Negotiation-support toolkit for learning landscapes

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22 | Participatory water monitoring (PaWaMo)

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Participatory Water Monitoring (PaWaMo) involves local community members in measuring and monitoring water flow using several simple quantitative indicators. These indicators can be used as an index for assessing and comparing the patterns of relationship between river flow and rain as a basis for monitoring changes of hydrological functions at sub-watershed level.

Introduction

Well-maintained watershed functions are caused by well-managed river flows, especially when supported by social institutions that maintain a balance between individual and public interests. Today, people increasingly realize that by planting trees with economic value in their agricultural system they are also maintaining watershed functions at the same time because trees help stabilise hill slopes as well as prevent soil loss through erosion and water flow. However, issues related to watershed management are not only a matter of planting an amount of critical land with trees. Watershed management has different dimensions and each problem requires a different approach.

Overcoming problems of landscape management requires open communication between everyone involved (researchers, community members and government policy-makers) leading to negotiation and agreement in joint rehabilitation actions. Integrated understanding about a watershed and its characteristics is required to inform these processes, including 1) the interaction between landscape and rainfall; and 2) the landscape as water organisms' habitat functioning as an indicator of water quality and pollution levels.

Objectives

PaWaMo is a way of answering 1) how local communities and scientists together can assess the 'weak points' of a landscape that greatly affect the circumstances of downstream areas; 2) how to monitor sediment in river water; 3) what are the physical and chemical characteristics of a river's water; and 3) how to use water organisms to assess the quality of a river?

Steps

Watershed functions can be looked at in two ways: 1) supply aspects, which consist of river-water quantity (discharge), time, river-flow quality; and 2) demand aspects, which consist of availability of clean water and prevention of floods, landslides and mud puddles (Figure 22.1). Limited access to clean water is a main determinant in poverty and poor health. The problem of insufficient and untimely water supply for downstream communities can be dealt with using two approaches.

1. Technical approach, usually applied in the river body in the middle of a watershed through, among other means, increasing water flow to prevent flooding in critical areas, building dams or reservoirs as temporary water holders and/or building pipelines or water catchments (ponds, water towers) to distribute drinking water from upstream to downstream consumers.
2. Land-use approach in upstream areas, that is, by designating forests as protected and/or managing land in view of buffered water delivery.

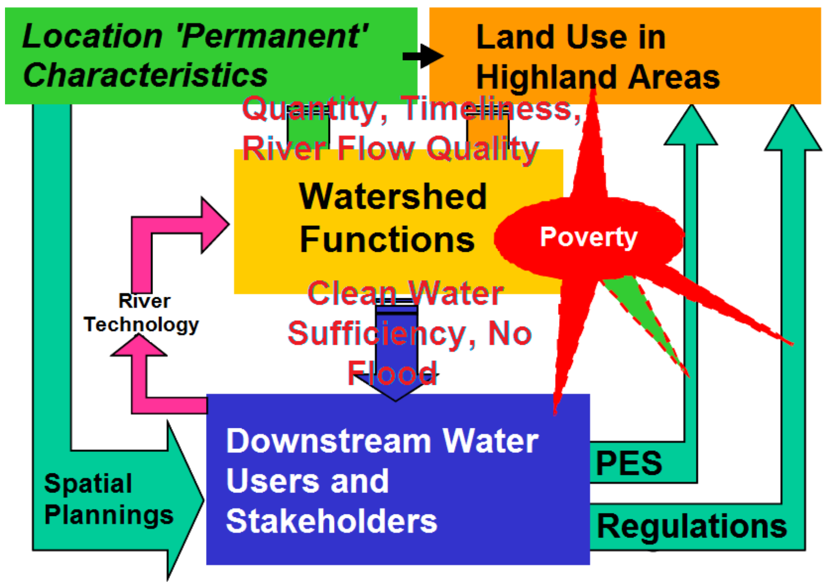

Figure 22.1. Reciprocal relations in a watershed

Note: Between 1) upstream areas that provide watershed functions in terms of quantity, time and quality of river water; and 2) area characteristics, both permanent (such as geology and topography) and non-permanent (such as land-use types and their impacts on downstream areas). PES = Payments for Environmental Services

Case study: water quality biomonitoring in Way Petai, Sumberjaya, Lampung province, Indonesia

Conversion of forests to shrubland, coffee gardens and rice fields in the Way Besai watershed, Sumberjaya, Lampung province, Indonesia, has reduced water quality. Biomonitoring activities using macroinvertebrates were performed in the upstream part of the Way Petai River—one of the Way Besai tributaries—to assess the impact of land-use conversion on water quality.

