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LATVIJAS VIDES, ĢEOLOĢIJAS UN METEOROLOĢIJAS CENTRS

Development of Latvia's National Climate Change Adaptation Strategy

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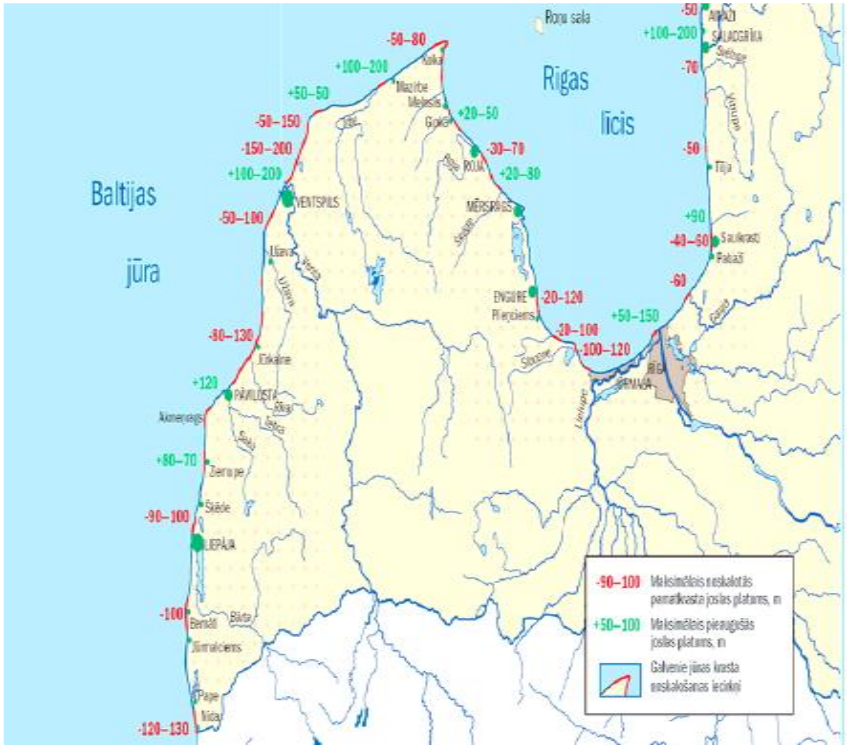
Oslo, Norway

Latvia`s geophysical features and coastal erosion processes

Overall change of basic coastline over period of last 70 years: territory of Latvia has lost 1000 ha taken by the Sea eroding basic coastline in range up to 50 – 200 m



- Latvia encompasses 64,589 square kilometers and is an extension of the East European Plain, 495km long sea coast
- Flat surface topography (98% of the country lies under 200m above sea level)
- The climate is humid (mean precipitation varies from 600 to 850 mm/year) and comparatively cold - mean annual air tº + 5.8º
- Latvia is rich in waters: the mean density of the river network is 600m/km2 water bodies occupy 1.7% from territory
- About 10% of Latvian territory consists of peat bogs, swamps, and marshes (>50% without human impacts)
- Rich in forests (main species: pine-tree, spruce, birch, alder, maple) – cover about 50% from territory; rich in biodiversity and biotopes

Identification of CC impacts (risks and gains) on main sectors

Sectors

- Health and welfare
- Water management and infrastructure
- Construction and building
- Biodiversity
- Forestry
- Transport infrastructure
- Health and welfare
- Water management and infrastructure
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Example: Water management and infrastructure

