TOPCONS

Marine spatial planning tool
for the conservation of marine ecosystems in the eastern Gulf of Finland

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Other TOPCONS partners

Transboundary tools for spatial planning and conservation of the Gulf of Finland - TOPCONS

"To create and test a prototype GIS-based tool for marine spatial planning."
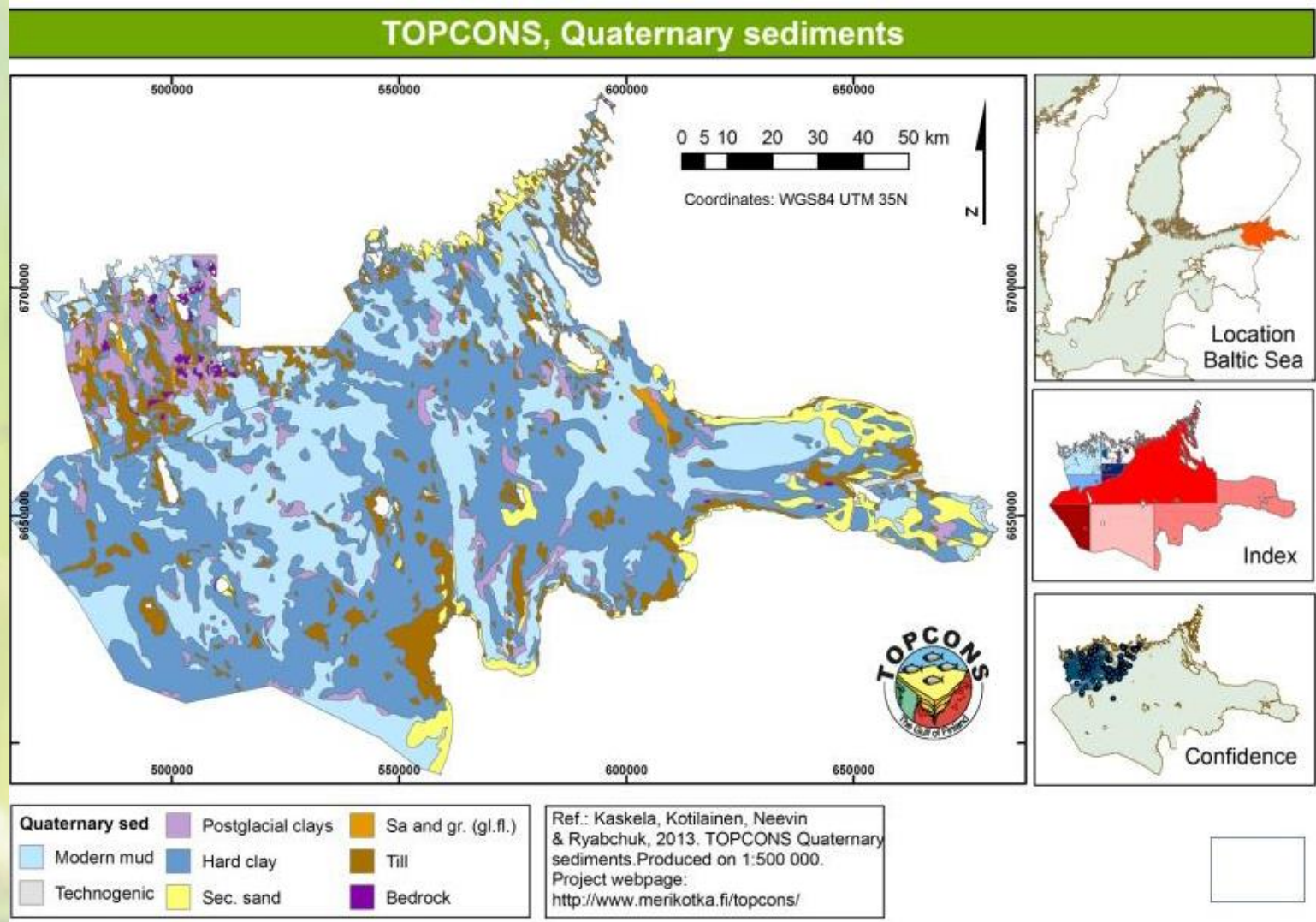
TOPCONS approach

- Developing efficient measures to protect marine ecosystems requires interdisciplinary approach

- Ecological knowledge needs to be integrated with information about human pressures

- Interactive and clever technical solutions aid in interpreting the accumulated knowledge

