SEAMEO SEARCA
ISSN 1656-8818
Policy Brief Series
2014 - 2

Watersheds in a Changing Climate: Issues and Challenges

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Watersheds are a landscape of interconnected ecosystems, and it is in the abundance of ecosystems that watersheds derive its importance due to the vast array of ecosystem services that it provides to humanity.

A sustainable watershed is a resilient watershed. In a sustainable watershed, the mechanisms involved to sustain the ecosystems within it are working properly. These mechanisms include soil conservation, water conservation, biodiversity conservation, and climate change mitigation.

Humanity benefits from sustainable watersheds in many ways. A sustainable watershed minimizes flooding; enables water and power sufficiency; and provides vibrant business and industry, healthy population, and productive farmlands. All of these benefits translate to income and welfare gains for society. Ironically, it is also those who benefit from watersheds—the people—who contribute immensely to the degradation of watersheds.

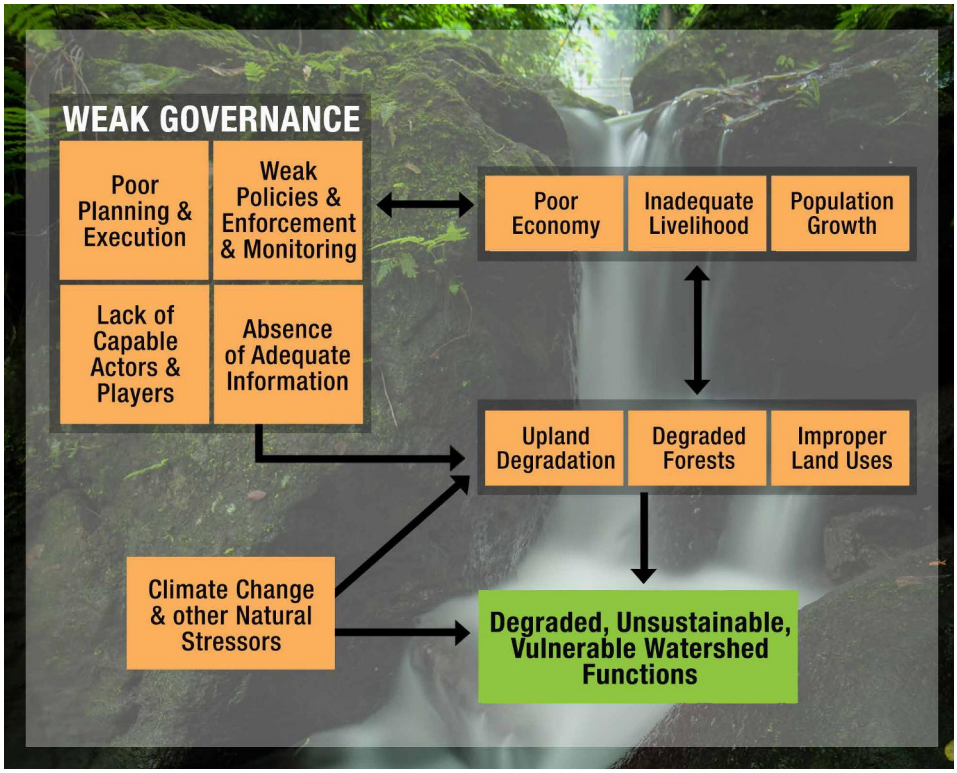

Figure 1. Fundamental causes of watershed degradation

Human and Natural Stressors

There are two kinds of stressors that put watersheds under stress: human stressors and natural or climate-induced stressors.

Human stressors are those impacts that are triggered by human activities, population increase, and other economic factors. Human activities that contribute to the degradation of watersheds include upland agriculture, land conversions, human-induced soil degradation, destructive mining, and illegal logging.

Furthermore, the increased demand for food and water, increase in population density in the river basin, and increase in poverty incidence resulting from population growth adversely affect watersheds. All of these impact on watersheds, as the resources that can be found in the watershed are used to service the increasing population.

