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Delineating future climate change impacts for cross-scale adaptation strategies: A case study of Japan

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comprehensive Research on Projection of Climate Change Impacts nd Evaluation of Adaptation

BACKGROUND

Adaptation as a cross-cutting policy issue

Climate-eco-human systems are fully coupled

Water environment

Agriculture & food security





→Compound risks, overlapping challenges

→New understanding of interconnections

Natural disasters



Ecosystem services & biodiversity



Human health, life, & activity



→Coping with climate change is multi-dimensional and multi-sectoral.

SSS

→ Towards a comprehensive, cross-scale adaptation pathway Comprehensive, robust, transdisciplinary adaptation solutions over space

> This study proposes a framework for harmonizing and mapping different climate change impacts at regional to national scales based on spatially explicit models.

Forward-looking reference

The framework assists future policy-making and spatial planning in Japan's climate change adaptation to 2100.

DATA USED

Indicator selection criterion: (1) Geographical coverage Data availability

• S-8 Project

- SI-CAT Project
- Regional Adaptation Consortium Project ۲



temperature precipitation rice yield risk of pine wilt disease probability of bamboo distribution economic losses caused by flood Impact indicators (7) probability of landslide heat-related excess mortality emergency carriers due to heatstroke



Climatic parameters (2)

Standard 3rd mesh data (1km)



Size: 385,188 meshes

METHODOLOGY









Correlation matrix MIRC	C5 RCP2.6	RiceYield	PineWilt	HeatMortality	HeatStroke	FloodDamage	Landslide	Bamboo	Temperature	Precipitation	
changing climate and multiple impacts	RiceYield	1.00	0.11	-0.01	0.03	-0.04	0.02	-0.05	0.21	0.20	-0.8
	PineWilt	***	1.00	0.06	-0.46	0.10	-0.11	0.75	0.06	0.27	-0.6
н	eatMortality	***	***	1.00	-0.15	0.03	0.02	0.11	-0.08	-0.03	-0.4
	HeatStroke	***	***	***	1.00	-0.09	-0.12	-0.66	0.38	-0.04	-0.2
Flo	odDamage	***	***	***	***	1.00	-0.03	0.13	-0.02	0.02	- 0
Т	Landslide	***	***	***	***	***	1.00	-0.06	0.01	0.05	-0.2
	Bamboo	***	***	***	***	***	***	1.00	-0.18		0.4
	emperature	***	***	***	***	***	***	***	1.00	0.89	-0.6
F	Precipitation	***	***	***	***	***	***	***		1.00	-0.8



Analogous impact maps in 2100





Homogeneous impact zones (HIZs)







The correlations and their strengths among different impacts can drive the direction of co-occurrence.

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Non-HIZ Areas





Regional heterogeneity for cross-cutting adaptation planning



spatial co-occurrence of multiple impacts at the regional scale

FINAL REMARKS

Based on spatially-explicit solutions, this study presented scenario-based blueprints for analyzing future multi-sectoral climate change impacts and further advancing adaptation planning in the context of Japan.

Summarization

- Exploration of the interconnection of changing climatic parameters and impact indicators;
- Identification and characterization of diverse future impacts' co-occurrences under different scenarios;
- Novel methods to account for spatial dependence and heterogeneity in multiple climate change impacts and their relationships.



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Thank you for your time and attention.

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Look forward to your questions and comments.

Presented by Fei Liu

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Reference:

F. Liu and Y. Masago*. Spatial heterogeneity of future climate change impacts and cross-cutting strategies for Japan.

Global Environmental Change. (submitted)