

 **MISSION:**

**HOPEFULLY NOT**

**IMPOSSIBLE**

measure unmeasurable,  
compare uncomparable

Anastasija Zaiko

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# Personal profile

**MISSION:**  
**IMPOSSIBLE**

## Background:

PhD in ecology and environmental research

## Specialization:

Aquatic ecology and biological invasions

## Teaching and supervising:

Undergraduate and postgraduate students  
LT, ES, IR, IT, R/V “Polarstern”

## Skills and techniques:

Field work in marine, estuarine and freshwater environments (including SCUBA), laboratory experiments, biostatistics, project management, proposal writing .....

..... molecular analyses and metabarcoding



# EU challenge: Marine Strategy

\* MISSION:  
IMPOSSIBLE



# MSFD in a nutshell

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- Good environment
- 11 descriptors
- Establishment of
- Development of
- Ecosystems
- Baseline
- Coordination
- Progress
- National -> regional



status  
gets  
indicators

ES  
h





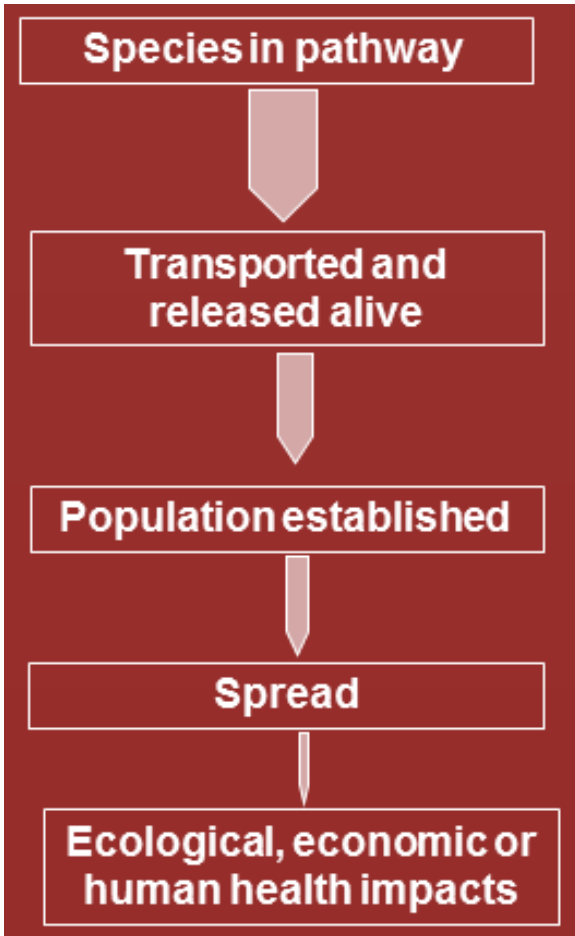


# Challenge #1: develop indicators

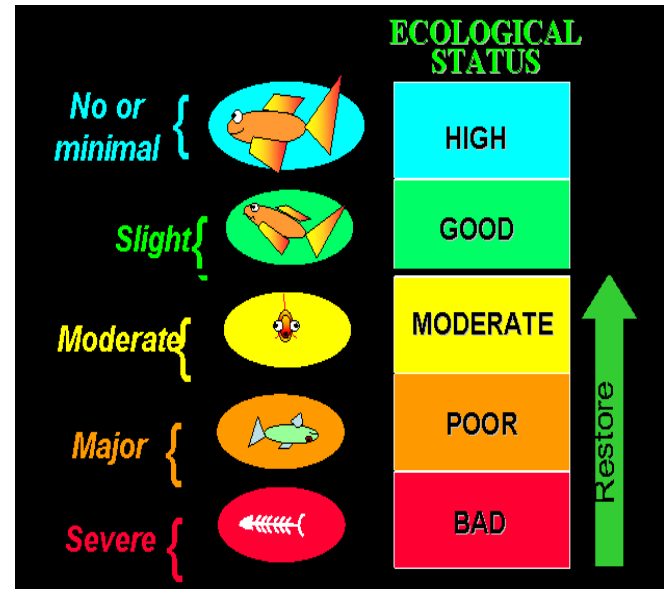


# Descriptor 2: NIS introductions

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“Beaufort Scale”  
for bioinvasion impacts?



