A SAF application case study - Bathing water quality issue in lagoon

Marija Kataržytė

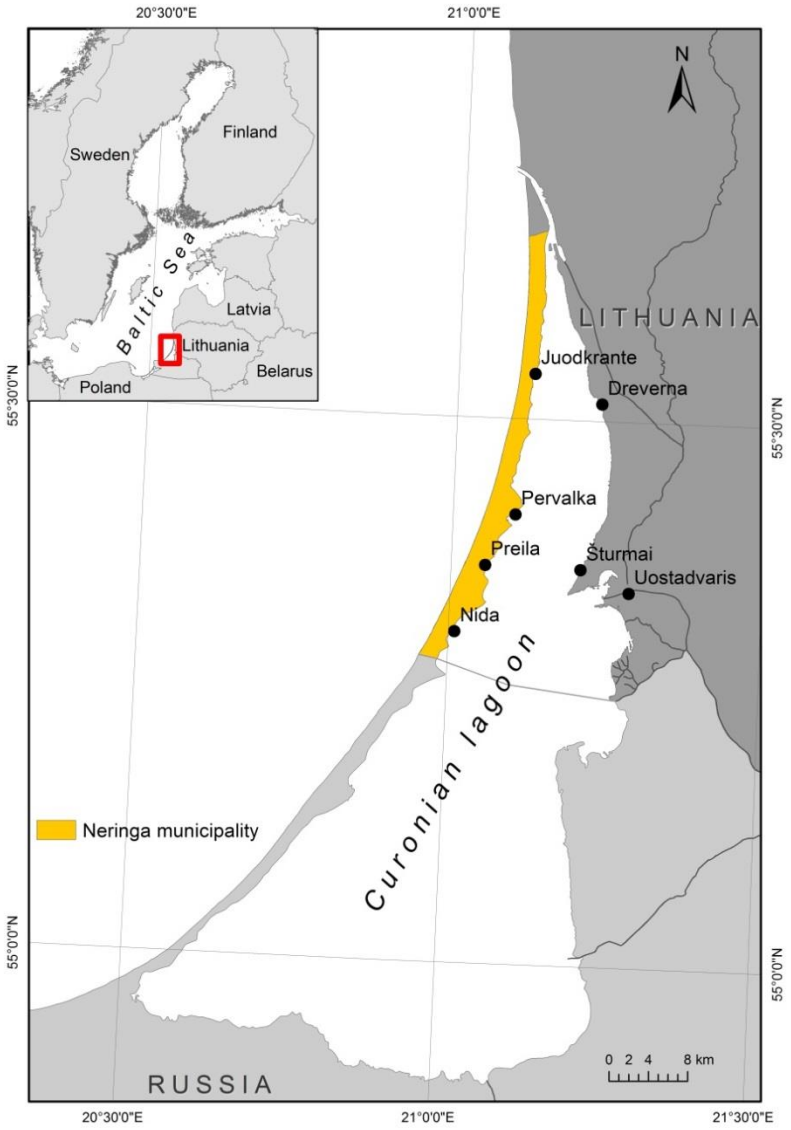
marija.katarzyte@jmtc.ku.lt

www.baltcoast.net

A SYSTEM APPROACH FRAMEWORK FOR COASTAL RESEARCH & MANAGEMENT

BONUS-BaltCoast received funding from BONUS (Art 185), funded jointly by the EU and Baltic Sea national funding institutions