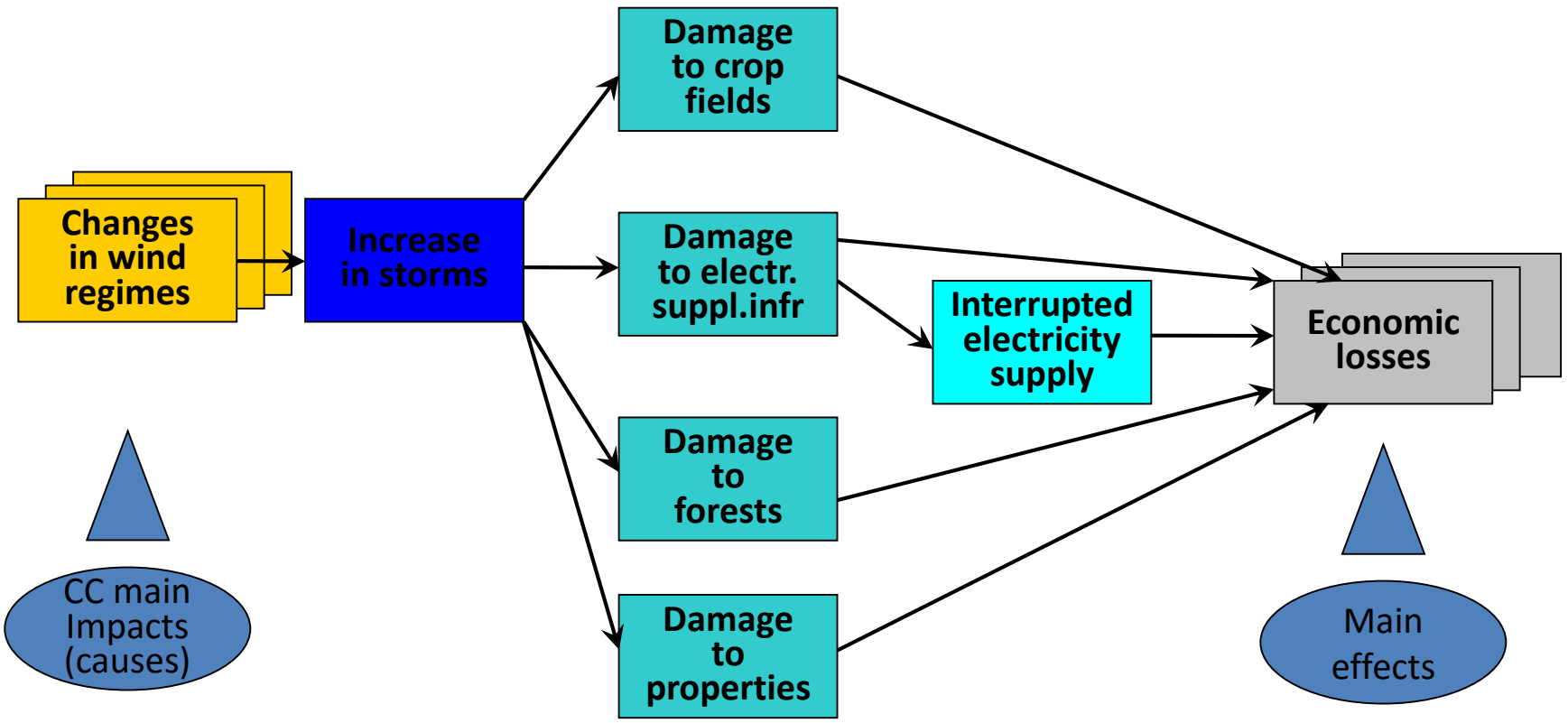
Risks

- Damage to hydropower plants (HPP) built on a big rivers as a result of extreme hydrological conditions
- Flood caused problems in a water supply and sewage systems
- Flood caused threat to public and civil engineering infrastructure
- Threat caused by the coastal erosion to the infrastructure objects near the Baltic Sea and / or the Gulf of Riga
- Ice congestion and flood damage to private properties

Gains or benefits

- Increase in river flow
- Changes in the seasonality of river flows and hydroelectric power resources
- Decrease of the early spring flooding risk

Climate change direct / indirect impacts on sectors



Opportunities / challenges for development of CC adaptation system

- CC adaptation policy and measures practically are incorporated into all sectorial policies (coast zone management, health care, energy, agriculture, civil protection, etc.) as well as at all levels in spite of lack of national adaptation system. Elaboration – by the end of 2016!
- Insurance system regarding weather extremes is developing rapidly. Two insurance schemes exist: 1) “Natural Disasters” exists in the private sector and applies to humans as persons, 2) in agriculture - insurance of agricultural risks (special fund)
- Civil protection system which includes management of all natural extremes (storms, rainfall, floods, etc.) in all sectors and governmental levels (under supervision of State Fire and Rescue Service)

Legislative policy instruments regarding CC adaptation

- Policy planning documents: Latvia's long-term development perspective – up to 2030; flood risk assessment and management; agricultural risk management; land-use policy; rural development; territorial and spatial planning; Baltic Sea and Gulf of Riga coastal zone management; national security and civil protection system strengthening (including e.g. material reserves), etc.
- Legislative acts: water management, sustainable forest management, protected belts and territories, compensations for damage in agriculture, invasive species distribution areal contain, flood risk control, construction standards (including building climatology), etc.

Climate change risk management system

EU level: European Commission document on Risks Assessment and Mapping Guidelines for Disaster Management (2010) plus EU Adaption Strategy Package (2013)

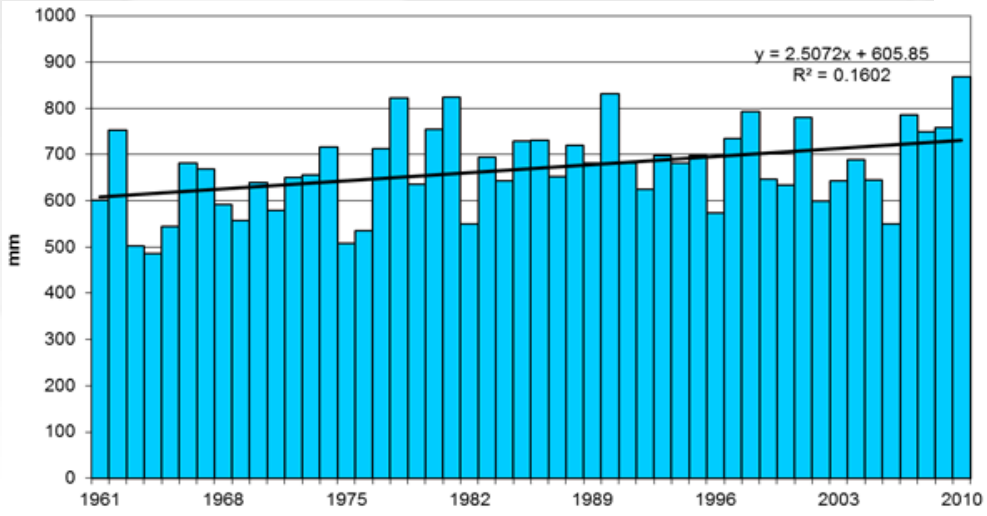
LV level:

- "Report on Adaptation to Climate Change" approved in Cabinet of ministers (2008) – CC risk identification in general
- Intergovernmental working group for preparing national risk assessment (2012)
- Analysis of CC risk assessment in sectors and proposals for development of adaptation system (2012)
- Ministry of Interior and State Fire and Rescue Service mapped 13 risk scenarios (causes, consequences and threats), e.g. storms, floods, forest fires, interruptions in electric power transmission and distribution systems (2015)
- Law on Civil Protection and Catastrophe Management (now draft in *Saeima* – national parliament - 2016)

