Baltic Sea Ecological Status

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The main scope of ecology:

live organisms ← *interrelation* → habitat

now → anthropogenic environment

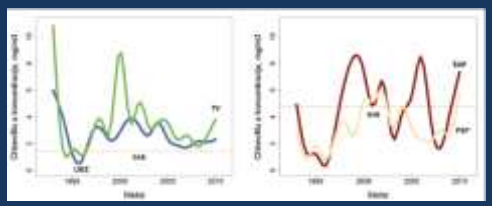
Environmental assessment

Assessing the environment – *what is „standard“ and what is „anomally“?*

- Assessment of human health and marine ecosystems' environment
  - Similar process – setting the list of indicators, defining standards for indicators that anable draw line between "good" health and "bad".
- Environmental quality assessment depends on
  - target
    (e.g.., water body suitable for fishery,, but not for bathing)
  - established threshold level

Interpretation what is good and not good
(in principle – what is "standard", and what is „anomaly")
is relative and varies in time!

And if to change the threshold level?



Exists several ways in defining the GES threshold levels:

- **Historical comparison**
- **Comparison of impacted and unimpacted habitats**
- **Modelling**
- **Best experts knowledge (expert judgement)**

Impact to water bodies

Ecological status of water bodies:

- Very good
- Good
- Moderate
- Bad
- Very bad

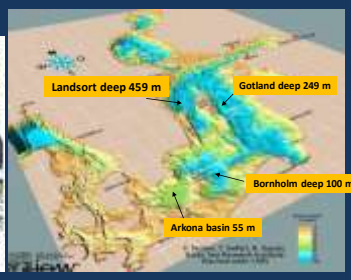
Significant impact to water body:

risk water body

Measures are necessary to reduce adverse impact and to reach good ecological status

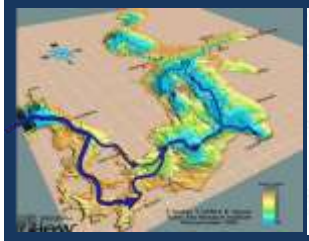
More then 85 million people live in the Baltic Sea basin

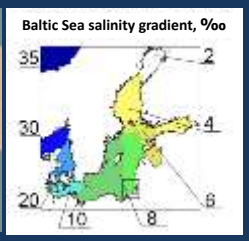
An exceptionally shallow sea



HELCOM, 2010

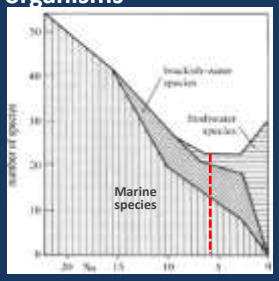
Strong salinity gradient





Baltic sea salinity is a stress factor for its organisms

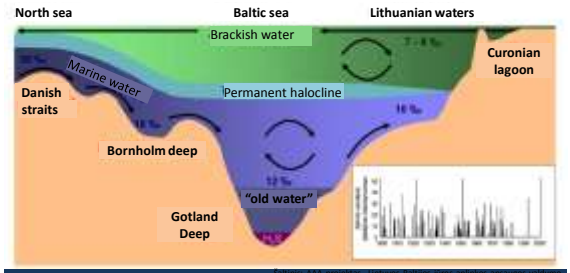
- Stunted growth
- Higher energy expenditures
- Lower tolerance to added stress



Marine, freshwater and brackish species number against salinity gradient

Remane 1934. Die Brackwasserfauna. Verhandlung der Deutsch Zoologische Gesselschaft 36: 34-74.

Baltic Sea hydrography and old standing stagnant water



Šaltinis: AAA projektas „Lietuvos Baltijos jūros aplinkos apsaugos valdymo stiprinimas " (KU Baltijos pajūrio aplinkos tyrimų ir planavimo instituto, Gamtos tyrimų centro bei Aplinkos politikos centro konsorciumas)

Extent of hypoxic & anoxic bottom water in the Baltic Sea, 2011 autumn

SMHI, 2011 Report Oceanography No.42

Main marine organisms groups:

6 thousand species, – 4,7% marine birds, fish, mammals

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Eutrophication

- too much algae in the Sea

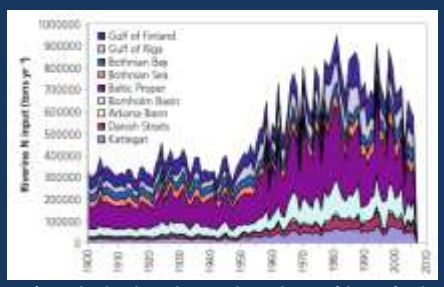
- water is not clear

Why algae is growing?