Available online at [www.sciencedirect.com](http://www.sciencedirect.com)



Marine Pollution Bulletin 55 (2007) 379–394



MARINE POLLUTION BULLETIN

[www.elsevier.com/locate/marpolbul](http://www.elsevier.com/locate/marpolbul)

“The tens rule”  
(Holdgate 1986, Williamson 1996).

Assessment of biopollution in aquatic ecosystems

Sergej Olenin <sup>a,\*</sup>, Dan Minchin <sup>b</sup>, Darius Daunys <sup>a</sup>

<sup>a</sup> Coastal Research and Planning Institute, Klaipeda University, H. Manto 84, LT92294, Lithuania  
<sup>b</sup> Marine Organism Investigations, 3 Marina Village, Ballina, Killaloe, Co. Clare, Ireland



# Biopollution assessment – the concept

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Abundance and distribution range of alien species.

<b>A</b>	Species occurs in low numbers in one or several localities
<b>B</b>	Species occurs in low numbers in many localities, or in moderate numbers in one or several localities, or in high numbers in one or several localities

Impact on community – the changes caused in native species composition and abundance, including shifts in type-specific communities

Impact on habitat – the character of habitat

No displacement of native species

0 - No	1-Weak	2-Moderate	3-Strong	4-Massive
A+C0+H0+E0	A+C1+H1+E1	B or C+C2+H2+E2	B or C+H3	C+H4
	B or C+C0+H0+E0	C+H1+E1	D+H2	D or E+C4+H4+E4
	B+C1+H1+E1	D or E+C1+H1+E1	D or E+C3+H3+E3	

<b>E</b>	Species occurs in high numbers in all localities
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<b>C3</b>	Population extinctions, alien species are dominant, loss of type-specific community
<b>C4</b>	Extinction of native keystone species, extinction of type-specific communities

<b>H2</b>	Alteration and reduction of spatial extent of a habitat
<b>H3</b>	Alteration of a key habitat, severe reduction of spatial extent of habitat
<b>H4</b>	Loss of habitats in most or the entire assessment unit, loss of a key habitat

<b>E0</b>	No measurable impact
<b>E1</b>	Weak changes with no loss or addition of new ecosystem function
<b>E2</b>	Moderate modification of ecosystem performance, changes in functional group(s)
<b>E3</b>	Severe shifts in ecosystem functioning, reorganization of the food web
<b>E4</b>	Extreme, ecosystem-wide shift in the food web and/or loss of the role of a functional group(s)