Development of climate change scenarios

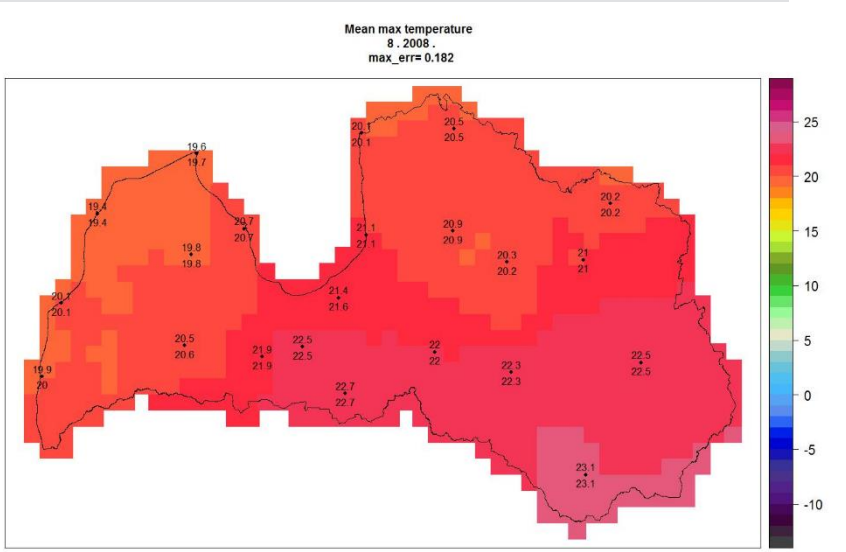
Past climate data analysis

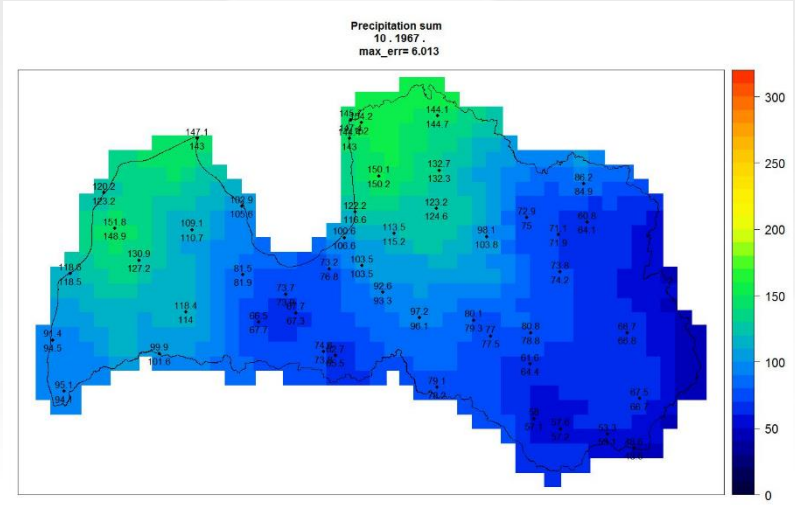
- Used observations: average, minimum and maximum air temperature, precipitation, average and maximum wind speed
- Time period: 1961 – 2010
- Time resolution: daily values
- Calculation of climate indices for past climate
- Trend identification and estimation

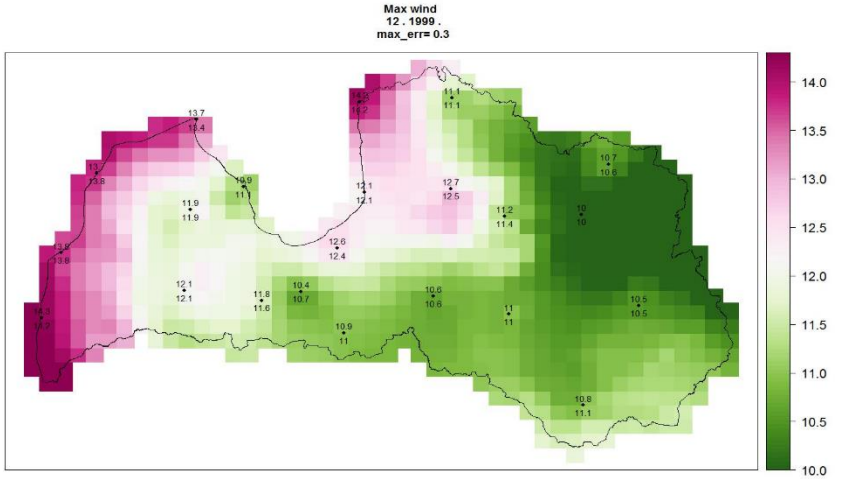


Development of climate change scenarios

Past climate and climate indices visualization and interpolation with spatial resolution 10x10 km and taking into account topographical features







Development of climate change scenarios

Future climate analysis

- Future climate change scenarios for the periods: years 2011-2040, years 2041-2070 and years 2071-2100
- Used scenarios: RCP2.6, RCP4.5 and RCP8.5 of IPCC (2013)
- Models: CanESM2, CNRM-CM5, GFDL-CM3, HadGEM2-ES, MIROC5, MPI-ESM-MR
- Calculation of climate indices for future climate
- Future climate and climate indices visualization

GIS tool for interactive visualization of data

Tool functionality and options:

- Data selection by climatic parameter, scenario, location and time period
- Spatial data visualization as an interpolated map
- Temporal data visualization for a chosen place as a chart
- Option to select and download the data and related information

