



Christian-Albrechts-Universität zu Kiel



Management of Lake Durowskie

Wągrowiec- Poznań 2016

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Outline

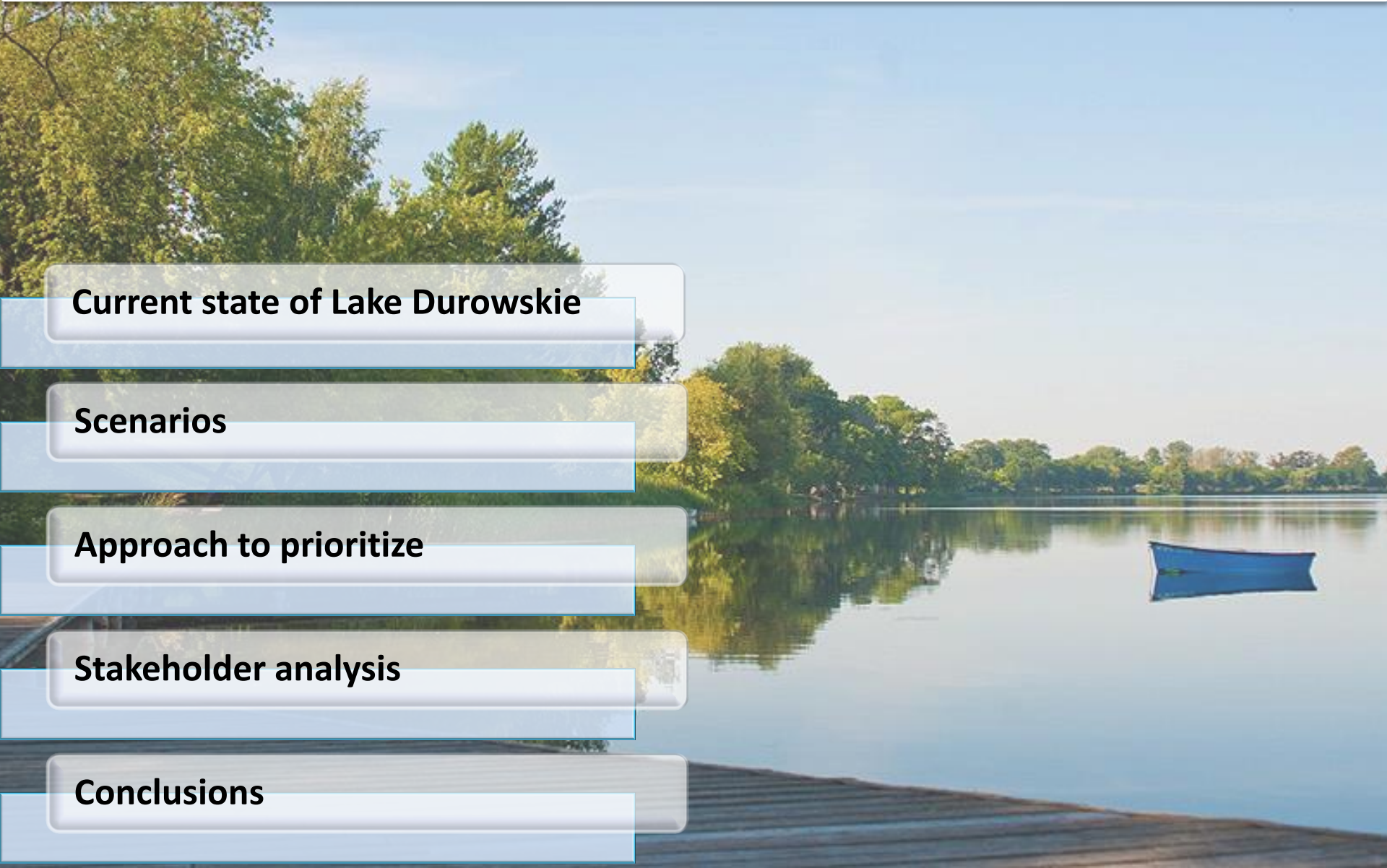
Current state of Lake Durowskie

