



Measuring erosion along the coast of southern Sweden

Using aerial photography in a geographic information system

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January 2022



What you will learn

Is erosion a problem?

Why measure coastal erosion?

Assessing erosion from aerial photography

Long-term erosion in Skåne

Future work

Kustnära sedimentdynamik

Johan Nyberg, Bradley Goodfellow, Jonas Ising & Anna Hedenström

mars 2020

SGU-rapport 2020:04
Diarie-nr. 423-1763/2019



SGU
Sveriges
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undersökning

Skånes känsliga stränder – erosionsförhållanden och geologi för samhällsplanering

Kärstin Malmberg Persson, Johan Nyberg, Jonas Ising & Lars Rodhe

september 2016

SGU-rapport 2016:17



SGU
Sveriges geologiska undersökning
Geological Survey of Sweden

How we do it

Advantages

Disadvantages

Fysiska och dynamiska förhållanden längs Skånes kust – underlag för klimatanpassningsåtgärder

Johan Nyberg, Bradley Goodfellow & Jonas Ising

februari 2021

SGU-rapport 2021:02
Diarie-nr: 31-542/2020



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Is erosion a problem?

It depends...

Natural process

Becomes a problem if:

At SGU, we assess coastline change over time

It persists over many years

Drivers are man-made

It threatens property, important natural resources

Erosion

Accumulation
(can also be a problem)



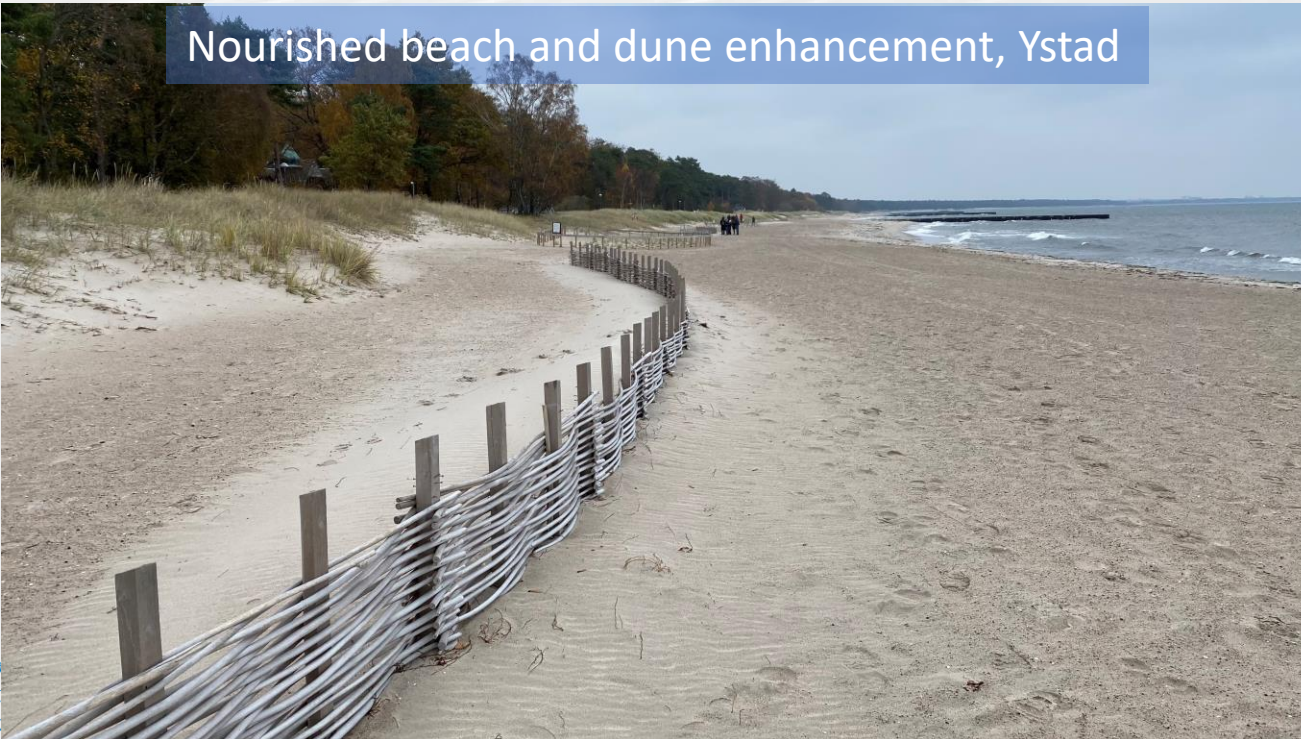
Why measure coastal erosion?

