



REPORT ON

**DEVELOPMENT OF BACKWARD
HILL AREAS**

NATIONAL COMMITTEE

ON

THE DEVELOPMENT OF BACKWARD AREAS

PLANNING COMMISSION
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NATIONAL COMMITTEE ON THE DEVELOPMENT OF BACKWARD AREAS

REPORT ON

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SUMMARY OF RECOMMENDATIONS

INTRODUCTION

1. In the Himalayas the Committee accepts the areas already demarcated as hill areas of U.P., West Bengal and Assam as backward hill areas for special consideration. The exclusively hill State of Jammu & Kashmir, Himachal Pradesh, Arunachal Pradesh, Manipur, Mizoram, Nagaland, Meghalaya, Sikkim, and Tripura are already treated specially as backward States and the needs of the backward areas in these exclusively hill States should be looked after in the State Plan on the basis of the guidelines given by the Committee for dealing backward areas.

(para 1.8)

2. Excluding the areas covered under tribal sub-plan for which separate provision exists, the rest of the hill areas above 600 meters contour in the Deccan belt should be considered backward hill areas for the purpose of special development.

(para 1.7)

3. The programme for hill areas should be an integrated development programme for building up of infrastructure and for supplying a package of inputs and other necessary services almost simultaneously. Each component of the programme has to be inter related and coordinated with the other components, with the ultimate aim of maximising production and benefiting the hill people economically.

(para 1.16)

Strategy for Development of Backward Hill Areas

4. The strategy for development should be dictated by considerations of :—

(i) Benefiting the people as a whole rather than the status groups;

(ii) developing local resources and utilising local talents so that the need for out-migration of the adult males is no more necessary, or at least gets considerably reduced;

(iii) transforming a consumption-oriented economy into an investment-oriented one;

(iv) regulating inter-regional terms of trade in a manner that they cease to be exploitative for the backward regions;

(v) the States filling up the gaps in the marketing mechanism to give the backward areas fair return for labourers; and

(vi) maintaining the ecological balance.

(para 3.3)

5. In order to slow the progress of outmigration, generation of gainful employment locally has to receive a high priority.

(para 3.4)

6. Methods of reducing drudgery in the women's life have to be found so that the women can also become participants in the development process and yet remunerated for their labour in the time saved from drudgery.

(para 3.4)

7. Gearing up of the production system and creating proper distributive machinery are from this point of view, the two primary requisites of ensuring flow of benefits of growth to the people.

(para 3.5)

8. In backward hill areas, self-sufficiency cannot be and should not be the goal of the development policy; but maximizing the income from each unit of the development base, either land or water or domestic animal. Therefore, a policy of promoting spatial specialisation needs to be favored.

(para 3.6)

9. The problem of food can be solved if in areas wherever the food crops are replaced by new cash crops if :

(a) suitable marketing facilities are built into the system to buy the production at fair prices and take them off the hands of the farmers of the areas, and

(b) arrangements are made to supply the food grains commonly consumed in the area in fair price shops so that the farmer can buy his requirements at reasonable prices. An area approach of development will have to be taken up first in the zones which can be much more productive under the 'new strategies and on the communication routes'.

(para 3.7)

10. It is suggested that:

(i) necessary know how and facilities be provided to ensure more efficient utilisation of available resources, particularly those of the forests, cattle, land and water;

(ii) the framework of focal points be used for a more realistic and a rational location of various services connected with education, health etc.

(iii) resources should not be frittered away by unconnected developmental schemes but used for an integrated rural development approach on an area basis, with emphasis on production and better investment by the State on the necessary and infrastructural base for the production strategy.

(para 3.8)

11. It is recommended that the watershed should be the primary planning unit, rather than a block or a district. The watershed approach provides a sound basis for programming of soil conservation, water harvesting and harnessing and land use and planning social institutions. It is also possible to delineate watersheds into micro and mini watersheds. A mini water-shed may be equated with our concept of a focal point and may cover an area of a cluster of villages with population coverage of a 5000 or 6000 of a block population and micro watershed may cover an area of 1000 to 1500 hectares.

(para 3.9)

12. The strategy of entrepreneurial and skilled labour development that has been recommended in its report on 'Industrial Dispersal' is all the more necessary in the backward hill areas. The Committee would, therefore, recommend necessary action to super-impose the industrial development in these areas by following guidelines in that report.

(para 3.11)

13. Industrial development in the hill areas has to be based essentially on the promotion of such activities in which hills offer a distinct advantage like forest based industries, vegetable and fruit processing etc. Another area in which hill areas offer an advantage in terms of climate and dust and pollution free environment is electronic and precision goods. The major advantage of such industries is that they do not involve heavy transportation of raw materials. These are mainly skill based industries where the value added is substantial. Necessary steps will have to be taken for training and skill development so as to prepare the environment for location of such industries.

(para 3.12)

14. Livestock has attained great importance in developing hill economy. Therefore, priority should be given for improving quality of livestock on commercial lines through cross breeding with exotic breeds. Pasture development programmes should be taken up along with measures to improve cattle.

(para 3.13)

15. Social forestry on scientific lines is necessary to check soil erosion, maintain ecological balance and produce industrial new raw materials, conservation, extension and productive exploitation of forests has to go hand in hand to meet the industrial requirements and general needs of the people.

(para 3.14)

16. The administration is generally not committed to programmes of backward hill area development because most of the time, people do not choose to serve in these areas. Posting in the hills is generally seen as a form of punishment. Therefore, officers charged with development programmes should have feeling of commitment to these areas and be sensitive to the needs and aspirations of the people.

(para 3.16)

17. The sub-plan idea is conceptually a sound one and must be regarded as a breakthrough in our area development concept. The underlying idea is one of achieving internal consistency and integration among various on-going programmes. It is an appropriate method of imparting some new orientation in area planning by taking note of the missing elements in the normal sectoral programmes of the State Governments.

(para 3.18)

18. While planning for big projects in under-developed hill areas, it would be necessary to build in adequate safeguards to protect the environment on the one hand and the interests of the local population on the other by enabling them to avail of the job opportunities that arise.

(para 4.2)

19. It would be necessary to work out suitable mechanism to replace the non-descript and unproductive livestock heads by introducing remunerative and fewer heads. It would be desirable to work out appropriate land use patterns so as to ensure adequate feed and fodder for improved livestock population.

(para 4.5)

20. Attempts should be to aim at appropriate land- use management in the hill areas, suiting to the specific site conditions, which would include wet cultivation and dry cultivation, horticultural and cash crop plantations and cultivation of utility trees/shrubs.

(Para 4.6)

21. Watershed approach would mean planning and implementing soil conservation programmes for all types of lands and associated drainage system of selected watersheds within a reasonable time frame with the objective of providing maximum protection to existing land and water resources while optimising their use for increasing production and employment benefits.

(para 4.7)

22. In order to comprehend the total problem vis-à-vis the total potential and to draw up a programme which could be implemented within a reasonable period (say five years), the size of such watershed should be between 1,000 to 5,000 hectares. Once delineation and modification works are over, inters priorities and development of these watersheds are to be assigned taking into consideration the corrective factors for erosion and sedimentation ranging from physiographic to climate and including proximity to the reservoirs. The Central and State Soil Conservation and Soil & Land Use Survey Organisations would have to take up this task to identify, at the earliest, watersheds on a priority basis for preparation of integrated management plans and implementation of the same.

(Para 4.7)

23. Watershed management planning will need data pertaining to watershed characteristics such as topography, soils, geology, vegetation and climatic data, besides incidence of erosion, flood and drought hazards. Therefore, there should be an adequate

mechanism at the level for collection of such data through field State Headquarters and at field/units or from concerned agencies. The need for the basic data should be fully recognised and their collection, analysis and interpretation should be considered as a pre-- investment towards proper planning and implementation of watershed management programmes.

(Para 4.9)

24. The most logical step would appear to be to incorporate corrective measures in the existing land use system to make the existing land-use practices less vulnerable to erosion and degradation, hazards.

(Para 4.10)

25. Alternative management practices should be introduced slowly to encourage the beneficiaries to shift gradually to the improved land-use pattern. If the agro-silvicultural practices or agro-horticultural practices can be made profitable while practising mixed farming, it may be possible to achieve this gradual shift in land-use pattern and retiring the steeper slopes from cultivation of common agricultural crops, to productive and remunerative fodder or tree cover.

(Para 4.10)

26. Once priority watersheds are identified and land classification completed it will be necessary to identify the areas needing treatment under agricultural, forest and other land use practices. Depending upon a number of factors, such as slope, soils, rainfall, etc. Package of treatment measures will have to be chosen. These measures would include bench terracing, outlets with drop pits, riser protection; rehabilitate deteriorating terraces, hill side ditches on the agricultural lands.

(Para 4.11)

27. For pasture lands combination of grasses, legumes and fodder trees and bushes will have to be chosen. Closures and erosion control measures like dykes may have to be adopted here as well.

(Para 4.11)

28. Water harvesting structures such as low canal sills, diversion weirs and some ponds in suitable locations, could be considered for appropriate utilisation of available run off. Check dams, revetments and spurs will be necessary for controlling gullies and erosion along the stream banks and beds as well as land slips along the roads.

(Para 4.11)

29. Some arrangements will need to be made in the planning Cell for collecting representative base level data for typical areas representing dominant combination of practices such as bench terracing, afforestation, water harvesting system, pasture etc.

(Para 4.13)

30. There are practical difficulties in mobilisation of self-labour in innumerable individual holdings in a single terrace for subsidised working through extension methods under the Soil

Conservation Acts. Land records need updating. All this has resulted in the concept of integrated watershed management being rarely achieved, particularly when a large number of farmers are reluctant to join in the working. At the same time, any soil conservation programme would be self-defeating if the people on whose lands these are carried out are not only involved in it effectively but have some stake in improving the land and maintaining it. Considering all this, the Committee would recommend:—

(i) that the existing practice of subsidising private works on farmers' lands to the extent of 50% should be continued.

(ii) if there are any works on the private lands like construction and renovation of risers, which would benefit not only the land on which they are located but also other lands belonging to other farmers, these should be treated as items of benefit to the community and financed to the extent of 100 per cent by the State; and

(iii) the existing practice of financing the soil conservation programme on community land on 100 per cent basis should continue.

(Para 4.17)

31. It is necessary to develop production programmes which, whilst preserving the soil, will gradually improve the economic condition of the people of the area. The strategy outlined below has been developed after careful consideration of the pros and cons of the matter;

(i) reclaiming land, where necessary, and providing minor irrigation, where possible, so as to encourage settled cultivation in villages and on terraced slopes on the lines adopted by the Savaras of Orissa and the Angamis in Nagaland, assuring at the same time inputs, fair price shops, communication and marketing facilities;

(ii) identifying the areas suitable for plantation crops such as tea, coffee, rubber, which would give subsidiary occupation for a family on the basis of the one hectare of plantation each;

(iii) developing gross reserves to support a subsidiary programme of animal husbandry; and

(iv) developing suitable areas for agro-silvicultural operations and commercial forest plantations, which would give full occupation to large number of village population.

(Para 4.21)

32. An important change which has to be brought about is the change over from the hoe cultivation to plough cultivation and settled agriculture. For the resettled cultivation, the farmer has to learn the use of the plough, breeding of cattle and care of crops. Therefore, wherever such resettlement is being done, there has to be close supervision and training of the farmer families so that they can learn the new technology.

(Para 4.22)

33. People living in the catchment areas necessarily require pasture lands for grazing and also land to raise their food requirements. Unless, therefore, an integrated watershed area development programme becomes a part of the treatment of catchment of the river valley

project, the problem is not going to be solved. The first priority has to be provided for the needs of the local people for grazing, fuel wood and other requirements.

(Para 4.27)

34. It is recommended that the maintenance of the assets created in the catchment should become an integral part of the whole scheme. The Committee would also recommend that top most priority should be given to the critically eroded areas of the catchments, particularly those lying within the 'hill areas'.

(Para 4.28 & 4.29)

35. As scientific implementation of the soil conservation programme would require a multi-disciplinary programme and approach, the integrated watershed management approach cannot be planned or implemented unless a multi-disciplinary organisation is created.

(Para 4.30)

36. It has also been found that the organisations handling soil conservation programmes are mono-disciplinary. Sufficient sub-divisions should be created which should be of multi-disciplinary type.

(Para 4.31 & 4.32)

37. It would be necessary to provide refresher and reorientation courses to the officers of other departments involved in the problem of watershed management.

(Para 4.32)

38. It is necessary to devise a cadre of soil conservationists with the basic background such as forest, soil science or science or agricultural engineering. It is equally necessary to acquaint the policy makers, administrators and financiers with the role of soil conservation in the areas of national and regional priorities affecting various development programmes of the country.

(Para 4.33)

FORESTS

39. Hill areas which are thickly forested or are in close proximity of thickly forested areas are highly suitable to horticulture, plantation crops, orchards, inter-culture, floriculture and pasture development.

(Para 5.10)

40. Himalayan hills are suitable for raising mulberry trees and boost the silk production. Floriculture is turning out to be a flourishing business. The demand for cut flowers is increasing rapidly and hill areas are most suited to growing flowers of different kinds.

(Para 5.11)

41. Hill areas are equally suitable for pasture development which will not only make a firm base for a Dairy development but would also check the growing menace of soil erosion.

(Para 5.12)

42. Hill areas offer ample scope for agro-forestry based industries and handicrafts. In those of the hill areas which are richly endowed with forest wealth, there is enormous scope for setting up a large number of small industries. Those may include pulp paper and hard board, rosin and turpentine, sports goods, pencil industry, wicker-work, match industry, drug and pharmaceuticals, aroma chemicals and a large variety of other industrial enterprises.

(Para 5.13)

43. The Committee recommends the following Action-oriented Programmes:—

(i) Survey of land use and delineation of micro-watersheds requiring various degrees and types of treatment required and preparation of action plans.

(ii) Taking up required soil and water conservation measures including engineering as well as vegetative methods such as land shaping, gull plugging, construction of check dams, soil binding plant species, etc. These have been covered in Chapter 4 dealing with integrated watershed management.

(iii) Improvement of pastures and afforestation of degraded lands or waste lands belonging to Government or community should be taken up under social forestry and other programmes.

(iv) Introduction of species suitable for use as fodder, fuel and small timber of a very short duration. There should be adequate research support and the species should be chosen with care so that the local population can feel the impact of the benefits at the shortest possible time.

(v) Association of voluntary bodies and panchayats in a forestation and pasture development must be secured. Raising of community forests even on Government lands where ownership belongs to Government but the management given to the community where a strong panchayat or a voluntary body exists should be taken up.

(vi) Replacement of contractors by departmental felling or by forest labour cooperatives' and destruction of felling in vulnerable areas should be forthwith done. The Government of U.P. has issued an order that no felling should be carried in slopes above 45°, felling between 30° and 45° should be on selection system and no felling above 3000 meter altitude should be done. Some such regulations are necessary in other States also.

(vii) Animal Husbandry improvement scheme must be introduced simultaneously to reduce the number, while improving the quality of the stock. A very hard and unpopular decision at the political level is required to be taken about calling of any unremunerative cattle as recommended by the National forest Commission on Agriculture.

(viii) Creation of some biosphere reserves and more national parks so as to cover at least 10% of the forest areas in the Himalayas with very careful management in the above surrounds of such reserves and parks.

(ix) Diversion of forest land for non-forestry uses in the Himalayas must be stopped immediately. All lands under agriculture should be properly shaped and terraced and water courses regulated to do the least damage.

(x) In the matter of road construction whether under Central or State agencies cost for taking up conservation measures to eliminate damage due to cutting up of the hill sides should be included in the project itself, and its execution should be integral part of the roads programme.

(xi) Improvement should be carried out in the alpine pastures and grazing conditions along migration routes and in the lower ranges use for grazing by migratory graziers in winter. For that purpose there must be socio-economic coupled with agroecological studies, regarding migratory grazing, conditions of graziers, intensity of grazing, availability of alpine pastures, the ownership, pattern of the livestock which the migratory graziers take to alpine pastures etc.

(xii) Horticulture (Himachal Pradesh as an example) is becoming very popular in this region. Care will have to be taken that this important economy for the development of hill areas does not result in degradation of environment and deforestation due to increasing demand of boxes for packing cases.

(Para 5.21)

44. Steps would also have to be taken to ensure that it is made obligatory on orchards to replant the forest areas from where trees have been felled to pack the fruits.

(Para 5.21)

45. The more important steps to eliminate the deforestation to meet the demand of packing would be the introduction of alternative packing material like hardboard. Alternative material packing would have to be persuaded vigorously if the expanding demand of boxes for packing is to be met, without large scale deforestation.

(Para 5.21)

46. There is some hostility between the Forest Department staff and the local population, and this distress can be removed only through proper extension efforts and much closer contact between the two, so that each others problems and limitations are better understood.

(Para 5.22)

47. The continual over-exploitation of trees and shrubs for fuel will go on unless a successful policy of first halting the trend and then reversing the process can be thought of and implemented. This is the most important aspect of the forest in the hill areas. Over exploitation of grass lands by the growing cattle and sheep population, without any attempt to regenerate the cover and control the grazing, has now led to a position where very little grass is available annually for the cattle and sheep wealth. The policy will have to aim at gradually halting this process of deterioration and building up the pastures of the hill areas so that a balance may be struck between the cattle and sheep wealth and available fodder in the first instance.

(Para 5.35)

48. As a general policy, the nation has laid down that the purchase of minor forest produce in the forest areas must be departmentally managed so that the collectors of minor forest produce are given a fair price for their labourers. This policy has yet to be developed on large scale and it is also noticed that some States have a habit of going back on the national policy deliberately. A consistent policy will have to be developed to ensure that the tree wealth which gives the minor forest produce is not only maintained but developed so that steady source of income will be available to the local population. Thereby encouraging them to see to the preservation of these trees. Secondly, a fair price should be given to the produce not necessarily based on the labour charges alone but by complete departmentalisation of minor forest produce collection so that the urge to over-exploits is also curbed.

(Para 5.35)

49. If the backward area is to be developed the local population should get every opportunity to benefit by the various developmental and employment opportunities that can arise in the area. Forests being an important part of the economy in the hill areas, every opportunity available in the forest for benefiting the local population and for giving them employment opportunities should obviously be availed of.

(Para 5.37)

50. It will be useful to compile a list of purely protective forests for each of the States or Union Territories. It is obvious that very stringent tests will have to be applied to take out an area entirely from the orbit of productive forests and to earmark it for protection of terrain only.

(Para 5.38)

51. The Committee advises that an immediate examination should be made of all such areas in the backward hill areas which should legitimately be brought within the classification of protected forests and steps taken to declare them as protected forests. Then a systematic programme should be taken up to see that the forest cover is brought back in all

these protection forests within a reasonable time frame utilising the finances for 'social forestry'. This, in the view of the Committee, is of priority in the Himalayan hillranges.

(Para 5.38)

52. Although the position may not have such serious consequence in the forest areas of the backward hill areas of the Deccan, still it is serious enough to warrant a similar action to identify the areas which should be put under protection forests. A period bound programme should then be taken up to ensure that such areas are afforested quickly and maintained as protection forests.

(Para 5.39)

53. There are large forest areas which need replantation with economic species and commercial species. In the backward hill areas, economic forestry should include the types of timber trees and fodder trees which can solve the problem of raw material for village industries and fodder for the animal wealth.

(Para 5.42)

54. Serious attempt should be made by forest administrations in the backward hilly areas to involve the local population in the operations connected with the forest managements which are remunerative so that the local population can see the benefit of the forests from their economic angle. Similarly, the involvement of the local population in collection of minor forest produce and paying them a fair remuneration for the collected produce is another aspect which needs wide acceptance by the forest departments and the Governments of the States.

(Para 5.44)

55. In backward hill areas, therefore, where forests are important, the forest administration must learn to involve the local people so that they benefit from the forests and see the benefit in real terms.

(Para 5.44)

56. Cold arid areas occur in the Ladakh region of Jammu and Kashmir (Ladakh & Kargil Districts) and Lahaul and Spiti region and Hongrang Valley of Himachal Pradesh. Land availability will be no limiting factor. The concerned States have already taken up a programme of afforestation, soil conservation and fodder development. This may be continued. Range management and grass land development should be an important part of the programme. The local people are not migratory and hence provision of improved fodder should have the utmost priority for the local livestock. Natural grass lands are not abundantly available in the region. The extremes of climate and high altitude also limit their choice. For any large scale programme, pastures will have to be raised artificially where irrigation is available. In summer, graziers from outside migrate to the area with their livestock and cause destruction of natural vegetation. It will be necessary to regulate the entry of such migratory graziers strictly in accordance with the carrying capacity of the grazing runs.

(Para 5.46 & 5.49)

57. The Committee would strongly endorse the recommendation of the National Commission on Agriculture to set up a centre for forest research on cold desert to undertake forest research on the following:

- (i) Identification of areas for pasture development and growing of forest trees to provide fodder for the grazing animals, small timber and fuel for the local population and stabilisation of areas threatened with erosion
- (ii) Selection of suitable indigenous and exotic species and testing their performance.
- (iii) Ecological and physiological studies in relation to photosynthesis and respiration at high elevation.
- (iv) Studies of socio-economic aspects in relation to rangelands, soil and water conservation.
- (v) Study of the effect of shelter-belts and windbreak against high velocity wind.

(Para 5.50)

WATER UTILISATION

58. The cost of construction of irrigation works in hill areas is higher in view of the topographical conditions. Following would appear to be the most appropriate methods for developing irrigational facilities in the hill areas :

- (a) contour channels, with storages or diversion structures;
- (b) lift irrigation from storages or running streams; and
- (c) hydraulic rams.

(Para 6.5 & 6.6)

59. In order to minimise the damage to contour channels, it is desirable to explore the possibilities of utilising polythene and alkathene pipes.

(Para 6.7)

60. It has also been brought to the notice of the Committee that in Himachal Pradesh the rights of the farmers are standing in the way of optimum utilisation of kulh irrigation. We recommend that the State Government should review the entire position and devise suitable measures to ensure that there is full utilisation of the water and all the farmers within the command of the kulh receive a share.

(Para 6.8)

61. Lift irrigation from the running streams can go a long way in meeting the water needs for irrigation and drinking purposes. The Committee would recommend that valleys need to be identified where lift irrigation schemes are feasible and these should be suitably brought into a Master Plan of Construction quickly.

(Para 6.9)

62. Fast rising prices of diesel oil and other fossil fuel have made it imperative to find out alternative sources of energy. This would point towards the need for further efforts in developing the technology for utilising the kinetic energy of water which mostly go waste at present and devices like Hydraulic Rams, Himalayan Mill and Floating Mill which do not involve very high cost or long gestation period will be very useful.

(Para 6.10)

63. Minor and Medium Irrigation in the Deccan Plateau are much simpler schemes than in the Himalayan Ranees. A Master Plan for Minor Irrigation in the Backward Hill areas is very necessary and the Committee recommends an early examination of the potential and a time bound programme for execution.

(Para 6.16)

LAND USE AND CROPPING

64. Quick growing economic species preferably handy fruit bearing (like walnut, peanuts and fodder) trees may be planted in these areas, if considered possible, so as to keep the interests of the owners alive.

(Para 7.6)

65. Cultivation on hill slopes should be discouraged as far as possible as this causes erosion. Even the high value crops like potatoes which cause erosion should not be encouraged on slopes: There should be long term policy for covering such areas under perennial crops. Degrees of slopes beyond which cultivation should not be allowed may be specified for different regions.

(Para 7.7)

66. As far as possible, horticulture should be encouraged in combination with sod cultivation. Sod should preferably be comprised of grass clover mixtures suitable to the locality. This will provide a very good combination for horticulture and animal husbandry both of which are complementary.

(Para 7.8)

67. The Committee recommends strongly that the Agricultural Universities in the States which have the hill areas should now take up in right earnest firstly, applied research in the different zones of the various high yielding materials that have been developed in the country. At the same time, breeding of varieties suitable to the climatic conditions of the various zones of hill areas will have to be taken up strongly by these universities. The Committee recommends that the ICAR may not take active leadership in ensuring that this basic work for hill area development is now undertaken on a systematic manner.

(Para 7.12)

68. The research has to be two-fold—firstly to identify the crops and zones where basic seed material of high quality can be supplied to the rest of the country and secondly pest and

environmental problems leading to crop damage. Special attention will have to be paid in regional stations of the Agricultural Universities to these problems.

(Para 7.13)

69. The land use in the hill areas as in other parts of the country has been guided mostly by the pressure of the population on land and the tendency is to bring under cereal production even marginal lands unsuitable for cultivation. This problem specially is acute in the hill areas leading thereby to cultivation on slopes and on thin soil profiles thereby leading to very rapid soil erosion and a permanent loss to the productive areas. It is, therefore, necessary to see that the land use is adjusted to the potential of the land without leading to land deterioration. Pasture and horticultural development, the former on thin soil and the latter on sloping terrain which even now are largely practiced in the hill areas, will have to replace the agricultural crops in marginal terrain. This can only be done by an active and intelligent extension approach.

(Para 7.14)

70. Under the climatic conditions a horticultural or a vegetable crop can be much more profitable per unit of land than cereal production. The Agricultural Universities will have to take up detailed investigations of profitable land use under the climatic conditions and the right type of crop to be grown in the various zones under various environmental conditions. This will be an exercise extending the idea that has been postulated by the N'CA about fitting the right type of food crop to the hill area. The Committee recommends that this research work should be done.

71. Today no householder in the backward areas with the paucity of an administrative support and communications will risk the possibility or not producing a certain minimum food crop for his own family and depend on other people for his food. The change over, therefore, cannot take place all over the hill areas and on mere statement of policy but some selective approach will be necessary. The problem can be solved if wherever the good crops are replaced by new cash crops whether cereal, agricultural raw materials, horticulture or animal husbandry products, suitable marketing facilities are built into the system to buy the production at their fair prices and take them off the hands of the farmers of the area. Parallel to this organisation there has to be an organisation to supply the food crop prevalent in the area in fair price shops so that the farmer can buy his necessities from the fair price shops.

(Para 7.16)

72. An area approach of development taking the more productive zones which can be still more productive and on the communication routes will have to be taken up first. The administrative support and the technical support will have to be laid on as a necessary part of the programme. The Committee recommends that this vast approach of development and change over of the cropping pattern to the best use should be brought about in the hill areas at least substantially by 2000 A.D. A vast programme should be built into the Five Year Plans.

(Para 7.16)

73. It is necessary that the productivity and income per unit of land is increased so that the hill areas can sell in the plains and get their needs from the plains balancing or improving the balance towards their side by the greater income per unit of land.

(Para 7.17)

74. An important problem in expanding horticulture in the hill areas is the difficulty of communications in the Himalayan areas making it difficult to transport perishable fruits quickly to the consuming markets. Firstly, it is necessary to ensure that where-ever active propagation of horticulture is being done as a remunerative replacement for the subsistence cereal economy; care should be taken to see that a suitable marketing system can be run in these areas to remove the produce quickly to the marketing areas. Where communications are difficult or cannot be established before the trees come into fruition, other methods of handling the fruits so as to give a remunerative return to the farmer needs examination.

(Para 7|23)

75. Achievement of high productivity is not sufficient by itself. The grower must get incentive return so as to enable him to maintain the orchard properly. This is only possible if the post-harvest handling and marketing systems are modernised and streamlined.

(Para 7.26)

76. Presently, all packing of fruits in the hills is done in wooden cases. The availability of wood will outstrip the demand. Therefore, the forests will be devasated and then Horticulture Industry will reach a dead end by the end of the century. Introduction of alternative packing cases is, therefore, a must.

(Para 7.28)

77. The Committee recommends that firstly research work in fruit processing and preservation should be carried out as a priority subject in the Agricultural Universities in the States where hill areas are important. Secondly, imaginative schemes for fruit preservation should be launched in time to take off all the fresh fruit in difficult areas and the fresh fruit during flush seasons in the regions where horticulture is being deliberately expanded.

(Para 7.30)

78. It is proposed that some minimum limit say 15 per cent for use of fruit juices in all sorts of drinks may be recommended. The incidence of duties and taxes should be reduced with the increase in percentage of juice in such drinks.

(Para 7.31)

79. Horticulture should be treated at par with the industries in the backward areas for the purposes of advance of capital and interest.

(Para 7.33)

80. Horticultural planning should be integrated covering all important aspects such as Production (Production of planting material, orchard management etc.) post-harvest handling, marketing and processing. All these should have a strong backing of Research.

Para 7.34)

81. Temperate vegetables can be grown best in the middle levels of the hill areas both in the Himalayan ranges and in the Western Ghats. Proper planning of the right type of vegetables for the various areas and the adjustment of the seasons to give them a scarcity value in the plains market in various seasons should now be taken up seriously by the Horticulture Administration of States. Along with the increase of irrigation, providing for a tree crop routine in parts of the hill areas, introduction of vegetable growing in the crop routines will give greater remuneration to the farmers than following purely cereal routine.

(Para 7.35)

82. Plantations have not come up in a big way in the Himalayan hills in the Western and Middle parts. Some amount of research will have to be done about the possibility of plantation crops in these areas. The country has found new areas for planting tea, rubber, coffee and so on through the various Boards taking an active part on promotion and identifying suitable areas with suitable climatic conditions. This work should be done in a wider way in the Himalayan hills.

(Para 7.36)

83. In all the hill areas, the relevant varieties of trees will have to be identified for tasar programme and for a fodder tree programme. As pasture and animal husbandry development is of special significance in both the Himalayan hills and the Western Ghats, a fodder tree plantation will be of special benefit to the rural population.

(Para 7.37)

84. The hill areas provide good scope for floriculture. The need is to organise and expand production and marketing to make floriculture more lucrative.

(Para 7.38)

85. Another direction in which the hill areas can specialise is aromatic and medicinal plants. Many of those are wild growth in the hill forests.

(Para 7.39)

86. The Committee recommends that the Central Silk Board should explore the possibility of expanding sericulture extensively in the hill areas. Extension of tasar culture throughout the oak belt of the Himalayas should be vigorously pursued by the Central Silk Board.

(Para 7.40)

87. The Central Silk Board should organise seed multiplication and distribution, if necessary, by importing exotic strains. The Department of Agriculture can deal with sericulture aspect up to the processing stage of cocoons. Short terms in service training to junior staff and familiarisation training of farmers and rearers should be introduced.

(Para 7.40)

88. Possibility also exists for taking up tasar culture, which is now largely confined to Assam, through out the oak belt of the Himalayas. The development of tasar hybrid, which thrives well on oak, has production of high quality material. Similarly muga culture at present practiced in Assam can be extended to other parts of the north eastern regions.

(Para 7.41)

89. Apiculture, i.e. production, collection and marketing of honey and honey products could be a useful subsidiary occupation giving supplemental income to the people in the hills. There is great scope for increasing honey yields through organised apiculture, horticulture and forests. Detailed survey of the vegetation of forests with regard to floristic composition should be carried out.

(Para 7.42)

ANIMAL HUSBANDRY AND DAIRY DEVELOPMENT

90. No reliable data is yet available about that possible contribution which the "rearing of animals, sheep, goat and pigs and poultry can make to the economics of farming in the hill areas. It is, therefore, necessary that detailed studies should be taken up in various agro-climatic hill conditions for determining :

- (i) the minimum economic unit and type of the livestock for each unit of holding for a specific situation;
- (ii) the increase in income in a mixed farm that is attributable to livestock and other components; and
- (iii) the extent of utilisation of potential farm, family labour and farm livestock.

(Para 8.10)

91. In the high altitude areas of the western Himalayan region, encouragement should be given for rearing small stationary sheep flocks in the apple orchards in Himachal Pradesh and Jammu & Kashmir. Limited experience gathered so far has shown that legume grass mixture could be grown in the orchards for the maintenance of sheep.

(Para 8.11)

92. Before we can opt for an aggressive programme of cattle development, the initial move should be to develop fodder and develop the hill pastures.

(Para 8.12)

93. The common pastures have to be rapidly brought back to massive production according to their potential. Jammu & Kashmir introduced several exotic clovers in their common pasture and especially in the Alpine pasture with significant advantage. This method should now be spread to the Hill areas of Uttar Pradesh, Darjeeling, Sikkim and Assam. For good effect, pasture should be closed for grazing in a rotation and given a year at least to recoup. After that rotation grazing should be enforced. As additional boost to growth, an initial fertiliser application for the legume grass mixture is necessary. The experiment of J & K in fertilising their pastures can be carried out on a war footing in much larger areas. Whilst

the initial expenditure may look prohibitive from the ordinary standards, as this will lead to the cattle revolution and sheep revolution ultimately in these areas and boost the annual income of the families, the initial investment is worthwhile and is strongly recommended by the Committee.

(Para 8.13)

94. Nomadic husbandry is a very essential part of the hill economy. Improvement of cattle and sheep has to be done in the nomadic population also if there is to be general uplift. For this, two essential initial steps have to be taken. Firstly, the summer pastures in the Alpine hills will have to be fertilized and sown with legume grass, and high quality rotation grazing principle instituted. Secondly, on the seasonal migration routes, at least a couple of kilometers from the main route on either side will have to be intensively developed for fodder, so that the nomadic movement does not impinge on the traditional village pastures. Both these are priority issues and the Committee recommends that improvement of nomadic pastures and the traditional paths should be taken up on a priority basis.

