



Water quality improvement by mussel cultivation – Case study Szczecin Lagoon, Baltic Sea

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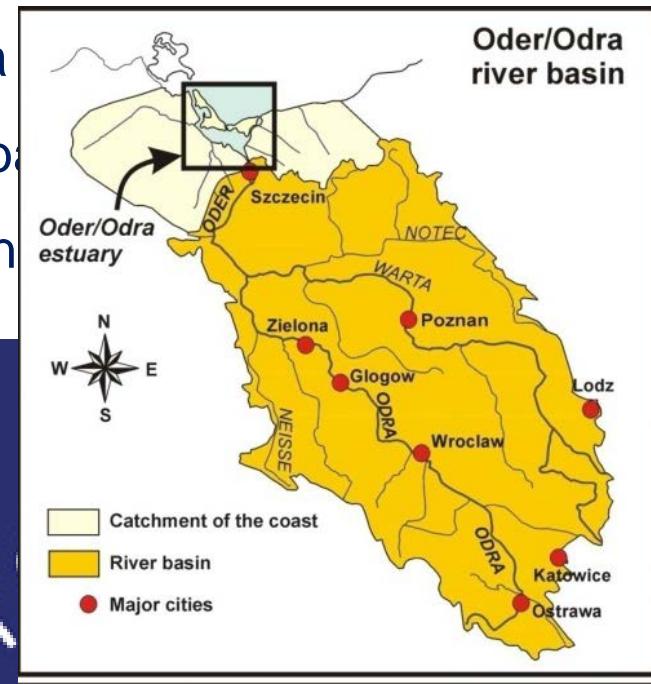