Risk assessment

Mitigation

Helps us predict what can happen in the future

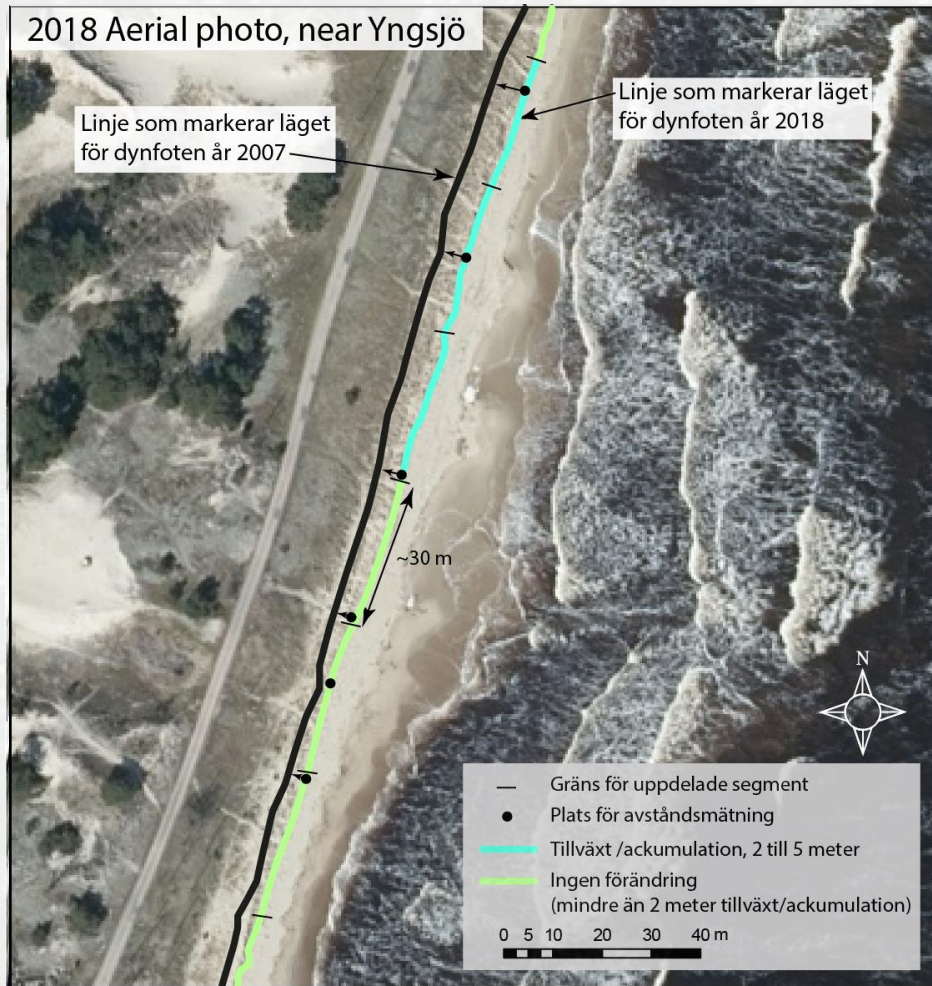
Nourished beach and dune enhancement, Ystad



Sea level rise



Measuring coastal erosion using aerial photography



Different methods to measure coastal erosion

SGU uses aerial photography

Corrected for optical distortion and image perspective of terrain

Use orthorectified photos from different years (reference year and comparison year)

Choose a line to map in a GIS:
-e.g., dune foot OR shoreline (waterline)