Study area



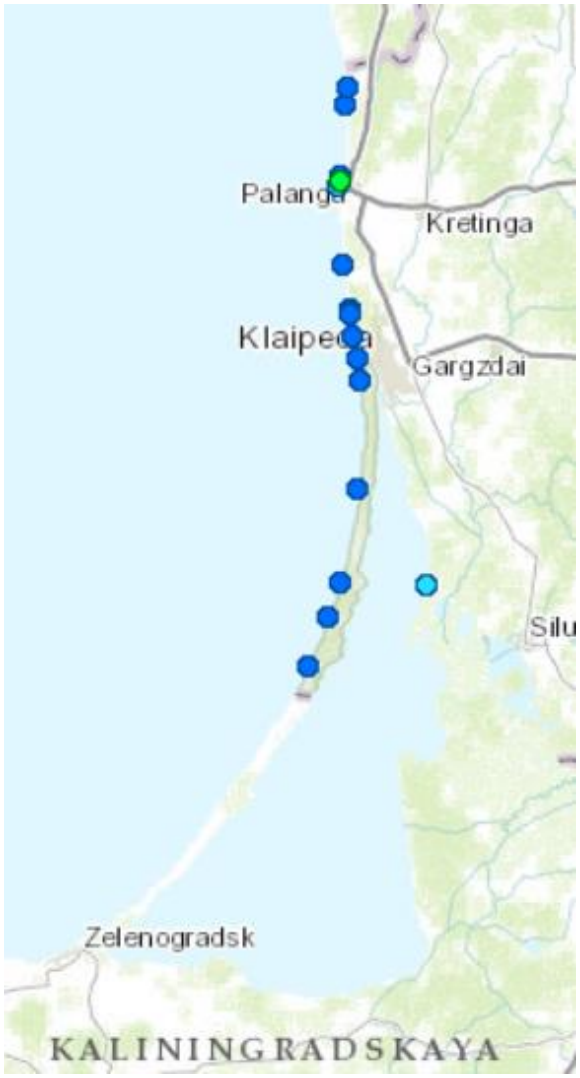
The total area - 1584 km^2, the volume - 6.3 km^3, mean depth is 3.8 m (Žaromskis, 1996).

Northern part in Lithuania (413 km^2) and a southern part in Russia (1171 km^2). Only inlet is situated in the north (Lithuanian).

The northern part - a transitory riverine-like system where salinity fluctuates from fresh water salinity to salinity of the sea (7 ‰).

The lacustrine fresh water southern part - a relatively closed water circulation and lower current velocities (Ferrarin et al., 2008).

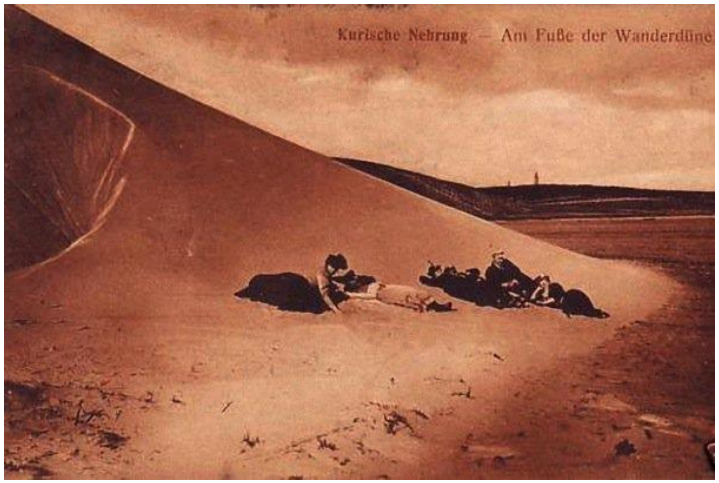
Bathing places along Curonian spit



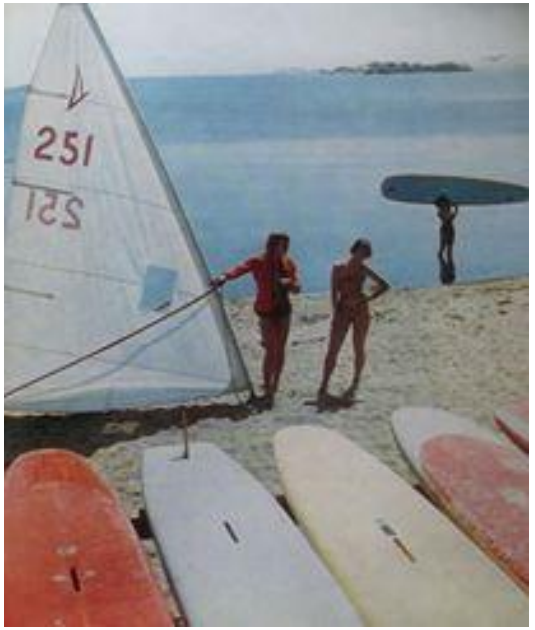
- About 12 km (out of nearly 50 km) of Baltic Sea beaches along Curonian spit are used for recreational purposes
- Blue Flag, and possess excellent bathing water quality according the Water Bathing Directive 2006/7/EB

What about bathing in Curonian lagoon?