- Because we waste phosphorus and nitrogen into the sea

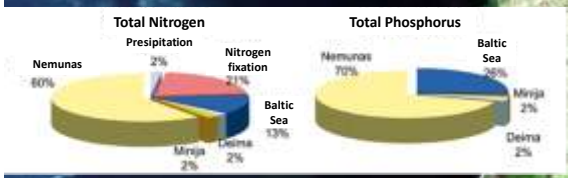
Nutrient amounts that enter the sea depend on processes not only in the basin (leakage from agriculture fields, industry, water treatments plants, forests but from sources outside (atmospheric transfer) as well.

About 75 % nitrogen and 95% - phosphorus enter the Baltic Sea from rivers

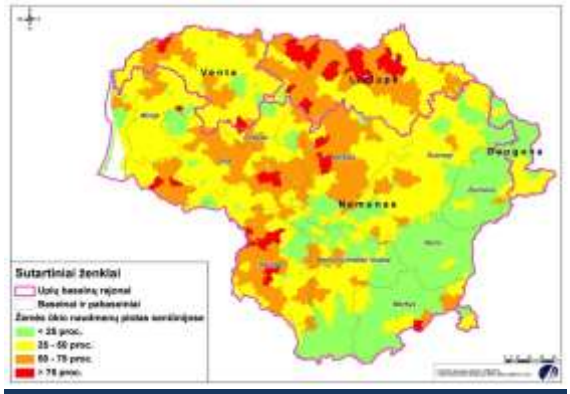


Tendency in riverine Nitrogen input into Baltic sea basins,
HELCOM 2011

Annually about 50 000 tons TN and 2000 tons TP enter the Baltic sea from Lithuanian territory

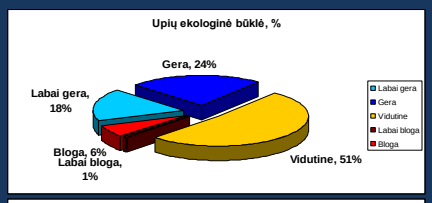


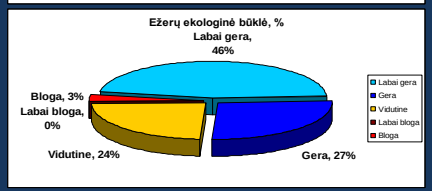
Sources of TN and TP and their part to the Curonian Lagoon



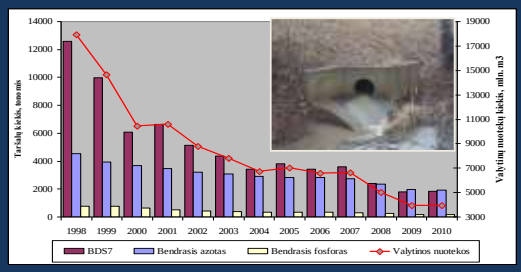
Lithuanian water bodies ecological status

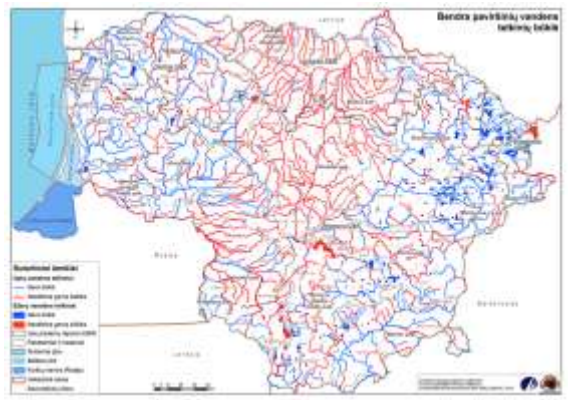
Ecological status of rivers and lakes in LT



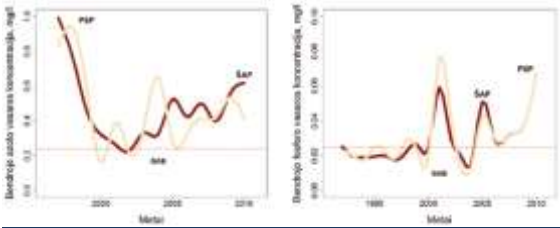


Tendency of pollutants amounts from waste water treatment plants 1998-2010 m.

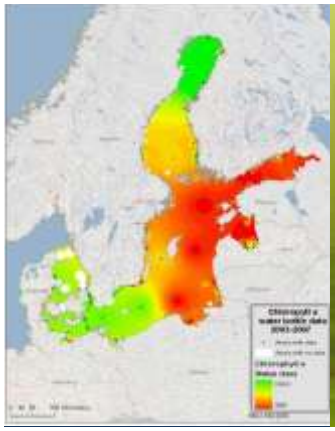




Mean summer TN and TP concentrations tendency in Lithuanian coastal zone

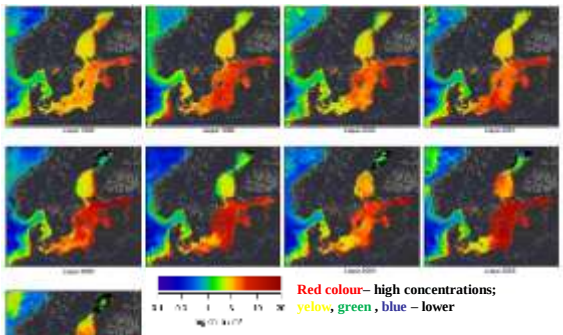


GAB - good environmental status threshold value, PSP and ŠAP – southern and northern coastal zones



