BONUS BASMATI
Baltic Sea Maritime Spatial Planning for Sustainable Ecosystem Services

MYTILUS – a tool for assessing the cumulative impact of human pressures on the ecosystems

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BONUS
Science for a better future of the Baltic Sea region

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for Sustainable Ecosystem Services

Maritime activities

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Cumulative Impact Assessment

$$I_{Sum}(x,y) = \sum_{i=1}^{n} \sum_{j=1}^{m} D_i(x,y) e_j(x,y) \mu_{i,j}$$

- n pressures and m ecosystem components
- Di: Spatial distribution of pressures, such as fishing effort or shipping intensity, as regular grids
- Pressure data are log(x+1)-transformed and rescaled to 0..1
- ej: Spatial distribution of ecosystem components as regular grids, e.g. continental slope soft bottom habitat either as presence (1) and absence (0)
- μi,j: Sensitivity weights" numerically representing the sensitivity of ecosystem component j to pressure i.
- These weights are typically derived by expert judgment

Halpern et al. 2008)

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Additional indices

Cumulative impact index averaged over ecosystems

$$I_{Mean} = \sum_{i=1}^{n} \sum_{j=1}^{m} \frac{1}{E_{Div}} 1P_i \times E_j \times \mu_{i,j}$$

Cumulative pressure index

$$PI = \sum_{i=1}^{n} (P_i \frac{1}{m} \sum_{j=1}^{m} \mu_{i,j})$$

Ecological diversity index

$$E_{Div} = \sum_{j=1}^{m} E_j$$

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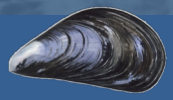
- MYTILUS has been developed as part of the NorthSEE and BONUS BASMATI projects and it is open source and freely available

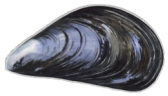
- The aim of MYTILUS is to provide an open source tool to enable assessments of cumulative impact of various maritime activities on the marine ecosystems and its services

- MYTILUS is applying a scenario based approach to analyse the effect of various maritime spatial planning options, and the differences between scenarios can easily be visualised in a high-performance environment

- Expert users can change values directly in the sensitivity matrix, and the calculations are done very fast to facilitate its use at stakeholder events, where the effect of different spatial planning proposals can be demonstrated



MYTILUS

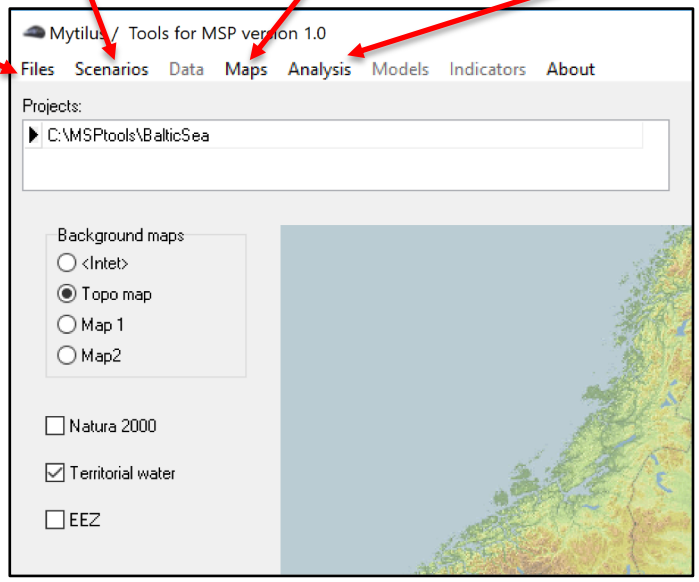


- Base maps
- Activities
- Pressures
- Ecosystems
- Compare Maps
- Compare scenarios
- Fragmentation Map

- New scenario
- Copy scenario
- Delete scenario

- Cumulative pressures
- Ecological Complexity
- Cumulative Impacts
- Edit Sensivity Matrix