Historical review



People resting on the beach of Curonian lagoon



Recreational activities in Nida in 1981

Historical review

- EU Bathing Directive **76/160/EEC** (in 1976)
  - microbiological parameters (total coliforms, fecal coliforms and streptococci)
  - physicochemical parameters (mineral oils, surface-active substances and phenols)

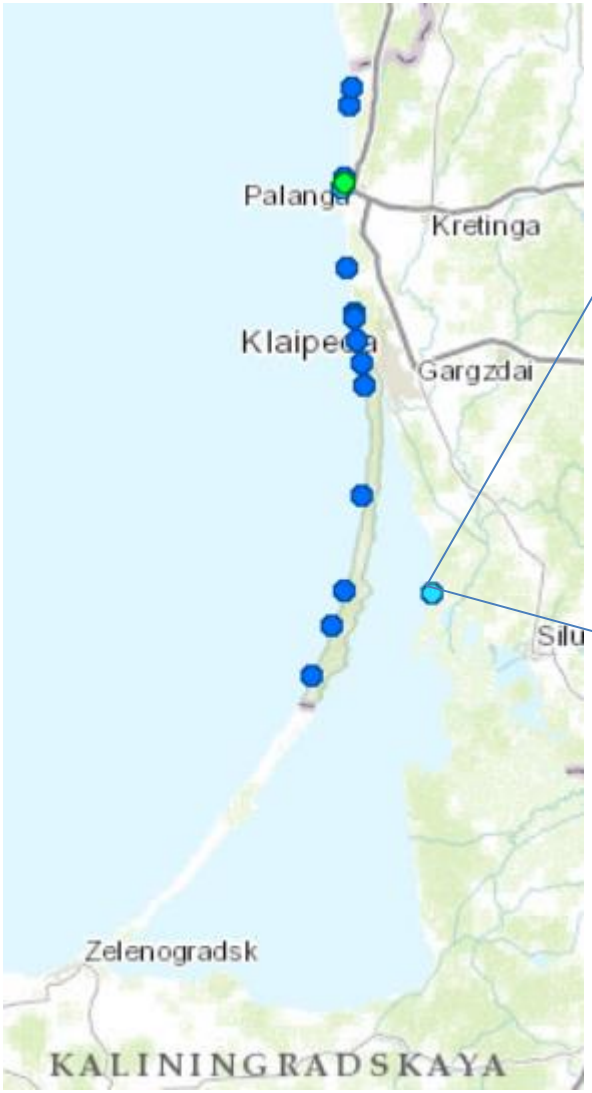
- 1995–2003 threshold of coliform bacteria during summer observed in Klaipėda straight and in Nida

- EU Bathing Directive 76/160/EEC **-> Directive 2006/7/EC** (in 2006)
  - microbiological parameters (total coliforms and fecal coliforms) -> **intestinal enterococci and *Escherichia coli***

Historical review

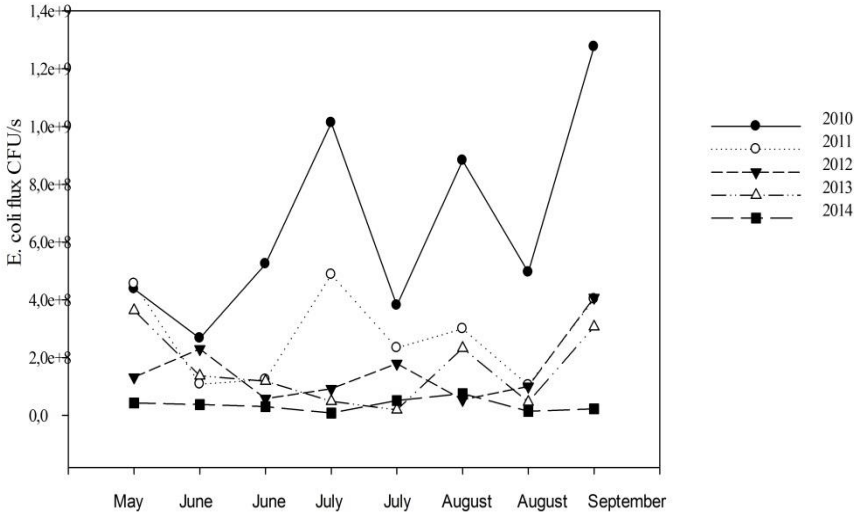
- LT governance (2006) indicated main issues and management focus regards Curonian lagoon water quality:
  - **Eutrophication** related with nitrogen and phosphorus: algal bloom and fish kills due to oxygen depletion;
  - **Microbial pollution** due to human and animal feces
  - Main sources**: insufficient sewage treatment** and **pollution** from agriculture coming with **Nemunas** river discharge.
- In 2008 sewage treatment system renewed in Curonian Spit and elsewhere else.

