Chapter 9
Conclusions

Rather than analysing the findings of this study in order to draw conclusions in a conventional manner, a SWOT analysis of sustainable land use and land management in the NWHRI has been undertaken.

Strengths

- Wide range of topography, terrain, landforms, and climates where a considerable spectrum of production choices is available
- Agroclimatic heterogeneity that can support agri-silvipastoral diversification and preservation of biodiversity
- Niche advantages for production of special crops/fruit/off-season vegetables/nuts/spices and high-value items such as saffron, mushrooms, flower and vegetable seeds, cut flowers, tea, etc which can generate higher incomes
- Sufficient rainfall (except in cold desert and westernmost areas of the region) that can be harvested for productive purposes
- Manpower availability
- Equable climates (except at very high altitudes), scenic endowment, and good possibilities of developing environmentally-friendly tourism
- Immense hydropower resources
- In rainfed agriculture, there is considerable productivity potential for which technology is available.
- With appropriate skill development and encouragement to entrepreneurship, there is much scope for achieving value-addition before produce moves out of the region for marketing.
- A large and growing consumer market is available in adjoining states. There are also export possibilities.
- The region has seven universities (including three agricultural and one forest/horticulture university) and more than a dozen national and state research institutions and facilities in areas such as environment, forestry, agriculture, survey work, soil and water conservation, geology, horticulture, remote sensing, medicinal plant/herbs, seed development, high-altitude crop/vegetable production, wildlife management, etc. These valuable facilities can effectively provide support for better and more sustainable land use.

Weaknesses

- The database in respect of land resources is both weak and inaccurate. Land in the region is not fully surveyed cadastrally. Reliable time-series' data are not available. Water-flow data (except in respect of main rivers) are not available. This makes land and water planning difficult.
- Information in respect of soils is also inadequate. This creates difficulties for farmers in planning appropriate nutrient application and water use regimes.
- From the administrative and developmental point of view, field personnel of the departments/agencies of the state governments are thinly deployed and weakly developed in terms of present-day knowledge, skills, motivation, and managerial needs. Human resource development has remained an area of low priority.
- Accessibility and transportation/ communication infrastructure are poor.
- Extension arrangements are weak and, where available, mostly confined to crop husbandry. Community mobilisation is wanting. People generally do not identify with common property resources such as forests and rangelands. This hampers protection and gives rise to non-sustainable use of these resources.
- Lab–land interface is not interactive or people-friendly. This is an area of neglect and deserves attention on a priority basis. Research must be related to problems of farmers/growers and, where technology prescriptions are evolved, they need to be proved in farm conditions. Varietal research and development are of low intensity.
- Value-additions to produce are almost absent. Hence, returns to farmers/ growers are low and spoilage losses high. Post-harvest technologies are hardly used.
- Livestock quality is poor. The percentage of cross-breds or animals of better breeds is abysmally low.
- Investments in forestry are inadequate. The rate of afforestation is low and forest cover is only a fraction of w hat it should be as laid down in the National Forest Policy 1988.
- Credit-deposit ratio is low and declining. Long- and medium-term credit that is meant for bringing about permanent improvements in land has shown little progress. In some areas, it has declined.
- Institutions of democratic decentralization (*panchayats*) and local-level resource management (e.g., *van panchayat*(s) and cooperatives) are weak. They need to be empowered in terms of resources, organizational capacity, and authority. While joint forest management and joint eco-development initiatives are welcome, they have yet to be translated into wide-based, successful and sustainable arrangements.

Opportunities

- Improvements in land use and data reliability are possible.
- Productivity gaps, particularly in high hill areas, are considerable. Based on current knowledge and technologies available, it is not difficult to fill gaps and increase yields.
- Water regimes and their utilisation can be improved by increasing biomass cover; by encouraging infiltration of water and reducing surface runoff; by adopting conservation methods such as leak-proof conveyance, reduction in evaporation, and use of drip irrigation; through *in situ* moisture protection; by adoption of crop regimes that are less water intensive; and by harvesting water through polythene-lined shallow tanks and diggies
- Intensive soil surveys/testing can help

in developing farm/field-based fertility regimes and appropriate combinations of organic/inorganic fertilizers and other micro-nutrients.

- Integrated pest management and integrated plant nutrition management can greatly improve soil health care and sustained fertility capacities.
- Many technologies can be harnessed to increase forest/agriculture/ horticulture/ rangeland yields and achieve better growth rates, e.g., remote sensing, biotechnology, tissue culture, etc.
- Broad-banding of extension arrangements can stimulate more integrated use of resources at the farm/ field level, e.g., cropping/agroforestry/ fruit and vegetable growing/poultry/ animal husbandry/floriculture; etc.
- Opportunities can be converted into tangible actions and results only if people are fully carried along and involved in the process of development. This implies greater adoption of community and joint management strategies in which people clearly perceive that they can become better off in the process and sustainability can be achieved at the same time.

Threats

- Mountain terrains are difficult, often remote, and soil cover (except in valleys and foothill plains) is thin. Restoration can be difficult, costly, and time-consuming. Maintenance poses similar problems.
- Fragmentation and the unconsolidated nature of land holdings make land management difficult, low-yielding, and labour intensive.
- At many places, especially near urban agglomerations, prime agricultural land is diverted to non-agricultural, non-biomass uses. This accentuates shortage of cultivable land, an already scarce commodity in the NWHRI. This diversion needs to be curbed.
- Water management leaves much to be desired.
- Demographic increases are creating great pressure on resource bases. Often, this pressure becomes intolerable. For want of productive employment and incomes, outmigration takes place which affects the quality of human resources available for land management. Policy interventions, education, and awareness are necessary for stabilising populations within carrying-capacity levels.
- There are about 17.5 million animals in the NWHRI and most are nondescript, scrub types with extemely low productivity. This number has generated grazing pressure that exceeds yields by a factor of 2.5–3. There are serious fodder shortages in many parts of the region.
- Demand for fuelwood is steadily increasing. Forests cannot meet these demands. Alternative sources of energy need to be provided at affordable prices. At the same time, energy conservation is essential (e.g., pressure cookers, improved stoves, etc)
- Seed replacement rates are low (except in foothill *terai*/flat valleys). Hence, productivity gains are difficult to obtain and retain.
- Unless road-building techniques are made safe, these activities will continue to create problems for hill lands. Technologies/methods of environmentally-friendly road-building are available but, generally, have not been adopted.
- Community–wildlife-park management conflicts offer a threat to biodiversity protection objectives. They need to be resolved by taking people 'on board' in the preservation and management of protected areas.