



# AstrA

## CLIMATE CHANGE AND WATERS

9.-12. May 2007

Riga, LATVIA

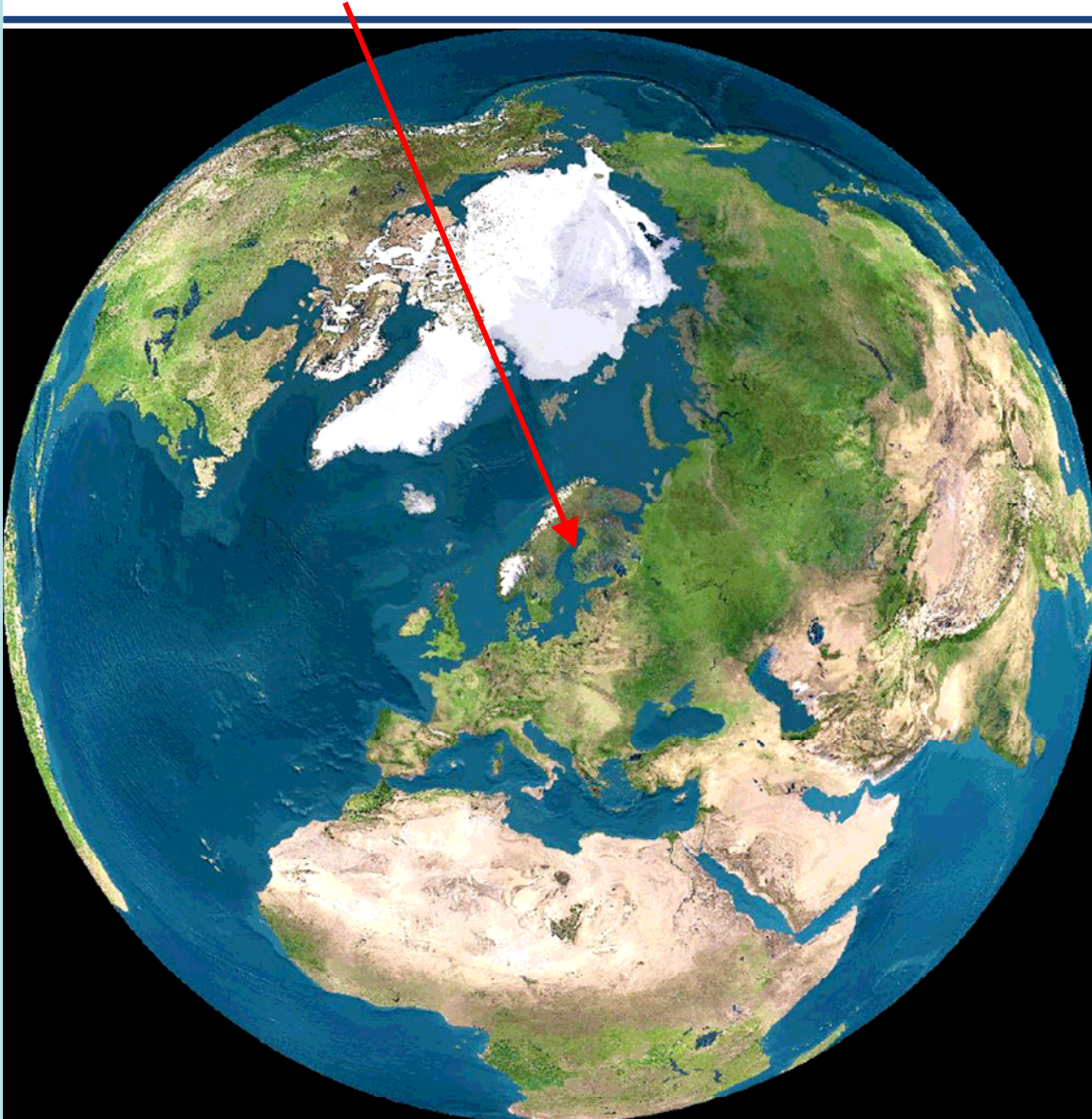
Kokkola Old Harbour Bay Masterplan -  
Climate change impacts on planning process

