

Võõrliikide mõju hindamine: PlanWise4Blue portaali tutvustus

Jonne Kotta

Iceland
Liechtenstein
Norway grants



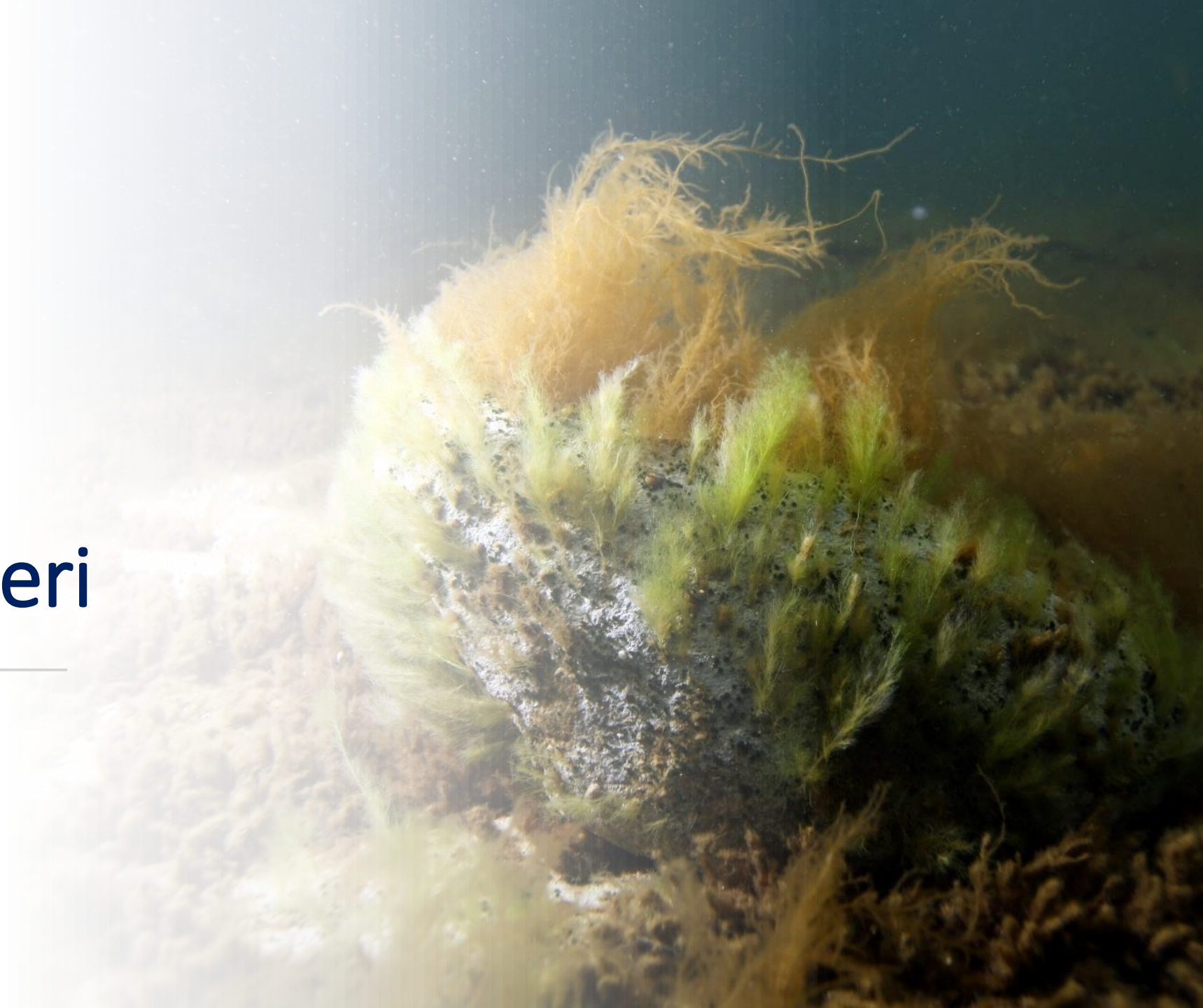
 **TOETAB**



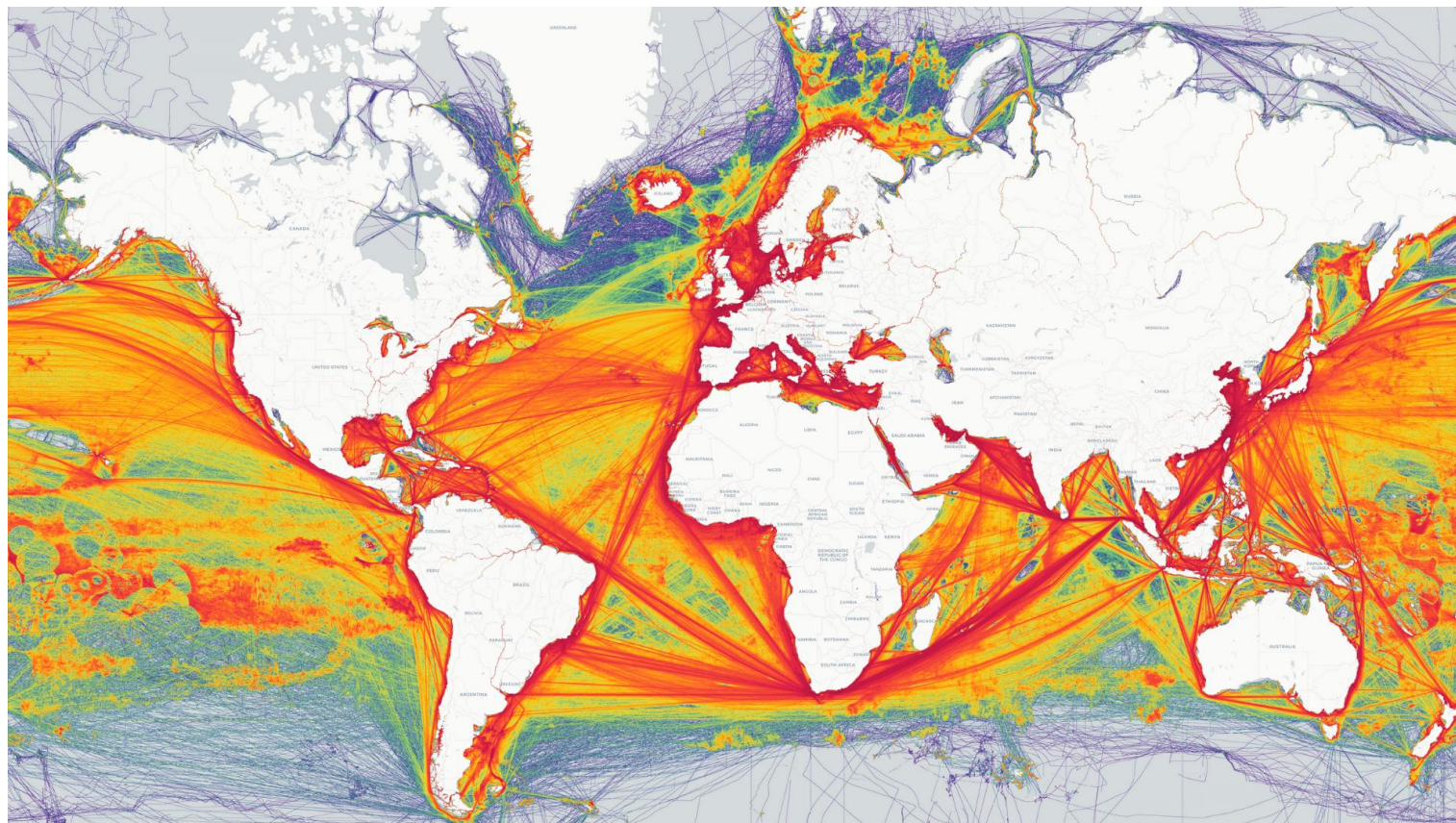
TARTU ÜLIKOOL
Eesti mereinstituut



Võõrliigid ja meri



Laevatransport...