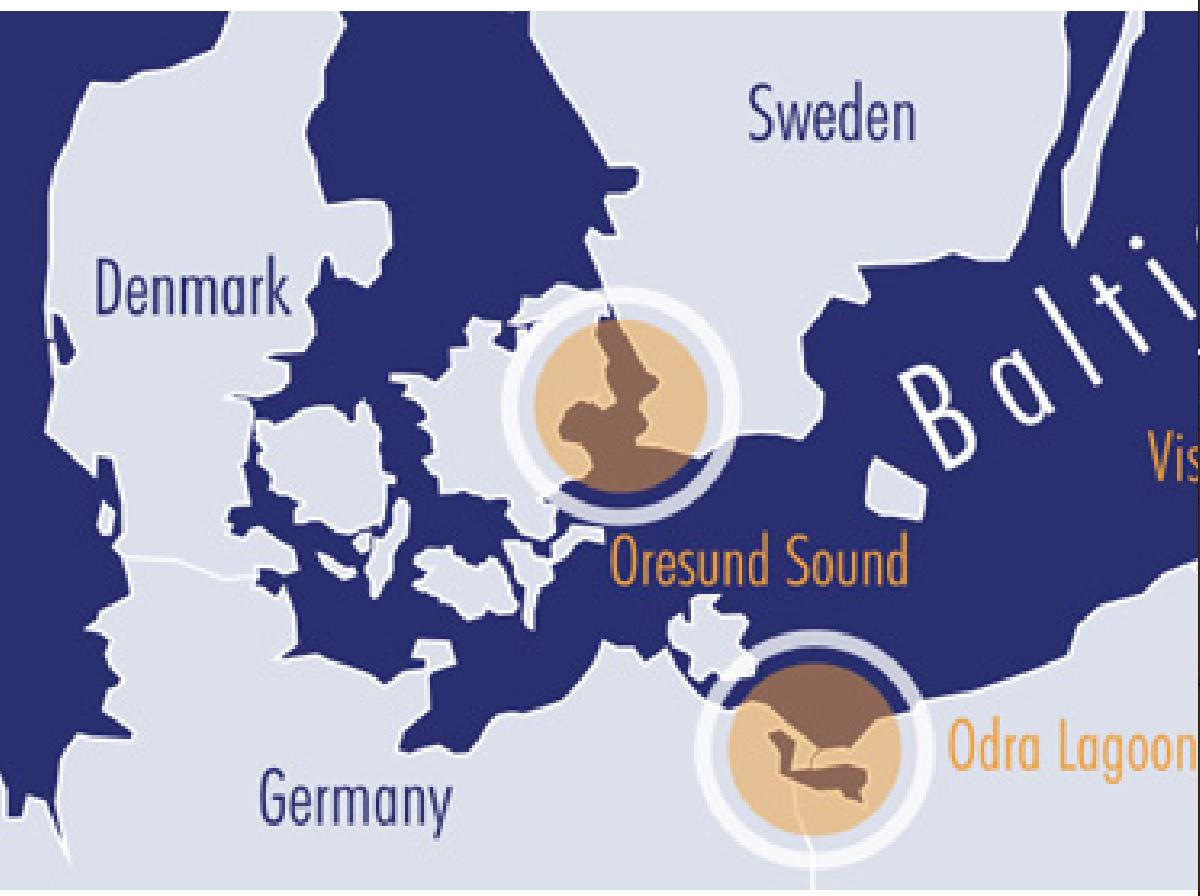
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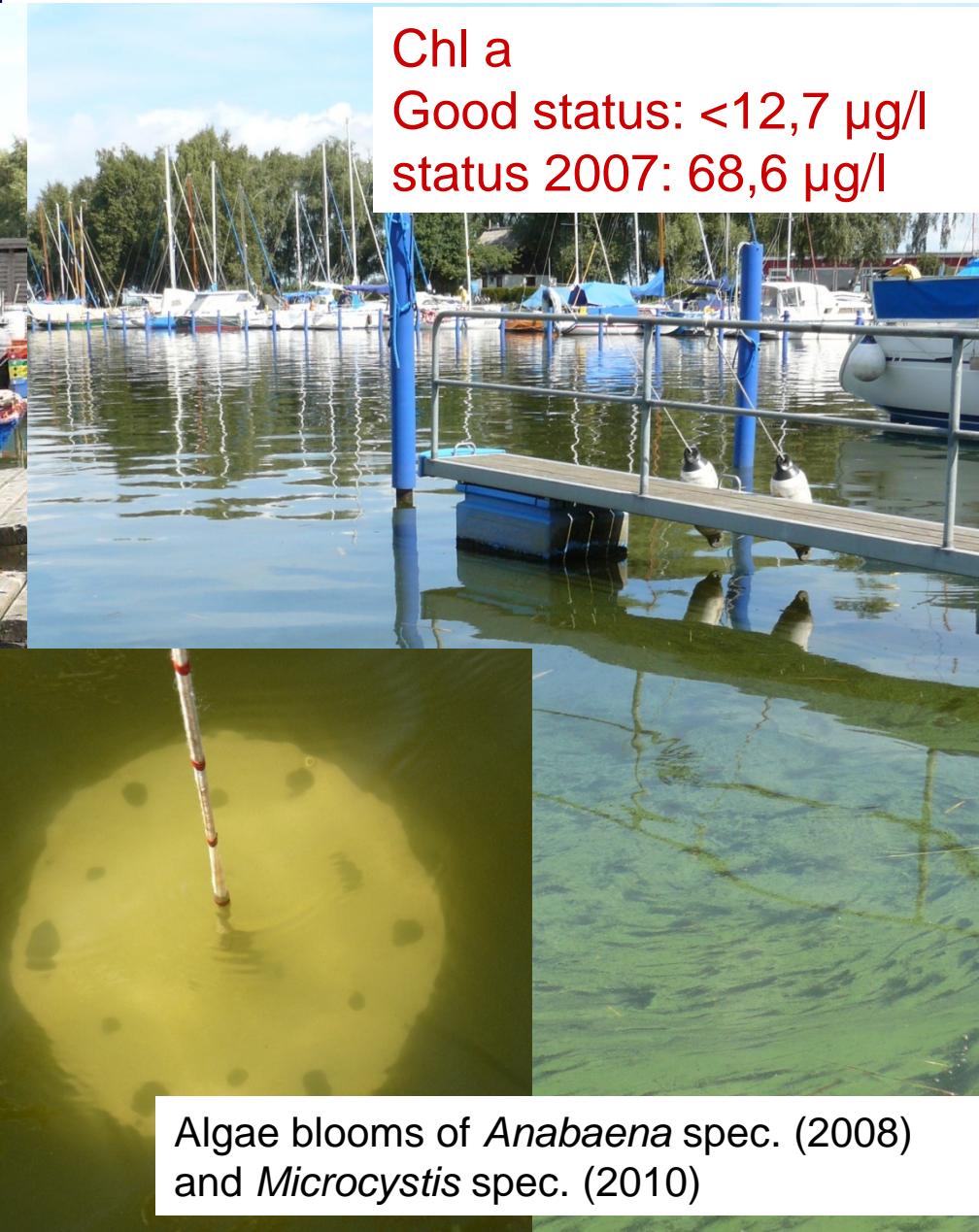
Oostende, 28.11.2012