Map this line for both years

Divide each line into equal segments and calculate distances between these segments

Assign erosion or accumulation and show these values on maps

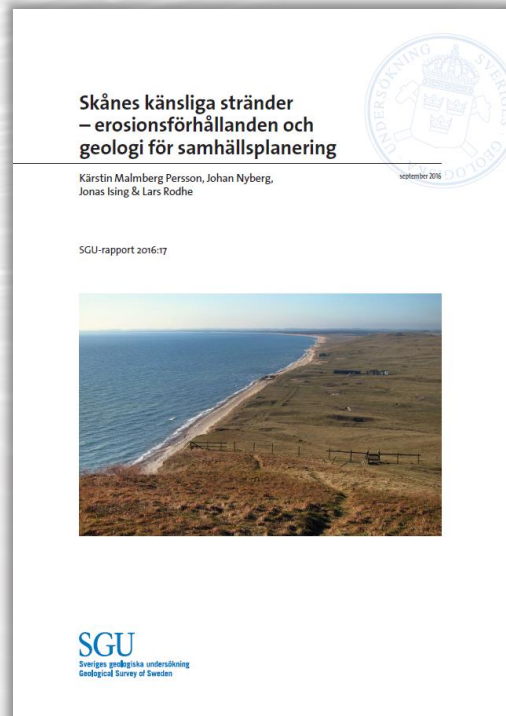


Advantages of assessing coastal erosion from aerial photographs

It's inexpensive

It's time efficient and relatively simple

It's effective



-Long sections of coast can be assessed
-All of Skåne and Halland

Permits an assessment of short and long-term trends

High precision and accuracy



Disadvantages of assessing coastal erosion from aerial photographs

It's incomplete

False impression of long-term erosion

Sources of uncertainty



Images are low quality
(old black and white photos)

It can be difficult determining shorelines from old B&W photos
(map the dune foot line instead)

Vegetation obscuring the dune foot line or shoreline



What can we say about long-term erosion in Skåne

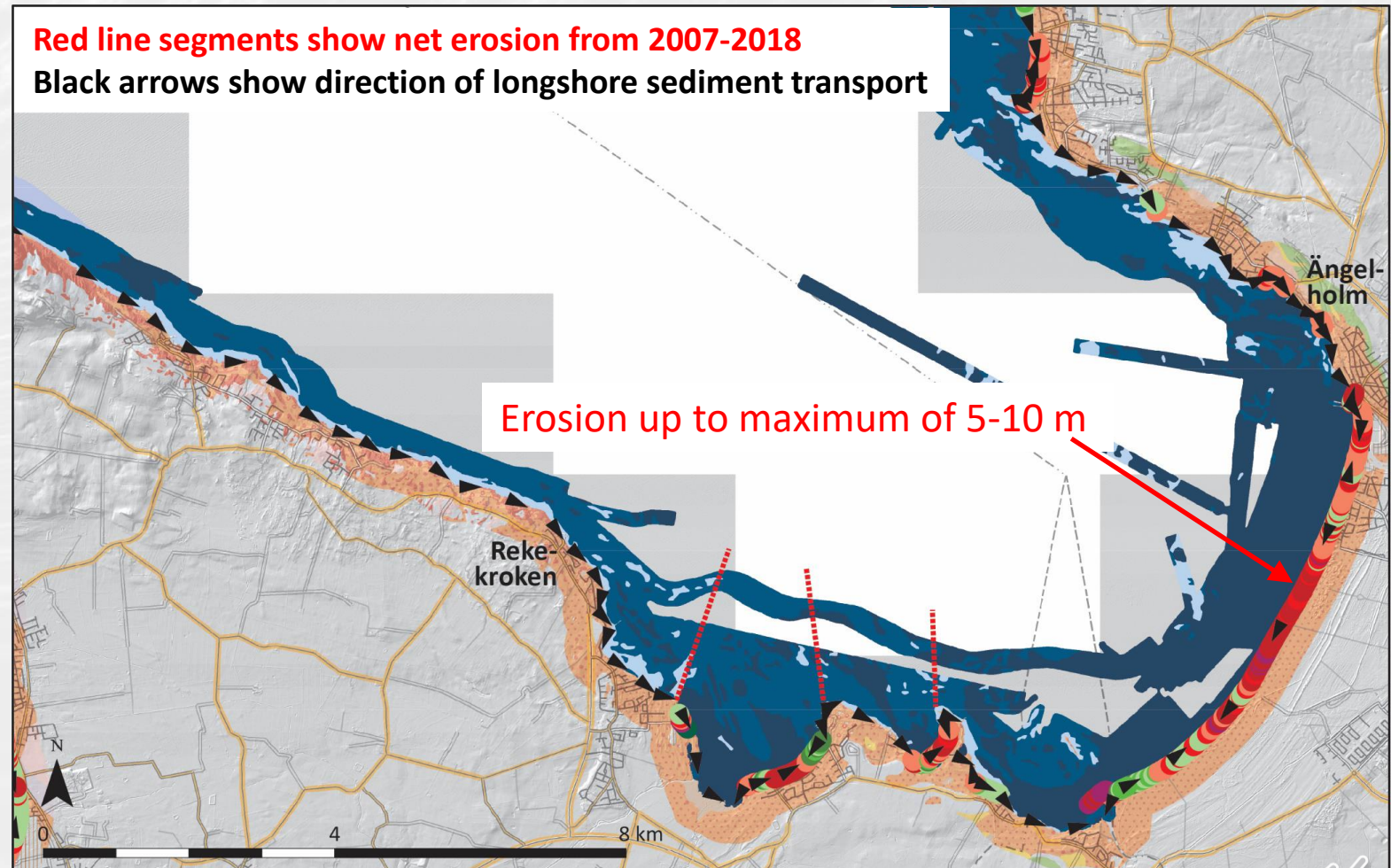
Skälderviken, from Nyberg et al., SGU rapport 2021:02