IMO. No. 7344364

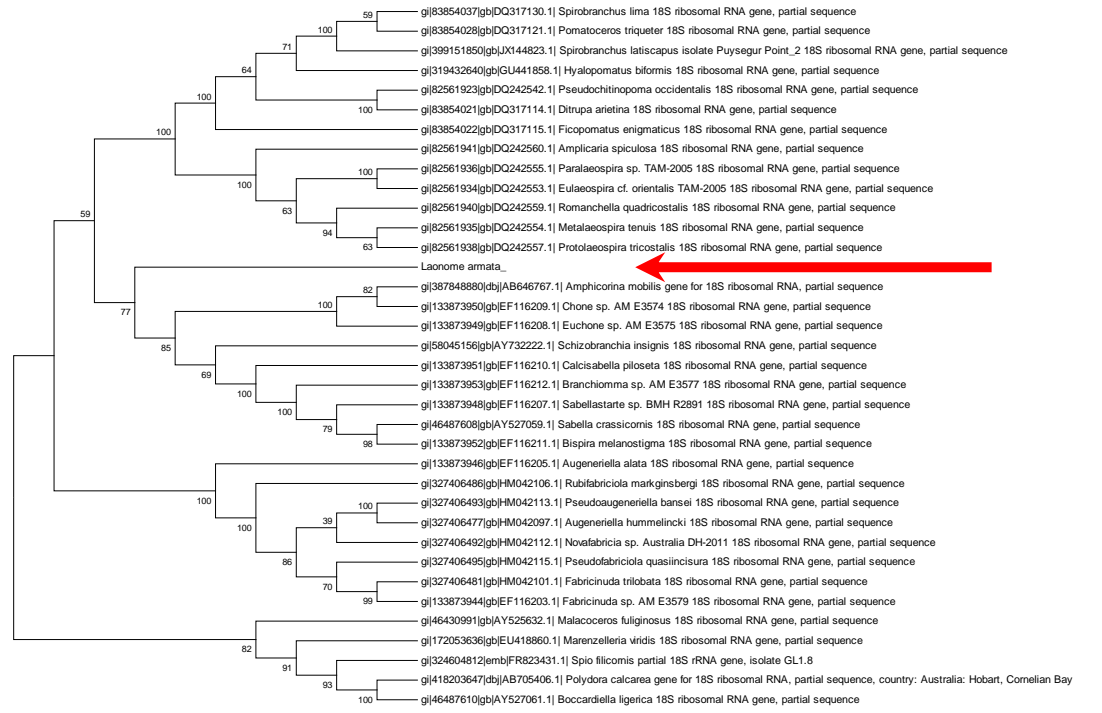
SAFETY
+
FIRST

8
6
4
2



... ja merevee
soojenemine





Mida teame rändkrabist?

Talub ekstreemseid keskkonnatingimusi

Suur sigivus → suur asustustihedus

Ei ole elupaiga suhtes eriti valiv

Kõigesööja



Ümarmudil

Arvati, et paikne, aga telemeetria näitab suurt liikuvust

Talub suurt hulka stressoreid

Suur sigivus → suur asustustihedus

Söök palju (elupaiga insener)



Toitumiskatsed



Looduses



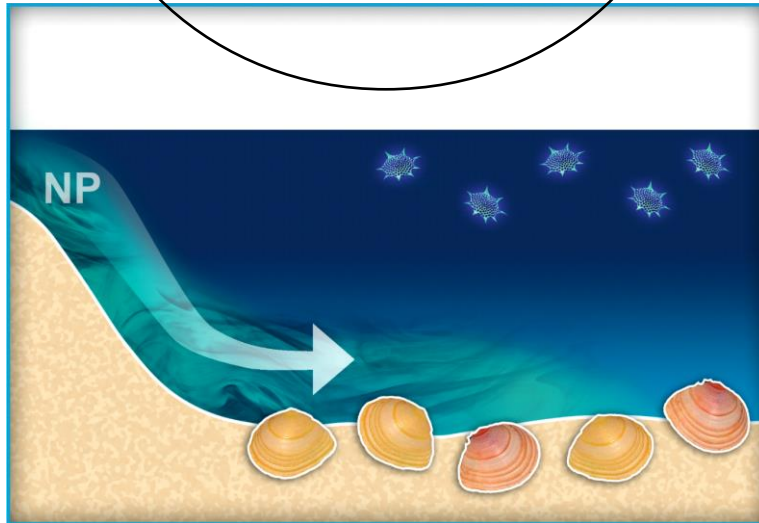
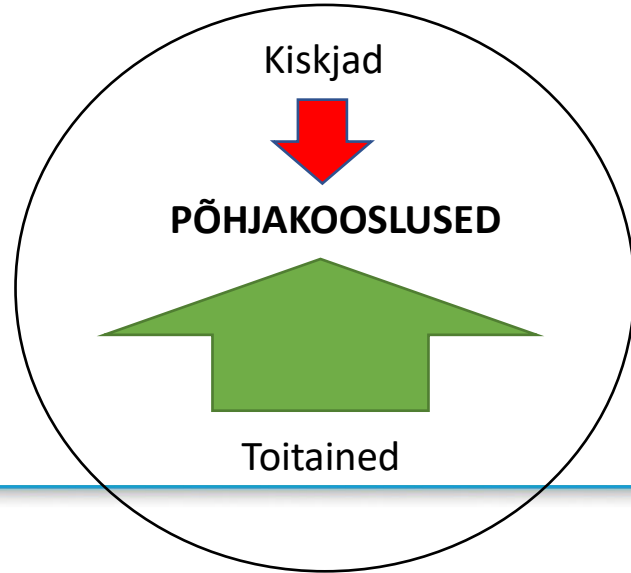
Puhastavad 1 m² ala selgrootutest 30 päevaga, toitumiseelistused puuduvad

Laboris

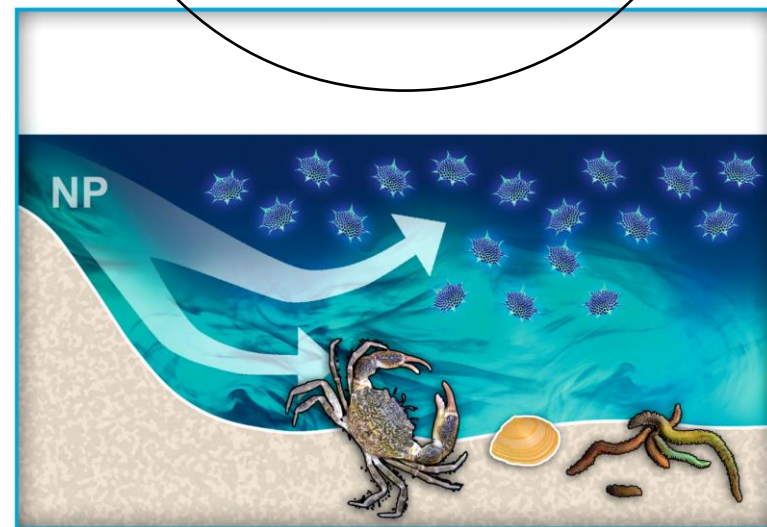
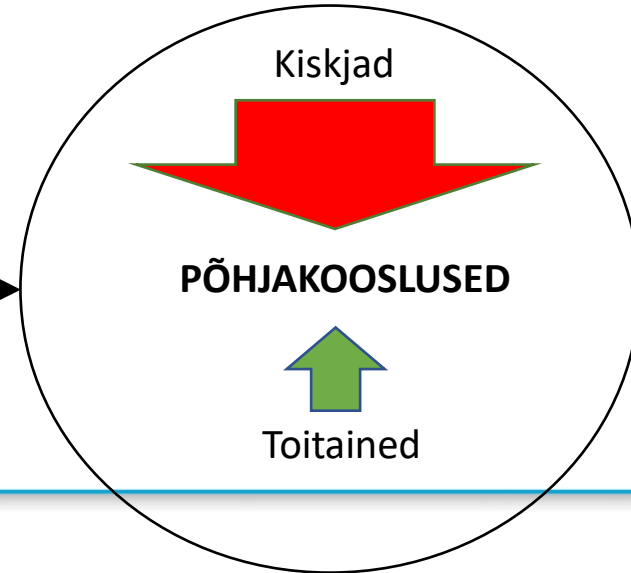


Puhastavad 1 m² ala selgrootutest 10 päevaga.