Juhani Hannila

City of Kokkola

Kokkola

Astra



- **Finnish Land Use and Building Act: All the needed investigations have to be done before accepting a regional, master (§ 39, 9 points) or detailed plan**
- **Masterplanning is always long term decision making**
- **Are there any tools to take climate change impacts into account in Urban planning? Hopefully some after the Astra project...**

## Case Kokkola: Old Harbour Bay

1. Land uplift history in Kokkola
2. Mapping of the Vulnerable targets
3. Height model (Geological survey of Finland) of the coast
4. Sea level predictions 2100, (Swedish hydrological and meteorological institute, seareg-project), flood maps
5. Predictions of possible impacts on temperatures, precipitation, melting-freezing cycles, windiness, duration of snow and ice cover of sea, snow precipitation and snow cover water equivalent maximum (years 2071-2100)
6. Analyse over the Old Harbour Bay master plan (adaptation and mitigation) (have the counted climate change impacts been taken into account on the master plan, should the plan be opened and changed).

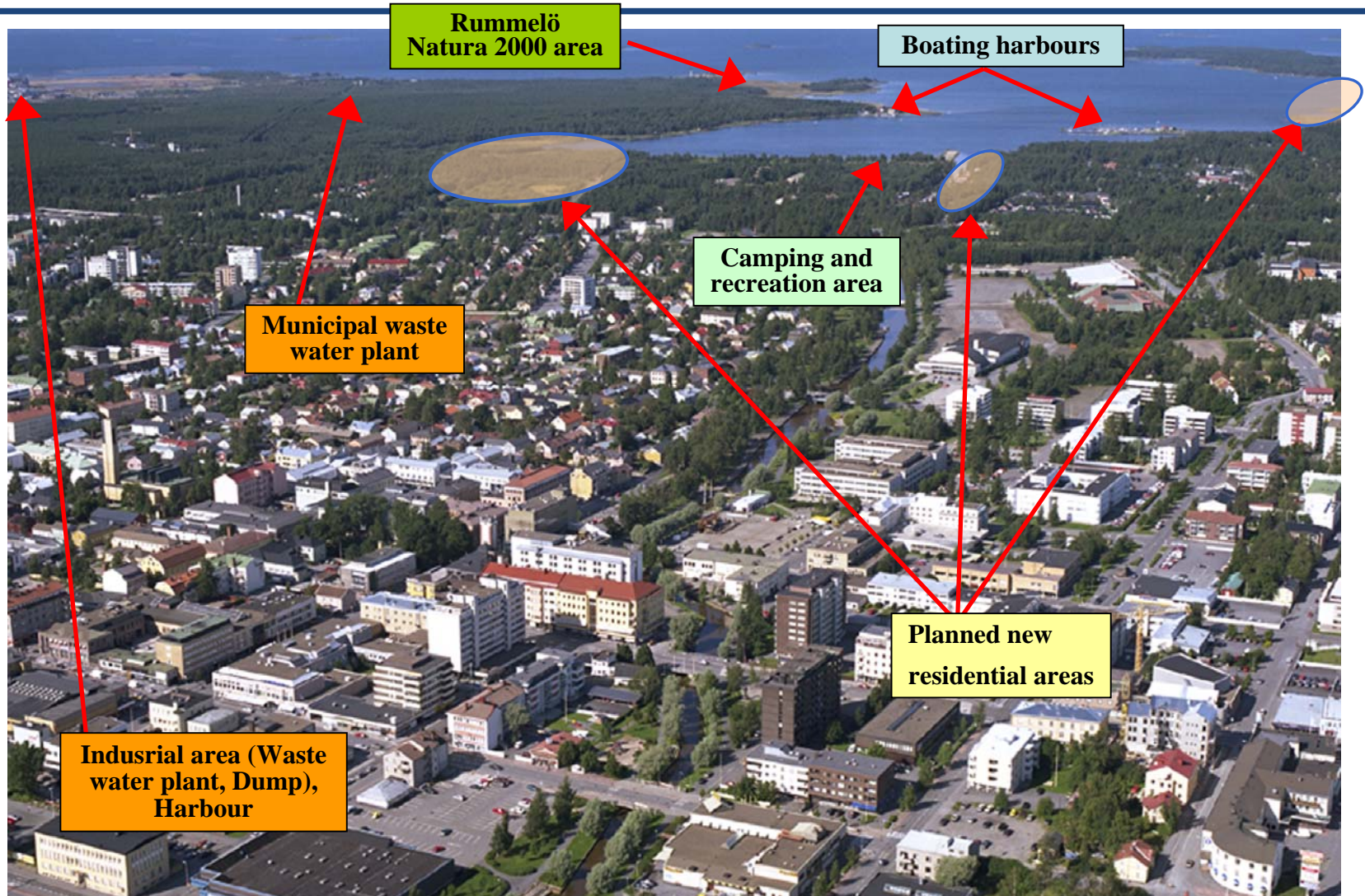


Old Harbour Bay General Plan  
Kokkola





# Kokkola Old Harbour Bay, vulnerable areas



Rummelö  
Natura 2000 area

Boating harbours

Camping and  
recreation area

Municipal waste  
water plant

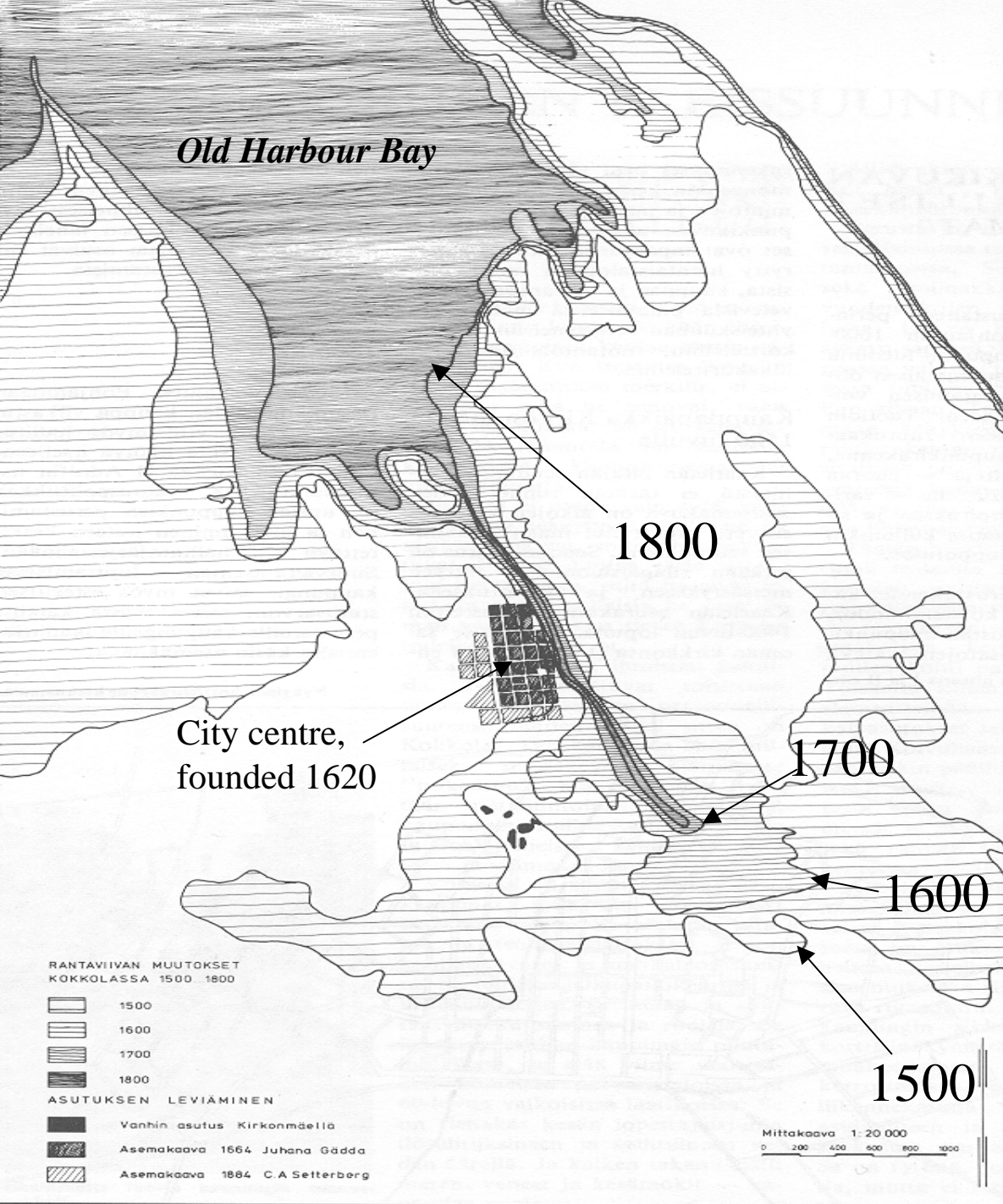
Planned new  
residential areas

Industrial area (Waste  
water plant, Dump),  
Harbour



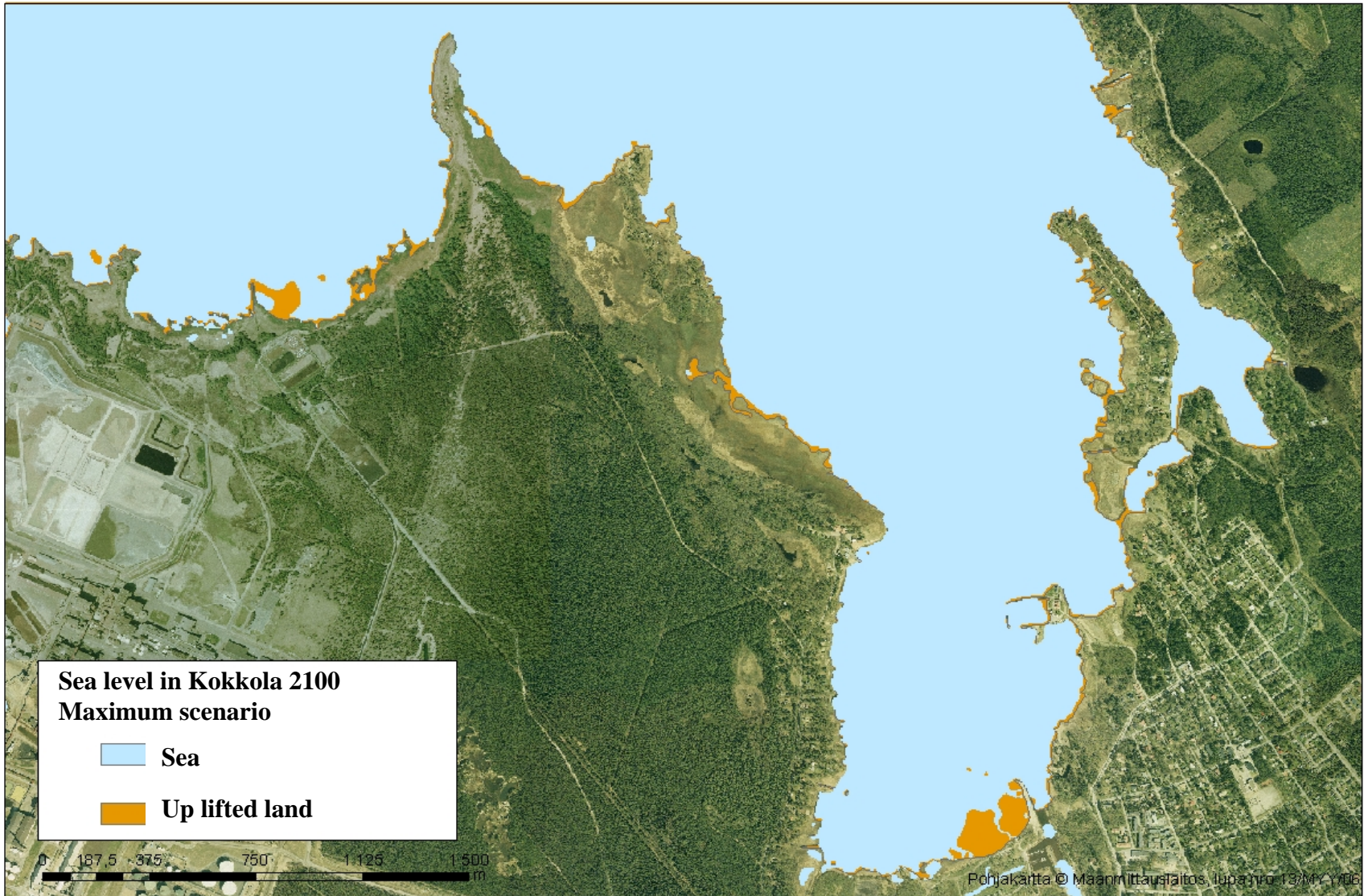
## Changes of the shoreline in the Old Harbour Bay

