Lithuanian Case Study

Water Quality and Tourism

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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

The Curonian Lagoon ecosystem

- The **Curonian Lagoon** is located in the **South-eastern** part of the **Baltic Sea**
- In Lithuanian Kuršių Marios, is the **biggest coastal lagoon** in Europe

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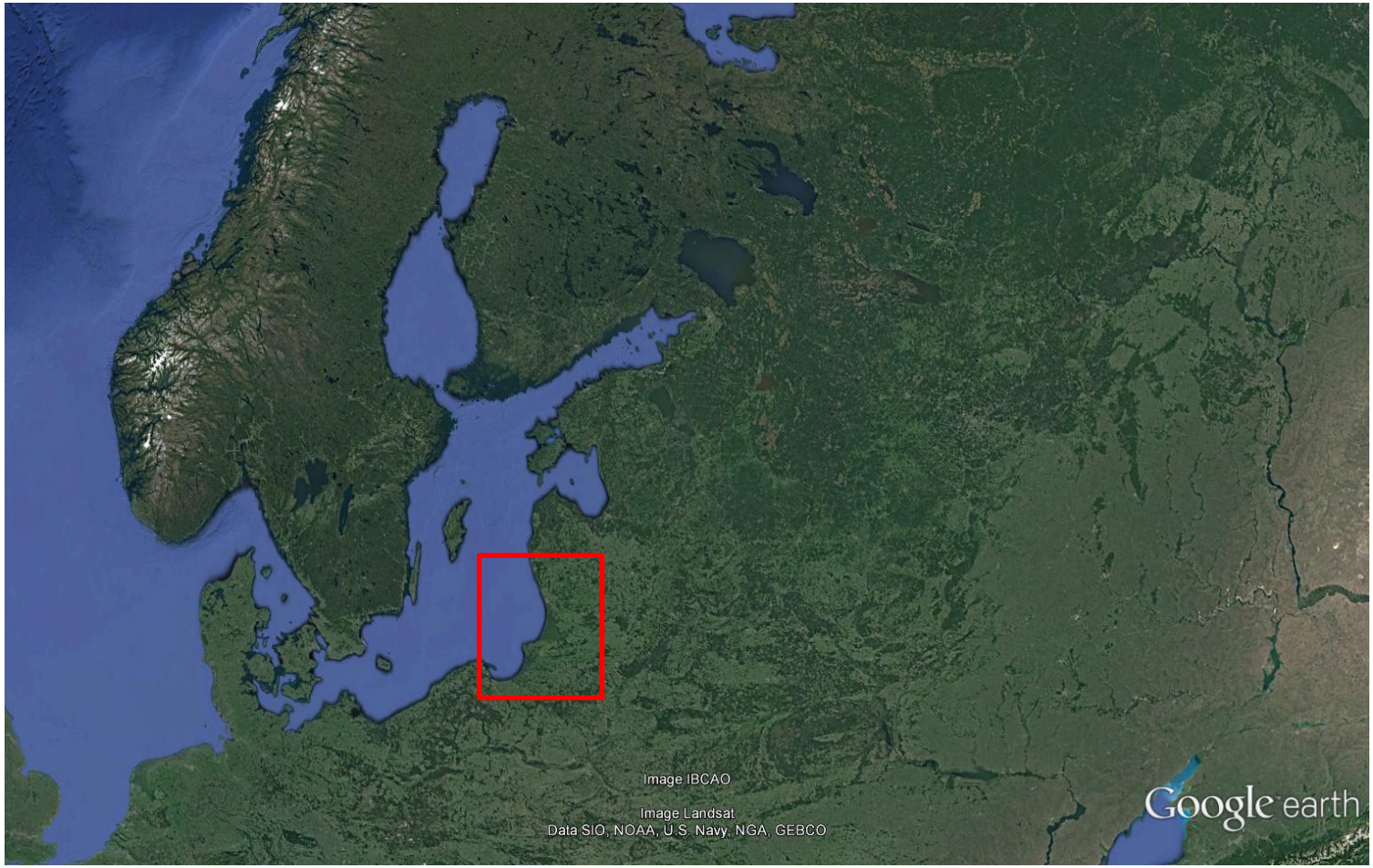

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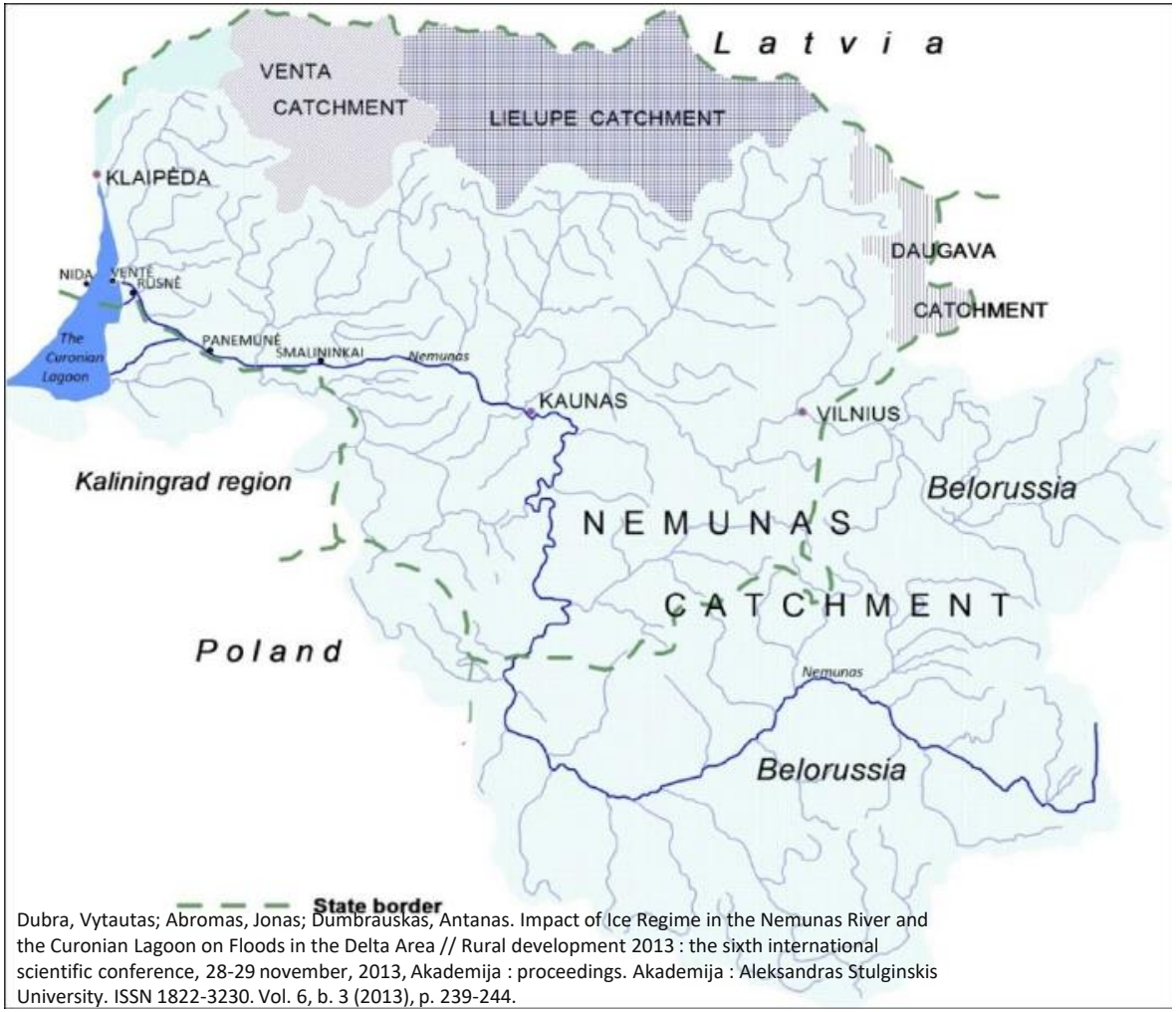
The Curonian Lagoon ecosystem

- This lagoon is shared by two countries:
  - the **central-northern** part of the lagoon belongs to **Lithuania**
  - the **central-southern** part belongs to **Kaliningrad District of Russia**

The Curonian Lagoon ecosystem

- The main influencing river discharging freshwater is the Nemunas River



Dubra, Vytautas; Abromas, Jonas; Dumbrauskas, Antanas. Impact of Ice Regime in the Nemunas River and the Curonian Lagoon on Floods in the Delta Area // Rural development 2013 : the sixth international scientific conference, 28-29 november, 2013, Akademija : proceedings. Akademija : Aleksandras Stulginskis University. ISSN 1822-3230. Vol. 6, b. 3 (2013), p. 239-244.