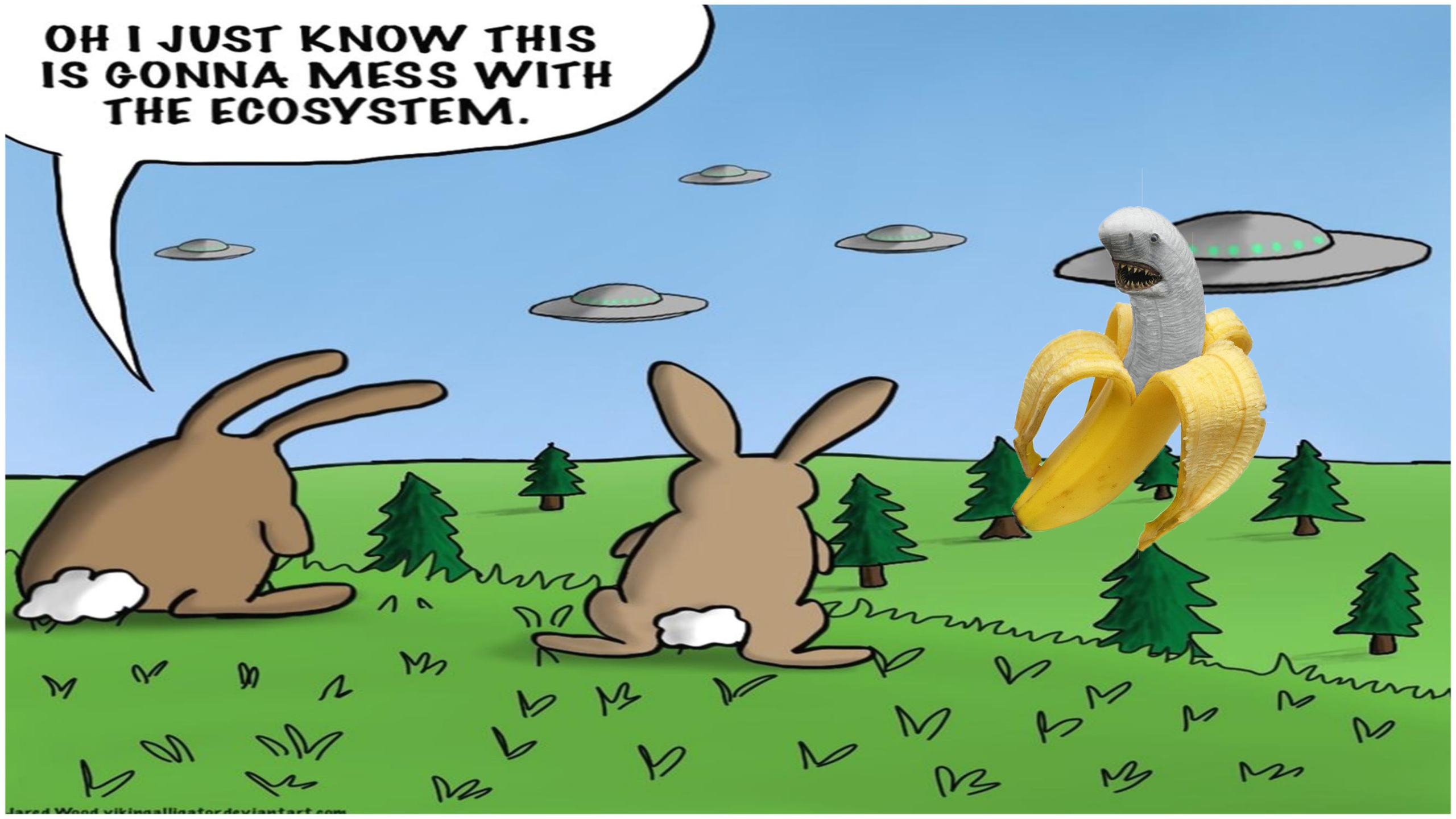
ENNE isepuhastumine



PÄRAST õitsengud



OH I JUST KNOW THIS IS GONNA MESS WITH THE ECOSYSTEM.



Modelleerimine

Kõik mudelid valetavad, aga mõned on meile väga kasulikud

George E.P. Box



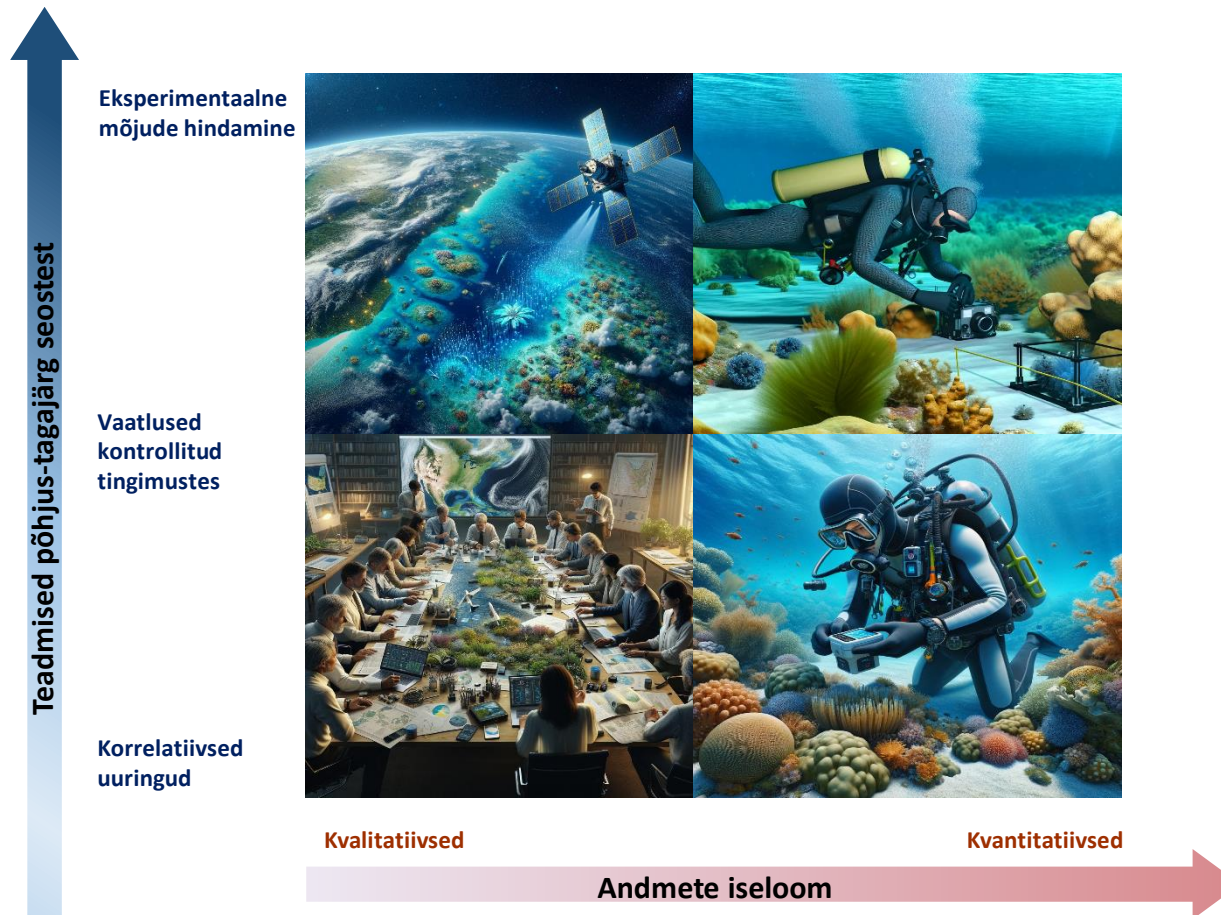
Kuidas hinnata võõrliikide keskkonnamõju?