(Para 8.14)

95. Our objective in plantation being to give a cover to the land against soil and wind erosion till the new plantations provide complete canopy over the lands, the land continues to be liable to erosion till the canopy develops completely. During this period as a necessary part of the social forestry and for soil conservation, the land has to be covered by a pasture of Legume and grass which are quick growing.

(Para 8.15)

96. As the Social Forestry programme includes growing of fodder trees on degraded forests, systematic building up of degraded forests near cattle and sheep concentration with trees fit for leaf fodder will go a long way towards improving fodder availability.

(Para 8.15)

97. An aggressive cross-breeding programme can succeed only when artificial insemination can be done promptly on the heat of the village cow and there is a nearby market for the fluid milk that the cow gives in daily lactation.

(Para 8.16)

98. There is considerable scope for developing milksheds in the hills of Kerala and Maharashtra (Ratnagiri, Satara, Poona, and Kolhapur districts) and we recommend that this potential should be suitably exploited.

(Para 8.18)

99. The farmer should be encouraged to rear cross bred heifer upto the age of bearing so that these could be sold to milk sheds areas in the plains, giving an annual income to the breeder.

(Para 8.18)

100. The State Animal Husbandry/Sheep Departments should set up service centres on the migration routes and take up a systematic and integrated programme of shearing, grading and marketing of wool to alleviate the difficulties of the nomads.

(Para 8.19)

101. The practice of letting goats loose in the forests areas should be discouraged as this species, due to its browsing and acrobatic habits, causes immense damage to growing plants. We are not in favor of increasing the number of goats but their quality must be improved to get more milk and meat.

(Para 8.22)

102. There is good potential for development of poultry in the hill regions since the demand for eggs specially that for meat is substantial. The type of poultry keeping, however, has to be tailored according to level of management practices available.

(Para 8.24)

103. There is a good scope of growing tapioca in hill areas and this can comprise a major component of poultry feed and help rearing poultry at a comparatively cheaper rate if cassava can be grown and utilised in large quantity.

(Para 8.24)

104. In the areas where the poultry rearing is purely backward operation, it is necessary to improve the quality of local birds by crossing them with exotic/crossbreed male birds.

(Para 8.24)

105. There is also very good scope for introducing improved duck rearing in some of the North-Eastern States. The cross-breeding programme has been successfully taken up on pilot basis in Tripura and Assam. This programme needs to be intensified.

(Para 8.24)

106. The National Commission on Agriculture in its interim report on poultry, sheep and livestock have identified the districts and also the measures necessary for development of poultry in north eastern States and other hill districts. The Committee recommends that these measures should be taken up earnestly and vigorously.

(Para 8.24)

107. An integrated programme of piggery development which envisages setting up of farms with cross-bred pigs and improved pig management practices could be taken up in rural areas.

(Para 8.25)

108. Regular supply of cross-bred pigs for field programme depends mainly on Government pig breeding farms.

(Para 8.25)

109. The problem of higher cost compounded pig feed could be solved to some extent by use of agricultural waste and agricultural bio-products. Necessary advice to this end could come from Agricultural Universities. Meanwhile compounded pig feed could be subsidised. This subsidy may be related to the performance of individual farms.

(Para 8.25)

110. The other difficulties of marketing pigs at remunerative price could be overcome by organising cooperative societies of primary pig producers and by forceful efforts for making pork popular.

(Para 8.25)

111. In view of the difficult terrains, mobile veterinary units should be established in order to cover remote areas. It is necessary to strengthen disease investigation facilities in these regions. The hilly terrains are largely free from rinderpest. Hence entry of unvaccinated animals should be prohibited. For this purpose rinderpest check posts should be set up on important cattle movement routes entering such terrains.

(Para 8.26)

112. It would be necessary to protect valuable exotic and cross-bred cattle against foot and mouth diseases (FMD).

(Para 8.26)

113. Since the FMD vaccine is costly it would be necessary to subsidise it suitably for the benefit of the weaker sections in these areas.

(Para 8.26)

114. The FMD virus typing/epidemiological centres of the ICAR's coordinated project on 'Epidemiology of Foot and Mouth Disease' should prepare maps showing prevalence of various types of FMD virus in the hilly regions, with a view to explore the possibility of evolving a monovalent vaccination programme there.

(Para 8.26)

115. Among pigs, swine fever is most important in the North-Eastern Region. Therefore, it would be necessary to protect the pig population of this region against this disease.

(Para 8.26)

FISHERIES

116. In the high altitudes, there is potential for development of cold water fisheries. Considering the demand for fish from the local population and also as an added attraction for tourists, hill areas offer good scope for the development of fisheries both for commercial and sport purposes.

(Para 9.1)

117. The water resources on the high altitude would continue to be mainly the cold streams and lakes. However, in low regions, many ponds, tanks and beels will have to be suitably reclaimed for developing culture fisheries of major carps. Reservoirs too can be profitably exploited. But emphasis has to be on intensive pisciculture practices.

(Para 9.4)

118. In the lower regions, culture of Indian major carps, Chinese carps and European common carps would be considered. The technology is fairly well-known and there should be no difficulty in implementing this scheme.

(Para 9.5)

119. There seems to be distinct scope for introducing grass carps in some of the weed infested lakes in high altitudes. Such a measure besides resulting in increased fish production could also keep the excessive vegetation under check.

(Para 9.6)

120. It is essential that the States take energetic steps to introduce innovations in hatchery practice and developing artificial feeds which would assure higher survival of the young trout.

(Para 9.9)

121. The ecology and fishery biology of the species comprising the main fishery of the snow trout should be studied with a view to improving the indigenous fishery.

(Para 9.11)

122. The cold water fisheries Research Unit of the CIFRI has identified the localities 'for the collection of seed fish of snow trout. It is, therefore, suggested that cultural possibilities of snow trout should be explored by the concerned States in the water of the Western, Central and Eastern Himalayas.

(Para 9.11)

123. The Committee strongly stresses the importance of availability of scientific data in respect of ecological and biological conditions, the absence of which greatly hamper the development of fisheries in hill areas. There is also need for hydrographic surveys of water areas suitable for pisciculture. Training of officers of fisheries in the techniques of cold water fishery is equally important.

(Para 9.12)

RURAL ELECTRIFICATION

124. Considering the present-critical situation of the availability of kerosene oil and diesel oil and also the need to preserve our precious forests in the hill areas, it is essential to spread electrification in the hill areas to the maximum extent possible not only to reduce the

dependence of the hill people on Kerosene for lighting purposes, but also to persuade them to give up to the extent possible, the use of fuelwood and diesel oil as energy base.

(Para 10.1)

125. While planning big power projects in the hill areas adequate safeguards would need to be taken to protect the environment on the one hand and the interest of the local population on the other by providing greater opportunities for job employment in order to improve the economic conditions of the rural people.

(Para 10.3)

126. The approach in regard to the electrification of the hill areas has necessarily to be based on the principle of 'growth point' development.

(Para 10.4)

127. Rural electrification programmes should not only cater to domestic/light requirements, but should also cover pumping projects service connections for commercial purpose, agro-based industries, village, tiny and cottage industries. This approach would not only improve the viability of the rural electrification schemes but would also contribute in improving the economic lot of backward hill area people.

(Para 10.4)

128. The Committee would strongly urge that the norms for rural electrification in the hill areas should be realised to the maximum extent possible considering the pattern and the situation prevailing in the hill areas normal norms cannot be applied if rural electrification has to make a real headway in the hill areas.

(Para 10.5)

129. Use of wooden poles which are largely available with proper creosoting agent be encouraged more vigorously in place of conventional steel tubular or rail type poles.

(Para 10.6)

130. Realistic Integrated Area Development Programme be chalked out in certain pockets, which should take care of development of small/medium industries. The power development programme should be so framed so as to meet the time bound requirement of electricity demand in these pockets.

(Para 10.7)

131. The backwardness of the region calls for building up of infrastructure for future development of the areas and a special tariff for electric supply in these areas should be framed, keeping in view the social objectives of developing the area and reducing the cost to the extent possible by using cheap material and methods.

(Para 10.8)

132. The emphasis should be on taking up small micro-hydel projects for which there is considerable scope in these areas. It would be in the national interest to subsidise the power tariff as the increasing use of electricity by the villagers would prevent deforestation also.

(Para 10.8)

133. There is also considerable scope for under taking extensive programmes for rural forestry and of bio-gas plants, depending upon the availability of cattle. In this context, there is also need for research on the economic possibilities of solar energy in the hill areas.

(Para 10.9)

TOURISM

134. The decision for formulating appropriate policies should be taken keeping in view the need for developing the backward hill areas and providing opportunities for the middle level tourists and keeping the common man in view so that all the developments and economic activities arising out of promotion of tourism are focused on his overall benefit. Obviously this objective can best be fulfilled by promoting domestic tourism at modest cost and attending to that minority of foreign tourists who travel on a shoe-string budget and would settle for any place which is cheap and comfortable.

(Para 11.3 & 11.4)

135. Most of the hill areas are a trekkers paradise. Trekking and mountaineering are two of the most important activities which can not only develop the economic conditions of the poor hill people in the backward areas but also provide a spirit of adventure in our youngsters.

(Para 11.4)

136. The most important type of traffic from our point of view is the pilgrim traffic: Lakhs of people visit Badrinath, Kedarnath, Gangotary, Yamnotri, Amamath, Vaishnodevi and such centres and quite a large number cannot make it to these places because of lack of facilities and inadequacy of transport services. If past trend is any indication, the number of pilgrims, given improved facilities, is likely to increase by leaps and bounds.

(Para 11.4)

137. An integrated approach, encompassing an integrated development, of various activities, with reference to each other, would not only lead to dispersal of tourist activities and its attendant economic benefit but also would be a step towards the improvement of the economic conditions of the common man residing in the backward hill areas.

(Para 11.5)

138. The State Tourist Development Corporations should play an active role in the development of the superstructure of tourism as well as the basic infrastructure such as adequate and regular supply of water and electricity, surface transportation to reach the various centres, public health and medical facilities, etc.

(Para 11.6)

139. As a first step towards the promotion of this tourist traffic, each State must identify the yatra and trekking routes. It is equally essential to bear in mind the travel circuit concept. It is desirable that travel circuits radiating from specified centres are identified for developing tourist infrastructure in an integrated manner in the area. This exercise will help in developing tourist facilities in a planned and regulated manner.

(Para 11.7)

140. Pilgrim centres are at present awfully lacking in adequate accommodation and other facilities. The example of Tirupati and Guruvayoor where income from the temples is utilised for providing adequate facilities and development of these centres is worth emulating in the northern hill area shrines. Necessary legal and other measures be taken if necessary on the lines of what has been done at Tirupati and other such centres in South India.

(Para 11.10)

141. Initiative for providing cheap and suitable accommodation on identified yatra and trekking routes should be taken up in a coordinated manner by the State Tourism Development Corporations.

(Para 11.11)

142. A more liberalised policy will have to be followed in the matter of offering accommodation in the P.W.D. and forest rest houses to the tourist and in many cases, it may also be desirable to set up annexes to rest houses, and camping sites within the compound of the main rest houses so that tourists can use the common facilities provided there.

(Para 11.12)

143. Where an experiment has been tried to clear the ground and provide tents, people prefer to stay in camps provided the rent is not too high and other common facilities are available. Development of such sites with proper facilities of power, water and basic hygiene may be considered,

(Para 11.13)

144. There is considerable scope for encouraging private individuals particularly the ex-servicemen and such of the educated young men who have migrated outside the hill areas, to take loans and construct suitable accommodation for this purpose. Norms could be laid down for these private persons and preconditions of licensing could also be imposed on the loans before institutional loans are made available. This will of course involve a basic change in the present lending policies of banks and financial institutions. More and more youth hostels should be provided.

(Para 11.14)

145. The State Tourist Development Corporation should be specifically entrusted with this responsibility and it should be its duty to ensure that whatever facilities are created in the identified centres and routes, they are properly maintained and run. If necessary, the Corporations should be given adequate powers to enforce this discipline.

(Para 11.15)

146. Improved transport, arrangements will have to be made for the places identified for development. More buses, taxis, etc. will have to be provided to meet the transport requirements for development of the places likely to be developed. Improved bus-stands, better reservation facilities and more coordination between the railways and the road operators also have to be organised.

(Para 11.16)

147. In almost all the places with the potential for development of tourism, there is an acute shortage of water supply as a result of which even the present tourist traffic is put to a lot of inconvenience. Water supply schemes will have to be worked out in detail and L.S.G.D. Departments will have to be asked to give priority to these schemes for places which are selected for development.

(Para 11.17)

148. Adequate medical facilities are not generally available in backward hill areas. These facilities will have to be provided so that, in case of emergency, tourists are not stranded without medical aid. In these places, where the permanent population does not warrant the establishment of regular hospital or a dispensary, temporary shifting of a dispensary or posting of a doctor during the season could be resorted to.

(para 11.18)

149. Hardly any way side amenities worth the name are available in this region. Punjab and Haryana offer good examples where standard but cheap way side amenities have been provided and this should be encouraged.

(Para 11.19)

150. Publicity will have to be regarded as a specialised job for which either proper machinery will have to be created within the Tourist Department or private agencies which may be capable of handling this job will have to be pressed into service.

(Para 11.20)

151. The State Tourist Development Corporation should take up in right earnest the publicity campaign and other connected matters in collaboration with hotel organisations, etc.

(Para 11.20)

152. Forests can play an important role in the hill areas to provide recreational facilities.

(Para 11.21)

153. It is recommended that each State Government should take up the preparation of Master Plans which should:—

- (a) take account of the basic natural factors contributing to the attractiveness of a place of tourist interest and identify pilgrim and trekking routes;

(b) study with reference to the existing and the expected volume of tourist traffic, the availability of the civic medical and public health, water supply and accommodation facilities, to determine the steps required for their augmentation and improvement;

(c) appraise the variety and quality of boarding, catering and other facilities and work out the measures needed for their improvement; .

(d) the approach should not be to confine planning with reference to the development of tourism but to look upon the various places of tourist interest situated within a reasonable distance of each other as a complex of inter-related facilities and to draw up plans for integrated development, including vegetable growing, poultry, souvenir production etc.

(e) In any Master Plan, the importance of preserving the environment in the hill areas must be kept in view. The need to maintain the ecological balance while taking up tourism development in the hill areas, the need to assess the absorption capacity of each centre before taking up development so that ecological balance is maintained, the need to evolve the requisite architectural and building guidelines for the development proposed in the hill areas etc. are important in connection with the preparation of Master Plan.

(Para 11.23)

INDUSTRIAL DEVELOPMENT

154. There is great potential in the hill areas particularly in regard to cottage and village industries based on forest material and wood, horticultural and vegetable, mineral products, apart from such units which can be economically established in the hill areas because of the area having salubrious climate, thereby saving lot of expenditure* on air conditioning etc. like precision instruments, electronics, watches etc.

(Para 12.2)

155. The major effort in the industrialisation programme to the backward hill areas has necessarily to be based on the exploitation of the raw materials available in plenty and the traditional skills particularly for the development of handloom village and cottage industries, carpets etc. Further, there is scope for wool industry using sheep and goat wherever possible. The recent revolution in manifold increase in the production of horticultural crops, particularly fruits, has opened up vast possibilities of establishing industries based on these raw materials.

(Para 12.5)

156. Industries utilising local raw materials cannot provide a sufficient basis for industrial development in hill areas. In many cases raw material based activities will be transport intensive and face handicaps in marketing because of the heavy incidence of transport costs. Hence a special effort has to be made to direct to these areas certain types of footloose industries which produce high value low weight products like pharmaceuticals, watches, electronic devices, etc.

(Para 12.6)

157. If the occupational structures in hill areas is to be diversified those footloose type of industries have to be pushed to hill areas because the extent of transport cost disadvantages will not be significant and because other, more transport intensive, footloose units cannot be promoted effectively in these areas. Thus the approach to industrial development of hill areas must be based not merely on the exploitation of local raw materials but also on a deliberate effort to ensure that these areas get a fair share in the overall natural development in footloose industries.

(Para 12.6)

158. There is ample scope for establishment of some Industrial Estates in these areas on the lines advocated in its Report on 'Industrial Dispersal'. These estates should be designed so as to attract specific categories of industries. Where possible functional with common service facilities should be promoted to attract the type of footloose industries mentioned earlier. Wherever public sector projects are set up, industrial estates should be set up to support ancillarisation in local area.

(Para 12.7)

159. It is time that, as a first step towards effective development of agro-processing units in the backward areas, action is initiated toward the development of regulated markets covering horticultural based crops, with professional supervision. As pointed out in the Report on Industrial Dispersal, this appears to be the more hopeful approach for an organisation which will handle the needs of the farmer and at the same time command a professional management for efficient running of the industry.

(Para 12.8)

160. The Committee would like to emphasise the need for the concerned States to identify the skills that are necessary to develop the type of industries discussed in this chapter and suited to the hill areas, the extent they are not available locally and the manner in which local population should be trained to fill these gaps. The potential source of entrepreneurship would have to be tapped.

(Para 12.10)

161. A large number of educated people from the hill areas have migrated outside their own homes. Attempts should be made to attract them back by providing those necessary facilities and training. In particular, the training of entrepreneurs should include provision of initial help to the trainees, suitable accommodation and stipends, supply of blueprint of the industries which the selected applicant wants to start, good consultancy aids, continuous technical guidance and assistance during the period of operation, etc.

(Para 12.10)

162. The margin money for the entrepreneurs in the hill areas should be kept to the minimum and should not in any case exceed 20% of which 15% should be available from the subsidy and the balance 5% alone should be found by the entrepreneurs. Similarly, margin money for working capital will have to be allowed and should not exceed 50% of the normal

requirements as specified by the monitoring authorities in non-backward areas. In addition, both term loans and production loans should be available as a package, from a credit institution so that internal wrangling on security can be overcome.

(Para 12.10)

163. Howsoever one may wish, industrial development cannot be brought about solely with the help of subsidies, provision of infrastructure and State help. While these are no doubt essential, more important is the economics of agglomeration and to lay emphasis only on such industries which provide a specific advantage, vis-a-vis the non-hill areas and concentrate its efforts only on the development of such industries.

(Para 12.11)

ROAD & COMMUNICATION

164. The Committee would urge that apart from following the traditional methods of constructing roads, careful study should be made about the design and specifications of roads in the hill areas, depending upon the intensity of the traffic and availability of local raw materials and efforts should be made to utilise them to the extent possible. Another easy mode of transport in the hill areas is the extensive use of ropeways. The latter should be explored and encouraged to the maximum extent possible as it is much cheaper than the traditional cost of construction of roads. (Para 13.6)

165. The P&T Department has also decided to provide a LDPCO in each village having a population of 2500 or more in hilly and backward areas without any conditions of minimum revenue. In tribal areas the population limit of 2500 for a single village has been relaxed to cover a group of villages within a radius of 10 kms. of a bigger central village provided no two public telephones will be opened on this basis within a radial distance of 10 kms. of each other. The Committee would recommend that a similar criteria should be thought of in hilly areas and wherever there is a police station under the charge of Sub-Inspector of Police or above, a LDPCO has to be provided even when the revenue does not cover the annual recurring expenditure in the maintenance of the LDPCO.

(Para 13.10)

ORGANISATION OF ADMINISTRATIVE AND FINANCIAL STRUCTURES

166. For the purpose of the administrative and financial organisation, the structure has to be adjusted to these three classes:

(i) Backward hill areas in the Deccan plateau and part of the States having hill areas like Uttar Pradesh, West Bengal and Assam;

(ii) Backward hill areas in the hill States of the Himalayas comprising Jammu & Kashmir, Himachal Pradesh, Arunachal Pradesh, Manipur, Meghalaya, Nagaland, Mizoram, Tripura and Sikkim;

(iii) Forward hill areas in the hill States mentioned" in item (ii) above.

(Para 14.2)

167. The National Committee's report on "Organisation of Administrative and Financial Structure for Backward Areas Development" has recommended integrated development project approach for a project area comprising 2 or 3 blocks in backward areas. The Committee would recommend that this project approach with the necessary implications about administrative autonomy and financial autonomy should be implemented in the area comprising items (i) and (ii) in paragraph 14.2 above.

(Para 14.3)

168. A multi-disciplinary approach is essential for following watershed management strategy.

(Para 14.5)

169. It will be necessary to ensure that the Hill Area Development Commissioners wherever they exist and wherever the creation of such posts is considered necessary, depending upon hill area to be developed, are given adequate staff support and administrative and financial powers. The National Committee would recommend that the Hill Area Development Commissioners should enjoy the same powers and status as have been recommended in respect of the development of backward areas for officers to be designated as Backward Areas Development Commissioners.

(Para 14.6)

170. The National Committee would like to recommend that the Steps suggested by it in Chapter 7 "Personnel Policies" of the Report on Organisation of Administrative and Financial Structures for Backward Areas Development must be properly enforced particularly in the hill areas to ensure that adequate , staff support is available.

(Para 14.7)

171. The Committee would like to emphasis people's participation and thereby providing built in seeds of success in the integrated watershed management programme. The Committee's observations in Chapter 9 dealing with people's participation in its report on Organisation of Administrative and Financial Structure would have to be consistently kept in mind while drawing up plans and programmes for implementation in the hill areas.

(Para 14.8)

172. Detailed strategies have been suggested for formulation of sub-plans, budgetary control and delegation of adequate financial powers. In such States as are not wholly hill States, there is already a sub-plan for development of hill areas. So far as these States are concerned, these are covered by what has been recommended in the main report on Organisation of Administrative and Financial Structure.

(Para 14.9)

173. The Committee suggests that the needs of the backward hill areas would be taken into consideration whilst allotting special funds for States in the Plan

(Para 14.10)

I. INTRODUCTION

1.1 The hill areas of the country comprise the Himalayan region and parts of the Deccan plateau. The Himalayan region is divided into three sub-regions : The Western Himalayas covering Jammu & Kashmir and Himachal Pradesh; the central Himalayas consisting of eight hill districts of Uttra-khand in Uttar Pradesh; and the eastern Himalayas and the north eastern ranges comprising the Darjeeling district in West Bengal and the Hill areas of Sikkim, Assam, Arunachal Pradesh, Meghalaya, Mizoram, Nagaland, Manipur, Tripura. The Himalayas have several ranges. They are described as outer Himalayas, the middle Himalayas and the main Himalayas. Sometimes only two classifications are made, namely, the greater Himalayas and the lesser Himalayas. The Karakoram in the of Jammu & Kashmir is the highest of the Himalayan ranges and includes the high plateau of Ladakh. The Southern part of the Himalayas has the lower range of hills known as the Siwalik range. The Himalayan region contains deep valleys running from west to east, like Lahaul-Spiti and Kulu. At the far eastern end are the low flat hills of Assam and the bald round-headed hills of Manipur. These hills are not very high but are thickly forested except where the practice of Jhum cultivation has depleted the forest cover and the top soils.

1.2 Himalayan hill areas do not constitute a homogenous region. Conditions vary from place to place in regard to altitude and topography, climate and rainfall, water resources, vegetation, etc. The geographical factors exert a decisive influence on the life of the people and their economic development. There are variations in rainfall depending on altitude, direction of the mountains and other factors. While some areas like the Darjee-ling district and parts of Assam get very heavy rains, some parts of Himachal Pradesh, such as Kalpa are semi-arid and get only about 75 cm of rainfall annually. The Ladakh and Lahaul-Spiti areas are cold arid, the average rainfall being very low. A number of water resources are found in the hilly regions but because of the different sizes of the catchments and command areas, different levels of rainfall, etc. the quantities of water available in the valleys differ widely resulting in varied potentialities of crop production. The scope for rearing different types of livestock also varies from area to area depending, in particular, on the availability of pastures. A forestation also depends on the altitude aspect and rainfall pattern of different hill regions. For formulating development programmes, therefore, it is necessary to differentiate between the problems of hill areas in different zones classified on the basis of climate, rainfall, topography, etc.

1.3 The Deccan Plateau is almost like an inverted triangle, covering almost the entire terrain south of the Indo-Gangetic Plain. In the North-West of the Plateau lies the Aravalli ranges of Rajasthan running from the south-west to the north-east. To a little southward lie the Plateau of Malwa, the Vindhya and Satpura ranges running from east to west. In the North-East area lie the Rajiuhah and the Chhota Nagpur hills of Bihar. The Western Ghat and the Eastern Ghats form the two sides of the plateau. The southernmost part of this plateau covers the Gordamom hills of the Kerala State.

1.4 Both the Hill systems, the Himalayan and the Deccan, have large rivers flowing through them. Most of them have innumerable hill streams and rivulets rushing during the monsoon at great speed. Most areas in both the regions get enough rain for luxuriant growth of forests and a variety of vegetation. Mountain vegetation varies according to the altitude and rainfall. From the grass lands in the foothills, tropical, temperate and coniferous forests are found at progressively greater and greater heights. Most of these forests are lush. But above the height of 4000 metres, hardly anything grows except moss and lichen.

1.5 The National Development Council decided in 1971 to select the hill areas lying within the four States of Uttar Pradesh, Assam, West Bengal and Tamil Nadu for special attention. Exclusively hill States like Himachal Pradesh, Jammu & Kashmir; Meghalaya etc. were left out of the purview of this programme as they had already been fully taken care of in the State Plans which were exclusively meant for their development. Later, a contiguous territory in the Western Ghat comprising 122 talukas in the States of Maharashtra, Karnataka, Tamil Nadu and Kerala and a small part of the Union Territory of Goa were included under this programme.

1.6 The hill areas in the Himalayan regions were identified as follows :—

Jammu & Kashmir	Entire State.
Himachal Pradesh	Entire State
Uttar Pradesh	Uttar Kashi, Chamoli, Pithoragarh, Tehri, Pauri, Almora, Nainital and Dehradun
West Bengal	Darjeeling District.
Arunachal Pradesh	Entire Union Territory
Assam	United Mikir and North Cachar Districts.
Manipur	Entire State
Meghalaya	Entire State
Nagaland	Entire State
Mizoram	Entire Union Territory
Sikkim	Entire State
Tripura	Entire State

fall above the contour of 600 meters. It was found that this excluded plateau areas which are generally flat in the middle of India and more progressive. The Committee would, therefore, recommend that excluding areas covered under the tribal sub-plan for which separate provision exists, the rest of the hill areas above 600 meters contour in the Deccan belt should be considered backward hill areas.

1.8 In the Himalayas the Committee accepts the areas already demarcated as hill areas of U.P., West Bengal and Assam as backward hill areas for special consideration. The exclusively hill States of Jammu & Kashmir, Himachal Pradesh, Arunachal Pradesh, Manipur, Mizoram, Nagaland, Meghalaya, Sikkim, and Tripura are already treated specially as backward States and the needs of the backward areas in these exclusively hill States should be looked after under the State Plan on the basis of the guidelines- we have given for dealing with backward hill areas.

1.9 In the Himalayas, the foothills which are generally below 600 meters height and are included in the States of Punjab, Haryana and in some of the foot hill districts of U.P., having been formed by the detritus from the Himalayan development have extremely friable soils. This is the ka'ndi area type of problem where special steps have to be taken to stabilise the land. Some pilot schemes have already been started in the Punjab and Haryana kandi area needing special investment. The Committee recommends that all kandi areas in the foothills of the Himalayas should be treated as backward hill areas.

1.10 The economy of hill farmers is largely based on land, animal and forest resources. Almost all the farmers are small farmers and holdings are generally small because of topography. The land available for cultivation is limited to the valleys and slopes, and the holdings are scattered. The poorest sections of the hill people are mostly members of the Scheduled Castes and Scheduled Tribes. Their proportion in the total population is high.

1.11 The basic statistical data and land use pattern relating to hill areas is given in Annexure III & IV. The hill areas are sparsely populated. The density of population is as low as 6 per sq. km. in Arunachal Pradesh, 16 per sq km in Mizoram, 29 per sq km in Meghalaya, 46 per sq km in Jammu & Kashmir and 62 per sq km in Himachal Pradesh as against 173 per sq km for the country as a whole. Also, there is heavy pressure on land as the total cropped area is very low. It is only 1.6 per cent in Arunachal Pradesh, 5 percent in Mizoram, 4.3 percent in Jammu & Kashmir, 16.8 percent in Himachal Pradesh, 9.3 per cent in Manipur, 17.0 per cent in Nagaland and 9.1 percent in Sikkim as against 52.4 percent for the entire country. Since a major portion of the land is under forest, permanent pasture and grazing land, barren and uncultivable land, etc. the per-capita availability of land for cultivation in the hill areas is quite low. As for instance, in Himachal Pradesh, out of the total geographical area, 54 percent is reported areas for land utilisation. Of the total geographical area, 12.2 per cent is under forest, 6.3 per cent not available for cultivation, 21.2 percent under forest, 6.3 per cent available for cultivation, 21.2 percent under permanent pasture and other grazing lands and 24.5 per cent as unculturable waste land. The available statistics on land use pattern with all their limitations, indicate the overwhelming importance of forestry in the hill areas. Forest area varies from 61.8 per cent to 12.2 per cent of the total geographical area in the hill States. It is 61.8 per cent in Mizoram, 55.2 per cent in Tripura, 36.3 per cent in Sikkim, 12.4 per cent in Jammu & Kashmir and 12.2 per cent in Himachal Pradesh. Pasture and grazing land varies from 0.2 per cent of the total geographical area as in Mizoram to 21.2 per cent in Himachal Pradesh. Whereas for the country as a whole, the net area sown forms about 43 per cent of the geographical area, it is only 10.1 per cent for Himachal Pradesh, 3.2 per cent in Jammu & Kashmir, 6.3 per cent for Manipur, 1.4 per cent for Arunachal Pradesh. The net irrigated area in hill areas varies from 0.3 per cent as in Arunachal Pradesh to 6.7 per cent in Himachal Pradesh.

1.12 Broadly speaking, the important features of hill areas are :—

- (i) Higher cost of essential goods and services, lower market price of produce, etc.
- (ii) Factors like poor infrastructural facilities and low resource level often lead to out-migration of enterprising youth educated and un-educated, from hill areas.
- (iii) Very little industrial development. Predominance of relatively less paying occupations resulting in lower income.
- (iv) Ecological balance in the hills involves a very fine balance of crop production, animal husbandry, forestry etc. This balance has now been broken due to greater denudation of forests and deteriorating conditions in supply of fodder and fuel.
- (v) Low incomes mean low demand and the local trade and commerce, as also the crafts have been facing bad days.
- (vi) The remittance received in the shape of money orders from armed personnel, employees in domestic menial services, government or semi-government organisations is primarily used

for consumption purposes by those left behind and generally not made use of for productive purposes.

(vii) The arable land in hill areas is limited and alternate occupations, have not emerged to absorb the growing labour force.

(viii) The possibilities of growing both horticultural and other cash crops of remunerative nature are indeed high in hill areas.

1.13 It has been generally accepted that the problems of development are far more onerous and intractable in remote and inaccessible hill areas. The major problems which are more or less common to these hill areas can broadly be identified as follows:—

(i) The terrain is usually rocky and undulating and land available for agricultural operation is limited.

(ii) Hills have problems concerning land slides and soil erosion.

(iii) -There is a lack of adequate irrigation sources; their high cost of maintenance operations and supervision is another problem.

(iv) Communications and transportation facilities in hill areas are often inadequate. Poor means of communication alongwith mountainous terrain are among the factors inhibiting the-development of such regions. Due to the hilly terrain transport is possible only through forest paths and roads.

(v) Storage godowns in important or key centres are inadequate or non-existent. Processing and storage facilities remain inadequate.

(vi) There is a lack of suitable and adequate marketing facilities in hill areas particularly those located away from the hill stations and important towns.

(vii) Terms of trade are unfair. Inadequate transport facilities, high cost of transportation to plains and lack of suitable marketing infrastructure result in producers getting low prices for their, produce. On the other hand, for almost similar reasons, the people hi hill areas have to pay ex-horbitant prices for what they require. The few traders who go into these closed areas further exploit the producers in both ways. '

(viii) There is a general reluctance on the part of officials and staff to take up assignments in these areas. Local people remaining behind are not educated and advanced enough yet to fill up the gap.

(ix) Records of right in land are in-adequate.

1.14 Any strategy for development of hill areas has to take note of the economic constraints of the environment and to try to maximise productivity directly by crop production supplementing it by suitable subsidiary occupations which the environment can support.

1.15 A broad based strategy of action has to be evolved with a view to substantially improving the economic conditions of the inhabitants of the hill areas. The backwardness of hill, areas is not always due to lack of natural resources but largely due to continued neglect

and lack of concerted action to develop their potential. The economic programmes for these areas have to be formulated and executed in a coordinated fashion. The fragmentary approach in the past has adversely affected progress in these critical areas in various ways. It has confused priorities. It has impeded proper coordination and synchronization of inter-related programmes.

1.16 The programmes for hill areas should be an integrated development programme for building up of infrastructure and for supplying a package of inputs and other necessary services almost simultaneously. Each component of the programme has to be inter-related and coordinated with the other components, with the ultimate aim of maximising production and benefiting the hill people economically.