- ⤵ The landscape and shoreline in Kokkola is changing gradually because of land uplift (8-9 mm/year). Harbours have been replaced several times, but the centre of the town has remained in its original place.



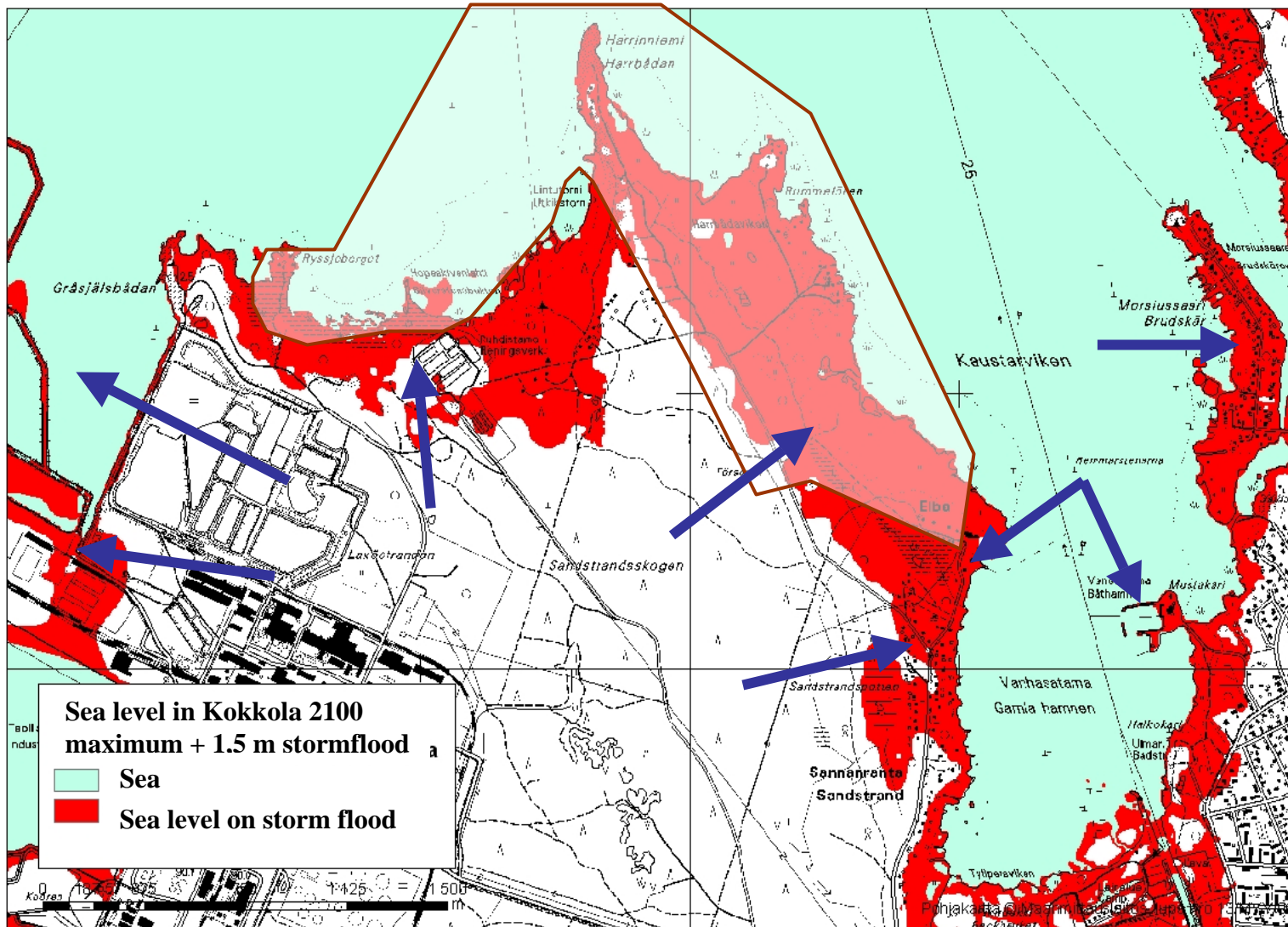


# Maximum scenario 2100





# Flood maps, (Maximum scenario + 1,5 m storm flood)

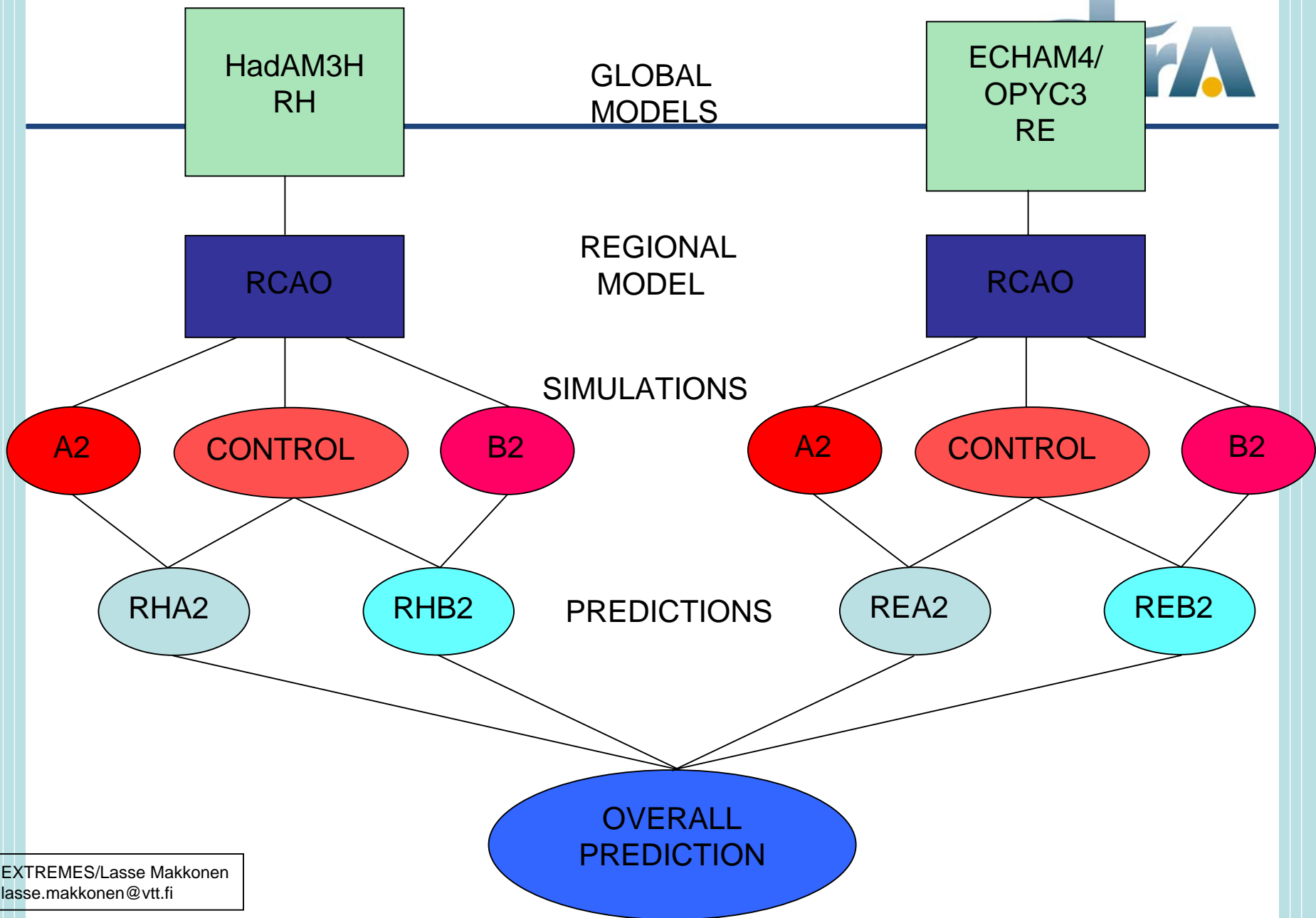


## Climate Change in Urban Planning (Irmeli Wahlgren, Technical Research Centre of Finland)

- ≡ A project of Finland's Environment Cluster Research Programme and Climate Change Adaptation Research Programme (ISTO)
- ≡ The aim of the project is to promote adaptation to and mitigation of climate change in urban planning and thereby i.a. reduce damages caused by floods and storms as well as reduce greenhouse gas emissions.
- ≡ The project analyses plans at different levels: regional, master and detailed plans.
- ≡ The basis for analyses are predictions of climate change in the case localities.
- ≡ Next issues are analysed: How climate change risks have been taken into account? How climate change mitigation has been realised? How impacts of climate change have been assessed? Are there conflicts between measures for climate change mitigation and adaptation? How to develop impact assessment and control of climate change?
