WATERSHED REGIONS OF PAKISTAN

Pakistan can be divided into a number of watershed regions which are sufficiently homogeneous in themselves, but distinct from each other in two major characteristics i.e., land form and climate, the factors which mainly determing the framework for watershed management. Main watershed regions and their problems are given below:

The Northern Mountain Region: Comprising the in-land Indus Basin above Attock with Swat-Chitral and Gilgit tributary catchments, and the in land in Jhelum Basin upstream of Mangla. These are the only important inland sources of water for Pakistan. They are drained by the upper Indus and the upper Jhelum Rivers. The vast irrigation system developed in the Indus plains depends almost entirely on te natural precipitation falling in the mountain catchments of the Indus and its tributaries. Erosion is widespread throughout the region in all vegetation zones and under all forms of land use, ~~including the forest.~~

The Uplands of Northern Punjab: This is a relatively small, but highly complex upland plain. Some smaller water shed development projects are included in the region. Few parts of this region have been spared by gully erosion. The main watershed problem is control of gully erosion. All watershed mprovement in the region should be according to an integrated plan not just in sectors. In the forestry domain, the emphasis would have to be on protection rather than production forest; the technical means are exclusion of grazing, and afforestation linked with structural water conservation works. In the range/sector, a survey of existing resources and of possibilities for improvement of the grazing lands is indicated, and on this basis range use can be adjusted to the actual carrying capacity of the land.

The Western Mountain Region: It includes the catchments of Kohat, Toi Kurran, Zhob-Gomel, and small streams of the Quetta District. Since most of the catchments are poorly vegetated, there is a high degree of surface run-off from the land during the rains. Water conservation on the land and stabilization of erratic stream flow are the number one watershed problems of the region. Watershed improvement plans for the reion, technically, would have to include restoration of the forest cover in the upper catchments and on thin soils, at the expense of range land; active improvement of the remaining range areas; structural modification of the land surface for better water retention on croplands both in the piedmonts and valley plains; water spreading; and structural and biologic control of bank erosion in torrents. There is a great potential for development of ground water resources.

Side by side with the exploitation of ground water, recharge of ground water is very important in this region as it is quite arid. Recently work in this direction has been initiated and measures for reducing runoff and increasing infliltration have been adopted by the Forest Department.

The Southwest Baluchistan Plateau: It is not a water producing area. It lies west of Kirthar Range. Much of the land is unused and the rest is poor grazing. There is only scattered agriculture. There are no pertinent development schemes worth mentioning in this region, and the possibilities for watershed improvement are practically nil due to lack of water.

The Coastal Belt: It includes Hub, Prali-Kud, and Dasht river catchments. It comprises the land between the Makran range and the Arabian sea. Most of the coastal zone is desertic or grass-land much overused as pasture. Possibiloties for watershed management are very lmited in this region. Efforts should concentrate on protection and

surface water development projects and on conservation of water on the land itself for improved range production. Wind erosion has become a very serious problem in some of the coastal areas.

The Indus Plain: The region is not in itself a water-producing area. In the north, serveral large tributaries join the Indus; the Jhelum, Chenab, Ravi and Sutlej flow in to it from the East, and the Kabul, Swat, Kurram and Gomel descend from the western ranges. The economy of the region is predominantly agrain. Unlike all other regions of Pakistan hydric erosion is no great problem in the Indus plains. Wind erosion, by contrast, threatens fairly large tracts of arid land in the non-irrigated deserts, and the irrigated cultivable lands lying fallow in winter. Dust bowls and sand dunes are common features in desertic tracts of Thal, Thar and Cholistan.