1.17 Furthermore, there cannot be any hide-bound uniformity in these programmes for all the hill areas. Geography and climate, history and customs even superstition play important roles in the life of particular hill regions. The variations of experience have to be taken into account in designing a suitable package of development programmes for particular hill areas. Flexibility, therefore, should be an inbuilt feature in such programmes to suit them to local needs.

1.18 The National Committee on the Development of Backward areas constituted Working Groups on Rural Development, Tribal Sub-Plans, Industrial Development and Organisational Structures; The Working Group on Rural Development was entrusted with the subject of hill areas development also. It consisted of experienced officers from various States as well as concerned development Ministries. The notices of the meeting of the Working Group were sent to National Committee Members with his request that if they wanted to attend the meetings, they were welcomed to do so.

1.19 The Working Group held a large number of meetings. Later, the National Committee decided to hold joint meetings with the Members of the Working Group when its broad approach and draft chapters were discussed.

1.20 A three day Seminar on the Development of Hill Areas was held at Nainital on April 21-23* 1980. The Seminar was sponsored by the National Committee on the Development of Backward Areas and was organised jointly by the Giri Institute of Development Studies, Lucknow, and the Government of Uttar Pradesh. The Seminar was attended by about 100 participants. They included social scientists from Universities and Research Institutions in Andhra Pradesh, Delhi, Gujarat, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Uttar Pradesh and West Bengal and representatives of several State Governments. Besides, some interested individuals and social workers also attended. Over fifty papers dealing with various facets of development in the hill areas formed the basis of the deliberations at the Seminar. A list of participants and papers presented are given in Annexure I & II.

1.21 The National Committee would like to make it clear that the report deals with mainly the broad approach for the development of backward hill areas and the operational steps that need to be taken for its implementation. Care has been taken to avoid repetition of what has already been covered in the reports already submitted namely, the Report on organisation of Administrative and Financial Structures for Backward Area Development, Industrial Dispersal and Village and Cottage Industries. Some of the elements such as marketing, credit, etc. which are common to most backward areas would be covered in a subsequent report.

2. REVIEW OF PAST EFFORTS

Review

2.1 During the first three plan periods, the development of hill areas did not receive adequate attention. However, higher rates of central financial assistance were granted to concern State Governments for certain schemes in specified areas. There was no concerted effort at formulating an integrated programme of agricultural development embracing crop production, horticulture, animal, forestry, etc., and the piecemeal efforts did not produce any perceptible impact on the living conditions of the people.

2.2 Towards the end of the Third Plan, the National Development Council appointed a Steering Committee in the Planning Commission which suggested that hill areas should receive special attention and made several recommendations to accelerate the economic development of these areas. The recommended strategy for hill areas of U. P., Assam, Tamil Nadu and West Bengal which formed part of larger States was of preparing separate plans for the areas.

2.3 The Fourth Plan suggested a Multi-directional Area Development approach for accelerating the development of backward areas. These areas were grouped into two broad categories for evolving proper policy frame:—

(i) Areas with unfavorable physio geographical conditions, terrain, climate and regions inhabited by people with typical cultural characteristics, and (ii) Economically backward areas marked by adverse land man ratio, lack of infrastructure or inadequate development of resource potentials. The Plan recognised that in hill areas, there would be higher cost and poor returns from investments and in view of the above unfavourable factors, more Central assistance was allocated to meet the special needs and problems of the hill areas on a selective basis.

2.4 Certain pioneering projects had been taken up earlier under the Indo-German Assistance Programme. These projects were experimental in nature and intended to find a suitable approach for development of the selected backward hilly regions within a short period. To start with, these were located in the Mandi and Kangra Districts of Himachal Pradesh, Almora in U. P. and Nilgiri in Tamil Nadu. These projects aimed at integrating development of agriculture, horticulture, animal husbandry, dairying besides development of infrastructure facilities including minor irrigation, soil conservation, drainage, storage, processing and marketing. These projects did help in the dissemination of know-how and could also be said to be instrumental in making durable but limited improvements in the infrastructure. New institutions were established and existing ones strengthened which included experimental, trial, seed and cattle farms, artificial insemination centres, implement workshops, soil testing laboratories, processing units, storage godowns, etc. The credit and marketing institutions were also strengthened.

2.5 Encouraged by the limited success in these projects, the Government of India decided to take up some more pilot projects, and a beginning was made with two projects in 1972-73, one at Pauri Garhwal in Uttar Pradesh and other in the Nungba Division in Manipur State. These projects were 100 percent Centrally financed. The basic approach was the selection of complete water shed, for taking up soil conservation measures and construction of irrigation works in the area. Land development work was to be followed by introduction of suitable

cropping patterns, development of horticulture alongwith animal husbandry, dairying, poultry keeping etc. Some provision was also made for strengthening the infrastructure like markets, construction of link roads and godowns, establishment of processing facilities etc.

2.6 The NDC decided in 1971 to select the hill areas lying within the four States of Uttar Pradesh, Assam, West Bengal and Tamil Nadu for special attention. Exclusively hill States like Himachal Pradesh, Jammu & Kashmir, Meghalaya etc. were left out of the purview of this programme as they had already been fully taken care of in the State Plans which were exclusively meant for their development. Later a contiguous territory in the Western Ghats regions comprising 122 talukas in the States of Maharashtra, Karnataka, Tamil Nadu and Kerala and a small part of the Union Territory of Goa were included under this programme.

2.7 The outlays and the actual expenditure during the Fifth Plan in the hill areas of the four States taken up under the special Central assistance programme as well as in the States which are regarded as exclusively hill areas is given in Annexure V.

2.8 Under the Central assistance programme, separate sub-plans for the hill area development were prepared and special supplementary assistance was set apart for implementing programmes for integrated development of the area. High priority was assigned for providing basic infrastructure facilities like roads, irrigation etc. A brief review of important programmes in different States for Hill Areas development under the Central Programme will give an idea about the priorities assigned for speedier development.

2.9 A basic problem in the hill districts of Assam is shifting cultivation prevailing among the local tribal population and that poses problems of irreparable ecological deterioration. Therefore, the strategy adopted was to reduce the dependence of tribals on traditional shifting cultivation by undertaking multi- disciplinary 'Composite Projects', so as to wean them away from this wasteful method of cultivation. The projects consists of a core cash crop plantation programme for rubber and coffee along with various inter linked programmes for soil and water conservation, minor irrigation, afforestation, agricultural inputs and extension and provision of infrastructure. To tackle this twin problem of developing the plantation and rehabilitating the tribals in Assam Plantation Crops Development Corporation was constituted. The total plan covers all the sectors—both production programme as well as social services. In the Fifth Plan, short-falls have occurred in the composite projects, irrigation programmes, industries and also to some extent in road construction. In the composite project, the plantation programme as well as its ancillary programmes have not taken off as anticipated. Besides social factors, slow progress is on account of inadequate attention in regard to proper selection of sites and lack of coordination among the different departments. Except for some segment of the hili districts, utilisation of irrigation facilities, application of fertilizers, energisation of pumps and use of better seeds have not found wide-spread acceptance. However, there has been a tradition of cultivation of horticultural crops in the hill areas and the schemes undertaken to improve yield and application of better technology to such crops have shown some encouraging results. There is hardly any industrialisation in the hill areas and even low technology industries have not provided any significant employment to the local people. Barring the processing and canning of fruit in the small sector, there has not been much development of this sector. There are a number of village industries particularly such crafts as weaving, sericulture, bamboo cane handicrafts, etc. which have a long standing tradition and need to be developed.

2.10 In the Darjeeling hill area special orientation was given during Fifth Plan to agriculture by increasing productivity and marketability. Programmes under agriculture

included HYV maize, multiple cropping, Soyabean and potato development, development and utilisation of local manorial resources and introduction of new cash crops, farming under ginger, cardamom, revitalisation and expansion of orange orchards and multiplication and supply of seeds of improved varieties of flowering plants. The agriculture programme has received support from soil conservation and minor irrigation.

2.11 The major emphasis of the animal husbandry programme in Darjeeling area has been on improvement of A.I. facilities, strengthening of central semen collection centres and increasing emphasis on piggery which has become popular together with streamlining arrangements for marketing of milk and milk products through cooperative marketing societies. A special feature introduced in the area to complement the Government veterinary service was to train the local youth in each village in A. I. work and veterinary first aid. Another significant achievement during the Fifth Plan period was in sericulture sector. Assistance was provided to individual cultivators to grow mulberry and rear silk worms. Promoting of sericulture programme has made considerable impact among the villagers who have taken to it as a subsidiary occupation. This was also the base for supplying; nucleus disease free layings for cocoon development programmes in the plains of West Bengal.

2.12 The Fifth Plan programmes for Nilgiris development were formulated in the sector of agriculture, minor irrigation, dairy development, animal husbandry, forestry, khadi and village industries, roads, tourism etc. The important schemes in agriculture & horticulture included establishment of seed farms for ginger, vegetable seeds, paddy, tapioca and spices and development of mandarin oranges. The animal husbandry programmes related mainly to sheep development.

2.13 The U. P. Fifth hill area development plan is virtually an extension of the plamo area programme with, of course, some emphasis on the development of local resources in the hill areas. The Plan amounts to merely a mechanical disaggregation of outlays for the hill areas and can at best be regarded as a regionalised Plan budget. With a view to promoting the socio-economic development of hill areas, high priority was assigned to Transport and Communication during the Fifth Plan period. The level of industrialisation was very low despite good resource base for industrial development in terms of forest, minerals, livestock and horticulture potentials. For optimal exploitation of the existing potential and natural resources of the area, efforts were made to connect potential areas as also tourist resorts and remote and inaccessible areas through fair weather roads for opening up the economy. To improve quality of life of the people, social and community services were also given priority in the Fifth Plan.

2.14 Other programmes in the agricultural, horticultural, animal husbandry, forestry etc were of the same type as in the plains.

2.15 The programme content of Western Ghats Development seems to have influenced by two objectives viz.

(i) economic well being of the hill area people and

(ii) exploitation of the resources of the hill areas. During Fifth Plan, it has remained as an ad-hoc exercise in distribution of schematic outlays from the central additive. There is no plan embracing the whole region, identifying regional priorities and programmes. It also did not adopt a 'sub-plan' approach during the Fifth Plan with the result that it is not possible to understand the inter linkages of different programmes, executed in the State Plan Sector. An

analysis of the schemes implemented by the States of Maharashtra, Karnataka, Kerala, and Tamil Nadu reveals the following.

2.16 In the Maharashtra programme, the schemes in the Agriculture sector claimed the highest allocation followed by roads, industries, tourism, animal husbandry and forestry. Under Agriculture, terracing of land is the most important and in terms of performance too, the State Government did well. In plantation of mango and cashew, there were heavy short falls in achievements because of poor response from farmers. In Karnataka forestry, animal husbandry and agriculture stand out as the priority sectors. Under forestry, higher priority was given for various plantations like bamboo, matchwood and plywood, cashew, medicinal plant and spices. In Tamil Nadu the largest proportion of expenditure has been incurred in the forestry sector to promote plantations of pulp wood, rubber, tea and cloves. The schemes have not been conceived in such a way as to make a substantial thrust in one or two identified sectors which will have their spread effects. Very few schemes have been formulated in the nature of a package programme. On the other hand, most of the schemes are meant as tiny additives in different sectors and sub-sectors and not whole projects -with same distinguishable features. The central assistance funds have not been deployed in a manner to attract more funds from institutional credit.

3. STRATEGY FOR DEVELOPMENT OF BACKWARD HILL AREAS

3.1 The backward hill areas do not constitute a homogenous region and variations on the basis of climate, rainfall, topography and soil conditions call for different developmental approaches for different regions. Each hill area has to be developed by utilising its natural advantages to the optimum. However, due consideration may have to be given to the human and economic constraints, besides social and ecological environment for the development of the area. These include inaccessibility of villages due to lack of road network and other communication facilities, small and scattered land holdings, absence of growth centres or even small towns to act as growth foci. The human constraints are not- allowing the hill areas to develop, as the adult male members out migrate in large numbers and the members of the family left behind, mostly women and children and the old and the infirm, have very little time or energy to spare for subsidiary gainful occupations, being almost wholly engaged in the day-to-day fight for survival. They cannot participate in any development programme which may give them suitable remuneration. Their time is occupied mostly in household chores like the collection of fuel for their daily cooking and bringing water for drinking purposes from long distances and from great depth. In this regard, women and children are employed almost whole-time in chores which yield very little remuneration but which are very essential for life.

3.2 It has now become widely accepted that measures and instrumentalities conceived under a plan for a just and balanced regional development of a backward economy lose much of their direction, if they are to operate through the medium of existing market mechanism. The development process under such a situation becomes, largely dependent upon the characteristic stimulus from the market and results in the relative neglect of regions with

- (i) unfavourable physio-geographic conditions, terrain and climate,
- (ii) adverse land-man ratio and poor infrastructure facilities, and
- (iii) low resource development levels.

Such a development process far from reducing interregional disparities tends to accentuate them. Within the region, it gives rise to phenomenon of selective "growth" in which the economy is geared to meet the needs of status groups in the society to the neglect of survival needs of the general masses. This results in massive migration of the relatively young in the non status population seeking more opportunities and better remuneration for their labour with obvious consequences on the one hand for broken home life engendering discontent, and, on the other for the emergence of a remittance economy shifting the balance in favour of consumption against much needed investment. A lagging region, therefore, is a threat to social cohesiveness as well as to the process of development itself.

3.3 It is therefore, recommended that the strategy for development should be dictated by considerations of :—

- (i) benefiting the people as a whole rather than the status groups;
- (ii) developing local resources and utilising local talents so that the need for out-migration of the adult males is no more necessary, or at least gets considerably reduced;

- (iii) transforming a consumption-oriented economy into an investment-oriented one;
- (iv) regulating inter-regional terms of trade in a manner that they cease to be exploitative for the backward regions;
- (v) the State filling up the gaps in the marketing mechanism to give the backward areas a fair return for labour; and
- (vi) maintaining the ecological balance.

3.4 The majority of the people in the hill areas are living at the subsistence level and, therefore, there is an urgent need to raise the productive capacity of the economy by encouraging income generating activities like horticulture, animal husbandry, social forestry, tourism, etc. Then there is the problem of out migration of adult males in search of employment outside imposing a heavy burden on women. In order to slow the progress of out migration, generation of gainful employment locally has to receive a high priority. Methods of reducing drudgery in the women's life have to be found so that the women can also become participants in the development process and yet remunerated for their labour in the time saved from drudgery.

3.5 The poverty of the people is primarily on account of the failure of the production system to rise to the occasion in the sense that it has aimed largely at subsistence and failed to produce a large enough surplus which can be simultaneously utilised for improving the consumption levels of the people and raising the investment rate, through a carefully developed distributive machinery. Gearing up of the production system and creating a proper distributive machinery are from this point of view, the two primary requisites of ensuring the flow of benefits of growth to the people.

3.6 In backward hill areas, self-sufficiency cannot be and should not be the goal of the development policy but maximising the income from each unit of the development base, either land or water or domestic animal. Therefore, a policy promoting spatial specialisation needs to be favoured. By and large the holdings are small. Families dependant on land have to get the best return out of their small holdings This may mean a change from a subsistence food crop to possible cash crops which may give more return.

3.7 Because of paucity of and administrative support and communication no house holder in the backward hill areas will risk the possibility of not producing a certain minimum food crop for his own family and depend on other people for his food. The problem can be solved if in areas where the food crops are replaced by new cash crops by an active extension organisation, (a) suitable marketing facilities are built into the system to buy the production at fair prices and take them off the hands of the farmers of the area and (b) arrangements are made to supply the food grains commonly consumed in the area in fair price shops so that the farmer can buy his requirements at reasonable prices. An area approach of development will have to be taken up first in the zones which can be much more productive under the new strategies and on the communication routes.

3.8 Limitation of resources along with higher investment requirements per unit of infrastructure or production which is attributable largely to geographical and terrain conditions and partly to unscientific and wasteful management of resources is the main problem that has to be taken into account. Investment requirements are also higher than in the plains as more units of infrastructure items are needed to serve the same size of population

due to relatively small and scattered settlements of human population. Based on these considerations, it is suggested that:—

(i) necessary knowhow and facilities be provided to ensure more efficient utilisation of available resources, particularly those of the forests, cattle, land and water;

(ii) the framework of focal points be used for a more realistic and rational location of various services connected with education, health, etc.

(iii) resources should not be frittered away by un-connected developmental schemes but used for an integrated rural development approach on an area basis, with emphasis on production and better investment by the State on the necessary and infrastructural base for the production strategy.

The Committee is of the view that resources survey of various hill areas is essential for better planning of soil, water and crop management and also formulating plan for the region. It, therefore, recommends that resources survey maps should be drawn after carrying out aerial surveys and wherever possible through remote sensing techniques. Similarly a survey should be made on human resources.

3.9 For integrated development and appropriate planning unit has to be adopted. One view is that district can continue to serve as a planning unit, integrating village block level plans. The other view is that district boundaries are seldom co-terminus with an economic planning region and, therefore district as a planning unit would neglect the possibilities of special planning. A district would tend to derive justification for its programmes and policies from the national or State Plans. In hill areas it will be generally found that the area for social and economic planning will be a watershed. Communications follows the streams, water conservation and land use follow a watershed approach. Social groups and village boundaries are generally co-terminus with watershed as communication across watersheds is difficult because of the terrain. It is, therefore, recommended that the watershed should be the primary planning unit, rather than a block or a district. The watershed approach provides a sound basis for programming of soil conservation, water harvesting and harnessing, and land use and planning social institutions. It is also possible to delineate watershed into micro and mini watersheds. A mini watershed may be equated with our concept of a focal point and may cover an area of a cluster of villages with a population of coverage of a fifth or sixth of a block population and micro watershed may cover an area of 1000 to 1500 hectares.

3.10 Although hill development programme, if seriously taken up involves stopping the out-migration of the relatively young people, migration will still remain necessary for a long time. At present, out-migrants from hills have to take up menial jobs because they have little education and barely any skills. Education and suitable training in skills would enable persons to obtain remunerative jobs outside.

3.11 The strategy of entrepreneurial and skilled labour development that the Committee has recommended in its report on 'Industrial Dispersal' is all the more necessary in the backward hill areas. The Committee would, therefore, recommend necessary action to superimpose the industrial development in these areas by following guidelines in that report..

3.12 Industrial development in the hill areas has to be based essentially on the promotion of such activities in which hills offer a distinct advantages like forest based industries, vegetable and fruit processing etc. Another area in which hill areas offer an advantage in terms of

climate and dust and pollution free environment is electronic and precision goods. The major advantage of such industries is that they do not involve heavy transportation of raw materials. These are mainly skill based industries where the value added is substantial. Necessary steps will have to be taken for training and skill development so as to prepare the environment for location of such industries.

3.13 Livestock has attained great importance in developing hill economy. Therefore priority should be given for improving quality of livestock on commercial lines through cross breeding with exotic breeds Pasture development programmes should be taken up along with measures to improve cattle. For the success of a strategy, however, the importance of irrigation, transport, storage, especially cold storage, and marketing would need to be given special attention.

3.14 Forests are an important resource of the hill regions. An aggressive forest policy is the first requirement in the denuded forest areas. Social forestry on scientific lines is necessary to check soil erosion maintain ecological balance and produce industrial raw materials. Conservation, extension and productive exploitation of forests has to go hand in hand to meet the industrial requirements and general needs of the people.

3.15 The poorly developed basic amenities like health, education and drinking water supply in hilly areas need to be given the highest priority for improving the quality of life of the people. To reduce the drudgery of the women folk and also for providing them with subsidiary occupations to raise their standard of living, problems of supply of fuel, food and drinking water should be tackled on a priority basis as collection of fire-wood and bringing water from long distances occupy a great deal of time of women in hill areas.

3.16 It will be necessary to reorganize and reorient the administrative machinery to serve the development needs of the hill areas. The multiplicity of development agencies and programmes as exist at present leads to inefficiency, delay, wastage and unnecessary duplication. Therefore, the need is to have an integrated development planning and implementing agency at the district field levels. Also, conscious efforts should be made to involve the people in the planning and implementation process. This the Committee has already recommended in its report on 'Organisation of Administrative and Financial Structure'. The administration is generally not committed to programmes of backward hill area development because most of the time people do not choose to serve in these areas. Posting in the hills is generally seen as a form of punishment. Therefore, officers charged with development programmes should have feeling of commitment to these areas and be sensitive to the needs and aspirations of the people.

3.17 It was very prominently brought out at the Seminar held in Nainital that a large number of developmental posts were lying vacant in the hill areas. The Committee has already dealt with in great detail the administrative set up and the steps to be taken to post officers and staff to the backward areas in its Report on Organisation of Administrative and Financial Structure for backward area development.

3.18 In view of higher cost and poor returns from investments, central assistance was allocated to meet the special needs and problems of the hill area. It is observed that when a special assistance programme from the centre is introduced, there is always a tendency for the schemes formulated under this programme to remain somewhat isolated from other programmes formulated for the area from other sources of funding like the State Plans. In this method the total approach to the development of the area as well as the complementarily and

linkages with other programmes are likely to be overlooked and serious imbalances may arise in course of time. To overcome such problems, it was decided to introduce 'Sub-Plan Approach' for hill area. The sub-plan idea is conceptually a sound one and must be regarded as a breakthrough in our area development concept. The underlying idea is one of achieving internal consistency and integration among various on going programmes. It is an appropriate method of imparting some new orientation in area planning by taking note of the missing elements in the normal sectoral programmes of the State Governments.

4. WATERSHED MANAGEMENT & CONTROL OF SHIFTING CULTIVATION

4.1 Hilly regions in the country are dispersed in North, North-East, East & West Coasts and also in Central India. While Northern Himalayas have the problem of high altitudes which are snow bound, the inner Himalayas are subject to heavy denudation of forests, overgrazing of grasslands and cultivation on the steep slopes without supporting conservation measures. Outer Himalayas such as Siwaliks and the foot-hills have the problem of fast flowing torrents and streams with shifting courses, inundation of the banks and swamping of the valuable land. Landslides seem to be a common problem throughout the Northern Himalayan Region. In the North Eastern Himalayan Region the main problem is shifting cultivation which affects about 2.7 million hectares and about 5 lakh families. With the increase in population, the cycle of shifting cultivation, called jhumming, has become short, and that has led to steady degradation of the area, subjected to shifting cultivation and however this lowers productivity. Besides, along the foothills, gullying- and swamping of good lands with coarse debris are very serious problems. Landslides and erosion along the hill streams called 'Jhora' are very extensive and serious problems. Soil erosion throughout the Himalayas also give rise to problems of heavy silt load rushing down the slopes causing either siltation of expansive reservoirs or congestion of drainage systems, leading to flood havoc. In other hills, such as Western Ghats, including the Nilgiris, the problem is more of using available water resources throughout the year for productive land management and disposing off the excess rain water during the monsoons without causing drainage or degradation problems down the slopes. In Central hills, the problem is to control erosion, use available moisture in a way to combat the recurrent drought conditions and increase productivity and employment potential for the region.

4.2 The major projects which have been undertaken in hill areas in power and irrigation sectors have an important nation-building role, while their potential for building of the local area is very limited. On the other hand, such developments have tended to create ecological and environmental problems in the hill areas, as they have been undertaken with no proper safeguards for preventing soil erosion. In some of these projects, the local population, for several reasons, have not even been enabled to avail of the employment opportunities that arose in the wake of heavy investments made in these large and sophisticated projects. While planning for big projects of this nature in underdeveloped hill areas, it would be necessary to build in adequate safeguards to protect the environment on the one hand and the interests of the local population on the other by enabling them to avail of the job opportunities that arise.

4.3 Relatively high to very high precipitation is rather common in hill areas. Yet, many of the hill regions are subject to water stress conditions in late post monsoon periods due to steady decreasing watershed retention capacity. Even the Nilgiris having rainy days around 150 days have been found to face considerable water stress conditions affecting water supply as well as plant growth. Similarly, many hill regions, for example, Mizoram, are subject to serious water shortage, even though annual rainfall is as high as 2500 m.m. Many of the streams which flow heavily during monsoon get dried up just after the rainy season. As a result dry weather flows which supports the post monsoon activities, are entirely low, thereby affecting the overall development of the hill areas. Sufficient evidence is available to show that appropriate management of forest trees, grassland, including selection of species, supported by small engineering works in the drainage system and catchments of smaller streams and tributaries promote greater absorption of incident rainfall and penetration absorption of incident rainfall and penetration of the water to the deeper hydrologic soil mantle and gradual but steady release of infiltrated rainwater into the bigger order streams and rivers, assuring

larger and longer dry weather flow. The hydrologic management of lands in the hills is very necessary for ensuring perennial stream flows and moderation of flash floods in the plains below.

4.4 Over Rs. 7,000 crores have been invested up-to 1978-79 in constructing about 400 multi-purpose river valley projects with a view to create irrigation i potential and hydro-electricity power to promote in- I tensive agriculture and greater industrial develop- ' ment. However, capacity surveys conducted in many of the reservoirs have revealed that the rate of filiation is many times higher than the rate which was assumed as design rate. This could be visualised from below : —

Sediment production rate in ha mt/100 sq. km./year			
Name of the Reservoir	Design	observed/ initial	1. Rates upto 1977
1	2	3	4
Bhakra	4.29	8.04	5.99
Maithon	1.62	15.27	13.02
Panchet	2.47	13.16	9.92
Muchkund	3.90	3.38	2.3
Hirakud	2.52	4.12	3.58
		(6.58)	1
Tentative Capacity survey Data. N.B.:- The value of Muchkund and Hirakud is from inflow-outflow surveys.			

The siltation rates in the reservoir of Tungabha-dra, Matatila, Mayurakshi, Dantiwara and Mahi are also on fairly higher side than the design rates.

4.5 Another serious problem in the hill is large livestock population which includes considerable number of nondescript cattle, mostly kept for collecting cow-dung. This huge livestock population exerts serious pressure on land and competes with human population in the matter of feed. It would, therefore, be necessary to work out suitable mechanism to replace the non-descript and unproductive livestock heads by introducing remunerative and fewer heads. In the Nilgiris cross breed Jersey cattles have already brought about significant benefits. In the Himalayan hills, experiments in a small area have also shown similar feasibility. It would be desirable to work out appropriate landuse patterns so as to ensure adequate feed and fodder for improved livestock population.

4.6 Land-use management in the hills throughout the world has always tended to be mixed farming. This has got great relevant to the climate, particularly snow and rains, terrain and utilisation of available working, days. Therefore, attempts should be to aim to appropriate land use management in the hill areas, suiting to the specific site conditions, which would include wet cultivation and dry cultivation, horticultural and cash crop plantations such as coffee, tea, apple, peach, cardamom, pine-apple, ginger plantation, jack fruit etc. and cultivation of unity-cum-energy trees/shrubs. This would also have to keep in view the lower availability of labour in these areas with the introduction of multilateral development programmes.

4.7 Watershed approach would mean planning and implementing soil conservation programmes for 11 types of lands and associated drainage system of selected watersheds with

a reasonable time frame with the objective of providing maximum protection of existing land and water resources while optimising their use for increasing production and employment benefits. In order to comprehend the total problem vis-a-vis the total potential and to draw up a programme which could be implemented within a reasonable period (say five years), the size of such water shed should be between 1,000 to 5,000 hectares. Within such small geographical area understanding of the problems and the resources to meet the requirement of food, fibre, fodder and fuel, besides providing employment, becomes easier. It will, therefore, be necessary to undertake appropriate programmes for preparation of a framework of watersheds by delineating the catchments and sub-catchments into smaller units and codifying them with a system which will be understandable to all users. Once delineation and codification works are over, inter-se priorities and development of these watersheds are to be assigned taking into consideration the corrective factors for erosion and sedimentation ranging from physiography to climate and including, proximity to the reservoirs. The Central and State Soil Conservation and Soil and Land Use Survey Organisations would have to take up this task to identify, at the earliest, watersheds on a priority basis for preparation of integrated management plans and implementation of the same.

4.8 Besides, the existing technical criteria followed by the All India Soil & Land Use Survey Organisation in fixing inter-se priorities, the following points, as recommended by the National Seminar on Water- shed Management held in Delhi in January, 1980, could also be considered : (i) Problem intensity, (ii) Development potential, (iii) Technology availability for the selected area conditions, (iv) Likely catalytic effect (which would depend upon people's participation primarily). (v) Accessibility—Demonstration effect, (vi) Investment needed and finance availability, (vii) Infrastructure availability.

4.9 Watershed management planning will need data pertaining to watershed characteristics such as topography, soils, geology, vegetation and climatic data, besides incidence of erosion, flood and drought hazards. Land-use details, with current returns, along with ownership pattern, would also be necessary for facilitating integrated planning. To make the protective measures more acceptable, the feasibilities of increasing production through integration of the development of utility trees, horticulture, back-yard plantations and of devices to collect, store and reuse available rain water should be explored. Therefore, there should be an adequate mechanism at the State Headquarters and at field level for collection of such data through field units or from concerned agencies. The need for the basic data should be fully recognized and their collection, analysis and interpretation should be considered as a pre-investment towards proper planning and implementation of watershed management programmes.

4.10 Developing an optimum scientific land-use plan for any watershed is the base of ecological regeneration. This would depend on a practical system of land classification. The existing systems in use are those developed in the United States of America. These methods have been modified variously by the States of Tamil Nadu, Uttar Pradesh and also Himachal Pradesh for appropriate application in the hill areas. Even then there is scope, as has been discussed in many international" forums, to improve upon the system of land use classification for the hill areas. Attempts should be made to review all available methods and evolve a natural system. The most important point which will, however, arise is, can we change the prevalent land-use practices in the area immediately even in the - near future? Also, even though technically desirable, can we restrict cultivation to a scope, say upto 40%, when in many of the hills cultivation is being practiced through generations on lands on much higher slopes. The most logical step would appear to be to incorporate corrective measures in

the existing land-use system to make the existing land-use practices less vulnerable to erosion and degradation hazards. Simultaneously alternative management practices should be introduced slowly to encourage the beneficiaries to shift gradually to the improved land-use pattern. If the agro-silvicultural practices or agro-horticultural practices can be made profitable while practicing mixed farming, it may be possible to achieve this gradual shift in land-use pattern and retiring the steeper slopes from cultivation of common agricultural crops, to productive and remunerative fodder or tree cover.

4.11 Once priority watersheds are identified and land classification completed it will be necessary to identify the areas needing treatment under agricultural, forest and other land use practices. Depending upon a number of factors, such as slope, soil, rainfall, etc., package of treatment measures will have to be chosen. These measures would include bench terracing, outlets with drop pits, riser protection; rehabilitate deteriorating terraces, hill side ditches on the agricultural lands. For forest lands, closures and small dykes for breaking the slope length and selection of appropriate species with a view to prevent erosion and ensure better hydrologic responses, particularly in terms of higher and continued dry weather flow, will be "necessary. For pasture lands combination of grasses, legumes and fodder trees and bushes will have to be chosen. Closures and erosion control measures like dykes may have to be adopted here as well. On other lands utility trees could be planted so that people do not mercilessly cut them which are of economic value to the population like fruits, fodder etc. Water harvesting structures such as low canal sills, diversion weirs and some ponds in suitable locations, could be considered for appropriate utilisation of available run-on. Check dams, revetments and spurs will be necessary for controlling gullies and erosion along the stream banks and beds as well as land slips along the roads. Appropriate mixture of agro-silvicultural species will have to be identified and introduced as a complementary practice to the terracing in agricultural land.

4.12 Once- the package of practices are identified for each type of land, it would be necessary to determine the extent of area that will be treated by each of the combination of these practices. These practices again will have to be supported by follow up agronomic and silviculture practices for ensuring better return over the years to come. Maintenance and repair requirements are also to be incorporated in the plan itself.

4.13 Some arrangements will need to be made in the Planning Cell for collecting representative base level data for typical areas representing dominant combination of practices such as bench terracing, afforestation, water harvesting system, pasture, etc. These pockets would need to be watched over 2—5 years and data corresponding to the base level data would have to be collected to provide a time series for comparison and working out actual transformation and benefits derived from implementation of the programme so that programmes can be reviewed and modified, as necessary.

1 4.14 A caution is made here that attempts to integrate all possible descriptions (items) on watersheds level should be checked. Since basic land-uses are : agriculture, forests, grass-lands and basic concern is to provide adequate return in terms of food, fodder, firewood etc. the level of integration should be restricted to those line departments which are directly concerned. Super imposition of other capital facilities, which improve the logistic support and thereby economic conditions, should be taken care of at a much higher level, say the District Planning! Schools and suitable coordination with corresponding organisations should be made at that level. At watershed level, too many fine departments should" not be brought together, as that would create confusion.

4.15 The Ministry of Agriculture (Soil Conservation Division) have issued guidelines for planning and: implementation of soil conservation works of water-H shed both in the hill and non-hill areas. This should be followed for identification of mini watersheds as well as for preparation of detailed programmes.

