Niclas Hjerdt

Living with floods – challenges of mitigation and adaptation



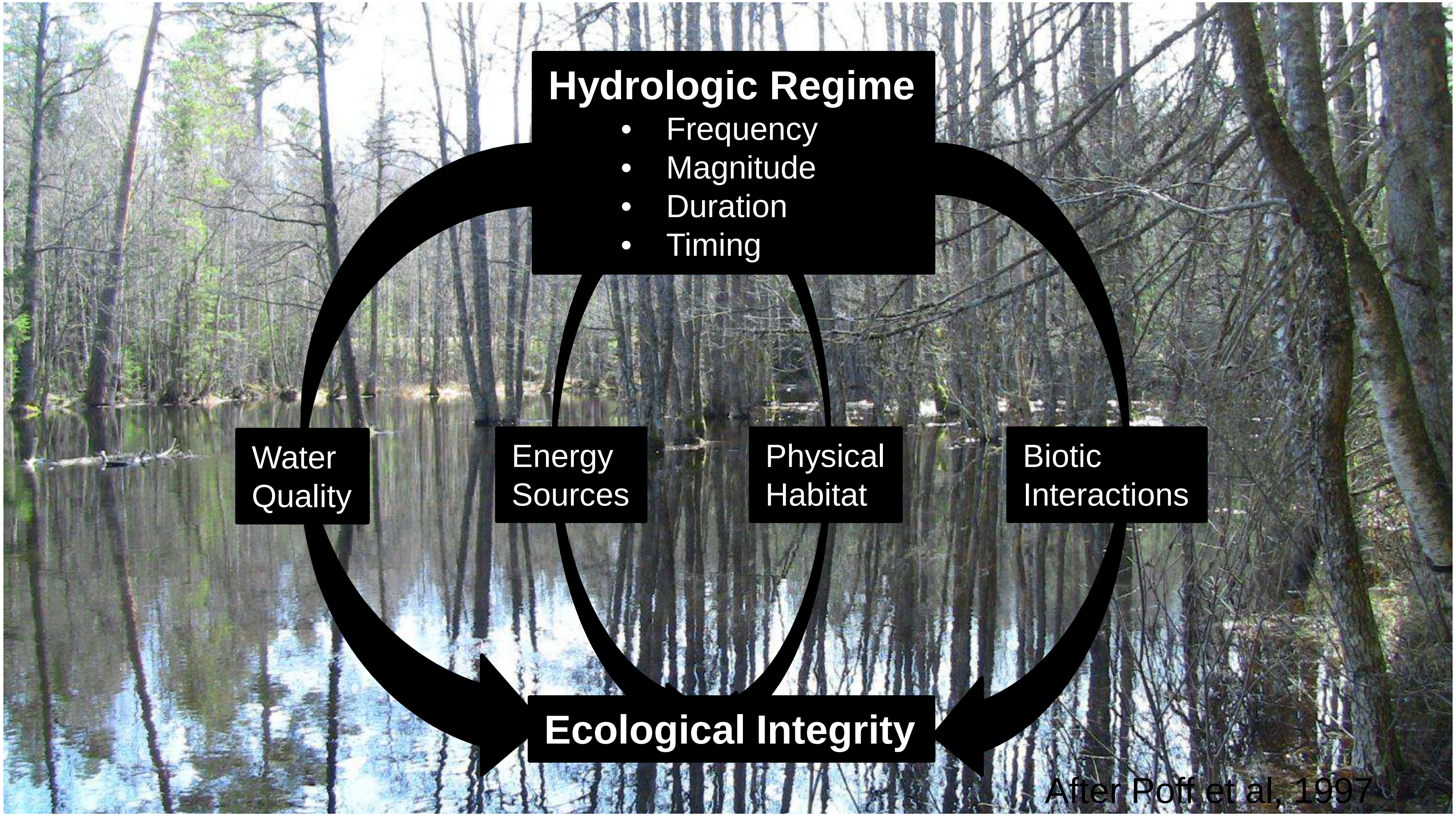
Flood risk challenges

- Extreme precipitation
