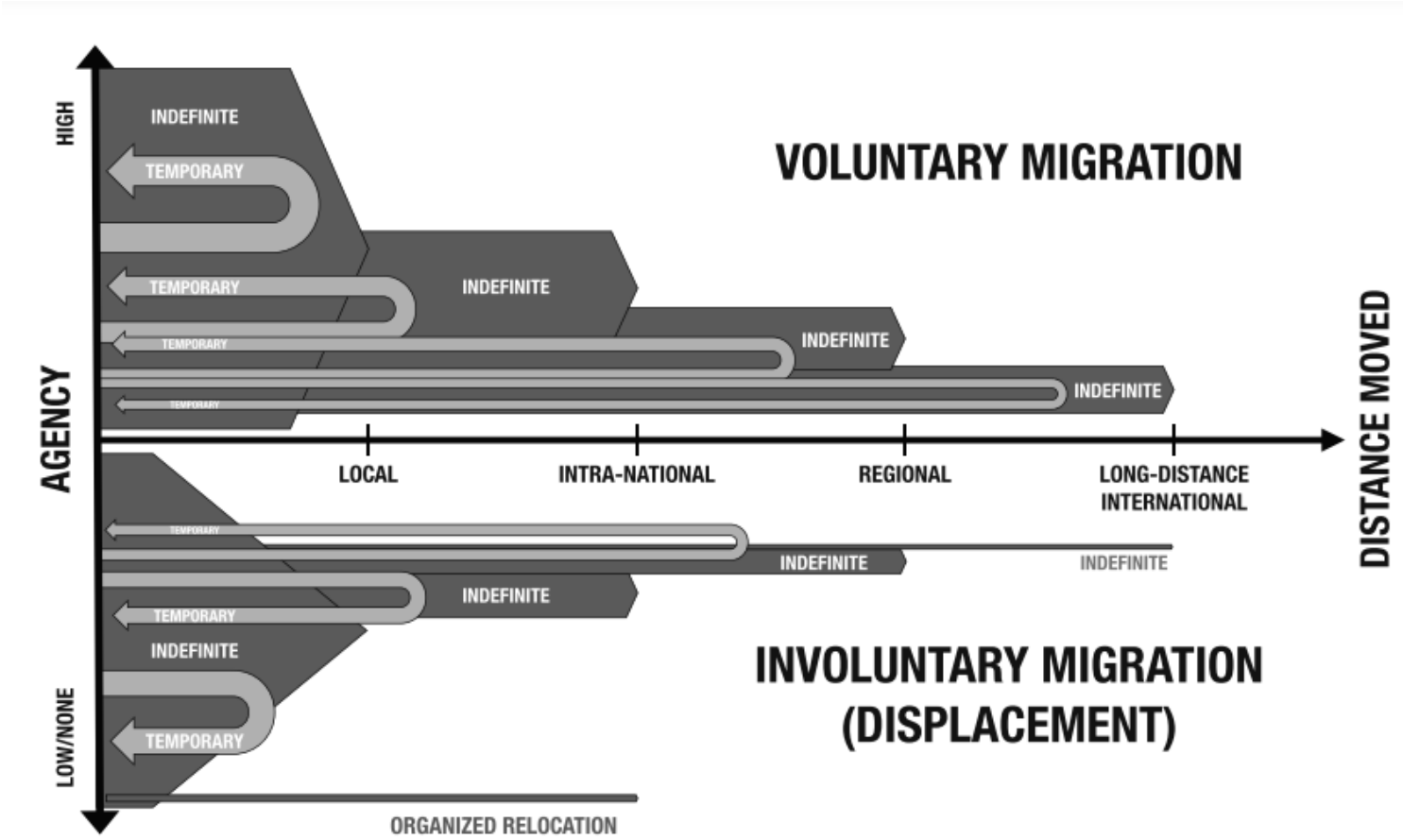

Credit: Jonas Bendiksen/Magnum

Table 7 – Types of population movement/migration made in res estimated from the focus group discussions, not by actual coun

Movement type	River—flood and erosion	
	Gaibandha	Sirajganj
Evacuation	100% to school/ embankment	50–60% to embankment or flood shelter
Temporary migration	80–90% to Dhaka for work	25–50% to Dhaka, nearby towns for work
Seasonal migration	60–75% to towns or harvest work	None
Permanent migration	5–10% Dhaka	10–20% Dhaka, Bogra, Pabna
Notes	Whole village moved due to erosion several times	Moved to embankment

