

WP4: COASTAL PROCESSES



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The background of the slide is a photograph of a coastal scene. In the foreground, there is a sandy beach. A line of white, foamy waves is breaking onto the shore, moving from the right side towards the left. The water is a deep blue color. The sky above is a clear, bright blue. The overall scene is bright and sunny.

Goal:

The objective of this study is analysis of coastal changes and forecast climate fluctuation impact on the coastal dynamic and ecosystems in Latvian terrestrial waters of the Baltic Sea, to describe the quality and biological diversity of the sea environment, marine resources and service for its sustainable use.

Phase 2 tasks of WP4:

1. Systematization of published and archived materials (like maps and plans) of the 20th century and preparation of the coastal processes (erosion) digital maps.

Systematization of historical cartographical and bathymetry plans, maps and estimation the coastal zone changes (retreat, accretion) in Latvian harbors.

2. Estimation and characterizing of coastal geological processes in the 20th century.

Determination of changes in coastal erosion and accumulation zones recording of hydro – technical activities (harbors, coastal protective structures), and estimation of their influence of the coastal dynamic.

3. Creation of the maps of coastal erosion and accumulative processes in the 20th century. Preparing the maps of maximal coastal retreat and accretion zones in Latvia: the map of coastal geology (coastal typology) and the map of maximum sea – water levels (storm surge levels)

Phase 2 tasks of WP4:

4. Field works:

Mapping of the coastal erosion zones after winter – spring storms (2006/2007)

Mapping of the coastal protective structures of the Gulf of Riga

Mapping of the erosion risk at selected sites of the Gulf of Riga (Roja, Saulkrasti)



Phase 2 results

Task 1:

Investigations of coastal geomorphology in Latvia and first substantial scientific articles or monographs on this topic appeared only in the 50s and 60s of the 20th century.

These publications were descriptive and they did not include measured data and calculations.

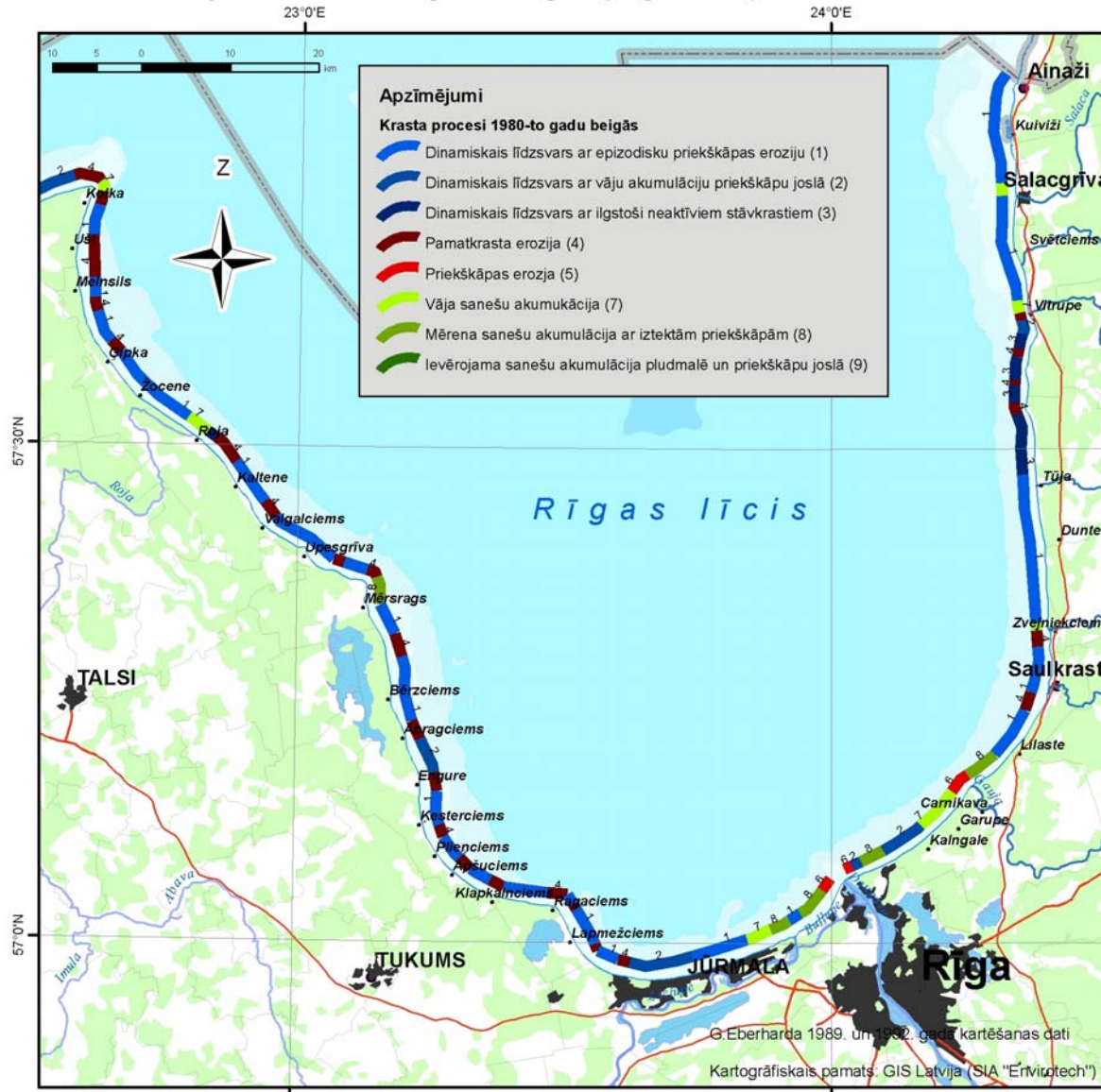
Maps are generalized and cartographically distorted (majority of the area belonged to the soviet time secret zone)