4.16 There have been persistent demands from several quarters that soil measures in the hills be financed on 100 percent grants and treated in an integrated manner, instead of making piecemeal attempts which make little impact on the erosion control and is not in accordance with the concept of integrated watershed management. As at present, private works are subsidised to the extent of 50% while the community works are executed by the State at its own cost.

4.17 The Committee has given careful consideration to this question. Holdings are small and fragmented. Terraces are narrow and occasionally divided into number of holdings, both latitudinally and longitudinally. The economic condition of the farmers is poor and self-labour availability of the farmer is low. There are practical difficulties in mobilisation of self-labour in innumerable individual holdings in a single terrace for subsidised working through extension methods under the Soil Conservation Acts. Land records need up-dating. All this has resulted in the concept of integrated watershed management being rarely achieved, particularly when a large number of farmers are reluctant to join in the working. At the same time, any soil conservation programme would be self-defeating if the people on whose lands these are carried out are not only involved in it effectively but have some stake in improving the land and maintaining it. Considering all this, the Committee would recommend :—

(i) that the existing practice of subsidising private works on farmers' lands to the extent of 50% should be continued.

(ii) if there are any works on the private lands like construction and renovation of risers, which would benefit not only the land on which they are located but also other lands belonging to other farmers, these should be treated as items of benefit to the community and financed to the extent of 100 percent by the State; and

(iii) the existing practice of financing the soil conservation programme on community land on 100 percent basis should continue.

Shifting cultivation

4.18 Shifting cultivation has been practised from time immemorial in the tribal areas of North-Western States, Orissa, Madhya Pradesh, Andhra Pradesh etc. As a traditional form of cultivation in heavy rainfall areas, where weed growth is rapid, such a system of cultivation may have had its uses when population pressure was low and the jhummed area could be left fallow for a number of years. With population pressure developing, the jhum rotation is becoming shorter and shorter and has led to rapid soil erosion. As a result in many parts of Orissa and Andhra Pradesh, the bed rock has been exposed.

4.19 In the north-eastern region, immense damage has been done to the soil and forest wealth by shifting cultivation on extensive areas, disturbing thereby the ecological balance. The problem has become more acute as the cycle of shifting cultivation has shrunk to three to four years. In earlier days, a longer cycle (about 20 years) at least provided sufficient time for recuperation of soil. The impact of the short cycle on productivity or soil fertility is, therefore, severe.

4.20 Agriculture in the hill areas can, however, substantially improve and the ecological balance can be restored if the destructive process of shifting cultivation is controlled and permanent cultivation and tree growth encouraged. The State Governments are encouraging permanent cultivation, in the hills by making terraces for the conservation of soil in some areas. This requires land shaping in the form of benching or terracing. Sustained raising of crops is possible only on such terraced and developed lands which is, however, very expensive. Wet rice cultivation on the permanently terraced fields is being done in the hill districts of Assam and Manipur, attempts have been made to introduce horticulture on the fields which are usually under shifting cultivation. In the valleys proper, levelling and bunding will lead to greater productivity and minimum soil erosion. On the gentle slopes, through suitable contour bunding and contour ploughing, food crops like maize can be grown without depleting the soils. Similarly, development of forests will have to be taken up on an extensive scale for ecological balance and soil conservation.

4.21 It is necessary to develop production programmes which, whilst preserving the soil, will gradually improve the economic condition of the people of the area. The strategy outlined below has been developed after careful consideration of the pros and cons of the matter

(i) reclaiming land, where necessary, and providing minor irrigation, where possible, so as to encourage settled cultivation in villages and on terraced slopes on the lines adopted by the Savaras of Orissa and the Angamis in Nagaland, assuring at the same time inputs, fair price shops, communication and marketing facilities; .

fii) identifying the areas suitable for plantation of crops such as tea, coffee, rubber which would give subsidiary occupation for a family on the basis of one hectare of plantation each;

(in) developing gross reserves to support a subsidiary programme of animal husbandry; and

(iv) developing suitable areas for agro-silvicultural operations and commercial forest plantations, which would give full occupation to large number of village population.

4.22 Because of the diversity of conditions prevailing areas which are subject to jhum cultivation in the country, one or the other of the above strategies would apply. The correct decision has to be taken after careful study of the situation and on the basis of available experience. An important change which has to be brought about is the change over from the hoe cultivation to plough cultivation and settled agriculture. At present, while the bulk of the labour is spent in cutting the timber and burning the same, the seed is merely dibbled in the hole and left to nature. For the resettled cultivation, the farmer has to learn the use of the plough, breeding of cattle and care of crops. Therefore, wherever such resettlement is being done, there has to be close supervision and training of the farmer families so that they can learn the new technology. This really mean that the jhumia has to be taught all the rudiments of settled agriculture. It is only after he-is in a position to follow settled agriculture that there can be a case for developing scientific neo-agriculture. It must be realised however at the same time that there will be a period of transition when jhuming may have to be controlled in some areas and gradually changed to settled cultivation.

Treatment of the catchment of major river valley projects

4.23 Recognising the urgency to reduce sediment flowing to the multipurpose reservoirs and thus to enhance their effectiveness and useful lifespan, Government of India initiated

during the Third Five Year Plan a centrally sponsored scheme of soil conservation in the 13 multi-purpose river valley project catchments. The main objectives of this scheme are as follows :

(i) to reduce siltation of the reservoirs by adopting soil conservation measures in the catchment areas;

(ii) to prevent degradation of the catchment area and enhance its productivity through optimum land use management;

(iii) to ensure adequate irrigation water to the command area and thus increase production;

and

(iv) to provide employment opportunities in extensive rural areas.

4.24 During the Fourth Plan, 8 more river valley project catchments were added and during the Fifth Plan 10 more catchments were brought under this scheme. The scheme is now in operation in 31 catchments having total area of about 79 million ha. which are spread over 19 States and Union Territories including DVC. Large catchments areas of these irrigation projects fall in hill and tribal areas.

4.25 Upto the end of 1979-80 an area of about 14.29 lakh ha. covering 6.99 lakh ha. of agricultural land and 7.30 lakh ha. of non-agricultural land would have been treated at a cost of Rs. 89.60 crores⁵ out of an estimated critically eroded area of 12 million ha. Obviously, efforts so far have touched only a fringe of the problem. The National Commission on Agriculture had recommended that the treatment of the catchment areas should be completed within a period of five years. The Irrigation Commission has also emphasized this aspect and suggested completion of treatment of catchment areas within 20 years from the implementation of the project.

4.27 Mere treatment of these catchment areas is not enough. It must be recognised that human element is an important contributory factor in soil and water erosion in the catchment areas. People living in the catchment, areas necessarily require pasture lands for grazing of their cattle, fuel wood and small timber for their personal use and also land to raise their food requirements. Unless, therefore, an integrated watershed development programme becomes a part of the treatment of catchment of the river valley project, problem is not going to be solved. The first priority has to be to provide for the needs of the local people for grazing, fuel wood and other requirements. An experiment of this type has been tried with great success in South-Korea. Pilot Projects of this model were also intended to be taken up in our country in some of the selected catchments during the Fifth Plan, but unfortunately these programmes could not make much headway. It is time that a concerted effort is made to bring about an integrated watershed development approach in the catchment of the major river valley projects.

4.28 Another drawback noticed is the complete neglect of maintenance of the civil and other structures created in these catchments. There is no maintenance by Soil Conservation Division, on a regular basis, in the catchment areas. The Soil Conservation Divisions carry out the development part and thereafter its further management is forgotten. It is recommended that the maintenance of the assets created in the catchment should become an integral part of the whole scheme.

4.29 The Committee would also recommend that top most priority should be given under this programme to" the critically eroded areas of the catchments, particularly those lying within the 'hill areas'

Organisation

4.30 As scientific implementation of the soil conservation programme would require a multi-disciplinary programme and approach, the integrated watershed management approach can not be planned or implemented unless a multi-disciplinary organisation is created.

4.31 A survey of the existing State organisation made by the Soil Conservation Division of the Ministry of Agriculture indicates that there are about 750 sub divisions engaged in soil and moisture conservation programmes in States, many States and Union Territories hardly have any organisation worth the name. Even in the States where organisations are available, sub-divisions have been diverted to carry out high priority and high treatment programmes such as command area development, etc. It has also been found by the same survey that, by and large, the organisations handling soil conservation programmes are mono-disciplinary.

4.32 Sufficient sub-divisions should be created which should be of multi-disciplinary type. Even after the creation of multi-disciplinary teams, it would be necessary to provide refresher and reorientation courses to the officers of other departments involved in the problem of watershed management.

Training

4.33 Soil and moisture conservation is a complex subject which calls for appreciation of the role of other technical disciplines besides pre-dominant involvement of a particular discipline. It is necessary to devise a cadre of soil conservationists with the basic back ground such as forest, soil science or science or agricultural engineering. It is equally necessary to acquaint the policy makers, administrators and financiers with the role of soil conservation in the areas of national and regional priorities effecting various development programmes of the country.

5. FORESTS

Introduction

5.1 Forests are said to constitute the lungs of a country but in case of the hills they represent the very soul of the people living there. The needs of the people are so intricably mixed with the forests in the hills that the very life of the people would be almost impossible without forests.

5.2 The present forests of India are the remnants of very large forests which once covered a major part of the country. The wide range of latitude, altitude, climate and geological structures have produced a variety of forest types. Most of these are located in the hill areas. Some of the important forest types are mentioned in Annexure IV. The map showing the broad regions of tropical forests in India has a fairly close correspondence with the rainfall map of the country.

5.3 What little forests we are left with today, surviving the varied degrees of interference by men, comprise 23% of the land area. Out of a total of about 75 million ha of land classed as forests, many areas are understocked, poorly stocked or bereft of any vegetation worth the name. The forest blocks are generally confined to the hilly tracks (including foot hills) and to poor soils. Undisturbed forests are rare. Forests are mostly State owned (95.2%), corporate bodies account for 3.1% and private 1.7%. Broadleaved forests form the bulk (81.6%) coniferous forests 5.6% and bamboo forests 12.8%. With regard to legal status, 50.8% are reserved forests, 32.3% are protected forests and 16.9% are still unclassed.

5.4 More than 40% of land area in the north-eastern States, 56% in Himachal Pradesh and 60 percent in Jammu & Kashmir is covered with forests. The total area under forests in U.P. is 4.8 million hectares, of which approximately an area of 4 million hectares is in the hills.

5.5 Indian economy is predominantly rural in character and the hill areas form a part of our rural society. Many of our villages live in close proximity of forests and heavily depend on these for their various needs. The nature and extent of the development and exploitation of forest wealth, therefore, has an immediate impact on the population inhabiting these areas. For changing the outlook of pure hill areas, we need a forest revolution greener than the green revolution has been. Forests have played a remarkable role in the economic progress of the countries like Australia, Canada, Mexico, Sweden, Taiwan and Korea. Since the data and research findings pertaining to forestry in the country are scanty, it is difficult to present a quantitative description and analysis of exact forest wealth in the country but it may not be difficult to list a large number of activities based on forests and which can contribute substantially to the development of hill areas. 5.6 Forests can contribute to the development of hill areas in three important ways.

(i) As a source of timber, firewood, medical herbs and aroma chemical, minor forests produce and charcoal. Forests area can also be developed as scenic tourist resorts.

(ii) By offering ample scope for horticulture, plantation, orchards, inter-culture, floriculture and pasture development.

(iii) Agro-forestry based industries and handicrafts.

5.7 As a source of timber and firewood, forests play an important role in the economy. In the Himalayan region forests are richly endowed with commercial timber (covering more than 50% of the total area) which when exploited scientifically can contribute a lot to the development of the region in terms of income and employment. Jammu & Kashmir which is one of the leading States in commercial timber has thousands of people directly or indirectly employed in various activities producing timber and transporting it to the Plains. In the southern hills we have the Ghat forests which are situated in high rainfall zone and are, therefore, timber rich, moist and deciduous type. These are the only evergreen forests in the country. These forests provide enormous possibilities of commercial afforestation. In Karnataka, Kerala and Tamil Nadu forests are well planned and are being developed. In Maharashtra, there exist possibilities of intensive fodder development which may provide a basis for commercially viable animal husbandry programme.

5.8 Forests not only supply timber and firewood but are also the source of highly useful medicinal herbs and aroma chemicals and a large variety of minor products. There is enormous scope for exporting these medicinal herbs to other countries. There is also scope for setting up wind mills in high wind velocity areas and small power units in high hydrodynamic pressure zones. These Wind mills and power units can easily cater to the energy requirements of local areas. Forests waste can meet the fuel requirements of the local population to a very large extent and thus enable to release large quantities of cow dung for manure. This has considerable importance for hill farming where chemical fertilizers cannot readily be used owing to deficient rainfall and inadequate irrigation facilities. Even the hill soil may not be suitable for chemical fertilizer treatment owing to hard rocky surfaces. Cow dung in such cases may prove more useful as a fertilizing agent for the soils. In a study conducted in one of the hill villages of Jammu, it was observed that coefficient of fertilizers in the production function turned out to be non-significant while as for manures it turned out to be significant.

5.9 Forest area can also be developed into scenic tourist resorts. Apart from boosting the earnings of the local population, it can provide accessible tourist resort to low arid middle income groups. It will also have educative value by introducing the local population to outsiders, other cultures, languages and life and living styles.

5.10 Hill areas which are thickly forested or are in close proximity of thickly forested areas are highly suitable to horticulture, plantation crops, orchards, inter-culture, floriculture and pasture development. Horticulture, orchards, floriculture and pasture development has enormous scope in the north Himalayan hill regions as has already been shown by the States of Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh. These enterprises are so remunerative, that farm population of hill areas is converting their agricultural lands to orchards. The area under fresh hand dry fruits is estimated to be between 1.5 to 1.8 Mha. It is possible to raise this area to about 4 Mha. in 2000 A.D, Fruit production is likely to be increased by more than 4 times during the same period. This fruit production shall not only meet the rising internal demand but will also create large surplus for export market.

5.11 Himalayan hills are suitable for raising mulberry trees and boost the silk production. Floriculture is turning out to be a flourishing business. The demand for cut flowers is increasing rapidly and hill areas are most suited to growing flowers of different kinds. The cut flower trade is estimated at around Rs. 9.25 crores annually. The volume of this trade is likely to expand substantially in future and hill areas can reap the benefits from this enterprise.

5.12 The southern hills are highly suitable for plantation crops and interculturing of tuber crops. The area under plantation crops may be extended in preference to other crops. There is scope for substituting the high yielding crops for low yielding ones in order to ensure better returns to the growers. Several hill areas in Karnataka, Maharashtra and Tamil Nadu have been suggested to be tested for horticulture crops such as pineapple and orange and for other plantation crops. It has been observed that several minor crops can be intercultured with major plantation and horticultural crops. Hill areas are equally suitable for pasture development which will not only make a firm base for Dairy development but would also check the growing menace of soil erosion.

5.13 Hill areas offer ample scope for agro-forestry based industries and handicrafts. In those of the hill areas which are richly endowed with forest wealth, there is enormous scope for setting up a large number of small industries. These may include pulp paper and hard boards, rosin and turpentine, sports goods, pencil industry, wicker-work, match industry, drug and pharmaceuticals, aroma chemicals and a large variety of other industrial enterprises. In a labour surplus economy, where plains and cities have already become overcrowded, what can be more ideal than to set up small industrial units in the hill area thereby checking not only urbanward movement but also exploiting the local resources to the maximum advantages of the local people themselves. In a study conducted in one of the hill areas in Jammu district, it was observed that about 44% males and about 60% females were redundant owing to limited scope for farming and absence of non-farming occupations. If agro-forestry based industries are set up in these areas, this large chunk of surplus manpower can very fruitfully be used. Neglect of this large reserve of labour force would force it to move towards towns aggravating hereby the economic and social problems with which the urban areas are already infested.

5.14 Hill sections of the Western Ghats traverse through the States of Maharashtra, Karnataka, Tamil Nadu and Kerala and Union Territory of Goa. Over 24 per cent of the total geographical area of the States in the region is under forests. The Ghat forests are situated in high rainfall areas. This is the only large area of evergreen forests in the country. In Maharashtra, at present, the forests contain only some species which are commercially valuable. The rate of regeneration in areas which are worked from year to year is also quite low. In Karnataka, much of the forest areas is under regular working and being developed. In Kerala, the wide variations in climatic and topographical conditions have resulted in a wide variety of forests. Among the natural forests, deciduous forests comprise 80% of the growth. In Tamil Nadu, Coimbatore and Nilgiri districts together contribute 80 per cent of the total value of the timber produced in the State. In Goa, the evergreen forests are found mostly in patches along deep ravines and steep hills where the rainfall is very heavy.

5.15 There are three other hill ranges which require special mention from the forestry point of view. These are Aravali in Rajasthan and Haryana and Vindhayachal in Madhya Pradesh and U.P and Satpura hills in Maharashtra. These are largely dry areas and the population mainly practices subsistence agriculture. The degradation or destruction is illegal felling of forests, partly for their own consumption and partly to earn by selling to well-to-do-people. Moreover, there is heavy grazing in these areas much above the carrying capacity, grazing of animals being another aspect of rural economy in these regions. These are generally inhabited by Tribals. This aspect has been fully covered in the report on Development of Tribals. This Chapter would also deal with certain aspects of forestry, particularly production forestry and industrial forestry.

5.16 The major pressures on the forest eco-system include :

- (i) Conservation of land to agriculture, resettlement of displaced persons and landless people and by gradual encroachment;
- (ii) removal of wood for domestic use;
- (iii) grazing of forests and lopping of them both of nomadic and settled people for domestic stock which is often un-productive;
- (iv) removal of other forest products of importance to the socio-economic life of the people of the area;
- (v) disforestation for various development schemes and or new settlements;
- (vi) increasing demands on forests for supply of raw materials for various forest based industries or wood using industries. Of late, demands for recreation and environmental conservation are gaining grounds.

Himalayan Areas

5.17 The condition of the watersheds in the Himalayan areas has attracted considerable attention in recent years. The frequency and intensity of floods in the Ganga and Jamuna basin, accelerating in recent years, point to the need for intensifying a treatment plan for eco-development in the region. The total area of the Himalayan river basin in India above 500 metre contour is about 43 million ha. for the major river system. In addition, there are smaller river systems requiring treatment. Actual data are lacking on the extent of areas which require treatment on a priority basis from the soil and water conservation point of view.

5.18 There are several causes of acute environmental degradation of the Himalayas :

- (a) Fuel is practically the only source of energy available to the population in the Himalayan ranges. With the increase in human population the demand for fuel wood has increased to an extent which the existing forests are unable to sustain.
- (b) Increase in human population also means requirement of more timber for household construction, as the houses in the hills have a large component of wood.
- (c) There is an extensive system of rights and privileges, which such right-holders etc. can collect from the forests. This is one source of pilferage from the forests.
- (d) The existing large livestock population are allowed free roaming for grazing purposes and this degrading the forests and tripping them of ground cover. There is no programme to reduce the number of stock and improve its quality, to an extent as to have a favourable impact on available grazing.
- (e) A lot of damage takes place along migration routes of livestock.
- (f) In some of the States there is a dual system of control over the forests. For instance in U. P. hills almost 50% of the forests area was under civil authorities without any scientific management. This has resulted in large scale depletion of resources in such forests and greater impact is felt on the reserved forests of the Forests Department in satisfying the rights and privileges of the local population. In Himachal Pradesh, only 8% of the forests are reserved, balance being only protected forests, subject to the rights of local population to

convert some of the forests to farming and also heavy removal of produce, (g) The increase in livestock population has also depleted the common grazing lands creating serious erosion problems.. (h) Due to the gradual disappearances of uh-classed forests which were kept as a buffer between reserved and protected forests under the Forest Development on the one hand and the farming lands on the other in order to meet increasing local needs due to pressure of human and livestock population, more demand has fallen on reserved and protected forests which ought to be under scientific management.

(i) Due to lack of funds, extensive programme; of forest plantations and pasture development could not be taken up.

(j) Fire damage in the hilly forests, which are mostly coniferous, has not only caused damage to ground cover but sometimes has caused ecological changes of useful broad leaved species areas being converted into pines. The fires are mostly caused by the farmers to increase the availability of grass in the forests and the natural succession process eliminates the useful broad leaved species.

(k) One of the most useful species for local economy is oak. Due to increase in livestock population extensive lopping is destroying the trees and their moist habitat resulting in changes from oak forests to pine forests.

5.19 All the above factors have caused the combined effect of making large areas bereft of vegetation, creating serious erosion problems. Based on priority delineation surveys carried out by the All India Soil and Land Use Survey Organisation of the Government of India, the treatable area may be assumed to be 15% of the total area of the catchment. For the whole Himalayan area the treatable area would at least be 70 lakh ha.

5.20 The percentage of forest area to the total geographical area in the Himalayas varies from 40 to 60% only. But as already explained, some of such forest areas have not been under scientific management and was not under the control of the Forest Department. Though the present policy is to transfer all such areas under the control of Forest Department, it has not been able to remove many of the causes of environmental degradation like rights and privileges. Some of the Himalayan areas included hi forest statics are also above tree line (alpine pastures) and some under permanent snow.

5.21 The Committee recommend the following Action Oriented Programmes

(i) Survey of land use and delineation of macro-water-sheds requiring various degrees and types of treatment required and preparation of action plans.

(ii) Taking up required soil and water conservation measures including engineering as well as vegetative methods such as land shaping, gully plugging, construction of check dams, soil binding plant species etc. These have been covered in Chapter 4 dealing with integrated watershed management.

(hi) Improvement of pastures and a forestation of degraded lands or waste lands belonging to Government or community, should be taken up under social forestry and other programmes.

(iv) Introduction of species suitable for use as fodder, fuel and small timber of a very short duration. There should be adequate research support and the species should be chosen with

care so that the local population can feel the impact of the benefits at the shortest possible time.

(v) Association of voluntary bodies and panchayats in afforestation and pasture development must be secured. Raising of community forests even on Government lands where ownership belongs to Government but the management given to the community where a strong panchayat or a voluntary body exists, should be taken up.

(vi) Replacement of contractors by departmental felling or by forest labour cooperatives and destruction of felling in vulnerable areas should be forthwith done. The Government of U.P. has issued an order that no felling should be carried in slopes about 45°, felling between 30" and 45r- should be on selection system and no felling above 3000 metre altitude should be done. Some such regulations are necessary in other States also.

(vii) Animal Husbandry improvement scheme must be introduced simultaneously to reduce the number, while improving the quality of the stock. A very hard and unpopular decision at the political level is required to be taken about culling of any unremunerative cattle as recommended by the National Commission on Agriculture.

(viii) Creation of some biosphere reserves and more national parks so as to cover at least 10% of the forest areas in the Himalayas with very careful management in the above surrounding of such reserves and parks.

(ix) Diversion of forest land for non-forestry uses in the Himalayas must be stopped immediately. All lands under agriculture should be properly shaped and terraced and water courses regulated to do the least damage.

(x) In the matter of road construction whether under Central or State agencies, cost for taking up conservation measures to eliminate damage due to cutting up of the hill sides should be included in the project itself, and its execution should be integral part of the roads programme.

(xi) Improvement should be carried out in the alpine pastures and grazing conditions along migration routes and in the lower ranges use for grazing by migratory graziers in winter. For that purpose there) must be socio-economic coupled with agroecological studies, regarding migratory grazing, conditions of graziers, intensity of grazing, availability of alpine pastures, the ownership pattern of the livestock which the migratory graziers take to alpine pastures etc.

(xii) Horticulture (Himachal Pradesh is an example) is becoming very popular in this region. Care will have to be taken that this important economy for the development of hill areas does not result in degradation of environment and deforestation due to increasing demand of boxes for packing cases.

It has been estimated that an equivalent to 10 hectares are felled to pack the fruits from one hectare of orchards. Alternative packing would have to be introduced. Steps would also have to be taken to ensure that it is made obligatory to replant the forest areas from where trees have been felled to pack the fruits. While it is doubtful if orchard owners would genuinely take steps to replant the forest areas from where trees have been felled to pack the fruits, yet efforts should continue to be made in that direction, the more important steps to eliminate the deforestation to meet the demand of packing would be the introduction of alternative

packing material like hard board. The Forest Research Institute has carried out a number of experiments by using forest produce like pine needles etc., for the manufacture of hard board. Alternative material packing would have to be persuaded vigorously if the expanding demand of boxes for packing is to be met, without large scale deforestation.

5.22 It is not possible to have just a technical solution of the forestry problems in the Himalayan region. The vanishing of the forests has as much to do with the rural poverty, preoccupation in agriculture as the mainstay of the economy. Political involvement in protecting delinquent staff, interference in the Political posting etc. are further causes which must be tackled. All in all, the local involvement is a must. Already there is some hostility between the Forest Department staff and the local population, and this distress can be removed only through proper extension efforts and a much closer contact between the two, so that each other's problems and limitations are better understood.

Western Ghats

5.23 The term 'Western Ghats' is applied to the whole line of mountains to the west of Peninsular India running almost parallel to the Western coast of India :—

(i) The Sahaydris beginning from Dangs to Goa and Mulliangiri in Mysore and (ii) the mountain ridges from Malaprabha and Kali rivers in Karnataka right down to Pulinays. The first part is volcanic in origin and the second part is mainly made up of Archeans.

5.24 The Western Ghat Region of India is spread over an area of about 1.3 lakh sq km. in parts of States of Maharashtra, Karnataka, Tamil Nadu, Kerala and Goa. Western Ghat is mainly a hilly area, rain and forested area with dense forest and very high altitudes in the Southern parts. While towards north the density of forests and altitude is low. The Western Ghats have been defined not in the sense of mountain range but mainly as the uplifted western border of the Deccan Peninsula encompassing different geological formations, the ghat runs for about 1600 km. length along the western border of Peninsula starting from the mouth of river Tapi and ending at Cape Comorin. The entire Western Ghat is divided into three physiographic sub-units viz. the Northern, the Middle and the Southern parts. The Northern part of the ghat lies mostly in Maharashtra, and the Middle and the Southern parts in the rest of the States, 5.25 Area under forests in these States is : Karnataka—1448 sq. kms Kerala—11120 sq. kms. Maharashtra—2833 sq. kms. Goa—886 sq. kms. Tamil Nadu—2173 sq. kms.

5.26 The type of forests in this region are :—

- (i) Low evergreen scrub on the foot hills with laterite crops in the coast;
- (ii) Semi-evergreen mixed forests on the lower Westernly slopes;
- (iii) Tropical wet evergreen forests along the upper slopes and protected valleys;
- (iv) Mixed Moist deciduous forests on the eastern slopes;
- (v) Dry deciduous forests on the eastern foot hill, and
- (vi) The grassy blanks on the lower slopes near the crest of the ghats.

5.27 The major problem faced in this region can be listed as below :—

- (i) Protection and Preservation of Forests;
- (ii) Encroachments;
- (iii) Shifting cultivation
(in Private Forests only);
- (iv) Grazing;
- (v) Forest Fires; and
- (vi) Release of forest lands for re-settlement.

5.28 The problem of illicit cutting is serious mostly in forests, which supply fire wood, charcoal and other forest produce to the big cities and towns. Normally illicit cutting is resorted to by local people to meet their own requirements of fire wood and small timber. However, illicit cutting of timber trees particularly of pole size is also indulged in for sale and trade by local people. At some places even organised gangs operate for this work. They use not only bullock carts but also trucks for this purpose. Due to hilly terrain, lack of quick accessibility and lack of co operation from the people, it often becomes very difficult to effectively control the activities of anti-social elements. The local people in most cases do not give cooperation to the Department in investigation of the forest offences. The other form of damaging tree crops is indiscriminate lopping, topping and pollarding of trees called 'tahal cutting'. The cut material is used for burning rabs in the agricultural fields.

5.29 Encroachment is a very serious problem and in spite of many attempts to curb this activity of the villagers the tendency to encroach on forest land is on the increase in certain districts. The cultivation of forest land was encouraged during the 2nd World War period as a part of Grow-More Food Campaign. However, the campaign was discontinued in 1953 and the plots were taken up for raising forest crops along with agriculture. These steps partially succeeded but eventually resulted in conversion of forest lands into cultivation. This conversion of forest lands into cultivation was earned out by both landless persons and land holders. The problem became very serious between the years 1953-56 to 1959-60. Due to proper vigilance and effective protection by the department against the activities of such encroachers this evil was reduced in the year 1964-65. But due to relaxation in Government Policy regarding grant of forest lands for cultivation and due to various pressures, it has once again become a very serious problem. Special staff is created and appointed for preventing the encroachments. The encroachments have resulted in honey-combing the forest areas and have created problems in effective protection and efficient management of forests in this region.

5.30 In the Western Ghat Region, considerable forest lands are privately owned and which are situated on gentle to gently steep slopes of Sahyadri ranges. These privately owned lands are known as 'Varkas' lands consisting of barren to the sparsely tree covered lands with various types of growth such as shrubs, trees etc. As per the All India Land Capability Classes these lands are classified as types V, VI & VIII. These lands contribute to excessive erosion if put under plough and, therefore, they are not considered productive enough for permanent cultivation of agricultural crops. In this area shifting cultivation is practised. The so-called forest growth is cut down on the steep slopes and burnt for rab before onset of monsoons. The woodash obtained after burning makes a good seed-bed for broad casting

seeds of inferior crops such as Nagli and Varai. In subsequent years another patch of forest growth in the area taken up first becomes just sufficient to provide material for fresh rab. This form of shifting cultivation is very wide spread in this region and causes much damage, both to the tree growth as well as to the soil and the water regime.

5.31 There is a large number of uneconomic cattle in the villages which are subjecting the forests to heavy pressure of grazing in certain parts. The protected forests bear the main burden of the grazing pressure. The effects of over-grazing are quite harmful to the forests. Trampling and browsing not only destroy the young seedlings but the consequent hardening of the soil hinders germination of the seed. Over-grazing also increases soil erosion. Some damage by way of hacking of- young growth is caused by the herdsmen accompanying the cattle.

5.32 Mos'uy surface fires occur both on the upper reaches of the mountains as well as forests below. The undergrowth gets destroyed. Also the frequent fires make the trees hollow and thus reduce their value. These fires are both accidental as well as intentional. The intentional fires are due to a fallacious notion amongst the local people for getting early flush of grass consequent to burning before monsoon. In spite of fire-control measures, control of fire becomes rather difficult due to inaccessibility of the hilly tract. 5.33 The Indian- Forest Act and the Rules framed there under and the various executive orders issued are enforced in this region. These are applicable to the reserved, protected and private forest. The Section 35 of the Indian Forest Act Was particularly made applicable for regulation of fellings of forest trees in the private forests. This work was carried out.

5.34 No rights except that of way and to water exists in the reserved forests and the protected forests. In Kulaba district right of free grazing in reserved forests in certain villages is admissible. So far as the right of occupants to fell and utilize all jungle wood trees grown on their lands is admissible and the reserved trees in their own lands are also allowed to be felled and utilized after obtaining permission from the competent authority. The usual concessions enjoyed by the villagers are regarding collection of small dead-wood, thorns, grasses, leaves and fruits and grazing their cattle. The tribal communities in this region are given further liberalized concessions.

5.35 A suitable strategy will have to be developed for managing the forests in the hill areas of the country to answer the problems of environmental stability, at the same time meeting the needs of the people who in the hills are very much dependent on forests for many of their daily requirements. The recorded forests areas whether in the reserves of protected forests or in community forests like the civil forests of U.P., form a large percentage of the land area in the backward hill areas. The density of population is on the whole much less than the average in the State. Yet, because of the abject dependence of the people of these areas for their fuel, fodder and, to some extent food requirements in their daily life, it has been established that the forest areas have been severely depleted. Starting with the civil and community forests the depredation have now gone on into the reserve forests also. As a result, large areas though recorded as forest areas, at present do not appear to have much of soil cover either in the shape of trees or grass and the resultant soil deterioration has already been commented upon. Fuel wood is the most important energy base for the entire hill areas. It will be a long time before any alternative energy base can be supplied at reasonable prices in the various backward hill areas of the country. The continual over-exploitation of trees and shrubs for fuel will go on unless a successful policy of first halting the trend and then reversing the process can be thought of and implemented. This is the most important aspect of the forest in the hill areas. Secondly, even though large areas are recorded as forest areas, in fact because

of thin soil cover much of these areas are fit only for grass land. Over exploitation of these grass lands by the growing cattle and sheep population without any attempt to regenerate the cover and control the grazing has now led to a position where very little grass is available annually for the cattle and sheep wealth. Further the annual migration of sheep in the northern ranges and of cattle, in the hill areas of the Deccan have led to severe devastations along the migration paths. The policy will have to aim at gradually halting this process of deterioration and building up the pastures of the hill areas so that a balance may be struck between the cattle and sheep wealth and available fodder in the first instance. Then the 'problem of improving the cattle and sheep wealth and their numbers and expanding the fodder availability will have to be built in into the long term policy. Thirdly, the minor forest produce in all forest areas gives substantial employment though seasonal to the people in the area in collection of the minor forest produce and selling them in the controlled market. As a general policy, the 'nation has laid down that the purchase of minor forest produce in the forest areas must be departmentally managed so that the collectors of minor forest produce are given a fair price for their labour. This policy has yet to be developed on large scale and it is also noticed that some States have a habit of going back on the national policy deliberately. Because of this uncertainty about the availability of fair prices and a continuous opportunity, there is over-exploitation of the minor forest produce like resin and gums in the Himalayan ranges on the one hand and a sort of blindness on the part of the rural population in preserving the oil seeds producing trees like mahua, karej and so on in the Deccan plateau. These areas are therefore liable to over exploration for fuel wood and fodder for lack of interest of the local population in maintaining the trees. A consistent policy will have to be developed to ensure that the tree wealth, which gives the minor forest produce, is not only maintained but developed so that a steady source of income will be available to the local population thereby encouraging them to see to the preservation of these trees. Secondly a fair price should be given to the produce not necessarily based on the labour charges alone, by complete departmentalisation of minor forest produce collection so that the urge to over-exploit is also curbed.