Scenarios

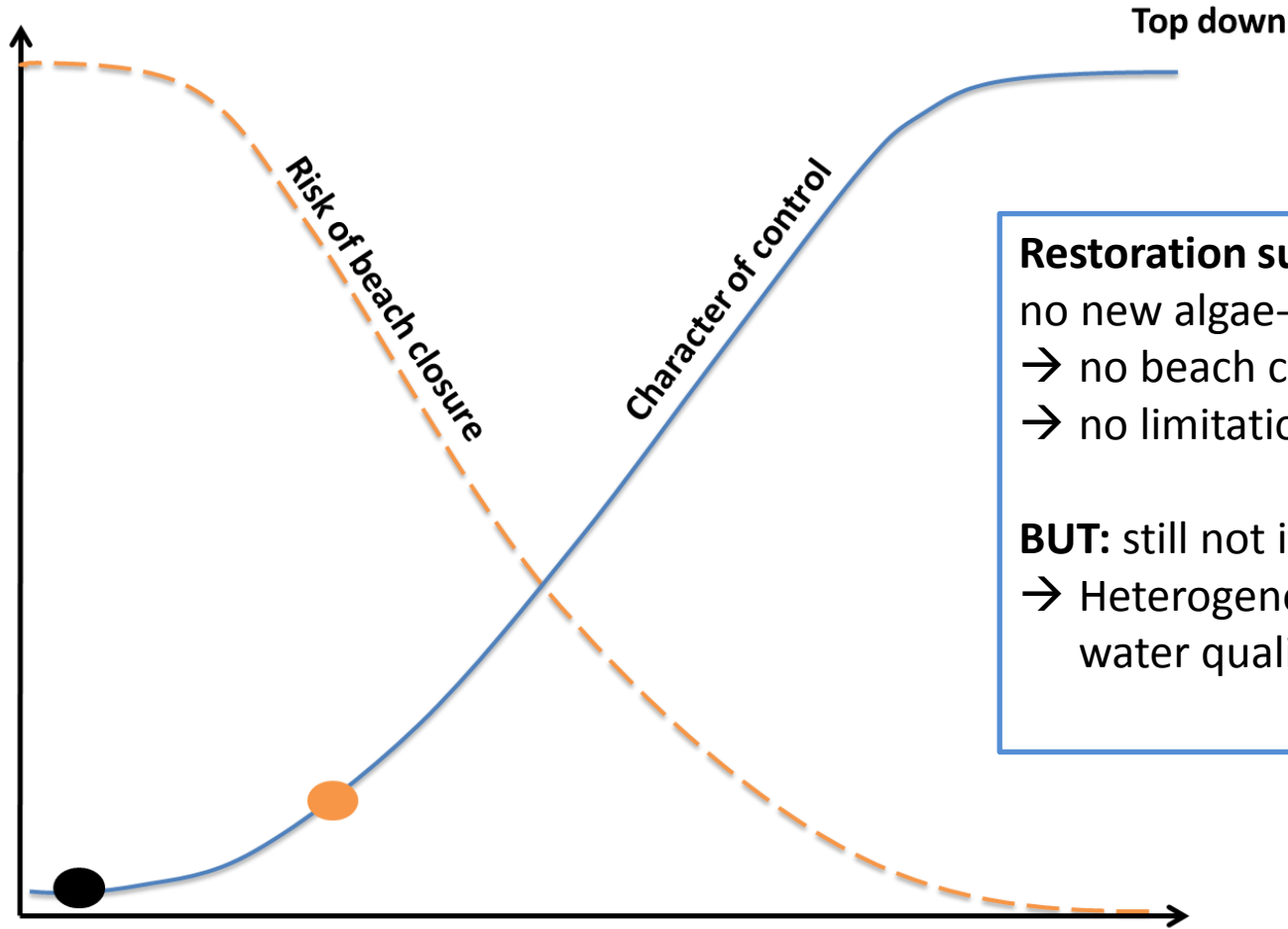
Approach to prioritize

Stakeholder analysis

Conclusions



Target of restoration: transition from bottom up to top down control



Restoration successful:

- no new algae-bloom
- no beach closure
- no limitations for recreational use

BUT: still not in a stable state

- Heterogenous picture of different water quality indicators

Bottom up



● State of Lake Durowskie before restoration
● Current state of Lake Durowskie

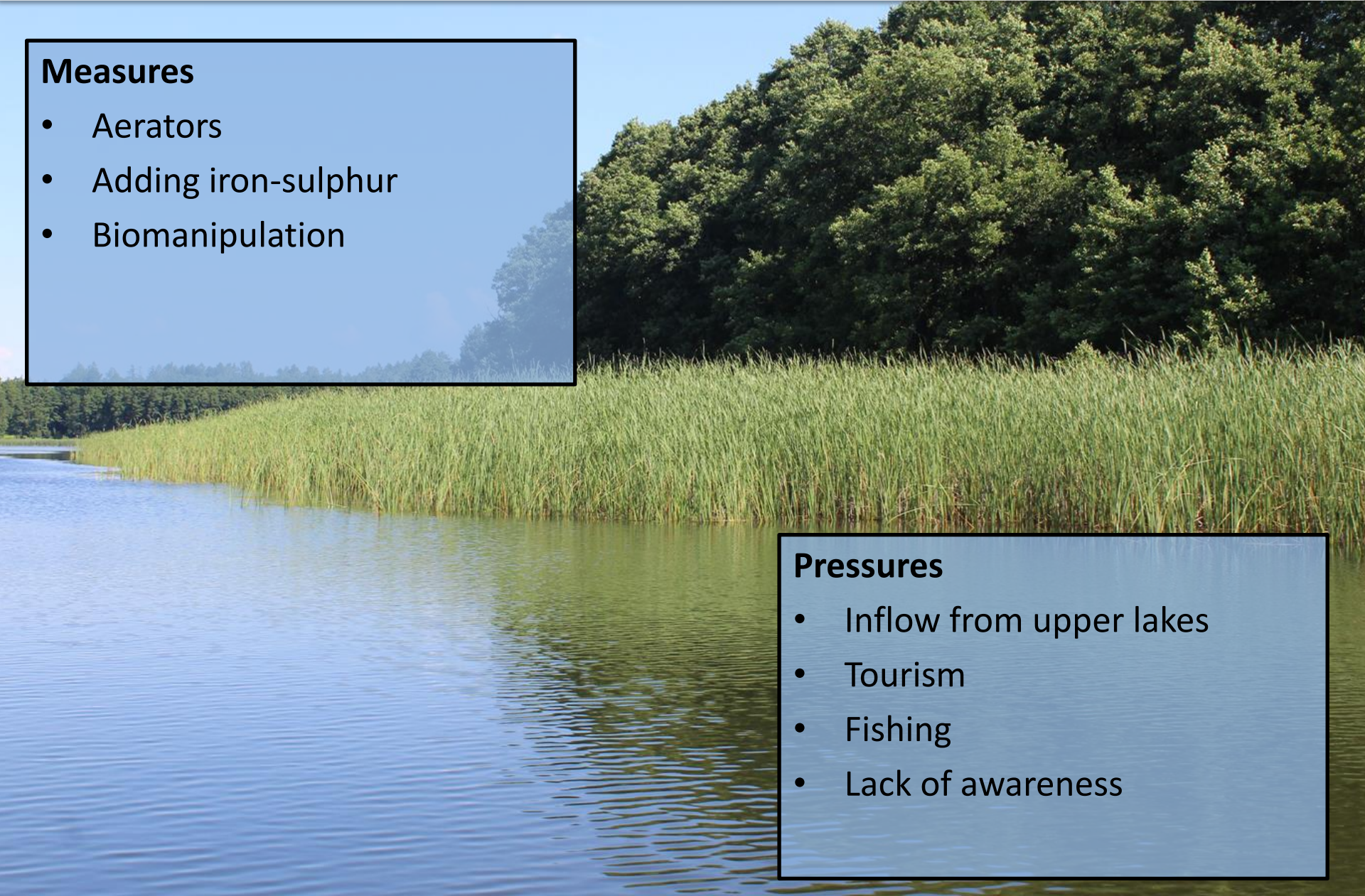
Current state of Lake Durowskie

Measures

- Aerators
- Adding iron-sulphur
- Biomanipulation

Pressures

- Inflow from upper lakes
- Tourism
- Fishing
- Lack of awareness



Erosion

- Erosion around the lake
- Eroded shoreline
- Footpaths (shortcuts)