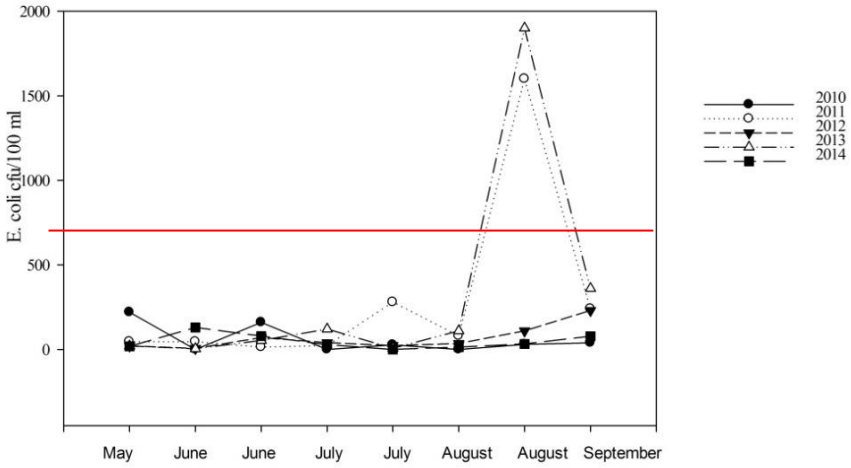
Current situation



Beach in Kintai (from 2012)

Current situation





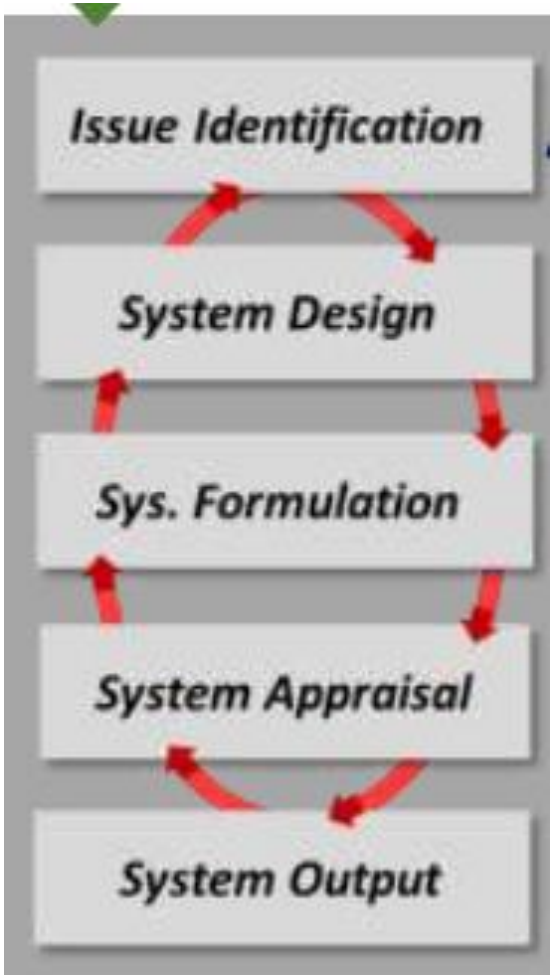
E. coli fluxes in Nemunas (Atmata river) in year 2010-2014
(based on Bathing monitoring data)

Pattern of *E. coli* amount (CFU/100 ml) in Kintai beach 2010-2014. Red line indicates the threshold of *E. coli* for coastal waters according Bathing Water Directive (2006/7/EC).