(Penning-Rowsell et al., *Environmental Science & Policy*, 2013; Palmer, *Nature*, 2014)

Migration, organized relocation and displacement

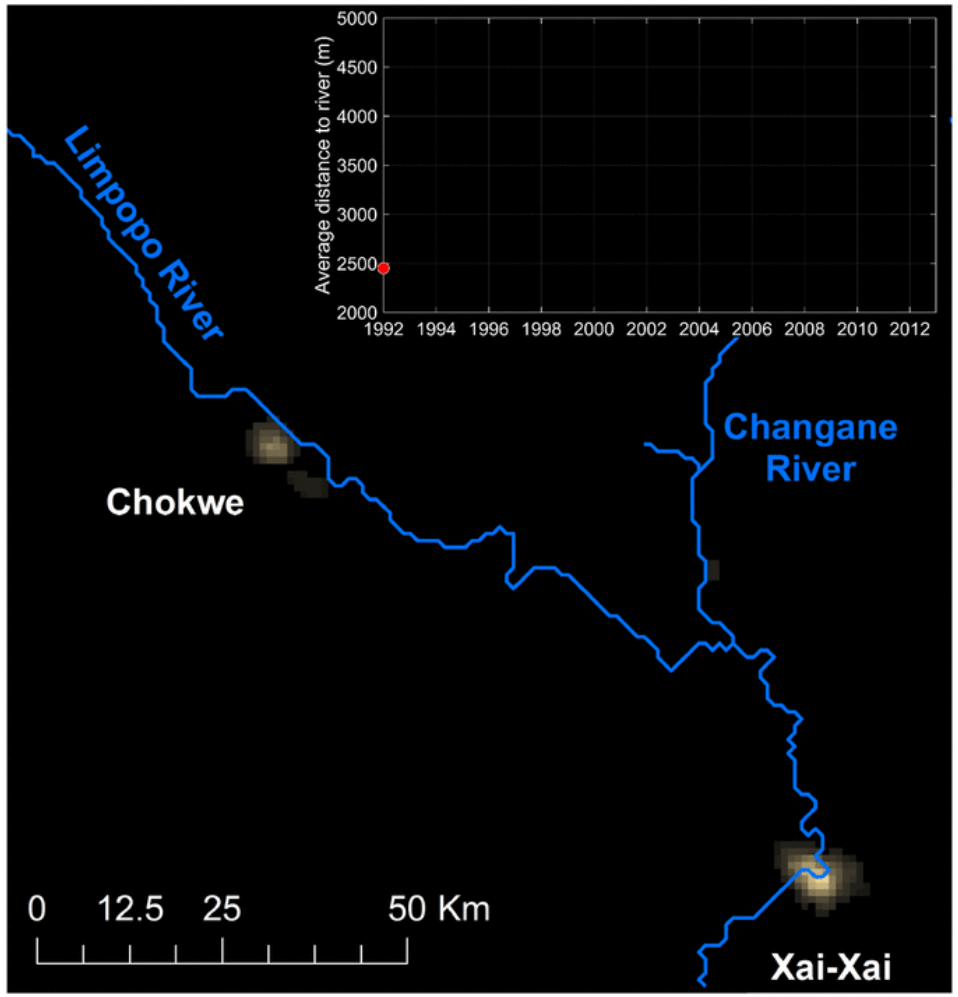


(McLeman et., *Climatic Change,* 2021)

