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Protection of Chure: need for an ecosystem-based management with a hydrologic cycle framework

Natural resource management in Chure range is very complex and challenging. But certain management principles and approaches for Chure can be spelled out using the present state-of-art in natural sciences. The natural ecosystem in Chure range, which is very fragile is mainly governed by the underlying geology, soil, topography, natural vegetation and environmental interactions. However, Chure as it is now is a unique and delicate ecosystem that developed under a complex interaction of climatic, natural and human impacted disturbance regimes. Therefore the nature of the ecosystem management problem requires not only a scientific management vision embracing best management practices of individual patches of land, forests, torrents and farm units but also an adaptive management of sub-watersheds, landscapes, river systems originating from Chure and Terai-Chure interactions. Viewed in this context, the main analytical framework of Chure must embrace hydrologic cycle perspective from an ecosystem approach that addresses all attributes of water.

In Chure region, surface-subsurface water exchange and maintenance of multistoried vegetation and ground cover are important dynamic factors. On the other hand, evaporation and evapo-transpiration management are issues requiring landscape level approach to natural resource management. In Chure, indigenous techniques of water harvesting and torrent management that have evolved over centuries of experience in managing with natural hazards need also to be considered. Higher ground water depth is another key characteristic of Chure region. Porosity/ Storage Coefficient/ Storativity / Specific Yield are also regionally variable. Phreatophytic vegetation can be a good indicator of ground water depth. Ground water movement based on hydraulic gradient governs three-dimensional distribution of water. This means that the priority areas of management may be delineated based on ground water indicators. Also, adaptive Watershed Management for Chure must also address water harvesting and moisture conservation and recharge friendly activities to maximize ground water storage.

Chure mountain range represents a physically and ecologically integrated system. It is a continuum of subwatersheds at different scales. Obviously, the subwatershed continuum is an appropriate resource management framework for linking plans, strategies and policies and implementation in a nested continuum of sites, subwatersheds, rivers and regions for ecosystem approach to integrated natural resource management.

Ecosystem approach to natural resource management is the fundamental basis for sustainable natural resource management. Since a watershed integrates physical, biological,

geo-morphological, and social processes as well as people-resource interactions, the most appropriate basis for watershed management is the ecosystem approach. Different scales of watersheds in Chure range can constitute the basic units of ecosystem management. Obviously, ecosystem approach to watershed management must embrace the water and energy budgets in relation to the hydrological cycle as a system. The approach can encompass soil-vegetation-atmosphere relationship as well as land-water interactions covering all impacted and natural systems. In such a setting, present situation of the watersheds in Chure can be assessed. The cause-effect inter-linkages between Chure and Terai would reveal how the resources, processes and their interactions are equilibrating. This must constitute a basis for focusing on problems based on a cause-effect relationship. Furthermore, public issues and management concerns should set the adaptive management course of watershed management. Therefore, an ecosystem approach to subwatershed management in Chure must logically be system-based, problem-focused and improvement-oriented adaptive ecosystem management approach.

Watershed analysis system can be useful for generating several scenarios as management options for Chure in terms of food fuel, fodder, energy, biodiversity, medicinal herbs, tourism, aesthetics biodiversity indigenous technology knowledge, local resource mobilization, centuries-old traditional management systems, participatory management, evolutionary institution building and social learning processes in mountain areas as an integral elements of the ecosystem approach. This can eventually be a basis for a definitive course of social transformation through ecosystem-based watershed management. Watershed analysis system must be a problem solving tool that:

- systematises management of watershed size in a continuum of watershed, basin and Chure region embracing hydrological cycle representing resources and processes unique to the mountain areas accommodates technical, economic, social, institutional and environmental dimensions and appropriate criteria from an ecosystem approach
- consists of a suitable temporal basis range from an indicative plan to periodic plan to annual plan and community plan in a bottom-up fashion
- links an integrated logical framework of goal, purpose, outputs and activities should be designed in terms of objectively verifiable indicators, means of verification, assumptions and preconditions
- characterises of strengths, threats, opportunities, weaknesses, public issues and management concerns of relevant institutions and institutionalises inter and intra-sectoral co-ordination and networking.

Expected outputs from such an analysis should be focused on 1. meeting Agricultural Perspective Plan expectations, 2. Increasing water availability in extent and number of additional days, and 3. Improvement in ground water storage and practice of moisture Conservation Practices extensively at individual land management units, 4. Evapotranspiration management in degraded land, 5. Adopt a torrent system by communities, and 6. People's water budget improvement plans.

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