- Climate change
- Urbanization
- Land use changes

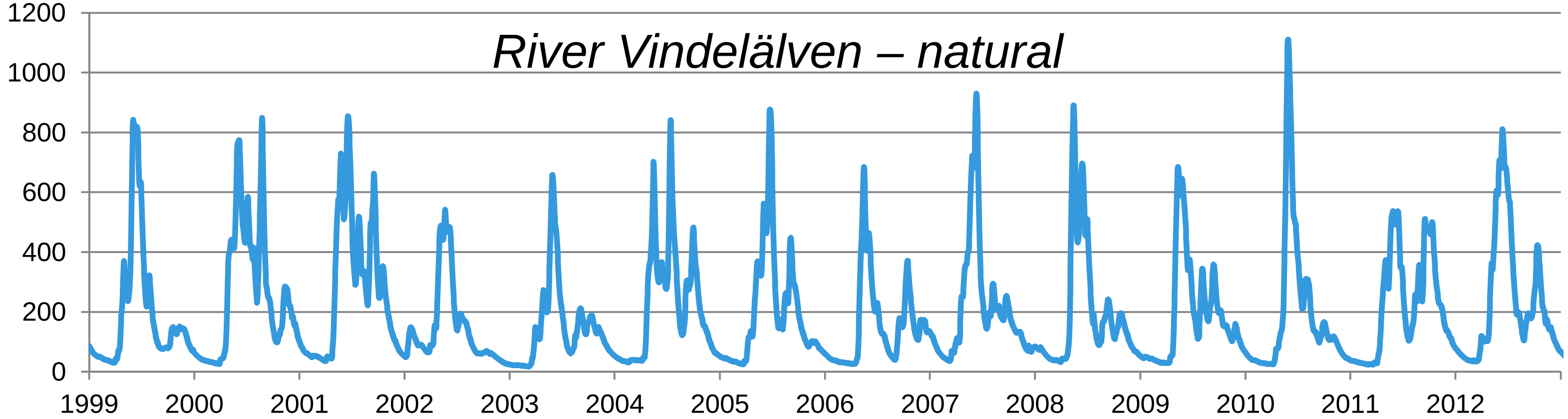
→ How can society mitigate and/or adapt to flood risks?

