





Socio-economic drivers and plausible developments under alternative global futures

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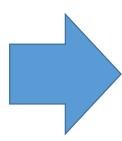
MEGATRENDS, SOSIOECON. DEV.

Global population growth

Urbanization

Technological development, digitalization

Consumption patterns, life styles



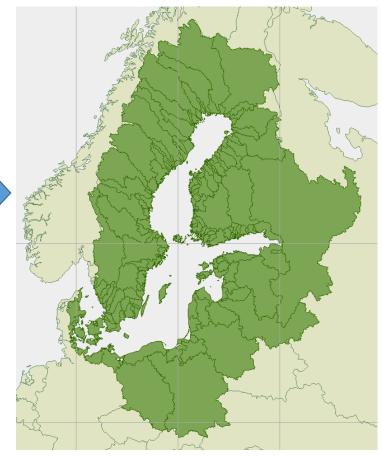
MULTIPLE PRESSURES

Nutrient loads

Fisheries

Hazardous substances, Plastic, pharmaceut.





Source: Baltic NEST

Integrated modelling as the tool to describe the causal human-nature-human interactions

Causal framework

Changing climate
Changing society

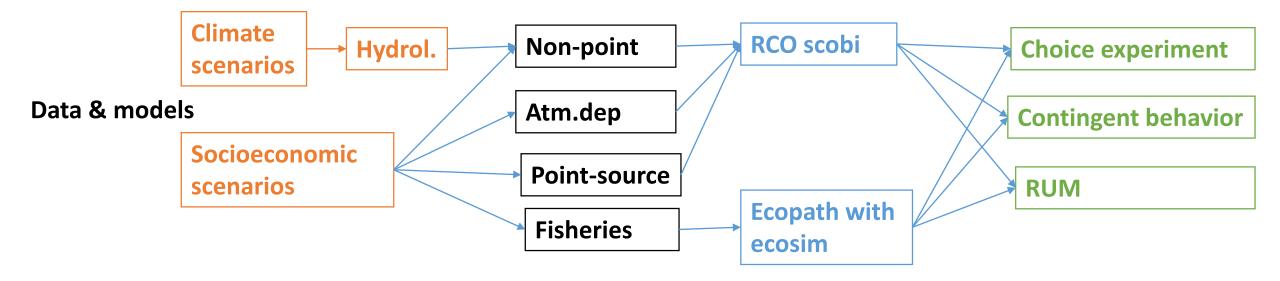
Changing society

Pressures:
Nutrient loads
Fisheries

Nutrient loads
Food-web

Marine ecosystem:
Biogeochemical cycles
Food-web

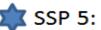
Human wellbeing:
Benefits/damages



What tools/results are available, global scale?

Shared socioeconomic pathways

challenges for mitigation Socio-economic



Mitigation challenges dominate Fossil-fueled Development Taking the Highway



🛊 SSP 3:

High Challenges Regional Rivalry A Rocky Road



Intermediate challenges Middle of the Road



SSP 4:

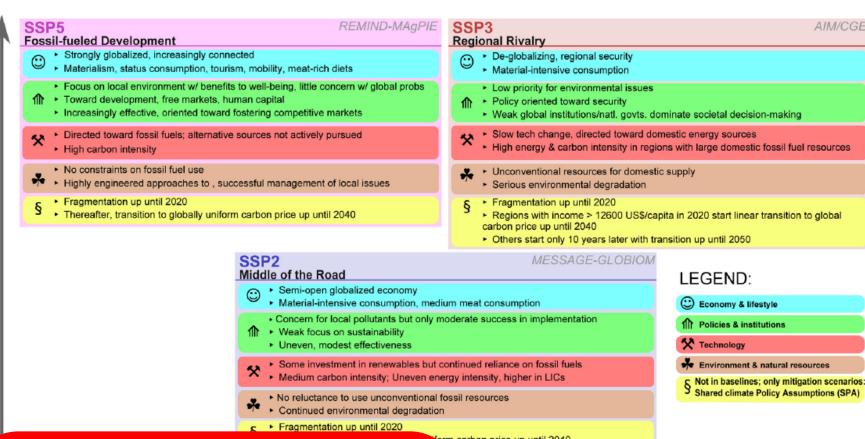
Adapt- Challenges Dominate Inequality A Road Divided