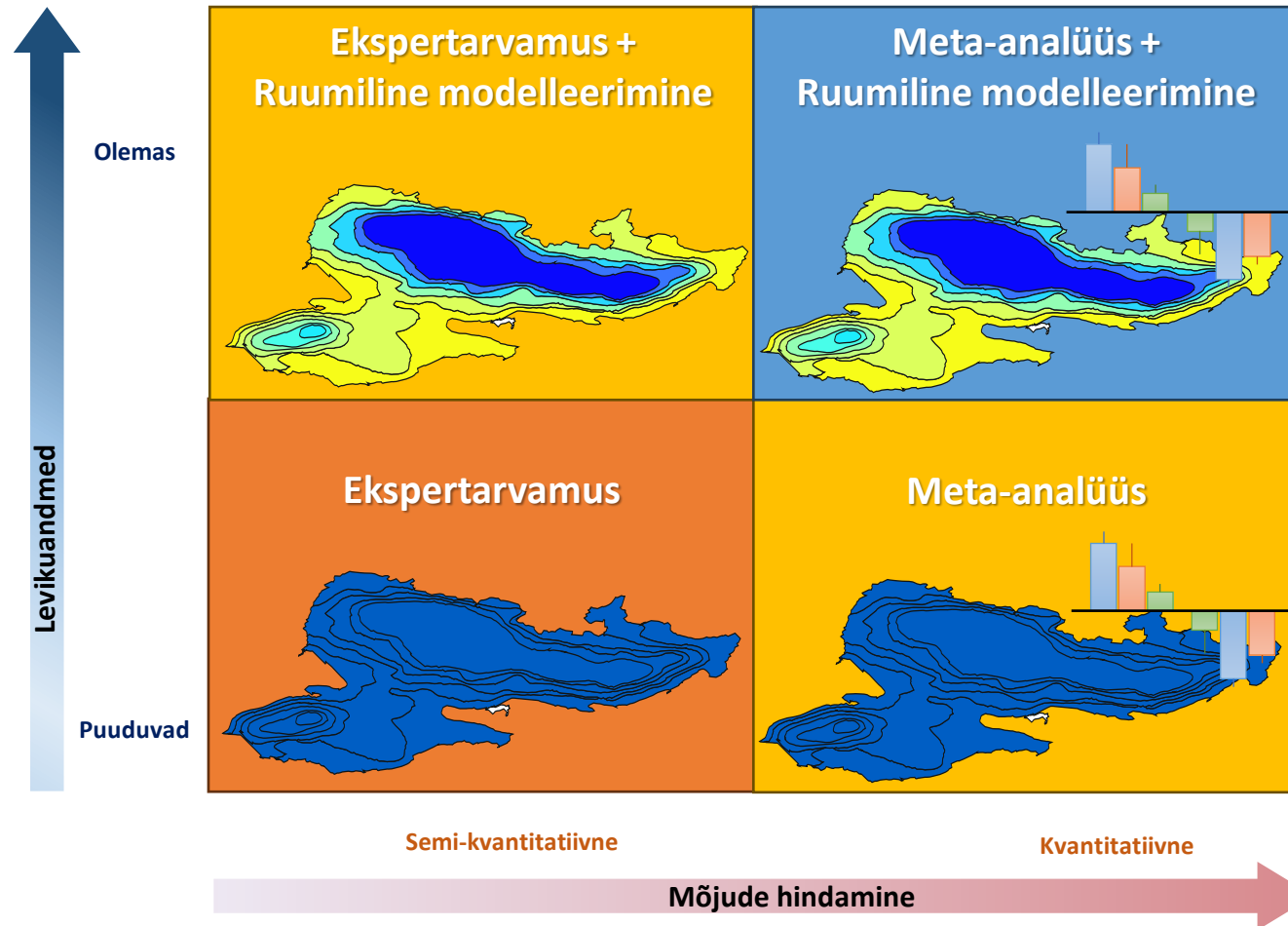
Muutused liikidevahelistes suhetes ja mõjud eluta keskkonnale.

- Kui palju ja mida nad söövad?
- Kes neid sööb?
- Kuidas ja kui kiirelt nad levivad?
- jne...

Teadmised ja andmed



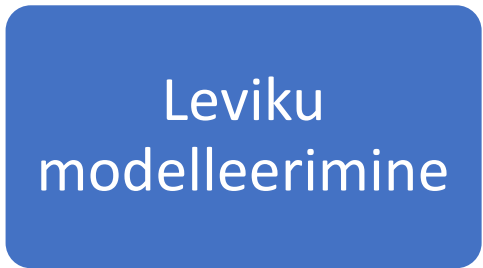
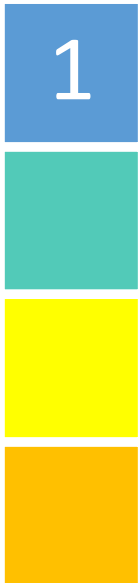
Mõjude hindamine mereruumis





Näide 1

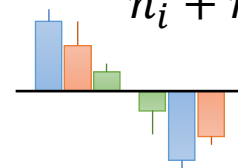
- a) võõrliigi mõjud looduskeskkonnale on teada
- b) andmeid on piisavalt, et modelleerida võõrliigi levikut



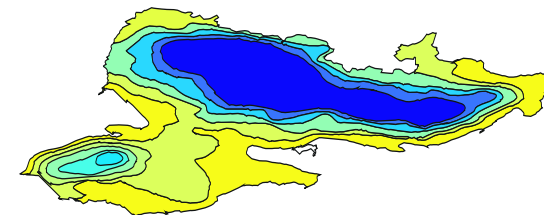
$$Hedges'g = \frac{\bar{Y}_i - \bar{Y}_C}{SD_{pooled}} J$$

$$J = 1 - \frac{3}{4(n_i + n_c - 2) - 1}$$

$$SD_{pooled} = \sqrt{\frac{(n_i - 1)SD_i^2 + (n_c - 1)SD_c^2}{n_i + n_c - 2}}$$



Arvukus = f (ruumilise modelleerimise meetod)



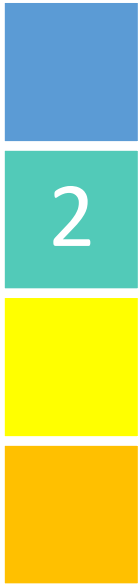
Mõju = $Hedges'g \times Arvukus$

$$SE_{pooled} = \sqrt{p^2 SE_{effect}^2 + effect^2 SE_p^2}$$

?

Näide 2

- a) võõrliigi mõjud looduskeskkonnale on teada
- b) andmeid ei ole, et modelleerida võõrliigi levikut



Meta-analüüs



Leviku modelleerimine

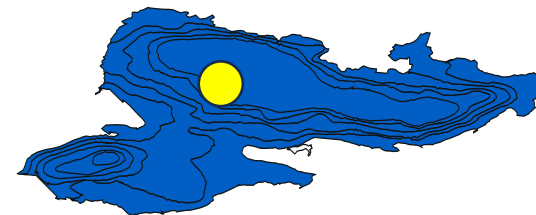
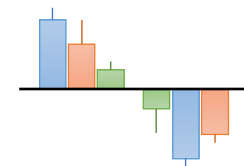


Mõjude hindamine

$$Hedges'g = \frac{\bar{Y}_i - \bar{Y}_C}{SD_{pooled}} J$$

$$J = 1 - \frac{3}{4(n_i + n_c - 2) - 1}$$

$$SD_{pooled} = \sqrt{\frac{(n_i - 1)SD_i^2 + (n_c - 1)SD_c^2}{n_i + n_c - 2}}$$

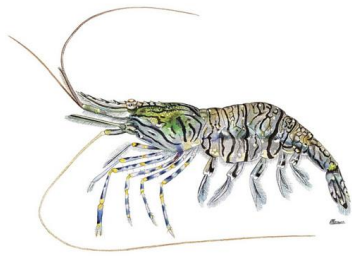


Arvukus = seirejaama keskväärtus
SE = seirejaama varieeruvus

$$Mõju = Hedges'g \times Arvukus$$

$$SE_{pooled} = \sqrt{p^2 SE_{effect}^2 + effect^2 SE_p^2}$$

Mõju = levila × arvukus × indiviidi efekt



Näide 3

- a) võõrliigi mõjud looduskeskkonnale ei ole teada
- b) andmeid on piisavalt, et modelleerida võõrliigi levikut