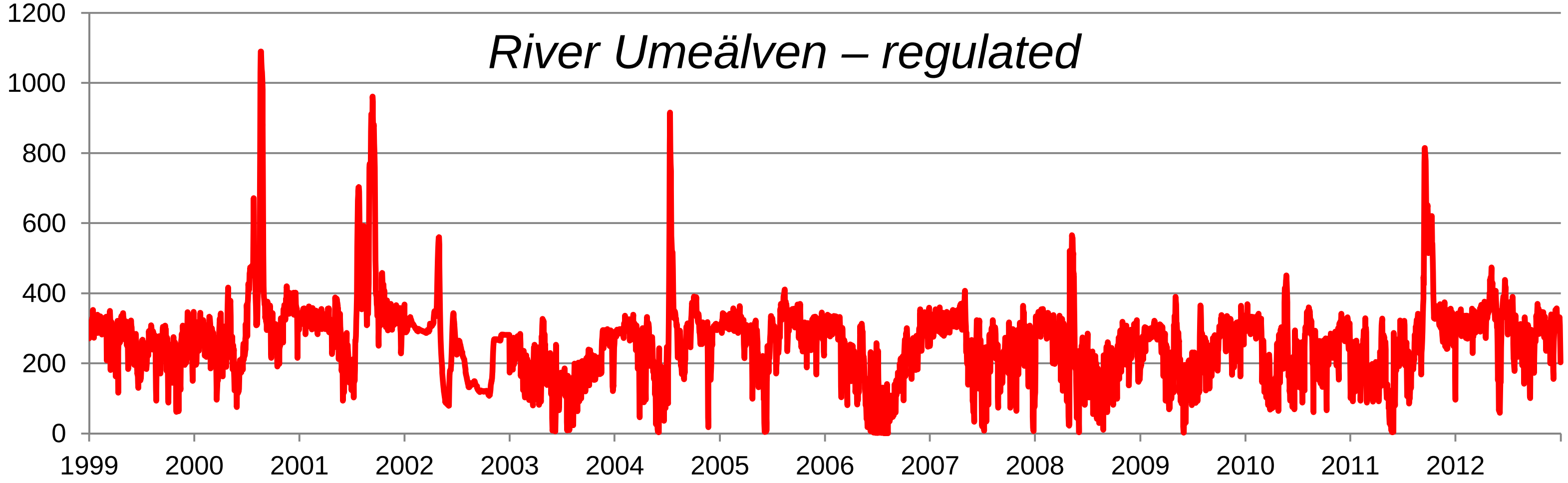


Fact:
Floods occur naturally and maintain biodiversity

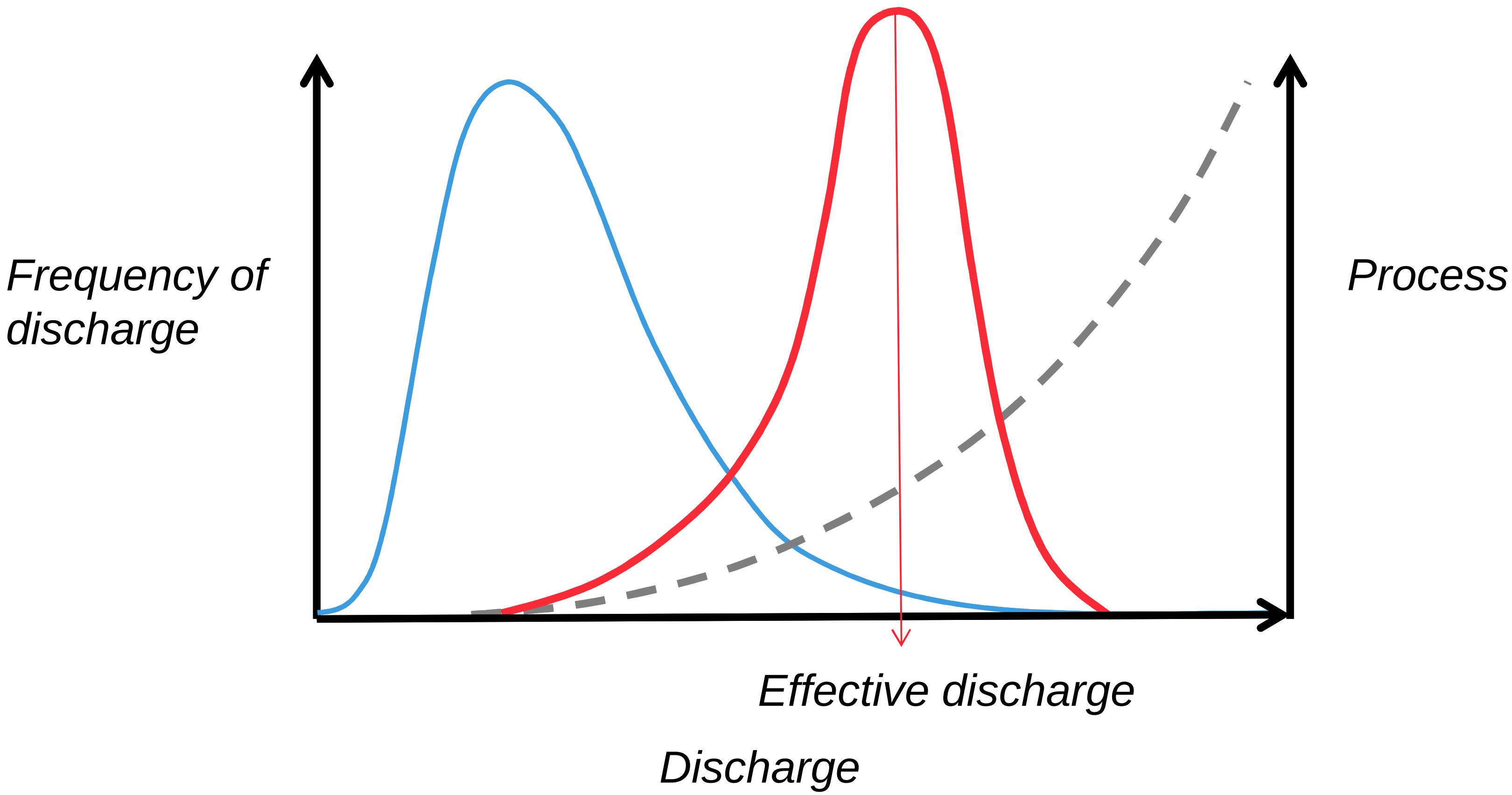


Floods in natural and regulated rivers





Ecosystem functions depend on flow dynamics