The review of historical data allowed to produce several digital maps:

- Latvian coastline dynamic during the last 2500 years
- Coastal processes of the gulf of Riga in the 50ies of the 20th century
- Coastal erosion in hurricane of 1969
- Periodicity of the Baltic coastal erosion and accumulation processes (1956 – 1987)
- Coastal processes of Latvia at the beginning of 80ies of the 20th century

Costal processes of the Latvia at the 80ies of the 20th century

Jūras krasta procesi 1980-to gadu beigās (Rīgas līcis)



Phase 2 results

Task 2:

Estimation and characterizing of geological processes in the 20th century

Determination of changes in coastal erosion and accumulation zones

Recording of hydro technical activities (harbors) and estimation of their influence on the coastal dynamic



Results

The earliest land topographical measuring plans (1935 – 1938) at scale 1:5000 and 1:2500 and soviet topographical maps produced in the 80ies (scale 1:10000 have been analyzed

The review of maps and plans give an opportunity to determine coastal changes (retreat, accretion) during the last 50 – 60 years (1935 – 1990)

Based on comparison of these maps, the graphs of the change of Latvian coast have been produced.

Long – term mean and maximal rates of coastal erosion calculated

Open Baltic Sea coastal change and processes in the 20th century (1935 – 1990)



Results

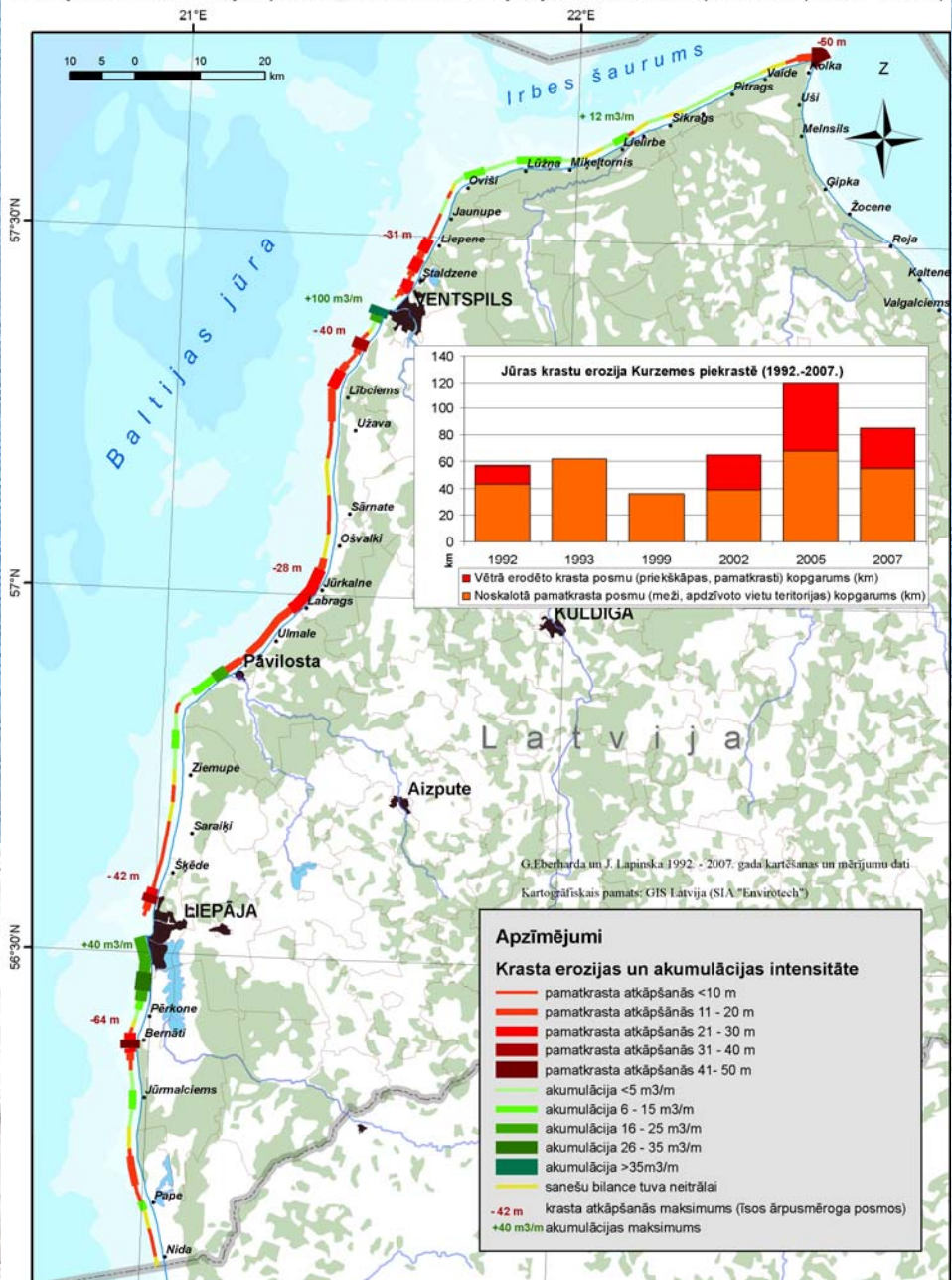
Assessment of the coastal processes that took place during the last 15 years was based on the long – term coastal geological processes monitoring data and mapping of the coastal erosion cells after storms

Results of these studies are presented in the maps:

- Coastal change and modern processes of the Gulf of Riga (1992 – 2007)
- Coastal change and modern coastal processes of the open Baltic (1992 – 2007)
- Coastal geology (types of the coast)
- High erosion risk coastal segments
- Coastal erosion in the storms of November 2001
- Coastal erosion in the hurricane January 8/9, 2005
- Coastal erosion in storm January 15, 2007
- Latvian harbors activities and sediment loss
- Local factors determined coastal erosion

Coastal change and modern processes of the open Baltic (1992 – 2007)

Erozijas un akumulācijas procesu intensitāte Baltijas jūras Kurzemes piekrastē (1992. - 2007.)



Coastal geology

Baltijas jūras Kurzemes krastu ģeoloģiskā uzbūve (krasta tipi)