Meta-analüüs



Leviku
modelleerimine

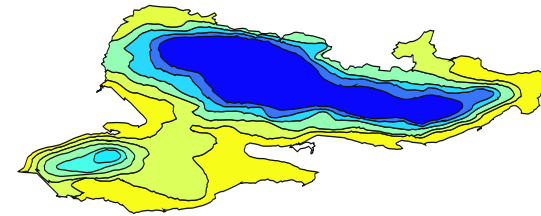


Mõjude
hindamine

Indiviidi efekt = ekspertarvamuse keskväärtus

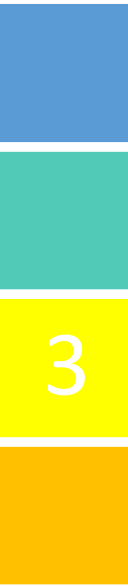
$SE = \text{ekspertarvamuse varieeruvus}$

$Arvukus = f(BRT \text{ vms})$



$Mõju = \text{Indiviidi efekt} \times \text{Arvukus}$

$$SE_{pooled} = \sqrt{p^2 SE_{effect}^2 + effect^2 SE_p^2}$$



Mõju = levila × arvukus × indiviidi efekt



Murchisonella

Näide 4

- a) võõrliigi mõjud looduskeskkonnale ei ole teada
- b) andmeid ei ole, et modelleerida võõrliigi levikut

Meta-analüüs

Indiviidi efekt = ekspertarvamuse keskväärtus

$SE = \text{ekspertarvamuse varieeruvus}$

Leviku modelleerimine

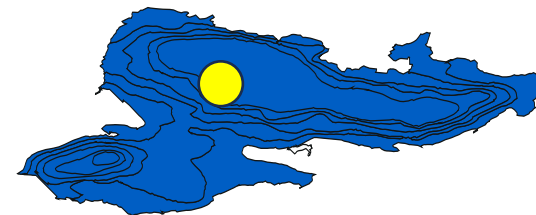
Arvukus = seirejaama keskväärtus

$SE = \text{seirejaama varieeruvus}$

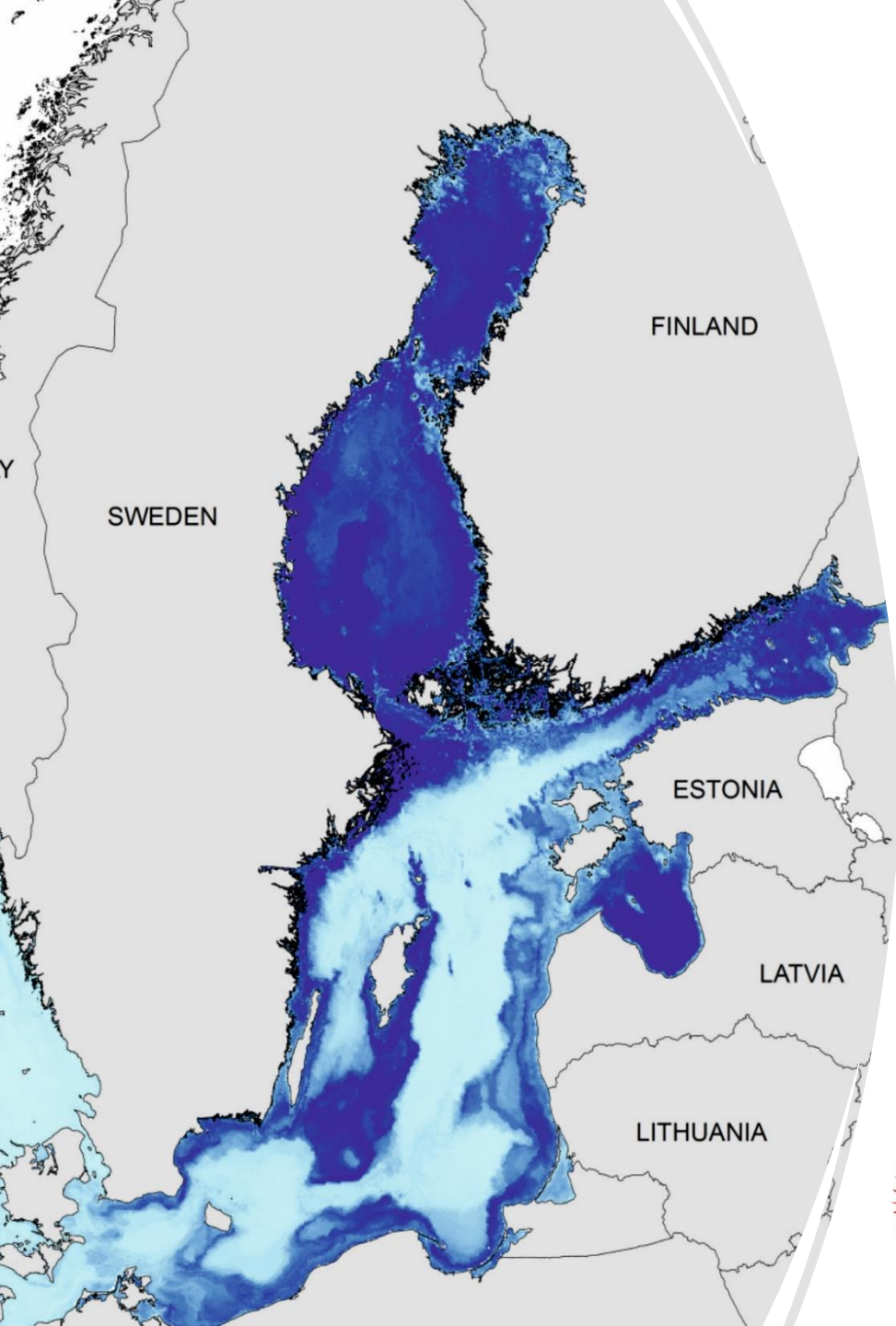
Mõjude hindamine

$Mõju = \text{Indiviidi efekt} \times \text{arvukus}$

$$SE_{pooled} = \sqrt{p^2 SE_{effect}^2 + effect^2 SE_p^2}$$



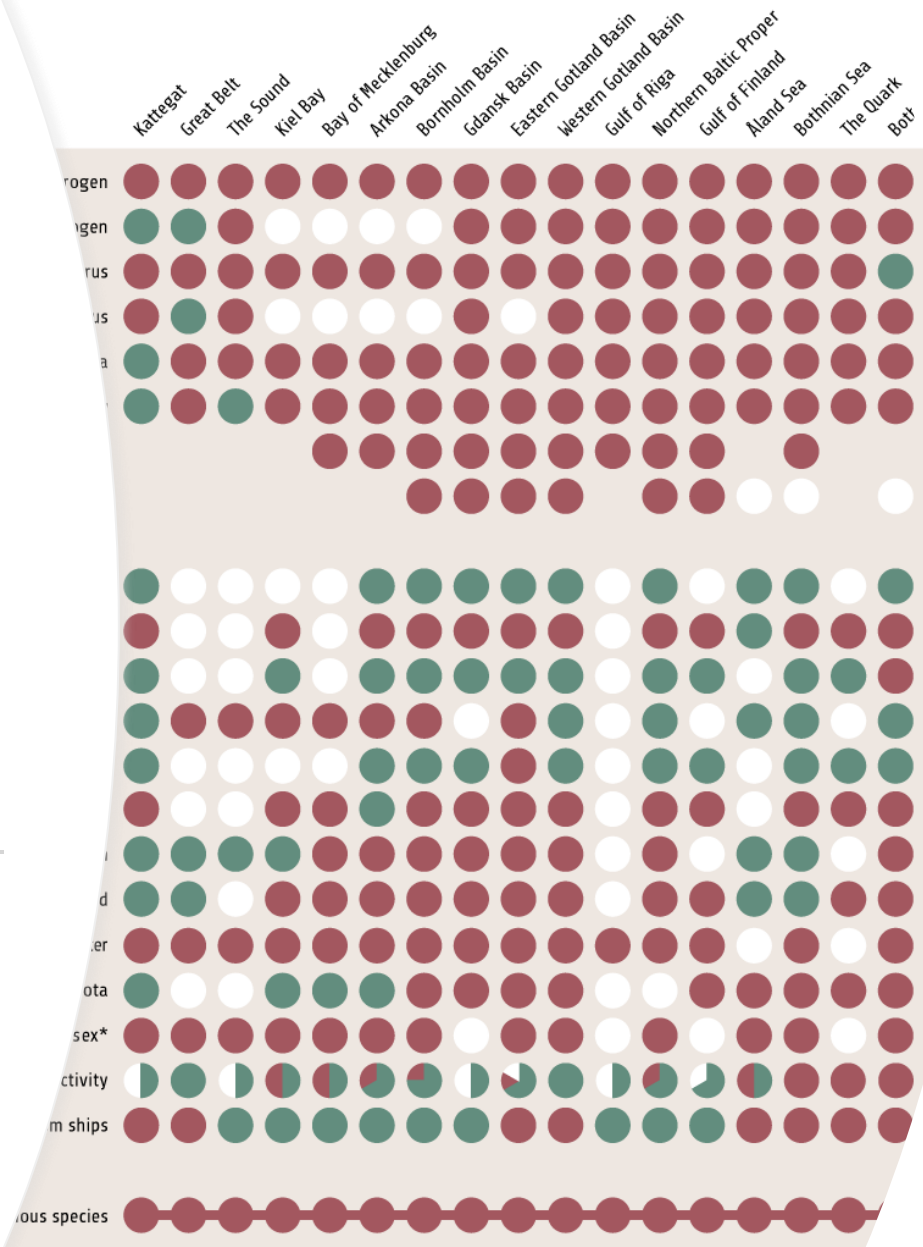
EL merestrategie raamdirektiivi keskkonna seisundihinnang võõrliikide teemal (D2)



