SEAMEO SEARCA
KC3 SEARCA
Vol. 2 No. 6
ISSN 2225-9694

AGRICULTURE AND DEVELOPMENT NOTES
CLIMATE CHANGE ADAPTATION

# Watershed Management and Governance in a Changing Climate

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*Watersheds are critical to economic development and environmental protection in Southeast Asia. Thus, managing them effectively is a key in the pursuit toward sustainable development. Watershed management, however, is a complex decision-making process. The threat brought by climate change further puts stress on the already-stressed watersheds in the region, and would further complicate the already-complex process of watershed management and governance. Extensive research is therefore needed to provide an empirical database that will predict the future changes in watersheds. An integrated watershed management framework must also be developed to synchronize the development of all land and water uses. The roles of multiple stakeholders involved in watershed management and governance should be harmonized in order to achieve effective watershed management and governance in a changing climate.*

A watershed is a physical system that extends from the mountain ridge all the way to the coastal area. It is a continuum of ecosystems and landscape units encompassing human and natural systems that are critical to economic development, environmental protection, and to the security of human well-being. Watersheds underpin the security of agriculture and fishery, public health, commercial industry, energy and transport, as well as recreation and tourism.

However, human activities such as upland agriculture, land conversions, destructive mining, and illegal logging, among others, have caused the degradation of watersheds in Southeast Asia, particularly in the Philippines. At present, the Philippines is experiencing the adverse impacts of watershed degradation as evidenced by the occurrence of soil erosion, siltation, and loss of biodiversity, which have already resulted in calamities such as wetlands and marine ecosystem destruction, flooding, water shortages, fishery decline, and other agricultural losses.

Watersheds are also likely to be affected by climate change. Climate conditions indicate that extreme weather events are expected to increase. Tropical cyclone intensities, variability of precipitation, extreme rainfall and temperature events, as well as rise in sea levels are all expected to increase. All of these will impact on watersheds due to the enhanced hydrologic cycle, which will consequently cause more rains and runoffs, and increase the probability of flood. Conversely, the increasing variability or seasonality of precipitation resulting from climate change would lead to further problems related to water shortages and droughts.

Compounded by the threat of climate change, the problem in the current state of watersheds in the region can ultimately lead to economic losses and worsening human welfare. Thus, effective watershed management and governance is critical in addressing the imminent threat posed by climate change and in society's pursuit of sustainable development.

**Challenges in Watershed Management and Governance**

Watershed management and governance, however, remains a challenge for a number of complex reasons.

Photo by Jong Buenafe

For one, *watershed management is multi-objective.* Thus, it needs to address many different types of goals and objectives. Intervening in the process of the watershed is difficult without entailing the unwanted impacts or economic externalities. Options and trade-offs must be weighed judiciously in the decision-making process such that the array of goals of watershed management can be attained at a desirable level.

Furthermore, *watersheds are composed of a conglomeration of many different ecosystems,* which makes the ecosystems difficult to manage if watersheds are used as the base unit for managing and planning. A particular watershed does not provide only one ecosystem service, but a variety


Photo by Khant Zaw | Myanmar

of environmental services coming from different ecosystems that can be found inside the watershed. These ecosystems are intricately linked to one another and are invariably vulnerable to climate change and non-climate stressors. The challenge therefore is how to manage the watershed in an integrated and comprehensive fashion to promote the robustness of the various ecosystems in the watershed and the sustainability of ecosystem services.

*Watersheds also encompass many different local government units (LGUs), settlements, and natural ecosystems, which make the decision-making process a problem.* For instance, the LGUs in the upstream watershed will have greater responsibility to ensure that rich ground water resources are maintained at the sufficient level such that the water supply flowing downstream will be maintained. As the LGUs at the upstream are located at the most critical parts of the watershed, they have to consider their huge responsibility in preserving the integrity of the watershed when formulating their respective locales' development agenda. On the other hand, although the LGUs located downstream have less direct power to decide how to manage upstream areas, they have an equally vital responsibility to provide support in protecting the watershed or they will have to content themselves with the kind, quality, and amount of water that it gets from the upstream watershed.

The quality of watershed management from the upstream accordingly affects natural systems and development in the areas downstream. Watershed managers, therefore, must consider the complexities of the drivers and impacts of watershed degradation into the kind of governance that will be established. Thus, the different government units located at the different parts of the watershed must synchronize their roles in managing the watershed.

Considering that watershed governance is already a complex decision-making process, adding the threats imposed by climate change into the process would further make watershed governance more challenging.

## Watershed Management in Climate Change

Human activities, economic factors, and population increase are the direct drivers of watershed degradation. Digging deeper, however, the fundamental causes of watershed degradation lie in poor policies and weak governance. Failing to enforce environmental regulations, lack of public information and awareness, absence of integrated land use and management plans, and inequity in the access to resource and benefits from the watershed aggravate the existing issues that directly contribute to watershed degradation.

Thus, to have effective watershed management strategies, *an integrated watershed management framework must be developed.* The framework needs to consider the trans-boundary nature of physical and human systems within a watershed, thus the legal and institutional arrangements should go beyond the traditional geopolitical boundaries. The framework should also accommodate land-water interactions such that land and water developments for the upstream and downstream parts of the watershed are synchronized. Watershed management is no longer a domain of any single discipline, thus, policies should be made in accordance with these interactions.

*Investments in long-term watershed research must also be sustained* in order to develop an empirical database for more effective information, education, and communication initiatives about watersheds. The comprehensive database of empirical information about the geophysical, socioeconomic, and biological characteristics of a watershed is foundational to the understanding of the various natural and social processes in the watershed that is essential to science and evidence-based management and policy decisions.

Successful watershed management also entails *multi-stakeholder governance.* Multi-stakeholder governance is the type of governance and management system that engages the stakeholders from the different topological zones of the watersheds (i.e., upstream, midstream, lowland, and coastal system) in the decision-making process. However, the stakeholders must have meaningful participation in managing watersheds and not just participate for the sake of getting better resources. They must be engaged in the whole scheme of management activities—from planning, goal-setting to implementation and monitoring.

Managing and governing watersheds effectively is highly critical, particularly in this age where climate change is upon humanity. The character of management however, must not only consider the characteristics and conditions of watersheds, but also address the prevailing and emerging challenges in watershed governance.

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*This article is based on the presentation of the author during the Executive Forum on Natural Resource Management "Watershed Governance in the Context of Climate Change: Tenure and Policy Reform Processes" jointly offered by the Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA), Regional Community Forestry Training Center (RECOFTC), and ASEAN Social Forestry Network (ASFN) on 6–10 August 2012, SEARCA, Los Baños, Laguna, Philippines.*

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Adaptation in Agriculture and Natural Resource Management in Southeast Asia

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