Main eutrophication consequences in the Baltic Sea

- More frequent water blooming
- Less water transparency
- Disappearance of valuable macroalgae
- More intensive sedimentation of organic matter and higher consumption of oxygen
- Possible benthic "deserts"

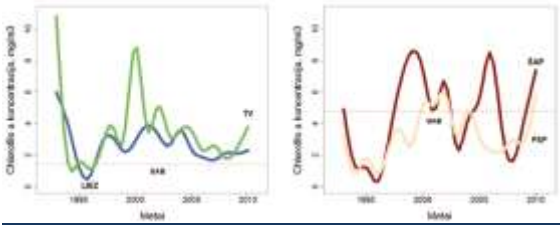


Red colour– high concentrations; yelow, green , blue – lower

Chlorophyll a (mg/m³)
1998-2006 July

(http://marine.jrc.ec.europa.eu/)

Mean chlorophyll a concentration tendency in Lithuanian coastal zone



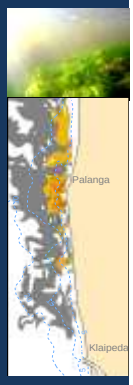
GAB - good environmental status threshold value, left: TV – territorial sea, LIEZ – exclusive economic zone, right: PSP, ŠAP – southern and northern coastal zones

Perennial benthic flora :

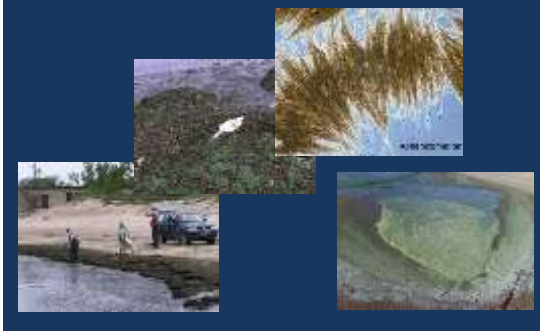
- Red algae F*urcellaria lumbricalis is the only large macroalgae present in the Lithuanian coast.*
- *It's continuous dense belt in depth of 4-10 m* functions as good biotope for benthic fauna; many fish species , especially Baltic herring, use them as spawing grounds and is a good feeding place for birds

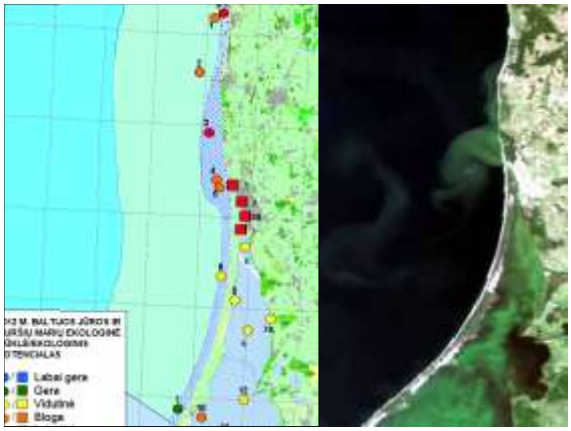
Bottom flora in Lithuanian coastal zone:

1968-1969	1993-1996	2003-2008	Year
42 km²	27 km²	31 km²	Distribution area
15	16	15	Max depth limit



Intensive water blooming is common phenomenion in Lithuanian beach zone

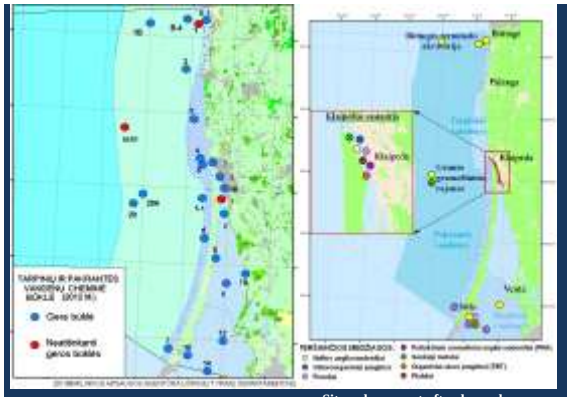




Lithuanian coastal and transitional waters – appointed as risk waterbodies due to:

- Inflow of N and P
- High eutrophication level
- Limited water circulation
- Hydromorphological changes
- Transboundary pollution (neighbouring, not EU countries)

Now the main task to select proper, economically effective measure to reduce eutrophication and to reach good water quality untill 2020



Sites where most often hazardous substances are determined

THANK YOU