Catastrophic floods and human settlements

Satellite night time lights as proxies of population distribution

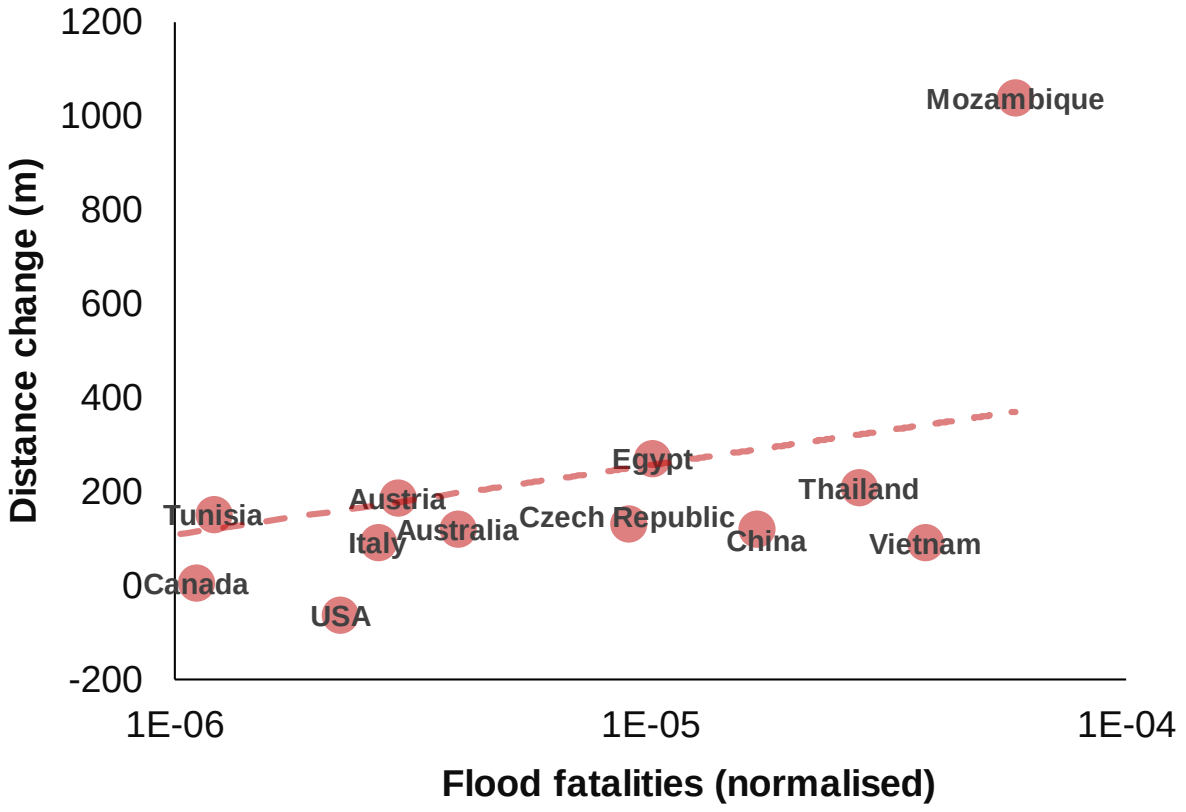
Source: ESA –river Nile delta

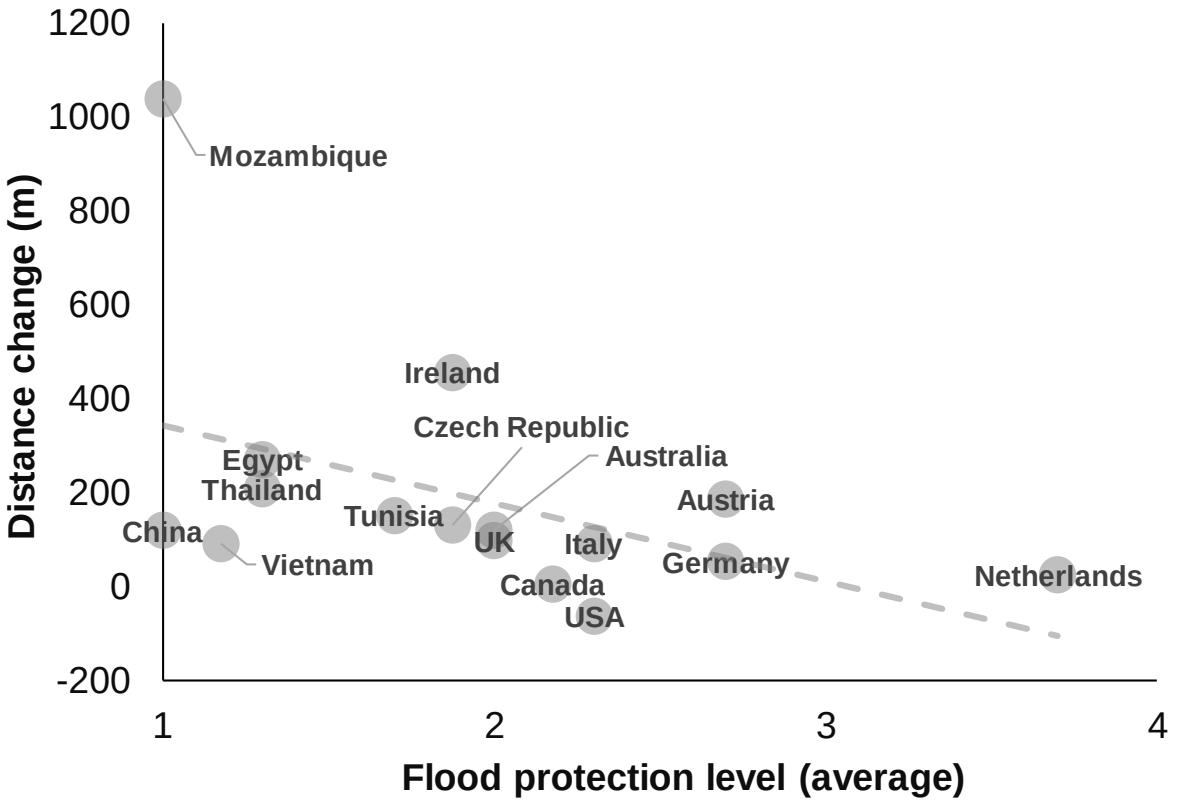


(Mård et al., *Science Advances*, 2018)

Catastrophic floods and human settlements

Increasing distance from rivers after catastrophic events (Adaptation?)
reduced with high levels of structural protection (Levee effect?)