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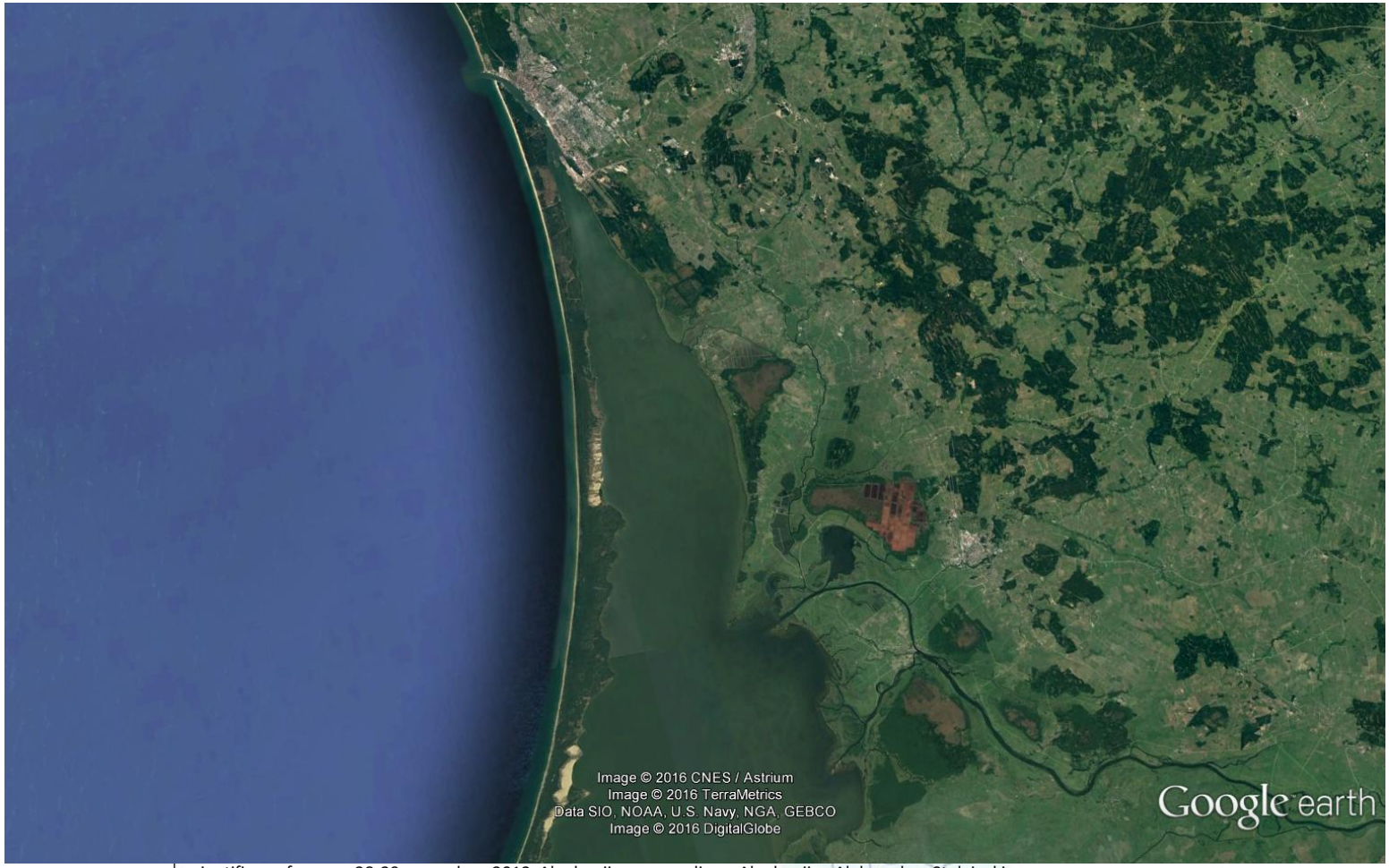

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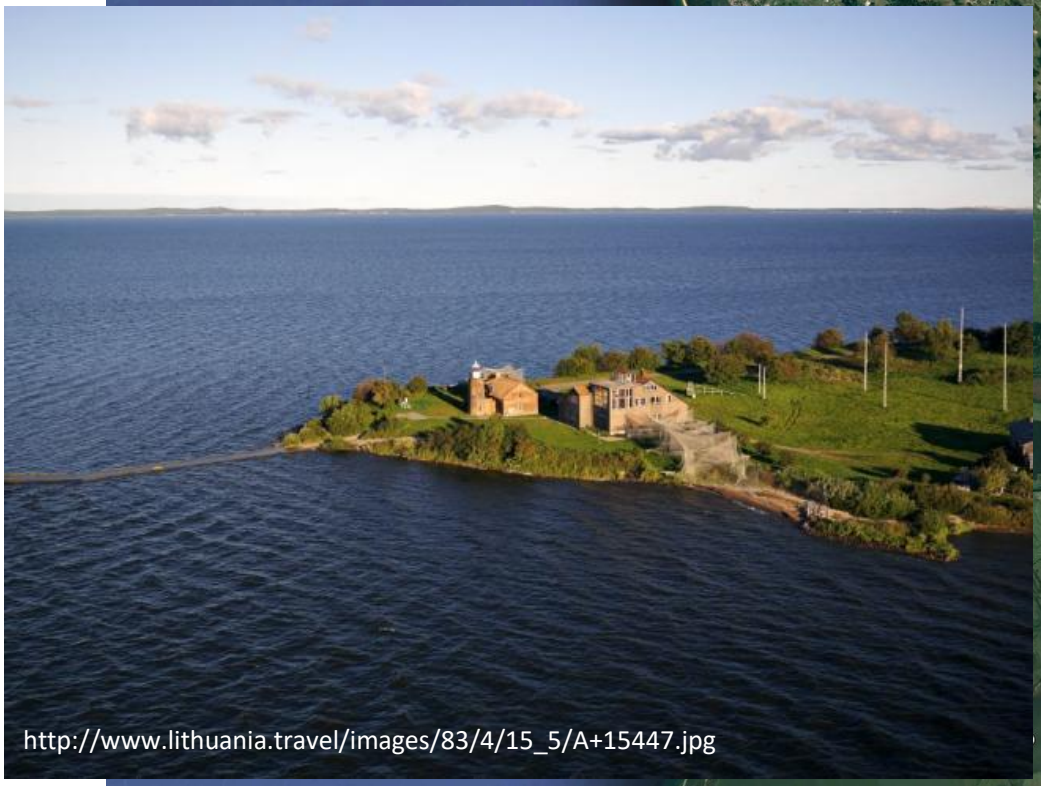

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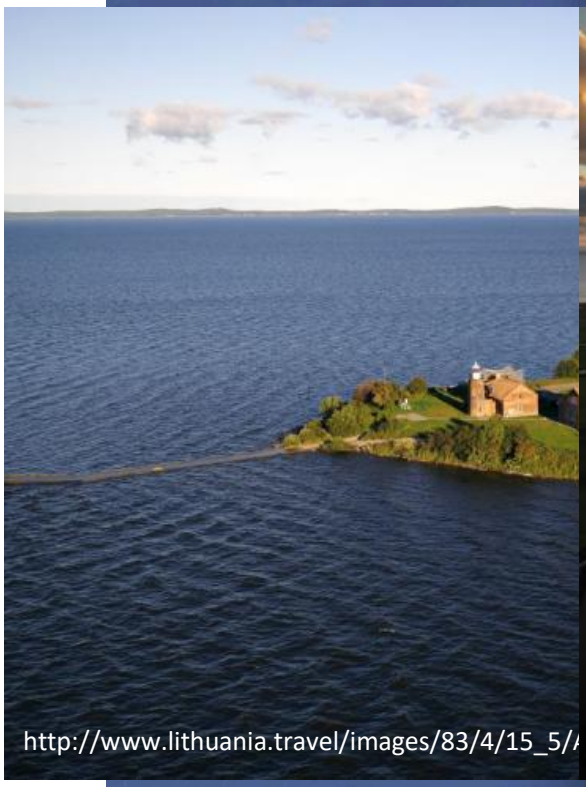