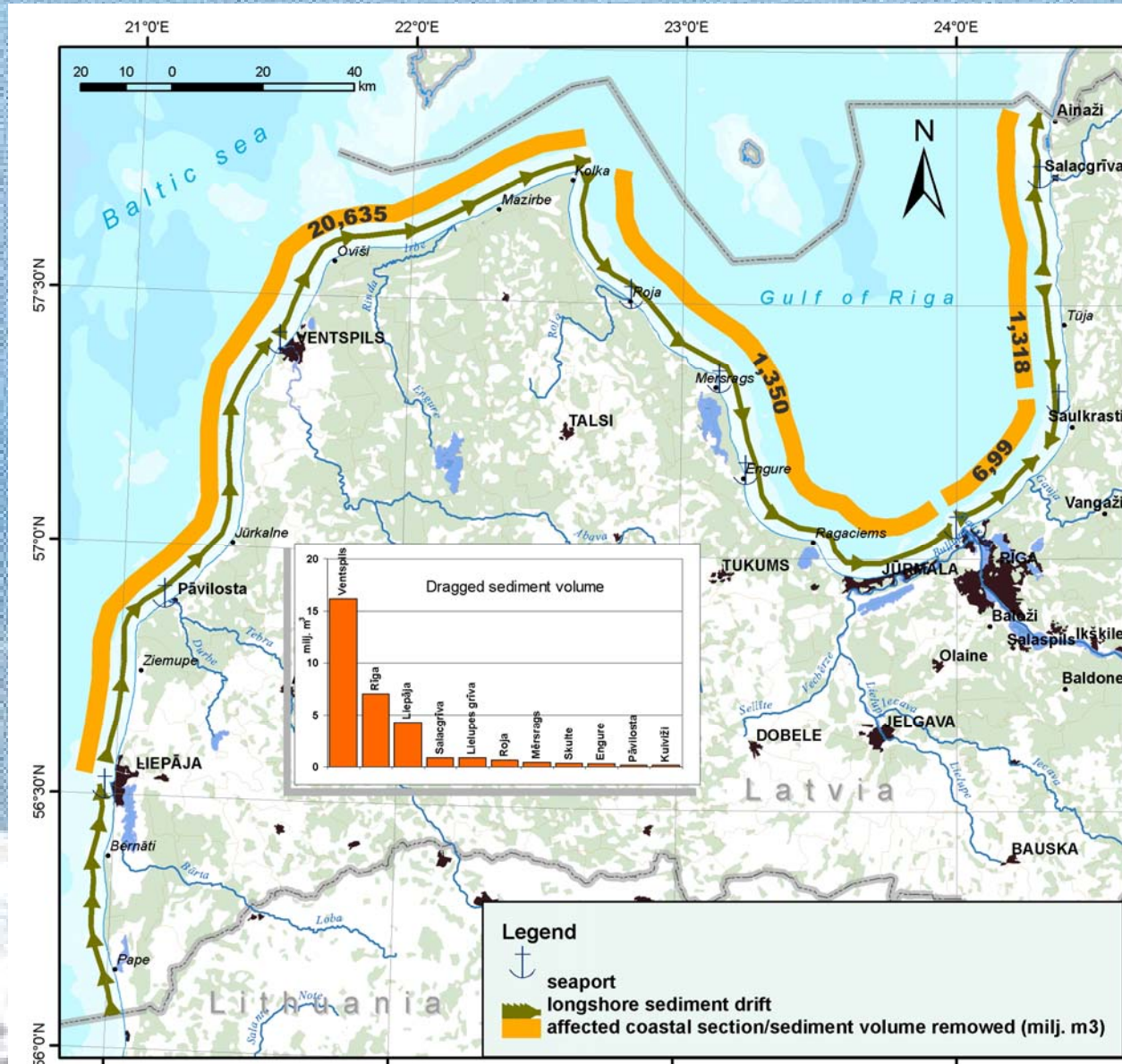


Coastal erosion

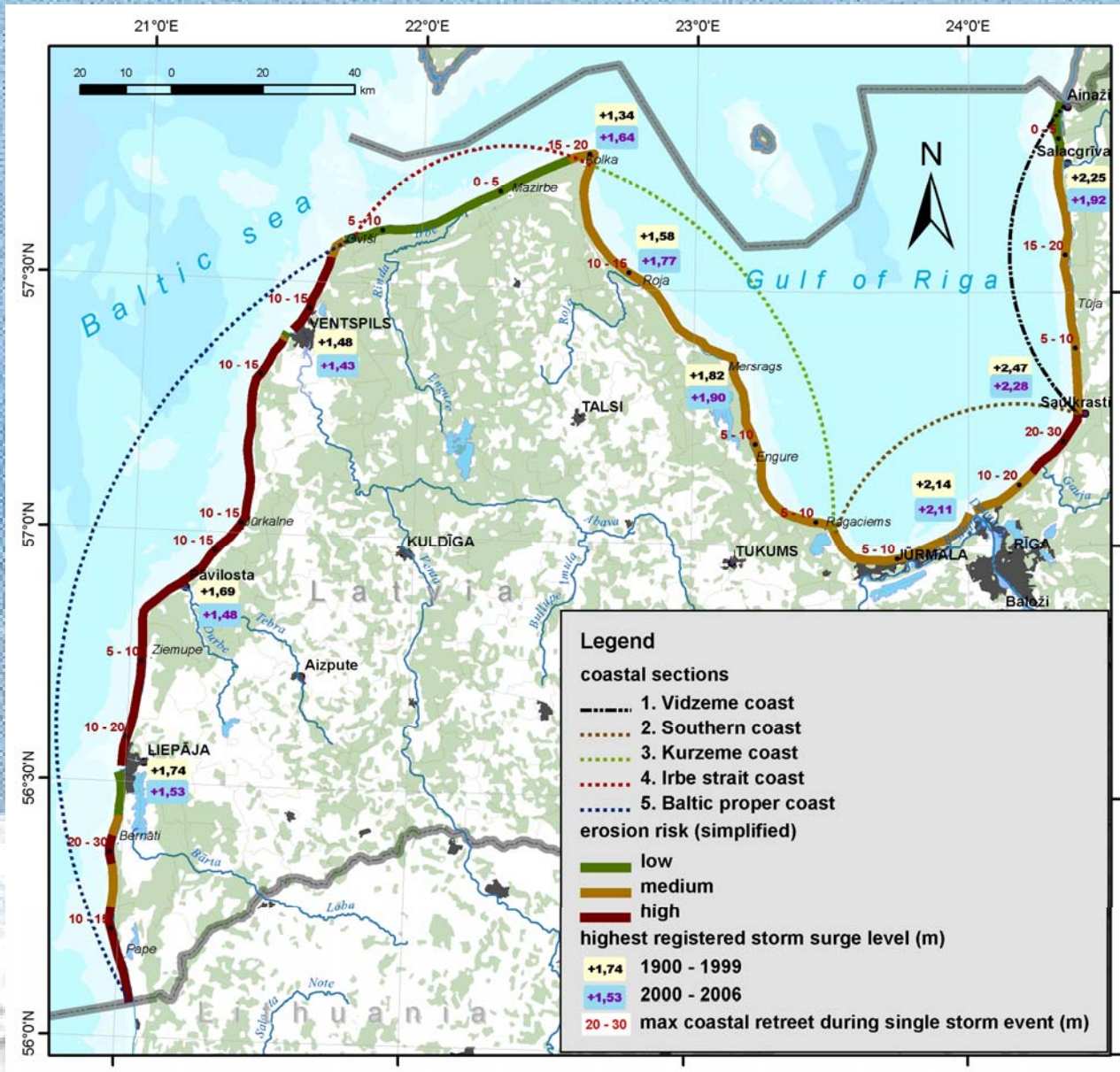
Krasta erozija 2005. gada 8. un 9. janvārī vētrā "Gudrun" (Rīgas līcis)



Latvian harbors activities and sediment loss



Local factors determined coastal erosion



Task 4: Field works

- Mapping of the coastal erosion after the winter – spring storms 2006/2007
- Mapping of the coastal protective structures of the Gulf of Riga
- Mapping the erosion risk the selected coastal sites (Roja, Saulkrasti)



Scientific and economic significance of results:

Quantitative data on distribution of the coastal retreat and erosion rates were obtained for the first time in Latvia

The new data will be used to prepare a series of maps depicting Latvian coastline changes and coastal processes during the 20th century and, in particular, the recent 15 years (1992 – 2007)

In addition the maps will illustrate the coastal erosion that took place during separate strong storms (2001, 2005, 2007) at different wind climate and storm surge levels in sites with varied coastal geology and exposure

These maps will describe the local factors determining the coastal erosion risk

In 2008 these maps will be prepared and published as an atlas “Coastline change and modern coastal processes in Latvia” (27 maps)

The results obtained in second phase of the work will serve as a basis for the phase 3 (2008), focusing on the coastal erosion forecast, flooding risks of low – lying coastal areas, risk assessment for the future 30 – 50 years, under an impact of the climate change

WP 4 tasks fore the 3th phase (2008)

Continuation of mapping of the coastal changes and measuring of coastal erosion after the winter storms of 2007/2008

Finalization of mapping and estimation of efficiency of coastal protective structures (open Baltic coast) and preparation of digital map

Preparation of coastal erosion forecasts fore different climate change sceneries. Preparation of digital maps for coastal administrative units that could be used fore planning and management purposes

Adaptation of EU erosion criteria fore conditions of Latvia, design of tailor – made methodology fore risk assessment.