- ≡ Greenhouse gas emissions caused by implementing of the plan are estimated
- ≡ Results of the project are recommendations of practical procedures and means for taking climate change into account in urban planning and impact assessment.
- ≡ Study areas in Finland: City of Helsinki, Uusimaa Region, **City of Kokkola**, City of Kuopio, Kuopio Region, Sodankylä



- ☞ Predicted climate change in Kokkola based on simulation results of a regional climate model
  - The regional atmosphere-ocean climate model RCAO of Rossby Centre, Sweden
  - Extremes by University of Helsinki and VTT, Technical Research Centre of Finland
  - Simulations with boundary conditions of two global models and using two emission scenarios by IPCC (A2 and B2)
  - Results concerning changes describe mean values of four simulations at a counting point by Kokkola, which responds 50 km x 50 km area in the model.
  - "Present condition" by control simulations 1961-1990 and "prediction" by scenario simulations 2071-2100
  - Extremes or maxima and minima describe on average once in a 50 year period exceeding (or going below) values





# Predicted climate change in Kokkola



## ☺ Predicted changes:

- Mean temperature of a year + 4 °C
- Temperature maximum + 5 °C
- Temperature minimum +12 °C
- Melting-freezing cycles - 25 %
- Mean wind speed of a year + 0 %
- Wind speed maximum - 5 %
- Precipitation of a year +25 %
- Precipitation maximum 6 h + 40 %
- Precipitation maximum 5 d + 55 %
- Snow precipitation maximum 6 h + 30 %
- Snow cover water equivalent max. - 35 %
- Duration of snow cover - 60 d
- Duration of ice cover of sea - 80 d

# Finally



What is needed? What kind of knowledge should there be for planners, what kind for politicians?

- Awareness of climate change and its possible impacts
- Best possible predictions, clear numbers (millimeters, degrees, percentages) based on best possible scenarios
- Knowledge and ways to use these predictions, ability to see the possible future and visualizing it to decision makers
- Using the prudence principal in decisionmaking

Clear instructions from state (Ministry of environment) to municipalities and regional administration how to clarify the impacts of climate change during the planning process (point 10)



# Astra

**KEIN ASTRA KEIN SPASS.**



**Astra. Was dagegen?**

[www.astra-bier.de](http://www.astra-bier.de)

**Thank you! Kiitos! Tack!**

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# Bride Island 2006, from recreational to residential area 2017?

