



Photo: P. Danielsson

# Climate adaptation by managed realignment CAMEL

Gunnel Göransson<sup>1</sup>, Lisa Van Well<sup>1</sup>, Jonas Löwgren<sup>2</sup>, Arianit Kurti<sup>3</sup>, Jim Hedfors<sup>1</sup>,  
Nina Lemon<sup>3</sup>, David Bendz<sup>1</sup>, Per Danielsson<sup>1</sup>, Lasse Johansson<sup>4</sup>, Maria Andersson<sup>4</sup>

<sup>1</sup> Swedish Geotechnical Institute (SGI)

<sup>2</sup> Linköping University (LiU)

<sup>3</sup> RISE Research Institutes of Sweden (RISE)

<sup>4</sup> Swedish Meteorological and Hydrological Institute (SMHI)

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SGI Swedish Geotechnical Institute



Photo: P. Danielsson, SGI



Photo: A. Björfin, SGI

## Overall aim

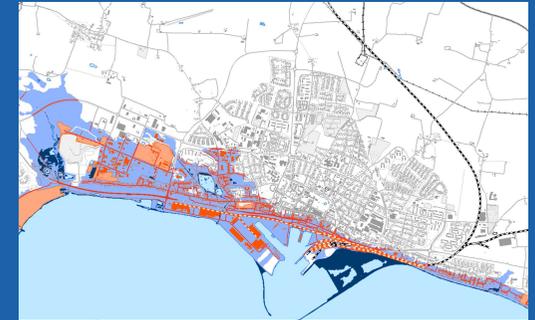
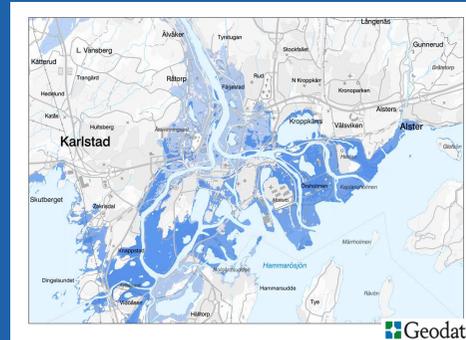
Investigate managed realignment (managed/planned retreat) as a possible option for adapting to an elevated sea level and flooding from rivers, and investigate how visualization can help decision makers make more sustainable planning decisions.

# Five urban case studies

Norska havet



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Umeå – riverine and coastal town, land uplift  
*Workshop, 2020*

Karlstad – riverine and lake town, delta land  
*Workshop April 4, 2019*

Öckerö – rocky island  
*Workshop October 3, 2019*

Halmstad – riverine and coastal town  
*Workshop November 5, 2019 (incl. all municipalities in Halland County)*

Trelleborg – coastal town, flat  
*Workshop May 21, 2019*

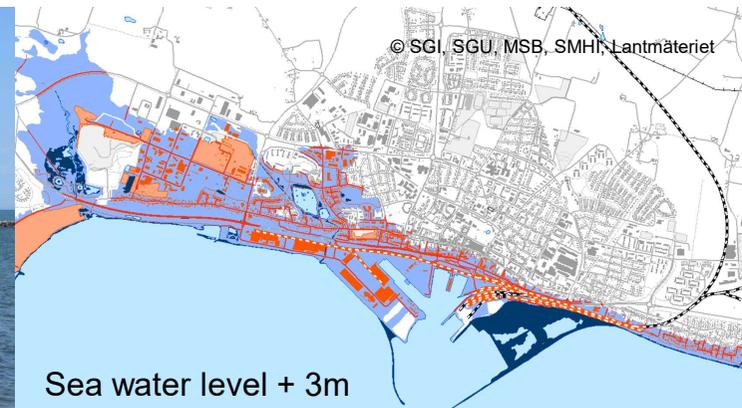
The following pages summarize observations (so far) from the literature and workshops.



Photo: P. Danielsson, SGI



Photo: A. Björlin, SGI



## Realignment, retreat, relocation, ...?

- Managed realignment – managed retreat, managed restoration, habitat restoration, set back.  
Examples: UK, the Netherlands, Belgium, France, Germany, USA, China
- Managed retreat – managed/planned relocation/resettlement/realignment.  
Examples: Australia, USA, New Zealand, the Netherlands, France, China
- Planned retreat – planned/forced relocation/resettlement, migration/evacuation.  
Examples: PIC, Vietnam, Indonesia, Zambia

**Managed realignment**, “this strategy aims to create space for coastal ecosystems to persist in the face of rising sea levels, generally by removing structures such as sea walls, to allow the rising waters to intrude”

([https://coastadapt.com.au/sites/default/files/case\\_studies/SS46\\_UK\\_Coastal\\_Realignment.pdf](https://coastadapt.com.au/sites/default/files/case_studies/SS46_UK_Coastal_Realignment.pdf))

**Managed realignment** “involves setting back the line of actively maintained defences to a new line inland of the original – or preferably to rising ground – and promoting the creation of inter-tidal habitat between the old and new defences”

(Rupp et al, 2002)

**Retreat** is used to capture the philosophy of moving away from the coast rather than fortifying in place.

(Wong, P. P. et al. In Climate Change 2014: Impacts, Adaptation and Vulnerability (eds. Field, C. B. et al) 361-409 (IPCC, Cambridge Univ. Press, 2014)

**Managed retreat** is the application of coastal zone management and mitigation tools designed to move existing and planned development out of the path of both short- and long-term coastal hazards.