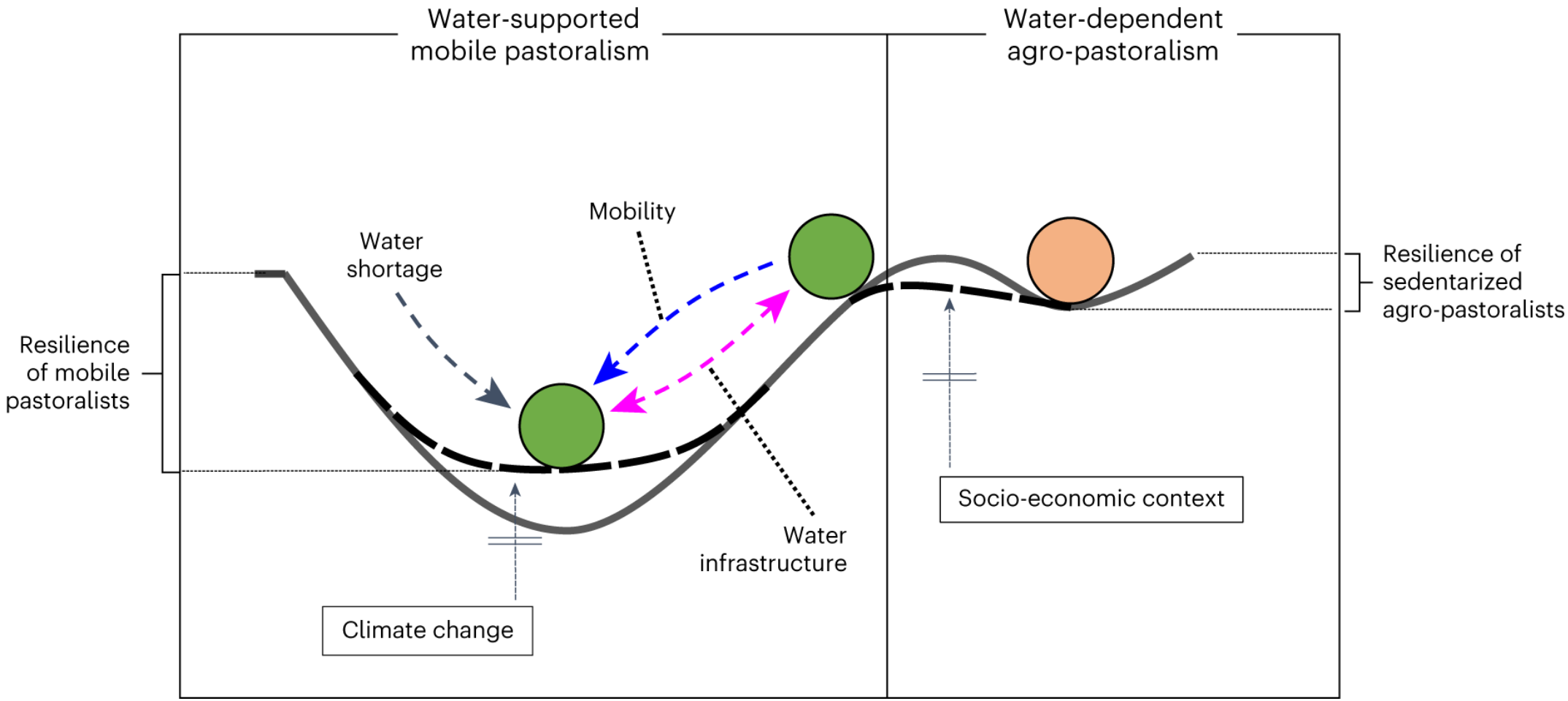




(Mård et al., *Science Advances*, 2018)

Mobility as adaptation? The role of water infrastructure

Increasing water supply, without effective governance, tends to reduce mobility and hinder the