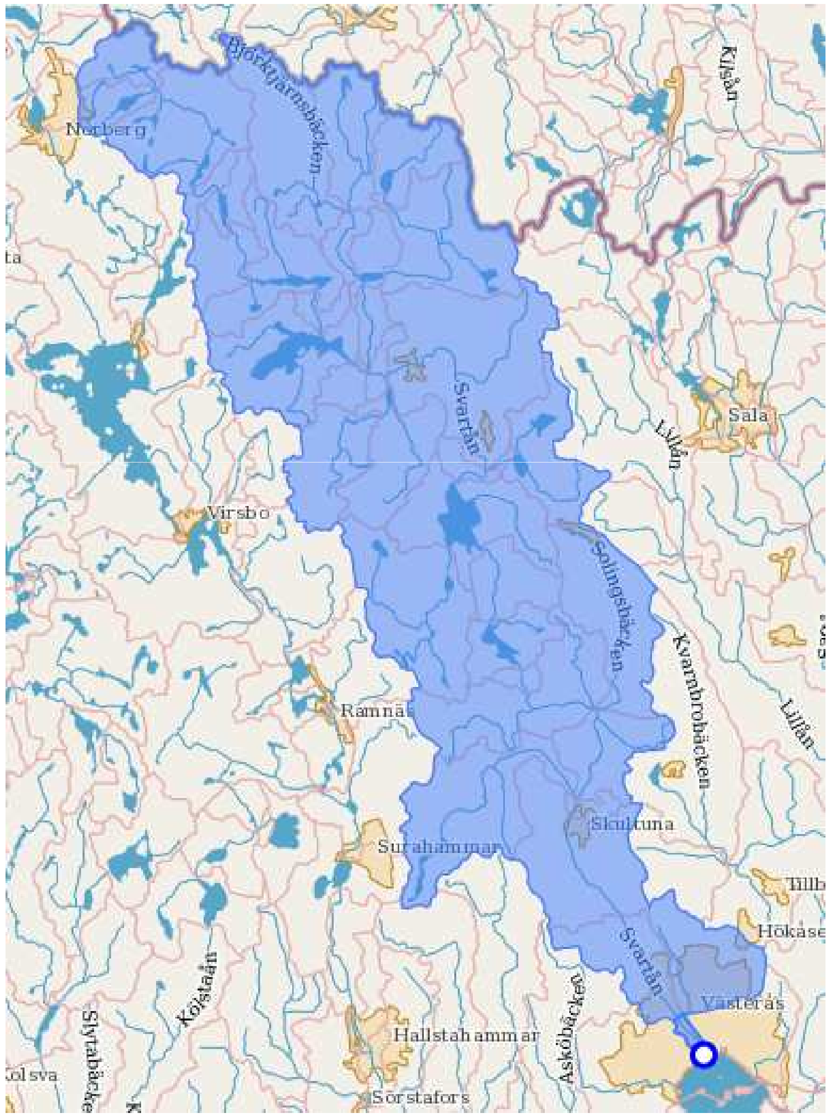


Problem: Rivers meet urban areas

Case study 1: River Svartån 2009

Svartån watershed

Total area:	776 km^2
Forest:	69%
Agriculture:	22%
Lakes:	4%
MQ:	6.3 m^3/s
Regulation:	2%