This management strategy is based on a philosophy of avoiding or moving out of harm's way and is proactive in recognizing that the coastal zone dynamics should dictate the type of management employed.

(Neal et al., 2017, In book: Encyclopedia of Coastal Science, pp1-7)



Photo: P. Danielsson

## When has managed retreat been implemented?

Managed retreat projects have mainly been carried out in areas where the hard structures over time has not worked (they break, moves the problem to downstream areas, damage ecosystems) and the cost for maintenance becomes too high.

In coastal areas, also when there is a shortage of sand for beach nourishment.

# Examples

## **Managed Realignment – Medmerry, Sussex, UK, 2013**

*“It is the largest open-coast scheme in Europe and is one of the most sustainable projects the Environmental Agency has ever delivered.”*

Source: [https://www.theguardian.com/environment/2019/may/18/this-is-a-wake-up-call-the-villagers-who-could-be-britains-first-climate-refugees?CMP=share\\_btn\\_tw](https://www.theguardian.com/environment/2019/may/18/this-is-a-wake-up-call-the-villagers-who-could-be-britains-first-climate-refugees?CMP=share_btn_tw)

## **Managed Relocation - Soldier’s Grove, Wisconsin, USA, 1983**

*“Soldier’s Grove is an early example of managed retreat: a proactive, intentional shift of civilization away from an environmental threat.*

*Today, managed retreat is a potential strategy for survival in the face of rising sea levels from our rapidly changing climate.”*

*“While most major cities talk only about walls and infrastructure to protect against the encroaching sea, Soldiers Grove is a model of how retreat can be a cost-effective option, and a chance to do something more than just run away.”*

Source: <http://soldiersgrove.com/history/the-solar-village-2/>

## **Isle de Jean Charles Resettlement, Louisiana, USA, ongoing**

*“Increasing frequency and intensity of disaster events, exacerbated by ongoing land loss, subsidence and sea level rise along our coast.*

*That is why we have begun to think about recovery with the core principles of resilience and adaptation. Cannot rebuild land in Louisiana faster than we are losing it. Make plans today that will keep us safer tomorrow.”*

Source: <http://isledejeancharles.la.gov> ; <https://smartercommunities.media/louisianas-managed-retreat-isle-de-jean-charles/>

## **Trade sea walls for parks, Boston, USA, planning**

*“Shoreline projects are more feasible and more effective ways to increase our city’s resilience. ... This is our vision of a resilient Boston.*

*It’s a system not of barricades but of beaches — and parks and trails and open spaces.”*

Source: <https://www.pewtrusts.org/en/research-and-analysis/blogs/stateline/2018/11/02/living-with-water-facing-climate-change-cities-trade-sea-walls-for-parks>

# Obstacles to managed retreat

Most of the barriers are political and socioeconomic rather than management constraints:

- Political risk.
- Property viewed as growth assets.
- The 'levee effect'.
- Assets anchoring.
- Land and water rights.
- Lack of responsible agency and policy documents.
- Officials and decision makers opt for (hard) engineering solutions that they understand (limited knowledge about managed retreat as a concept).
- Attachment to place, perceptions of the potential destination.
- Time required.
- Inability to value intangible benefits and too short time perspective in socioeconomic analyses (cost-benefit analyses).



