MARS fact sheet #03

MARS PROJECT

Managing Aquatic
ecosystems and
water Resources
under multiple Stress

MARS scenarios and storylines

The multiple combinations of drivers and pressures for a given aquatic system for the current situation are shaped by its historical and present climatic, managerial and socio-economic conditions. The future combinations of drivers and pressures depend on the future climatic and socio-economic scenarios considered plausible for this system. Within MARS, scenarios and storylines are used to project the impacts of multiple stressors on aquatic ecosystems. They deliver a qualitative framework and, where possible, quantitative data for modellers to run simulations.

Various future climatic and socio-economic scenarios have been chosen within MARS to define three storylines at European level. Each storyline frames the conditions leading to certain combinations of drivers and pressures for Europe. These storylines have been downscaled to case-study catchment-level using the expert knowledge of the scientists working on the 16 MARS case-study catchments, and the stakeholders of these catchments.

What are storylines and scenarios within MARS?

A storyline is a narrative about a fictive sequence of events that could take place in the near future. Within MARS, storylines describe several aspects of economic, environmental, political and climatic developments and are mainly defined focusing on the different fashions to manage and regulate drivers and pressures impacting aquatic systems.

A scenario is a coherent description of alternative hypothetical futures that reflects different perspectives on past, present and future developments. Within MARS, we used climatic and socio-economic projections as scenarios that served as the basis to define our storylines.

Development of MARS storylines

Storylines in MARS are built on scenarios. The combination of certain climate scenarios and socio-economic scenarios set the basis for the narratives. We used the Representative Concentration Pathways (RCPs) and the Shared Socioeconomic Pathways (SSPs) to define our storylines.
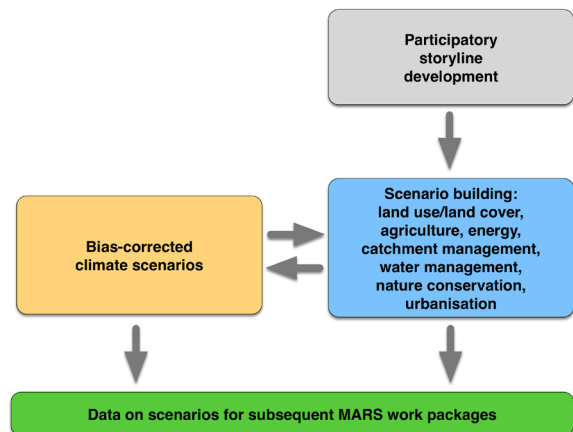

Figure 1: Development of the MARS storylines

MARS storylines

The time-horizon for the storylines of MARS is 2030 and 2060.

Storyline 1: 'Techno world' or 'Economy rules'

This is a world driven by economy. A fast economic development increases the use of energy. Policies are not focused on the environment but on enhancing trade and benefitting the economic growth. Climate is changing rapidly. This world is based on a combination of SSP5 and climate scenario 8.5.

Storyline 2: 'Consensus world'

Economy and population grow at the same pace as now. Policies to protect the environment are continued after 2020, and the preservation of nature is regulated by the government. This world is based on a combination of SSP2 and climate scenario 4.5.

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Storyline 3: 'Fragmented world'

This world is characterized by an unequal development of the different countries. International trade agreements are stopped and each country needs to fight for its own survival. Environment is just protected by rich countries at a local scale, but in general no attention is paid to the preservation of nature. This world is based on a combination of SSP3 and climate scenario 8.5.

MARS quantitative storylines

These qualitative storylines have been translated to quantitative data. Grids of 0.5 x 0.5 degrees resolution were provided for several parameters (e.g. temperature, precipitation, water abstraction, run off, flood risk areas, nitrate losses), covering Europe for the three storylines and the two time-horizons. The quantitative values used in predictive modelling were derived from existing projects and modelling tools (e.g. ISI-MIP, SCENES, CLIMSAVE).
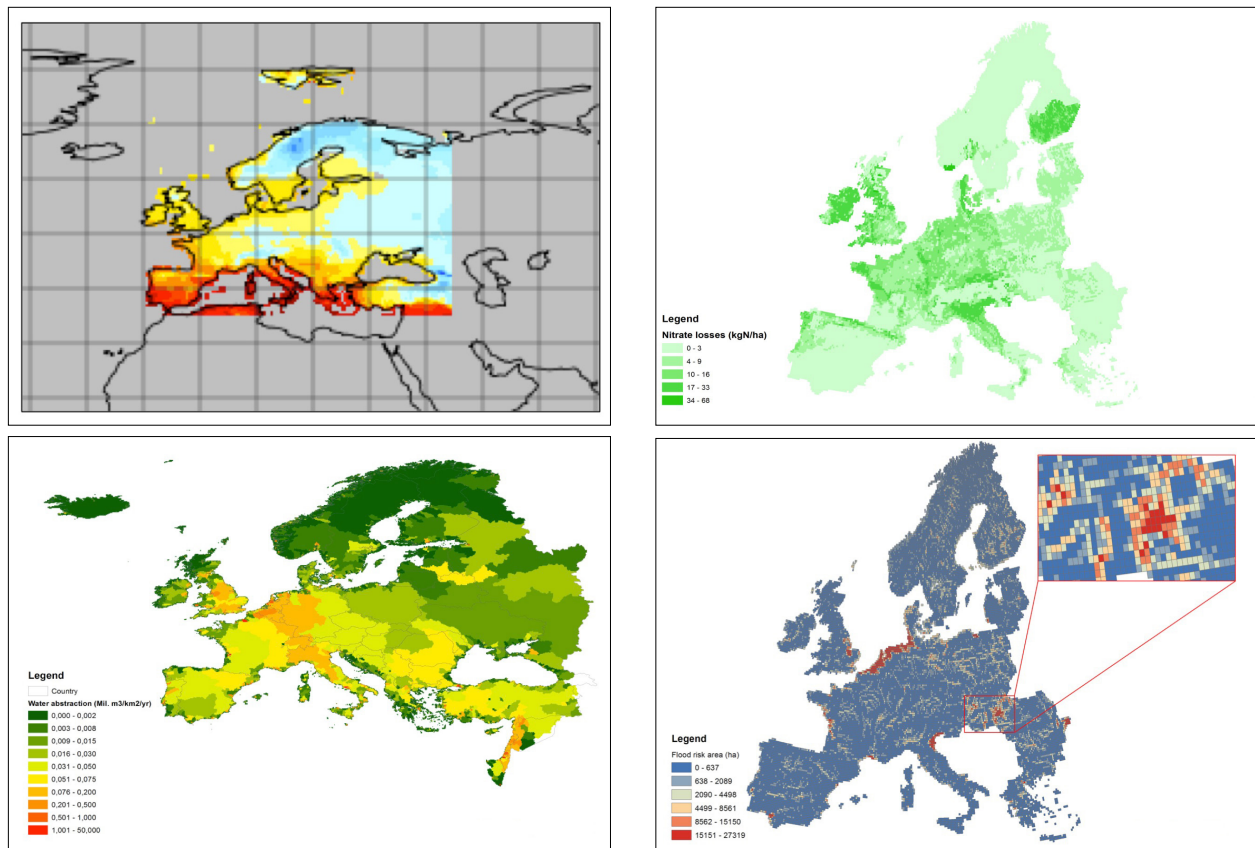

Figure 2: Grids showing quantitative storyline data for the time-horizon 2030

Further reading

Faneca Sanchez, M. et al. (2015) Report on the MARS scenarios of future changes in drivers and pressures with respect to Europe's water resources. Part 4 of MARS Deliverable 2.1: Four manuscripts on the multiple stressor framework.