THE SOCIOECONOMIC CONDITION OF THE PEOPLE IN WATERSHEDS

The people living in these areas have small holding - the average size being less than even 2 acres. They have too little education and lack the requisite skills to improve their lot. They seem to have reconciled to sustain themselves on a deteriorating resource base. The income derived from the ill-managed and impoverished land is too small to meet the demands of an overgrowing family. To supplement, they keep large herds of ill-nourished sickly goats, sheep and cattle which road aroundfreely in the denuded pastures, deveouring whatever vegetation is within their reach. The people living in the uplands have no access to gas or electricity to keep themselves warm to cook their food and to have reasonable shelter for survival, there is no way out but to cut the trees. The forest areas are inevitably being further pushed back. Thus, cultivation on steep slopes which are fit only for afforestation, removal of all types of vegetation and over-grazing have jointly let loose a wave of devastation in the watersheds of the country.

As if that was not enough another phenomenon is taking place in the watershed areas. Young people are going out of the country to explore better living conditions. The fields which were originally terraced are not being looked after properly. The older generation left behind has neither he physical strength nor the financial resource to keep the terraces in proper shape. Instead, they are putting new pieces of land under the plough, without properly terracing the land, which gets washed down with the next heavy shower. These people on return from foreign countries, instead of picking up the plough to stablize the agricultural fields, open a shop of video cassettes, television, radio to show off. They

take it very low to revert to the land If they are left with some money they prefer to construct an andacious house on the hill top. As one travels to zad Kashmir from Murree one can see hundreds of such houses on the steepest of the slopes without caring for the value of the maintenance of the base itself.

EFFORTS MADE TO IMPROVE THE WATERSHEDS IN PAKISTAN

Efforts to introduce watershed and soil conservation practices in Paksitan are about a 100 years old. Several organizations dealing with soil and water conservation and watershed management are involved. All these agencies and departments are operating with one purpose. i.e. reclamation and improvement of land through soil and water conservation measures such as planting of forest, fruit and fodder trees, range improvement, gully plugging, stream training, terracing, check-damming, etc. This is supported by provision of subsidies to the landowners including feed for cattle, substitute fuels, firewood, stoves and rations. The projects are being implemented either through the country's own resources of with the help of donor agencies such as, World Food Organization, UNDP, The World Bank, Dutch and German governments etc. However, the problem is of such a colossal nature that a massive effort is needed to make a real headway.

ALTERNATIVE STRATEGIES AND APPROACHES

To improve the over-grazed, highly degraded and denuded watersheds, a concerted, all-embracing effort is required at the national level. Since the watersheds are inhabited by a multitude of human and cattle populations, it has become more of a social problem than a technical one. A good watershed management approach has to be technically feasible and socially acceptable. Bare minimum needs of the people will have to be understood and accommodated as far as possible.

Future strategies and approaches can take several forms: Technical, administrative and political, all focusing on stablization of ecological equilibrium of the watersheds, and in the process improving the socio-economic conditions of the people. These, besides intensive afforestation/reforestation would included proper animal husbandry, and agromical practices, planting of fruit trees, supply of commercial energy to take pressure off the vegetation together with well planned, integrated multipurpose programs. It has to be duly supported by adequate incentives training and education, transfer of information and technology and creation of public awareness. Some of these possibilities are discussed below in a little more detail.

Creation of Public Awareness of The Problem

Although the mountain man can see that the ground on which he is living is gradually slipping from under his feet, every other day he comes across land-slips, land-slides, disappearance of once fertile agricultural land, scarce vegetation even becoming scarcer, he seldom bothers to look beyond his nose. He would see village after vanishing around him, but prefers to adopt a casual care-free attitude. In fact he does not realize the gravity of the situation, thinking that either God almighty or the Government would set every thing right for him. This approach of self-complacence has worsened the situation. The inhabitants have to be made to believe that proper management of the land and resources is essential not only for their survival but also for the future of posterity. Since, generally speaking he is allergic to the advice given by a Government employee, the institution of a mosque, could be used to bring him round. Intensely religious as these people are, they could be better convinced by the preachings of a mullah or Imam. Most important is how to win friends and persuade the people to listen to a constructive point of view. How it comes, is immaterial. He has to be convinced to the point that he himself becomes an extension worker pleading the cause of proper management of land where he lives.