Current situation

- Demand to open beach in Nida

SAF – Bathing water quality



Mapping stakeholders
Identifying issues

Conceptual models

Developing sub models
Calibration and validation

Generating systems model
Calibration and validation
Preparing scenarios

Running scenarios
Presenting to stakeholders
Evaluation

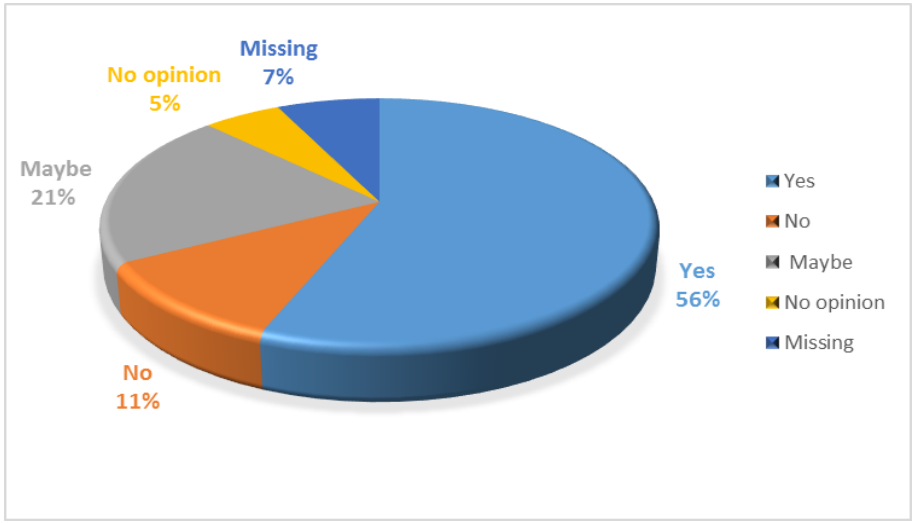
Meeting with stakeholders and managers in Nida

Issue identification: stakeholder mapping

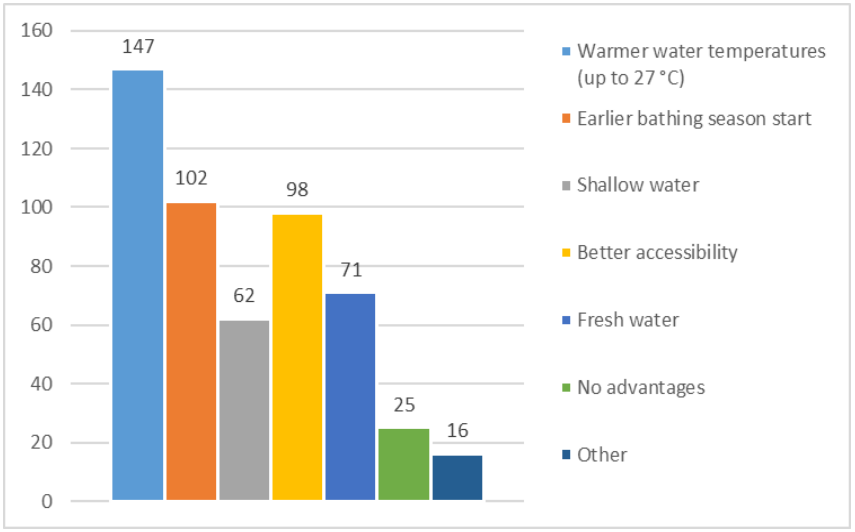
Human Activity	Associated stakeholder groups
Governance and residents	Governance representatives and local action groups
Tourism services	Tour operators Information services Accommodation services Wellness services Transport services Catering services Water tourism Leisure/incentive services Place for conferences organising NGOs
Fisheries	Fisheries association
Infrastructure/services	Infrastructure service providers
Natural heritage	National park and others (see Appendix 1)
Education and art	Local educational and activity schools
Harbor authorities and sailing boats	Port services
Scientific research	Scientists

Issue identification

- Tourist perception about bathing possibility in Curonian lagoon



Intention to go to a beach at the Curonian lagoon



Advantages in comparison to Baltic Sea beaches

Issue identification: system definition

System definition: DPSIR 1st cycle (problem oriented) → **System definition: DPSIR 2nd cycle (opportunity oriented)**

Improved sewage treatment systems (in 2008)

System definition: DPSIR 1st cycle (problem oriented)

Driver:

Urbanisation of the lagoon area

Pressure:

Increase of insufficiently treated waste waters to the Curonian Lagoon

State:

Increase of *E. coli* bacteria concentrations

Impact:

Water quality exceeds threshold according to Bathing Water Directive

Responses:

Improved sewage treatment (new plant 2008)

Consequences (Driver for 2nd DPSIR cycle)

New opportunity, like possibility to open or re-open beaches

System definition: DPSIR 2nd cycle

Driver:

Improved (good) Bathing Water Quality & Climate Change with higher water temperatures create opportunities

Pressure:

Increasing demand for sustainable tourism and socio-economic development in Neringa municipality

State:

Short summer season with temporary over-expoited tourism infrastructure and high prices

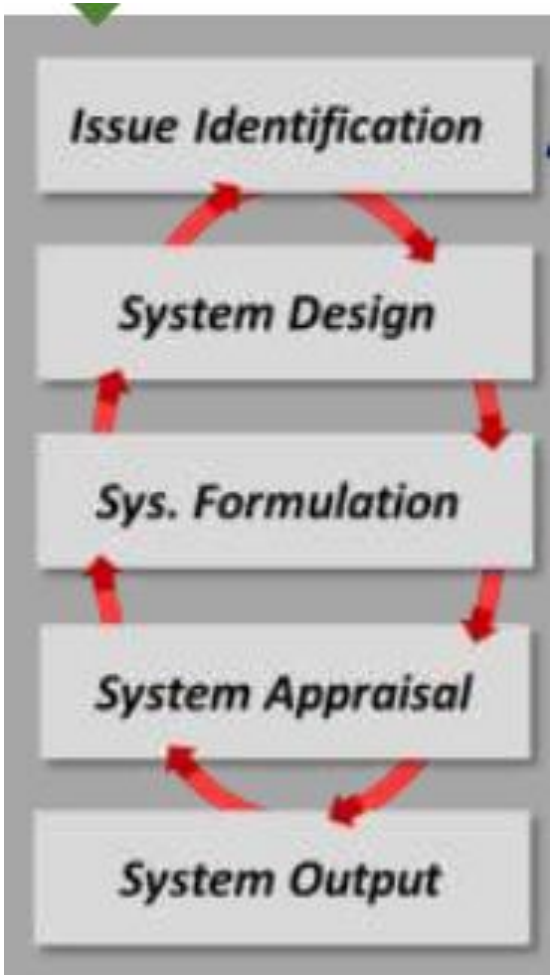
Impact:

Poor annual utilization of the infrastructure; seasonal jobs and social imbalances

Responses:

New inner coastal beaches which support longer seasons (precondition is the maintenance of a good Bathing Water Quality)