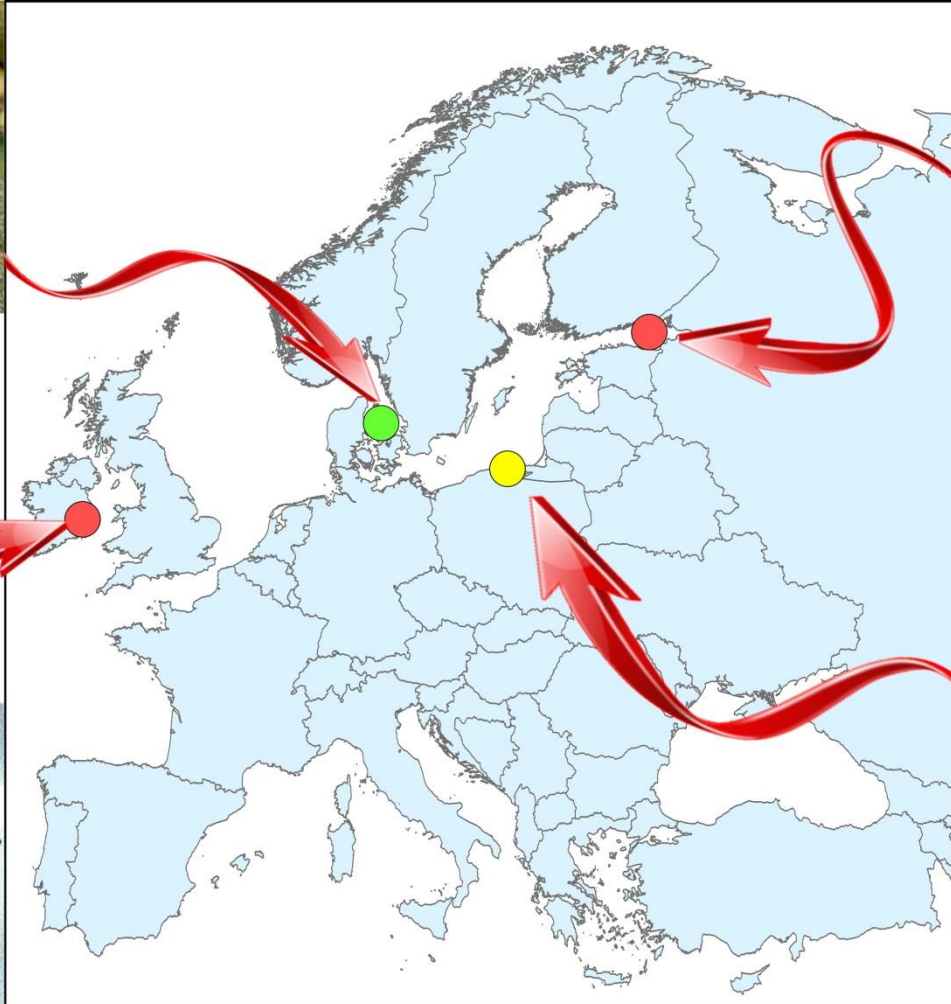
# Impact comparisons among species

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**Who:** *Crepidula fornicata*  
**Where:** Kattegat and Belt Sea  
**When:** 1990-2009  
**BPL:** 1 (weak)  
**Why:** get more information from BINPAS

**Who:** *Dreissena polymorpha*  
**Where:** Lough Derg, Ireland  
**When:** 1998-2006  
**BPL:** 3 (strong)  
**Why:** get more information from BINPAS



**Who:** *Balanus improvisus*  
**Where:** Gulf of Finland, Baltic Sea  
**When:** 1990-2009  
**BPL:** 3 (strong)  
**Why:** get more information from BINPAS

**Who:** *Orconectes limosus*  
**Where:** Vistula Lagoon, Baltic Sea  
**When:** 1990-2009  
**BPL:** 2 (medium)  
**Why:** get more information from BINPAS

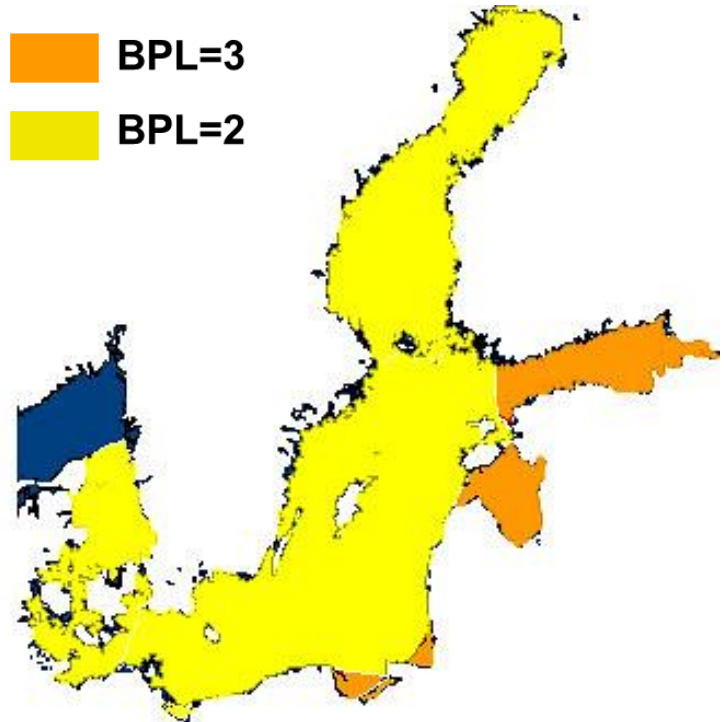


# Impact comparisons among ecosystems

## MISSION: IMPOSSIBLE

- BPL ranged from “moderate” (BPL=2) to “strong” (BPL=3)
- The highest scores - in the coastal lagoons, inlets and gulfs
- The highest number of impacting alien species (BPL>0, i.e. weak, moderate and strong impacts) - in the coastal lagoons and inlets too