- Table edit
- New project
- Add existing project
- Delete project
- Exit



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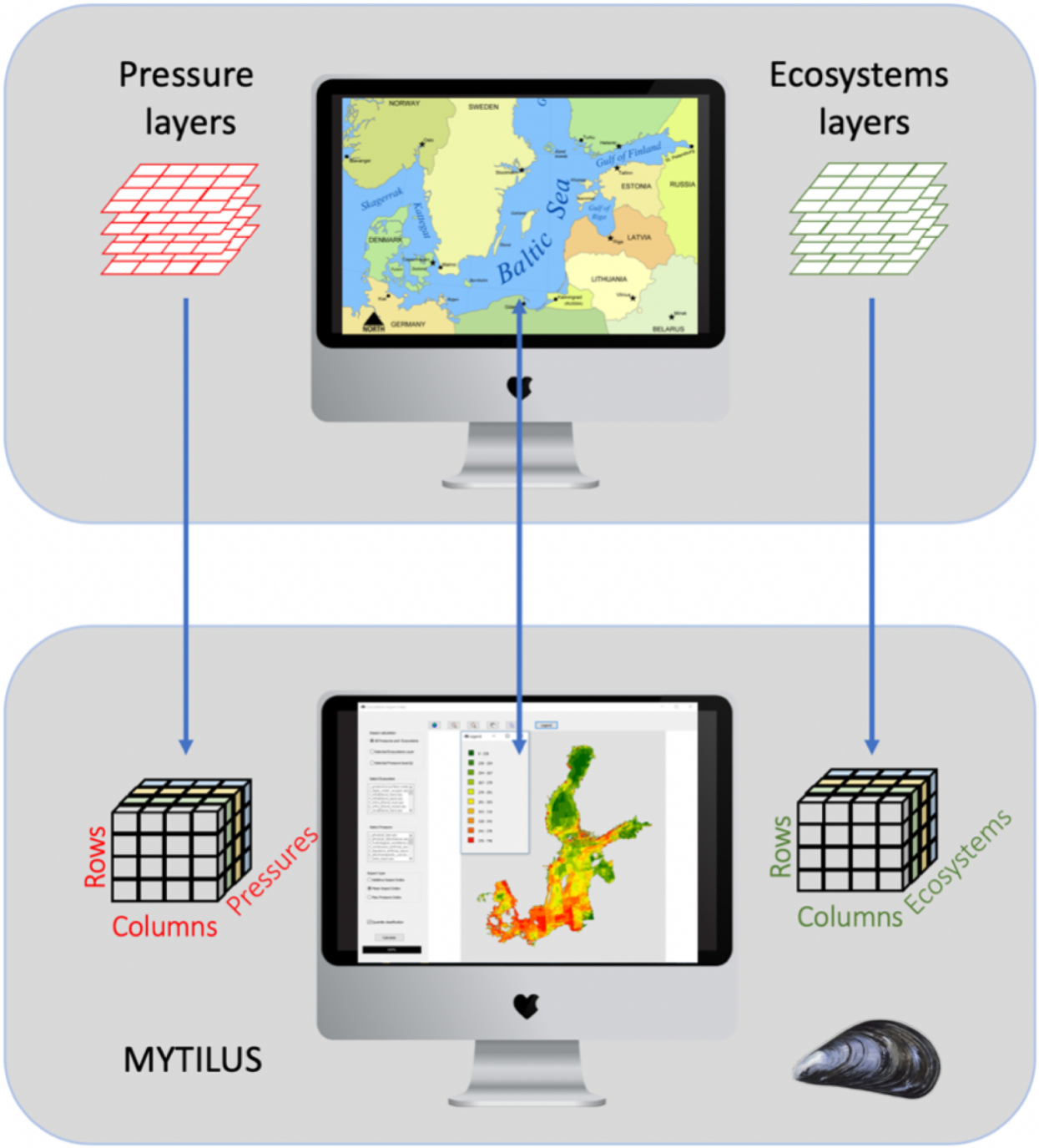
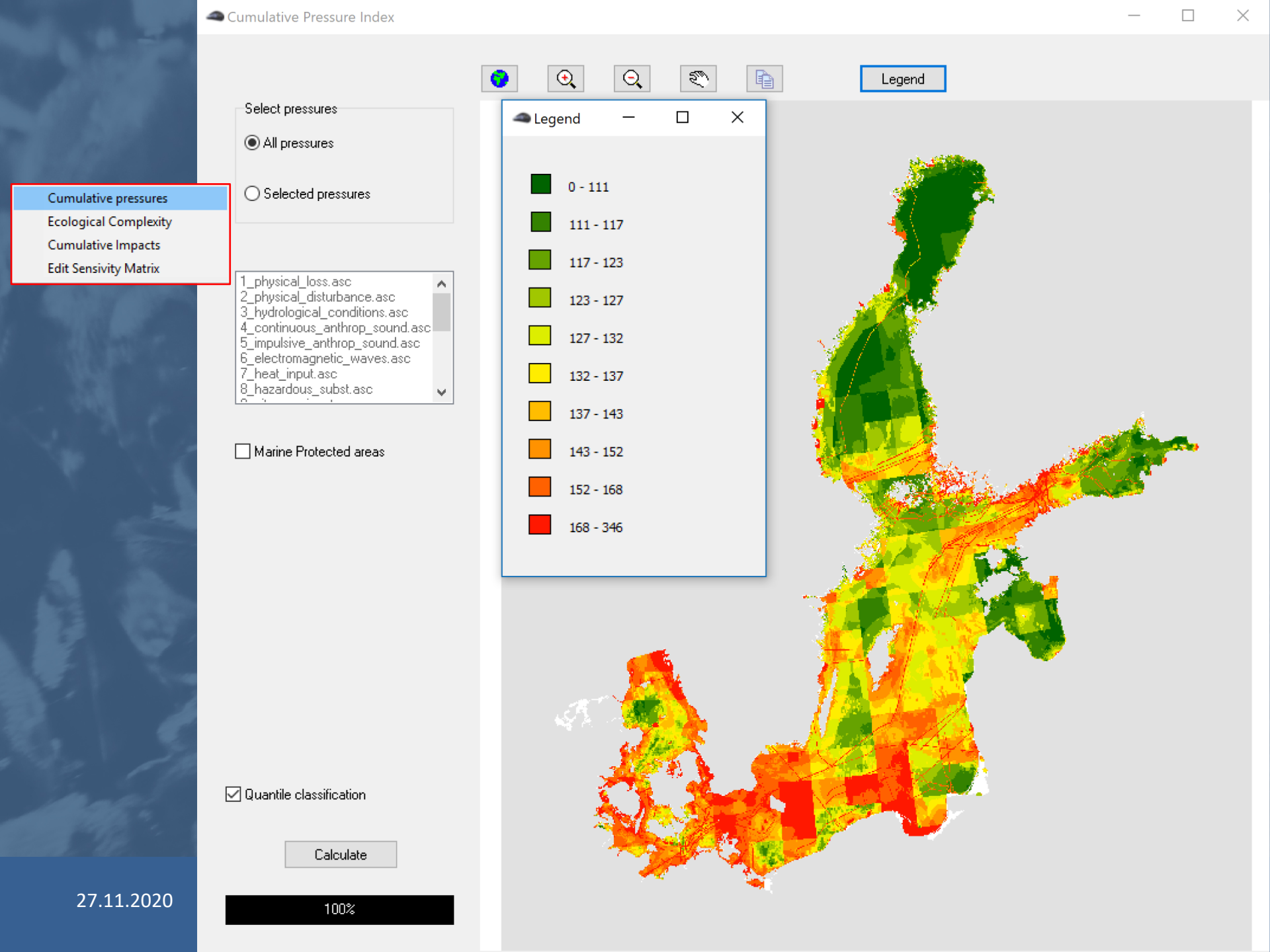