SAF – Lithuania case



Mapping stakeholders
Identifying issues

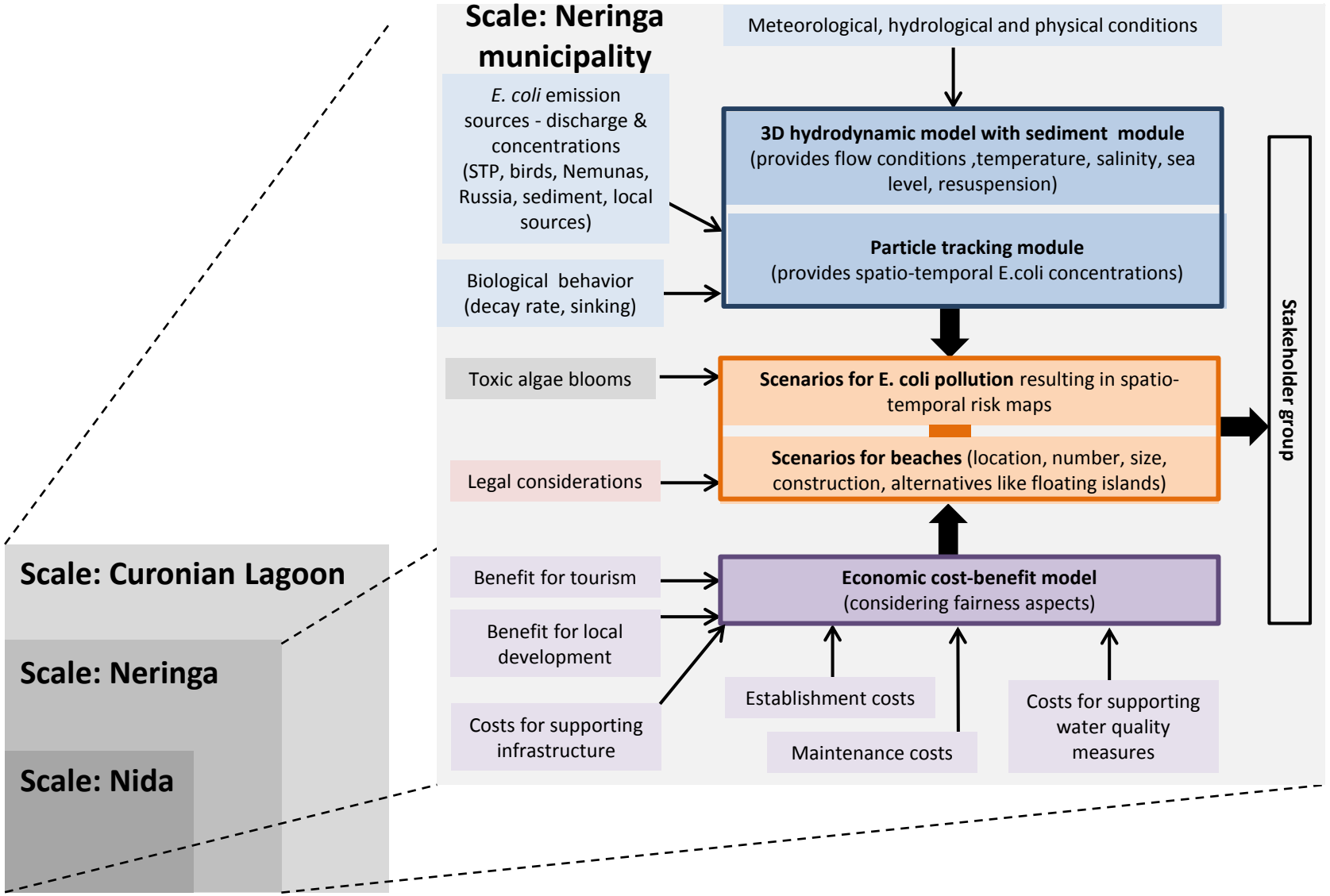
Conceptual models

Developing sub models
Calibration and validation

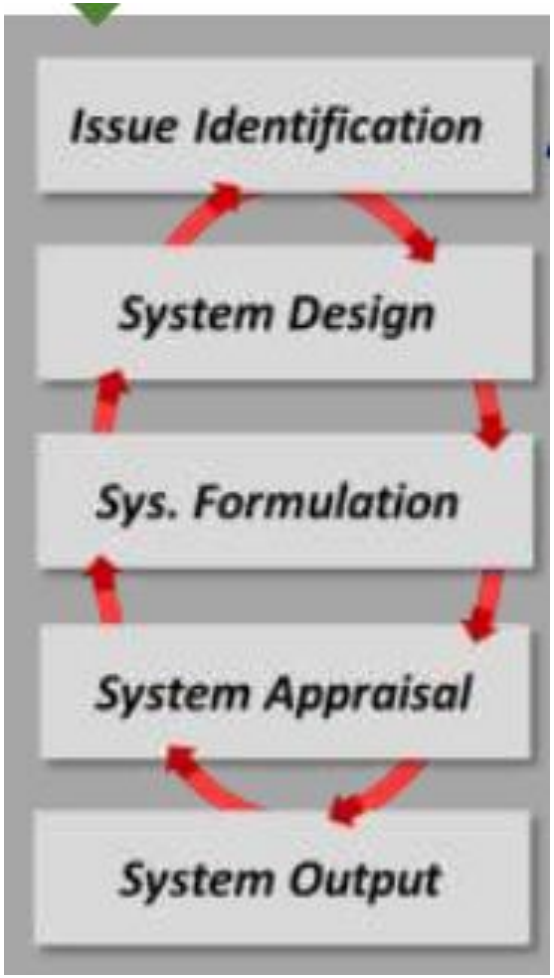
Generating systems model
Calibration and validation
Preparing scenarios