Erosion has been a problem over recent years in some locations

Äspet, Löderups strandbad, Ystad, Ängelholm, Båstad

Longshore sediment transport is a key process

www.sgu.se
<http://projects.swedgeo.se/RKS-SH/>
www.sgi.se

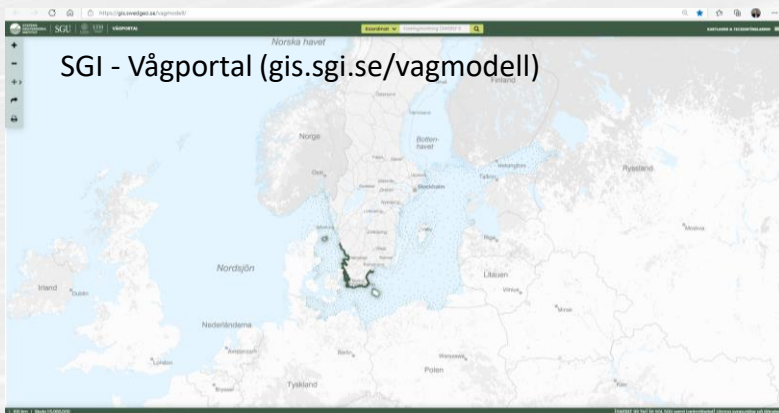


What we need to do in future work

Develop a consistent methodology

Integrate the different studies into a single long-term assessment

Complement with other methods



Fysiska och dynamiska förhållanden längs Skånes kust – underlag för klimatanpassningsåtgärder

Johan Nyberg, Bradley Goodfellow & Jonas Ising

februari 2021

Almir Nunes de Brito Junior, Björn Almström, Magnus Larson

SGU-rapport 2021:02

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Societal impacts of sea level rise induced erosion in southern Sweden (SISLER)

FORMAS project, 4 years starting January 2022

Collaboration between SGI, Lund University, SGU, Länsstyrelsen Skåne

We have started to do this:

1). Numerical modeling of longshore currents and potential sediment transport

2). Develop predictions for future shoreline responses to SLR

SISLER