Transitional waters of the South Baltic Sea region

- Buffering function for protecting the Baltic sea
- Influenced by high nutrient loads in the river basin
- WFD demands good ecological status, current



Eutrophication



Methods of restauration / Eutrophication abatement

Biological:

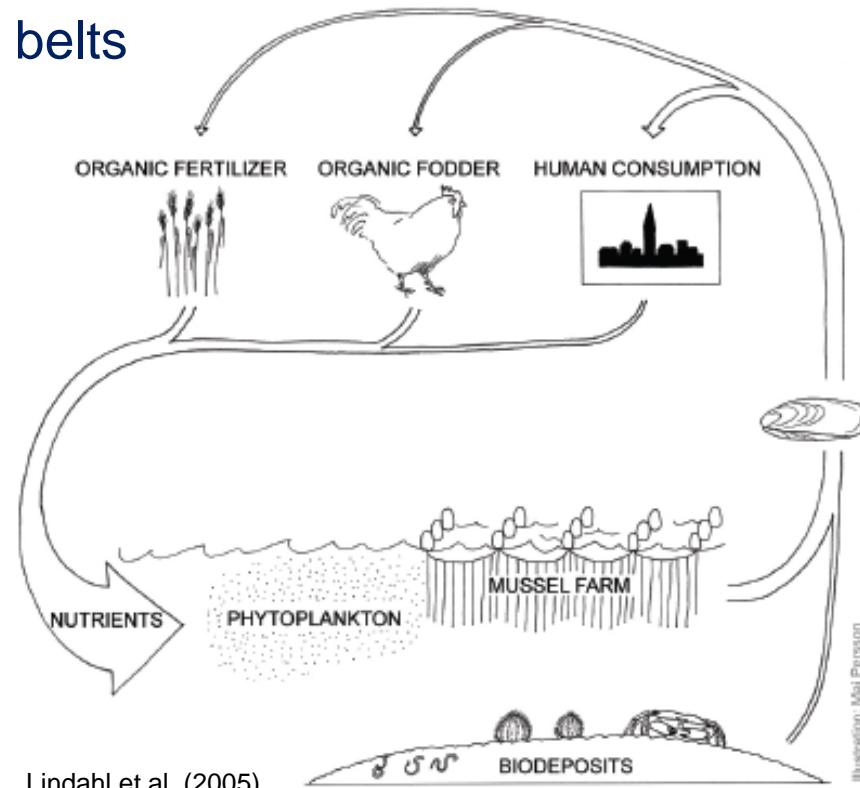
- Mussel cultivation and enlargement of natural mussel beds
- Cultivation of macro algae
- Enlargement and management of reed belts

Mechanical:

- Dredging of sediment and dumping on land
- Sediment capping

Chemical:

- Precipitation of nutrients



Mussel farming trials in the Baltic Sea



X = ongoing or completed small scale trials

★ = ongoing or completed large scale trials

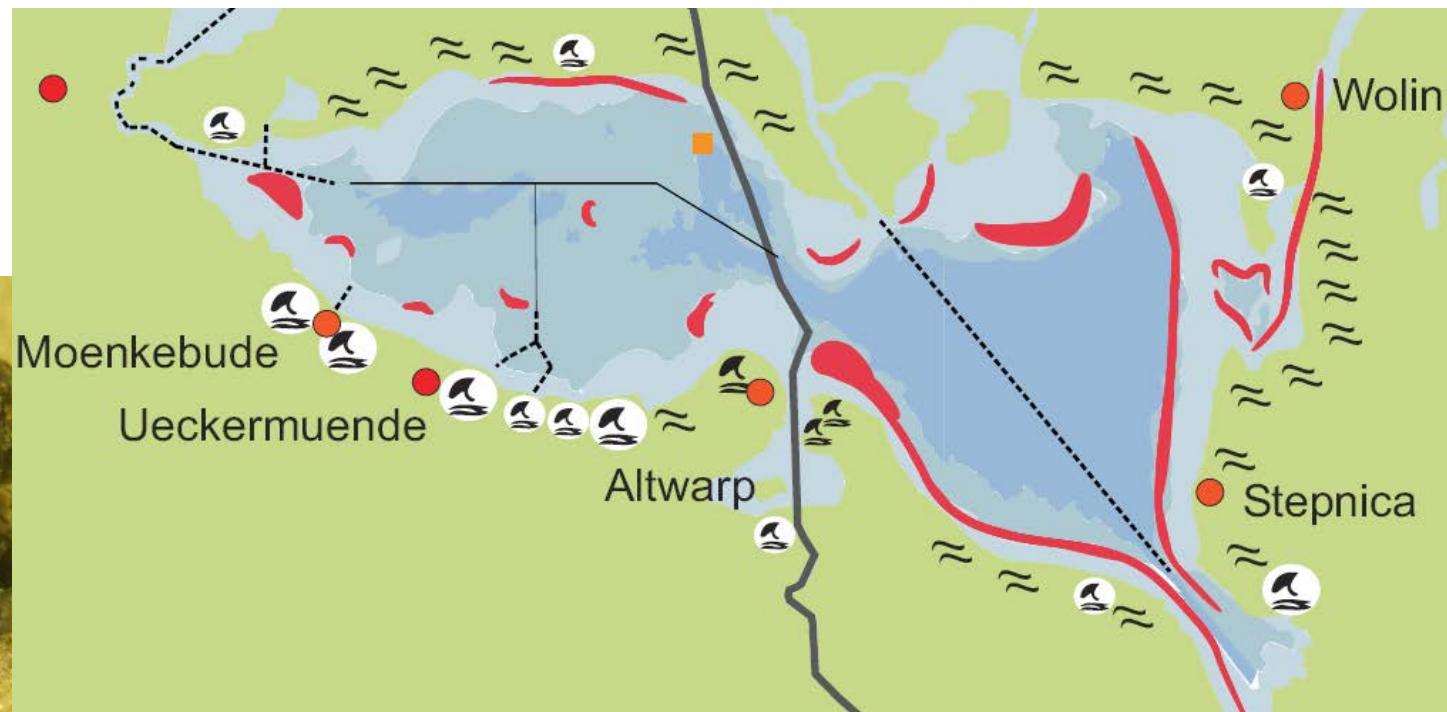
Z = zebra mussel trials

— = seafood mussel production



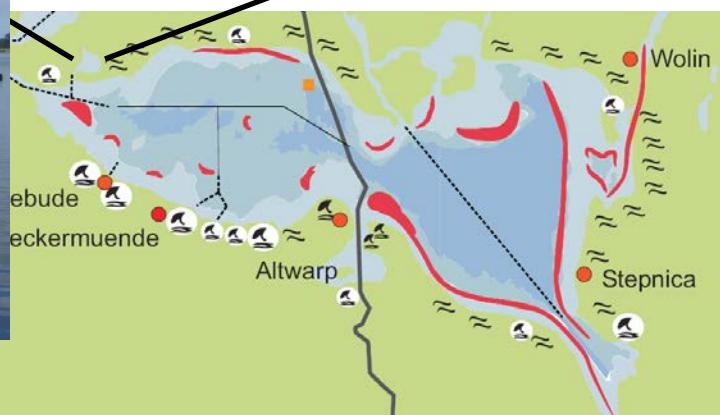
Zebra mussel beds in the Szczecin Lagoon

- Biomass: ca. 68.000 t, thereof 8.000 t in the German part (Radziejewska et al. (2009))
- Coverage in the German part: 6,56 km² or 2,4 %
- Main problems for natural settlement: missing hard substrate and risk of anoxia



Zebra mussel cultivation in the Szczecin Lagoon

- Pilot station of University of Greifswald in Usedomer See since May 2012
 - space of 100 m x 100 m with 6 net collectors of 240 m²
 - settlement by regular spat fall



SWOT-Analysis of zebra mussel cultivation

Strengths	Weaknesses	Opportunities	Threats
<ul style="list-style-type: none">• Environmentally friendly, „native“ species• Removal of nutrients by periodic harvest• Improvement of ecosystem quality by increased biodiversity• Low limitation by spatfall in comparison with bottom cultures	<ul style="list-style-type: none">• Uncertain commercial use because of slow growth and small harvest size• Increased concentration of heavy metals affects mussel use for animal husbandry• Reduction of mussel biomass by predators (fish, waterfowl) or lack of food• No tradition and experiences in mussel cultivation• Uncertain legal and planning situation	<ul style="list-style-type: none">• Resettlement of macrophytes by improved water transparency• Altered food web interactions, more benthic feeding fish and expanded fishery• New regional jobs in harvesting and processing of mussels• Higher number of tourists and overnight stays in summer season by improved water transparency	<ul style="list-style-type: none">• Local anoxic surface sediment by deposited organic material• Bothered tourists by mussel shells washed ashore• Material damage by fouling of boats, gillnets etc.• Damage of net structures by ice cover in winter



Legal aspects

Legislation on different levels

1. International Law
2. European Union Law
3. National Law: German Law; federal system: Bund / Länder
Polish Law

No aquaculture law!