■ BPL=3  
■ BPL=2



Biol Invasions (2011) 13:1739–1765  
DOI 10.1007/s10530-010-9928-z

ORIGINAL PAPER

**Assessment of bioinvasion impacts on a regional scale:  
a comparative approach**

Anastasija Zaiko · Maiju Lehtiniemi ·  
Aleksas Narščius · Sergej Olenin



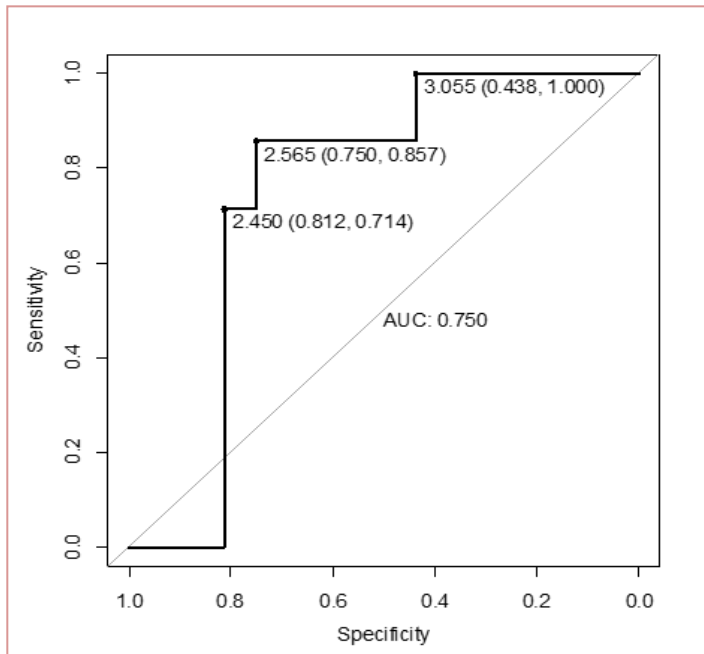
# Challenge #2: test the response



# BQI response to eutrophication

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Environment parameters	BQI response (coastal area)	BQI response (plume zone)
Chl- <i>a</i> concentrations	0.75 (Acceptable)	0.56 (Poor)
(TP) concentrations	0.74 (Acceptable)	0.56 (Poor)
(TN) concentrations	0.70 (Acceptable)	0.87 (Excellent)



The steps denote proposed threshold values (strict – 2.45, the most accurate – 2.56 and lenient – 3.05). Numbers in brackets indicate specificity and sensitivity values respectively.



Contents lists available at [ScienceDirect](#)

Ecological Indicators

journal homepage: [www.elsevier.com/locate/ecolind](http://www.elsevier.com/locate/ecolind)

Application of signal detection theory approach for setting thresholds in benthic quality assessments

Romualda Chuševė<sup>a,\*</sup>, Henrik Nygård<sup>b</sup>, Diana Vaičiūtė<sup>a</sup>, Darius Daunys<sup>d</sup>, Anastasija Zaiko<sup>a,c</sup>