- Uute võõrliikide arv
- Invasiivsete võõrliikide arvukus ja ruumiline jaotumus
- Võõrliikide tekitatud keskkonnamõju ruumiline ulatus: alabasseinidest 1 km² mastaabis tehtud hinnanguni.



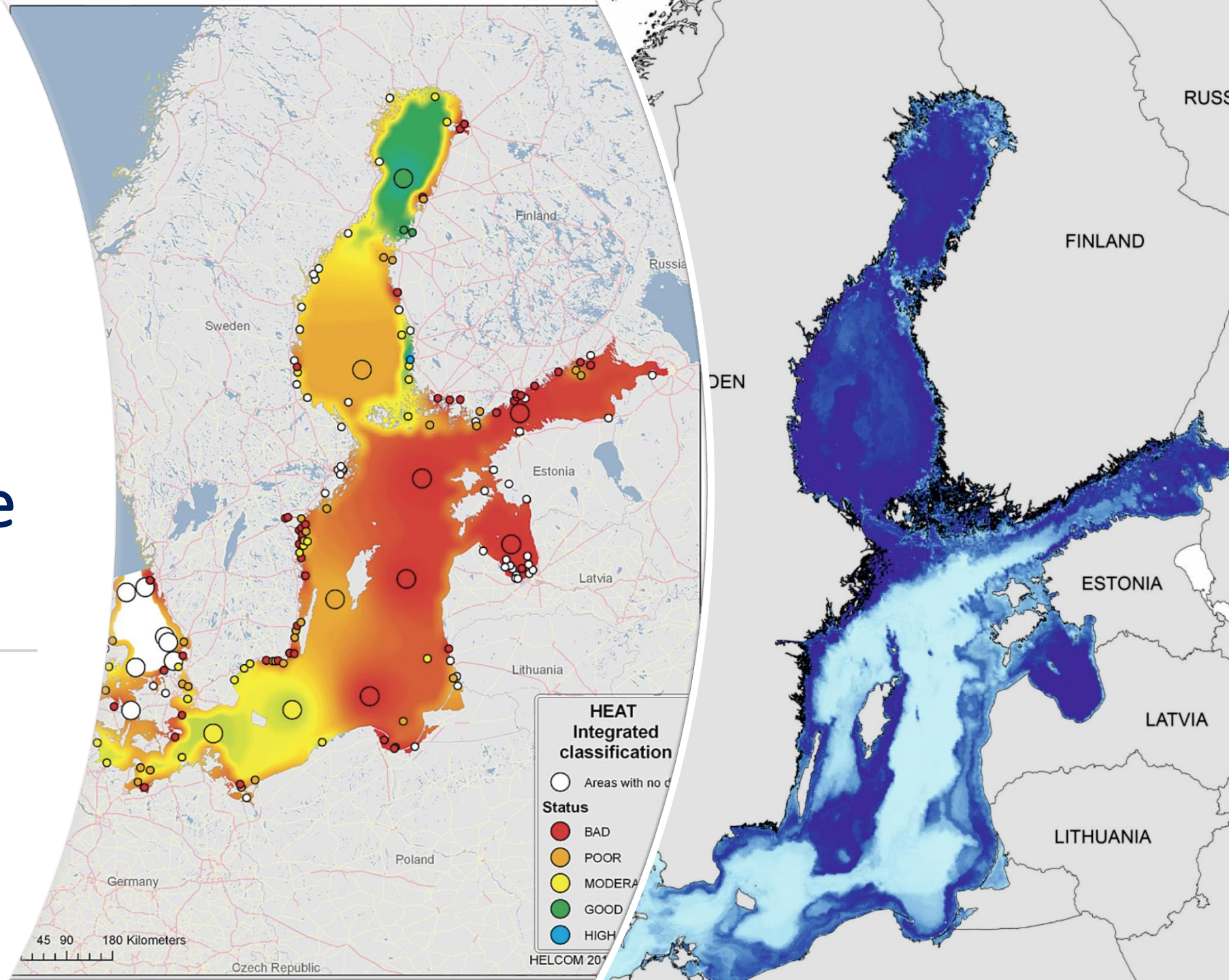
of pressure-based core indicators in the sub-basins of the Baltic Sea



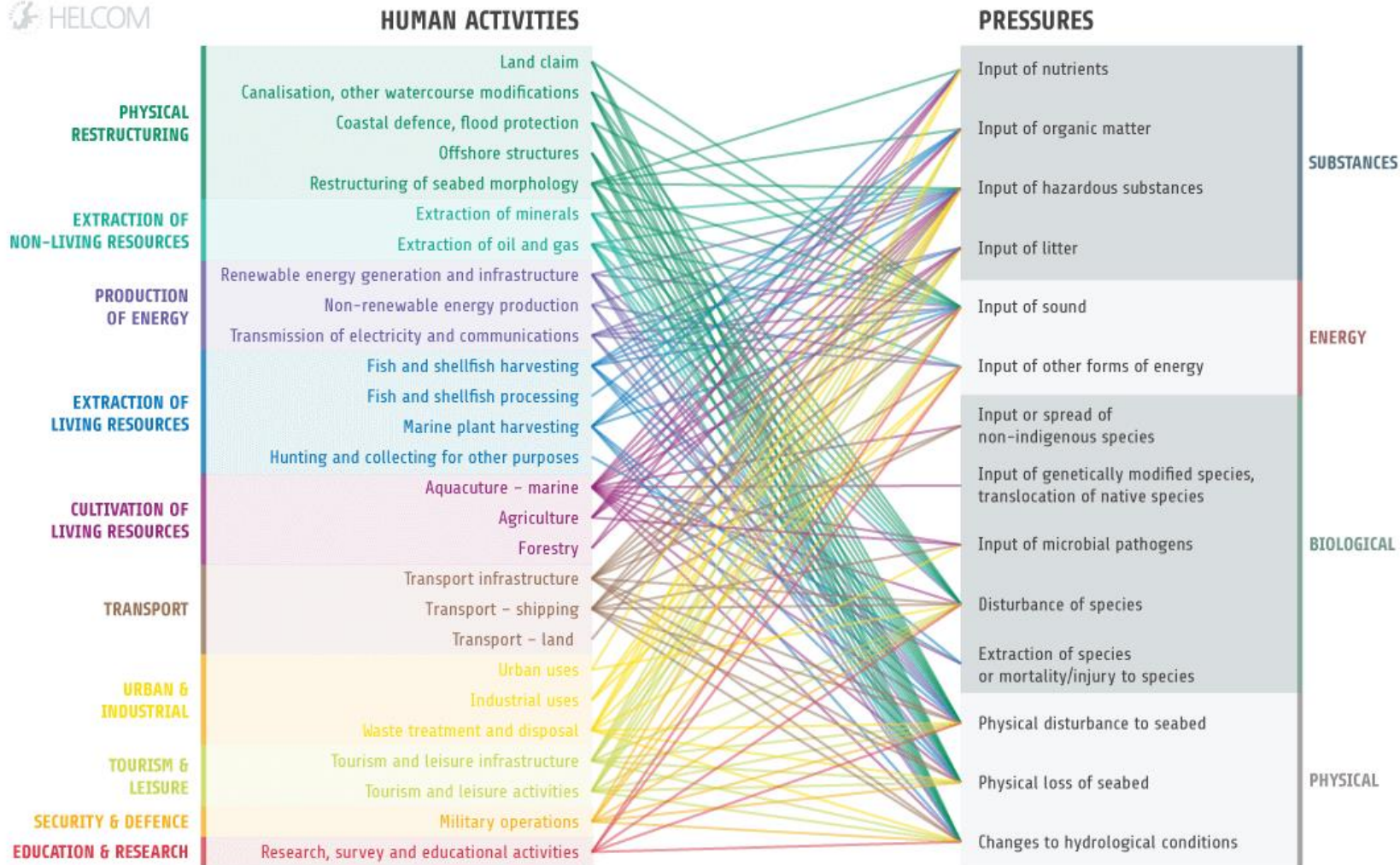
Kuidas hinnata
võõrliikide mõju
teiste
survetegurite
foonil?