Adaptation for climate changes

Development of the a concept of monitoring system for adaptation to climate change in Latvia for most vulnerable sectors, done in cooperation with 6 experts

- Construction and infrastructure planning
- Agriculture and forestry
- Civil protection and emergency assistance planning;
- Landscape planning and tourism
- Biodiversity and ecosystem services
- Health and prosperity

Development of flood risk maps and flood risk management plans for three river basins

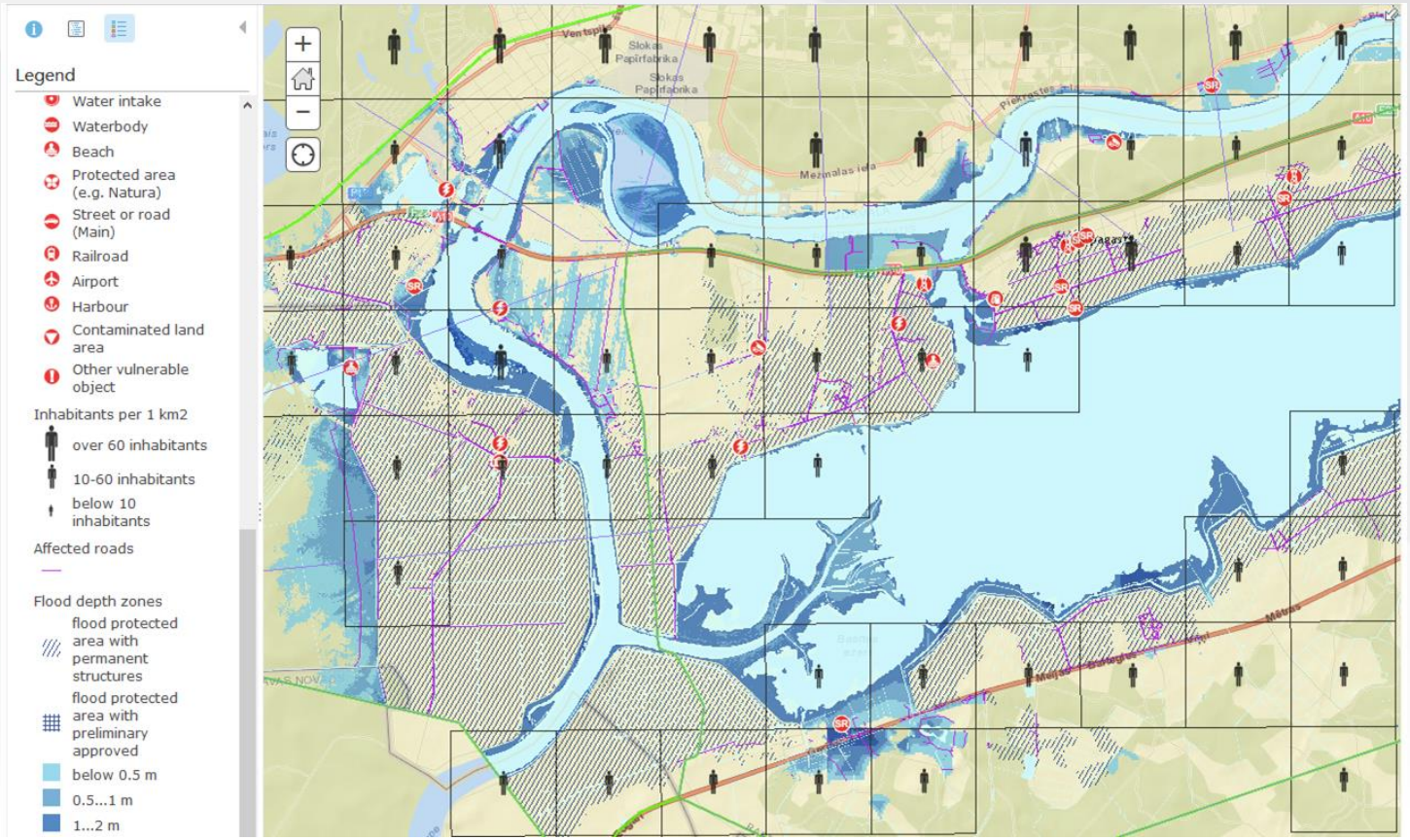
(Gauja, Lielupe, Venta)

Cooperation with SYKE

- 5 trainings for LEGMC experts:
  - Hydraulic modelling (development of the model)
  - Flood risk mapping and publishing
  - Flood risk and flood hazard map development and publishing
- Modelling manual
- Development of the hydraulic model, flood risk and flood hazard mapping in a pilot teritory – lower reach of the Lielupe river and Babite lake:
  - Maps for three scenarious (0,5%, 1%, 10% probability) were deveolped, including:
    - Flood risk territories (roads, polders, land use)
    - Risk objects (WWTP, residential areas)
    - Population density
    - Estimation of the economic losses