resilience of pastoralists to climate change and drought

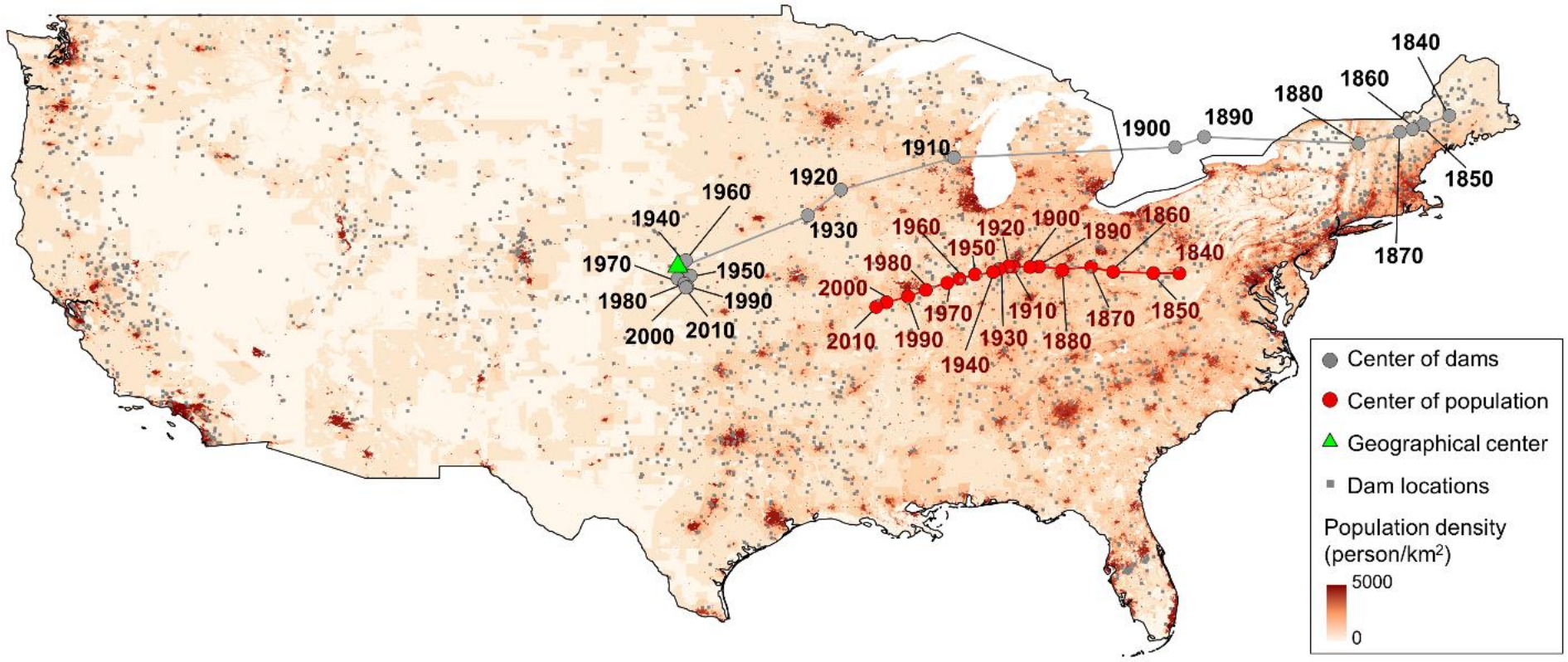


(Piemontese,et al., *Nature Climate Change*, 2024)

Feedback mechanisms

Dams, water supply and population in the US –chicken or the egg?

