

## Global and regional integration of social-ecological study toward sustainable use of biodiversity and ecosystem services

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The expanding global economy has accelerated losses of biodiversity and multiple ecosystem services through global climate changes and rapid land/sea use changes, which are especially pronounced in Asia. Establishing sustainable use of biodiversity and ecosystem services is highly needed though activities like environmental stewardship cultivated through co-design, co-production and co-management activities at both local and global scales. However, scientific knowledge is still limited to plan and execute effective management activities at these respective scales with the presence of bottlenecks such as the lack of fine-resolution information of the distribution of biodiversity, the high degree of variability in biodiversity and ecosystem services across multiple environmental gradients, insufficient understanding of the importance of interconnectivity among different ecosystem types (e.g., terrestrial-coastal interactions), lack of scientific knowledge within local communities about the status of biodiversity and ecosystem services, and due to insufficient communication among stakeholders and local citizens with different interests and demands.

A transdisciplinary project on "Belmont Forum Collaborative Research Action on Scenarios of Biodiversity and Ecosystem Services" has started since April 2015 (for the period of 2 years) by a group of international scientists. The project, entitled as TSUNAGARI (Trans-System, UNified Approach for Global And Regional Integration of social-ecological study toward sustainable use of biodiversity and ecosystem services) aims to build a network of researchers to address the above-mentioned problems of decision-making processes for the sustainable use of biodiversity and multiple ecosystem services in Asia. The project consists of the following 4 main objectives; (1) Establishing methodologies to integrate fine-resolution spatial information of ecosystems to a broad-scale database for the improvement of precise evaluation of biodiversity and multiple ecosystem services. (2) Examining and understanding scale-dependency in the effects of multiple human-induced drivers on variability in biodiversity and multiple ecosystem services, and in the decision-making processes of biodiversity and multiple ecosystem services use by societies at various levels. (3) Evaluating the importance of ecosystem connectivity (from forest to marine ecosystems) on the variability and changes in biodiversity and multiple ecosystem services, and investigating how connectivity affects the interactions among local communities at different sites within a watershed, and on their decision-making. (4) Developing new indicators and models for scenario analysis to achieve sustainable biodiversity and multiple ecosystem services use based on feedbacks between ecological and socioeconomic sciences using outputs of above-mentioned objectives.

By overcoming the major bottlenecks in biodiversity and ecosystem services research and in their management, the outcome of this project will contribute significantly to conservation and sustainable management in Asia-Pacific regions, both for academic societies and for practitioners to advance their decision-making processes at multiple levels (from local community to international levels).

**Keywords:** Ecosystem connectivity, Scenario analyses, Biodiversity footprint, Co-management, Land-use change, Multi-spatial scale interactions