Integrated Research on the Development of Global Climate Risk Management Strategies : Plan and Initial Results

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Background

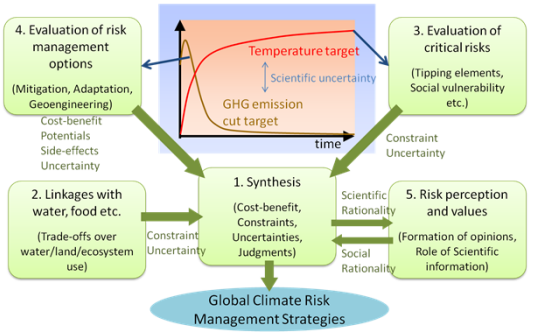
Agreement has been reached in the United Nations' climate negotiation process that from a scientific perspective, the global average temperature should not exceed two degrees above the preindustrial level. The sum of bottom-up targets pledged by individual countries, however, does not reach such an ambitious global target and a new framework to reach the target is still under debate. In the first place, a temperature limit to be avoided cannot be determined solely by science but it must involve the value judgment of society. There is also a large scientific uncertainty between temperature targets and emission targets. Furthermore, linkages between climate change policy and other global issues, such as a potential conflict between large-scale deployment of biomass energy versus food and biodiversity issues, are insufficiently understood.

Overview of the project

In this study, we adopt a risk management standpoint to tackle this problem. Namely, we comprehensively assess risks due to the impact of climate change and climate change policies, explicitly deal with uncertainties, utilize the best available information, and consider every possible condition and option. We regard the problem as one of decision-making at the human level, which involves social value judgments and adapts to future changes in circumstances. We are conducting research under the following five themes:

1. Synthesis of global climate risk management strategies
2. Optimization of land, water and ecosystem uses for climate risk management
3. Identification and analysis of critical climate risks
4. Evaluation of climate risk management options under technological, social and economic uncertainties
5. Interactions between scientific and social rationalities in climate risk management

The project is now called ICA-RUS
(Integrated Climate Assessment – Risks, Uncertainties and Society)



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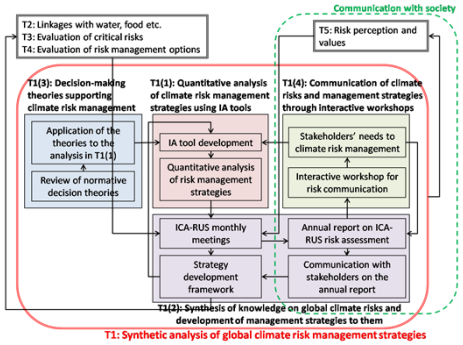
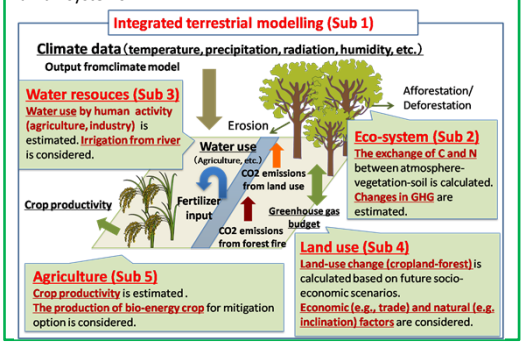
Theme 1: Synthesis of global climate risk management strategies

Theme 1 consists of four sub-themes. Sub-theme 1 has charge of quantitative part of the analysis using an integrated assessment model named AIM/Impact[Policy], which is going to be improved in ICA-RUS by incorporating impact functions and information on countermeasures provided by Themes 2-4, while Sub-theme 2 adopts more qualitative approach to organize monthly meetings for theme synthesis and publish annual reports on the ICA-RUS assessment. Sub-theme 3 reviews decision-making theories that are possibly relevant to global climate risk management and suggests how they could be applied to ICA-RUS's assessment. Sub-theme 4 continuously holds interactive workshops to communicate the climate risks identified in ICA-RUS to various stakeholders including policymakers and its findings based on the practical communication would be reflected to the ICA-RUS's assessment framework.