- (one of the) *responses* to growing population, and water demands
- (one of the) *drivers* of growing, and water demands



(Di Baldassarre et al., *Ambio*, 2021)

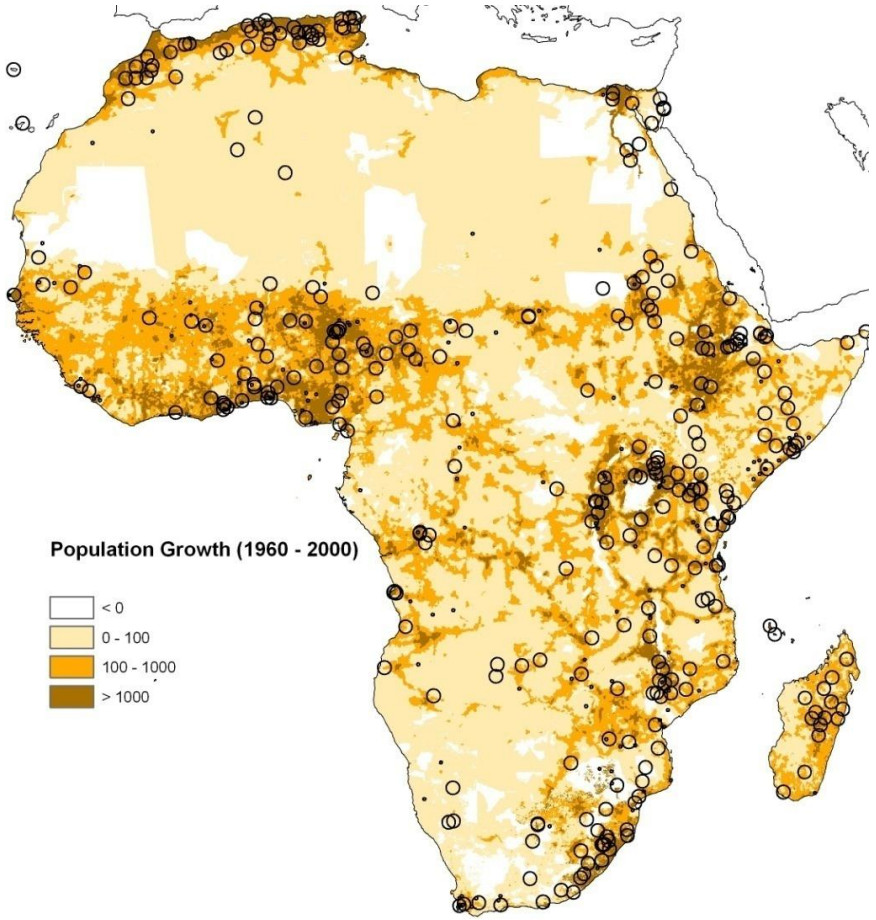
Feedback mechanisms

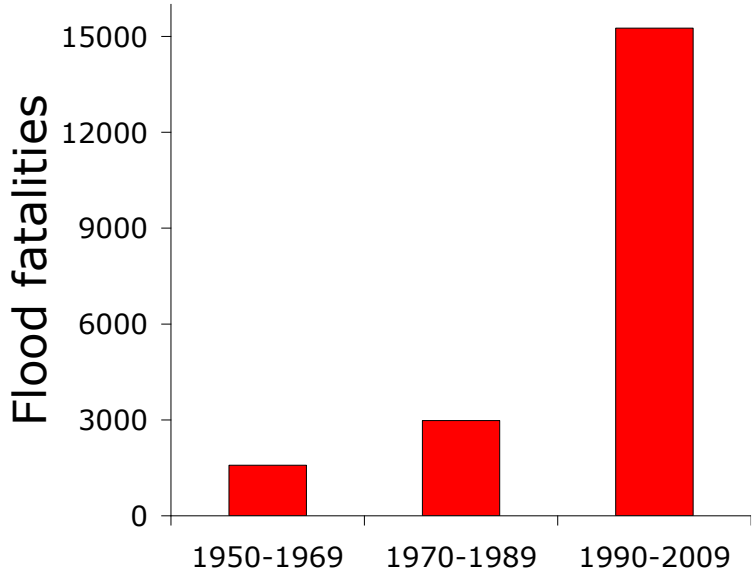
Population distribution does not only respond to, but also drive climate-related risks

Example: Increasing flood fatalities in Africa (floodplain population)

Response to drought?