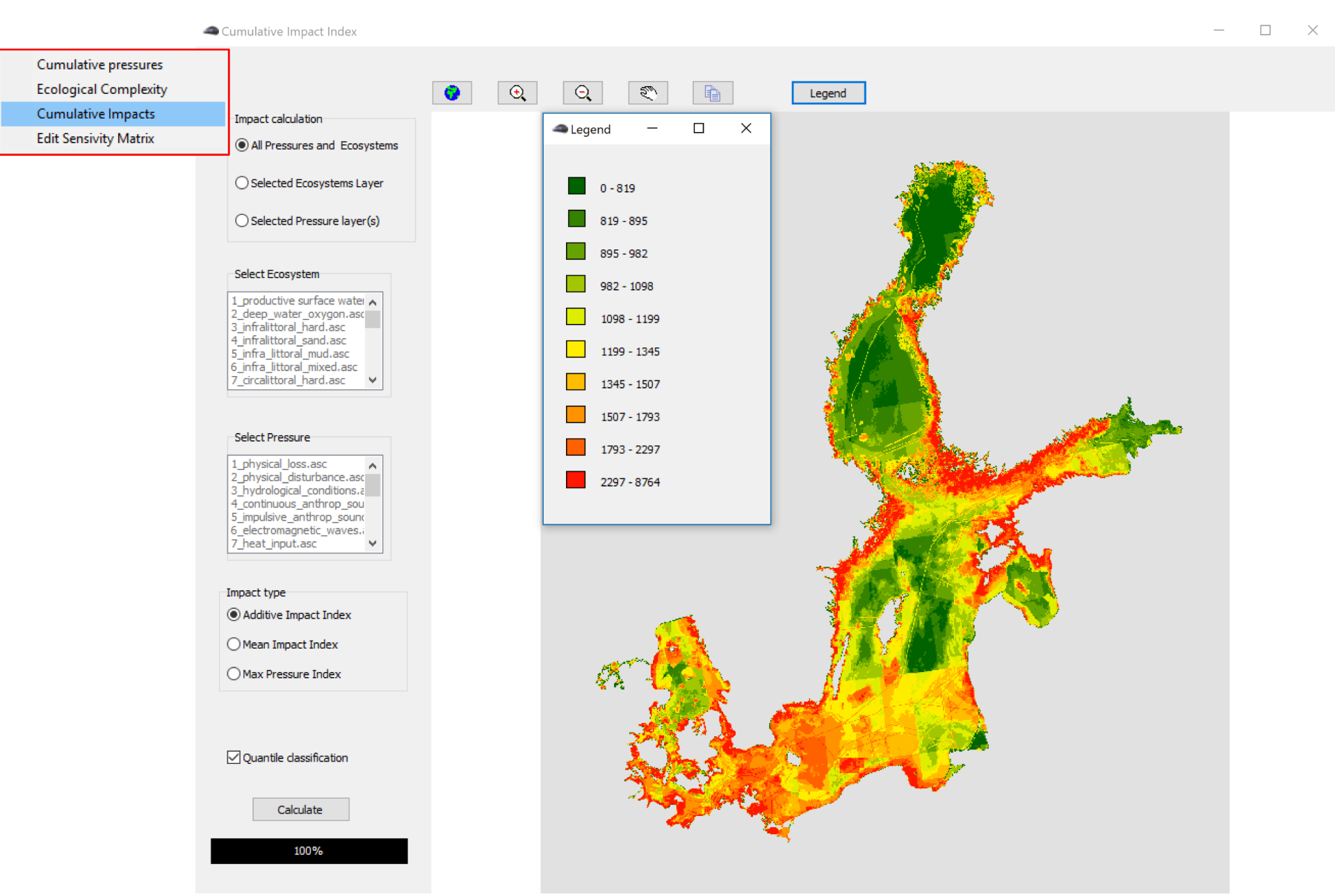
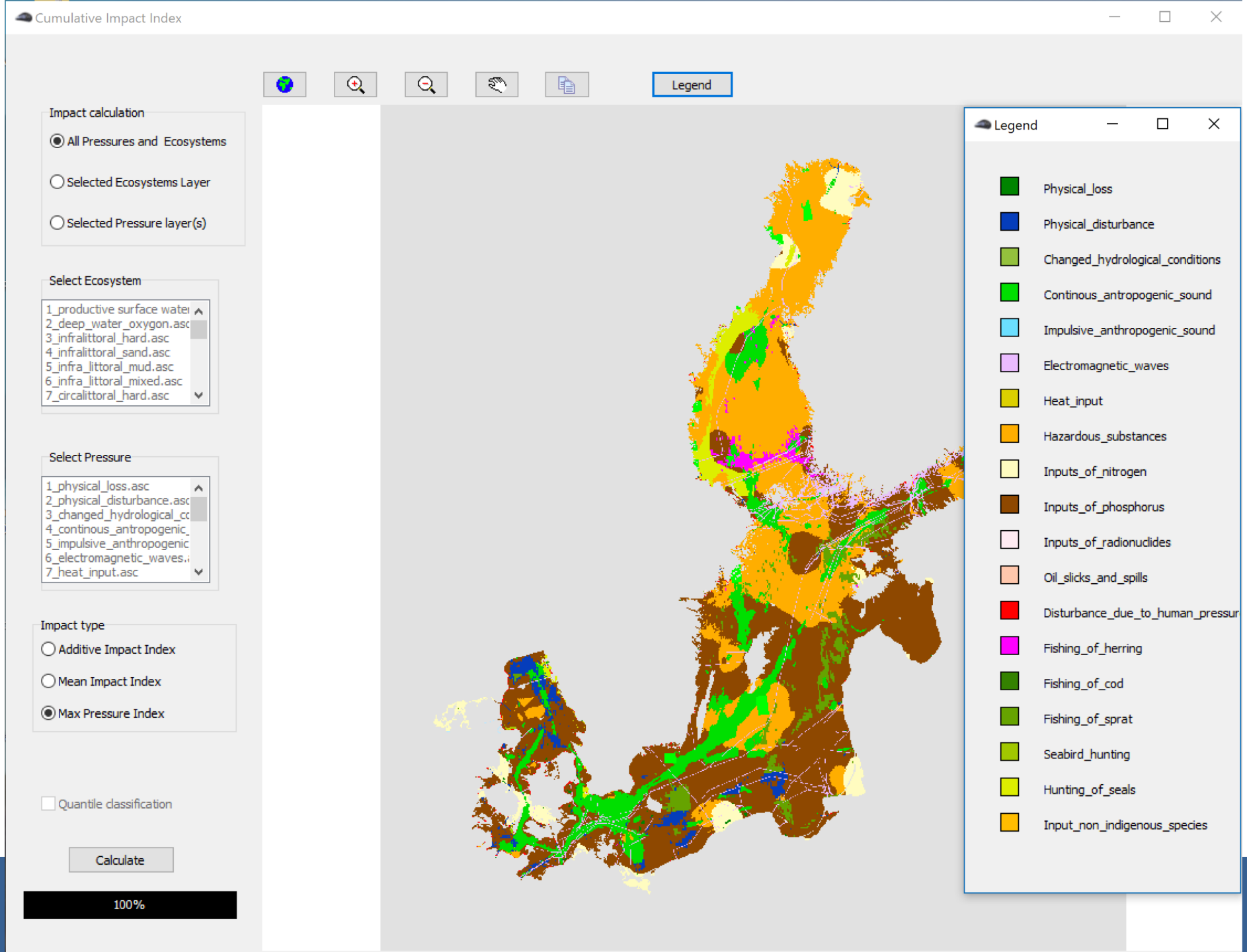
http://bonusbasmati.eu/

