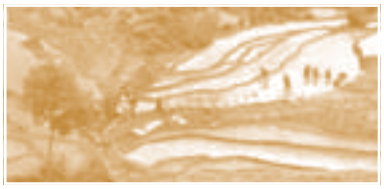
MATTERS OF SCALE

Watershed management can be implemented at scales that range from small upland watersheds to entire river basins. Most watershed management programmes focus on relatively small territorial units, however, generally corresponding to sub-watersheds. As these small-scale pilot projects have a limited impact on the larger watershed or river basin, the scaling-up of successful local experiences is a critical challenge for watershed management programmes. This is further complicated by the technical difficulties of extrapolating information and experiences from small watersheds for application in major watersheds or river basins.



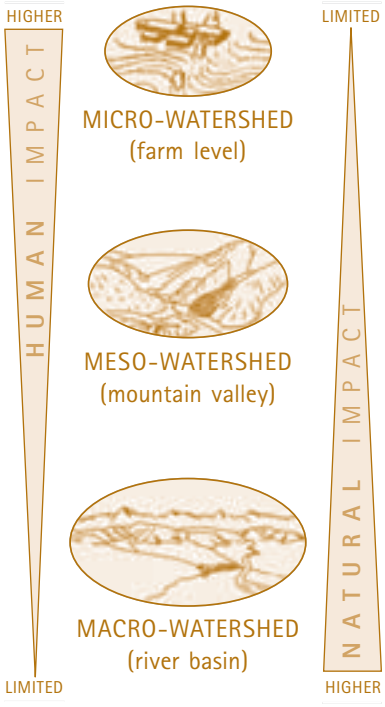
Top: A farm-level micro-watershed in Nepal
Bottom: A meso-watershed in the Swiss Alps

Opposite page: A macro-watershed in the eastern Peruvian Andes

HUMAN VERSUS NATURAL IMPACTS ON WATERSHED PROCESSES: A MATTER OF SCALE

According to their size, watersheds can be classified as "micro" (less than 50 km^2), "meso" (from 50 to 20 000 km^2) or "macro" (bigger than 20 000 km^2) scale. Although the lower and upper limits of these three watershed categories are arbitrary, this classification is useful to assess within a watershed the potential impact of human activities (such as farming, forest harvesting, grazing, etc.) compared with that of natural events (such as geological movements or extreme weather events). Research has shown that in micro-scale units the impact of human activities on watershed processes tends to be higher than that of natural events. In meso-scale units, natural processes are as critical as human factors. This makes meso-watersheds particularly vulnerable to environmental degradation. Finally, in macro-watersheds (i.e. river basins), the site-specific effects of human-made interventions are overwhelmed by the dimension of the natural processes involved. In particular, floods and other extreme events occurring in alluvial plains depend on major and long-term geological and climatic processes and should not be attributed to inappropriate watershed management practices upstream.

Source: Based on G. Ives and B. Messerli. 1989. *The Himalayan dilemma. Reconciling development and conservation.* London and New York, Routledge.



Top: An upstream Himalayan watershed in Nepal
Centre: A terraced watershed in the Middle Hills of Nepal
Bottom: Crossing a river in the Terai lowlands, Nepal

The optimal scale of a watershed programme depends on several factors, including the watershed's strategic value, the existing demand for watershed services, the ecosystem situation, disaster risks, local stakeholders' priorities, and the financial and technological resources that are available. The nature and size of the final expected impact should be consistent with the scale of the programme. Local programmes should also consider the "big picture" of upstream/downstream linkages within the whole watershed and river basin. This is best achieved by addressing major watershed management programmes as a "mosaic" of site-specific projects that share a common institutional, methodological and operational framework.

To manage the river basins shared by more than one country, strong international and subregional fora for discussing and negotiating upstream and downstream interests and priorities are needed. In several areas of the world, transboundary watershed management agreements are becoming important mechanisms for regional integration, based on synergy among national agencies and ruled by ad hoc international bodies. Exchange of knowledge and experiences among the countries that share a river basin is often instrumental in the development of a common policy framework, and facilitates long-term commitment and continual and consistent funding from international institutions and donors.

TRANSBOUNDARY WATERSHED MANAGEMENT AND REGIONAL INTEGRATION IN WEST AFRICA

At 4 200 km, the Niger is the third longest river in Africa; its basin is the ninth largest in the world, with 2.2 million km^2 of surface. It is an important asset for nine West African countries – Benin, Burkina Faso, Cameroon, Côte d'Ivoire, Guinea, Mali, the Niger, Nigeria and Chad – some of which are among the world's poorest countries.

The river crosses four climatic zones: humid tropical, dry tropical, semi-arid and arid. Its very variable rainfall ranges from 4 000 mm in the Gulf of Guinea to 200 mm in the Sahel. Widespread environmental degradation and deteriorating natural resources in the basin are a result of unsustainable agricultural and ranching practices, bush fires and deforestation, pollution, water and wind erosion, silting of water courses, and proliferation of aquatic plants. Land degradation is a major threat for productivity and food production, particularly in the Sahelian area in the mid-watershed. An increasingly dry climate and decreasing sedimentation, associated with increasing demand for agricultural land, have contributed significantly to the destruction of vegetation cover. Stream flow, ecosystems and socio-economic activities are seriously threatened.

The Niger Transboundary Watershed Programme was set up to combat hydrological erosion. Its long-term objectives are protecting the basin's natural resources and conserving its hydrological potential in order to foster development, decrease food insecurity and poverty and preserve local ecosystems. It adopts a participatory, gender-sensitive approach, aimed at strengthening local stakeholders' responsibility and involving them in rehabilitation activities.

The programme includes a regional component aimed at strengthening the basin authority's capacity to intervene at the transboundary level. Three national components, designed as investment projects, focus on priority actions for environmental protection and the combating of siltation in Burkina Faso, Mali and the Niger. All three share common development objectives, but each has significant autonomy. National activities follow the participatory approach at all stages of implementation. They aim to raise the awareness and commitment of local stakeholders and to strengthen livelihoods for local people. This includes: enhanced food security; income generation and diversification; rural employment; and women's empowerment through income-generating activities and literacy.

The expected environmental outcomes of this programme include: stabilizing 3 000 to 5 000 ha of dunes, managing/protecting rangeland and catchments, rehabilitating 13 500 ha of degraded land through agroforestry, enhancing the watershed management capacity of local institutions and people, and strengthening the Niger Basin Authority. Other expected outputs include: a tool kit for identification, planning, coordination, monitoring and evaluation; and a management plan for combating hydraulic erosion and siltation.