http://www.lithuania.travel/images/83/4/15_5/

http://www.baltic-info.com/userfiles/images/Litouwen/Nature/NemunoDeltas.jpg

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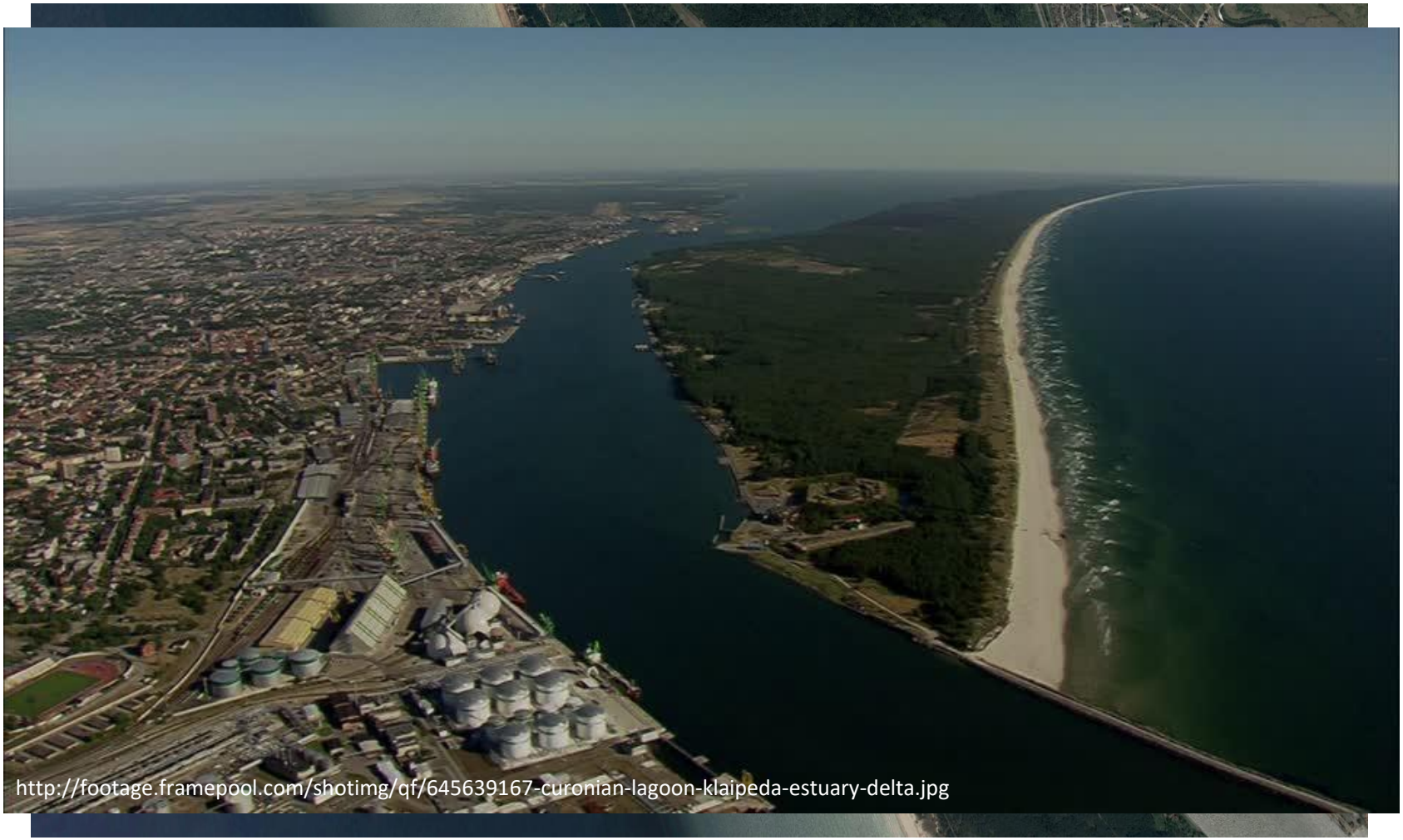
- Curonian Lagoon is **connected** with the sea by the **Klaipeda Strait**



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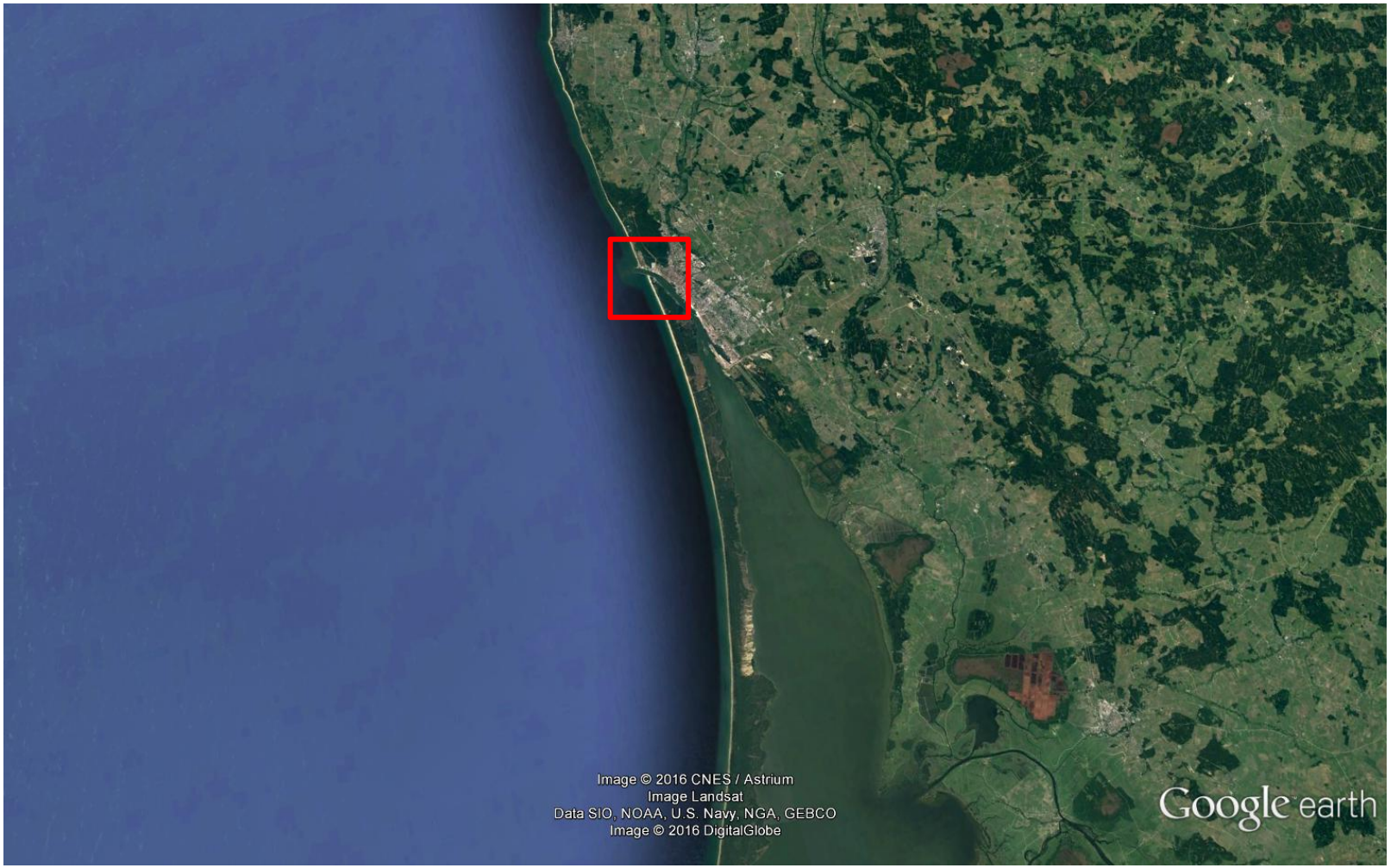

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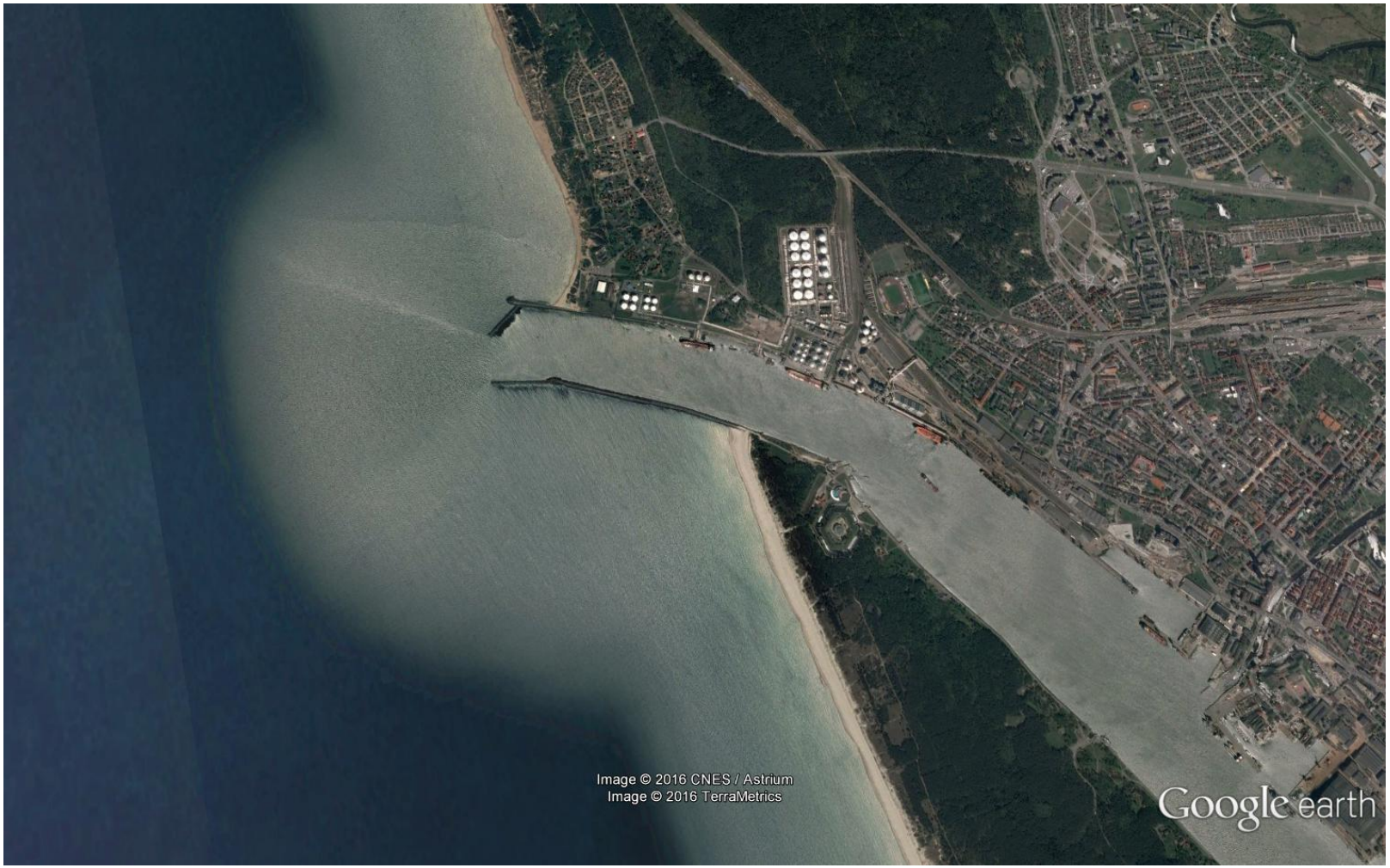