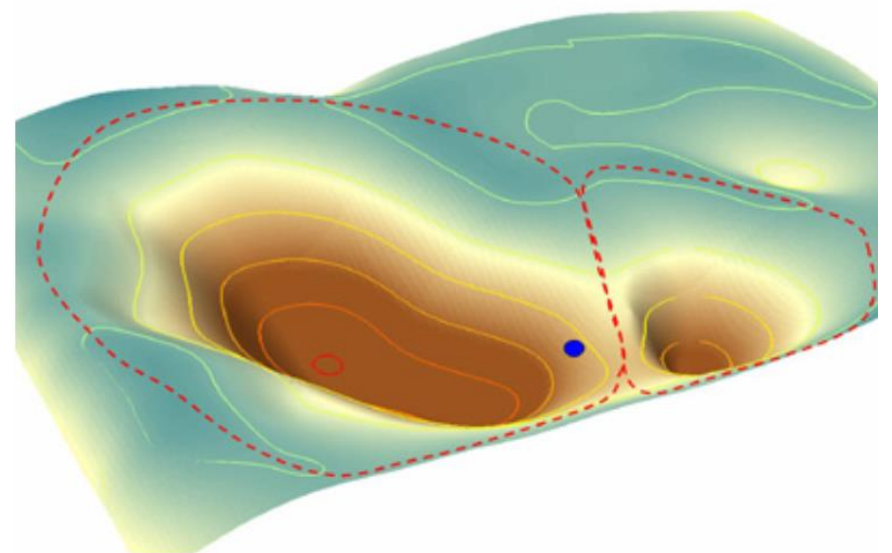
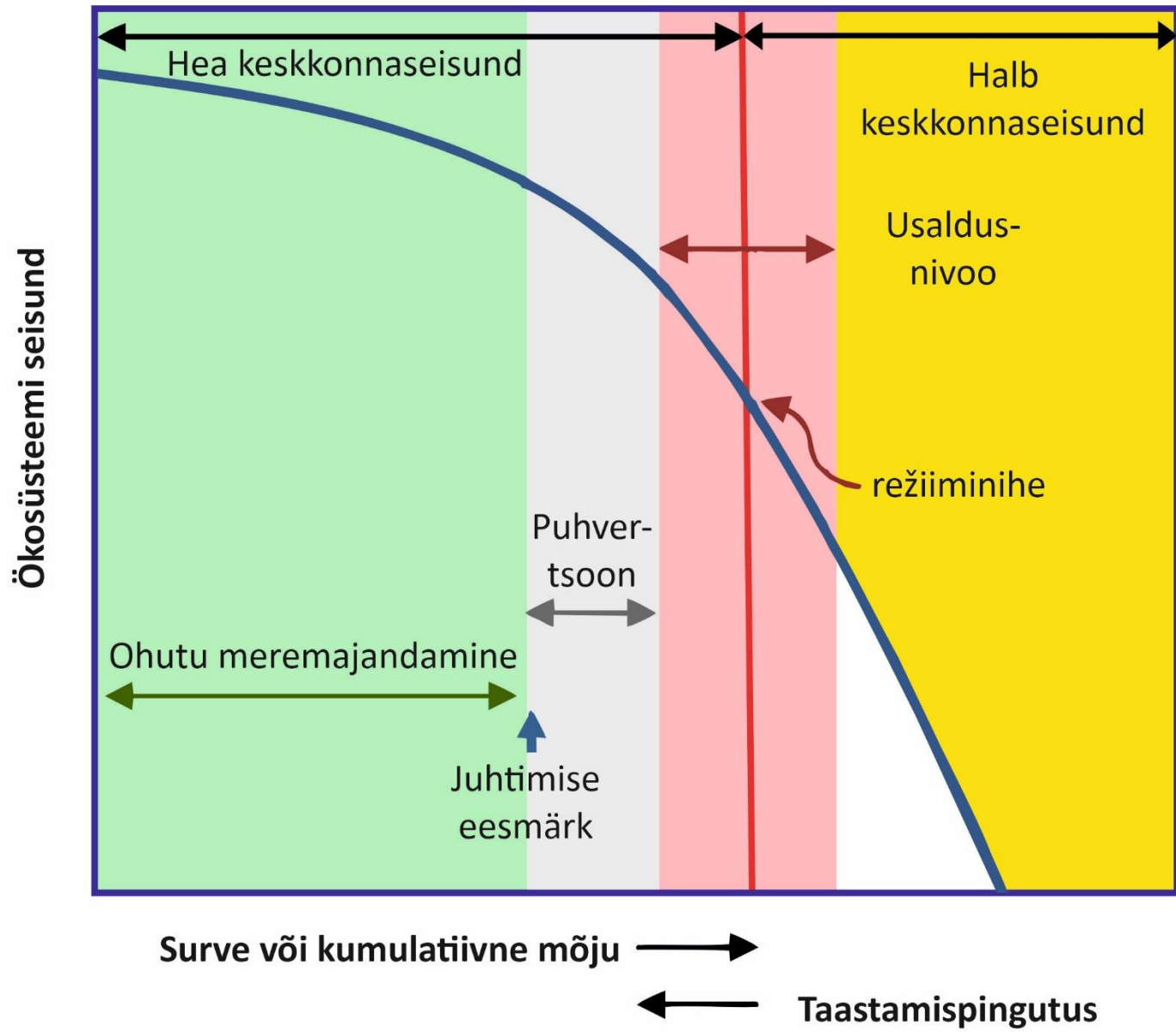


eutrofeerumine
+ võõrliigid



Tuleb prognoosida inimtegevuste kumulatiivset keskkonnamõju





Lihtne veebitööriist

PlanWise4Blue tööriist hindab kumulatiivseid keskkonnamõjusid erinevatele loodusväärtustele 1 km² ruumimastaabis

The screenshot displays the BlueBioSites web application interface. The top navigation bar includes a home icon, the text "BlueBioSites", and a user profile "msp@sea.ee". Below the navigation bar, there are several menu items: "Input Layers", "Sustainability compass", "Economic models", and "Cumulative Effects Assessment". The "Cumulative Effects Assessment" section features a text input field for a workspace name and a table with the following data:

Workspace	Timestamp
test1	30.12.2023 13:05:52
test	07.12.2023 09:43:41

Below the table, there is a section for "test1 layers" with a "Left side map" and a "Right side map". The "Left side map" shows a map of the Baltic Sea region with a red outline indicating the scenario extent. The "Right side map" shows the same region with a heatmap overlay representing ecosystem services impact. The heatmap uses a color scale from light yellow to dark red, indicating the intensity of the impact. The map includes labels for Tallinn, Parnu, Riga, Jelgava, and the Gulf of Riga. The interface also shows a top navigation bar with "PlanWise4Blue Versions" and "Baltic Sea", and a toolbar with icons for "Model settings", "Extent", "Human pressures", "Ecosystem Services", and "Model results", each with a "success" indicator.