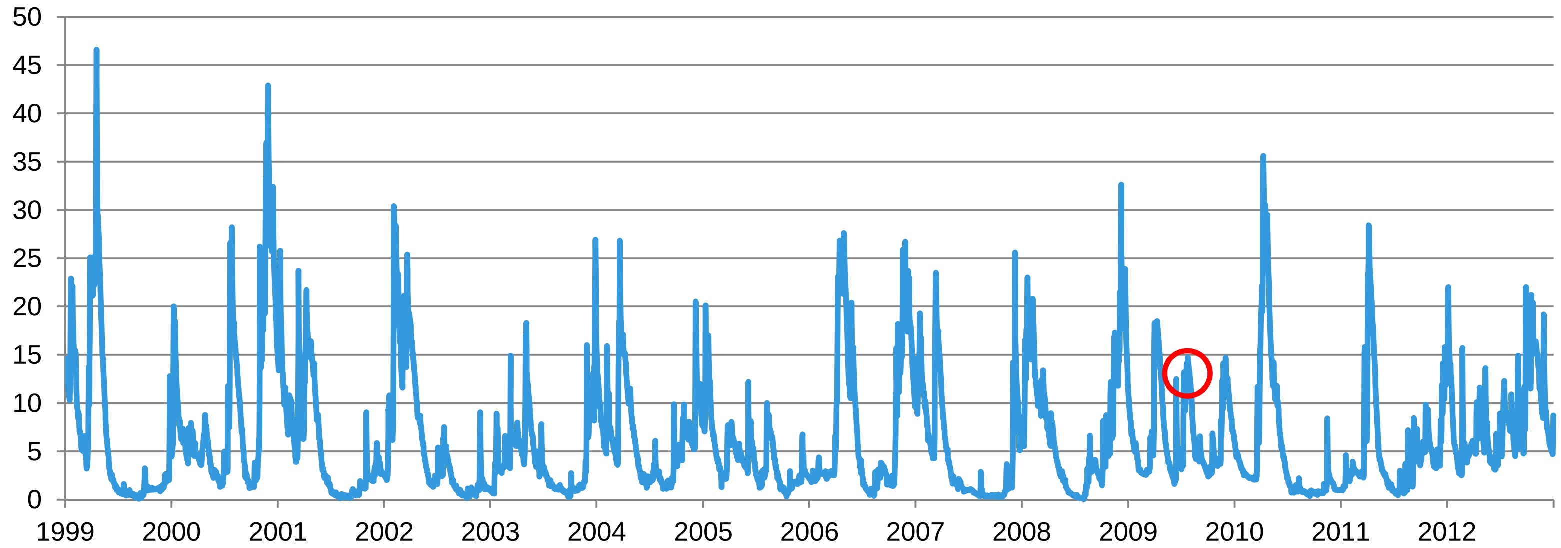


Summer 2009

- On July 8, the upper parts of Svartån received ca 120 mm of rain in two hours, and another 40 mm later on the same day.
- Water levels rose quickly along the river, broke through levees and flooded some 600 ha of agricultural land.

What happened downstream?

- As a result of the upstream flooding, peak flow in the city of Västerås only rose to about twice the average discharge (MQ).



- Is it reasonable to allow upstream rural areas to flood in order to reduce flood risks in downstream urban areas? Lowlying fields could easily be converted to wetlands with high biodiversity.