Photo: G. Göransson

# In favor of managed retreat



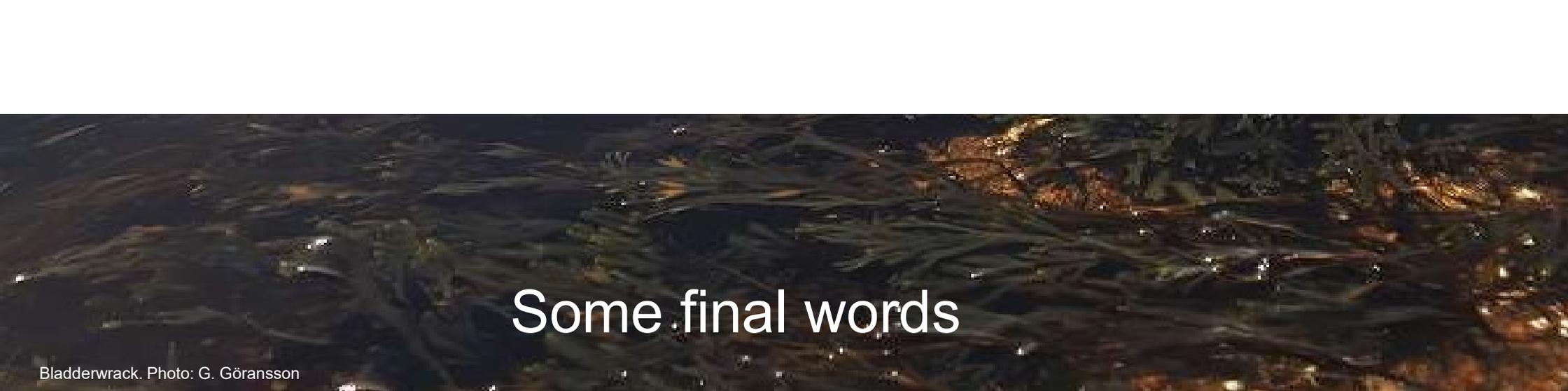
A crab with seaweed, ready for attack. Photo: G. Göransson

- Impaired opportunities for insurance and loans in hazard zones.
  - The old way to protect will not be enough.
  - Long term protection and safety.
  - Recreation of habitat and ecosystem services.
  - Accessibility to the water and open spaces.
  - Buffer zones.
- Benefits human health and economy.

# What is needed to enable managed retreat

Photo: G. Göransson

- Political courage.
  - Understand the core principles of resilience and adaptation.
  - Set up standards for when in-situ adaptation is no longer possible.
  - Restrict asset intensification in vulnerable areas.
  - Start with short term options.
  - Implement managed retreat as part of an adaptation strategy and integrated in a stepwise approach.
  - Review laws and regulations.
  - Willingness of landowners.
  - Contribution from external funding.
  - Retain sense of place.
  - Bottom-up, transparent and inclusive process, mutual agreement, community engagement
- Trust and communication!

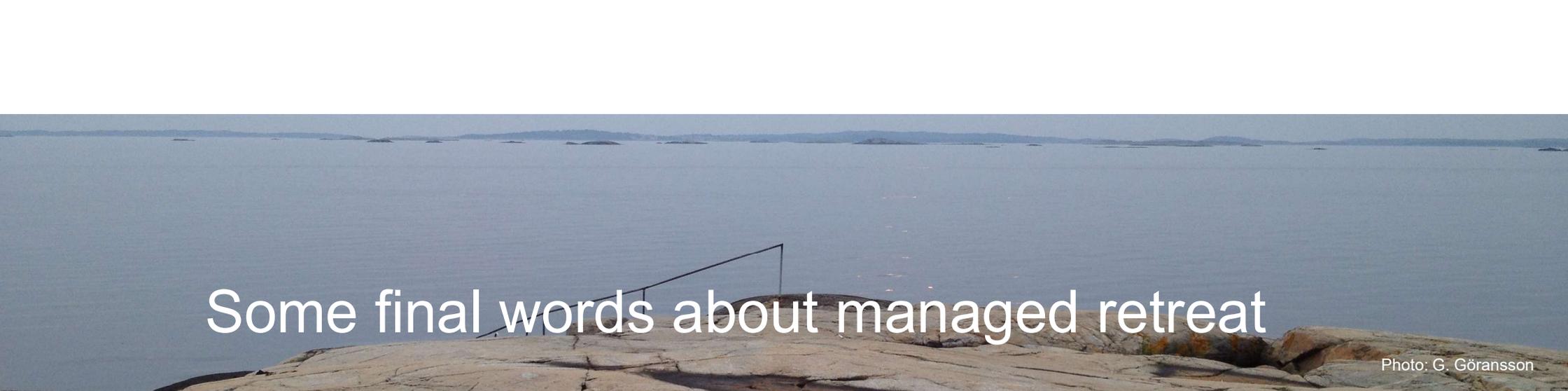


# Some final words

Bladderwrack. Photo: G. Göransson

What is it that we are protecting, from what and for whom?

- It is not about protection but about adaption and mitigation.
- It is not about us but about next and future generations.
- Thus, we need to shift from small incremental adjustments to a large transformational change.



## Some final words about managed retreat

Photo: G. Göransson

*Managed retreat* is a long-term climate adaptation strategy when the time has come to move out from harm's way and make room for nature to take its place.

*Managed retreat* is a shift away from 'status quo' and holding-the-line, and is in that sense a complete different strategy than protection or accommodation.



Photo: G. Göransson

*“... the term retreat suggests that the time has come to retreat not only from particular places but also from particular ways of life that are likewise proving unsustainable.”*

(Koslov, 2016)

[gunnel.goransson@swedgeo.se](mailto:gunnel.goransson@swedgeo.se)