MYTILUS
Systems Architecture




Cumulative Pressure Index
Legend
Select pressures
All pressures
Selected pressures
Cumulative pressures
Ecological Complexity
Cumulative Impacts
Edit Sensivity Matrix
1_physical_loss.asc
2_physical_disturbance.asc
3_hydrological_conditions.asc
4_continuous_anthrop_sound.asc
5_impulsive_anthrop_sound.asc
6_electromagnetic_waves.asc
7_heat_input.asc
8_hazardous_subst.asc
Marine Protected areas
Legend
0 - 111
111 - 117
117 - 123
123 - 127
127 - 132
132 - 137
137 - 143
143 - 152
152 - 168
168 - 346
Quantile classification
Calculate
100%
27.11.2020


Cumulative Impact Index
Cumulative pressures
Ecological Complexity
Cumulative Impacts
Edit Sensivity Matrix
Legend
Impact calculation
All Pressures and Ecosystems
Selected Ecosystems Layer
Selected Pressure layer(s)
Select Ecosystem
1_productive surface wate
2_deep_water_oxygon.asc
3_infralittoral_hard.asc
4_infralittoral_sand.asc
5_infra_littoral_mud.asc
6_infra_littoral_mixed.asc
7_circalittoral_hard.asc
Select Pressure
1_physical_loss.asc
2_physical_disturbance.asc
3_hydrological_conditions.a
4_continuous_anthrop_sou
5_impulsive_anthrop_soun
6_electromagnetic_waves.
7_heat_input.asc
Impact type
Additive Impact Index
Mean Impact Index
Max Pressure Index
Quantile classification
Calculate
100%
Legend
0 - 819
819 - 895
895 - 982
982 - 1098
1098 - 1199
1199 - 1345
1345 - 1507
1507 - 1793
1793 - 2297
2297 - 8764


Cumulative Impact Index
Legend
Impact calculation
All Pressures and Ecosystems
Selected Ecosystems Layer
Selected Pressure layer(s)
Select Ecosystem
1_productive surface wate
2_deep_water_oxygon.asc
3_infralittoral_hard.asc
4_infralittoral_sand.asc
5_infra_littoral_mud.asc
6_infra_littoral_mixed.asc
7_circalittoral_hard.asc
Select Pressure
1_physical_loss.asc
2_physical_disturbance.asc
3_changed_hydrological_cc
4_continous_antropogenic_
5_impulsive_anthropogenic
6_electromagnetic_waves.
7_heat_input.asc
Impact type
Additive Impact Index
Mean Impact Index
Max Pressure Index
Quantile classification
Calculate
100%
Legend
Physical_loss
Physical_disturbance
Changed_hydrological_conditions
Continous_antropogenic_sound
Impulsive_anthropogenic_sound
Electromagnetic_waves
Heat_input
Hazardous_substances
Inputs_of_nitrogen
Inputs_of_phosphorus
Inputs_of_radionuclides
Oil_slicks_and_spills
Disturbance_due_to_human_pressur
Fishing_of_herring
Fishing_of_cod
Fishing_of_sprat
Seabird_hunting
Hunting_of_seals
Input_non_indigenous_species

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Thank you for your attention 😊

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