Problem: Extreme precipitation in urban areas

Case study 2:

Copenhagen flood damages: € 1 billion

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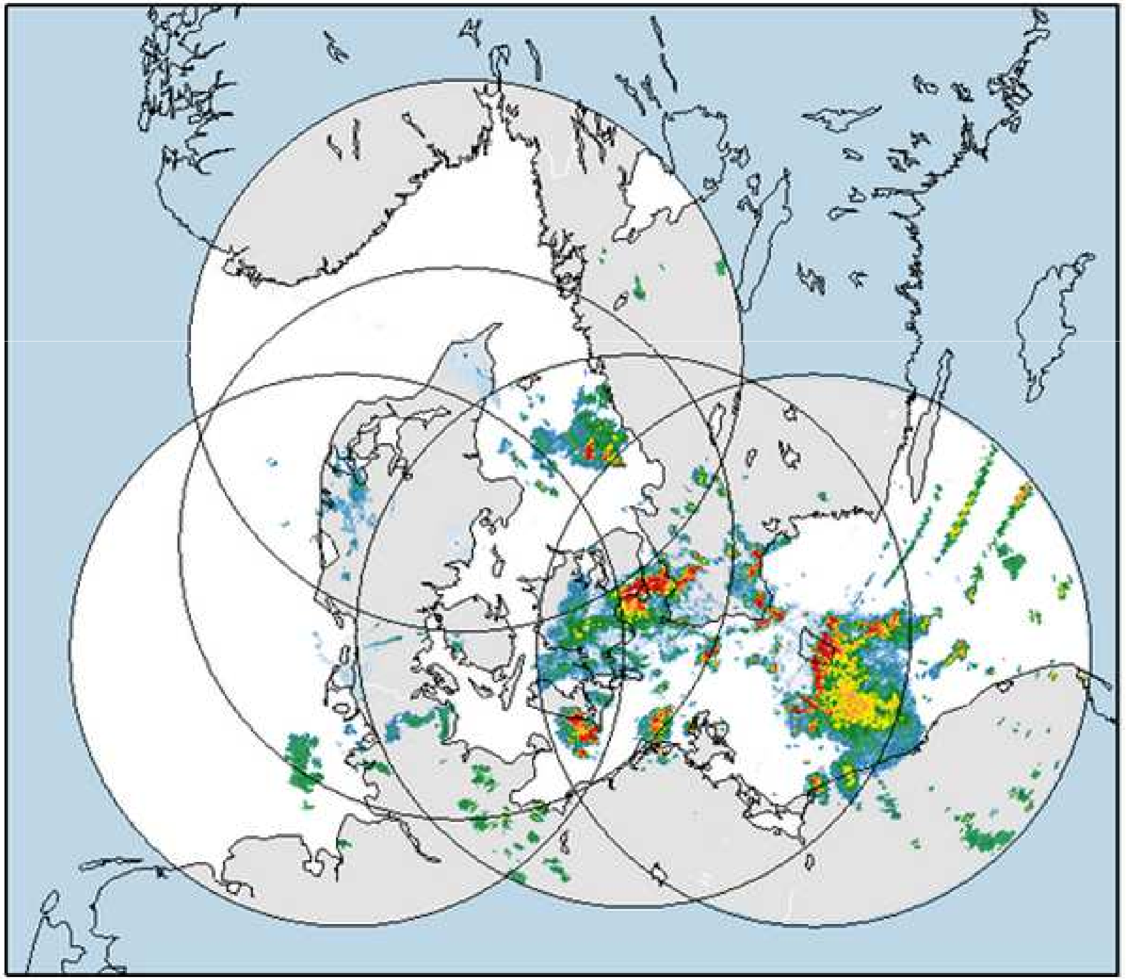
Copenhagen - Could it happen in Sweden?

- How unique is the Copenhagen event?
- Are Swedish cities as susceptable as Copenhagen to extreme precipitation?
- What can we learn from climate records, and what can we expect in the future?