5.36 Both in the Himalayan ranges and in the backward hill areas of the Deccan it is noticed that generally the people of the area get, very little benefit in the matter of employment in the various silvicultural operations that are going on in the forests of the country.

5.37 The Committee for the Development of Western Ghats had initiated a study by the Hyderabad, Administrative Staff College to find out the benefit that the local people, in certain sample blocks selected in the Western Ghat area got out of the development process. This study brought out, in 9 of the 11 block studied, that the forest economy was very important for the local people as forests cover a large extent. Yet, it was found that the local people were not engaged in the labour opportunities in the maintenance and exploitation of the forests. It was also found that temporary cultivation in the forest areas was given mostly to outsiders and not local people. Thus the local people seemed to get very little benefit within the forest economy. Similarly in the Himalayan ranges, there is a perpetual complaint that outside contractors are exploiting the forest areas clandestinely to the detriment of the forests themselves. Some of these complaints have gathered momentum under the 'chipko' movement. If the backward area is to be developed, the local population should get every opportunity to benefit by the various developmental and employment opportunities that can arise in the area- Forests being an important part of the economy in the hill areas, every opportunity available in the forests for benefiting the local population and for giving them employment and opportunities should obviously be availed of,

Protected Forests

5.38 The National Commission on Agriculture has pointed out the importance of protected forests. This is what they say about the utility of such forests :— "Forests managed primarily for protection occupy hill slopes, watersheds of rivers, river banks, sea shores and other localities vulnerable to erosion and degradation. Protective influences of these forests, specially on soil and water should be developed in full by suitably managing the existing forests and providing for their rehabilitation and improvement for maintaining the water balance, control of erosion, prevention of rapid silting of reservoirs and moderation of floods. No felling should generally be permitted in these forests".

They have further advised the specific action to be taken in protected forests in the following manner :—"The instability of terrain in protected forests may be due to reasons of geology, nature of soil or slope of ground. Such areas where even the slightest disturbances of the forest cover is undesirable should be classed as protection forests. It will be useful to compile a list of purely protective forests for each of the States or Union Territories. It is obvious that very stringent tests will have to be applied to take out an area entirely from the orbit of productive forests and to earmark it for protection of terrain only. The other forests mountain systems and river valley catchments can and should be developed and managed simultaneously both for production of timber and for environmental values. The protection of forests offer scope of development as Nature reserves, and also for use for educational or research purposes. Protection afforded to these forests is guarantee enough for preservation of landscape. But excessive enthusiasm to cover every bit of land with trees must be guarded against. Open glades or treeless tops and slopes in the hills like the Nilgiri downs, open savannath grasslands in the terai, etc. should be left as part of the natural landscape".

In the Himalayan ranges, one of the causes of serious landslides in the banks of the fast flowing streams, leading to sometime blocking up the streams and consequent danger to the areas down below, is the lack of permanent forest cover on both the lines or slopes of the fast flowing streams. If the protective forest theory had been systematically applied in the Himalayan hill ranges such occurrences should not have taken place. The Committee will advise that an immediate examination should be made of all such areas in the backward hill areas which should legitimately be brought within the classification of protected forests and steps taken to declare them as protected forests- Then a systematic programme should be taken up to see that the forest cover is brought back 1 in all these protection forests within a reasonable time 1 frame utilising the finances for 'social forestry'. This, in the view of the Committee, is of priority in the Himalayan hill ranges.

.5.39 The position, though it may not have such serious consequence in the forest areas of the backward hill areas of the Deccan, is still serious enough to warrant a similar action to identify the areas which should be put under protected forests. A period bound programme should then be taken up to ensure that such areas are afforested quickly and maintained as protected forests.

5.40 The above recommendation of the Committee may not give any direct benefit to the people of the hill areas because protected forests are not to be exploited. But the indirect benefits of soil cover being maintained and prevention of land slides taking away, even village sites will be the secondary benefits from this policy of protection and are certainly important.

5.41 In the Chapter No. 3 on 'Strategy', the Committee has already pointed out the need for saving the drudgery to the women folk of the hill areas in their daily labours regarding collection of fuel and fodder. The country has embarked upon large -scale social forestry programmes with the intention of gradually rehabilitating the community forest areas, the degraded forest areas and the bare patches in protected forests and reserve forests which need afforestation. The strategy aims at raising fuel wood plantations which are suitable to the climate and which can give good amount of fuel wood in short rotation of harvesting. The National Commission on Agriculture has recognised that such rehabilitation of the bare forest areas by fuel wood plantations will be of benefit only after 10 or 15 years when the stand comes in for harvesting. Till then, alternative methods will have to be found to see that these plantations are not disturbed and alternative fuel arrangements are made. The National Commission on Agriculture has suggested that in all the interim period it is in the interest of the forest departments to gather the lops and tops in the coupes that are exploited every year and gather them at convenient depots near the villages. This fuel wood and small timber should be supplied to the populace at cost price. Some States have started working such depots with great success. It is necessary that particularly in the Himalayan hill ranges and in the Deccan, for the backward hill areas such depots are started quickly by the forest department. The Committee recognises that, solution is a long time process and the difficulties in the transition cannot be washed away. A good deal of cooperation of the local people will be required in the maintenance of the social forestry stands and agreeing to a rotational exploitation. The Committee cannot over-emphasise the need for fuel depots scattered over the backward hill areas where-ever the exploitation of existing stands has been severe.

5.42 There are large forest areas which need replantation with economic and commercial species. The National Commission on Agriculture has given sufficient indication of the seriousness of the situation from the aspect of the needs of the country for van- bos types of forest resources. In the backward hill areas, economic' forestry should include the types of timber and fodder trees which can solve the problem of raw material for village industries and fodder for the animal wealth. For each region, the forest expert should identify the type of trees and see that patches of such afforestation are done near about the village settlements in the backward hill areas so that over time more fodder availability will be ensured for the cattle and raw material will be developed for village industries. In the Deccan, kubabul has become an important timber-cum-fodder tree and in the hill areas willow popular, and such trees will be useful as fodder and also as basis for sport and match industry. The Committee is not attempting to identify the list.

5.43 The problem of pasture and fodder has been dealt with in detail in the Chapter sixth of this report dealing with Animal Husbandry. A repetition here is not needed.

5.44 Maharashtra has shown how labour cooperative societies can get benefit in helping the exploitation, of the coupes selected each year for felling. Other States have also experimented with the forest labour cooperative system. Yet, the study of the Administrative Staff College, Hyderabad, shows that such experiments are still in an extremely pilot stage. Serious attempt should be made by forest administration in the backward hilly areas to involve the local population in the operations connected with the forest managements which are remunerative so that the local population can see the benefit of the forests from their economic angle. Similarly, the involvement of the local population in collection of minor forest produce and paying there a fair remuneration for the collected produce is another aspect which needs wide acceptance by the forest departments and the Governments of the States. Devastation of the forests and thereby exposing the soil cover leading to soil

deterioration is not always for immediate use and many a time is thoughtless. Unless the local people see their interests in the maintenance of the forests, such thoughtless exploitation of the soil cover will continue. No amount of administrative supervision can protect the area against such thoughtless action. In backward hill areas, therefore, where forests are important, the forest administration must learn to involve the local people so that they benefit from the forests and see the benefit in real terms.

Organisation and Manpower Planning

5.45 The forest departments in the States, as at present organised, are not in a position to organise one million hectares of farm forestry a year and 3.2 million hectares of fuelwood and mixed forests in addition to five lakhs hectares under the fodder, Tussar and Lac production support. The National Commission had drawn attention to the need for training forest officers in Extension Forestry. This was a new art to the traditional forest staff who had all along only concentrated on conservation. Rapport with people had to be developed and the department had to get the concurrence of the people and also get their help in getting the work done. When fuel wood plantations are expected to be paying propositions in future and a commercial approach has to be developed, the forester is generally on a different wave length. He had been used to contractors who had done all the economies for him at his expense. Training in commercial forestry was, therefore, equally important. A National Training Centre for training the foresters in Extension and Commercial Forestry was agreed upon and a start made with a small unit at Ahmedabad. It is necessary to put through the basic concept of a National Institute with sufficient capacity at once as a necessary start of our massive programme of social forestry. The pace of our programme of social forestry will depend entirely on the speed at which we get this base laid and recruit the necessary order of staff. The present strength of the forest department in the States is very much unbalanced. The lower level staff like forests guards, rangers and junior officers are anything but equal to the massive task before them. Forest service has traditionally been one where all their staff at all levels have been trained for the job after selection to the service. There are not enough training colleges at present to train all those that have to be added to the staff in a crash programme. This problem of manpower requires immediate attention.

Cold Desert Forest

5.46 Cold arid areas occur in the Ladakh region of Jammu & Kashmir (Ladakh & Kargil Districts) and Lahaul and Snti region and Hanarang Valley of Himachal Pradesh. Lack of vegetation is caused by deficiency of water, absence of agriculture for all practical purposes, and a sparse and nomadic population depending mostly on animals for their livelihood. An essential part of the development of the cold desert is the provision of an adequate quantity of fuelwood and fodder. Forests therefore, would play an important role in the development of these areas.

5.47 In the cold desert of Ladakh region, two distinct bioclimates can be recognised, namely cold and cold temperate. In the Lahaul and Spiti region and Hangrang Valley of Himachal Pradesh, there are some pockets where general desert conditions find a change either due to the melting of snows in some depressions or the occasional escape of monsoon winds causing mild showers. In such cases 'kail' and 'birch' are found.

5.48 No tree vegetation, worth the name is found in the cold desert region. The region appears to carry only about a dozen endemic plant genera, mostly small and specialised. There are some woody shrubs and trees which are of special significance to the local

population for meeting their requirements of fodder, fuel and small timber. Forest development activities, to include afforestation, minor forest produce development and range management can be carried out over limited areas only and should be taken up with the active involvement of local population, mainly to meet their requirements of fuel, fodder and small timber.

5.49 Land availability will be no limiting factor. The concerned States have already taken up a programme of afforestation, soil conservation and fodder development. This may be continued. Range management¹ and grass land development should be an important part of the programme. The local people are not migratory and hence provision of improved fodder should have the utmost priority for the local livestock. Natural grass land are not abundantly available in the region. The extremes of climate and high altitude also limit their choice. For any large scale programme, pastures will have to be raised artificially where irrigation is available. In summer, graziers from outside migrate to the area with their livestock and cause destruction of natural vegetation. It will be necessary to regulate the entry of such migratory graziers strictly in accordance with the carrying capacity of the grazing runs.

5.50 The Committee would strongly endorse the recommendation of the National Commission on Agriculture to set up a centre for forest research on cold desert to undertake forest research on the following :

- (i) Identification of areas for pasture development and growing of forest trees to provide fodder for the grazing animals, small timber and fuel for the local population, and stabilisation of areas threatened with erosion.
- (ii) Selection of suitable indigenous and exotic species and testing their performance.
- (iii) Ecological and physiological studies in relation to photosynthesis and respiration at high elevation.
- (iv) Studies of socio-economic aspects in relation to range lands, soil and water conservation.
- (v) Study of the effect of shelter-belts and windbreaks against high velocity wind.

6. WATER UTILISATION

6.1 The areas which can be irrigated in the Hill States are scattered and small and large continuous tracts as in the plains are rare. This is the topographical difficulty. There is practically no possibility in the hilly terrain for major irrigation schemes. The scope for medium schemes is also limited in the hill areas. Irrigation development has to be largely through minor schemes of lifting water from streams, pumping water from the periphery of reservoirs, and pucca kuhes (small gravity channels irrigating about 100 hectares) as in Himachal Pradesh, etc. Bulk of the hill region will however have to depend on consumption of monsoon rainfall in the soil.

6.2 In the Western Ghats, water does not seem to be a problem. In the Western and Central Himalayan region, the duration of the precipitation is not more than four months. Molten snow however, adds to water availability and moisture. There are areas in the Himalayan region like Lahaul, Spiti and Kinnaur in Himachal Pradesh and Ladakh in Jammu & Kashmir where rainfall is scanty. In the North Eastern Region monsoon rains are received for a longer period as also- in the Western Ghats and in greater volume. Since the bulk of the hill area depends mostly on rainfall, the adoption of appropriate water harvesting, soil management, etc. are of special importance.

6.3 Irrigation facilities through major, medium and minor irrigation schemes, wherever feasible, is provided in the wholly hill States as a part of the State normal plan. The schemes generally include surface water storage and diversion schemes, surface lift irrigation schemes from rivers and streams and ground water schemes which comprise the construction of dugwells, tubewells, etc. In the States with partial hill areas which have been taken up under the special hill area development programme, provision is made under the special Central schemes. In addition, special central sector schemes intended for the benefit of small and marginal farmers have also been taken up.

6.4 A synoptic view of the present status of irrigation development in different hill States are:

(a) In Himachal Pradesh, a very high percentage of area is either under perpetual snow or under forests or steep barren slopes which cannot be cultivated. The - total cultivable area is scattered throughout under varied elevations. A Master Plan for development of irrigation in the State is being attempted. Against a cropped area of 9.00 lakh ha. the area that can be benefited from the irrigation has been roughly assumed as 3 lakh ha. Minor irrigation schemes taken up under the normal plan are lift irrigation from rivers and streams, diversion schemes like kulhs, ground water schemes like tubewell in the inter-mountane valleys. Some of the important major and medium irrigation schemes undertaken include Giri Irrigation Project and Bhabaur Sahib Lift Irrigation scheme.

(b) In Jammu & Kashmir, the minor irrigation schemes taken up include small storage works, lift irrigation schemes, zamindari kulhs and ground water schemes like tubewells etc. Major medium irrigation schemes like Tav/ilift irrigation scheme, Marvel and Lethopra lift irrigation schemes, remodelling of Ranbir canal, Ravi canal etc. have also been undertaken.

(c) Manipur is situated in the heavy rainfall area about the amount of precipitation is not always regular and timely. In view of this, minor irrigation schemes like lift irrigation,

construction of bunds are taken up in the State for providing irrigation facilities in the terrace fields in the hilly areas of the State.

(d) In Meghalaya several feasible minor irrigation, flow and lift schemes, few ground water schemes are taken up to create irrigation facilities for the cropped areas in the hills which are scattered.

(e) In Nagaland wherever adequate discharge in rivers and streams exists, small diversions and lift schemes are being taken up.

(f) In Sikkim lift irrigation schemes and diversion works like Kalerchu Phase I to III schemes, Pabang scheme, Tharapur Scheme, Sambaria scheme Phase I, Changay scheme have been taken up.

(g) Arunachal Pradesh has a mountainous track and cultivators mostly resort to shifting cultivation on hilly slopes. A few minor irrigation schemes like construction of channels, lift irrigation schemes, small storages works and medium irrigation schemes like Tafragram and Abapali have been taken up.

(h) In Assam, for the two hilly districts of Karbi Anglong and N. C. Hills, 23 minor and 2 medium irrigation, schemes are under operation benefiting an area of 8108 ha. Fifteen minor irrigation schemes and 2 medium irrigation schemes are under execution and twentythree schemes are under investigation.

(i) In most of the hilly regions of the North Eastern States the Jhum cultivation is in vogue and irrigation development is considered only in limited areas having stable cultivation.

(j) In the hilly areas of Karnataka, the rainfall is satisfactory, however, where necessary and feasible, minor irrigation tanks are constructed for supplementing rainfall.

(k) In Kerala schemes to tap groundwater in the hard rock areas, hilly and mid-land tracts of the State through intensive hydrogeological, aerial photo interpretation geophysical studies are being formulated.

(l) In Maharashtra special Central assistance for accelerated development of minor irrigation facilities in the hilly areas of Western Ghat region has been given.

(m) In Tamil Nadu, pump sets, check dams and co-operative lift irrigation schemes have been provided for irrigation in the hill areas.

(n) Normal rainfall of the State of Tripura is about 2000 mm, most of which is concentrated during the periods from May to October. As such, there is no difficulty in taking up rainfed kharif crop in the high lands. Schemes, to utilise the residual moisture have also been undertaken.

(o) In the hill areas of Uttar Pradesh, irrigation schemes, such as contour channels, hit irrigation schemes, hydrams, sprinkler irrigation for providing irrigation in the up land by pumping are taken up. In addition, new techniques of dry farming, community irrigation schemes and soil conservation measures are also being introduced.

(p) For hilly areas of Darjeeling in West Bengal, special Central assistance for accelerated development for creation of minor irrigation facilities are being provided, j

6.5 In developing irrigation in the hill areas, it would have to be borne in mind that by and large, most of the irrigation works in the region would fall in the category of minor irrigation works. The cost of construction of irrigation works is higher in view of the topographical conditions and the normal standards which are followed in the plains for regarding these schemes as economical cannot obviously be applied in the hill areas. The importance of developing lift irrigation has also to be realised in the context of their utility for providing drinking water to the population near their villages thereby saving drudgeries to the women folk in collecting drinking water from far below. Hill folk have to travel long distances to fetch pails of water and most of their time is taken up in this process, thereby depriving the families of their utility in increasing the family income by undertaking other vocations. Special norms would therefore have to be devised for irrigation works in the hill areas. Norms for schemes of major and medium irrigation schemes can be adopted initially and levels need to be adjusted for higher cost of materials and transport like, say, steel, cement etc.

6.6 Following would appear to be the most appropriate methods for developing irrigation facilities in the hill areas:

- (a) contour channels, with storages for diversion structures;
- (b) lift irrigation from storages or running streams; and
- (c) hydraulic rams.

6.7 In case of traditional contour channels, it has been observed that the water loss by seepage, leakage and spillage is very high (40 to 60 per cent) and very low irrigation efficiency is obtained. Field to field irrigation is faulty and wasteful in that some parts of the field remain un-watered whereas excessive pondage is obtained at other places and as such immense scope appears to be there for improvement. The cost per acre of Government kuhls including lining of channels in highly porous reaches ranges between Rs. 5000 to 7000. In order to minimise the damage to contour channels, it is desirable to explore the possibilities of utilising polythene and alkathene pipes. Use of such pipes offers distinct advantages such as saving of water, easy transportation of water etc. The chief disadvantage is the possibility of these pipes getting damaged by catties or other interference but this can be solved by bringing the pipe line at a sufficient depth to avoid such accidental damages. However the contour channels in the hill areas are even more susceptible to damages during heavy rains and it is very difficult to restore such damages quickly. It is therefore worthwhile considering the use of polythene and alkathene pipes as water carriers in the hill areas.

6.8 It has also been brought to the notice of the Committee that in Himachal Pradesh the rights of the farmers are standing in the way of optimum utilisation of kuhl irrigation. The use of water is governed by the settlement rights made as early as 1918. As a result, a few farmers located at the head of the kuhl are monopolising the use of water and the surplus is going waste. Since optimising the use of available water is basic to the development of the hill areas that has to be rectified in the present situation. We recommend that the State Government should review the entire position and devise suitable measures to ensure that there is full utilisation of the water and all the farmers within the command of the kuhl receive a share. We have not examined the position of rights and wastage in other Hill Areas. It is possible that such problems exist elsewhere also. This needs early examination and remedy.

6.9 Lift irrigation from the running streams can go a long way in meeting the water needs for irrigation and drinking purposes. Such irrigation schemes can help in drastically cutting down the drudgery element in time spent in procuring water from long distances for drinking purposes. The time thus saved can be put to useful alternative uses. Lift irrigation schemes can be operated both with the help of electricity and diesel. Keeping in view the present critical point and also the availability of petroleum products greater emphasis would have to be placed on use of electricity. Experiments show that a 300 ft. lift irrigation is cheaper than a 300 ft tubewell. When we have gone all out for leap tube well irrigations in plains, why should there be any apathy toward lift irrigation in hill areas. The Committee would recommend that valleys need to be identified where lift irrigation schemes are feasible and these should be suitably brought into a Master Plan of Construction quickly.

6.10 Fast rising prices of diesel oil and other fossil fuel have made it imperative to find out alternative sources of energy. This would point towards the need for further efforts in developing the technology for utilising the kinetic energy of water which mostly go waste at present and devices like Hydraulic Rams, Himalayan Hill and Floating Mill which do not involve very high cost of long gestation period will be very useful.

6.11 Hydraulic rams are motorless pumps which can pump water to a height of 200 to 300 ft. using the energy of flowing waters in rivulets with steep gradients. Since no motor or diesel operated engine is required for the working of the machine, its operating cost is limited to maintenance expenses. It can work continuously for several days without an operator. A pump with 4" suction and 2" delivery with a lift magnification of 10 (i.e. an intake head of 10' and delivery head of 100') would deliver about 2280 litres per hour.

6.12 The State Planning Institute, Planning Department, Kalakankar House, Lucknow, has been engaged in trials and evaluation of hydraulic rams for the past 5-6 years and the studies carried out by them have shown that under hill conditions, irrigation through hydraulic rams is economical and feasible. Apart from irrigation of nurseries, or orchards, small vegetable farms (even involving use of sprinklers) the need for introduction of these will have to be viewed taking into consideration that there are several hill areas where water supply even for domestic use is extremely difficult. The poor road development, lack of other communication facilities and shortage of power make it difficult to extend electrical lines, and install engine and pumpsets and to maintain the same efficiently.

6.13 Visualising the need for popularising hydraulic rams, the Department of Agriculture, as early as in 1977 organised a visit of a team consisting of officers of the Central Government Departments, Planning Commission, etc. to visit Districts of Tehri and Chamauli where hydraulic rams are in operation. The team came to the conclusion that the extension of use of hydraulic rams should be promoted. The Committee would urge that this programme be taken up on priority basis in the hill areas.

6.14 The Government of Uttar Pradesh have made some progress in the introduction of hydraulic rams in the hill areas. It is reported that about 80 hydraulic rams have been installed under the programme of minor irrigation. In some areas the hydraulic rams are used both for irrigation on community basis and also for meeting the domestic water requirements.

6.15 Himalayan Mills are in common use in the hill areas. Kinetic energy of falling water from a height rotates the shaft on which is mounted the grain grinder. The mills that are used are crude in construction using mostly wood and few iron parts. The present use of Himalayan Mills is limited to driving grain grinders whereas improved and properly designed

units can also be used for generating electric power Sufficient to drive small pumps, lighting of small villages and for operation of equipment used in small scale industries etc. depending on the volume of water flow. Very little work has hitherto been done in improving the design and construction features of Himalayan Mill for extending their use for agricultural and industrial applications.

6.16 Minor and Medium Irrigation in the Deccan Plateau are much simpler schemes than in the Himalayan Ranges. The terrain is flatten and the hills are undulating thereby raising the two great constraints in the Himalayas. A Master Plan for Minor Irriga tion in the Backward Hill Areas is very necessary and the Committee recommends an early examination of the potential and a time bound programme for execution.

7. LAND USE AND CROPPING

7.1 It has been observed that in the Himalayan hill areas, of the total reporting areas, forests occupy 53 per cent. Crop land, on the other hand, is relatively limited (about 11%). Pastures and grazing lands, miscellaneous tea crops and culturable waste account for about 8%. The remaining area (28%) is not available for cultivation being barren or un-culturable or put to non-agricultural use. Whereas for the country as a whole, the net area sown forms about 46% of the reporting area, it is 17% in Himachal Pradesh, 16% in Jammu & Kashmir and about 17% in the hills of Uttar Pradesh. In the north-eastern region, it varies from 2 to 7 percent in different States except Tripura where it is about 23%. The low acreage of net sown area in the north eastern region is perhaps explained by only recording land under permanent cultivation and non- inclusion of large areas under shifting cultivation which is a wide spread practice in agriculture in this region.

7.2 The land use and cropping pattern in the Western Ghats is quite different from the one prevalent in the northern hills. In Kerala hills the variations in altitude have led to two distinct agronomic environments. In the region below 500 metres mean sea level (msl), high rainfall humid tropical conditions prevail. The highlands above 1,000 metres (msl) have high rainfall cool humid temperature climatic conditions. The highlands are thickly forested in their upper reaches while in the lower reaches the forests are inter-spersed with plantations. The region between 500 and 1,000 m is occupied by ever green forests. The land use and traditional cropping patterns in Kerala are more or less consistent with the agronomic environment obtaining in different rainfall zones of the hills. Under conditions of undulating topography, different altitudes and soil conditions, the cropping patterns vary from area to area. Tea, coffee, rubber and cashew are grown on hill tops and upper slopes, pepper, arecanut and coconut on the lower slopes, and paddy in the valleys. Tea and coffee are grown in the cool humid temperature climate of the hill tops and rubber, coconut and arecanut in hot humid tropical conditions. Thus, perennial crops dominate the cropping pattern of Kerala accounting for nearly 50 per cent of the gross cropped area and nearly 60 per cent of the net area sown. High density of population and intensive land use have taken the margin of cultivation to the extreme. A higher proportion (57 per cent) of net area sown in relation to reporting area is observed. Excluding the forests, which occupy 28 per cent of the reporting area of the State, the percentage of net area sown to reporting area will be as high as 78 per cent leaving thereby very little scope for extension of area under crops. Similarly, the intensity of cropping with 60 per cent of the net area being under plantations is as high as 150 per cent, which is considerably higher than the national average of 110 per cent.

7.3 In Karnataka forest dominate the coastal and adjoining areas, the Coorg hills and South Mysore. 81 per cent of North Kanara is forested. Coorg and eastern taluks of South Kanara and Chikmagalur are 39 to 40 per cent forested. As against this only 15 per cent of the geographical area of the State is under forests. In the Ghat region the cropped area is about 5 per cent of the total gross cropped area of the State, where paddy predominates. Because of abundance of rainfall, natural grasses grow extensively in this region supporting cattle rearing which is, common in this area. Next in significance is the dominance of the plantation crops, namely, coffee, tea, pepper, cardamom, cashewnut, arecanut, coconut and rubber which are confined (with the exception of coconut and arecanut) to the hilly areas. From the point of view of area, coffee is the dominant crop in the hill districts of Coorg and Chikmagalur. In terms of total area under plantation crops, Coorg has 46 per cent of the area under plantation and Chikmagalur 29 per cent.

7.4 In Tamil Nadu, Nilgiris have 43 per cent of the geographical area under forests, the State average being only 14 per cent. Tea, coffee and cardamom plantations are dominant in the Nilgiris. Potato is also an important crop.

7.5 Mahabaleshwar hills in the Satara district of Maharashtra has the largest area under forests (59 per cent) with parts of Kolhapur district also having substantial area under forests. Cereals and millets dominate the cropping pattern, there being no area under plantations in the hill regions of Maharashtra.

7.6 Broadly speaking, forest covers in the hill slopes are ideal and should get priority. However, certain percentage of area fit for forest plantation is under private ownership in certain regions. Most of the farmers are not interested in planting long gestation forest trees. Quick growing economic species preferably handy fruit bearing (like walnut, peanuts and fodder) trees may be planted in these areas if considered possible so as to keep the interests of the owners alive.

7.7 Cultivation of hill slopes should be discouraged as far as possible as this causes erosion. Even the high value crops like potatoes which cause erosion should not be encouraged in slopes. There should be long term policy for covering such areas under perennial crops. Degrees of slopes beyond which cultivation should not be allowed may be specified for different regions.

7.8 As far as possible, horticulture should be encouraged in combination with sod cultivation. Sod should preferably be comprised of grass-clover mixtures suitable to the locality. This will provide a very good combination for horticulture and animal husbandry both of which are complementary.

FOOD CROPS

7.9 Food crops have some relevance in the northern hills. An overwhelming proportion (87 per cent) of the total cropped area in the hill regions is devoted to growing foodgrains. Rabi crops like wheat and barley and kharif crops like rice and maize are the principal cereals produced and occupy most of the cropped area. Small millets and pulses are also taken but the area these occupy is not large. Compared with foodgrains, the area under fruits and vegetables is small (4 per cent).

7.10 In Jammu & Kashmir hills, paddy, maize and barley are the important food crops grown. Paddy is taken in the valley regions while maize and barley grow on slopes at intermediate heights. This pattern agrees with the agro-climatic condition in this area. In Himachal Pradesh and Uttar Pradesh hills which form one contiguous area having similar characteristics, wheat, barley, paddy and maize are taken. Small millets and pulses are also grown. In this area, it would be desirable to confine rice cultivation to valley situations. The Garhwal hills in Uttar Pradesh offer good scope for growing superior variety of rice for export. This needs encouragement. However, rice should not be encouraged in the upper slopes. On these slopes it will be desirable to encourage maize and potato. Hill slopes provide natural drainage and are suitable for growing maize. The temperate climate of the hills is particularly suitable for the production of potato seed as well as table potato. Certain varieties of pulses also offer good scope for development in the region. Pulses can be encouraged not only for local consumption but also for surplus production for improving the economy of the grower. Pulse legumes are useful as fodder. Pulses can be taken in the space between fruit trees by inter-cropping. Small millets are widely grown for home consumption.

7.11 The National Commission on Agriculture in its chapter 13, part IV, on 'Climate and Agriculture' has dealt with the problem of hill area in the following words. The report of the NCA was issued in January 1976.

'The pattern of farming in hill and mountain areas is different from the one followed in the plains. Cultivation in hilly areas is possible in valleys and over slopes. Plots are usually small and over slopes these are arranged in terraces girdling the hill at, various points of its elevation. Fruit or plantation crops and paddy are commonly grown in such areas. The choice of fruit or plantation crops as also of the field crops, other than rice, varies according to region. Temperate fruits of various kinds are the speciality of the belt comprising Kashmir, Himachal Pradesh, West Bengal and Assam. Pineapple is the fruit grown in Meghalaya, Manipur and Tripura. Tea, coffee, rubber, cashewnut, pepper, cardamom, clove and nutmeg are the specialities of the southern hills while coconut and arecanut are usually grown on flat lands in the valley. The common arable crops are rice, maize, small millets and potato. Despite this kind of choice being available there is a temptation to give preferential treatment to paddy and fit it in all kinds of elevations disregarding the fact that water needed is really available for this crop only in the valleys. This brief description is meant to illustrate that there is no scientific pattern of cropping most suited to different elevations. The micro-climate over hills varies very widely depending upon various factors. The hill facing the ascending side of the monsoon winds is cooler, has more moisture and is, therefore, more lush green than the other side over which the wind descends. The duration of sunshine varies widely over small distances due to the directional orientation in general and due to the shadow effect of nearby hills in particular. Moreover, there is the valley effect where the valley acts as a pool for cold air and is covered with fog. The sequence of horticultural plantations as well as arable crops requires to be determined after taking into account all these meteorological considerations and the knowledge in India at present on these aspects is meagre. There is, therefore, a need to pay greater attention to research work as well as agricultural developmental work specially directed to the problems of hill areas'.

7.12 In 1974, the agricultural plan for Sikkim was drawn up by the Planning Commission. Sikkim was divided into three zones the high, the middle and the low and it was suggested that for each of these zones there should be adaptive research stations to find out the best crops to be grown under their climatic and environmental conditions. These adaptive results were to be translated through demonstrations by the Agriculture Department in the various blocks falling in the zone. This was to be followed by field level extension where the farmers have found the advantage of the suggestions. There being no research base on Sikkim, the adaptive research was obviously to be carried out with the knowledge available from the other hill, areas of the country. From what the National Commission on Agriculture has stated in 1976 it is clear that very little work of this nature has actually taken place in the rest of the country to identify crops suited to the various climatic zones in the hill areas. Before concrete suggestions for development can be made, there must be knowledge to support the approach. Unless, therefore, the research workers of the country in agriculture take up in right earnest the adaptive research, firstly in the various hill zones under different rainfall and climatic conditions, and then give the base to the extension workers for active field promotion, there can be very little introduction of suitable crops in the hill areas. There has been some limited amount of research of varieties suited to the hill areas. Kashmir has done work on rice culture suited for the cold climate. Dr. Boshi Sen's Institute in Almora has done work on maize and some vegetables, the Indo-German Project in Nilgiris had introduced horticultural crops. These are stray examples of other programmes taking up the basic problem of finding suitable cropping patterns for the hill areas. The Committee would, therefore,

recommend strongly that the Agricultural Universities in the States which have the hill areas should now take up in right earnest firstly, applied research in the different zones of the various high yielding materials that have been developed in the country. At the same time, breeding of varieties; suitable to the climatic conditions of the various zones of hill areas will have to be taken up strongly by these universities. Further, the National Commission on I Agriculture has pointed out that rice is being cultivated f in areas which are not suitable to it. Alternative crops which are more suitable to the terrain will have to be identified; The Agricultural Universities of Kashmir and Himachal Pradesh are directly interested in the basic problem of hill area. The Gobind Ballabh Pant Krishi Mahavidyalaya in Uttar Pradesh is to extend agriculture m the hill areas of Uttar Pradesh. The NCA has suggested regional research stations under the universities to deal with the special problems of the various zones in a State. The Committee would recommend that the ICAR may now take active leadership in ensuring that this basic work for hill area development is now undertaken on a systematic manner.