Motorboats

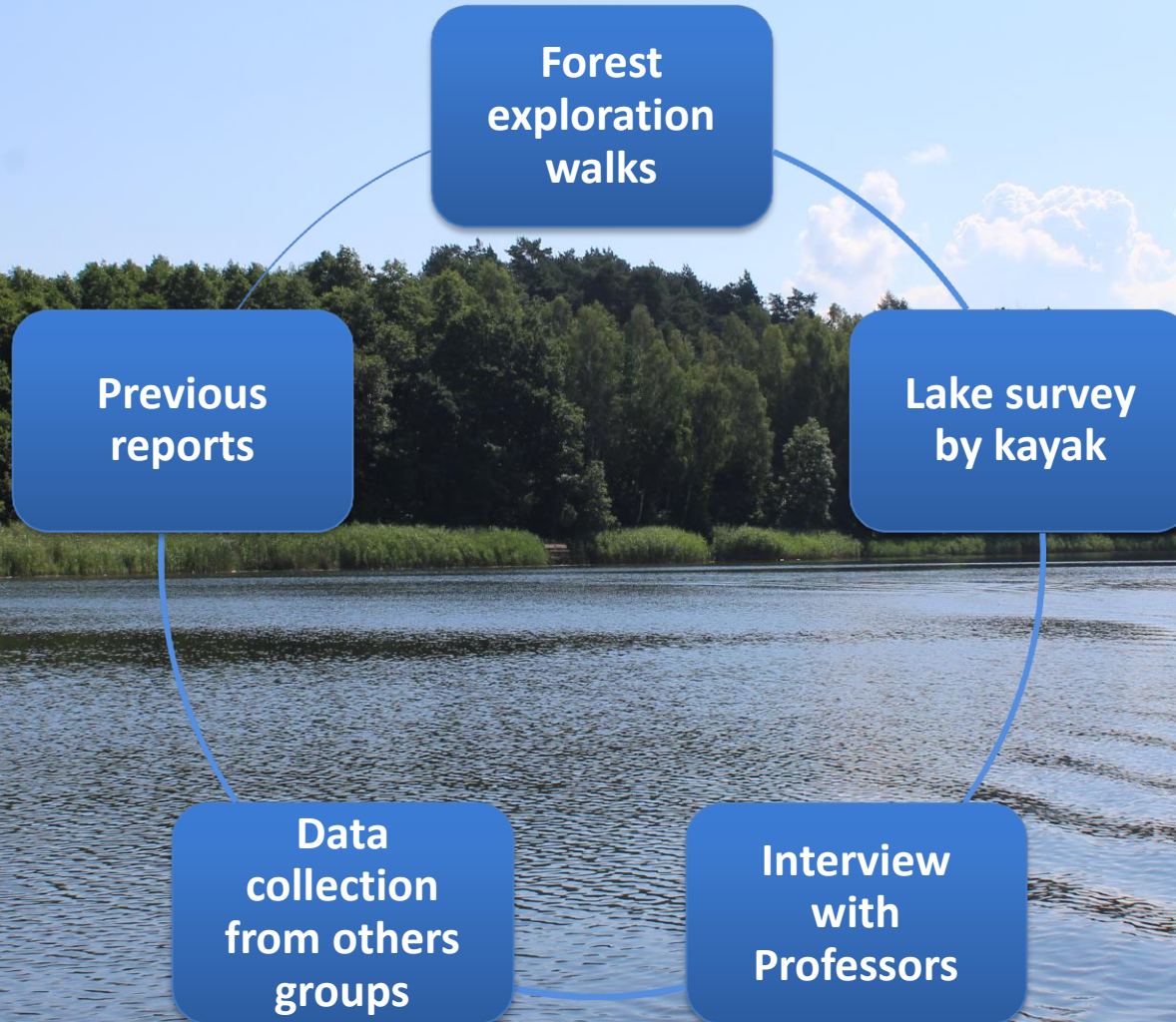
- motor boats mixes upper layers of the lake: nutrients from deeper layers are brought to upper layers
- Waves generate erosion on the shore
- Only small economic benefits



Littering



Methods




```
graph TD; Options([Options]) --> ScenarioA[Scenario A  
Failed investment]; Options --> ScenarioB[Scenario B  
Stagnation]; Options --> ScenarioC[Scenario C  
Investing in future];
```

Options

Scenario A

Failed investment

Scenario B

Stagnation

Scenario C

Investing in future

Scenario A – Failed investment

Scenario A implies a stop of all restoration measures

Example of Lake Swarzędzkie: after 3 years restoration measures were stopped → algae-bloom occurred only one year later