Cooperation with SYKE

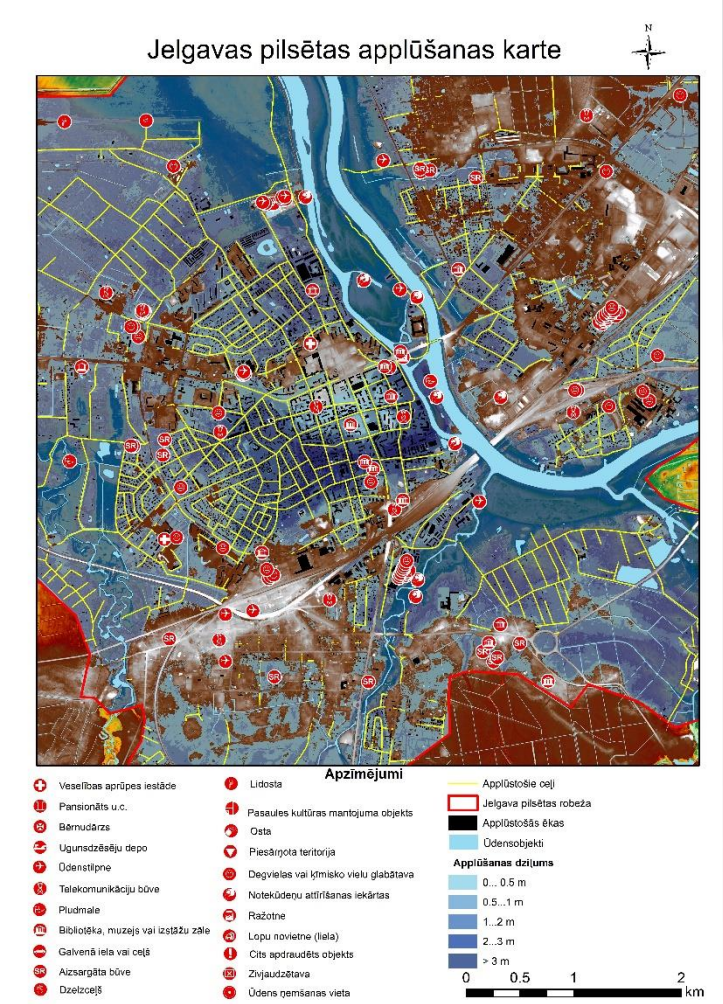
- Developed Flood map service for the pilot teritory: http://arcg.is/1ZPCX9V



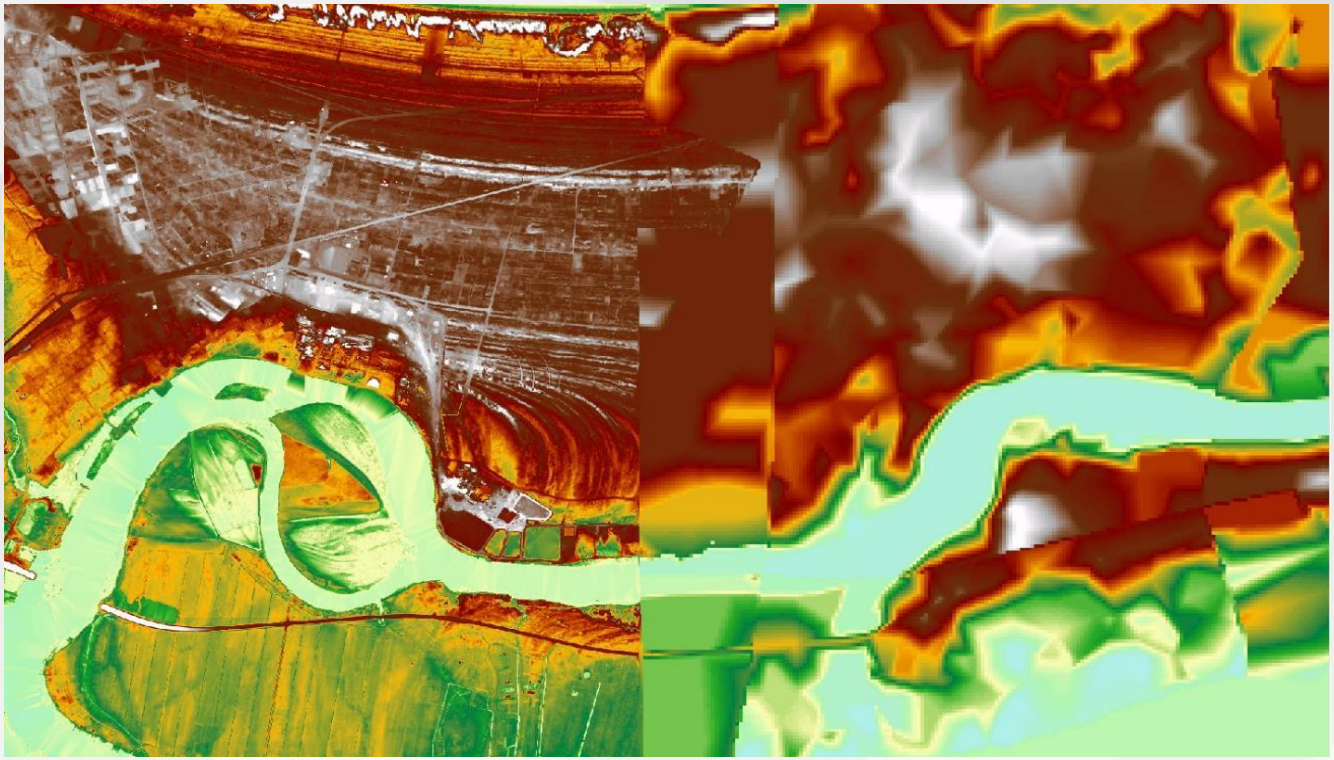
Completed tasks

- Preparational works for flood modelling in 3 river basins:
  - Requesting and compiling of the information from epresentative institutions;
  - Development of the DEM using available topographic and LIDAR data;
  - Measuring of the river cross sections;
  - Interpolation of the river cross sections
  - Editing of the river cross sections data by adding dams, polers, ineffective flodd areas;
  - Calculation of the initial and border conditions (flow rates and water levels);
  - Adding of the tributary water flow rates;
  - Analysis and compilation of the historical data for calibration purposes
    - Observed spring flood and Sea flood data since 1961
- Preparation of the geometry data for all significant flood risk areas (25):
  - Modelling of the floods according to 3 scenarios (0,5%, 1%, 10% probability) using HEC-Ras model