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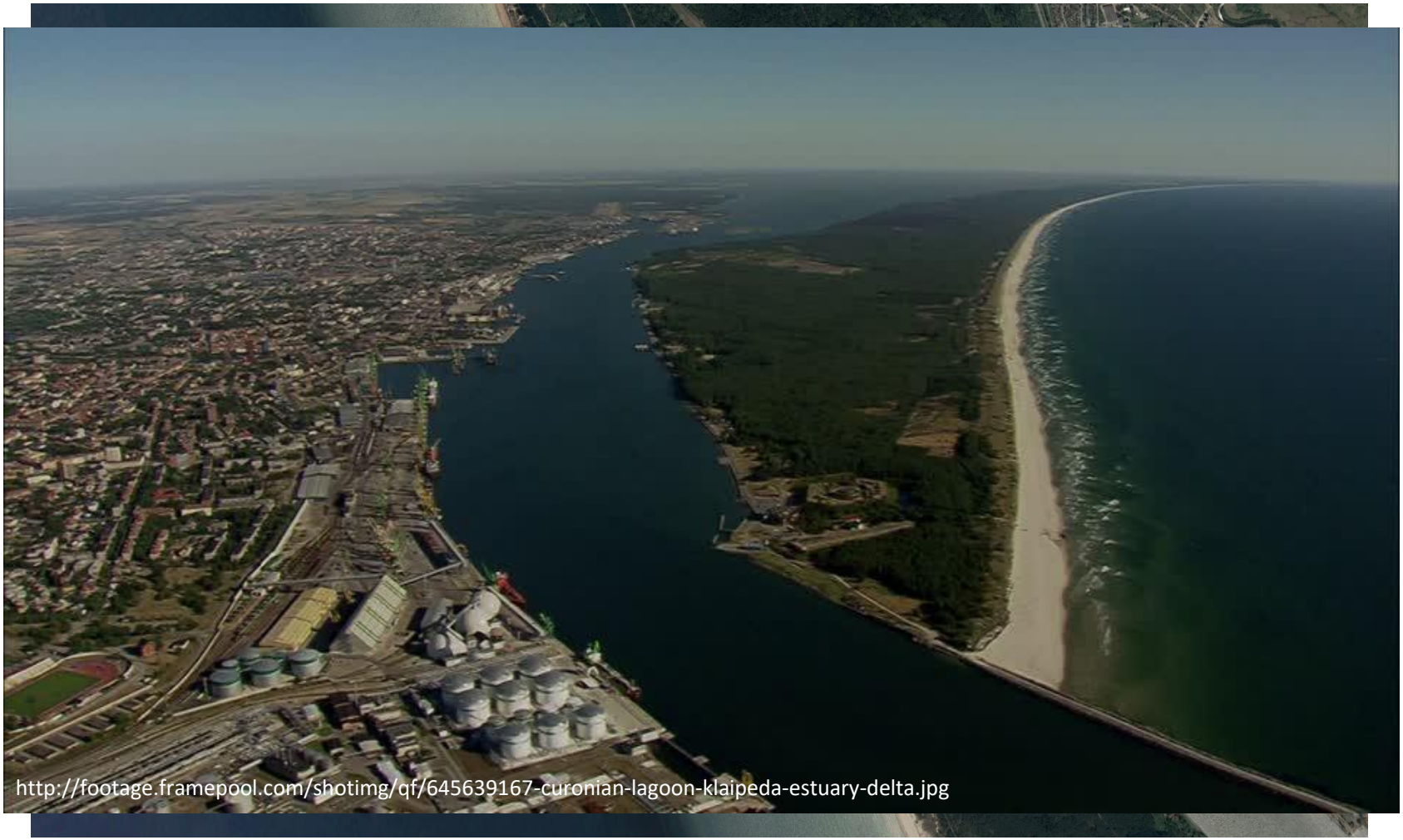
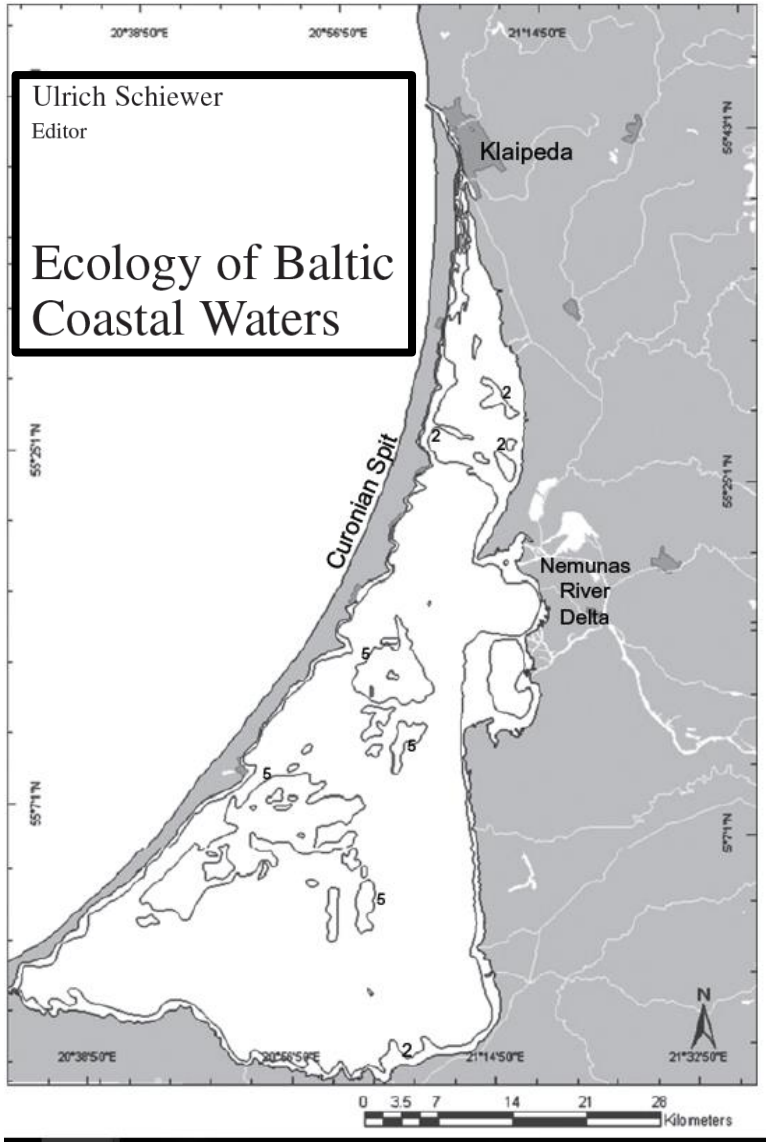


The Curonian Lagoon ecosystem

- **Environmental characteristics of the Curonian Lagoon***:
  - **Area**: 1584 km^2
  - **Volume**: 6000*10^6 m^3
  - **Mean depth**: 3.8 m
  - **Maximum depth**: 5.8 (14 in navigation channel)
  - **Catchment area**: 100458 km^2
  - **Secchi Depth**: 0.3-2.2 m



ORIGINAL RESEARCH ARTICLE

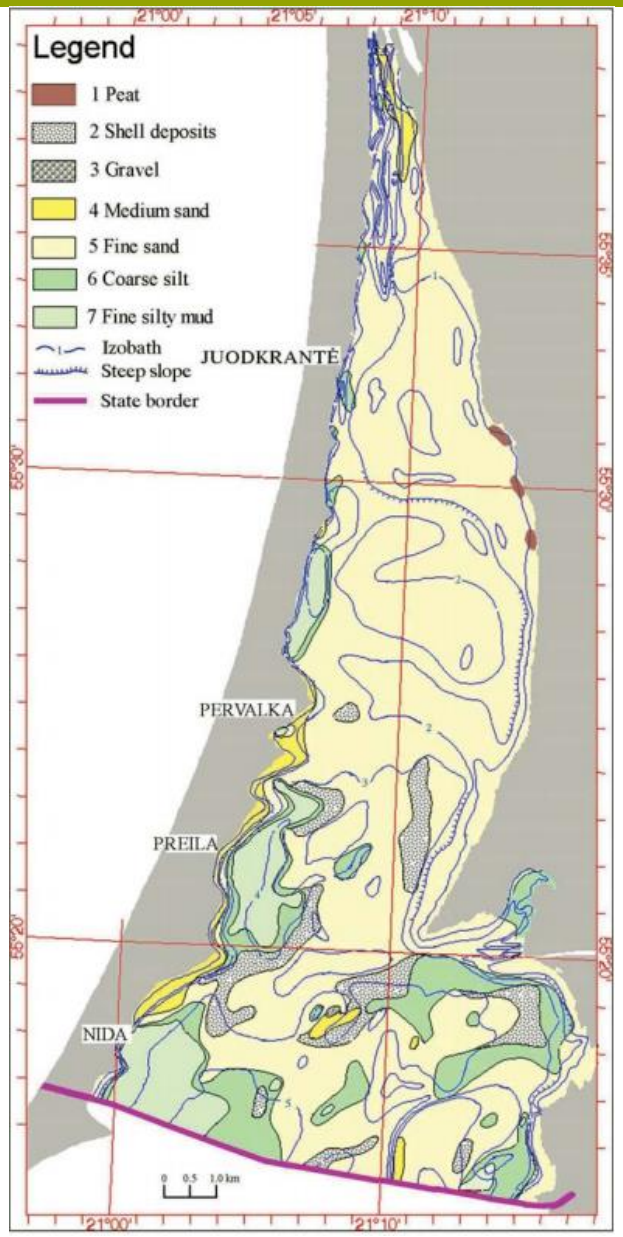
Curonian Lagoon drainage basin modelling and assessment of climate change impact☆