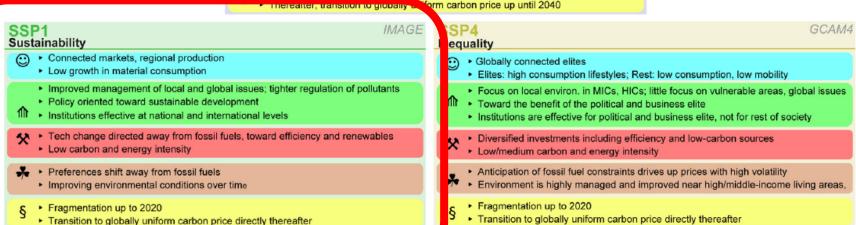


SSP 1:

Low challenges Sustainability Taking the Green Road

Socio-economic challenges for adaptation





hallenges to mitigation

SSP1 Sustainability



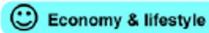


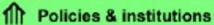
- Connected markets, regional production
- Low growth in material consumption
- Improved management of local and global issues; tighter regulation of pollutants
- Policy oriented toward sustainable development

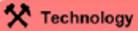


- Institutions effective at national and international levels
- Tech change directed away from fossil fuels, toward efficiency and renewables
 Low carbon and energy intensity
- *
- Preferences shift away from fossil fuels
- Improving environmental conditions over time
- Fragmentation up to 2020
 - Transition to globally uniform carbon price directly thereafter

LEGEND:







Environment & natural resources

Shared climate Policy Assumptions (SPA)

Source: Bauer et al. 2016



Source: Bauer et al. 2016

SSP5

REMIND-MAGPIE

Fossil-fueled Development



- Strongly globalized, increasingly connected
- Materialism, status consumption, tourism, mobility, meat-rich diets



- Focus on local environment w/ benefits to well-being, little concern w/ global probs Toward development, free markets, human capital
- Increasingly effective, oriented toward fostering competitive markets



- Directed toward fossil fuels; alternative sources not actively pursued
- High carbon intensity



- No constraints on fossil fuel use
- Highly engineered approaches to , successful management of local issues



- Fragmentation up until 2020
- Thereafter, transition to globally uniform carbon price up until 2040

LEGEND:



Economy & lifestyle



1 Policies & institutions



Technology



Environment & natural resources

Shared climate Policy Assumptions (SPA)

Extending global narratives at Baltic Sea scales

SSP1 - Sustainability



- Increased plant based diet
- High N efficiency, high share local & organic produce
- Reduced agricultural land cover & livestock



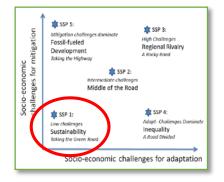
- Tertiary treatment becomes the standard in sewege treatment
- Separation of rainwater and sanitation
- Advanced on-the-site treatment common in rural areas.

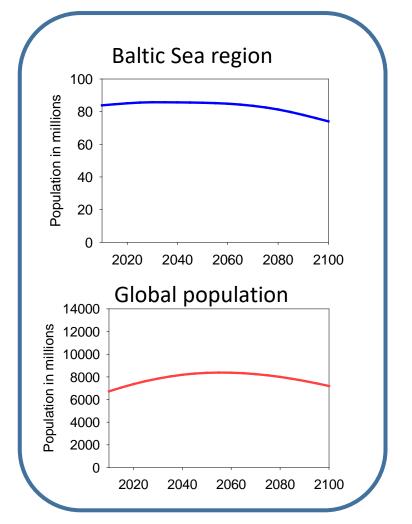


- Tourist shipping increases, bulk and oil shipping decrease
- Electrification in short sea shipping becomes a standard
- Emission of grey water, black water and waste discontinue



- Sustainable fisheries with high quality products
- Circular economy in aquaculture
- Small-scale, low impact fishes promoted; avoidance of habitat damaging gear and bycatch





SSP5 - Fossil-fueled development



- Increased meat and dairy in diet
- Globalised, export oriented sector, intensification
- Increased livestocks => expansion of agricultural land cover



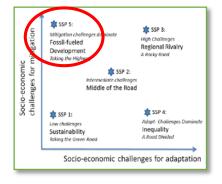
- New investments made to serve growing urban areas
- focus on human health rather than environmental quality
- Some upgrading due to technology spill-overs