The Use of Incentives

Due to a variety of measures such as terracing, plantations and restricted grazing, the traditional freedom of the inhabitants is curbed in the uplands and they become reluctant to accept offers of improvement. It will be appropriate the finacial inducements in the form of interest-free loans for seed, machinery, implements, fertilizers, construction of bench terraces, check-dams, formation of marketing societies, etc. are provided. The most important factor would be to involve the people in the decision-making processes at a local level through representatives and responsible village committees. An economic plan by which the hillman could draw his requirements of life from the plains and produce things which he could sell to purchase goods could be a very useful measure.

Introduction of Small Scale Rural Uplift Schemes

From most of the projects implemented in the watersheds involving soil and water conservation measures, the major benefits are derived largely by the people living in the plains. This indicates that the people living upstream do not receive as much benefits and their income and standards of living are not satisfactorily improved. They, therefore, require special attention for generating more income by introducing better agricultural systems, small scale industries such as canning, fruit

preservation, etc. Bee culture and silkworm rearing could be introduced. They would also need help in the form of developing appropriate markets and marketing facilities for their produce. Besides that there is total lack of primary health facilities and inking water supply both for men and their livestock.

Training And Education

The inhabitants of the upland areas usually do not have the required know-how for conceiving, planning and implementing the watershed management program. It would be appropriate that vocational training centres are set-up in suitable locallities. Side by side, it would be useful to encourage the national media to project watershed management problems and solutions and also include the subject in school curricula and textbooks. Short training programs for a sizable group of selected people from watershed communities on locally executed projects by practice and demonstration, will encourage others in the area to adopt similar methods. Vocational level or sub-professional level training and education in soil and water conservation, extension approaches, rural development, tree planting, agriculture, etc. is needed.

Transfer of Information And Technology

Although considerable data have been collected and are available pertaining to the case studies and research conducted it is observed that exchange of information, which could result in rapid application of the results of research on watershed management techniques, procedures and methods needs to be disseminated to the people in a manner in which it can be gainfully used.

It has also to be brought to the notice of the people that miserable social conditions and resultant environmental degradation are further compounded by rapid population growth. Steeply climbing populations undermine the effort to provide adequate nutrition, health care, education and housing leading to unproductive investment of scarce funds. The burgeoning population bound by poverty and lack, of knowledge of modern techniques can drastically impair the land life-support capacity.

Watershed Planning

Management of a catchment to provide maximum benefit for man implies utilization of the planning process. Indentification of the existing conditions of a catchment in terms of physical, social and economic considerations with subsequent development of management

plans to attain short and long term goals is prerequisite to maintaining productive watersheds.

• Need for planning

Objectives - Indentification of the management objectives is needed to permit appropriate decision making in the plan development phase. Specific objectives such as rehabilitation of severely eroded lands, protection of sensitive aeas, improvement of water yield, reduction in flooding and/or siltation, etc. need to be formulated. Management objectives can be developed at various levels; i.e. for national, regional local and community planning.

Integrated Management - The inherent interactions between and the atmospheric -soil-water-plant components of a catchment necessitates management from a comprehensive, integrated perspective. Management for a single objective or resource without consideration of the changes which may occur in the other components or resources usually produces undersireable results. Ideally the management plan should include coordinated biological and technical management of all the resources in a catchement. In practice this is diffeicult to accomplish, particularly in large catchments. Management Constraints - The constraints of management need to be identified in the initial phase of planning.

i. Physical - The natural physical constraints such as physiographic conditions, soils, access, etc. often limit the type of management.

ii Climatic - The production potential of many resources is limited by the amount of rainfall, length of drought periods, growing season, ec.

iii. Biologial - Limitations of productivity of the desired plants needs to be considered.

iv. Social - A well designed biotechnical plan is difficult to implement successfully if the social aspects have not been included. Social factors such as illiteracy, land tenure, cultural beliefs, family - community decision making processes, etc., often produce constraints in the implementation and maintenance phases of a plan.

v. Institutional - political and legislative constraints must be identified. The final decision regarding project mplementation is often influenced by the political process.