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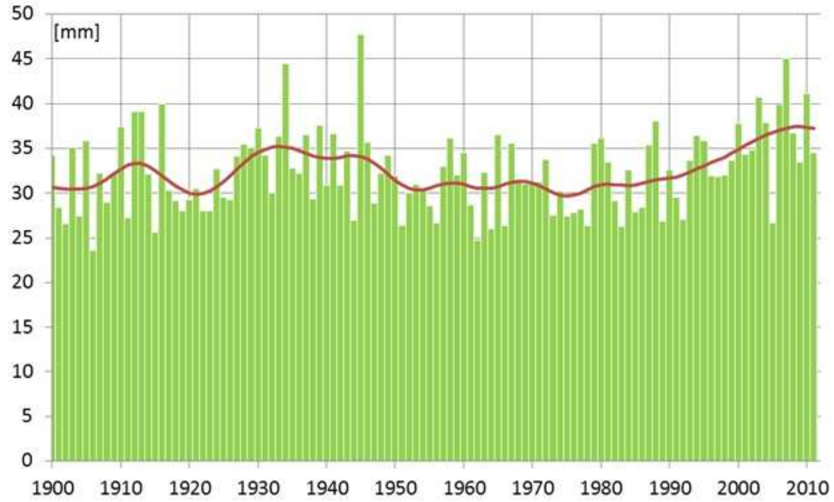
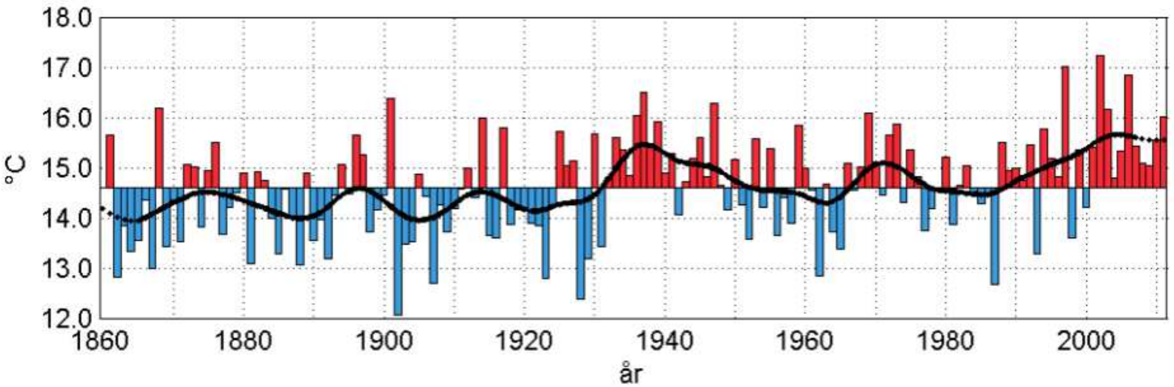
A historic analysis of extreme precipitation in Sweden

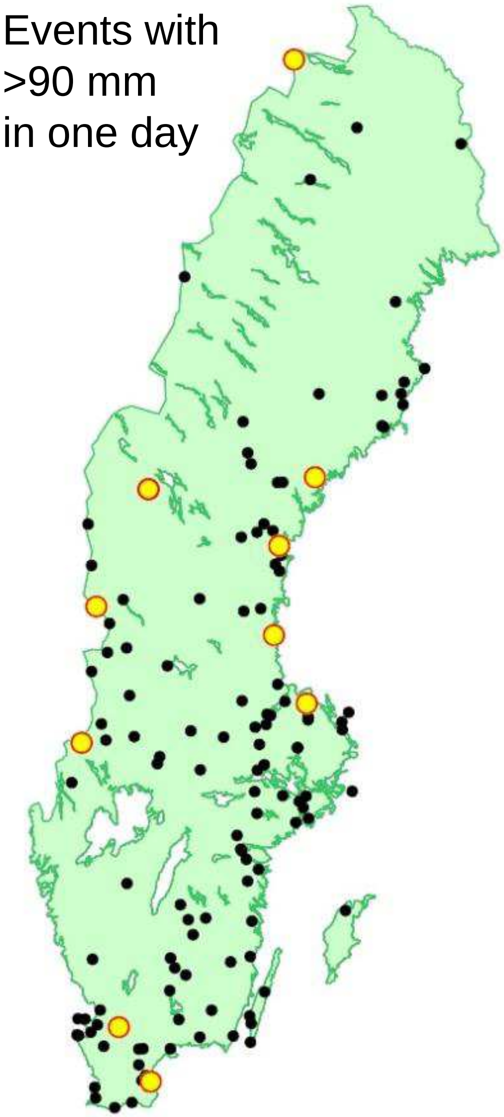
Apparent spatial and temporal trends in historic records!

