Abstract

[Project Information]

Project Title :	Projection of Climate Change Impacts and Evaluation of Adaptation Options for Agriculture, Forestry, and Fisheries
Project Number :	JPMEERF20S11820
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Keywords :	Common Climate Scenarios, Crop Yield and Quality Projections, Heat Stress in Livestock, Assessment of Multifunctional Roles of Forests, Assessment of Fishery Resources

[Abstract]

This project aimed to assess the impacts of climate change and the effectiveness of adaptation strategies across agriculture, forestry, and fisheries in Japan using a unified set of high-resolution climate scenarios. By applying consistent scenarios across sub-themes, the project provided scientifically grounded, spatially detailed, and quantitative projections of climate change impacts and potential adaptation effects tailored to different regions and commodities.

In Sub-theme 1, crop-specific yield and quality models incorporating new experimental findings and historical data were used to project future impacts and adaptation effects for rice, soybean, vegetables, and fruits. High-temperature damage models were applied at regional and national scales, and 1-km resolution suitability maps were developed for temperate fruits. Additional studies addressed the impacts of extreme heat events, such as the unprecedented 2023 summer, and analyzed global food security risks under climate change.

Sub-theme 2 focused on livestock, evaluating climate impacts and adaptation measures for dairy cattle, laying hens, and finishing pigs. Using 1-km resolution climate data under SSP1-2.6,

SSP2-4.5, and SSP5-8.5 scenarios, physiological responses and productivity losses due to heat stress were modeled and experimentally validated.

In Sub-theme 3, models were developed to predict the effects of climate change on plantation forest growth, mountain disaster risks, and tree species adaptation. National and regional models projected changes in cedar growth, landslide risk, and genetic suitability of cedar provenances. These were integrated to formulate adaptive forest management and optimal provenance selection guidelines under future climates.

Sub-theme 4 addressed marine fisheries and aquaculture, developing oceanic datasets and forecasting tools. The study quantified shifts in fishing seasons and grounds for bottom-trawl fisheries in coastal regions and projected future changes under climate scenarios. For aquaculture, growth models for wakame seaweed were developed and validated in Sanriku and Naruto regions. Adaptation strategies, including seed release for abalone, were also assessed for rocky reef ecosystems.

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