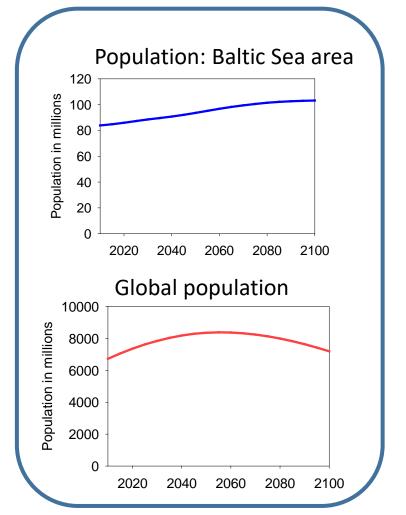


- Fast increase in shipping industry, both tourist shipping and in particular oil & bulk shipping
- The emissions to the water and air increase



- Large-scale fishing focusing on maximising profits
- Habitat destructive gear and bycatch allowed
- Industrial scale development of freshwater and marine aquaculture with no nutrient focus

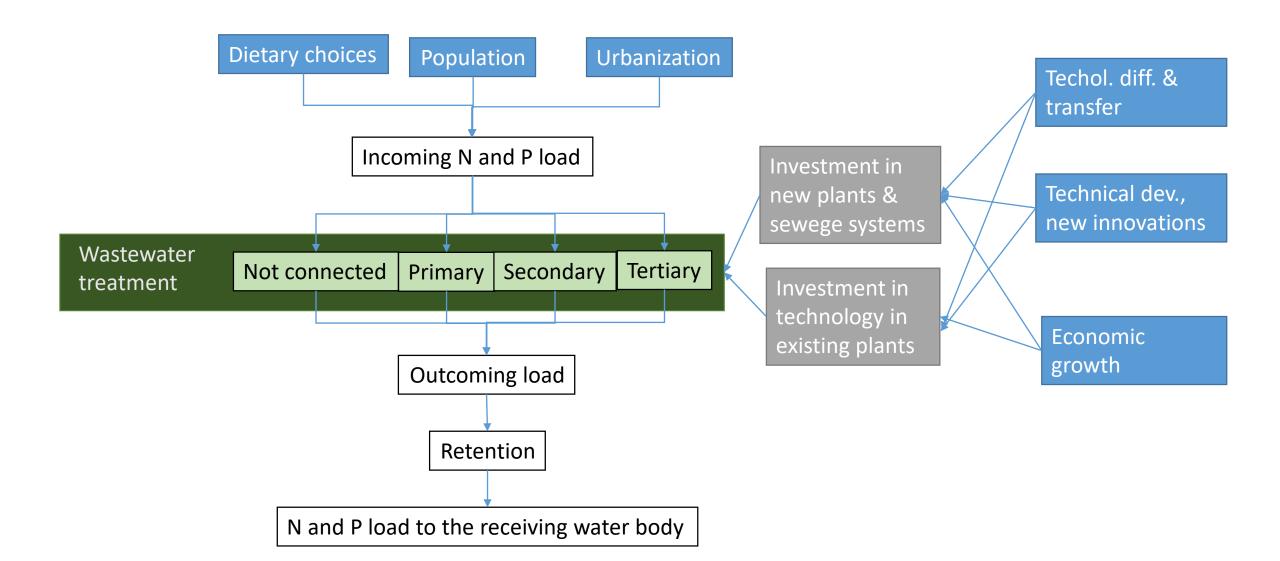




From qualitative to quantitative:

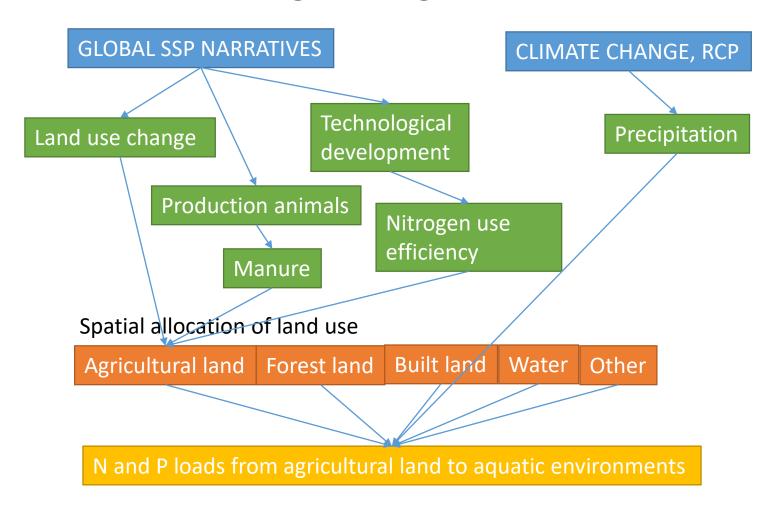
FROM QUALITATIVE TO QUANTITAVE:

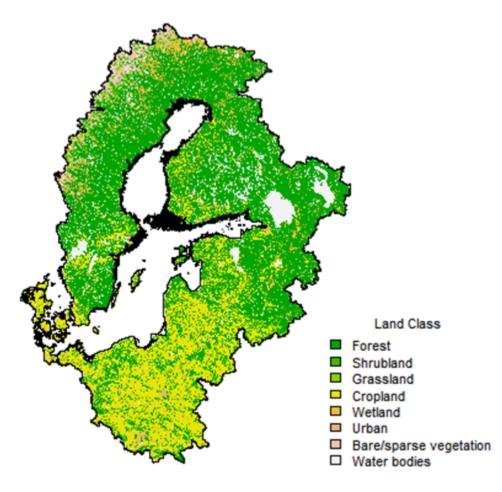
NUTRIENT LOADS FROM THE MUNICIPAL WASTE WATERS



FROM QUALITATIVE TO QUANTITAVE:

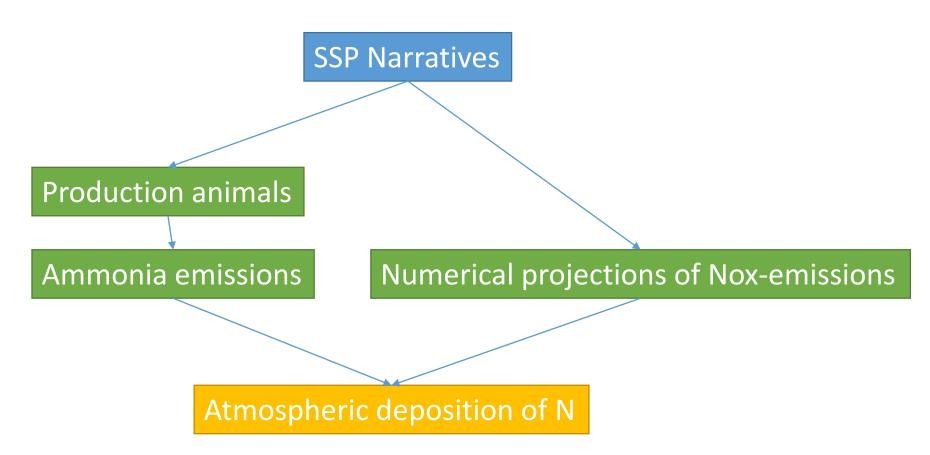
Nutrient loading from agriculture

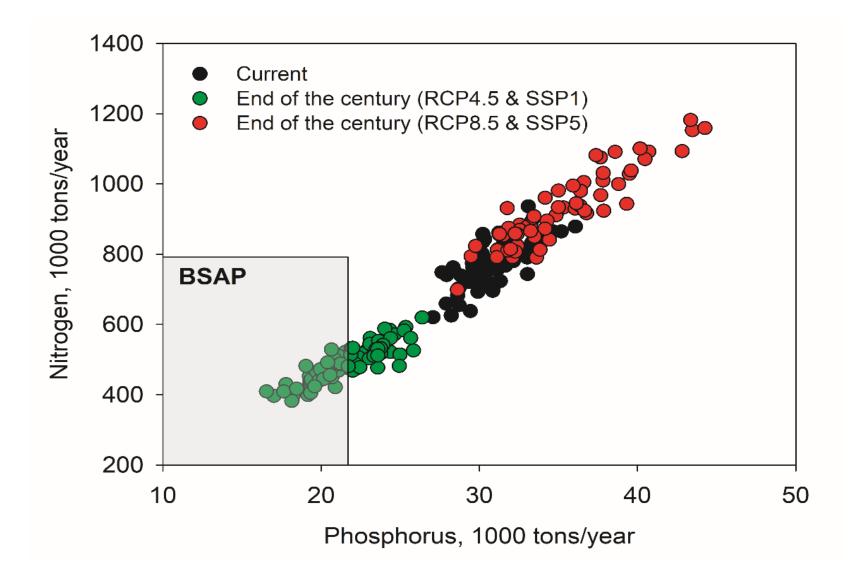




FROM QUALITATIVE TO QUANTITAVE:

Atmospheric deposition of nitrates





Annual variability in nutrient loads to the Baltic Sea currently (2010-2030) and at the end of the century (2078-2098)