Flood modelling results for Lielupe



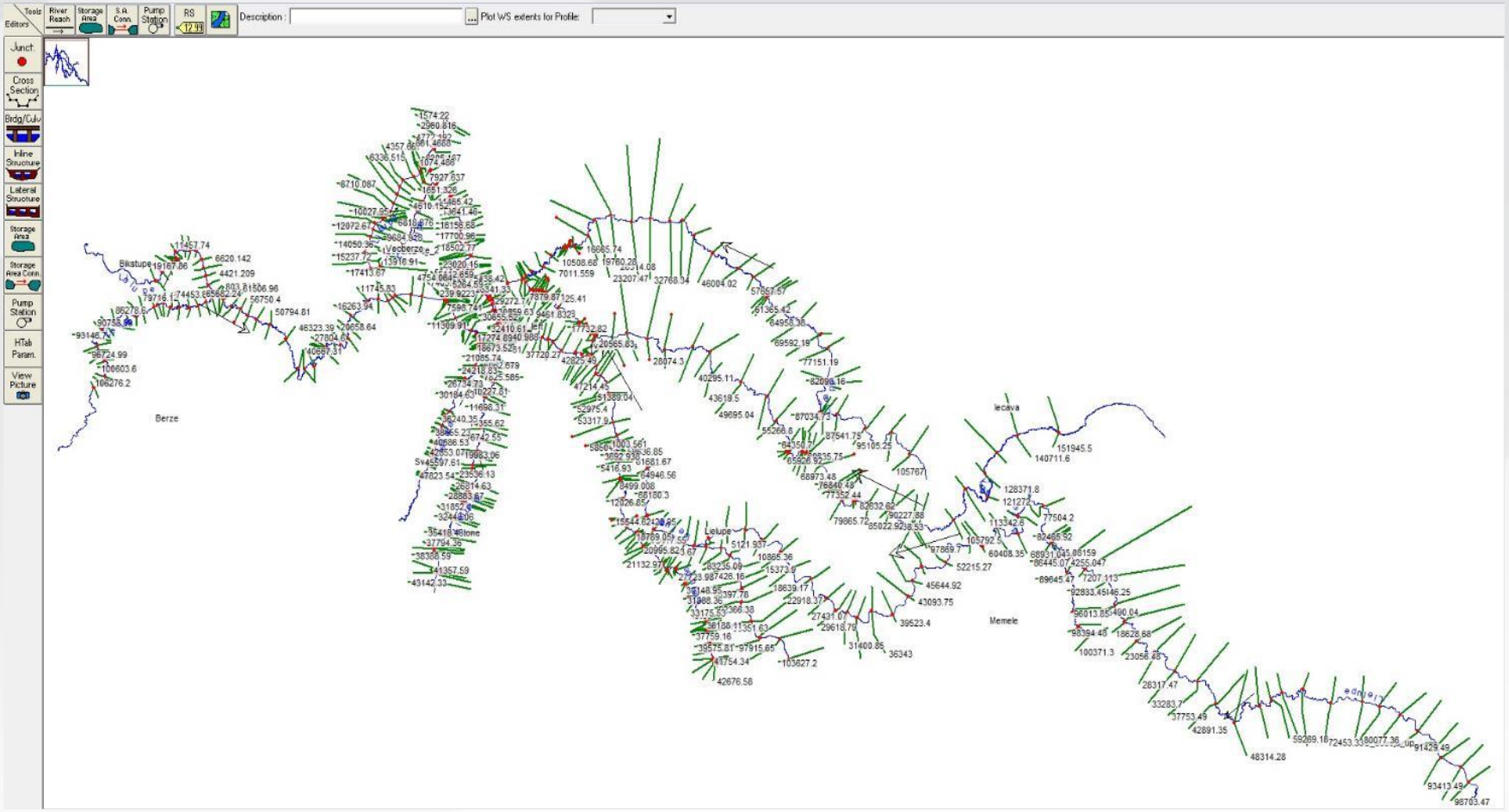
DEM differences



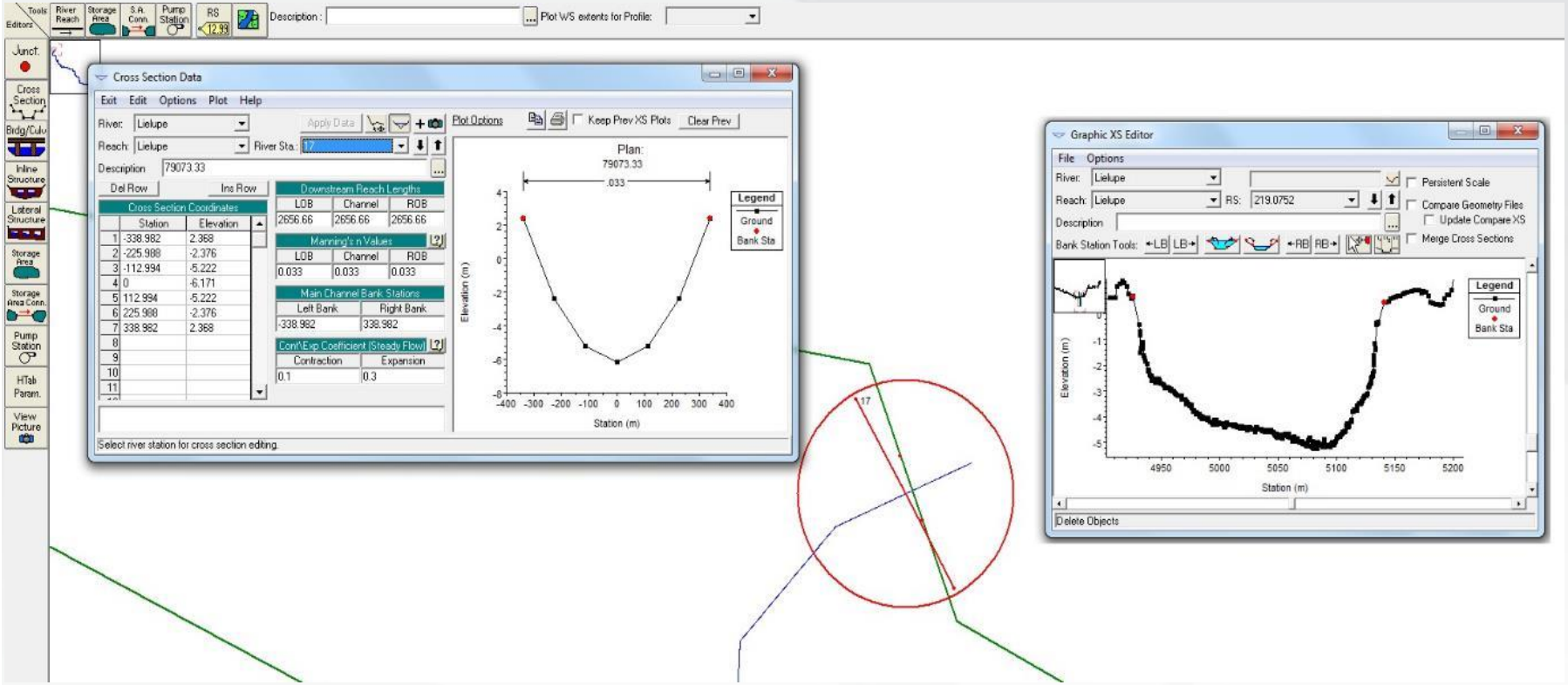
LID
AR

DEM
20x20m