- Knowledge should be communicated to the stakeholders

Photo: KMRA

Project area

TOPCONS, Quaternary sediments

Coordinates: WGS84 UTM 35N

Location Baltic Sea

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Confidence

Quaternary sed: Postglacial clays, Modern mud, Technogenic, Sa and gr. (gl.fl.), Hard clay, Sec. sand, Till, Bedrock

Ref.: Kaskela, Kotilainen, Neevin & Ryabchuk, 2013. TOPCONS Quaternary sediments. Produced on 1:500 000. Project webpage: http://www.merikotka.fi/topcons/

Datasets for the tool

- Existing, available datasets (geology, biology, hydrography) & new data collected

- Modelled data about key species, birds and fish

- Information about the human pressures (location, effects to environmental parametes)

- Stakeholder valuations from questionnaires and interviews

Photo: Metsähallitus
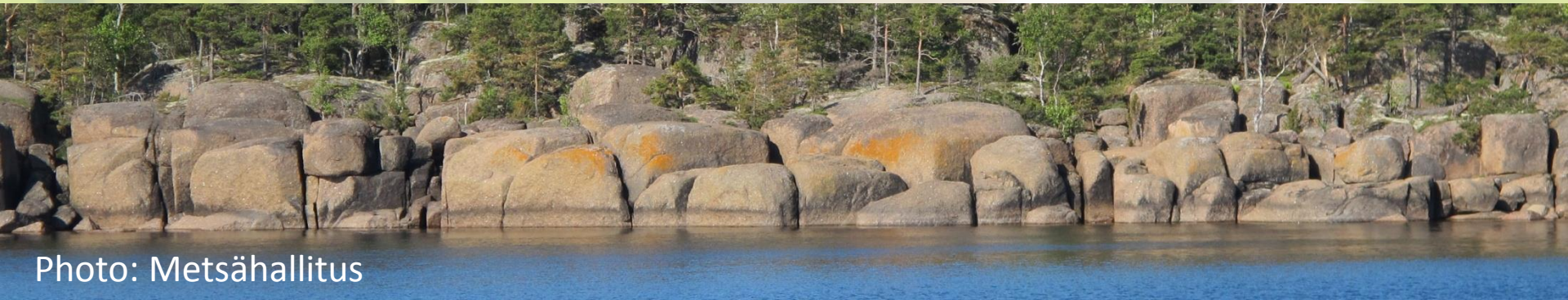
Human pressures chosen for the tool

Increase of oil transportation	Offshore wind power	Dredging and dumping	Cooling waters of power plants	Fish farming
Oil spills	Disturbance	Extraction	Thermal change	Nutrients
Underwater noise	Underwater noise	Smothering		Organic matter
Siltation		Siltation		
		Abrasion		

- Data collected from literature, expert interviews and modelling

Stakeholder valuations

- Valuations to be collected by interviews from 4 stakeholder groups

Value Keyspecies	Stakeholders	U1	Keyspecies	Value Threatened species		
Keyspecies		Yes				
Stakeholders		Researchers	Educational	DM	Public	
0		0	0	0	0	
1		0	0.3	0.2	0.1	
2		0.1	0.3	0.4	0.2	
3		0.5	0.4	0.3	0.4	
4		0.4	0	0.1	0.3	
5		0	0	0	0	
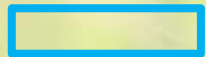
Stakeholder groups: researchers, educational organizations, decision makers, general public
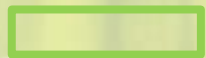
Valuation classes from 0 to 5