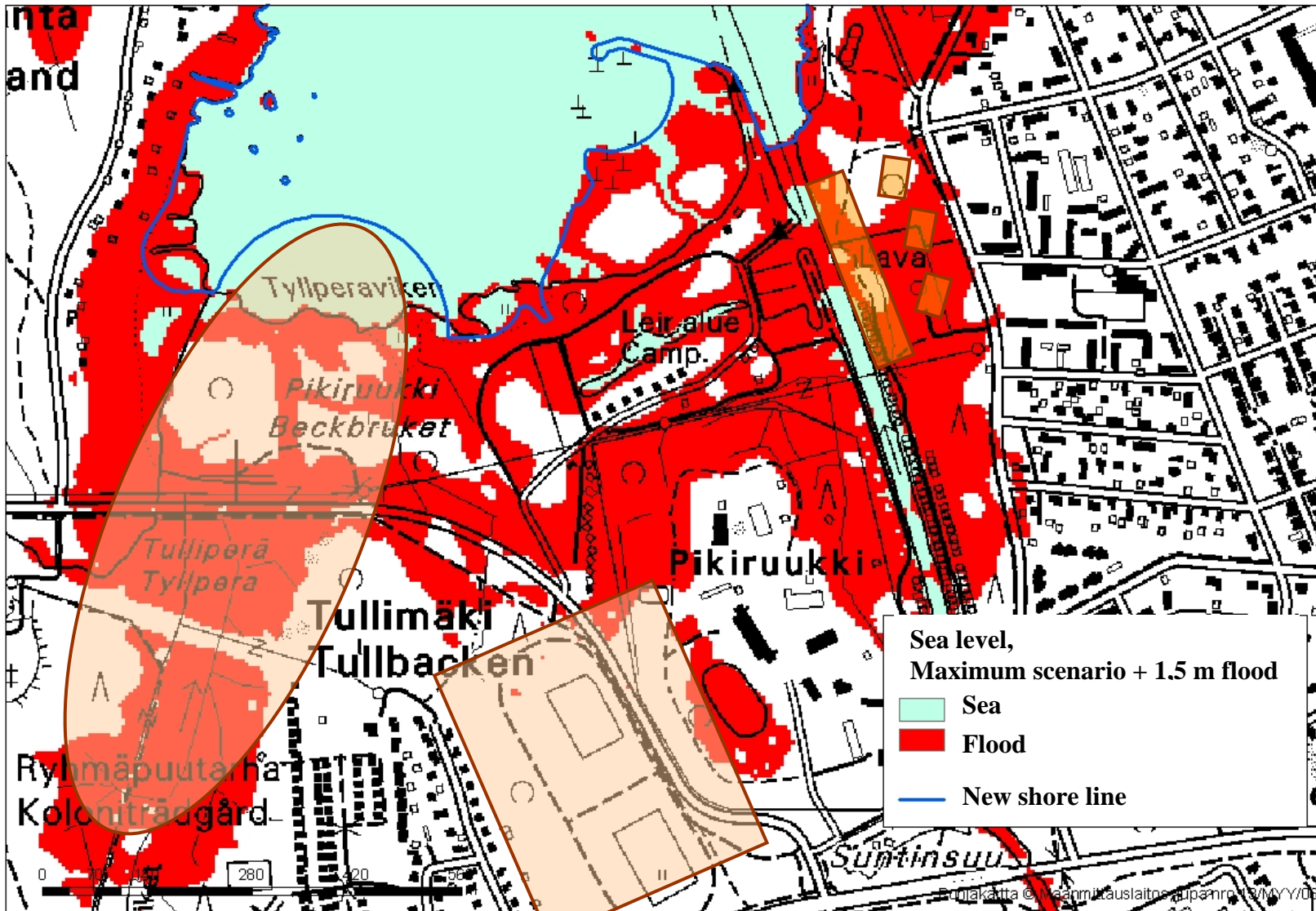


Master plan

Detailed plan



# Old Harbour Bay planned residential areas



# Land uplift 1000-2000 in Kokkola