Model for Lielupe river basin

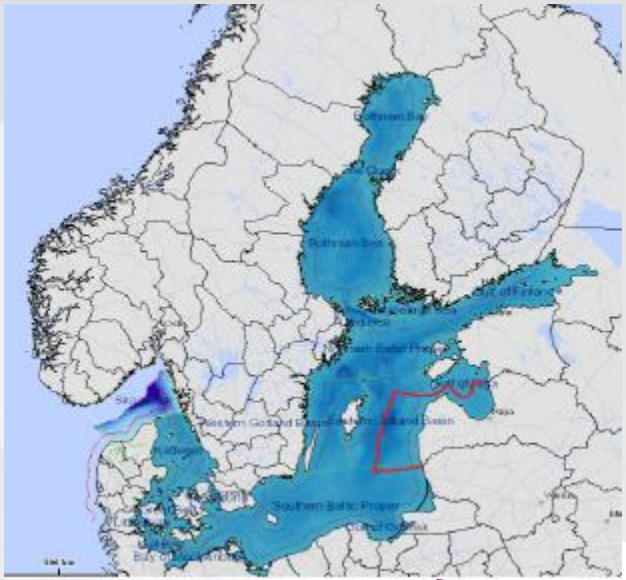


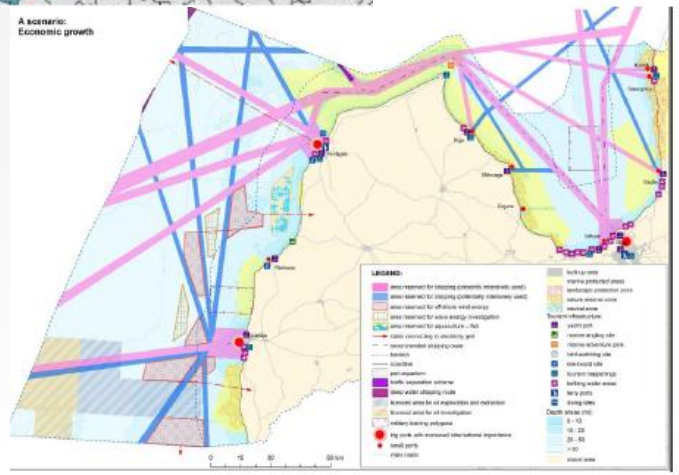
Cross section data – hypothetical vs measured



