Forests and water

Humans and other living things depend on water for life and health. Yet the World Health Organization reports that about 80 percent of the world's people live in places where the only available water is unsafe. Water-related problems such as overuse, scarcity, pollution, floods and drought are an increasingly important challenge to sustainable development – as the United Nations recognized in declaring 2005–2015 the "Water for Life" Decade.

Forested catchments supply a large proportion of all water used for domestic, agricultural and industrial needs. The availability and especially the quality of water are strongly influenced by forests and thus depend on proper forest management. The amount of water used by forests is also an issue of concern, particularly as the world increasingly looks to planted forests for carbon fixation, energy and wood supply and landscape rehabilitation.

To introduce this issue of *Unasylva*, I. Calder and co-authors appraise the state of knowledge of forest and water interactions and related policy issues. They emphasize the need to narrow the gap between research and policy-making and the importance of policy linkages between the forest and water sectors. They also stress the need for sound valuation of hydrological and other forest services.

Riparian vegetation has an important role in filtering sediment and pollutants. Bamboo is sometimes planted in tropical riparian areas to conserve soil and water. However, in a study in the Lao People's Democratic Republic, O. Vigiak *et al.* found that bamboo was less effective for this purpose than native grass; they recommend a grass strip alongside bamboo stands to enhance the trapping of sediments.

In Peninsular Malaysia, the criteria and indicators system used to certify tropical natural forests includes standards for protecting water. N.A. Chappell and H.C. Thang single out the most important of these standards – a 10 m buffer zone along streams and rivers where no forest operations are permitted – and consider its applicability to forest plantations and agroforestry systems.

The relation of forests and water in arid and semi-arid lands raises different problems. Availability of water is usually the main factor limiting natural distribution of trees in arid lands. M. Malagnoux, E.H. Sène and N. Atzmon examine strategies for reversing environmental degradation and desertification in drylands including afforestation, sand dune fixation, establishment of green belts and reserving areas for natural regeneration. They note that trees should only be planted where necessary and where the water balance allows.

The Tigris and Euphrates watershed is vital for the water balance of four countries in the Near East, where competition for water is increasingly a source of conflict. H.M. Kangarani and T. Shamekhi analyse the relations among forest, water and people to be considered in developing policies and collaboration for integrated conservation and management of forests and water in the region.

Mount Kulal, in northern Kenya, rises at the centre of one of the driest regions of East Africa. Capped with mist forest, it provides important hydrological services for the surrounding region. T.Y. Watkins and M. Imbumi examine the role of this unusual ecosystem as a source of water and natural resources which support local livelihoods. In Uganda, F. Kafeero postulates that the lowering of water levels in Lake Victoria has exacerbated deforestation, as reduced hydropower generation impels the population to rely on woodfuel for energy.

Forests also have a vital role in ensuring safe, clean water for urban populations. S. Stolton and N. Dudley note that more than one billion city-dwelling people lack access to clean water. Many of the largest cities in the world protect forests to help ensure a sufficient supply of freshwater for their inhabitants – in some cases through payments for environmental services.

Climate change adds to the complexity of the forest–water relationship. T. Stohlgren, C. Jarnevich and S. Kumar examine the many interacting factors that must be considered in trying to predict changes in water availability. Using examples from research in Colorado, United States, they trace the interrelatedness of mountain forest hydrology with climate change, previous land use histories, altered disturbance regimes (e.g. fire frequency, insect outbreaks, floods) and invasive species.

In South America, the loss of Andean cloud forests, particularly through conversion to agriculture, has upset the hydrological cycle and exacerbated landslide and flood damage related to El Niño. M. Fernández Barrena and co-authors analyse the viability of a system of payments for environmental services to mitigate the effects of El Niño through conservation of forests, soil and water in the Piura watershed of Peru, noting that such a system could also help improve the living conditions of peasant farmers in this mountain region.

Lastly, P.C. Zingari and M. Achouri look at progress in implementing policies, planning and management initiatives in the five years since an international expert meeting held in Shiga, Japan in 2002 brought forest and water interactions into the international spotlight. Examples show a clear trend towards stronger links in forest and water resource management at the global, regional and national levels.

Foresters and water management specialists are cooperating more closely than ever before, but their exchange of expertise could be developed further. Informed decisions about integrated forest and water management depend on applied research and its dissemination to policy-makers. With this issue of *Unasylva* we hope to enhance the flow of information, knowlege – and safe water.