Lack of appropriate legislation

Germany: Little experiences with mussel aquaculture

Szczecin Lagoon:

- Mussel cultivation = fisheries?
- Definition as fishery method or method for water protection?

->fishery method would be easier to implement



Legal aspects

Relevant laws:

- Law of Fisheries incl. the Right of fishing
- Building Law
- Water Law
- Shipping Law
- Environmental Impact Assessment required

Permission depends on:

- structure, size and place of construction
- method of cultivation (e.g. nutrient input, risk of anoxia)

Environmental Law: lagoon is part of NATURA 2000 network - permission under environmental law possible?



Legal aspects

Critical reflection of German Federal Environmental Agency (UBA)

Mussel farming can lead to impacts on benthic fauna and in case of hazardous substances stored in the sediments these can be released under anoxia

1. Too much threats! – Too little long-term experiences
2. Nutrient inputs must be remediated at source / as close to the source as possible

-> Agency is against using large-scale mussel farming !

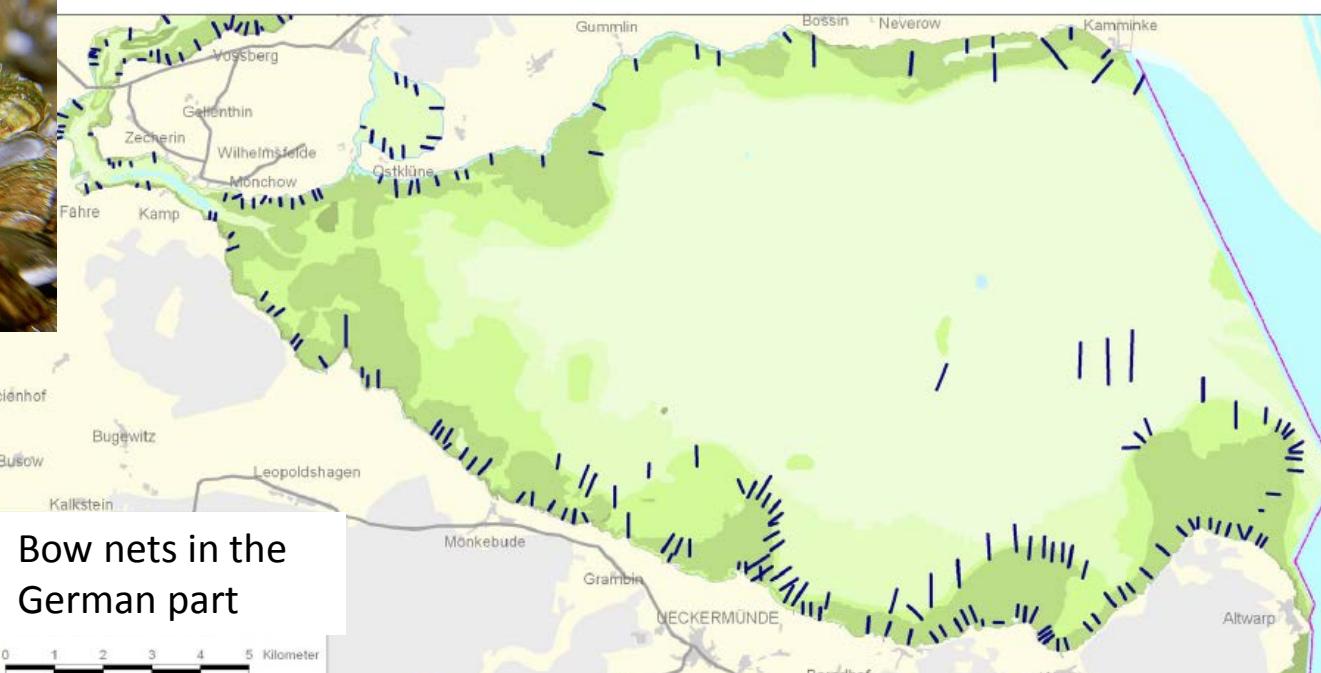


Acceptance of fishermen

Interview results

See problems in:

- competition with traditional fishery
- spatial use conflicts
- provision of invasive species (round goby) by cultivated food





Problems of implementation

- Fishermen / potential farmers tend to have a narrow short-term view
- stakeholders do not recognise ecological and economic value of bioremediation
- lack of tools, incentives and help of authorities to support bivalve farming for bioremediation

Interview campaigns to analyse value of water quality

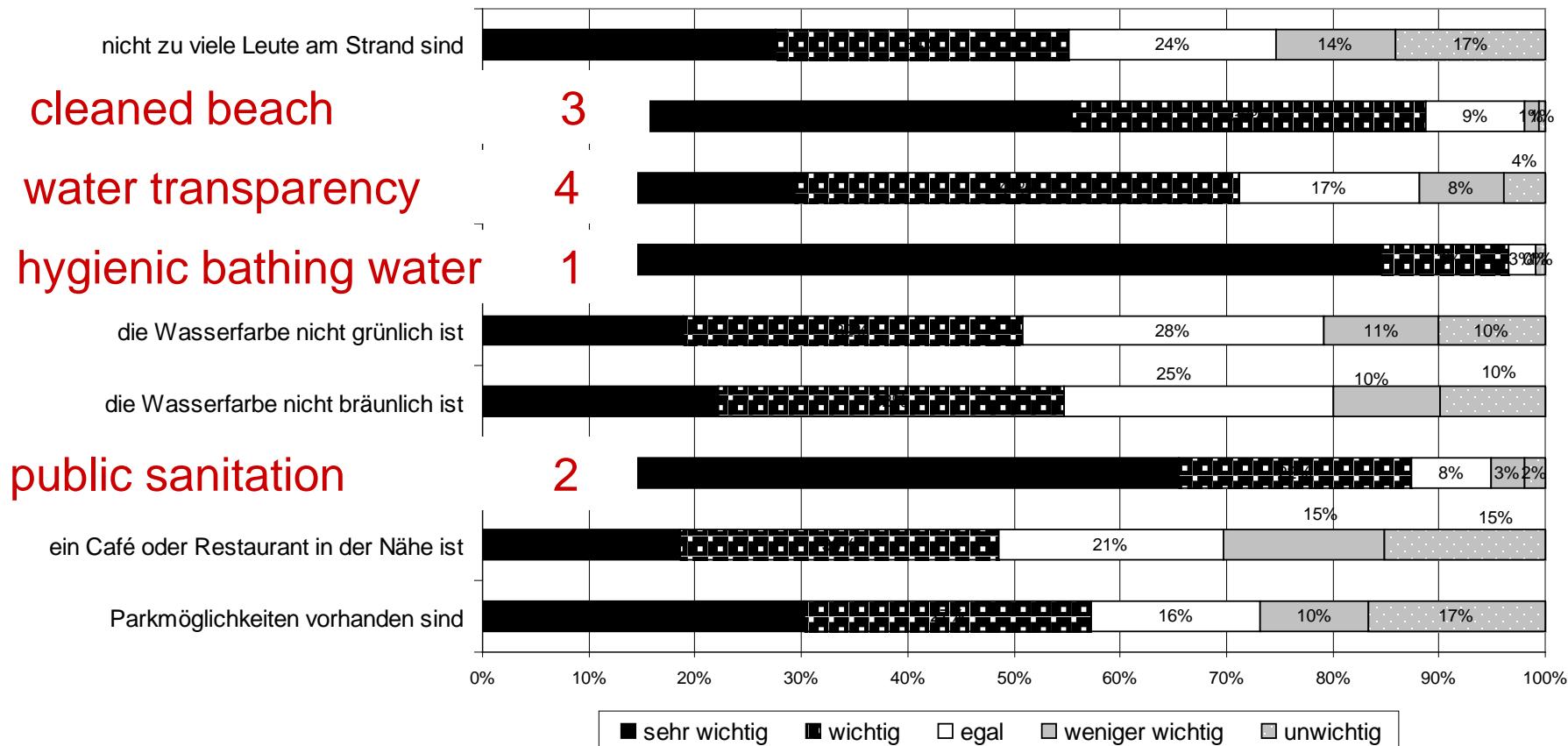
2008:
450 around lagoon,
mainly Germany

2012:
410 in Szczecin, Poland

Results of interview campaigns

Survey results in 2008 (12 beaches, 450 interviews): Water transparency plays an important role for tourists.