7.13 The hill areas have a climatic advantage in that in the high altitudes the pest problem in crops is highly minimised. The multiplication of potato seed in the hill areas of Himachal Pradesh is a good example of the country taking advantage of the climatic situation to develop basic seed material in the hill areas. Similarly many vegetable seeds are best grown in the hill areas. On the other hand, the hill areas may have to deal with special pest problems or special climatic problems like frost. The research, therefore, has to be two-fold-firstly to identify the crops and zones where basic seed material of high quality can be supplied to the rest of the country and secondly-pest and environmental problems leading to crop damage. Special attention will have to be paid in regional stations of the agricultural universities to these problems.

7.14 The land use in the hill areas as in other parts of the country has been guided mostly by the pressure of the population on land and the tendency is to bring under cereal production even marginal lands unsuit able for cultivation. This problem specially is acute in the hill areas leading thereby to cultivation on slopes and on this soil profiles thereby leading to very rapid soil erosion and a permanent loss to the productive areas. It is, therefore, necessary to see that the land use is adjusted to the potential of the land without leading to land deterioration. Pasture and horticultural development, the former on thin soil and the latter on sloping terrain which even now are largely practised in the hill areas, will have to replace the agricultural crops in marginal terrain. This can only be done by an active and intelligent extension approach. The farmer will have to be given alternatives which are more profitable to him. This Committee has dealt with the problem of animal husbandry and pasture development in detail in Chapter VIII of this report.

7.15 In the Himalayan areas, per family land holding is small. It is getting smaller. If poverty is to be removed, productivity per unit of land will have to in crease substantially. At present, there is substantial subsistence farming of food crops in order to set some amount of food for the family consumption. Thereby, marginal lands are being cultivated and the full productivity of land is not being: utilised. The apple revolution in Himachal Pradesh which has led to very substantial income to the apple growers and pros- nerity shows that a change over from food crops to horticulture has given much higher return per unit of land. In Lahaul recently it has been claimed that potato seed production has increased from 5000 bags a decade ago to 2,00,000 bags this year. This programme takes advantage not only of producing a higher value crop even as food but still higher value as nucleus seed for the rest of the country. Similar opportunities exist in various vegetable seed production. Thus, there

are sufficient examples already that under the climatic conditions a horticultural or a vegetable crop can be much more profitable per unit of land than cereal production. The agricultural universities will have to take up detailed investigations of profitable land use under the climatic conditions and the right type of crop to be grown in the various zones under various environmental conditions. This will be an exercise extending the idea that has been postulated by the NCA about fitting the right type of food crop to the hill areas. The Committee will recommend that this research work should be done.

7.16 From the point of view of the poor families depending on land in the hill areas of the country they have to get maximum return out of their small holdings. This may mean, that they cannot produce food crop for his own family and depend on other but have to invest in cash crops which have to be sold and transformed into necessary food. Today no householder in the backward areas with the paucity of an administrative support and communications will risk the possibility of not producing a certain minimum food crop for his own family and depend on other people for his food. The change over, therefore, can not take place all over the hill areas and on mere statement of policy but some selective approach will be necessary. The problem can be solved if wherever the food crops are replaced by new cash crops whether cereal, agricultural raw materials, horticulture or animal husbandry products, suitable. marketing facilities are built into the system to buy the production at fair prices and take them off the hands of the farmers of the area. Parallel to this organisation there has to be an organisation to supply the food crop prevalent in the area to fair price shops so that the farmer can buy his necessities from there. He should not be left to the mercy of the middlemen profit system. Both these approaches are well within the capacity of State administration. An area approach of development taking the more productive zones which can be still more productive and on the communication routes will have to be taken up first. The administrative support and the technical support will have to be laid on as a necessary part of the programme." The Committee will recommend that this vast approach of development and change over of the cropping pattern to the best land use should be brought about in the hill areas at least substantially by 2.000 A.D. A vast programme should be built into the Five Year Plans.

7.17 The Hill Areas Seminar at Nainital brought out very glaringly that the terms of trade of the hill areas is very much against the Himalayan hills. A casual look round the market will show that many of the necessities, even cereals, are brought from the plains. Vegetables are brought from the plains along with poultry, eggs, and so on. As the hill area agriculture is based on subsistence farming, there is really not much to sell with which to buy. Thus, a balance of trade has to be against the hill areas. Economically, therefore, it is necessary that the productivity and income per unit of land is increased so that the hill areas can sell in the plains and get their needs from the plains balancing or improving the balance towards their side by the greater income per unit of land. It is a tragedy that vegetables, poultry, eggs and so on which can all be grown or produced excellently in the hill areas are today imported in the various urban and semi-urban townships of the hill areas from the plains.

7.18 The approach that the Committee is suggesting need not necessarily mean that large amounts of food- grains have to be imported from the plains. In the Chapter on Irrigation in this report, the Committee has pointed out how the present potential for irrigation has not been tapped in the hill areas sufficiently. Both slope areas through the Kuhl system and many of the valleys with terraced lands can be covered by irrigation schemes based on the principles which have been accepted for the plain areas. If such irrigation is developed intensively, substantial tripling of crop can be done in the irrigated areas. With a high

yielding variety of foodgrains being used based on the research that the Commission has recommended, it is not unlikely that in the irrigated areas and in such of the dry areas where suitable foodgrains can be grown remuneratively, the hill areas can grow much more food than what they are doing today. Thus, the strategy will be to link up the increasing of the irrigated areas in the zone taken up for a change over to horticulture, pasture development, vegetable growing etc. What the Committee is recommending, is a package approach.

Horticulture

7.19 The hill areas offer a very good scope for growing of a variety of temperate fruits, off season vegetables, potato and other vegetable seeds, condiments and spices, floriculture, aromatic and medicinal plants and plantation crops.

7.20 The climatic conditions in the hill regions vary from place to place depending on the different factors like altitude, direction and slope of the land, distance from snow cover peaks, etc. Studies on agro-climatic and soil conditions of the hill regions reveal that these areas are quite capable of producing a large number of horticultural crops. The variety of agro-climatic conditions ranging from temperate transitional type to the sub-temperate and sub-tropical types makes it possible to raise many kinds of horticultural crops. Many fruits like apples, pears and cherries can be grown at elevations between 1,500 and 2,500 m., stone fruits like peaches, plums and apricot at elevations between 900 and 1,500 m. and in the sub-mountain regions upto 900 m. sub-tropical fruits like citrus fruits, guava, litchi, pineapple, papaya, pomegranate and grapes. In high altitudes with dry areas nut crops like almonds and walnuts, can be grown.

7.21 The impact that the cultivation of fruits and vegetables can have on the earnings and living conditions of the hill people has been demonstrated in some pockets in the hills of Uttar Pradesh like Ramgarh) as well as some areas of Himachal Pradesh (like Upper Mahasu and Kulu) and Jammu & Kashmir. In all areas where the economics of horticulture in terms of its higher pay-off is established high return from fruits and vegetables is inducing a change in the cropping pattern in favor of horticultural crops. Considerable parts of crop land in Nainital and Almora districts of Uttar Pradesh have been brought under horticulture. In that State intensive horticulture is proposed to be introduced in compact or continuous areas in the form of fruit belts or garden colonies in each of the hill districts.

7.22 Similarly, intensive horticultural programmes are being undertaken in the States of Jammu & Kashmir and Himachal Pradesh. In the former State under a special scheme, called the Horticulture Area Development Programme which is being financed by Agricultural Finance and Development Corporation, orchard areas are being extended in compact blocks in Kashmir. Under another scheme, viz, intensive Fruit Development Scheme, attempts are being made to increase the productivity of existing orchards by application of fertilisers, better agronomic practices, timely plant protection and improved methods of pruning. In Himachal Pradesh, the policy of the State is to popularise fruit growing at intermediate heights and in hills and encourage cereal production in the valley region. This in our view is the correct approach. Between 1965-66 and 1979-80. the area under all fruits has increased from 23,800 hectares to 103,000 hectares in Jammu & Kashmir and from 23,000 hectares to 84,340 hectares in Himachal Pradesh. In Uttar Pradesh hills, the area under horticulture crops at present is 200,000 hectares. Similarly, production of all fruits has increased considerably and the production during 1979-80 was 1,79,000 tonnes in Himachal Pradesh, 500,000 tonnes in Jammu & Kashmir and 230,000 tonnes in Uttar Pradesh hills.

7.23 An important problem in expanding horticulture in the hill areas is the difficulty of communications in the Himalayan areas making it difficult to transport perishable fruits quickly to the consuming markets. The problem of apple marketing has been solved in a very imaginative manner by Himachal Pradesh and is now being translated into action in the other States. Yet the problem remains for perishable fruits like peaches, plums and apricot and apples from remote areas which are not easily marketable in the Himalayan hills. Similar problems exist in the Western Ghats, in Coorg and other areas where horticulture is now prevalent, particularly citrus, papaya, grapes and so on. Firstly it is necessary to ensure that wherever active propagation of horticulture is being done as a remunerative replacement for the subsistence cereal economy care should be taken to see that a suitable marketing system can be run in these areas to remove the produce quickly to the marketing areas. Where communications are difficult or cannot be established before the trees come into fruition, other methods of handling the fruits so as to give a remunerative return to the farmer needs examination.

7.24 The horticultural development in the hill areas has not however, been balanced. It has, in fact been lopsided because the important components like post-harvest handling, market intelligence etc. necessary for the development of the industry have not yet been fully taken care of. Research in post-harvest handling, marketing and processing and so also infrastructure has not been able to keep pace with the extension of horticultural crops in the areas.

7.25 Furthermore, the productivity in the hills is very low. For instance, the average production per ha. of apple in India in 1979-80 was 5.17 tonnes. Similarly, the productivity of pineapple which is one of the most important crops of some areas of North Eastern region is less than 4 tonnes per hectare. Work done in some areas both in respect of pineapple and apple within the country has shown that productivity can be as much as 60 to 70 tonnes per hectare, low productivity is on account of low quality planting material and poor management of orchards. Due attention will be required to be paid to raising of high quality planting material only from the trees of outstanding merit within a variety if sound foundation for high productivity is to be laid.

7.26 Achievement of high productivity is not sufficient by itself. The grower must get incentive return so as to enable him to maintain the orchard properly. This is only possible if the post-harvest handling and marketing systems are modernised and streamlined. Marketing is a key to successful orcharding. The present system of handling and marketing is outmoded and out dated. The fruits are not picked at the right stage and maturity. These do not reach consumers at optimum taste and flavour. The standardisation of produce is lacking. There are no national standards for quality and size grades for most of the products. Packing cases are not available. Method of packing is poor leading to bruising. Transport system is inadequate, inefficient, expensive, time consuming and not suited to the requirements of perishables. Markets and methods of handling of consignments in the markets are outdated. The largest market (Delhi) of the country does not compare with a small time market in advanced countries in respect of handling facilities, efficiency of marketing operations, storage and tackling of offending wholesalers. Most of the produce is dumped in a few markets. For instance, Delhi gets 80% of production of apple of Himachal Pradesh and Jammu & Kashmir but consumes only 16%. The rest is purchased by middlemen and despatched to other cities. This is again repeated in all markets. System for despatching goods to consuming markets in accordance with their requirements has not been introduced and well understood. This causes temporary gluts in many markets and scarcity in others. Storage facilities are also inadequate

forcing the growers to carry the entire produce to the market immediately after harvest. All these and many other inadequacies in our marketing system result in deterioration of quality and poor gross returns.

7.27 On the other hand, marketing costs are comparatively high. For instance, cost of marketing of a box of apple in Himachal Pradesh in 1975-76 was about Rs. 20/- (16—18 kg). Transport and packing charges account for 44% and 37% respectively and the marketing charges (unloading, handling sales, etc.) 13%. There is thus a vast scope for reducing these charges.

7.28 Presently, all packing of fruits in the hills is done in wooden cases. The availability of wood will outstrip the demand in Himachal Pradesh in 1982 when it will be deficit by 4428 cu-meters. Similarly may be the position in other States, The requirements of wood for packing cases for apple alone is estimated to be 7.20 lakh cu-meter in 1985, 8.10 lakh cu-meter in 1990, 9.75 lakh cu-meter in 1995 and 11.40 lakh cu-meter in 2000. If this situation continues, firstly, the forests will be devastated and then Horticulture Industry will reach at a dead end by the end of the century. Introduction of alternative packing cases is, therefore, a must.

7.29 Corrugated card-board packing cases are available at Rs- 15/- per case. This apples cannot afford. There is an element of about 48% of excise duties and taxes on these cases. If these are waived off, CFB cases can be introduced on large scale. It may be mentioned that earlier the Finance Ministry had exempted pine needle packing cases from this duty.

7.30 Fruit preservation is now an accepted method for dealing with perishable fruits which are either located in areas with difficult communications or are heavily surplus during production period in spite of available transport. Fruit preservation which enables holding back of the intermediate produce either for a reasonable time to enable transport to final processing or even final processing itself gives the necessary relief to the 'farmer. The apple processing schemes in Jammu & Kashmir and in Himachal Pradesh are fore-runners of large scale expansion of this idea, Similarly, West Bengal has attempted processing of pineapple into concentrated juice in the Darjeeling hill areas and concentrates to be taken to the plains for dispensing in slot machines in the urban markets. Quite a lot of research work will have to be done as the best method of producing and preserving intermediate and the final products and the best containers for movement of juice, pulp, etc. without having recourse to the expensive metal box. system. The Committee would recommend that firstly research work in fruit processing and preservation should be carried out as a priority subject in the Agricultural Universities in the States where hill areas are important. Secondly, imaginative schemes for fruit preservation should be launched in time to take off all the fresh fruits in difficult areas and the fresh fruit during flush seasons in the regions where horticulture is being deliberately expanded.

7.31 The processing industry should be grower- oriented. It is not the case at present. It has been considered to be a luxury industry and has been subject to heavy taxation. This has shrunk the base for consumption and as such the grower is not at all benefited from this. For instance, a can of apple juice (850 gm) packed in Himachal Pradesh costs about Rs. 8.60. Out of this grower's share is 7.5 percent, excise and taxation 40 percent and the remaining is shared by retailers, whole-sellers, cost of cartons, spoilage, selling expenses, etc. Similar is the case in respect of all other products. This aspect needs consideration if consumption base is required to be enlarged. It is proposed that some minimum limit say 15 percent for use of

fruit juices in all soft drinks may be recommended. The incidence of duties and taxes should be reduced with the increase in percentage of juice in such drinks.

7.32 Instead of depending purely on perishable fruits, Himachal Pradesh has experimented with expanding the plantation of hybrid walnuts which mature quickly. In difficult areas for transport, an alternative horticulture would be of walnut trees and such nut trees where the nuts can be dried and transported at leisure. The various hill areas can examine their choice of nuts including exotic nut trees to be introduced into their schemes for this purpose.

7.33 Horticulture also requires heavy investment in the first year as well as during the long gestation period. This in itself is a disincentive for the proliferation. Horticulture, therefore, should be treated at par with the industries in the backward areas for the purposes of advance of capital and interest.

7.34 Horticultural Planning should be integrated covering all important aspects such as Production (production of planting material, orchard management, etc.), post-harvest handling, Marketing and Processing. All these should have a strong backing of Research.

7.35 Temperate vegetables can be grown best in the middle levels of the hill areas both in the Himalayan ranges and in the Western Ghats. The Nilgiri experiment of Indo German project shows conclusively now the farmers can be given a very remunerative employment and income from growing of temperate vegetables. In the hill areas many temperate vegetables like cabbages, carrots etc. which are anyhow grown on the plains can be grown in seasons when it is not possible to grow them in the plains. This marketing advantage is an additional factor for intensive vegetable growing in the hill areas. The Committee has already commented on the tragedy of urban and semi-urban centres of the hill areas of Uttar Pradesh having to buy their vegetables from the plains whilst there is excellent facility for growing the same vegetables in their area under irrigated conditions. Proper planning of the right type of vegetables for the various areas and the adjustment of the seasons to give them a scarcity value in the plains market in various seasons should now be taken up seriously by the Horticulture Administration of States. Along with the increase of irrigation providing for a tree crop routine in parts of the hill areas, introduction of vegetable growing in the crop routine will give greater remuneration to the farmers than following purely cereal routine. Further, special advantage in potato growing, particularly potato seeds and growing of vegetable seeds which can be used in the plains have already been commented upon.

7.36 Plantations are an important part of the economy of the western Ghats. As the country needs larger areas under the plantation crops such as tea, coffee, rubber and spices like cardamom etc., the various Plantation Boards are taking active interest in expanding plantation crops to new areas in the Western Ghats region. As a result of this drive rubber is being introduced in Maharashtra. Coffee and tea plantations are being increased through small farmers in the States of Tamil Nadu, Karnataka and Kerala. These facilities must be exploited to the full. Except for some green tea in the Himalayan region and tea plantations in Darjeeling, plantations have not come up in big way in the Himalayan hills in the Western and Middle parts. Some amount of research will have to be done about the possibility of plantation crops in these areas. The country has found new areas for planting tea, rubber, coffee and so on through the various Boards taking an active part on promotion and identifying suitable areas with suitable climatic conditions. This work should be done in a wider way in the Himalayan hills.

7.37 The Committee has already emphasised the needs for intensifying forestry plantations to cover the degraded forest areas and the civil forest areas in all the hill ranges. Forest plantations generally give the local population only a certain amount of employment in planting and guarding the government forests. In the civil forests, the usufruct is available to the villagers but this has got to be controlled. The local villagers can get direct benefit from a forest plantation programme if advantage is taken of the scheme for planting trees whose leaves are used for fodder in the areas concerned. In all the hill areas, the relevant varieties of trees will have to be identified for a tasar programme and for a fodder tree programme. As pasture and animal husbandry development is of special significance in both the Himalayan hills and the Western Ghats a fodder tree plantation will be of special benefit to the rural population. A plan scheme exists for giving the local villagers specific rights to the fodder trees or to the trees on which tasar can be reared with the right on the land still remaining with the Forest department. These programmes must be multiplied in the hill areas.

7.38 The hill areas provide good scope for floriculture. The need is to organise and expand production and marketing to make floriculture more lucrative. Research is already on and requires to be strengthened for the improvement of indigenous flowers. In respect of orchards, the production of new varieties and attractive hybrids and the proliferation of natural orchid flora are necessary. Creation of orchid sanctuaries should be encouraged in all the natural habitats and the regulation of exploitation.

7.39 Another direction in which the hill areas can specialise is aromatic and medicinal plants. Many of those are wild growth in the hill forests. Plantations are also found e.g. Cinchona in Darjeeling district.

Sericulture

7.40 The development and industrial activities in respect of sericulture are guided and coordinated by the Central Silk Board. The Committee would recommend that the Central Silk Board should explore the possibility of expanding sericulture extensively in the hill areas. Extension of tasar culture throughout the belt of the Himalayas should be vigorously pursued by the Central Silk Board. The principle which should determine the extension of moriculture is that it should not unnecessarily encroach on all other kinds of sericulture e.g. eri, muga in Assam or that tasar in Chota Nagpur and Orissa. All the States of the north eastern region and west Coast from Kerala to Konkan offer a great potentiality. The Central Silk Board should organise seed multiplication and distribution if necessary, by importing exotic strains. Sericulture has to come in the fields of agriculture if it has to be converted into a fully viable profession. The Department of Agriculture can deal with sericulture aspect up to the processing stage of cocoons- Short-term in service training to junior staff and familiarisation training of farmers and rearers should be introduced.

7.41 The hill areas offer good scope for development of different kinds of sericulture like mulberry silk, tasar and muga. Being a highly labour intensive occupation, their production can be an important source of MI or part time employment for small and marginal farmers and rural craftsmen. There is good scope for improving and extending moriculture (mulberry silk), in Jammu & Kashmir, Himachal Pradesh, Darjeeling district in West Bengal and several hill districts of Uttar Pradesh. Possibility also exists for taking up tasar culture, which is now largely confined to Assam, throughout the oak belt of the Himalayas. The development of tasar hybrid, which thrives well on oak, has production of high quality material. Similarly muga culture at present practised in Assam can be extended to other parts of the north eastern regions.

Apiculture

7.42 Apiculture, i.e. production, collection and marketing of honey and honey products, could be a useful subsidiary occupation giving supplemental income to the people in the hills. All the apiaries in the country are now being developed in the vicinity of forests or on the hills which are rich in vegetation. There is great scope for increasing honey yields through organised apiculture and coordinated efforts of the Department of Agriculture, Horticulture and Forests. In particular, the forest departments have a significant role to play in the protection of honey bees in the forest areas and developing forest trees as a source of bee fauna. Detailed survey of the vegetation of forests with regard to floristic composition should be carried out. Some beginning has already been made in Mahabaleshwar hills of Maharashtra, Kodaikanal, in Tamil Nadu, Karnataka, Himachal Pradesh and Jammu & Kashmir and active programmes for propagation of apiculture activities through necessary research, education and training should be taken up.

8. ANIMAL HUSBANDRY AND DAIRY DEVELOPMENT

8.1 A large part of the hill area population depends on livestock as the main source of earning. Livestock has attained great importance in developing hill economy so much so that it is an integral part of their life. The hill areas have a large number of livestock and poultry. Its distribution in various regions is shown in Annexure (VI). According to the distribution of the livestock population in the Hills of Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh, Cattle and sheep are more important. In the north eastern States, cattle, pig and poultry are more prominent. Cattle are the most important of all livestock species, maintained primarily for the purpose of meat and draught power. However, around the townships, cattle are kept for producing milk. Besides, milk and meat, they are supposed to provide manure for the fields as agriculture in hills depends on animal dung as manure.

8.2 Livestock rearing is of special significance in the economy of the people in the north-eastern regions. A large proportion of the population in this region as compared to many other regions of the country live in rural areas. The proportion of the rural population to total population ranges from 85% in Meghalaya to 96% in Arunachal Pradesh while the all-India average is 80%.

The area available for cultivation, however, is small in this region which is estimated to be only about 14% of the total reporting areas estimated around 2,270 million hectares. Of this area, over 70% is in Assam, 8% in Manipur and 7.5% in Tripura. The area available for cultivation in the other States is, therefore, very small. The rural people in general and the tribal population in particular rear livestock as an important source of food. For the people in this region meat constitutes an important item of their diet. Keeping domesticated animals and poultry has been a traditional occupation with the Mizos. Every Naga family in the villages rears livestock for meat. Mithuns are highly valued both as property and on socio-religious occasions by the tribal people in Naga-land and Arunachal Pradesh. The status of the family in these areas are determined by the number of mithuns offered in communal feasts. Consumption of beef and mithun meat is quite popular with the tribal people. Pig rearing is extensively practised in the area. As tribal people constitute 79% of population in Arunachal Pradesh, 88.6% in Nagaland and 80% in Meghalaya and since the life of these people is so much dependent on livestock, the importance of livestock development in this region cannot be over emphasised.

8.3 In the North-Eastern States, the livestock population, is fairly large which includes a considerable number of cattle, pigs, goats and poultry including ducks. The number of buffaloes is small except in Assam. The region being a heavy rainfall areas, sheep are scarce. The number of cattle, pigs and poultry per 100 human population is larger than that for the country. This difference is particularly marked in respect of poultry and pigs in Manipur, Meghalaya, Mizoram and Arunachal Pradesh. In regard to pigs the region is a high density area having about 16% of the country's pig population. This area has about 3.6% of the total poultry population of the country.

8.4 Despite large livestock population in this region, the local stocks are found to be inadequate to meet the current consumption requirements and there is large scale purchase of livestock, particularly pigs and, cattle from outside. Cattle from the plains are taken in large numbers to Meghalaya, Mizoram, Nagaland and Arunachal Pradesh. Similarly, there is large movement of pigs from Goalpara and Kamrup districts of Assam to Meghalaya through Gauhati. There is also some ingress of pigs from Burma into Nagaland and Manipur. It is

reported that this is one of the causes of occasional outbreaks of swine fever. It is understood that food articles worth nearly three crores of rupees are obtained by Nagaland from outside and about one half of the amount goes for livestock and livestock products. Similarly it has been estimated that about 9,000 to 10,000 catties costing six to seven lakh of rupees are purchased annually by the people of Arunachal Pradesh for meat purposes. In addition, bullocks in large numbers are also being bought every year by this State for cultivation purposes.

8.5 So far as Western Ghats hill region is concerned, livestock rearing is widely practised as a subsidiary source of income to the farmers and the plantation labourers. Grazing facilities on hill slopes, cool temperate climate and evergreen forests interspread with plantation crops offer, considerable scope for rearing different categories of livestock. Cattle and Buffalo' population in the Western Ghat hill region consists of non-descript types except in certain pockets where crossbred animals are found. Cattle rearing forms an important subsidiary occupation of the farmers and plantation labourers. The farmers in these areas keep cattle mainly on forest grazing. Grazing facilities and, cool climate are very favourable for rearing of cross bred animals. Crossbreeding work is already being undertaken in the States of Kerala and Karnataka. As early as 1963, an Indo-Swiss Project was launched in Kerala and a breeding cum research station was established at Mattupati in 1964. The objective was to undertake cross-breeding with a view to evolving a dairy breed of cattle and undertaking fodder production.

8.6 The hill farmers of Assam and the tribals of the States in the north-eastern region maintain cattle primarily for purposes of meat and draught power. Farmers, who are settlers from other areas and those around townships, however, keep cattle for milk production. Production and marketing of milk and milk products are not organised in these hill States. In Assam, steps have been taken to organise milk production in the Mikir and North Cachar hills.

8.7 Milch cattle are maintained in all hill districts of Uttar Pradesh. They are, however, poor yielders and are maintained mostly for the purpose of producing bullocks. The buffaloes which are generally of ' graded types are maintained for milch purposes. In Himachal Pradesh, milk supply schemes have been launched in potential areas like Mandi, Nahan and Palampur. A milk supply scheme has also been started for Simla. Under these schemes, milk cooperatives are being organised and loans are advanced to the farmers for the purchase of milch animals.

8.8 Gujjars, a nomadic tribe in Uttar Pradesh, move to the forests and pastures in the hill area of Uttar Kashi, Tehri Garhwal, Chamoli and Dehra Dun during summer months with their herds of buffaloes. After rains they start returning to the foothills, where they spend the winters. This practice of migratory grazing is also prevalent in Jammu & Kashmir and Himachal Pradesh.

8.9 Mixed farming would appear to be ideally suited for the hill areas. Mixed farming generally denotes a system, of farming combining field crop production with one or more of the enterprises like fruit and vegetable growing; raising cattle, sheep, goats, pigs and poultry as well as fishery, bee-keeping, sericulture etc. In mixed farming, the two main components viz. land and livestock act complementary to each other. Crop production provides besides foodgrains, feed and fodder for livestock, while the livestock provides milk, meat and eggs for the farmer. The growing of leguminous crop in crop rotation improves the soil fertility, help in soil conservation and thus ensures better land use. The dung, dropping and litters

obtained from livestock are useful as manure for building up soil fertility. The nutrients from the soil are taken up by crops to produce grains but only a small portion of these is returned to the soil. Through mixed farming this return can be assured to a larger extent. Thus in the mixed farming system of the land use, farm products and their by products are better utilised and fetch more income. Also the farm family labour engaged in mixed farming is employed gainfully throughout the year.

8.10 The practice of mixed farming not only varies from State to State but also- from place to place within the country, depending upon agro-climatic conditions, size of holding, availability of inputs and marketing facilities. No reliable data is yet available about the possible contribution which the rearing of, animals, sheep, goat and pigs and poultry can make to the economics of farming in the hill areas. In most of the studies/investigations carried out in the past, results have not been entirely free from bias or ambiguity. It is therefore necessary that detailed studies should be taken up in various agro-climatic hill conditions for determining :—

- (a) the minimum economic unit and type of the Livestock for each unit of holding for a specific situation;
- (b) the increase in income in a mixed farm that is attributable to livestock and other components; and (c) the extent of utilisation of potential farm, family labour and farm livestock.

8.11 In hill area particularly on the high ranges, where raising crops alone cannot provide sufficient income for the economic well being of the farmers, livestock rearing offers very good opportunities for improving their economic condition. Irrigation facilities in hill areas are inadequate. Cultivation is also restricted to sub-marginal lands. In the high ranges of Kerala State, the experience from the working of the Indo-Swiss Project has shown that improvement of cattle mostly owned by small farmers, through crossbreeding for higher milk production could go a long way in augmenting the income of the farmers in these areas. Efforts are also being made for improvement of grasslands in this region for ensuring better forage for cattle. Similar experience has also been gained in the areas covered by the Indpi-German Project in Mandi (Himachal Pradesh) and in Almora District (Uttar Pradesh). In the high altitude areas of the western Himalayan region encouragement should be given for rearing small stationary sheep flocks in the apple orchards in Himachal Pradesh and Jammu & Kashmir. Limited experience gathered so far has shown that legume grass mixture could be grown in the orchards for the maintenance of sheep. The jammu & Kashmir Government have already taken up a programme for sheep rearing as a supplementary occupation by farmers having small orchards. Pork consumption is quite popular in the tribal areas and in the eastern Himalayan region. In the latter, improvement in the quality of pigs has already been made to some extent.

Cattle and dairy development

8.12 Cattle including buffaloes are the most important domestic animals in the Hill areas. They are also very substantial in numbers. The economy is somehow maintained in spite of the difficulties in fodder supply. Technology has established that from the scrub cattle and indifferent milch buffaloes, through artificial insemination and use of exotic bulls and pedigree buffaloes, quality of cows and milch buffaloes, can be rapidly changed. Contrary to the prevailing impression, experience has shown that the cross-breed bullock is an efficient work animal and not in the least slower than the ordinary scrub bullock. Further, the complaint of the exotic cross-breed bullock not being able to stand the high temperature of

the plains as a scrub bullock will do, is not very relevant in the Hill areas where temperatures are tiniformally lower than in the plains. The experience of Nepali cow-breeders round about Shillong in Meghalaya has shown conclusively that very high percentage of exotic breed can be introduced as the cross-breed and the animals thrive well in the Hill climate. In Shillong cows giving 30 litres of milk a day is not a rarity. For improving the economics of the Hill areas and the families therein, the obvious attack should be on improving the quality of the cows and buffaloes by cross breeding and by improving the milch quality of buffaloes. The crossbreed good milk yielder cow or a good 'cross-breed work bullock will consume more fodder per day than the scrub cow or bullock now maintained by the hill people. Already, due to over-grazing of the common pastures, the average family spends a lot of time getting fodder for their animals. So before we can opt for an aggressive programme of cattle development, the initial move should be to develop fodder and develop the hill pastures.

" 8.13. The problems of the N. E. Hills will be dealt with in detail in the special report on the North-Eastern region. In this report, other Hill areas of the country are being examined. In the Himalayan Hill areas land holdings are miniscue and common pastures have been badly over-grazed. The nomadic cattle and sheep breeders have further encroached on the village pastures after having overgrazed their traditional pastures. Fodder that will be available from the small land holdings will not be very significant in the cattle development programme, though some attempt to utilise the off-season for fodder development will be of benefit to the family. The common pastures have to be rapidly brought back to massive production according to land potential. Jammu & Kashmir introduced several exotic clovers in their common pasture and especially in the Alpine pasture with significant advantage. This methods should now be spread to the Hill areas of Uttar Pradesh, Darjeel-ing, Sikkim and Assam. For good effect, pasture should be closed for grazing in a rotation and given a year atleast to recoup. After that, rotation grazing should be enforced. As additional boost to growth, an initial fertiliser application for the legume grass mixture is necessary. The experiment of Jammu & Kashmir in fertilising their pastures can be carried out on a war footing in much larger areas. Whilst the initial expenditure may look prohibitive from the ordinary standards, as this will lead to the cattle revolution and sheep revolution ultimately in these areas and boost the annual income of the families, the initial investment is worthwhile and is strongly recommended by the Committee.

8.14 In the Himalayan ranges, nomadic cattle breeders and sheep breeders are the traditional part of the community. Whilst a large part of these nomads are engaged in continuous mobility from the winter pastures to the summer pastures, the village cattie and sheep also, particularly, the latter, move bi-annually with some member of the family going with the sheep or cattle to the summer pastures. Nomadic husbandry is a very essential part of the hill economy. Improvement of cattle and sheep has to be done in the nomadic popualtion also if there is to be general uplift. For this, two essential initial steps have to be taken. Firstly, the summer pastures in the Alpine hills will have to be fertilised and sown with Legume grass and high quality rotation grazing principle instituted. Secondly, on the seasonal migration routes, at least a couple of kilometres from the main route on either side will have to be intensively developed for fodder, so that the nomadic movement does not impinge on the traditional village pastures. Both these are priority issues and the Committee recommends that improvement of nomadic pastures and the traditional paths should be taken up on a priority basis.