Town spend money for restoration measures to no avail



Scenario B - Stagnation

Aerators



Removal of phosphorus



Introducing fish



Scenario B - Stagnation

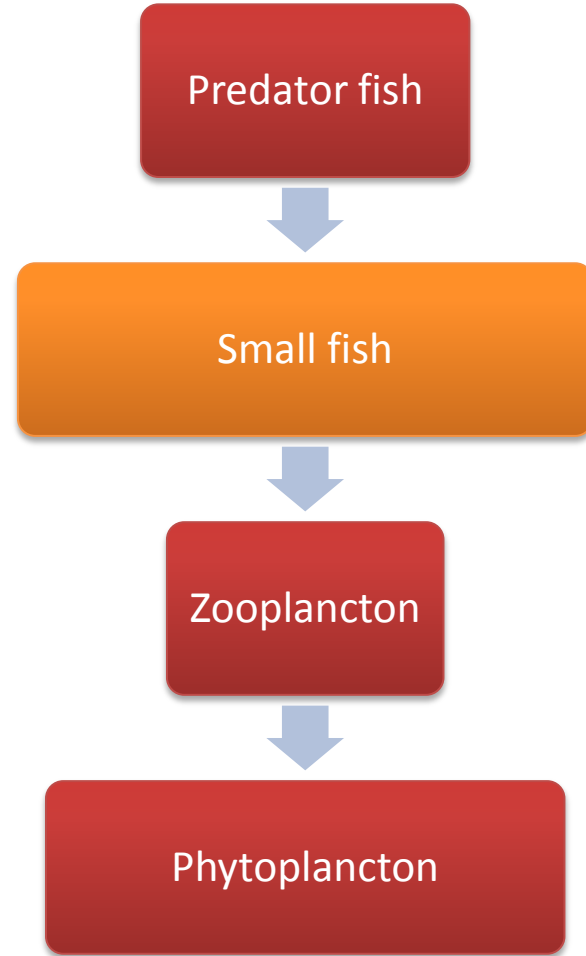
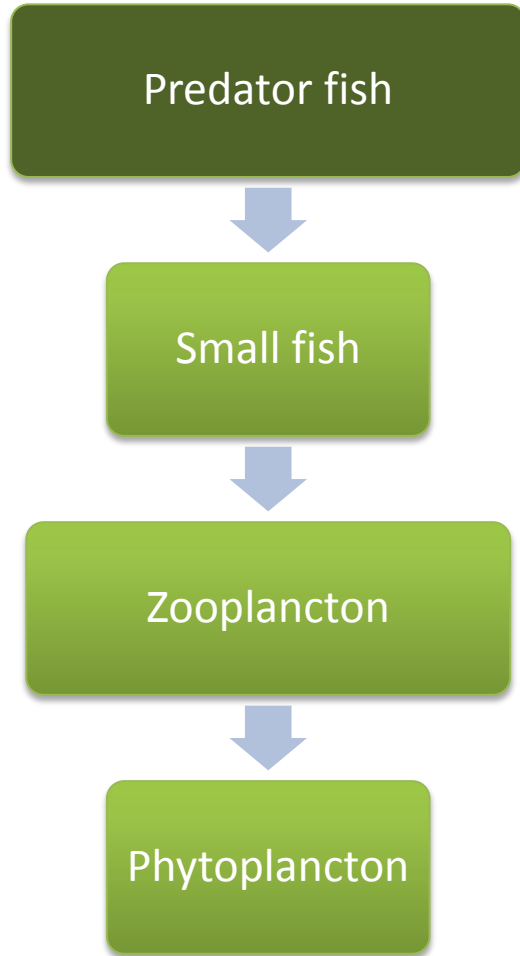
Scenario B describes a situation in which the restoration efforts do not increase but slightly decrease

Just because the Lake Durowskie is slightly recovering does not mean that it is able to tolerate new or more stress (as an upgrade of the camping site, the increased number of motorboats and damming of Lake Laskowieckie)

More restoration measures and correct application are necessary to compensate the new pressure