Natalja Čerkasova [a], Ali Ertürk [b,a], Petras Zemlys [a], Vitalij Denisov [c], Georg Umgiesser [d,a,*]

*based on Schiewer, U. 2003. Ecology of Baltic Coastal Waters: Chapter 9 – The Curonian Lagoon

The Curonian Lagoon ecosystem

- **Environmental characteristics of the Curonian Lagoon***:
  - Sediment typology:
    - **Fine sand** predominantly
    - **Muddy** areas



Baltica 16 (2003) 13-20

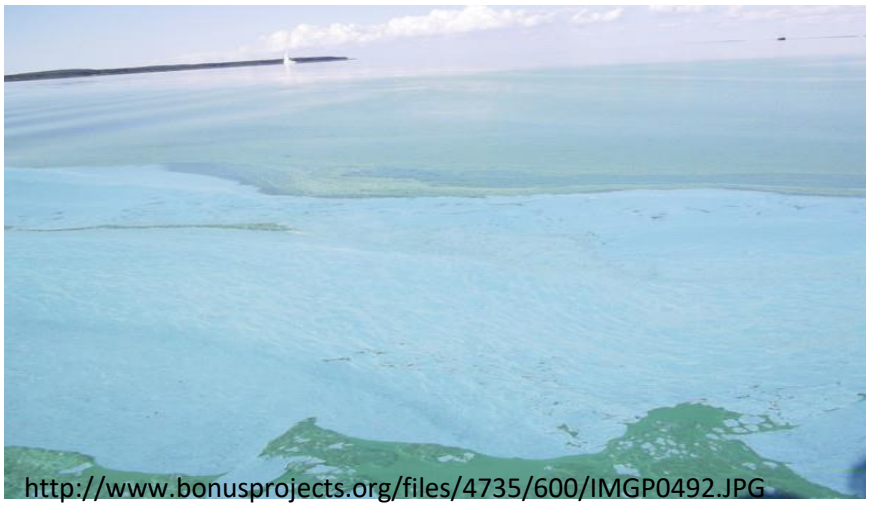
The Curonian Lagoon bottom sediments in the Lithuanian water area

Egidijus Trimonis, Saulius Gulbinskas, Modestas Kuzavinis

The Curonian Lagoon ecosystem

- **Environmental characteristics of the Curonian Lagoon***:

  - **Air temperature**: from -2.8 to 16.8 ˚C (monthly averages)
  - **Water temperature**: 0.1 – 19.3 ˚C(monthly averages)
    - Maximum 24-25 ˚C
  - **Residence time**: 81 days
  - **Ice covering**: 110 days per year in average
  - **Salinity:** 0-8 PSU
  - **pH**: 8.1-9.2
  - **Annual N input:** 33000 – 64000 t/yr.
  - **Annual P input**: 1200 – 4000 t/yr.
  - **Trophic level*:*** eutrophic



http://www.bonusprojects.org/files/4735/600/IMGP0492.JPG

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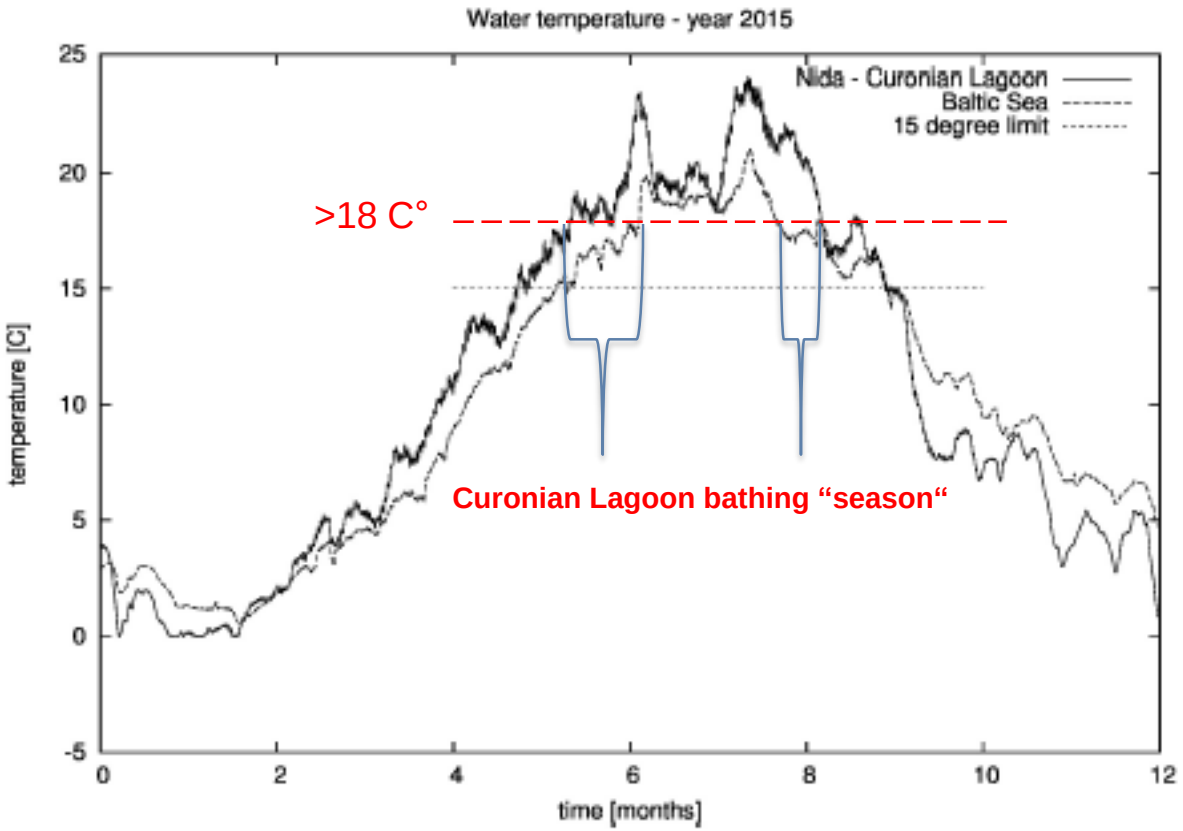
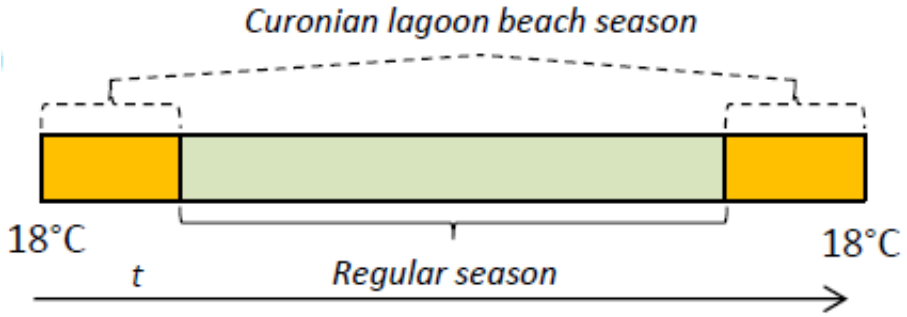


Curonian Lagoon water temperature, close to Nida, in 2015, reached more than 18°C for **85 days**