Distribution of valuation scores between classes

Combining the datasets

Bayesian Networks

- Models that consist of variables relevant to the problem
- Provide a quantitative means to study alternative decisions in the presence of multiple aims
- Transparent and consistent method for inductive inference
- Use probability as the measure of belief and calculate the process
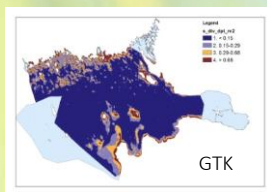- Updating the model is easy with new observations
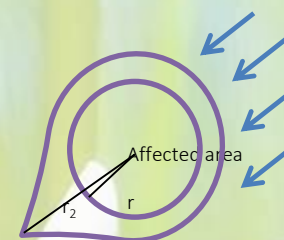
BBN model structure
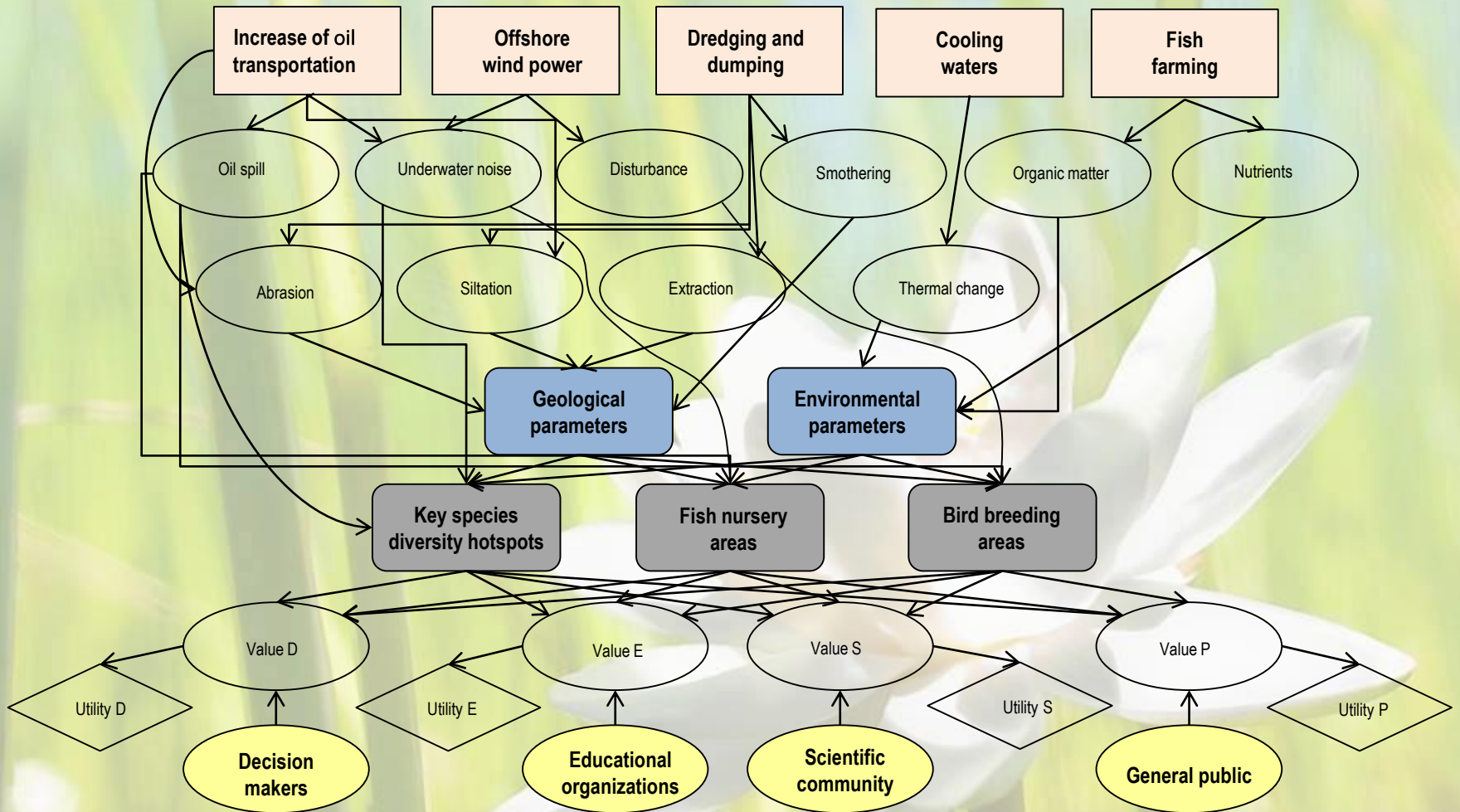
How will the tool work?

Species occurrences prediction without human pressure.

RKTL

BBN: assessing the impacts of human pressures on species. Risk analysis, measured as loss.
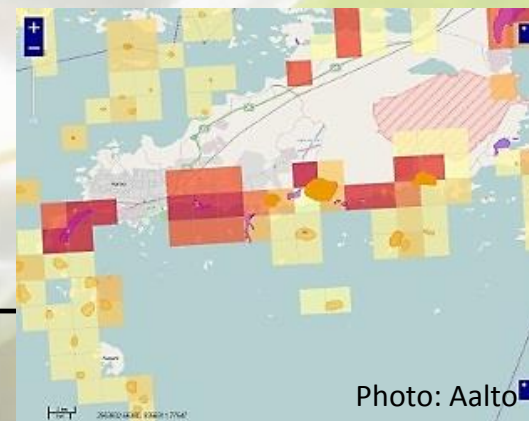
GTK

Area affected: distance function for the pressures, mean circulation included.