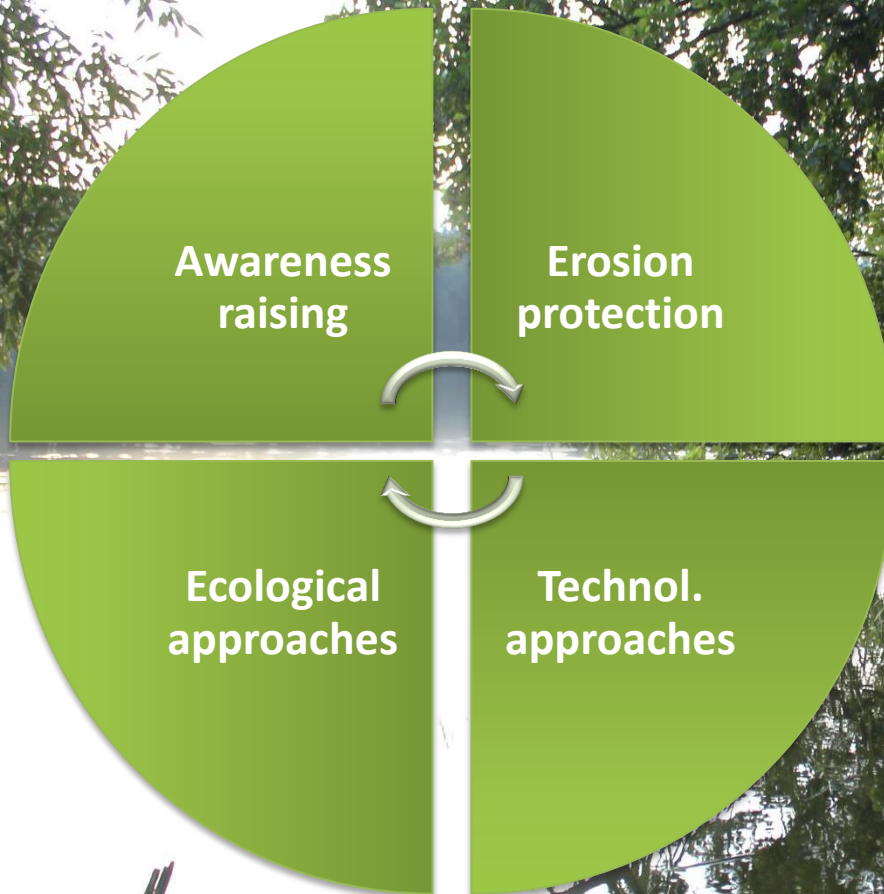


Mismanagement in biomanipulation



Scenario C – Investing in the future

Scenario C implies an improvement or implementation of new restoration measures



Scenario C – Investing in the future

Awareness raising

Erosion protection

Ecological approaches

Technological approaches

Lake Festival



Ecological education



School projects



Scenario C – Investing in the future

Awareness raising

Erosion protection

Ecological approaches

Technological approaches

- Built more stairs
- Access management
- Artificial supporting structures
- Guidepost



STAIRS

Scenario C – Investing in the future

Awareness raising

Erosion protection

Ecological approaches

Technological approaches

Bio-manipulation



Restriction or total ban of motorboats



Harvest macrophytes



Scenario C – Investing in the future

Awareness raising

Erosion protection

Ecological approaches

Technological approaches

- Improve the efficiency of the aerators
- Improve jetties
- Cooperation
- Irrigation with water from the bottom layer
- Dig out sediments
- Maintenance of the surrounding



- Educational path
- Lake Festival
- School projects

Awareness
raising

Erosion
protection

- Designate bathing and recreational areas
- Access management
- Artificial supporting structures
- Guidepost

Ecological
Approaches

Technological
Approaches

- Ban/ restrict motorboat use
- Introduce mussels
- Harvesting macrophytes
- Bentonite

- Improve efficiency of aerators
- Cooperation
- Irrigation
- Improve Jetties
- Maintenance of surroundings
- Dig out sediments

Approach to evaluate

- Awareness raising
- Erosion protection
- Ecological approaches
- Technological approaches