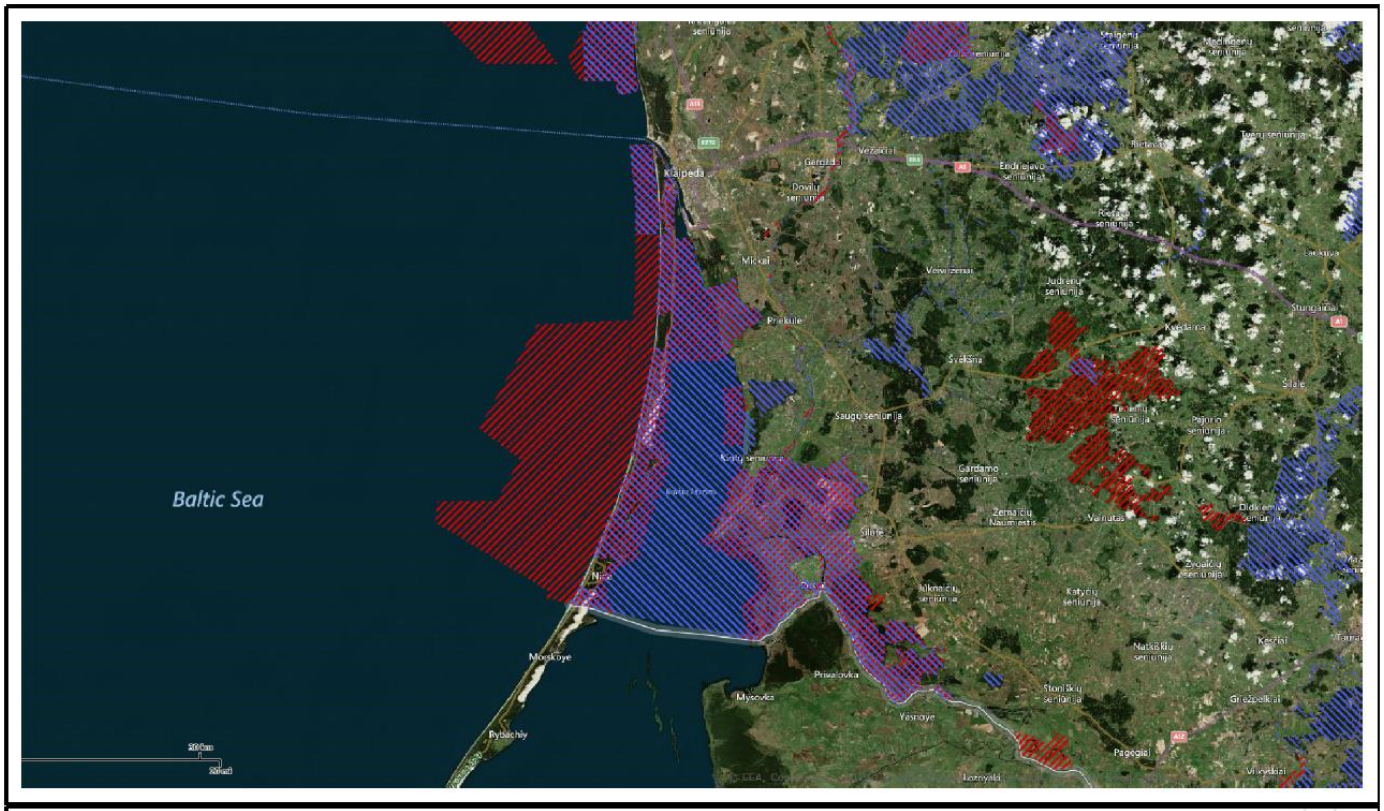
In comparison, the water temperature in **Nida beach was twice as warmer** then Baltic Sea beaches

Water temperature in 2015, in the Curonian Lagoon and Baltic Sea G. Umgiesser et al, 2016.



The Curonian Lagoon ecosystem

Protection Status of the Lagoon



Natura 2000 Network Viewer

The Curonian Lagoon ecosystem

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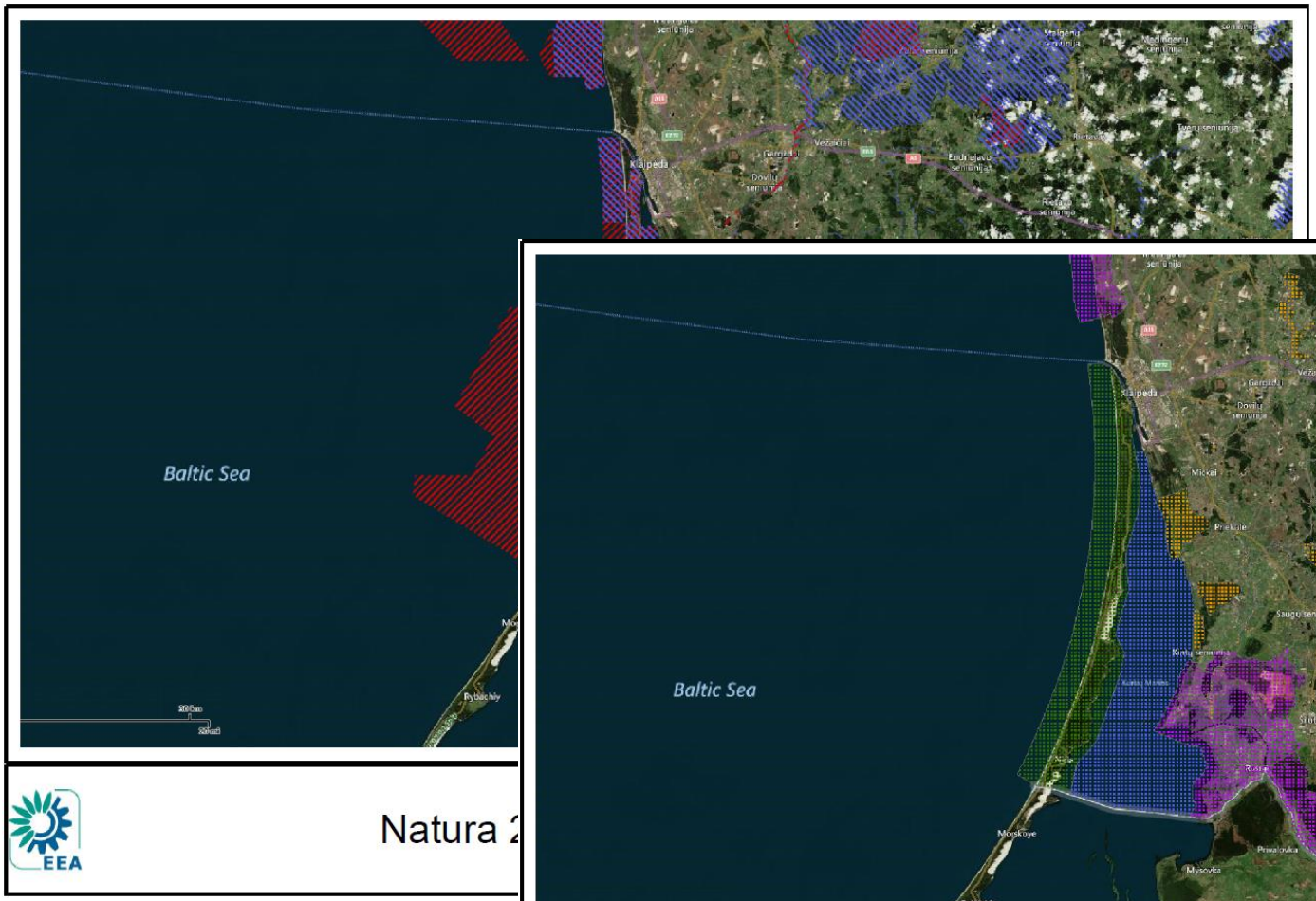


Curonian Spit

Curonian Spit

- Strip of land with a relief shaped by the sea and wind and Man,
- Formed around 5000 years ago, being the highest spit in Northern Europe;
- With 98 km length and 0.4 -4 km wide, it separates the Curonian Lagoon from the Baltic Sea;
- The spit is also the border between Lithuania and the Kaliningrad District of Russia;
- Mainly composed by forest and sand, urban areas only account for 6% of the area;
- The Spit is a Protected area and UNESCO World Heritage; both in Lithuanian and Russian side

Information from: visitneringa.com & whc.unesco.org

Curonian Spit

- **Curonian Spit (Lithuania)**
  - Administratively the Spit is part of Neringa Municipality, and District of Klaipeda;
  - The Spit is a Protected area called Curonian Spit National Park;
  - In early beginnings populated by fishermen communities, nowadays this is still a recurrent practice and along with tourism the most important economic activities;
  - Blue Flag, white sandy beaches make this one the most attractive bathing spots in the Baltic;
  - Two big settlements, Juodkrante and Nida;

Information from: visitneringa.com & whc.unesco.org

Nida

- **Nida**
  - The biggest settlement in the Lithuanian part of the Curonian Spit;
  - Administrative center of Neringa Municipality;
  - Around 4725 permanent residents;
  - First mentioned in 1385, with the name of “Noyken” and “Noyden”;
  - Nida settlement is composed by the historic remains of 3 fishermen communities;
  - Nowadays Nida is one of the most attractive spots in Lithuania;
  - The ex libris is the nearby Parnidis Dune near Nida, one of the biggest dunes in Europe;

