



Discussion Minutes

A1 – Integrated Nexus Modelling at Global Scale

Chair: Joseph Alcamo

Speakers: Simon Langan, Animesh Gain, Vera Heck, Jan Janse, Anne Biewald

Minutes: Fabian Heitmann

Presentation notes:

Simon Langan – Asian water futures – Multi scenarios, models and criteria assessment:

How can we deal with increasing demands and challenges associated with human needs and ecological health?

We need new water scenarios for seeking breakthroughs and developing solutions.

We need an inter-disciplinary approach for combining multi-model analysis across sectors and socio-economic variables, including governance.

Scenario analysis reveals increasing water stress as well as imbalance between water supply and demand. This can be used as a basis for dialogue with the stakeholders to identify the potential solutions, e.g. what happens if we improve water productivity or increase agricultural efficiency? What could be done at the domestic household level? And what impact does a limitation of population growth have?

Animesh Gain - Integrated assessment of synergies and tradeoffs of global challenges through nexus approach at global, national and local scales:

Global scale assessment: WEF index is developed; data gaps need to be addressed; time series analysis is required for achieving SDG targets by 2030

Local scale assessment: comprehensive assessment for water and energy securities is provided; need to include food securities as well

Issues need to addressed: climate change projection, transboundary cooperation, equity and social issues

Vera Heck - Opportunities and trade-offs of terrestrial carbon dioxide removal within planetary boundaries:

Terrestrial Carbon Dioxide Removal (tCDR) adds to biosphere degradation

There is a limited sustainable tCDR potential

There are strong trade-offs in the water-land-biodiversity context

Jan Janse - Modelling of aquatic ecosystem services related to global environmental change by a global modelling framework:

There are three pathways to prevent biodiversity loss by 2050:

Global technology pathway

Decentralised solutions pathway:

Consumption change pathway



Anne Biewald - The impact of climate change mitigation on water demand for energy and food:

Effects of mitigation on water demand → Socioeconomic and water policy drivers are important!

Crucial factor → irrigation of biomass

Climate policy → can have synergies for water use if combined with policies on irrigation of bioenergy and electricity water use

General discussion:

Where are the scientific gaps in integrated assessments (IA) or integrated assessment models that need to be filled so that we can better answer questions about the water-energy-food nexus?

Animesh Gain: For real integration we need more advancements in modelling and new quantitative tools to fill them into the already existing big frameworks.

Jan Janse: The analysis of the system is the big challenge and of the greatest importance.

Anne Biewald: Modelling frameworks for groundwater problems are very important. The SSPs are very important but in agricultural policy SSP specifications are still missing.

Simon Langan: 1. Uncertainty and a lack of baseline data is a problem.

2. Indicators about resilience have to be discussed. Do we really want to use GDP?

Vera Heck: 1. Social behaviour is triggering most of the changes. We do not really understand social transformations. SSPs are very static. Paris showed that there could be specific small changes. Maybe we are no longer on a pathway where we only care about economic growth?

2. Top-down/ bottom-up scaling: How could a regional study be implemented on a global scale? There needs to be some kind of connection between regional and global factors.

Joseph Alcamo: We have 20 years of parallel experience of social simulations and social ecological modelling that has not really been integrated in IA. In connection with the WEF nexus we should try a synthesis of parallel research and try to feed that into the IA discussion.

Dale Rothman: Often in modelling, the population and the macro economics are totally exogenous. We have no idea if there is internal consistency in terms of types of social environmental impacts and if they remain consistent with the exogenous population in macroeconomics. Hence, we should put these exogenous impacts into the model.

Keith Richards: Water quality, variations and costs of water reuse are often not taken into account.

Simon Langan [answer]: We speak to the sponsors of our work. We are working in the UN system and are trying to feed the outcomes into the SDGs.

How do you think we should work with the stakeholders in connection with the business of the WEF nexus?

Animesh Gain: On a local scale it is easier to discuss how global models can contribute to local society.

Jan Janse: It is difficult on a global scale, but you can talk to the local government and create voluntary agreements. We presented our research to stakeholders from the field of agriculture and to stakeholders important for our case study.

Anne Biewald: The most important platform is the IPCC and the IPCC discourse.



Vera Heck: Although at a very bottom level, school programmes can also be used as a discussion platform.

Wolfram Mauser: Large international companies are interested in the global view and participate also on a regional level. Also the public is becoming increasingly politicized. This will change the geopolitics around the globe. Also many small consulting companies are interested in the nexus analysis. We should ask ourselves to which extent do we want to allow these interests groups to affect the way in which assumptions from studies are communicated.

Keith Richards: Models should not be designed to be overly supply oriented. [direct comment]

Joseph Alcamo: these kinds of models seem to be changing.