Review: Connecting watershed services, livelihoods and human security

Water and watershed services make an essential contribution to meeting all of the Millennium Development Goals and for human well-being in general. However, attempts to demonstrate their economic significance in specific places have brought attention to complex and dynamic relationships that exist between land use, water and livelihoods and that are difficult to quantify. They have also highlighted conflicts between multiple objectives of water and watershed management that cannot all be resolved by planting trees. Various aspects of this are illustrated in a collection of case studies recently published in a special issue of EFTRN on Forests, Water and Livelihoods (edited by Meine van Noordwijk and Erika van Duyl) and some of which are highlighted below.

For example, in Lake Singarak, West Sumatra, van Noordwijk conducted a rapid appraisal identifying trade-offs between multiple objectives that included : maintaining the lake at a sufficient level to support hydropower production, maintaining productive agriculture in the hillsides, using water to irrigate rice fields in the plains, and maintaining water quality. However, the influence of land cover on hydropower production is much smaller than normal year-to-year variation in rainfall. Other trade-offs are that any increase in water availability as a result of land degradation would be offset by a reduction in water quality and that reforestation with fast growing evergreen trees would reduce water availability. Therefore, delivery of watershed services provides a weak rationale for payments by the hydropower company to the local government.

As discussed in other ETFRN case studies (by Palmer; Chappell and Bonnell; Enters and Durst), whether forest cover increases the amount of rainfall infiltrating the soil depends on soil conditions. Whether or this water is then released to streams, thus maintaining a steady flow, or is evapo-transpired (consumed by vegetation) , depends on the depth of vegetation roots compared with the depth of underlying aquifers. Water that reaches streams can be reserved for instream flow or diverted for other uses. However, increased infiltration that is entirely consumed by vegetation, i.e. *green water*, may also support rain-fed agriculture as well as maintaining wildlife habitat. Furthermore, while reforestation projects may consume more water in the short-term, they are likely to consume less in the long-term as vegetation matures. Whether or not any of this makes a significant difference in stream flow depends on conditions across the landscape.

Given the difficulty of balancing priorities, trade-offs are often avoided and not even fully understood until a disaster exposes vulnerabilities and lack of capacity to respond . It can be convenient to attribute damages to logging, which may well be a contributing factor. However, when the finger is pointed at any one single cause of a complex problem, it also diverts attention from other more controversial measures that are necessary to reduce vulnerability. It may also reflect land use conflicts between downstream and marginalized upland populations, as is seen in the Viasayas (Philippines) case study by Soriaga.

In Eastern Luzon (Philippines), logging may have been a contributing factor to the catastrophic flooding that occurred in 2004. However, according to the case study by Walpole, much of the damage was the result of tree plantations being uprooted from flood plains, and of people and infrastructure being in harms way. Addressing these sources of vulnerability in advance would require the identification of land for relocation of displaced communities. This would in turn

require recognition or reallocation of land and water rights, changes in infrastructure, and the resolution of conflicting local livelihood needs and more powerful external interests. Livelihoods (as well as management of watersheds), rely not only on regular flows of fresh water and sediment. They also depend on relationships between people, through which ecosystem goods and services are managed and exchanged, and on flows of information that inform decisions about trade-offs (Moench and Dixit 2004). By asking the right questions instead of attempting to implement standardized approaches, watershed management problems can be understood in the context of multiple and often conflicting values and criteria that actually drive land use decisions (Verbist and van Noordwijk).

Together, these case studies illustrate a learning approach that is necessary to adapt to a rapidly changing environment. Although this approach takes more time, Van den Berg considers that it can also clarify obstacles to meeting livelihood needs. It can also lead to different and more effective kinds of responses – which are illustrated in other case studies not discussed here. The alternative is to learn the hard way, as and when disasters occur.

References and further information

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Feedback and Commentary

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