Theme 2: Optimization of land, water and ecosystem uses for climate risk management

Theme 2 mainly focuses the impact of climate change on different sectors separately, such as eco-system, water, food, and so on, but it is very important to investigate these phenomena in the integrated system of natural environment and human activities. In the present study, we develop an integrated terrestrial model which describes the natural biogeophysical environment as well as human activities. Currently we develop a model version of a terrestrial land surface physical model coupled with eco-system vegetation and water resources model considering human activities. Using the terrestrial integrated model, we perform historical simulations to validate the model performance under the present climate conditions. In the future, we investigate the interactions between the changes in eco-system services and water resources under warming conditions, and also explore the possible impact of climate mitigation policy on the natural and human systems.

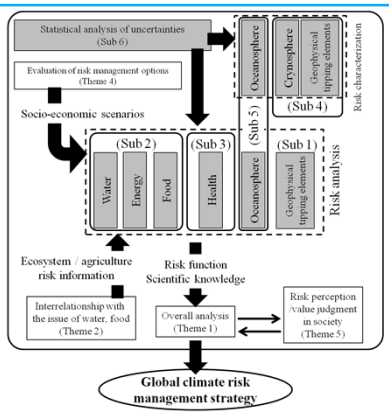


Theme 3 :Identification and analysis of critical climate risks

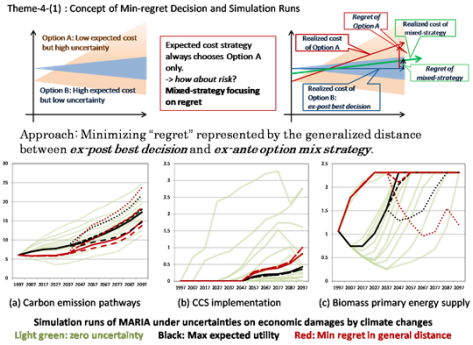
Theme 3 tries to comprehensively identify critical climate risks (the candidates of the climate change impacts that could be considered as the ones human should avoid) and analyze their magnitudes or characteristics and their development along the global climate change levels (e.g., global mean temperature increase), considering various uncertainties and social vulnerability.

Theme 3 consists of the following six sub-themes:

(1) Risk analysis of geophysical tipping elements and overall analysis for Theme 3
(2) Climate change risk analysis in water, energy and food sectors
(3) Climate change risk analysis in human health sector
(4) Climate change risk characterization around the cryosphere and overall analysis of geophysical tipping elements
(5) Climate change risk characterization around the oceanosphere
(6) Statistical analysis of the uncertainties in climate change risks



Theme 4: Evaluation of climate risk management options under technological, social and economic uncertainties



Theme 4 consists of the following four sub-themes:

(1) Development of integrated energy-economic model method focusing on the future uncertainties
Objective: Model development focusing on uncertainties of technological development strategy, climate change impacts, mitigation options, etc.
Progress: IAM preliminary runs with min-regret strategies (an example shown in the left)
(2) Gaming simulations focusing on the interactions of multiple decision makers with energy-economy model
Objective: Behavior simulations for the design of international institution
Progress: Preliminary multi-player CGE model development and literature review
(3) Expansion of integrated assessment models for the assessment of adaptation strategy and geoengineering options
Objective: Assessment and modeling of adaptation and geoengineering potentials
Progress: Preliminary assessment on aerosol scattering in the stratosphere, air capture with CCS and bioenergy with CCS (BECS) to identify the cost range and potential climate effects.
(4) Meta-level analysis on the adaptation potentials and costs and socio-economic scenarios
Objective: Assessment and meta-analysis of adaptation potentials
Progress: literature review and systematization

Theme 5: Interactions between scientific and social rationalities in climate risk management

Co-coordinating Scientific Rationality and Social Rationality: The Discussion Arena for Risk Management and Global Climate Change

Scientific results by ICA-RUS project should be informed to citizens as well as policy makers to establish an adequate countermeasure for climate change. What is the effective way to convey the results in order to enhance citizens' active behavior to prevent climate change? How to realize the public sphere to discuss the future directions? What is the best way to make the decision among stake holders? The aim of Theme 5 is to investigate these questions.

Theme 5 is divided into 3 sub-themes. Sub-theme 1 deals with the classification of social rationality and analysis of the characteristics of "Climate Change Problem" compared with the other problems. Sub-theme 2 deals with the classification of citizens focusing on the reaction to Global Climate Change. Sub-theme 3 evaluates the way of public engagements (an image shown in the right – from WWViews Japan held in 2009).