8.15 The forest areas—both reserved and common in these hills now contain large areas of degraded forests. Elsewhere, the Committee has recommended a very active Forest Policy for

rehabilitation or these areas for commercial and social forestry. This requires new plantations. Our objective in plantation being to give a cover to the land against soil and wind erosion till the new plantations provide complete canopy over the land, the land continues to be liable to erosion till the canopy develops completely. During this period as a necessary part of the social forestry and for soil conservation the land has to be covered by a pasture of Legume and grass which are quick growing. As the degraded forest areas are very large in these hills, systematic action on these fines will give substantial additional fodder reserve for the village cattle and sheep. Suitable rotation grazing for the cattle and sheep of nearby villages and allowing harvesting of fodder for storage for winter will have to be built into the system. Further, the prevailing practice in the Hill areas is to use the leaves of trees like willow as fodder. As the social forestry programme includes growing of fodder trees on degraded forests, systematic building up of degraded forests near cattle and sheep concentration with trees fit for leaf fodder will go a long way towards improving fodder availability.

8.16 Over and above all this, the experience of the Indo-German Project at Mandi and Almora shows that milk production and cross breeding can be stepped up in pockets for commercial milk Schemes under present conditions. An aggressive crossbreeding programme can succeed only when artificial insemination can be done promptly on the heat of the village cow and there is a nearby market for the fluid milk that the cow gives in daily lactation. In the hill areas, because of the difficulty in communications, both these necessary adjuncts to the programme of improvement are difficult. So, the development has to be selective. The villages should form a cluster within easy reach of a focal centre where the artificial insemination centre can be located. The centre should be suitable collection centre for milk on a reasonable road for motor transport to reach there for collection daily. The committee, therefore, recommends that as a first step in the above direction, such clusters should be identified in the block and steps taken to :—

- (i) build an A. I. Centre based on frozen semen technology at the focal centre at the clusters and follow the B. A. I. F. pattern of mobile Inseminator-cum-Doctor at the Centre;
- (ii) study the fodder situation in the area and use of the methods explained above to start the cross breeding programme of cattle or sheep with the necessary fodder bases; and
- (iii) provide for the milk collection and use in a suitable milk scheme.

8.17 The experience already gained in the approach of BAIF for elective clusters, cattle development in Western Ghat, (Indo-Swiss Cattle Breeding Project) Indo-German Cattle Project Almora, as well as entrepreneurs of Nepalese cow breeders in North Eastern Region should also be utilised for developing the entire area having comparable terrain and other agroclimatic conditions.

8.18 There is considerable scope for developing milksheds in the hills of Kerala (Cannanore and Quilon) and Maharashtra (Ratnagiri, Satara, Poona and Koihapur districts) and we recommend that this potential should be suitably exploited. The farmer should be encouraged to rear cross breed heifer upto the age of bearing so that these could be sold to milk sheds areas in the plains, giving an annual income to the breeder.

Sheep Stock

8.19 Sheep rearing is one of the main occupation in the hill areas of Uttar Pradesh, Himachal Pradesh and Jammu & Kashmir. Sheep rearing for wool and meat is an important

industry especially in the border districts of Uttar Kashi, Chamoli and Pithoragarh in Uttar Pradesh where a large number of sheep is found. Sheep are at present maintained on high alpine pastures by professional shepherds. But the industry is not organised in regard to marketing, spinning and weaving. In Himachal Pradesh sheep rearing is mainly for wool production and constitutes a major source of income to the sheep breeders. The State is, however, contemplating the introduction of dual type breed for wool as well as mutton in selected areas. Sheep rearing is the only source of living for migratory sheep breeders. During winter, their sheep flocks migrate to the lower hills. Sheep rearing for wool and mutton is also an important activity in the hill areas of Jammu & Kashmir and is in the hands of the most backward classes like the Bakerwals, Gujjars, Gaddis and other nomadic tribes. They maintain the sheep flocks mostly on migratory basis. Because of the constant movement of sheep over long distances with uncertain grazing and stock watering facilities, sheep owners are unable to adopt scientific methods of breeding for genetic improvement of stock. Shearing of sheep in distant places and sale of wool at far away markets do not give them any chance for organised collection, processing and marketing of wool and the sheep breeders are unable to bargain for remunerative price. The State Animal Husbandry/Sheep Departments should set up service centres on the migration routes and take up a systematic and integrated programme of shearing, grading and marketing of wool to alleviate the difficulties of the nomads. In Himachal Pradesh, the Khadi Boards and the Handicrafts Corporation and the State Governments have recently set up wool collection centres along with the migratory routes of sheep. There is no organised sheep rearing for wool or for mutton in the hill areas of north eastern States except in Arunachal Pradesh where sheep rearing for wool is a traditional practice with the Mompas of Kameng district.

8.20 The climatic conditions in the Western and Central Himalayas offer very good scope for sheep development. Sheep breeding farms have been established in these areas for breed improvement and the number of cross-breed sheep available is gradually increasing. For the maintenance of sheep, adequate grazing lands are required. The situation is, however difficult in the hill areas in the northern regions. In Uttar Pradesh, it is difficult to increase the sheep population due to the limited grazing land available. Intensive sheep rearing is possible if pastures are developed for regulated grazing. There is also prospects of maintaining sheep in orchards where nutritious grasses can be grown. In Himachal Pradesh such a programme will help sheep development. However, as it is, the hill pastures are the only source of fodder for migratory as well as stationary flock of sheep. In Jammu & Kashmir pastures are overburdened with an excessive livestock population which is one of the important factors for their low productivity. There are approximately 8 heads of cattle or 30-45 sheep per hectare of pasture land. Overgrazing also gives rise to the problem of soil erosion.

8.21 Sheep rearing is both nomadic and stationary. In Jammu & Kashmir, villagers maintain a large number of sheep in each family and during winter, a part of them are kept in the village and fed on dry fodder which is gathered during the summer. The rest are sent out with the village folk to the winter pastures. The first essential requirement for improvement of sheep quality is, therefore, the improvement of the village pastures and the Alpine and winter pastures. This has already been discussed under the pasture development for cattle. Wherever sheep concentrations are available in the Hill areas, pasture development on the same principles should be carried out in the vicinity over common pastures forest areas and migration routes. Detailed planning should identify these pockets for development and systematic introduction of cross-breeding, sheep shearing through modern practices and wool marketing should be organised simultaneously.

8.22 Goat rearing is an important subsidiary occupation in the region. However, the practice of letting goats loose in the forest areas should be discouraged as this special, due to its browsing and acrobatic habits, causes immense damage to growing plants. We are not in favour of increasing the number of goats in this region but their quality must be improved to get more milk and meat. Pashmina and mohair are in great demand by cottage industry as well as in the foreign markets. Increase in their production will considerably improve the economy of the concerned regions.

8.23 The hill region in the South is not very favourable for sheep development due to heavy rain fall and humid climate except in a very few selected areas. In Tamil Nadu, the Nilgiris breed which has been evolved by crossing indigenous hill breeds with exotic breeds like Cape Merino, South Dane and Chevoit produces fine wool. In Kodaikanal, there is a sub-centre of the Central Sheep and Wool Research Institute where extensive cross-breeding with exotic wool breeds is being undertaken. Since sheep, excepting in these pockets, grow very little wool or no wool, it is suggested that measures should be taken for augmenting meat production in areas where sheep can be reared. Special attention has to be paid to increasing the number of the local Red Sheep whose pets are high priced in the better market.

Poultry

8.24 There is good potential for development of poultry in the hill regions since the demand for eggs specially that for meat is substantial. The type of poultry keeping, however, has to be tailored accordingly to level of management practices available. In most of the hill areas intensive system of poultry keeping may not be the best practice of poultry farming as the prices of ready to use compounded feed are comparatively higher in hill areas compared to that in plain areas. However, there is a good scope of growing tapioca (cassava) in hill areas and this can comprise a major component of poultry feed and help rearing poultry at a comparatively cheaper rate if casava can be grown and utilised in large quantity. In hill areas where some locally grown grains can be fed to poultry, certain minimum health coverage can be given and night shelter can be provided, rearing of crossbreeds (crosses between two exotic breeds, viz. crosses between white Leghorn males and A ustralorps or Rhode Island Red females) is recommended. The males of crossbreeds can be profitably sold for meat purpose at 16 to 18 weeks of age. Thus by rearing cross-breed birds, the farmers can get some financial return right after 16 to 18 weeks. In the areas where the poultry rearing is purely backward operation, it is necessary to improve the quality of local birds by crossing them with exotic-crossbred male birds. In this operation, the males of indigenous breeds should be completely replaced with that of exotic /crossbred at a time. However, in these areas also minimum health coverage programme has to be provided. There is also very good scope for introducing improved duck rearing in some of the North Eastern States. The cross-breeding programme (crossing of indigenous females with exotic khaki combell males) has been successfully taken up on pilot basis in Tripura and Assam. This programme needs to be intensified.

The National Commission on Agriculture in its interim report on poultry, sheep and livestock have identified the districts and also the measures necessary for development of poultry in north eastern States and other hill districts. The Committee recommends that these measures should be taken up earnestly and vigorously.

Piggery

8.25 Pig rearing, which was introduced in Himachal Pradesh and in Chamoli and Pithoragarh districts of Uttar Pradesh has 'not made much progress. A small unit at Paonta, Sirmur district in Himachal Pradesh is functioning. The unit' in Chamoli has been closed down for lack of interest, but that in Pithoragarh is working. The economy of pig farmers can be improved and more meat made available for consumption if "cross bred stock would be i'ntrouced in field programmes. An integrated programme of piggery development which envisages the setting up of farms with cross bred pigs and improved pig managements practices could be taken up in rural areas. However, marketing of the potential needs careful consideration. Regular supply of cross bred pigs for field programmes depends mainly on Government pig breeding farms. In the case of Himachal Pradesh pig breeding farm is not operational. Such basic lacuna need to be attended to. In other areas suitable steps for strengthening of existing Government pig breeding farms are desirable keeping i'n view likely demand for field programmes. The problem of higher cost compound pig feed piggery Development Programme are higher cost of pig feed and marketing of pigs at remunerative price. The problem of higher cost compounded pig feed could be solved to some extent by use of agricultural waste and agricultural bio-products. Necessary advice to this end could come from Agricultural Universities. Meanwhile compounded pig feed could be subsidized. This subsidy may be related to the performance of individual farms. The other difficulties of marketing pigs at remunerative price could be overcome by organising cooperative societies of primary pig producers and by forceful efforts for making pork popular.

Livestock Health

8.26 Provision of efficient health service is necessary in the hilly terrains for successful implementation of livestock production programmes. In view of the difficult terrains mobile veterinary units should be established in order to cover remote areas. It is necessary to strengthen disease investigation facilities in these regions. The hilly terrains are largely free from rinderpest. Hence entry of unvaccinated animals should be prohibited. For this purpose rinderpest check posts should be set up on important cattle movement routes entering such terrains. It would be necessary to protect valuable exotic and crossbred cattle against foot and mouth disease (FMD). Since the FMD vaccine is costly it would be necessary to subsidise it suitably for the benefit of the weaker sections in these areas. The FMD virus typing / epidemiological centers of the ICAR's coordinated project on "Epidemiology of Foot and Mouth Disease" should prepare maps showing prevalence of various types of FMD virus in the hilly regions, with a view to explore the possibility of evolving a monovalent vaccination programme there. Fasciolis is immature am-phistomiasis, shistosomiatis, verminous pneunomia, hump sore, and other parasitic infestations are common ailments in the Hilly tracts. Provision of adequate stock of medicines would be necessary for combating these diseases. Drenching of anthelmintics to migratory flocks of sheep should also be undertaken. The hilly regions are largely free from Marek's disease. Hence birds to be supplied in these regions should be drawn from Marek's disease free flocks. The duck population must be protected against duck plague. Among pigs, swine fever is most important in the North-Eastern Region. Therefore, it would be necessary to protect the pig population of this region against this disease.

9. FISHERIES

9.1 In the high altitudes, there is potential for development of cold water fisheries. The water resources for fisheries development in the hill areas are mainly the streams and lakes wherein the indigenous varieties of snow-trout and mahseer abound. In some of the States, trout has been introduced as sport fish and common carp for commercial culture. Before Independence, its efforts to develop fisheries were confined mainly to sport fishing but, of late, attention has been given to commercial aspects as well. Presently, the local production is considerably below the demand, the markets are supplied with dried fish from the coastal regions. Considering the demand for fish from the local population and also as an added attraction for tourists, hill areas offer good scope for the development- of fisheries—both for commercial and sport purposes.

9.2 The water resources for the cold water fisheries development in the high altitudes of southern hills are also mainly streams and lakes wherein mainly the (rainbow trout abound. Main areas are streams in Munnar high ranges in Kerala and Nilgiris and Kodai- kanal hills in Tamil Nadu. As problems for the development of cold water fisheries are identical both in the northern and southern hills, the steps suggested for improvement of fisheries in the northern hills are equally necessary for southern hills.

9.3 Fisheries in streams and lakes, situated in high altitudes regions of the country, comprise indigenous fishes chiefly the mahseer, the snow-trout, and the exotic species mainly of the trout. Until recently, the developmental work in cold water fisheries was directed towards establishing trout fishery which is the most popular sport fish in the world. There has, however, been growing realisation for developing indigenous cold water fisheries.

9.4 The water resources in the high altitude would continue to be mainly the cold streams and lakes. However, in low regions, many ponds, tanks and 'beels' will have to be suitably reclaimed for developing culture fisheries of major carps. Reservoirs too can be profitably exploited. But emphasis has to be on intensive pisciculture practices.

9.5 In the lower regions, culture of Indian major carps, Chinese carps and European common carps would be considered. The technology is fairly well- known and there should be no difficulty in implementing this scheme.

9.6 There seems to be distinct scone for introducing grass earn in some of the weed infested lakes in high altitudes. Such a measure besides resulting in increased fish production could also keep the excessive vesetation under check.

Trout Fishery

9.7 Success in establishing in the country both in the north and south was achieved around 1905. In the snowfed north Indian trout streams, comprising about 1020 km. in Jammu & Kashmir, and 250 in Himachal Pradesh, it is mainly the brown trout (*Salmo trutta fario*) which provides the sport. In the spring-fed south Indian trout streams of about 34 km. in trie Munnar High Range in Kerala, 70 km. in Kodai Hills and 8 km. in the Nilgiris in Tamil Nadu, it is mainly the rain trout (*Salmo gairdnari*) both, 'shasta' and Arrideus' strains, which provides sport.

9.8 There is very low intensity of natural recruitment in trout because of low fecundity of females, specific requirements of a substratum for digging the nests or 'redds' limiting the spawning locations, long incubation periods etc. They have to be extensively propagated all over the world, by artificial fertilisation and rearing the fertilised eggs to fry stage in hatcheries and then releasing the young ones in the streams.

9.9 In recent years, there have been improvements in other countries in hatchery-operations. These involve incubator devices having the advantage of using small volume of water at controlled temperature for either accelerating or retarding the rate of development of eggs as desired, and supplying balanced dry feed and for getting the maximum survival of fry. As against these developments in other countries, the hatcheries located at different trout farms in India, established since the time of introduction of trout, continue to operate without any device for controlling the temperature of water. This has resulted in exposing the fertilised eggs to unusually longer periods of incubation, thereby increasing the exposure of developing stages to various diseases, resulting in considerable mortality. Added to this is the continuation of the old practice of giving an unbalanced as well as expensive diet, comprising egg-yolk, liver and silk-worm pupae to the fry and fingerlings, which results in a very low rate of survival of the young ones. This very much reduces the stocking necessary to maintain the trout population in the existing trout streams. ICAR have, already carried out lot of research in regard to innovation of fisheries practices, artificial feeding of trout, and cultural possibility of snow trout. These have already been published. It is essential that the States take energetic steps to introduce innovations in hatchery practice and developing artificial feeds which would assure higher survival of the young trout.

Mahseer Fishery

9.10 Mahseer stocked in confined waters in hilly areas have been known to fare well. The recent success in their artificial breeding and in rearing the fry under controlled conditions has indicated the possibility of seedfish production of mahseer for undertaking cultural operations. It comprises to the trout which requires sophisticated arrangements for seedfish production, the conditions required for mahseer are much simpler with a considerably shorter incubation period and greater chances of securing better survival of seed-fish. Detailed studies on food and feeding habits of the different species of mahseer are required to be undertaken so as to find out the necessary artificial feeds and conditions of culture under different temperatures. CIFRI is already engaged in such studies. Success in mahseer culture in hills has a great potential in providing sport fishing in tourist resorts. Besides, the egg of mahseer are of a size comparable to caviar which is a world renowned gourmet food and the possibility of utilising mahseer eggs for caviar, could also be examined. As regards caviar, the present world trade of caviar is almost exclusively on sturgeon, mainly got in the Caspian Sea. In India, we have made some preliminary attempts in preparing caviar out of other fish eggs but we have not been successful so far. While this work could continue, prospects of using Mahseer eggs for this purpose appears remote.

Snow Trout Fishery

9.11 This indigenous fishery consists of the various species of the general schizothora and Oreinus and is mainly prevalent in the streams and lakes situated in the Himalayas at altitudes ranging from 1400 to 4,000 metres. Fishing is generally undertaken by cast nets. It has been reported that after the introduction of the mirror carp, *Cyprinus carpio* var *specularies* lac, the indigenous fishery of the snow-trout has been considerably affected. This needs detailed investigations. The ecology and fishery biology of the species comprising the main fishery of

the snow-trout should be studied with a view to improving the indigenous fishery. The cold water Fisheries Research Unit of the CIFRI has identified the localities for the collection of seedfish of snow-trout. It is, therefore, suggested that cultural possibilities of snow trout should be explored by the concerned States in the waters of the western, central and eastern Himalayas.

9.12 The Committee would strongly stress the importance of availability of scientific data in respect of ecological and biological conditions, the absence of which greatly hamper the development of fisheries in-hill areas. There is also need for hydrographic surveys of water areas suitable for pisciculture. Training of officers of fisheries in the techniques of cold water fishery is equally important.

10. RURAL ELECTRIFICATION

10.1 The importance of rural electrification in the development of the backward hill areas is so obvious that it hardly needs any emphasis. Considering the present critical situation of the availability of kerosene oil and diesel oil and also the need to preserve our precious forests in the hill areas, it is essential to spread electrification in the hill areas to the maximum extent possible not only to reduce the dependence of the hill people on kerosene for lighting purposes, but also to persuade them to give up to the extent possible, the use of fuelwood and Diesel Oil as energy base. Electrification is equally important for development of agro-based and cottage industries in the hill areas.

10.2 Despite the fact that the hill areas particularly, the Himalayan region, possesses immense hydro electric potential, the programme of rural electrification in the hill areas, specially in the North Eastern region, has been rather unsatisfactory for a variety of reasons. It has been estimated that the hydro-electric potential of the Himalayan region within the country alone capable of technical and economic development is around 53% of the hydro-electric potential of the entire country. This estimate includes only major sources. It does not include enormous possibilities of small and micro-hydro development in this region. In the southern region also, there is considerable potential for development of hydro-electric programme from major sources. Hill streams also offer considerable scope for the generation of cheap hydro-electric power for local uses. The Table below sets out the progress of village electrification in the hill areas:

Name of the State	Total No. of Villages	Village, Electrified (30-6-1980)
Jammu & Kashmir	6,503(.) (b)	4,532 (.) (b)
Himachal Pradesh	16,1916	9,193
Hill districts of U.P.	15,260	3,610(d)
Darjeeling district of West Bengal		536 —
Arunachal Pradesh		
Nilgiri District of Tamil Nadu Ghat Talukas of Kerala Ghat Talukas of	2,912,	263(c)
Maharashtra	Data not readily available	
Ghat Talukas of Karnataka		
Sikkim	215(a)	53(a)
Nagaland	960	334
Manipur	1,949	322(c)
Tripura	14,727	780

10.3 The benefits of major hydro-electric projects undertaken in the hill areas, while having an essential nation-building role, as at present planned and executed, have not been very significant to the local people in terms of power consumed or utilised in the hill areas. But it must be conceded that wherever major hydro electric projects have been constructed in the hill areas, the local population has been able to avail of some employment opportunities but not as much as a planned approach can deliver. It is, therefore, suggested that while planning big power projects in the hill areas adequate safeguards would need to be taken to protect the environments on the one hand and the interest of the local population on the other

hand by providing greater opportunities for job employment in order to improve the economic conditions of the rural people.

10.4 The approach in regard to the electrification of the hill areas has necessarily to be based on the principle of 'growth point' development so that the concept of rural electrification could ensure an integrated rural development programme. Rural electrification programmes should not only cater to domestic/light requirements but should also cover pumping projects service connections for commercial purpose agro-based industries, village, tiny and cottage industries. This approach would not only improve the viability of the rural electrification schemes but would also contribute in improving the economic lot of backward hill area people.

10.5 A number of steps have been taken in the past to improve the spread of electricity in the rural areas. The Revised Minimum Needs Programme envisaged a minimum coverage of 60% of village electrification by 1990. In the hill areas, particularly the north-eastern States, the terms, conditions and viability criteria in respect of RMNP schemes have been some what relaxed. The norms laid down by the Rural Electrification Corporation for electrification of backward areas have, we understand, been made applicable in some parts of the hill areas. The Committee would strongly urge that the norms for rural electrification in the hill areas should be relaxed to the maximum extent possible, considering the pattern and the situation prevailing in the hill areas, normal norms cannot be applied if rural electrification has to make a real head way in the hill areas.

10.6 There are certain hill areas in the country where the conventional method of extending power supply by construction of transmission and distribution lines is not feasible on account of topography, terrain and local conditions. In such cases on site diesel sets and micro-hydel generations has been restored to meet the local demand of the areas. Both Himachal Pradesh and Uttar Pradesh have achieved considerable progress in setting up of micro-hydel stations in the hill areas. An ambitious programme of setting up small micro-generation schemes in the North-Eastern States is also under way. Other main problems in the spread of electricity to hill areas arise on account of their special problems like soil conditions, land slides, difficult terrain, high range of temperature variations etc. which need special design and technical parameters for the power transmission and distribution lines and equipments. Use of wooden poles which are largely available with proper creosoting agent should be encouraged more vigorously in place of conventional steel tubular or rail type poles.

10.7 Specific area programmes should be chalked out for utilising the existing spare capacity available at respective transformation sub-stations/micro-generation stations. Realistic Integrated Area Development Programme be chalked out in certain pockets, which should take care of development of small/medium industries (including cottage and forest based industries), tourism, horticulture, fisheries, poultry health and sanitation, education and water supply, etc. The power development programme should be so framed so as to meet the time bound requirement of electricity demand in these pockets.

10.8 Whatever measures be taken, the cost of supply and distribution of electric energy in rural hill areas would be abnormally high as compared to the plains. If the commercial angle with a view to obtaining a reasonable return on the investment made is applied, very few schemes in the hill areas would get justified. However, the backwardness of the region calls for building up of infrastructure for future development of the areas and a special tariff for electric supply in these areas should be framed, keeping in view the social objective of developing the area and reducing the cost to the extent possible by using cheap material and

methods, some of which have been advocated earlier. The emphasis should be on taking up small micro-hydel projects for which there is considerable scope in these areas. It would be in the national interest to subsidise the power tariff as the increasing use of electricity by the villagers would prevent deforestation also.

10.9 There is also considerable scope for undertaking extensive programmes for rural forestry and of bio-gas plants depending upon the availability of cattle. In this context, there is also need for research on the economic possibilities of solar energy in the hill areas. Recently, some work has been done in this regard and a small experiment has been attempted in the Leh region where a complex of houses and other facilities are being provided power through solar energy.

11. Tourism

11.1 Natural beauty and salubrious climate are two of the most natural assets of the hill areas, and all over the world these have been exploited systematically to boost the economy of such areas. It is true that tourism has been a major factor in the break-through process of many Alpine countries of Europe (Switzerland, Austria and Bavaria), in so far as it has acted as an agent of economic change. It is equally true that the most backward regions offer enough the most exotic resource-bases for attracting tourism. We have, however, to remember that barring exceptions, we are dealing in this report with the development of the backward hill areas.

11.2 Most efforts made by the State and Central tourist organisations have so far concentrated on promoting tourism for the richer sections of the community, whether local or foreign. The Committee would like to point out at the outset that while these efforts should continue, a new orientation would have to be given to the development of tourism which should specifically aim at development of tourism in the backward hill areas and give an opportunity for the large mass of middle level domestic, potential tourists. As things stand today, the benefit of the present tourist traffic, by and large, is confined to a few already Well- developed and advanced pockets in the hill areas. This, in turn, creates a feeling of dissatisfaction in the other hill areas which provide, if not more, as good beauty spots as the existing ones.

11.3 The Committee would, therefore, like to emphasise that the decision for formulating appropriate policies should be taken keeping in view the need for developing the backward hill areas and providing opportunities' for the middle level tourists and keeping the common man in view so that all the developments and economic activities arising out of the promotion of tourism are focussed on his overall benefit.

11.4 Obviously, this objective can best be fulfilled by promoting domestic tourism at modest cost and attending to that minority of foreign tourist who travel on a shoe-string budget and would settle for any place which is cheap and comfortable. Most of the hill areas are trekkers paradise. The majesty of the snow clad peaks, mystery of glaciers, magnificence of hill rivers, meadows covered with flowers, camping under starlit sky are things that not only make the soul come " alive but provide a good retreat in salubrious surroundings to come back refreshed. Trekking and mountaineering are two of the most important activities which cannot only develop the economic conditions of the poor hill people in the backward area but also provide a spirit of adventure in our youngsters. The next important type of traffic from our point of view is the pilgrim traffic. Lakhs of people visit Badrinath, Kedarnath, Gangotry, Yamnotri, Amarnath, Vaishno-devi and such centres and quite a large number cannot make it to these places because of lack of facilities and inadequacy of transport services. If past trend is any indication, the number of pilgrims, given improved facilities, is likely to increase by leaps and bounds.

11.5 What are the essential ingredients necessary for developing domestic type of tourism which would help in picking up of the economy of the backward hill areas. An integrated view of civic amenities, lodging and boarding and other facilities as well as encouragement of subsidiary occupations like poultry farming, dairying, growing of fruit and vegetables, manufacture of souvenir, etc. would have to be brought about for the purpose. Such an integrated approach, encompassing an integrated development of various activities, with reference to each other, would not only lead to dispersal of tourist activities and its attendant

economic benefit but also would be a step towards the improvement of the economic conditions of the common man residing in the backward hill areas.

11.6 The State Tourist Development Corporations should play an active role in the development of the super-structure of tourism as well as the basic infra structure such as adequate and regular supply of water and electricity, surface transportation to reach the various centres, public health and medical facilities, etc.

11.7 As a first step towards the promotion of this tourist traffic, each State must identify the yatra and trekking routes. It is equally essential to bear in mind the travel circuit concept. A number of domestic tourists visit hill stations for a holiday and undertake excursion to other centres in the area. Hence, it is desirable that travel circuits radiating from specified centres are identified for developing tourist infrastructure in an integrated manner in the area. This exercise will help in developing tourist facilities in a planned and regulated manner.

11.8 After carrying out the above exercise, the State Tourist Development Corporation and other tourist agencies in the State, should make conscious efforts in close association with the State Educational Institutions to encourage trekking and mountaineering on a group basis in our educational institutions.

11.9 As mentioned earlier, there is considerable scope for development of pilgrim traffic to the well known pilgrim shrines in the hills, which are available in abundance, particularly in the Himalayan hills. If the concept of travel circuits is kept in view and adequate publicity is organised, accompanied with the necessary arrangements for the basic needs, the pilgrim who are out on pilgrimages would be tempted to visit other hill stations in the travel circuits so identified.

11.10 Pilgrim centres are at present awfully lacking in adequate accommodation and other facilities. It is true that, of late, the State Governments are taking active interest in developing proper facilities at the more popular pilgrim centres but even today, by and large, majority of the facilities available in these pilgrim centres are those provided by philanthropist and charitable institutions. The example of Tirupati and Guruvayoor where income from the temples is utilised for providing adequate facilities and development of these centres is worth emulating in the northern hill area shrines. Necessary legal and other measures be taken if necessary on the lines of what has been done at Tirupati and other such centres in South India.

11.11 Barring some of the important tourist centres like Srinagar, Pahalgam, Gulmarg, Nainital, Mussoorie, Darjeeling etc., there is very little accommodation available in other places where tourists can come and stay. Most of the accommodation available is in the form of P.W.D. and forest rest houses which are not always available to the tourists. On yatra route as "distinct from Yatra Shrines, refer to earlier what ever accommodation is available has generally been provided by private philanthropists. Recently, some accommodation has been constructed by the Government but this is at present neither adequate nor satisfactory and can be utilised in the case of emergency only. Initiative for providing cheap and suitable accommodation on identified yatra and trekking routes should be taken up in a coordinated manner by the State Tourists Development Corporations.

11.12 A more liberalised policy will have to be followed in the matter of offering accommodation in the P.W.D. and forest rest houses to the tourist and in many cases, it may also be desirable to set up annexes to rest houses, and camping sites within the compound of

the main rest houses to that tourists can use the common facilities provided there. Apart from ensuring that these are kept reserved for the genuine tourists, it may be necessary to organise them at reasonable standard and at reasonable cost for tourist by providing common cooking and serving equipment and some imprest funds with the local officials or chowkidars of these guest houses to get provision in advance. Most of the tourists find it very cumbersome to carrying their cooking utensils and crockery to the hills. Provision are difficult to get at short notice.

11.13 In Kashmir, where an experiment has been tried to clear the ground and provide tents, people prefer to stay in camps provided the rent is not too high and other common facilities are available. Development of such sites with proper facilities of power, water and basic hygiene may be considered.

11.14 There is considerable scope for encouraging private individuals particularly the ex-servicemen and such of the educated youngmen who have migrated outside the hill areas, to take loans and construct suitable accommodation for this purpose. Norms could be laid down for these private persons and preconditions of licensing could also be imposed on the loaners before institutional loans are made available. This will of course involve a basic change in the present lending policies of banks and financial institutions. More and more youth hostels should be provided.

11.15 Mere provision of and other facilities would in itself not be adequate. Their pro- per maintenance is of utmost importance. The State Tourist Development Corporation should be specifically entrusted with this responsibility and it should be its duty to ensure that whatever facilities are created, in the identified centres and routes and by whom soever they are created, they are properly maintained and run if necessary, the Corporation should be given adequate powers to enforce this discipline.

11.16 Improved transport arrangements will have to be made for the places identified for development. At the moment transport is available on well established routes provided by the Road Transport Corporations and private operators and some private taxi operators. The t>uses used by the private operators are very old and do not provide satisfactory service to the tourists. More buses, taxis, etc. will have to be provided to meet the transport requirements for development of the places likely to be developed. Improved bus-stands, better reservation facilities and more coordination between the railways and the road operators will also have to be organised.

11.17 In almost all the places with the potential for development of tourism, there is an acute short age of water supply as a result of which even the present tourist traffic is put to a lot of inconvenience. For the places selected for tourist development it is essential to ensure safe and adequate water supply for the present as well as for the anticipated tourist traffic. Water supply schemes will have to be worked out in detail and L.S.G.E. Deptts. will have to be asked to give priority to these schemes for places which are selected for development.

11.18 Except for large towns like Nainital, Simla, Mussoorie, Ranikhet, Srinagar, Pahalgam, adequate medical faculties are not generaUy available in backward hill areas. These faculties will have to be provided so that, in case of emergency, tourists are not stranded without medical aid. In those places where the permanent population does not warrant the establishment of regular hospital or a dispensary, temporary shifting of a dispensary or posting of a doctor during the season could be resorted to. Whatever procedures are evolved by way of medical facilities will also have to cover strict supervision of all public health norms by shop-

keepers boarding and eating houses and restaurants and the maintenance of conservancy services.

11.19 Hardly any way side amenities worth the name are available in this region. Punjab and Haryana offer good examples where standard but cheap way side amenities have been provided and this should be encouraged.

11.20 The pre-condition for tourist development is adequate publicity. This has to be organised in such a manner and through such a media as would bring attraction for a particular tourist resort to the kind of tourist who is likely to take advantage of it. Seen from this point of view publicity will have to be regarded as a specialised job for which either proper machinery will have to be created within the Tourist Department or private agencies which may be capable of handling this job, will have to be pressed into service. There are a number of chains of hotels which can play a useful role in publicising the tourist resorts; and availability of faculties. It is true that most of these chains cater to the expensive tourist traffic but publicity once given them will attract even other tourists. Here, also, the State Tourist Development Corporation should take up in right earnest the publicity campaign and other connected matters in collaboration with hotel organisations, hotel chains, private agencies, etc.