Average maximum daily rainfall every year (60 stations).





Events with >90 mm in one day



Extreme precipitation + climate change → more extreme precipitation

- Extreme precipitation is likely to increase by 20-25% by 2100.
- Short duration rain events are likely to increase the most.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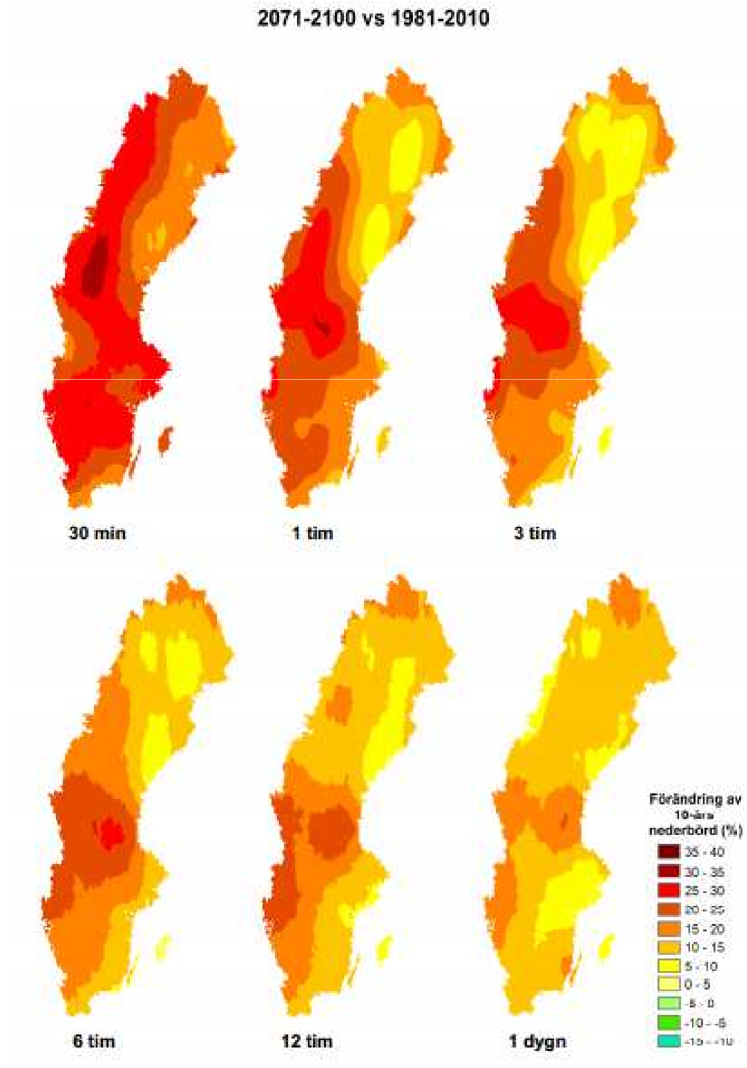
KLIMATOLOGI Nr 6, 2013

Extrem korttidsnederbörd i klimatprojektioner för Sverige

Jonas Olsson och Kean Foster



Conclusions

- Floods are important drivers of ecosystem functions and help maintain biodiversity.
- To live with floods, society must make room for water, **both in rural and urban areas.**
- In rural areas, low-lying agricultural areas near streams and rivers could, e.g., be considered for wetland reclamation.
- In urban areas, a priority should be to handle extreme precipitation on hard surfaces, e.g., by adapting streets to runoff diversion systems.