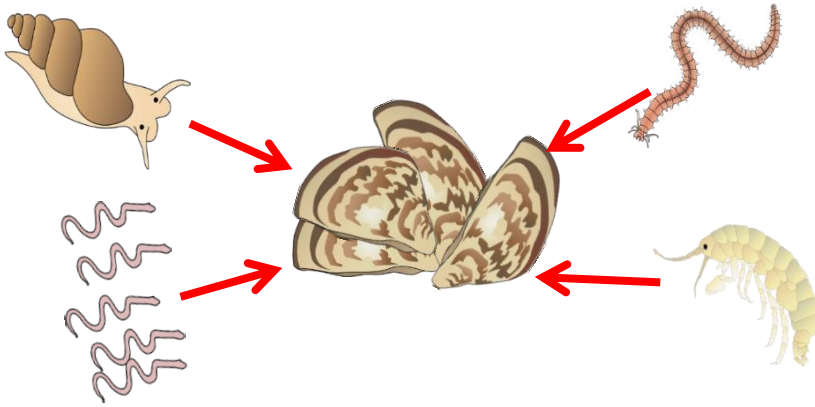
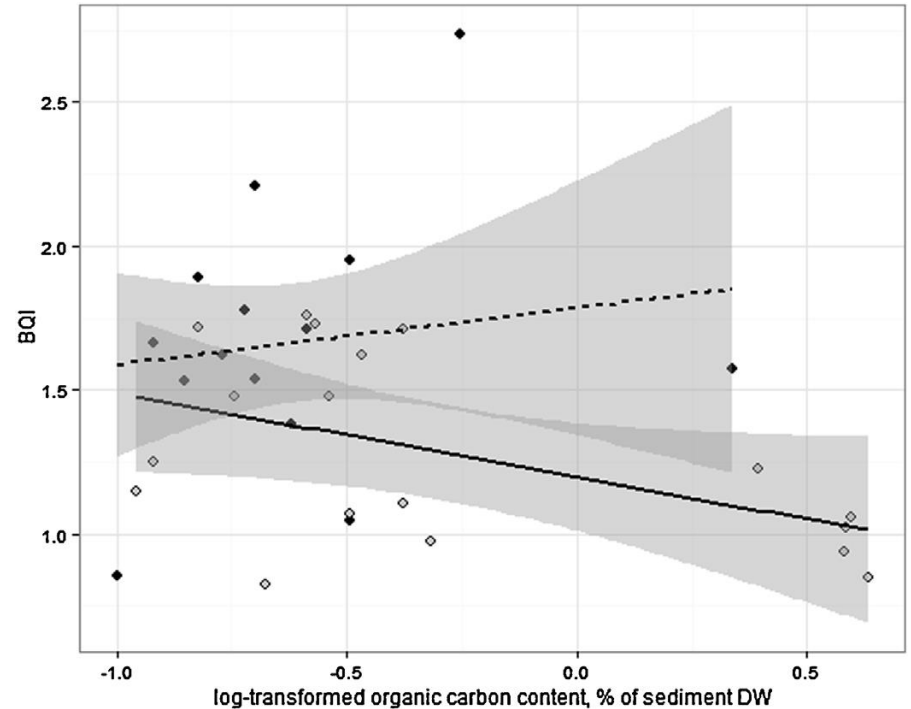
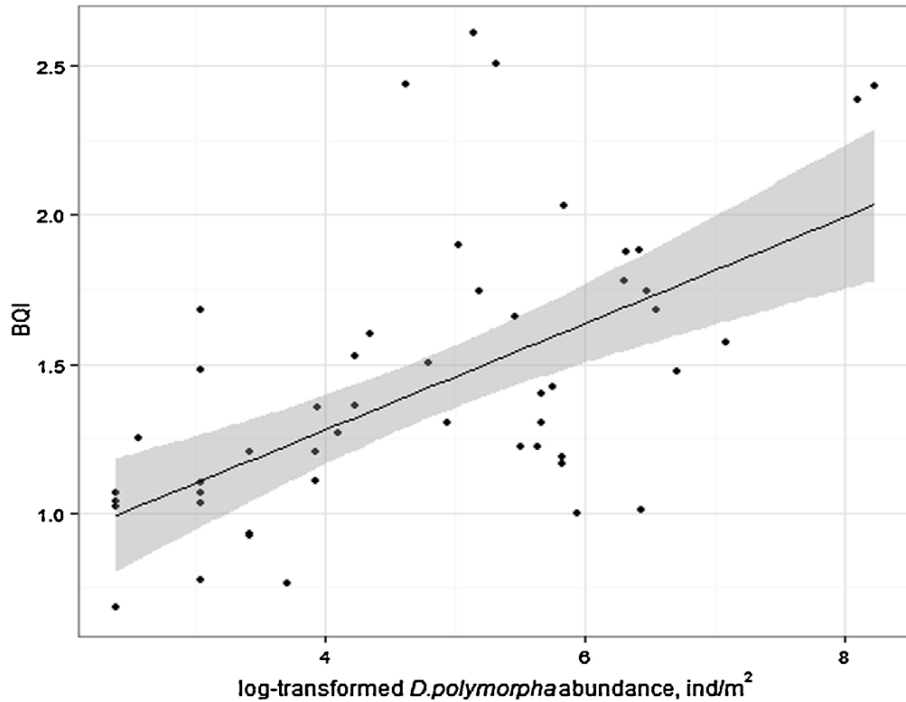