Information from: visitneringa.com & whc.unesco.org

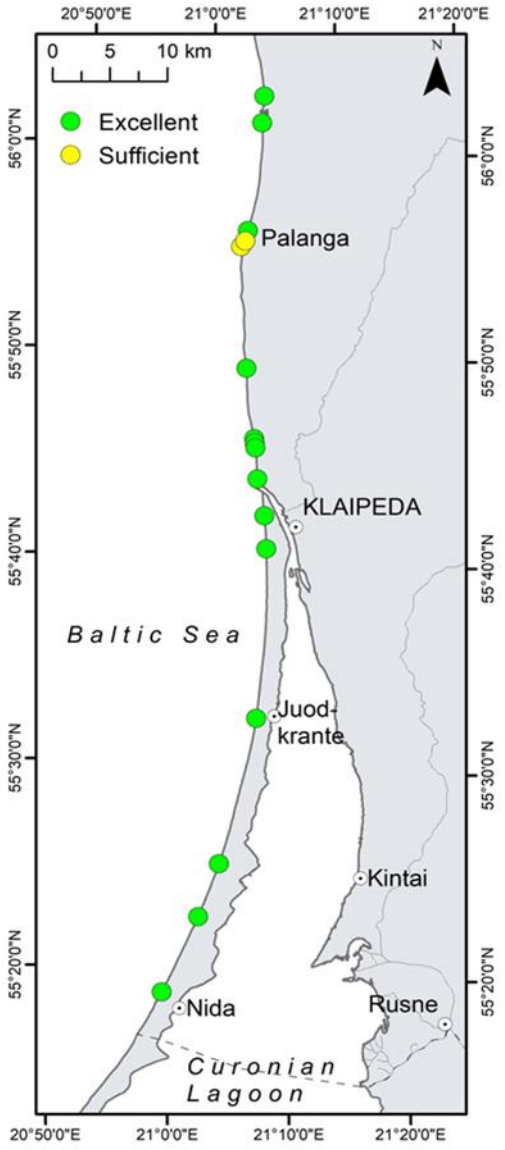
Nida

Nida

- Main economic activities in the Settlement are tourism and fisheries respectively;
- The settlement is prepared with infrastructure to receive its 13000 visitors, nut yearly around 600 thousand visitors per year;
- A big “slice” of Nida visitors are foreign people (specially German). Nida became international destination already in the end of XIX century.
- German artists, in the past, found Nida Artists’ Colony. Recently, Vilnius Academy of Arts established Nida Art Colony, which is very important for the locals;
- For Lithuanians this is a “must see” place and it is very common that they visit Nida every year or multiple times per year

Information from: visitneringa.com & whc.unesco.org

The issue: bathing water quality and tourism



Bathing water quality

- Lithuanian Baltic beaches popular among locals and tourist
- Excellent water quality in almost all locations
- Despite improved water quality very few bathing beaches in the Curonian lagoon

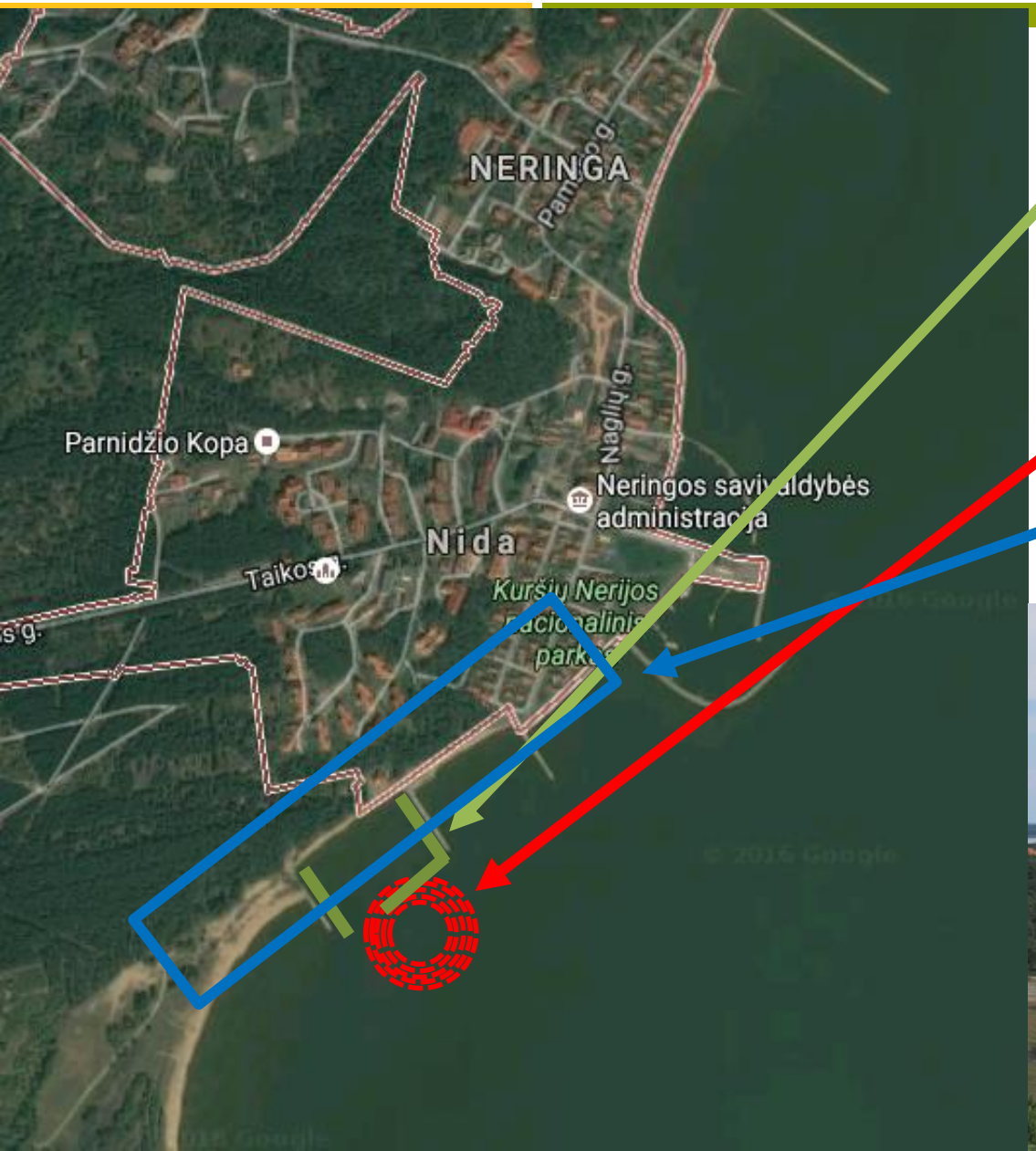
Tourism

- Increases in coastal tourism number
- Nida, popular tourism destination (world heritage site with unique heritage and nature)
- Strong seasonality

Opportunity of inner beaches

- Warmer water temperatures
- Earlier bathing season
- Better accessibility from resort towns
- Shallow waters/low waves and currents

Possible solutions: Future management scenarios



Scenario 1

Extension of macrophyte stands

Scenario 2

Beach mussel farm

Scenario 3

Infrastructure & advertisement

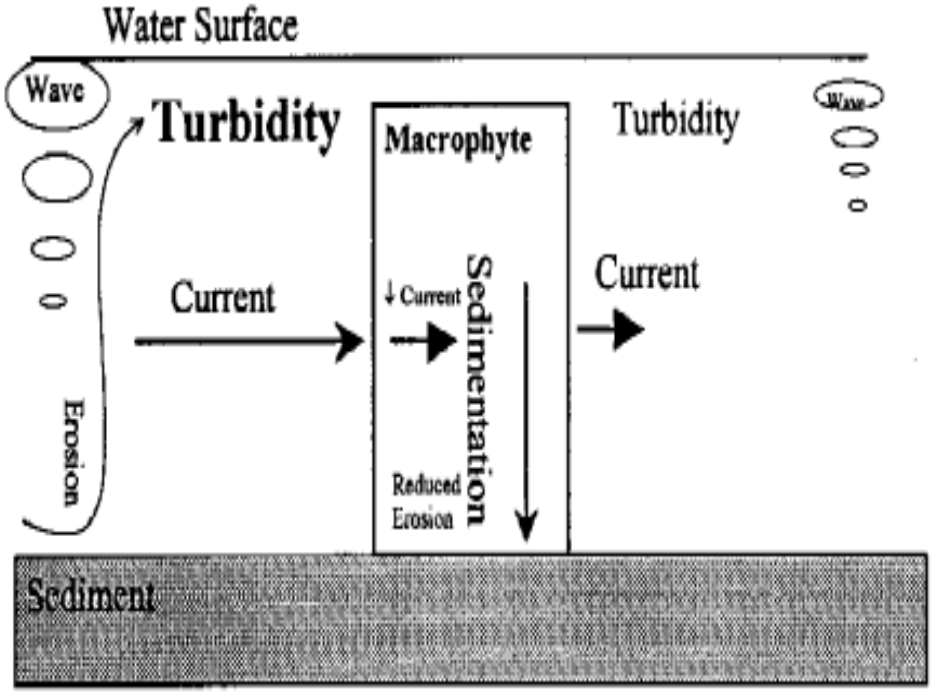
Scenario 1 - Macrophytes

Description:

This scenario focus on the use of macrophytes to improve water quality at a local scale. The aim is to extend naturally or artificially emerged and submerged macrophyte areas.