Tööriista komponendid:

- Loodusväärtuste kaardid ja teadmistepagas keskkonnamõjudest
- Stsenaariumanalüüside loomine
- Innovaatiline keskkonnamõjude hindamise algoritm

Kasutaja tööseisuvaaade

Home PW4B - Estonia PW4B - Gulf of Finland (ADRIENNE) PW4B - Baltic Sea (MAREA) Home msp

Input Layers

Workspaces

Enter new workspace name... +

Workspace	Timestamp
Scenario 2	25.05.2021 08:07:47
Scenario 3	25.05.2021 11:05:19
Scenario 4	26.09.2021 16:41:51
scen 5	05.10.2021 15:04:27

Current workspace's layers

Scenario 4

success success success

Overview Human pressures Nature assets Model results

How to prepare and run model

One can prepare and run several human impact scenarios. Scenario consists of lists of human pressures and nature assets. To prepare a new scenario user can create a new workspace on the left side pane. With selected workspace user can start preparing the lists of human pressures and nature assets on the corresponding tab page.

Please select existing workspace from the left side pane or create a new one.

Workspace name: Scenario 4 26.09.2021 16:41:51 Timestamp

Description

Submit

Model inputs for current scenario

Human pressures	Nature assets	Human impact calculation
Dredging and dumping areas [1] Mud crab [18]	HD - Sandbanks Bird - Benthos feeders	Run model success

Survestsenaariumi loomine

The screenshot shows a web application interface for scenario management and impact calculation. The top navigation bar includes a home icon, three active scenarios (PW4B - Estonia, PW4B - Gulf of Finland (ADRIENNE), PW4B - Baltic Sea (MAREA)), and user information (Home, msp).

Left Panel:

- Input Layers:** A section for managing input layers.
- Workspaces:** A section for managing workspaces, including a text input field for a new workspace name and a table of existing workspaces.
- Current workspace's layers:** A section for managing the layers of the current workspace, showing a list of layers with checkboxes.

Main Panel (Scenario 4):

- Overview:** A section for overviewing the scenario, with tabs for Human pressures, Nature assets, and Model results. Each tab has a "success" indicator.
- Available human pressures:** A list of available human pressures, including Dredging and dumping areas [1], Windpark areas [2], Fish farming [3], Shipping intensity [4], Underwater cables [5], Pelagic trawling [6], Benthic trawling [7], Harbours [8], Military activities [9], Wastewater discharge outlet [10], and Nutrient load [11].
- Human pressures in workspace:** A list of human pressures currently in the workspace, including Dredging and dumping areas [1] and Mud crab [18].
- Human impact calculation:** A section for calculating human impact, including a "Save list" button (success) and a "Run model" button (success).

Map Panel:

- A map of the Baltic Sea region showing various geographical features and locations, including Uppsala, Stockholm, Tallinn, Helsinki, Turku, Vyborg, Saint Petersburg, Kirishi, Pärnu, Tartu, Pskov, and Vysniy Volochyok.
- Blue icons representing wind turbines are visible in the Gulf of Finland.
- A 3D model of a fish is shown in the bottom right corner of the map.
- An "Editor" panel is visible on the right side of the map, with options for "Edit feature" and "Add feature".

Loodusväärtuste valimine

The screenshot displays a web application interface for managing nature assets. The top navigation bar includes a home icon, three workspace tabs (PW4B - Estonia, PW4B - Gulf of Finland (ADRIENNE), PW4B - Baltic Sea (MAREA)), and user information (Home, msp).

The left sidebar contains the following sections:

- Input Layers**
- Workspaces**: A text input field for a new workspace name and a table of existing workspaces.
- Current workspace's layers**: A section for managing layers, currently showing "Nature assets" with a checked "Nature assets initial" option.

The main workspace area is titled "Scenario 4" and features three tabs: "Overview", "Human pressures", and "Nature assets". The "Nature assets" tab is active, showing two lists:

- Available nature assets**: A scrollable list of asset types including Mammal - populations, Bird - Benthos feeders, Bird - Fish feeders, Bird - Migration routes, Birds - Wintering areas, Fish - Herring spawning areas, Fish - Pikeperch spawning areas, Fish - Whitefish spawning areas, Fish - Charophytes, and Habitat - Fucus.
- Nature assets in workspace**: A scrollable list of selected assets including HD - Sandbanks, Bird - Benthos feeders, Bird - Benthos feeders, Bird - Fish feeders, and Habitat - Fucus.

Navigation arrows (right, double right, left, double left) are positioned between the two lists. A "Save the list" button with a "saved" status is located to the right of the "Nature assets in workspace" list. A "Human impact calculation" section on the right includes a "Run model" button with a "success" status.

At the bottom of the interface is a map of the Baltic Sea region, showing the Gulf of Finland, the Baltic Sea, and parts of Finland, Estonia, and Russia. Major cities like Helsinki, Tallinn, Saint Petersburg, and Stockholm are labeled. The map includes standard navigation controls (zoom in/out, home, full screen).

Kumulatiivsete mõjude arvutus ja tulemuste kuvamine

Home PW4B - Estonia PW4B - Gulf of Finland (ADRIENNE) PW4B - Baltic Sea (MAREA) Home msp

Input Layers Workspaces

Enter new workspace name... +

Workspace	Timestamp
Scenario 2	25.05.2021 08:07:47
Scenario 3	25.05.2021 11:05:19
Scenario 4	26.09.2021 16:41:51
scen 5	05.10.2021 15:04:27

Current workspace's layers

Left side map

Nature assets result

Bird - Benthos feeders

init value

- ≤0.12
- ≤0.16
- ≤0.24
- ≤0.34
- ≤0.63

Right side map

Nature assets result

Bird - Benthos feeders

end value

- ≤0.12
- ≤0.16
- ≤0.24
- ≤0.34
- ≤0.63

Scenario 4

Overview Human pressures Nature assets Model results

Results

Lat/Lon 60.598 31.438

Powered by Esri

Results

Lat/Lon 60.832 21.690

Powered by Esri

Uudsus ja kasu

- EKSPERTHINNANGUST **ANDMEMUDELITENI**
- MÕJUMAATRIKS: ÜKSIK- JA **KOOSMÕJUD**
- REGULAARSED **UUENDUSED** (TEADMISED JA ANDMED)
- STAATILISEST ANALÜÜSIST KASUTAJA DISAINITUD **STSENAARIUMANALÜÜSIDENI**
- **KIIRE**
- **KEERULISED ALGORITMID** (KUID LIHTSALT ESITATUD)
- KASUTAJAL OMA **TÖÖSEIS** JA SURVETE **STSENAARIUMID**
- <https://gis.sea.ee/bluebiosites/>

Kui keegi kirjeldab universumi kogu tema täies hiilguses, siis see universum hävib ning asendub veelgi veidrama ja raskemalt kirjeldava moodustisega (väidetavalt on see paar korda ajalooos juba ka juhtunud).

“The Restaurant at the End of the Universe” Douglas Adams



Praktilised tegevused
võõrliikide ohjamisel:
Iga kodanik panustab



Järgneb PW4B portaali kasutamise koolitus



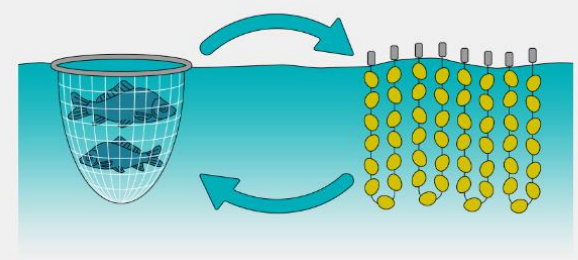
ODSS
Operational Decision Support System

PlanWise4Blue

PlanWise4Blue
Estonia

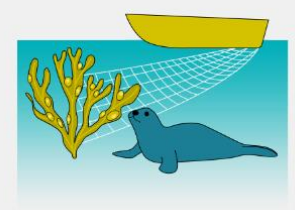
PlanWise4Blue
NorthEastern
Baltic Sea

PlanWise4Blue
Baltic Sea



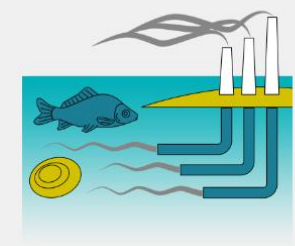
GUIDES

The blue mussel and macroalgae farming application - a platform for uploading, analysing and sharing information



GUIDES

ABC planner
Your area-based conservation planner



GUIDES



GUIDES

Your science-based compass for managing multiple pressures on marine assets