Six sample plots in forests, shrubland, coffee gardens and rice fields were established along the Way Petai River during the wet and dry seasons in 2005. The result of data observation and analysis based on the Family Biotic Index is shown in Figure 22.2.

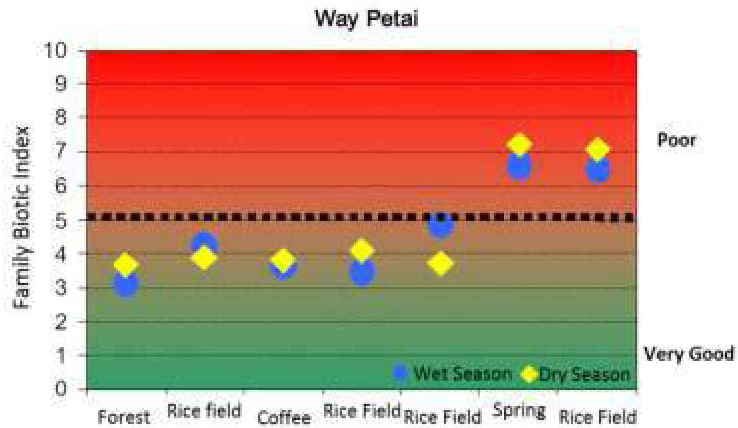

Figure 22.2. Water quality in upstream part of Way Besai River based on Family Biotic Index
Source: Andy Dedecker and Ans Mouton (dry season 2005 data); Indra Suryadi (wet season 2005 data)

Figure 22.2 shows that the quality of river water flowing through the forest is better than that in rice fields and coffee gardens. As for the spring, the water quality was classified as poor because of human use of the water for washing and bathing. In addition, the spring was located near a traditional market and rice fields, so that market garbage and pesticide residues from the fields contaminated the river near the spring. The bad water quality around the spring affected the water quality in the rice fields that were located downstream from the spring. Water quality during wet seasons was nearly equal to dry seasons.

Key reference

Rahayu S, Widodo RH, van Noordwijk M, Suryadi I, Verbist B. 2013. *Water monitoring in watersheds*. Bogor, Indonesia: World Agroforestry Centre (ICRAF) Southeast Asia Regional Program.

The landscape scale is a meeting point for bottom–up local initiatives to secure and improve livelihoods from agriculture, agroforestry and forest management, and top–down concerns and incentives related to planetary boundaries to human resource use.

Sustainable development goals require a substantial change of direction from the past when economic growth was usually accompanied by environmental degradation, with the increase of atmospheric greenhouse gasses as a symptom, but also as an issue that needs to be managed as such.

In landscapes around the world, active learning takes place with experiments that involve changes in technology, farming systems, value chains, livelihoods' strategies and institutions. An overarching hypothesis that is being tested is:

> Investment in institutionalising rewards for the environmental services that are provided by multifunctional landscapes with trees is a cost-effective and fair way to reduce vulnerability of rural livelihoods to climate change and to avoid larger costs of specific 'adaptation' while enhancing carbon stocks in the landscape.

Such changes can't come overnight. A complex process of negotiations among stakeholders is usually needed. The divergence of knowledge and claims to knowledge is a major hurdle in the negotiation process.

The collection of tools—methods, approaches and computer models—presented here was shaped by over a decade of involvement in supporting such negotiations in landscapes where a lot is at stake. The tools are meant to support further learning and effectively sharing experience towards smarter landscape management.

World Agroforestry Centre
ASB Partnership for the Tropical Forest Margins
AARD
Federal Ministry for Economic Cooperation and Development
Norad
IFAD Enabling poor rural people to overcome poverty
CGIAR Research Program on Forests, Trees, and Agroforestry