# Challenge #3: assess the bias



# Benthic quality and invasive species

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Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

Ecological Indicators

journal homepage: [www.elsevier.com/locate/ecolind](http://www.elsevier.com/locate/ecolind)

Invasive ecosystem engineers and biotic indices: Giving a wrong impression of water quality improvement?

Anastasija Zaiko<sup>a,\*</sup>, Darius Daunys<sup>a,b</sup>

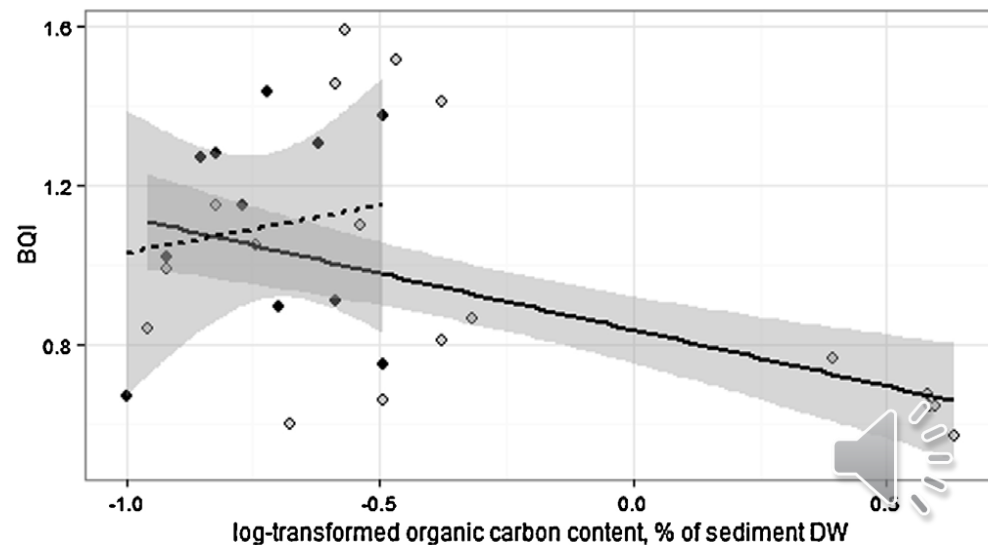
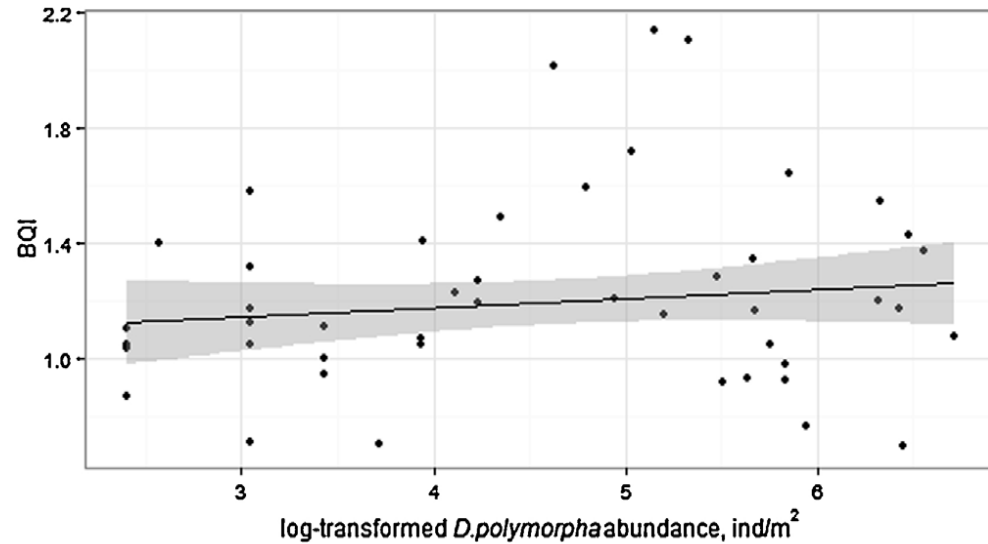