Objectives:

- Reducing water flow
- Increase settling velocity of sediment
- Increase water transparency
- Increase ecological status
- Create a more attractive "environment"



(MADSEN et al., 2001, S. 76)

Present Status

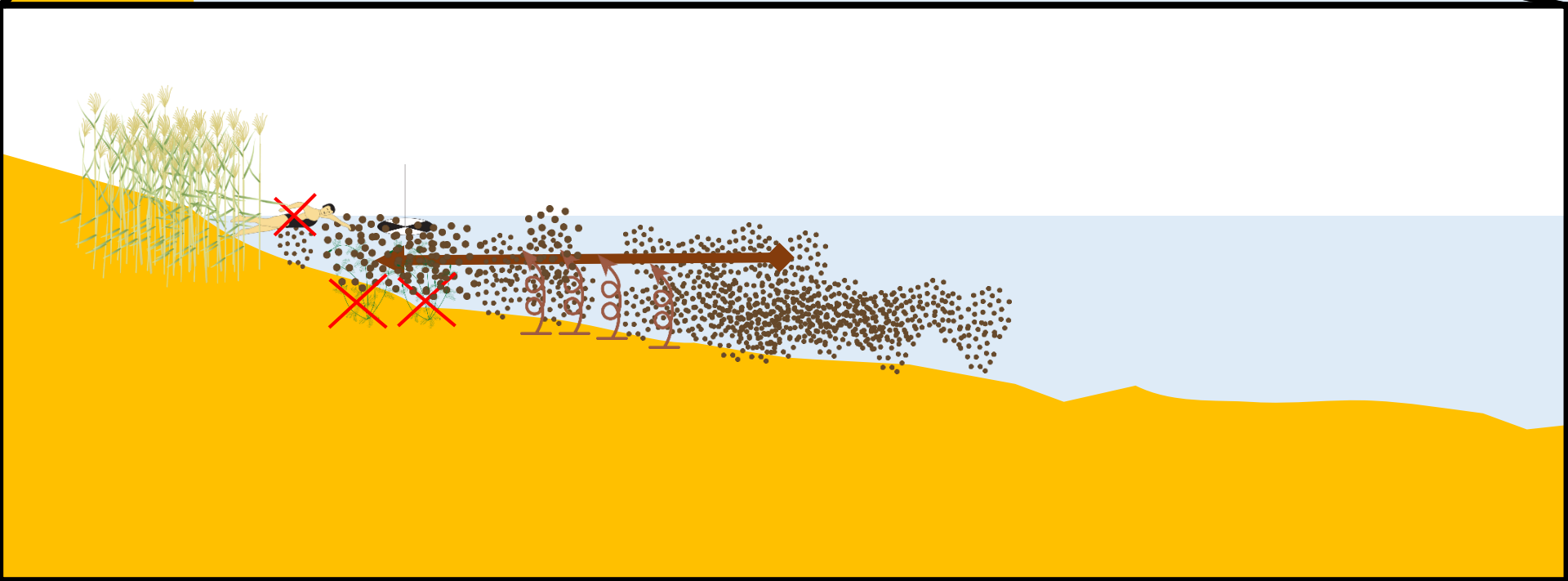
High sediment resuspension

High turbitdity = low transparency

Light penetration reduced

No development of macrophytes

Unattractiveness for tourism



Scenario 1.

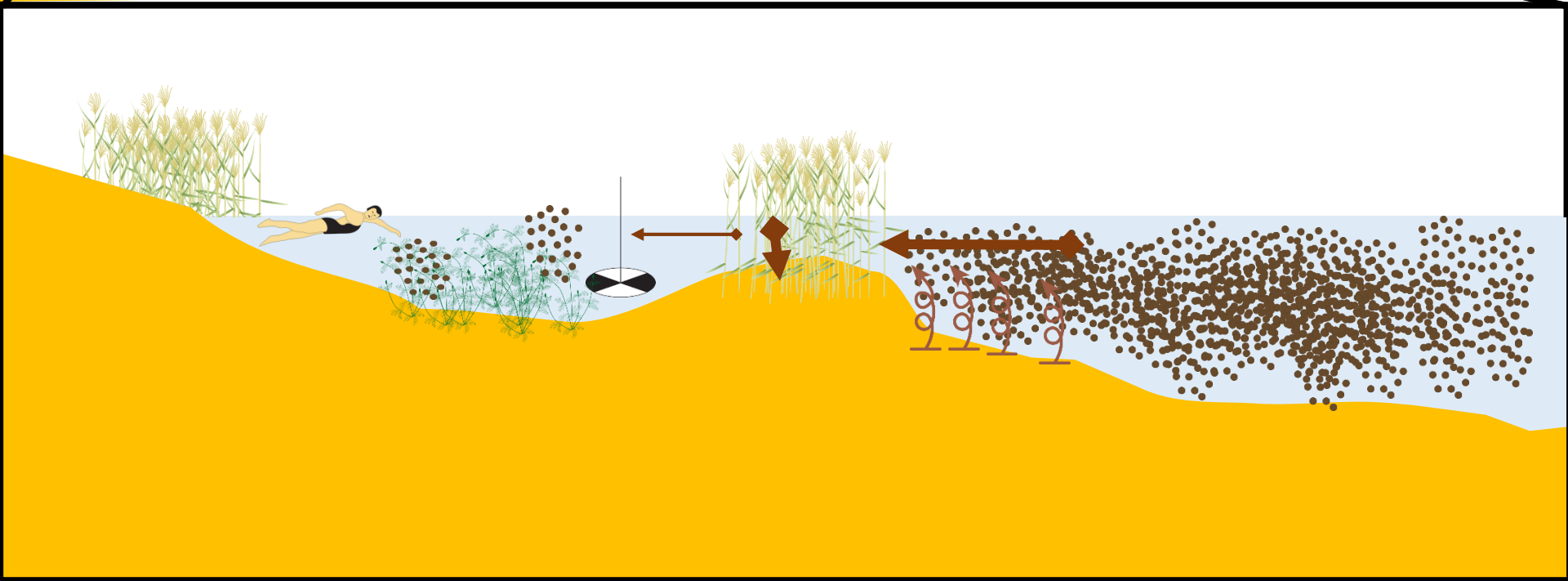
Less sediment resuspension

Lower turbitdity = higher transparency

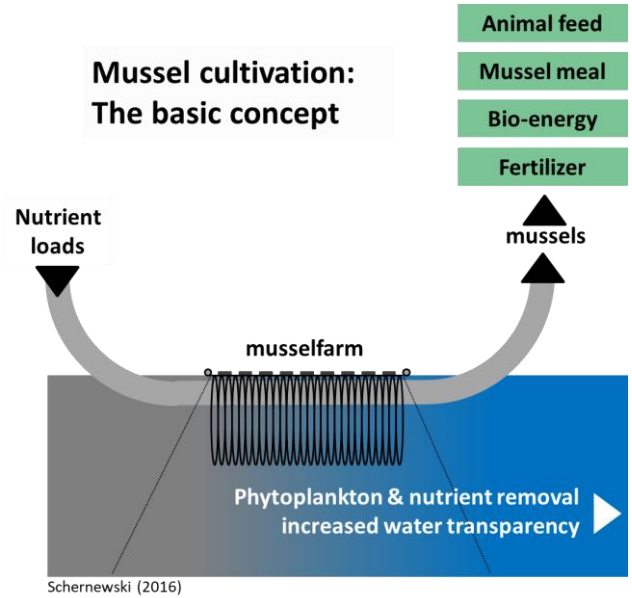
Light penetration increase

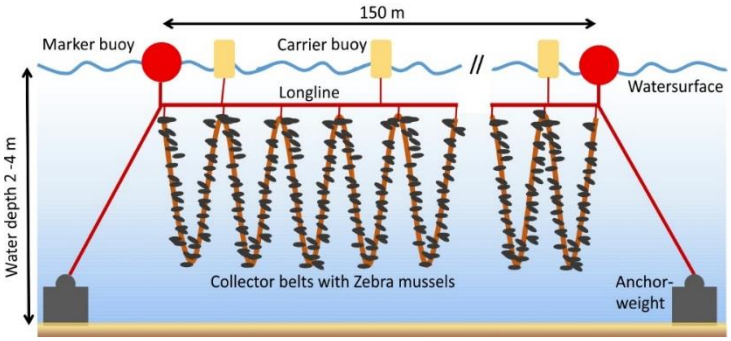
Development of macrophytes

Attractive for tourism



Scenario 2 – Beach mussel farm



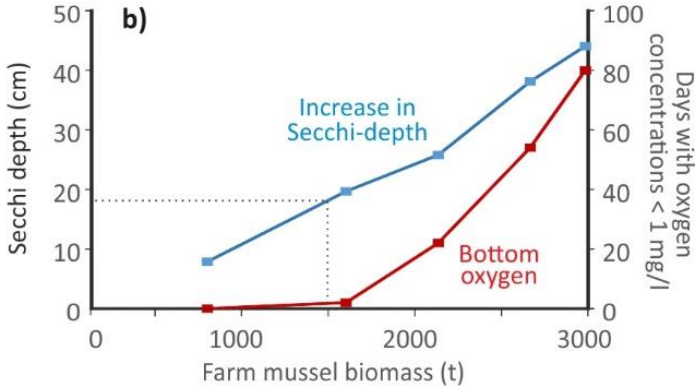


Objective

- Placement of mussel farm near beach to increase water transparency in bathing areas and support extension of macrophyte belts, which stabilize sediments and further increase transparency

Approach

- Establishment of a non-intensive mussel farm with an area of 10 ha (1km^2) in front of Nida beach
- Establishment within areas with a water depths between 1.5 and 3 meters
- Species: Zebra mussel with a mussel farm biomass of 1.0 kg m^{-3} a^{-1}



Scenario 3 – Infrastructure & advertisement

- **Objective:** investment in infrastructure and advertisement for more sustainable tourism in pre- and post- season

- ✓ ***Infrastructure***
  - Beach place preparation (beach cleaning; sand nourishment; water purification; building up benches, trash bins, changing rooms, toilets; rescue station; information boards about air and water temperature and other conditions (e.g. Blue Flag information board); the sign “Beach”)
  - Renewing old and build new nature paths
  - Open pool in lagoon

- ✓ ***Advertisement***
  - Cheaper renting prices for accommodation
  - Discounts for ferry tickets (Klaipėda – Nida)
  - Bird watching during migration
  - Camping sites along Curonian lagoon
  - More additional events to attract nature lovers

Thank you!

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