Maritime Spatial Plan

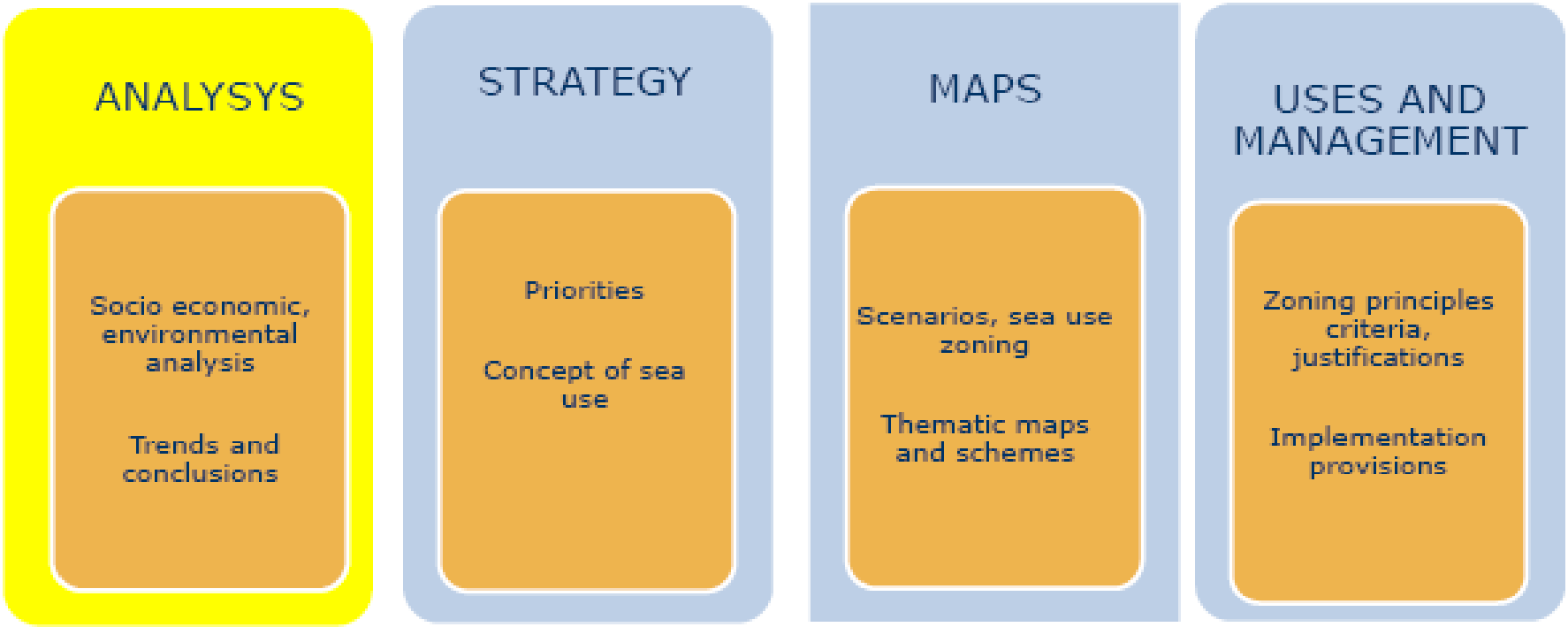
- The **Maritime Spatial Plan** for the territorial sea and Exclusive Economic Zone of the Republic of Latvia
  - national level long-term (up to 12 years) spatial development planning document
  - defines the permitted use of the sea and conditions in written as well as graphical form
  - has been established in accordance with the Spatial Development Planning Law (in force since 1st December, 2011)





Maritime Spatial Plan

Content of the MSP



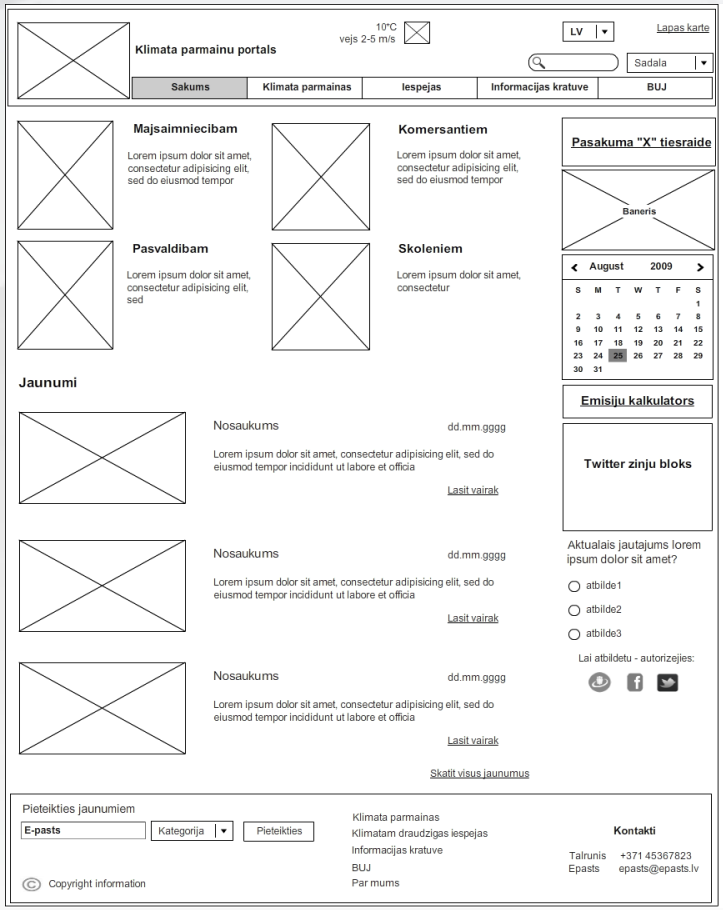
1st draft - end of November 2015

National stakeholder and Cross-border Public consultations- December 2015 – January 2016

Policy proposal for National Adaptation strategy

- Development of policy proposal for Latvia's National Climate Change Adaptation Strategy will be based on the Project identified research results
  - existing and potential scientific data for adaptation monitoring system
  - measures of the most vulnerable sectors
  - developed climate change impact scenarios
  - integrated mitigation and adaptation measures

Climate change web portal



- Development of Climate Change Web Portal
  - promote public participation and access to information of climate change and adaptation policy

THANK YOU!

Questions?