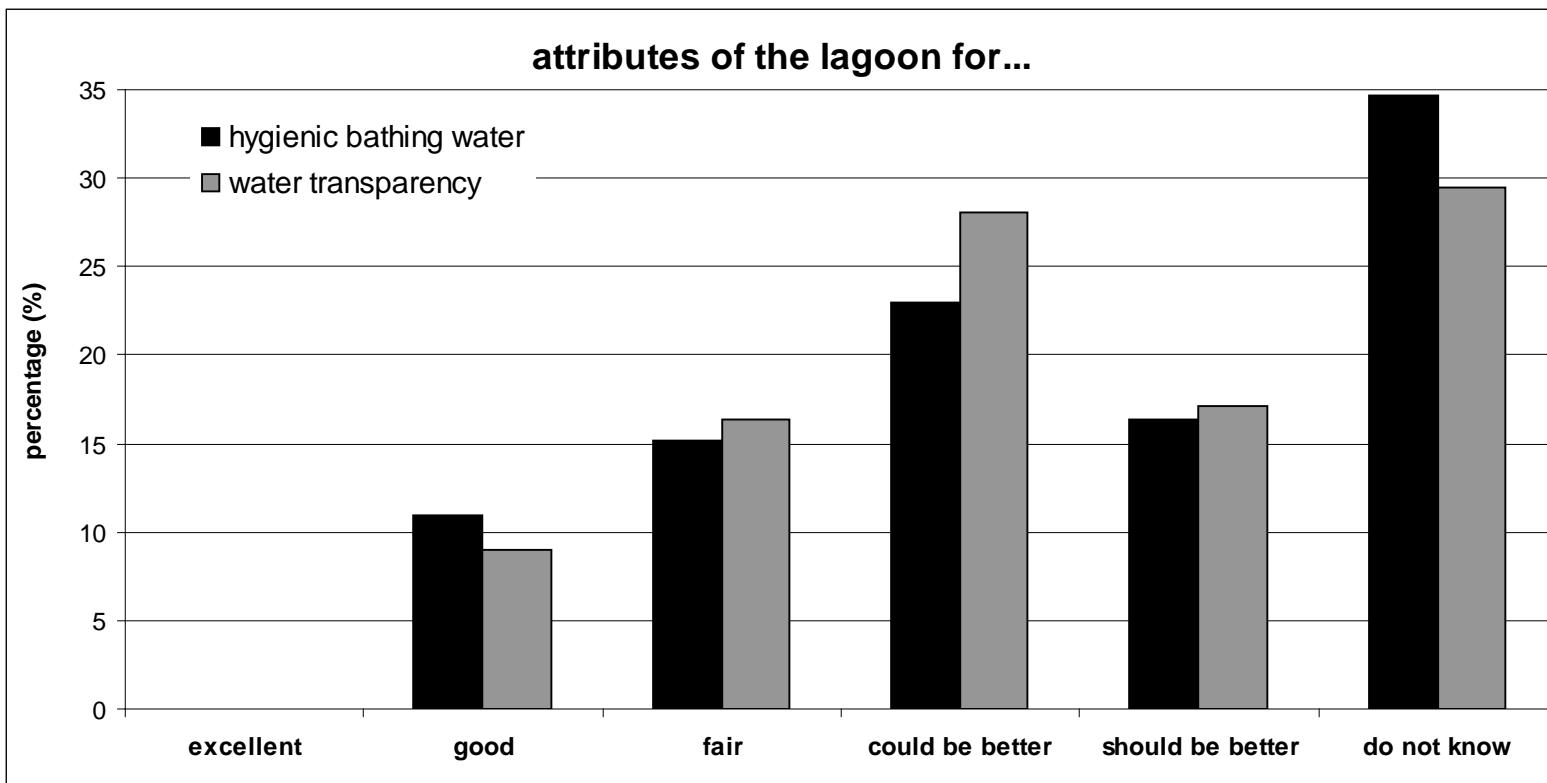
How important is it to find following characteristics at the lagoon?