# Suggested index corrections

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- Exclude species found exclusively with zebra mussels
- Exclude samples with extremely high zm abundances (>1000 ind/m<sup>2</sup>)
- Apply abundance corrections for species highly correlating with zm



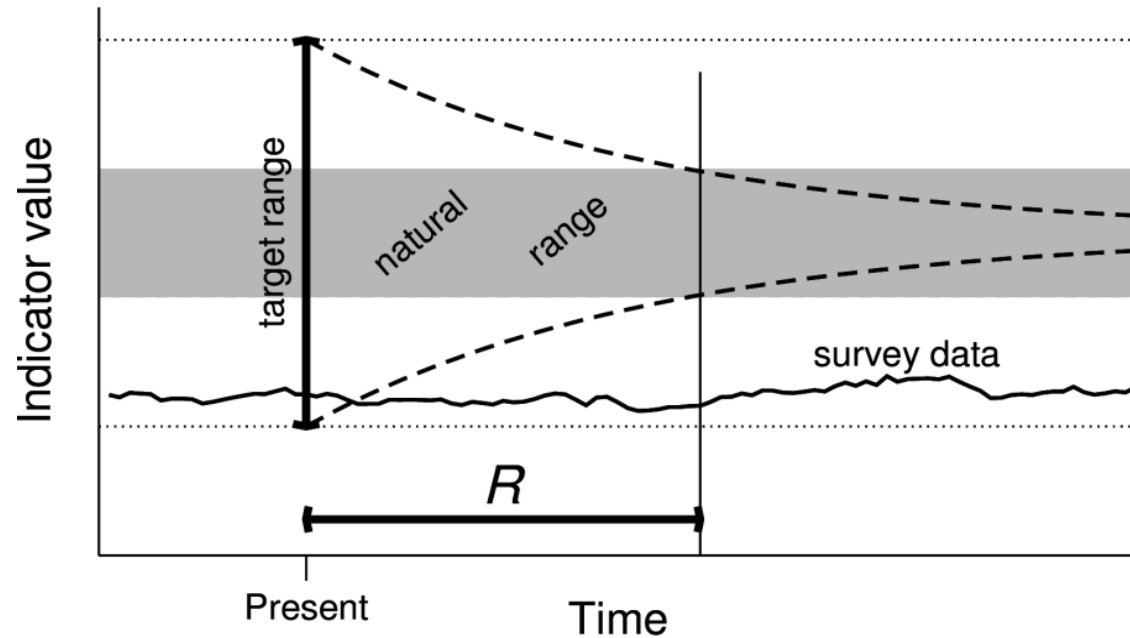
# Challenge #4: set the targets



# Framework for setting targets

## \* MISSION: IMPOSSIBLE

- Define the natural (pressure-free) range of the indicator
- Define  $R$ : largest acceptable time to recovery (e.g. human generation time)



## THEN:

*The target range – is the range of values from where the mean time to reach the natural range (if all pressures are removed) is  $<R$*



////// THERE IS ////

· NOTHING ·

IMPOSSIBLE

· TO HIM WHO WILL TRY ·

*Alexander the great*



# Thank you!



## People:

Sergej Olenin, Darius Daunys, Romualda Chuseve, Axel G. Rossberg, Diana Vaiciute