Running scenarios
Presenting to stakeholders
Evaluation

System design: conceptual model



System formulation



Mapping stakeholders
Identifying issues

Conceptual models

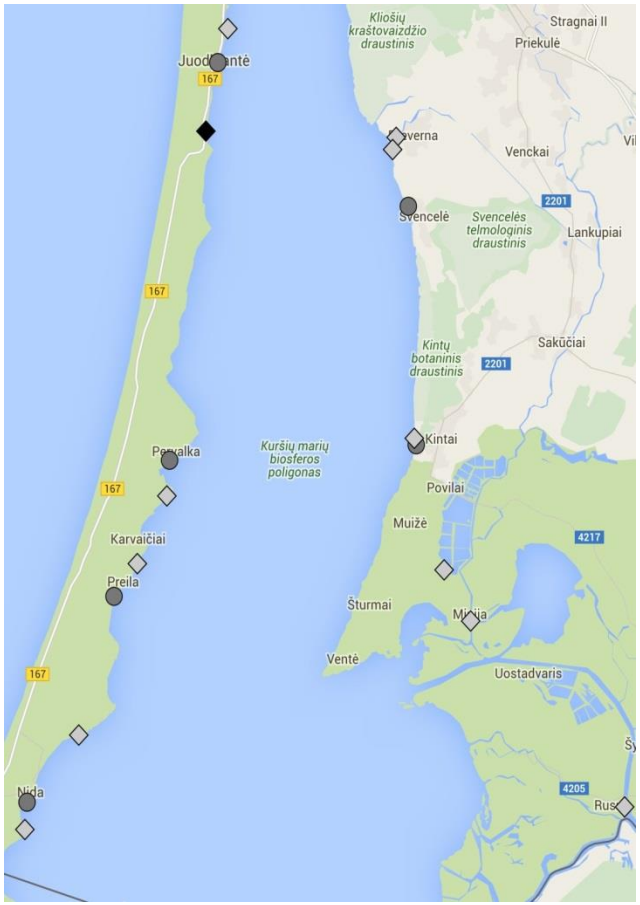
Developing sub models
Calibration and validation

Generating systems model
Calibration and validation
Preparing scenarios

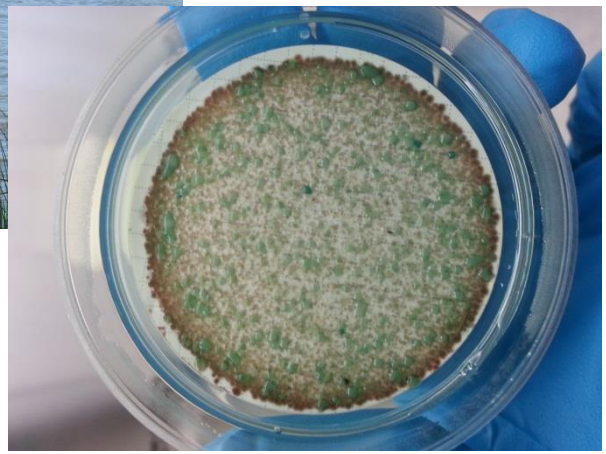
Running scenarios
Presenting to stakeholders
Evaluation

Meeting with stakeholders and managers in Nida

Data sampling



Sampling spots in Curonian lagoon



Monthly water samples taken

E. coli amount (CFU/100 ml) evaluated

The Curonian spit trip (Tuesday)

- Juodkrantė -> Cormorant colony (aprox. 20 min) (bird pollution issue)
- Beach on the seaside (aprox. 30 min) (possibilities for bathing Blue Flag and other)
- Bathing place in Nida (aprox. 20 min)
- Final discussion (aprox. 60 min) Savivaldybės salė III a. - ar lauke?
- Visit to dead dunes

Question for discussions (in groups)

- Would you consider bathing in Curonian lagoon?
- What is the most important issue in your opinion?
- What could be the management solutions for opening beach in Curonian lagoon?

BONUS BaltCoast

Study supported by: G. Schernewski, G. Umgiesser, E. Baltranaitė, N. Čerkasova, S. Liaugaudaitė, J. Mėžinė, L. Latakienė

A SYSTEM APPROACH FRAMEWORK FOR COASTAL RESEARCH & MANAGEMENT

BONUS-BaltCoast received funding from BONUS (Art 185), funded jointly by the EU and Baltic Sea national funding institutions

BONUS Science for a better future of the Baltic Sea region