Time and effort

Necessary cooperation

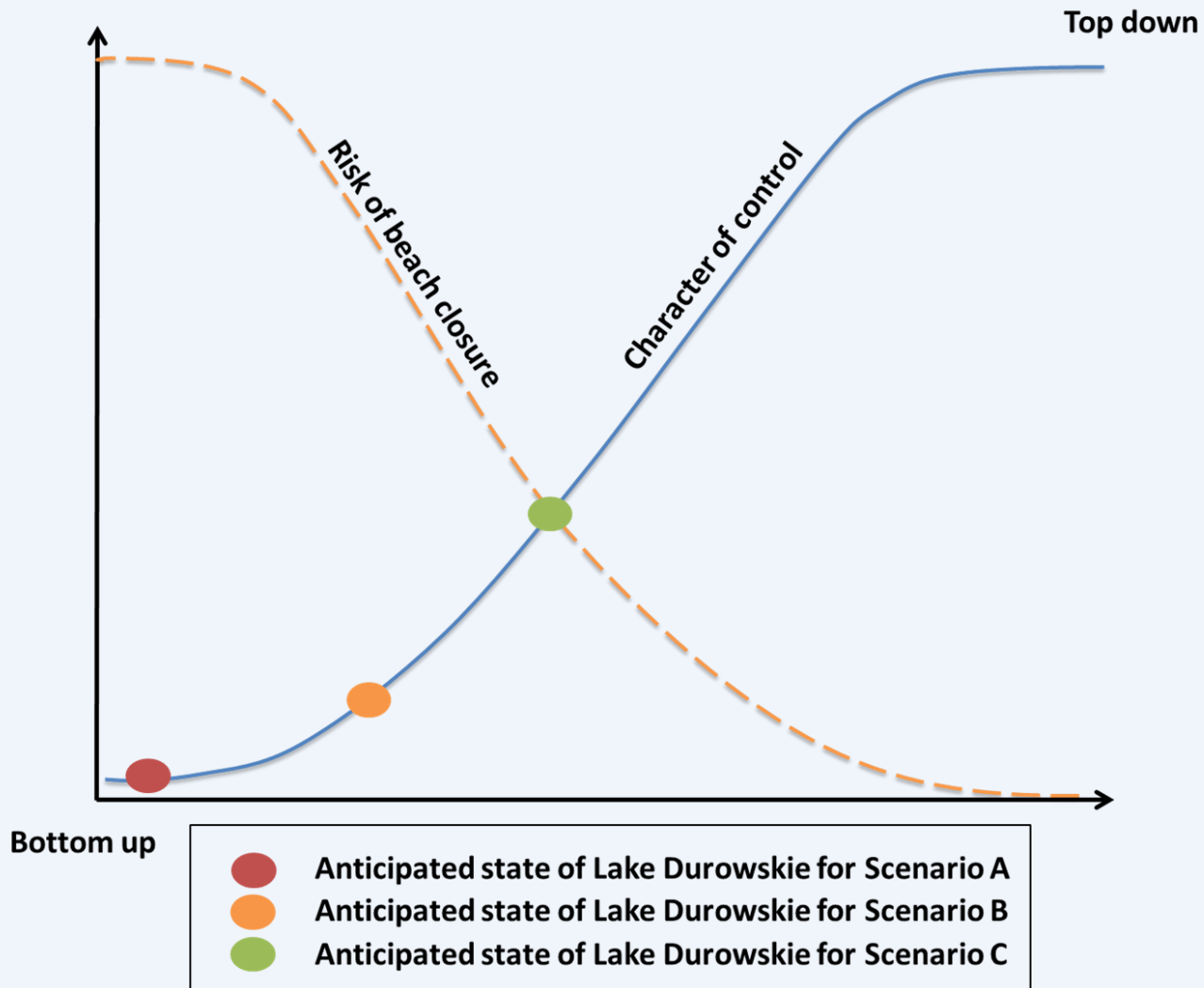
Efficiency

- Lake Festival
- School projects
- Access management
- Motorboat ban
- Introduce mussels
- Improve efficiency of aerators
- Irrigation with water from the bottom layer
- Improve jetties
- Maintenance of surrounding

Listening to peoples' needs



Conclusions



Risking the already
invested 500 000 zł

Increasing
pressures involve
more restoration

Investing in the
future secures
services provided
by the lake

Conclusion

- Cooperation is key for success
- Higher pressures → more restoration measures → higher economic income from recreation
- Improper use of the lake occurs when the stakeholders do not feel responsible for the lake → dialogue is necessary
- The restoration measures do not mutually exclude each other

Picture Credits

- http://www.wfosigw.olsztyn.pl/index.php?art_id=152
- http://www.safetysupplywarehouse.com/STAIRS_arrow_left_Glow_in_the_Dark_Sign_p/e10265.htm
- Vic_Rattlehead's photography

Thank you for your attention!

