

## Multiscale stewardship for water-food-energy nexus

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Water, energy, and food are fundamental resources for human beings and sustainable society with livelihood including agriculture and industries, and these resources are interlinked each other beyond the boundaries of single resource management. Therefore, integrated management and governance for water-energy-food (WEF) nexus is important by increasing synergies and reducing trade-offs among the three resources, environment/society/economy factors, and local/national/global scale. However, there are many disconnections of governances between not only three resources and different spatial scales, but also between sectors of production and consumption, and agencies of protection of environment and development of economy. Who should take responsibility of stewardship for multiscale water-food-energy nexus ? How to manage the tradeoff between carbon footprint as global environmental impact and water footprint as local environmental impact through multiscale WEF nexus ? Belmont Forum SUGI project “METABOLIC” has been analyzing the multiscale WEF nexus for sustainable resources management. Scenario and impact assessments by using system dynamics model and footprints analyses have been made for understanding how each area is inter- and intra- connected on WEF nexus by using three databases of resources, interlinkage, and scenario in multi-spatial scale. Analyses of the change in WEF nexus structure also have been made, and assessments of the changes in three resources, carbon emission, environmental and economic impacts are analyzed. These analyses with stakeholders can help to make future policies for sharing the roles of governance, land intensive policy and others to increase synergy for sustainable future.

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