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MARS fact sheet #12

MARS PROJECT
Managing Aquatic ecosystems and water Resources under multiple Stress

Storylines: writing the future for effective water management – Techno World

The future is uncertain. Depending on both human actions and the scale of climatic changes, we can expect any number of potential changes in freshwater ecosystems between now and 2060. In response to this uncertainty, MARS scientists and stakeholders have collaboratively developed a range of different scenarios, each based on climate and socioeconomic predictions.

Using these scenarios, three 'storylines' were written to explore the potential future impacts of multiple stressors on the ecosystems and basin regions studied by MARS. Two time horizons are used for scenarios: 2030 (to inform the update of the Water Framework Directive in 2027) and 2060 (to show the impacts of climate change).

This scenario methodology has been used by many organisations to present unpredictable futures, including UNEP and the IPCC. Traditionally, these scenarios have been simple, linear predictions, with sequential and predictable relationships between socio-economic actions and climatic and environmental outcomes.

In recent years, however, scientists have pointed out that the interactions between humans and the environment are more complex than such a sequential approach gives credit for, and a more re-sponsive methodology is used here, in which emissions and socio-economic scenarios are developed in parallel.

Tysso Hydroelectric Plant, Norway
(photo: Dag Endre Opedal. Flickr.com, CC licence)

Analytical priority is given to changes in emissions and greenhouse gas concentrations over time (termed 'Representative Concentration Pathways'). Scenarios can then be created based on these emission pathways alongside parallel (and plausible) 'Socio-Economic Pathways' and policy scenarios.

Scenarios and water management

As water management is usually site-specific, global data and predictions currently tells us little about water management in the future. Projections and data do tell us, however, about aggregate global demand and availability.

The storylines designed by MARS scientists use this data and create further predictions around potential changes such as technologies for irrigation, changes in river discharges, changes in pesticide use (and thus pollution), technologies like dikes and dams, water use in industry and energy production, and use of surface and groundwater.

Techno World

The Techno World storyline is based on a scenario of high greenhouse gas emissions and rising global temperatures (Representative Concentration Pathway 8.5) in combination with a strong, carbon-based global economy in which many currently pressing social concerns, such as inequality and population growth, have been ameliorated (Shared Socio-Economic Pathway 5).

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The Techno World storyline features a future world with the following features:

Economy

In the Techno World, the global economy is strong and growing. Governments worldwide (in the vast majority) prioritise this economic growth and the creation of financial capital, supporting innova-tions in technology, expansion of businesses and the opening up of new markets. This growth is positive socially, and is accompanied by a rising quality of living conditions and decreases in global inequality.

Energy

Industry is growing, and people are getting wealthier and consuming more, so Techno World has a high demand for energy. This demand is met in whatever is the most cost efficient way in the short term. Newer technologies like hydropower and biofuels are further developed, but so is the use of fossil fuel. Better technologies mean previously inaccessible gas, oil and coal stores can now be exploited, and so CO_2 emissions increase.

Environment

In Techno World, there is a broad consensus between government officials and business leaders that environmental regulation is economically inefficient and hinders development. Governments and international organisations tend to focus their eco-activity on win-win policies that improve economic as well as environmental performance (like energy efficiency), but environmental policies without an obvious financial benefit are weak.

Members of the public are concerned about the environment, and Techno World's campaigning charities and non-governmental organisations are well funded, but these tend to focus most on popular issues (such as local green spaces). Less visible or lucrative environmental goods, or those that require integrated regulation (such as river-basin management) are neglected.

Policies

As we move towards a Techno World future, existing international agreements that protect the environment are either not renewed when they expire or significantly weakened during reform. International agencies are focused on stimulating economic growth, and international law prioritises removing trade barriers, which reduces national governments' abilities to implement strong environmental policies.

By 2060, government intervention to protect ecosystems is virtually nil. The few policies that do exist tend to focus on the recreational value of "nature" as something for humans to enjoy.

Water Management Strategies

The primary focus of water management in the Techno World is to benefit humans. Freshwater is seen primarily as a commodity that is necessary for human health and economic development, and policies focus on having access to water for drinking, agriculture and industry.

Watercourses are primarily managed to reduce hazards to humans like floods, droughts or health risks. These aims tend to be met by technology and engineering like dams, sluices or floodgates. Management thinking is focused on the short term, with little attention given to ecological health and long-term sustainability.

Links

Shared Socio-Economic Pathways:

http://tinyurl.com/jcuhq4h

Representative Concentration Pathways:

http://tinyurl.com/hrnlx9s