Affected area

r_2 r

Rasterization of the data (grid 100 x 100 m)

Raster algebra: risk calculation for each of the grids

Photo: Aalto

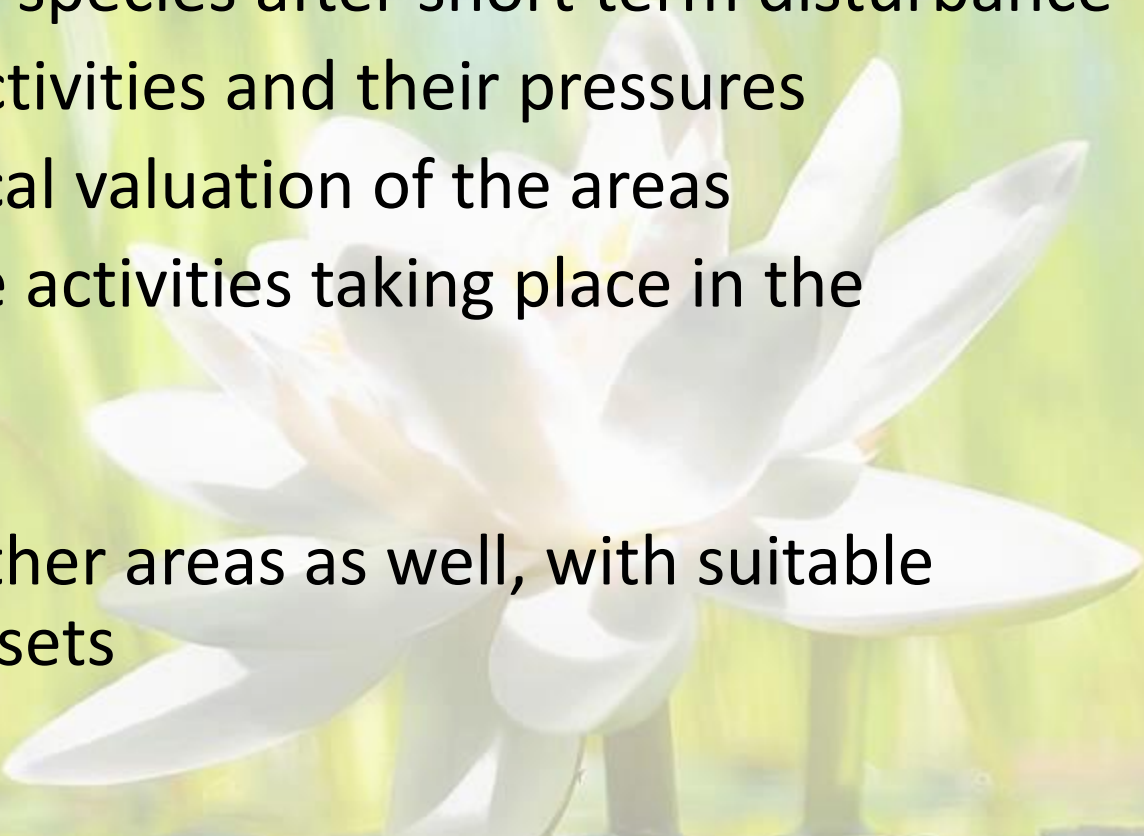**Graphical GIS interface**: impacts to species occurrences after disposition of human activities

First version of the tool will include

- Pre-selected human activities and their pressures
- Geological and hydrographical parameters defining the species distribution
- Probability of species distribution in the study area
- Changes in species presence/absence due to human pressures
- Location of protected areas and viewing possibility for original GIS and metadata sheets
- Stakeholder valuations of 4 groups – transparent to planners

Photo: KMRA

What could be included in the next versions?

- Now only species presence/absence data, possible to include abundance
- Recovery of the species after short term disturbance
- More human activities and their pressures
- Socio-economical valuation of the areas
- Effects from the activities taking place in the drainage area

- Applicable to other areas as well, with suitable backgroud datasets

More information:

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Final seminar in Helsinki, FI on 25 November 2014!