(Ceola et al., *Earth's Future*, 2023)



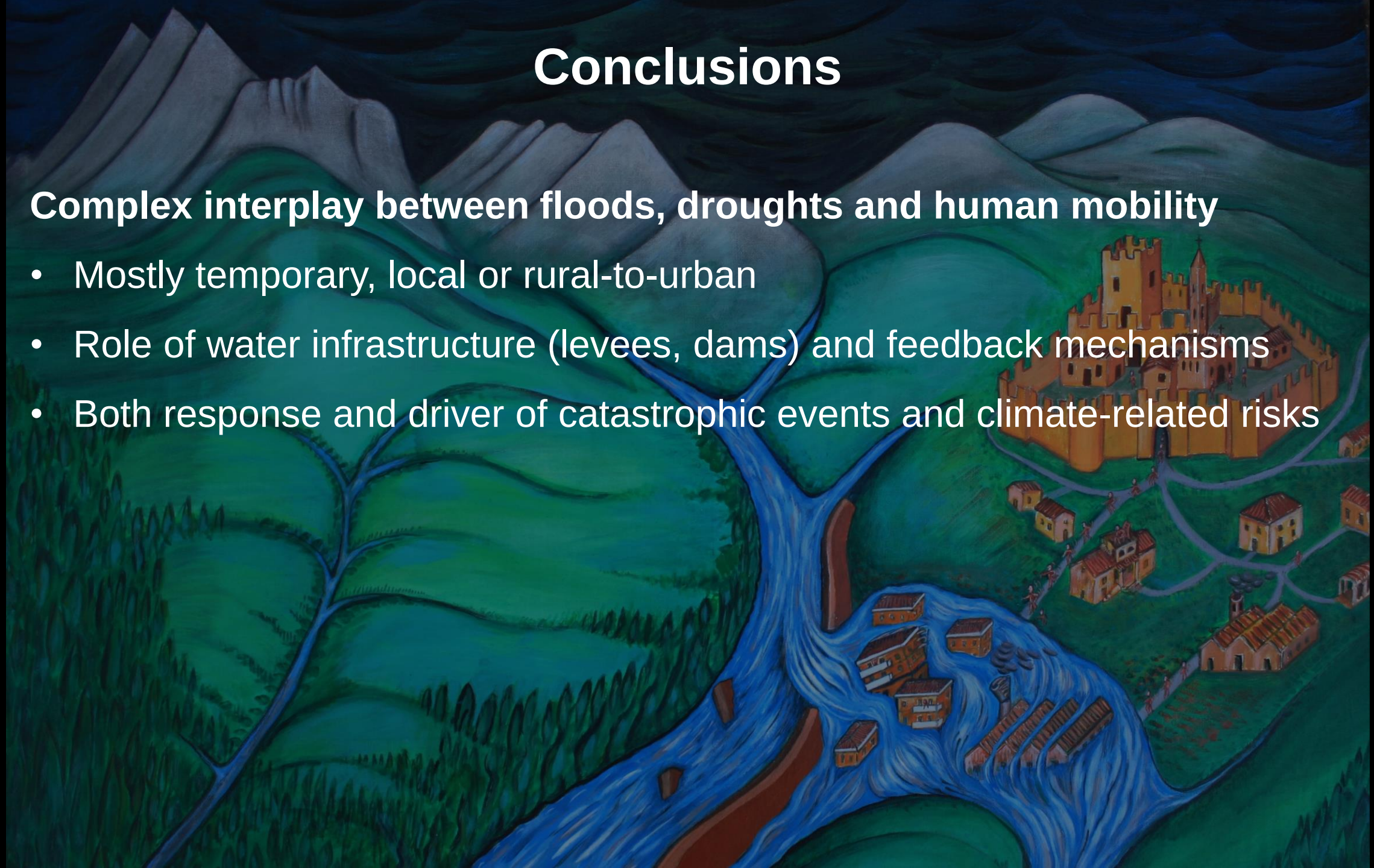


(Di Baldassarre et al., *Geophysical Research Letters*, 2010; Di Baldassarre et al., *Earth System Dynamics*, 2017)

Conclusions

Complex interplay between floods, droughts and human mobility

- Mostly temporary, local or rural-to-urban
- Role of water infrastructure (levees, dams) and feedback mechanisms
- Both response and driver of catastrophic events and climate-related risks



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