Results of interview campaigns

Survey results in 2012:

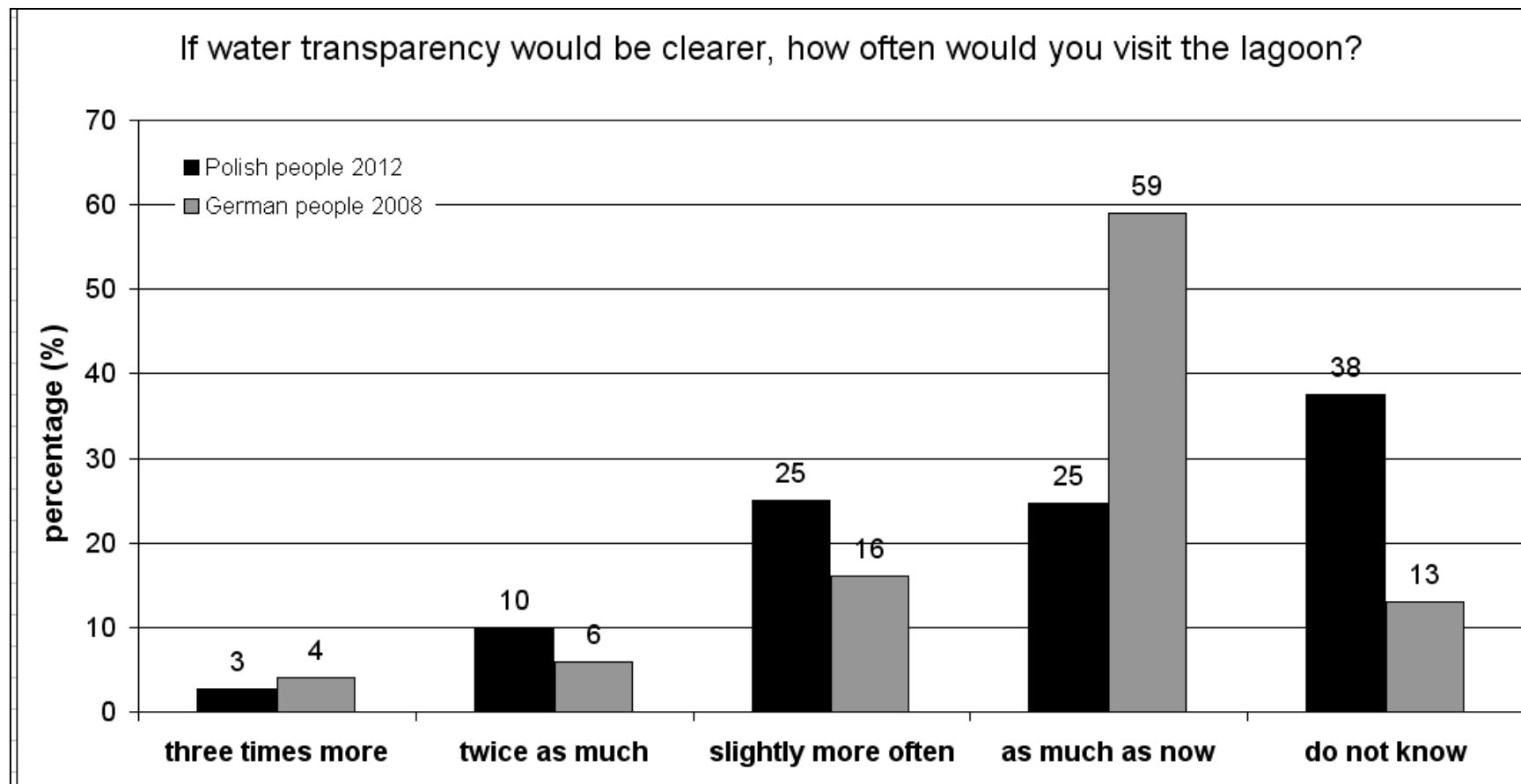
- 40% go regularly to the lagoon, mostly in summer
- Most of them come to the lagoon for a private day trip
- Just 13% use the lagoon for bathing
- 45% feel water transparency could/should be improved; 26% are satisfied



Results of interview campaigns

Tourism potential, surveys 2008 and 2012:

Improvement of water transparency implies an increase of tourist arrivals. Ca. 30% of respondents will come more often.





Summary

- Water transparency can play an important role in future development
- Improvement of water transparency would increase tourist arrivals by 30%
- Mussel cultivation as bioremediation measure is not widely accepted
 - No experiences and little knowledge in authorities
 - Fishermen need incentives to accept and test
- Pilot measures will help to generate results
- Projects as ARTWEI help to discuss bioremediation tools with authorities and enhance acceptance on both sides of the lagoon

Thank you for your attention !



ARTWEI



Part-financed by the European Union
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www.balticagoons.net/artwei/

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