Economic factors not only constrain opportunities for viable livelihood but also hinder watershed users from adopting conservation-effective technologies due to the costs that entail their usage. Examples of these economic factors are poor infrastructure and insufficient capital assets.

However, the fundamental causes of watershed degradation lie in watershed managers' weak governance (Figure 1). Such weak governance is evident in poor planning and execution of land use and management plans; multiple and overlapping government agencies involved in watershed management; weak policies, enforcement, and monitoring; lack of capable actors and players; absence of adequate

information; and undervaluation and under appreciation of watershed resources.

Meanwhile, ***natural*** or ***climate-induced stressors*** are manifested through higher evaporative demand; decrease in runoff to surface water supply; lower recharge into groundwater; extended drought and flood; saltwater intrusion and coastal flooding; and increased runoff, siltation, and urban runoff, among others. These manifestations may consequently lead to species becoming out of range. They may also result to alteration of species composition, distribution, and interactions; alteration of fruiting and flowering; pest and disease outbreak; species loss; alteration of ecosystem functions and services; and changes in the quality and area of forests and other critical habitats.

All in all, climate change may alter ecosystem functions and services. However, even without climate change, many watersheds in Southeast Asia are already compromised. As such, the threats posed by climate change could worsen the condition of damaged watersheds in the region.

Some Impelling Considerations in Watershed Management

There are certain issues that need to be considered to ensure that watersheds are managed effectively. These considerations serve as guiding principles when implementing interventions and mechanisms related to watershed management.

1. ***Sustainable watersheds and water resources are vitally linked to major development concerns.*** As such, watersheds must be properly managed to promote sustainable terrestrial, aquatic, and marine ecosystems; sustainable agriculture and fishery; poverty eradication; food security; water security; energy security; livelihood and community development; climate change adaptation, mitigation, and disaster risk reduction; and public health.

2. ***Sustainable watershed management is key to national and local development programs.*** Development officials and policy makers should be conscious about the vital connection between watershed management and development. The disjointedness happens when policy and decision makers fail to appreciate the value of watersheds to development and when watershed programs and development lack synergy and coordination.

3. ***Watersheds are not only about water conservation; it is also about cultural, environmental, and ecological integrity.*** Effective watershed management is one of the solutions to humanity's problems with climate change mitigation, adaptation, and disaster risk reduction; biodiversity conservation; and community and livelihood development.

4. ***The continuing growth in the demand for water for agricultural, domestic, environmental/ecological, and commercial/industrial uses must be considered*** in watershed management.

5. ***The increasing climate and non-climate related stressors on watersheds are all going to put pressure on watersheds*** as humanity continues to exploit the resources in it.

6. ***Greater participation of local government units (LGU), local communities, private sector, and other stakeholders in watershed governance is needed*** in terms of planning, execution, and monitoring of plans and in searching for workable mechanisms for stakeholder participation.

7. ***There is a weak link between science and policy and management decisions.*** Decision makers employ instead the intuitive approach to decision making, while the excessive politicizing of policy/management decisions further aggravate the process. Specifically, decision making in watershed management becomes problematic as it is plagued with issues, namely: (1) limited site-specific research and empirical data, (2) limited understanding of the watershed dynamics, (3) poor communication of research results to policy makers and manager, (4) waning responsiveness of research to current and emerging needs, and (5) the differences in the time scales of science and policy makers.

8. ***Watershed management is complicated and problematic due to governance issues*** in terms of leadership and financial constraints.

Since watershed management plays a key role in achieving development goals, efforts should be made to address the issues and challenges in watershed management. According to FAO (2007), nurturing watersheds is a collective responsibility. Watershed management thus requires the participation of all stakeholders—forest users, farmers, landholders, local government, and line agencies, among others.

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Additional reference:
FAO. 2007. *Why invest in watershed management?* Rome, Italy. Retrieved from http://www.fao.org/docrep/010/a1295e/a1295e00.htm

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