11.21 Forests can play an important role in the hill areas to provide recreational facilities. Our urban centres are getting extremely congested and the urbanities are now keen to get out to enjoy fresh air and nature. In recent years, there has been some appreciation of the need for out door recreation and Forests Departments have taken some initiative in developing recreational places. In these areas, provision is generally made for facilities such as shelters, cafes, guest houses, holiday homes, children parks, picnic places and places for viewing wild life etc. With increasing interest in out door recreation, such developments are bound to be more and more popular particularly in the hilly areas. Forest Departments should be called upon to create such places as a regular feature of environmental development. These should be developed primarily with aesthetic consideration and should provide necessary facilities. Forest Corporations can play an important role in this development process. The experiment being tried at Bannerghat near Bangalore has shown the way in this regard.

11.22 There is another important recreational facility which forests would give. This is wild life preservation. The country has rightly taken steps to create wild life sanctuaries in several parts of the country. Recently, a number of tiger sanctuaries has been created to preserve the rapidly declining tiger population. In all these areas, maintenance of the existing flora is also an important necessity so that the symbiosis between the flora and the fauna is maintained. In all these sanctuaries, facilities have been provided to enable tourists to see nature in the open. This will be almost necessary education for our growing children, who, with rapid urbanisation, may have no idea of the wealth of fauna and flora in the country.

Preparation of Master Plans

11.23 It is recommended that each State Government should take up the preparation of Master Plans which should :

- (a) take account of the basic natural factors contributing to the attractiveness of a place of tourist interest and identify pilgrim and trekking routes;

(b) study with reference to the existing and the expected volume of tourist traffic, the avail ability of civic, medical and public health, water supply and accommodation facilities, to determine the steps required for their augmentation and improvement;

(c) appraise the variety and quality of boarding, catering and other facilities and work out the measures needed for their improvement;

(d) the approach should not be to confine planning with reference to the development of tourism to individual places of tourism but to look upon the various places of tourist interest situated within a reasonable distance of each other as a complex of inter-related facilities and to draw up plans for integrated development including vegetable growing, poultry, souvenir production etc.

(e) In any Master Plan, the importance of preserving the environment in the hill areas must be kept in view. The need to maintain the ecological balance while taking up tourism development in the hill areas, the need to assess the absorption capacity of each, centre before taking up the development so that ecological balance is maintained, the need to evolve the requisite architectural and building guidelines for the development proposed in the hill areas etc, are important in connection with the preparation of Master Plan.

12. INDUSTRIAL DEVELOPMENT

12.1 A survey of the Industrial Development in the hill areas indicates that there is hardly any industrialisation in the area and even low technology industries like Khandsari, fruit canning, processing and preservation, forest based industries, etc. have not provided any significant employment to local people and have also had no spread effects. Some efforts had been made during the Fifth Plan period to develop industries such as starch and glucose, cement, sugar mills etc. but they have yet to bear fruit and the industries have not taken off.

12.2 As against this, there is great potential in the hill areas particularly in regard to cottage and village industries based on forest material and wood, horticultural and vegetable, minerals products, apart from such units which can be economically established in the hill areas because of the area having salubrious climate, thereby saving lot of expenditure on air-conditioning etc. like precision instruments, electronics, watches etc.

12.3 The National Committees has already dealt in great detail with the various steps necessary for development of the agro-based and raw material based industries in its report on "Industrial Dispersal" and in its report on the development of village and cottage industries. The recommendations in these two reports cover the development of the above type of industries and the Committee's approach towards their development.

12.4 In this report, the Committee would only like to highlight some of the distinctive and essential features characterising the backward hill area economy. Some of these are:

- (a) The backward hill areas are characterised by the absence of managerial abilities and management capabilities;
- (b) Poor mobility on account of ruggedness of terrain;
- (c) Lack of basic infrastructure like power, communications and supporting services.

12.5 As mentioned earlier, the major effort in the industrialisation programme to the backward hill areas has necessarily to be based on the exploitation of the raw materials available in plenty and the traditional skills particularly for the development of handloom, village and cottage industries, carpets etc. Further, there is scope wherever possible for promoting wool industry using sheep and goat. The recent revolution in manifold increase in the production of horticultural crops, particularly fruit, have opened up vast possibilities of establishing industries based on this raw materials. The North Eastern States, in addition, offer vast scope for development of meat and allied industries. The first step in this direction has to identify industrial opportunities based on raw material locally available so as to increase to the extent possible the value added products in these sectors as well as identification of industrial possibility in the industrial sector itself in tiny, small, medium and large industries.

12.6 Industries utilising local raw materials cannot provide a sufficient basis for industrial development in hill areas. In many cases raw material based activities will be transport intensive and face handicaps in marketing because of the heavy incidence of transport costs. Hence a special effort has to be made to direct to these areas certain types of footloose industries which produce high-value low-weight products like pharmaceuticals, watches, electronic devices, etc. The hill areas may have some limited special advantage in these

industries because of the cool climate but the advantage is not large enough to allow them to compete with locations in the plains. Hence, if the occupational structure in hill areas is to be diversified these foot-loose types of industries have to be pushed to hill areas because the extent of transport cost disadvantages will not be significant and because other, more transport intensive, footloose units cannot be promoted effectively in these areas. Thus the approach to industrial development of hill areas must be based not merely on the exploitation of local raw materials but also on a deliberate effort to ensure that these areas get a fair share in the overall natural development in footloose industries.

12.7 In order to promote this type of industrialisation, as advocated in the Report on 'Industrial Dispersal' submitted by the National Committee, Industrial growth centres would have to be established, on a cluster approach, where the necessary infrastructure and other supporting services are provided by the State. While it would be for the State concerned to determine whether any 'Industrial Growth Centre' fulfilling the criteria envisaged in its report on 'Industrial Dispersal' can be established in a suitable hill area where major and medium industries based on the exploitation of the raw materials available can be set up, there is ample scope for establishment of some Industrial Estates in these areas on the lines advocated in its Report on 'Industrial Dispersal'. These estates should be designed so as to attract specific categories of industries. Where possible functional estates with common service facilities should be promoted to attract the types of footloose industries mentioned earlier. Wherever public sector projects are set up industrial estates should be set up to support ancillarisation in local area.

12.8 The agro-processing units are best located at the centres of collection of agricultural and horticultural produce. The country has developed the concept of regulated markets effectively during the last few years to provide suitable collection centres, suitable provision by effective market committees with local authorities to ensure a fair competitive price to the farmers who bring their produce to the centres for sale, but such regulated markets are almost non-existent in the hill areas, primarily because the present system of regulated markets does not cover the cash crops and, in the hill areas, the traditional foodgrains crops are not surplus to the extent that a proper regulated market can prosper. It is time that as a first step towards effective development of agro-processing units in the backward areas, action is initiated toward the development of regulated markets covering horticultural based crops, with professional supervision. As pointed out in the Report on Industrial Dispersal, this appears to be the more hopeful approach for an organisation which will handle the needs of the farmer and at the same time command a professional management for efficient running of the industry. Once initial capital expenditure in modernising the yards in regulated markets for proper service to the producer is provided, the marketing committees will be getting extra resources in its hand for new supports to the farmers. This will also go a long way in ensuring a competitive price to the producers as it has been observed in these areas, that not only the number of competing parties are few, they often gang up, resulting in low bids and at cornering of the market to the detriment of the sellers. The only answer to this problem is to allow the market committees themselves to be competing bidder and establish a fair price. The Market Committee can then run an agro processing industry as a support to the producer.

12.9 The Forest Development Corporation can also play an important role in the development of forest based industries as well as to promote tourism. The approach has to be an integrated one.

12.10 Most important of all, the Committee would like to emphasise the need for the concerned States to identify the skills that are necessary to develop the type of industries

discussed in this chapter and suited to the hill areas, the extent they are not available locally and the manner in which local population should be trained to fill these gaps. The potential source of entrepreneurship would have to be tapped. A large number of educated people from the hill areas have migrated outside their own homes. Attempts should be made to attract them back by providing them necessary facilities and training. In particular, the training of entrepreneurs should include provision of initial help to the trainees, suitable accommodation and stipends, supply of blueprint of the industries which the selected applicant wants to start, good consultancy aids, continuous technical guidance and assistance during the period of operation etc. The Committee would like to reiterate that marginal money for the entrepreneurs in the hill areas should be kept to the minimum and should not in any case exceed 20% of which 15% should be available from the subsidy and the balance 5% alone should be found by the entrepreneurs. Similarly, margin money for working capital will have to be allowed and should not exceed 50% of the normal requirements as specified by the monitoring authorities in non-backward areas. In addition, both term loans and production loans should be available as a package from a credit institution so that internal wrangling on security can be overcome.

12.11 The Committee would like to utter a word of caution that howsoever one may wish, industrial development cannot be brought about solely with the help of subsidies, provision of infrastructure and State help. While these are no doubt essential, more important is the economics of agglomeration and to lay emphasis only on such industries which provide a specific advantage, vis-a-vis the non-hill areas and concentrate its efforts only on the development of such industries. These have already been identified in para 12.3.

13. ROAD & COMMUNICATION

13.1 Any development strategy in the hill areas has necessarily to provide services and essential infra structure through public agencies to improve the living standards of those living below the poverty line as well as the economic development of the hill areas as a whole with a view to increase the productivity and thereby ensuring greater prosperity.

13.2 The Committee has already dealt with in the earlier Chapters the infrastructural needs for development of agriculture, animal husbandry, horticulture, industry etc. and so also with that of power. In this chapter we are confining ourselves to the two other essential aspects of the basic infrastructure, namely, roads and communications.

13.3 The road network in the hill areas is considerably below the State and the national average. The 20-Year Plan of Road Development (1961-81) had adopted certain norms for the country as a whole. The levels of achievement of these norms vary from area to area and are generally much below the mark in the hill areas. The general conditions and requirements of the hill areas were not specially taken into account while preparing these general plans. The road development in the hill areas has to be so planned, that it provides necessary support to the economic activity and the integrated development. This is different from the situation in the advanced areas where a road sometimes is taken as a facility. Further, road development, if unaccompanied by effective protective measures, is likely to encourage exploitative forces and be detrimental to the interests of the local people.

13.4 The Minimum Needs Programme started during the Fifth Plan had the objective of providing link roads to all the villages above a population of

1500. In the 1980-85 plan, this programme is continued and it is expected that by 1990, all villages above the population 1500 and 50% of the villages with the population between 1000 and 1500 will be covered by link roads.

13.5 However, the following figures indicate that the hill areas continue to be backward, when compared with the State/National average:

State	Road length per 100 Sq. Kms. area ("surfaced)
All India	18.96
U.P.	21.25
Nainital .	12.13
Almora .	12.25
Pithoragarh	4.26
Pauri Garhwal	6.56
Tehri Garhwal	6-12
Uttar Kasi	7.88
Chamoli .	3.18
M.P.	11.13
Bastar	3.74
Surguja .	3.69
Himachal Pradesh	7.26

Kulu	1.23
Lahul Spiti	0.008
Chamba .	1.13

It would, therefore, be essential for the State Governments during 1980-85 Plan period to concentrate on the road construction in these areas. It may be recalled that for the purpose of Minimum Needs Programme, the Planning Commission have given guidelines indicating that a 'cluster of villages approach' can be adopted in backward areas like Desert Area, Tribal Area, Coastal Area, Hill Areas etc,

13.6 The Committee would also urge that apart from following the traditional methods of constructing roads, careful study should be made about the design and specifications of roads in the hill areas, depending upon the intensity of the traffic and availability of local raw materials and efforts should be made to utilise them to the extent possible. Another easy mode of transport in the hill areas is the extensive use of ropeways. The latter should be explored and encouraged to the maximum extent possible as it is much cheaper than the traditional cost of construction of roads.

COMMUNICATION

13.7 Post and Telegraphs provide another important element in the infrastructure of an area. The P&T Department has included the hill areas, together with other backward areas, for purposes of development of Communication network. A special relaxation has to be allowed in providing certain specific Telecom facilities like installation of LDPCOs—in backward and hilly areas. The hilly areas are being distinguished on the basis of their location, terrain, ecology, as also their economic development. Special significance has to be attached to the development of communication facilities in the hill areas, particularly in the Northern sector because of strategic reasons apart from the problem of in-accessibility on account of difficult terrain conditions etc. in all such areas.

13.8 Telecom planning particularly is dependant on the inadequacy of the existing networking and the difficulties in maintaining the present conventional system of overhead lines in hill areas. These over heads wires are prone to frequent faults and the meantime to repair them is high due to difficult terrain. Further, in most of the hill areas there are major hydel projects resulting in erection of high tension lines for dispersal of electric energy. The overhead Telecom Lines have necessarily to be shifted 5-10 Kms away from the main power lines but this is not possible due to terrain conditions. The P&T Department is, therefore, left with the problem of finding out alternative transmission medium in these areas.

13.9 The P&T Department has also decided to provide a LDPCO in each village having a population of 2500 or more in hilly and backward areas without any conditions of minimum revenue. In tribal areas the population limit of 2500 for a single village has been relaxed to cover a group of villages within a radius of 10 Kms of a bigger central village provided no two public telephones will be opened on this basis within a radial distance of 10 Kms of each other. The Committee would recommend that similar criteria should be thought of in hilly areas and wherever there is a police station under the charge of a Sub Inspector of Police or above, a LDPCO has to be provided even when the revenue does not cover the annual recurring expenditure in the maintenance of the LDPCO. The same principle should be followed for areas taken up for integrated area development so that communications, which constitute in such difficult areas an essential and vital link in the

development of the infrastructure, are readily available. It should not be forgotten that, very often, in the snow clad and inaccessible hill areas, wireless and telecommunications are the only source of contact.

14. ORGANISATION OF ADMINISTRATIVE AND FINANCIAL STRUCTURES

14.1 The Report of the National Committee on the Organisation of Administrative and Financial Structures for Backward area Development covers all the aspects so far as hill areas are concerned as these would get classified as 'Backward'.

14.2 In Chapter I, the Committee has explained how they are distinguishing between backward areas in the Deccan Plateau and backward areas in the hill States in the Himalayan range. For the purpose of the administrative and financial organisation, the structure has to be adjusted to these three classes :

(i) Backward hill areas in the Deccan Plateau and part of the States having hill areas like Uttar Pradesh, West Bengal and Assam;

(ii) Backward hill areas in the hill States of the Himalayas comprising Jammu & Kashmir, Himachal Pradesh, Arunachal Pradesh, Manipur, Meghalaya, Nagaland, Mizoram, Tripura and Sikkim;

(iii) Forward hill areas in the hill States mentioned in item (ii) above.

14.3 The National Committee's report on "Organisation of Administrative and Financial Structure for Backward Area Development" has recommended integrated development project approach for a project area comprising 2 or 3 blocks in backward areas. The Committee would recommend that this project approach with the necessary implications about administrative autonomy and financial autonomy should be implemented in the area comprising items (i) and (ii) in paragraph 14.2 above. In the forward hill areas in the Hill States mentioned in item (iii) above; it is for the States concerned to see whether the hill problems can be better dealt with by the integrated approach recommended by the Committee for backward areas or by any modification of the same.

14.4 One important criterion to be kept in view in planning the hill areas is to plan the sub-areas within a block on a watershed basis. The Committee has suggested a focal point approach in the report already quoted above. It is desirable that the area for consideration of the focal point should be watershed.

14.5 A multi-disciplinary approach is essential for following watershed management strategy. The specialists in different disciplines particularly of agronomy, soil science and survey, forestry and agronomy and agricultural engineering including small watershed monitoring for the hydrologic and sediment data will have to be provided in the IDPA with suitable counterparts at the field level. The strengthening of these disciplines both at the field level and at the project level so also at the District level would have to be given topmost priority and full support in the hill area development organisation structure.

14.6 In some States like Uttar Pradesh and Assam, there are Hill Areas Development Commissioners, charged with the responsibility of the development of the hill areas falling within the state. It will be necessary to ensure that the Hill Area Development Commissioners wherever they exist and wherever the creation of such posts is considered necessary, depending upon hill area to be developed, are given adequate staff support

and administrative and financial powers. The National Committee would recommend that the Hill Area Development Commissioners should enjoy the same powers and status as have been recommended in respect of the development of backward areas for the officers to be designated as Backward Areas Development Commissioners.

Personnel Policies

14.7 The National Committee would like to reiterate that one of the important bottlenecks in the development of the hill areas in the country is the lack of adequate staff support. This was brought to its notice by almost every participant at the Hill Areas Seminar held at Nainital that large number of posts, almost in each discipline, whether agriculture, medical, education etc. were lying vacant. The National Committee would like to recommend that the steps suggested by it in Chapter 7 "Personnel Policies" of the Report on Organisation of Administrative and Financial Structures for Backward Areas Development must be properly enforced particularly in the hill areas to ensure that adequate staff support is available. Needless to say, without the necessary personnel, no development programmes can be formulated and implemented.

People's Participation

14.8 The National Committee has already recommended that people's participation should be recorded both as a means and an end as it is the sine qua non of development particularly at the local level. And people's participation must mean willing and voluntary participation. Just as implementation is the touch stone for planning, people's participation would have to be looked upon as the touch stone of 'Integrated' approach to rural development. This concept becomes all the more important in the field of watershed management where the two important biological elements, namely, human and animal, constitute the core of the entire integrated watershed management programmes. The mini watershed projects would have to be so designed as to have a catalytic effect on the minds of the people. This would not be possible unless people are brought in and a momentum of its own generated. The Committee would therefore like to emphasise people's participation and thereby providing built in seeds of success in the integrated watershed management programme. The Committee's observations in Chapter 9 dealing with people's participation in its report on Organisation of Administrative and Financial Structure would have to be consistently kept in mind while drawing up plans and programmes for implementation in the hill areas.

Financial

14.9 Detailed strategies have been suggested for formulation of sub-plans, budgetary control and delegation of adequate financial powers. In such States as are not wholly hill States, there is already a Sub-Plan for development of hill areas. So far as these States are concerned, these are covered by what has been recommended in the main report on Organisation of Administrative and Financial Structure.

14.10 In the Himalaya Region, there are complete States which now fall under the classification of hill areas. These are Jammu & Kashmir, Himachal Pradesh, Arunachal Pradesh, Manipur, Meghalaya, Nagaland, Mizoram, Tripura and Sikkim. Though all the States are naturally hilly, there are advanced areas within these States. There is, therefore, a backwardness amongst the hill areas of these States which will require special attention. One of the advantages of declaring a block backward under the

classification suggested by the Committee is that if the suggestion of the Committee to allot a special additive of Rs. 5 lakhs per block, per year, for dealing with the backwardness is accepted, these blocks get increased allocation for dealing with their special problems. In the hill States, the problem of additive is provided for in a different way. All these States are not subject to the division of Central allocations on the basis of the Gadgil Formula modified from time to time but are treated as a class by themselves for special attention and special provision of developmental funds. The Committee suggests that in these States the needs of the backward hill areas should be taken into consideration whilst allotting special funds for these States in the Plan. In the budgetting, these special allocations for the backward blocks in the State will have to be specially provided for so that these moneys can be passed on to the local project unit for local planning and implementation.

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Sd/-B. SIVARAMAN

New Delhi
28th March, 1981.

ANNEXURE I

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ANNEXURE II
LIST OF PAPERS

1. Madhav Ashish Agricultural Economy of Kumaon Hills Threat of Ecological Disaster
2. B. R. Atteri, A. K. Ray, Development Potential of A. S. Sirohi and T. Haque Farmers in Hilly Region (Simla) Himachal Pradesh.
3. N. Bandyopadhyaya Removal of Backwardness in Hill Areas of Darjeeling—A Case Study of a Cooperative Effort.
4. C.P. Barthwal People's Perception and Problem of Their Participation in Garhwal.
5. G. S. Bhalla . Regional Development Analysis as Applied to Hill Area Development.
6. Sheila Bhalla Some Aspects of Land, Labour and Agricultural Incomes in Haryana's Hill Region.
7. N. S. Bist Strategy Alternative for the Accelerated Development of Hill Areas (with Special Reference to District Chameli)
8. G. S. Borude and S. R. Pawar Rainfed Horticulture for Hill area of Ratnagiri District (Maharashtra State).
9. S.K. Bose Minerals for Development of Hill Areas.
10. J. C. Budhraj Nainital : The Mushroom Town of Uttar Pradesh and Need for Extension of Mushroom Cultivation in the Hill Region of the State.
11. J. C. Budhraj, R. T. Tewari and D. C. Srivastava Strategy Alternatives for Accelerated Development
12. Sudhir Chandra and Y. S. Pangty Role of Plant Resources in Uplift of Backward Areas with Reference to Kumaon Region.
13. L. M. Chandola Development of Uttarkhand: Priorities and Potentials.
14. A. C. Chaturvedi Development of Irrigation in Uttar Pradesh Hills.
15. B.C. Das and V.D. Rayal Findings of Two Evaluation Studies Relating to Horticulture Development in Hill Areas of Uttar Pradesh.
16. B. C. Das and V. D. Rayal Evaluation of Indo-German Agricultural Development Agency, Almora.
17. T. S. Dhapola Socio-Economic Development of the Hill Areas: Some Psychological Issues.
18. S. Giriappa The Role of New Technology in Hill Areas Development: A Case Study of Nilgiri District.
19. Government of U. P. - Forest Development in U.P. Forest Department Hills : Status Paper.
20. Government of U.P. Department of Animal Husbandry A Note on Programmes and Constraints in Implementing Animal Husbandry Programmes in the Hill Areas of U.P.

21. Government of U.P.Hill Development Department. Status Paper: U. P. Hill Areas.
22. Government of U. P. Public Works Department. Note from U. P. P. W. D. for the Seminar.
23. Government of U.P. Tourism Department. Development of Tourism in the Hills of Uttar Pradesh.
24. S. K. Goyal Policies of Uplift of the Hilly and Backward Districts in India: A critique.
25. D.P. Gupta Forestry Development in Hill Areas : People's Perception and problem of Participation.
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27. P. N. Gupta Land Use Policy in U. P. Himalayas and Siwaliks.
28. R.N. Gupta Soil Conservation and Agricultural Development in the Hills.
29. S. Hussain Development of Hill Areas: Focus on Women.
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33. C.C. Maji Comparative Agricultural Development in Hilly Areas of India with particular Reference of Himachal Pradesh.
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38. Pant Nagar University Energy Resources in the U.P.Hill Areas.
39. V. Rajagopalan Alternative approaches in Development of Hill Areas— A Case Study of Nilgiri District, Tamil Nadu.
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49. A. K. Singh A New Strategy for Economic Development of Uttar Pradesh Hills.
50. Katar Singh Role of Tourism in the Regional Development of the Himalaya: Case of Uttarakhand.
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54. S. S. Teaotia Ethno-Linguistic Religious Back ground, Identity Issue and Development of Hill Areas. Administrative Imperatives for Development.
55. H. S. Verma Summary and Conclusion and Recommendations of a Study on the Socio-Economic impact of Rural Electrification in the Hill Areas of Uttar Pradesh.
56. N. P. Tripathi
57. UPDESCO

ANNEXURE III
BASIC STATISTICAL DATA

Indicators of Development	Assam Hill Areas	Tamil Nadu Hill Areas	U.P.Hill Areas	West Bengal Hill Areas	Himachal Pradesh	JammuA Kashmir
1. Area (In 1000 Sq. Kms.)	15.2 (78.5)	2.5 (130.1)	51.1 (294.4)	2-4 (87-9)	55.67	222.24
2. Population 1971 (lakhs)	4.55 (146.2)	4.94 (412.0)	38.22 (883.4)	4.80 (443.1)	34.60	461
3. Density of Population	30 (186)	194 (317)	75 (300)	254 (504)	62	N.A
4. Percentage of rural population	96.6 (91.2)	50.1 (69.7)	85.3 (86.0)	76.9 (75.3)	93.00	81.14
5. Percentage of literacy	20.5 (28.2)	47.0 (39.5)	31.02 (21.7)	33.1 (33.2)	31.96	18.58
6. Percentage of Agricultural Labourers to workers	7.3 (15.1)	60.4 (49.4)	6.5 (25.8)	23.1 (45.3)	4.17	3.16
7. Percentage of workers in Regist. Factories to total.	1.7 (4.1)	8.4 (13.4)	3.7 (7.3)	4.9 (14.6)	4.26	6.82
8. Percentage of ST population to total	57.7 (11.0)	4.02 (0.8)	3.68 (0.2)	13.88 (5.7)	4.10	
9. Percentage of SC population to total	2.3 (6.2)	18.8 (17.8)	16.1 (21.0)	12.6 (19.9)	22.24	8.26
10. Percentage of village electrified to total villages	0.1 (3.0)	97.3 (78.1)	6.4 (18.9)	28.9 (7.7)	51.90	69.99
11. Length of surfaced roads per 100 sq. kms. of areas	1.2 (6.0)	42.6 (38.5)	1.1 (11.4)	26.1 (19.6)	5.64	2.82

ANNEXURE III—(Contd.)

Indicators of Development No.	Tripura	Manipur	Nagaland	Meghalaya	Arunachal Pradesh	Mizoram	Sikkim
1. Area (In 1000 Sq. Kms.)	10.48	22.36	16.53	22.49	83.58	21.09	7.29
2. Population 1971 (lakhs)	15.56	10.73	5.16	10.12	83-58	3.33	2.10
3. Density of Population	149	48	31	45	6	16	29
4. Percentage of rural population	89.56	86.81	90	85.43	96.30	85.45	90.47
5. Percentage of Literacy	30.98	32.91	27.40	29.49	43-59	N.A.	20.22
6. Percentage of Agricultural Labourers to workers	19.96	4.96	1.51	7.64	1.96	N.A.	3-57
7. Percentage for workers in Regist. Factories to total	3.71	10.98	1.21	2.49	0.69	—	N.A.
8. Percentage of ST population to total	29.98	31.13	88.76	80.43	78.85	94.23	—
9. Percentage of SC population to total	21.00	1.53	—	0.38	—	Included in Assam	4.52
10. Percentage of village electrified to total villages	16.20	16.23	33.33	11.91	11.7	10.48	26.65
11. Length of surfaced roads per 100 sq. km. of areas		6.72	9.59	3.77	3.07	0.13	7.49
Note :—Figures within brackets indicate the corresponding figures for the concerned State as a whole.							

ANNEXURE IV
LANDS USE PATTERN—1977-78 (PROVISIONAL)

State/UT No.	Geo graphica l Area	Reported area for land utilisation	Forests	Barren and un culturable land	Area put to Non- Agricultural uses	Total area not available for cultivation	Permanent pasture & other grazing lands	Land under Misc. trees, Crops and groves not included in the net area sown
1. Assam	7852	7852(100.0)	1964 (25.0)	1533 (19.5)	882 (11.2)	2415 (30.8)	185 (2.4)	249 (3.2)
2. Himachal Pradesh	5567	3010 (54.9)	677 (12.2)	154 (2.8)	198 (3.5)	352 (6.3)	1178 (21.2)	53 (1.0)
3. Jammu & Kashmir	22224	4517 (20.3)	2762 (12.4)	226 (1.0)	339 (1.5)	565 (4.5)	125 (0.6)	109 (1.5)
4. Karnataka (Hill Areas)	—	—	—	—	—	—	—	—
5. Kerala (Hill Areas)	—	—	—	—	—	—	—	—
6. Maharashtra (Hill Areas)	—	—	—	—	—	—	—	—
7. Manipur	2236	2211 (98.8)	602 (27.0)	1419 (63.5)	26 (1.2)	1445 (64.6)	N.A.	24 (1.1)
8. Meghalaya	2249	2249(100.0)	813 (36.1)	230 (10.2)	83 (2.7)	313 (13.9)	21 (0.9)	146 (6.5)
9. Nagaland	1653	1653(100.0)	288 (17.4)	627 (37.9)	N.A.	627 (37.9)	N.A.	3 (0.2)
10. Sikkim	730	714 (97.8)	265 (36.3)	209 (28.6)	70 (9.6)	279 (38.2)	103 (14.1)	4 (0.5)
11. Tamil Nadu (Hill Area)	—	—	—	—	—	—	—	-
12. Uttar Pradesh(Hill Area)	1048	1048(100.0)	578 (55.2)	120 (11.5)	N.A.	120 (11.5)	N.A.	98 (9.4)
13. Uttar Pradesh (Hill Area)	—	—	—	—	—	—	—	-
14. Arunachal Pradesh	8358	5643 (67.5)	5154 (61.7)	37 (0.4)		37 (0.4)		9 (2)
15. Goa, Daman & Diu (Hill Area)								—
16. Mizoram	2109	2102(99.7)	1303 (61.8)	201 (9.5)	10 (0.5)	211 (10.0)	4 (0.2)	3 (2.8)
ALL INDIA	328738	304895(92.7)	67107(20.4)	21427 (6.5)	17636 (5.4)	39063 (11.9)	12365 (3.8)	3976 (1.2)

Figures in brackets are percentage to total geographical area.

ANNEXURE IV—(Contd.)

State/UT No.	Cultural Waste land	Uncultural Waste land excluding Fallow land	Fallow land	Net Area sown	Total cropped area	Net Irrigated area	Gross irrigated Area
	130 (0.9)	564 (7.2)	230 (2.9)	2679 (34.2)	3311 (42.2)	572 (7.3)	572 (7.3)
2. Himachal Pradesh	135 (2.4)	1366 (24.5)	55 (1.0)	560 (10.1)	935 (16.8)	375 (6.7)	155 (2.8)
3. Jammu & Kashmir	143 (0.6)	377 (1.77)	99 (0.4)	714 (3.2)	966 (4.3)	252 (1.1)	397 (1.8)
4. Karnataka (Hill Area)	—	—	—	—	—	—	—
5. Kerala (Hill Area)	—	—	—	—	—	—	—
6. Maharashtra (Hill Area)	—	—	—	—	—	—	—
7. Manipur	N.A.	24 (1.1)	N.A.	140 (6.3)	213 (9.3)	65 (2.9)	75 (3.4)
8. Meghalaya	456 (20.3)	623 (27.7)	322 (14.3)	178 (7.9)	209 (9.3)	47 (2.0)	48 (2.1)
9. Nagaland	42 (2.5)	45 (2.7)	511 (30.9)	182 (11.0)	182 (11.0)	54 (3.3)	54 (3.3)
10. Sikkim	1 (0.1)	108 (14.8)	1 (0.1)	63 (8.4)	65 (9.1)	10 (1.4)	10 (1.4)
11. Tamil Nadu (Hill area)	—	—	—	—	—	—	—
12. Tripura	2 (0.2)	100 (9.5)	4 (0.4)	246 (23.5)	385 (36.7)	29 (2.8)	29 (2.8)
13. Uttar Pradesh (Hill Area)							
14. Arunachal Pradesh	19 (0.2)	168 (2.0)	169 (2.0)	115 (1.4)	130 (1.6)	23 (0.3)	24 (.3)
15. Goa, Daman & Diu (Hill Area)							
16. Mizoram	3 (0.1)	81 (3.5)	430 (20.4)	77 (3.7)	105 (5.0)	8 (0.4)	8 (.4)
ALL INDIA	3976 (1.2)	33261 (5.1)	22858 (7.0)	142606 (43.4)	172311 (52.4)	36665 (11.2)	45910 (14.0)

Figures in brackets are percentage to total geographical area.

ANNEXURE V
OUTLAY/EXPENDITURE FOR FIFTH FIVE YEAR PLAN—HILL AREAS

Hill Area/Hill States	Fifth Plan outlay			Expenditure (1974)			Percentage of Expenditure to Plan outlay		
	SP	CA	Total	SP	CA	Total	SP	CA	Total
1. Assam Hill Areas	4000.00	2329.00	6329.00	3250.22	1842.90	5093.82	81.3	79.1	80.5
2. Tamil Nadu Hill Areas	790.00	700.00	1490.00	587.40	680.67	1268.07	74.4	97.2	85.1
3. U.P.Hill Area.	10134.00	11400.00	20534.00	N.A.	N.A.	22361.85	—	—	108.9
4 West Bengal Hill Area	2034.00	1500.00	3534.00	2221.87	1502.98	3724.85	109.2	100.2	105.4
5. Western Ghats	—	2000.00	2000.00	—	1912.99	1912.99	—	95.6	95.6
Total (Hill Areas)	16958.00	16929.00	33887.00	—	—	34361.48	—	—	101.4
6. Himachal Pradesh	23895.00	Included in the State Plan	23895.00	24116.00	Included in the State Plan	24116.00	100.9	Included in the State Plan	100.9
7. Jammu & Kashmir	36264.00	Do.	36264.00	40990.00	Do.	40990.00	113.0	Do.	113.0
8. Manipur	9286.00	Do.	9286.00	10324.00	Do.	10324.00	111.1	Do.	111.1
9. Tripura	6968.00	Do.	6968.00	7997.00	Do.	7997.00	114.7	Do.	114.7
10. Nagaland	8363.00	Do.	8363.00	9981.00	Do.	9981.00	119.3	Do.	119.3
11. Meghalaya	8953.00	Do.	8953.00	10541.00	Do.	10541.00	117.7	Do.	117.7
12. Arunachal Pradesh	3030.00	Do.	3030.00	6575.38	Do.	6575.38	216.9	Do.	216.9
13. Mizoram	4659.00	Do.	4659.00	5072.13	Do.	5072.13	108.8	Do.	108.8
Total Hill States	101418.00	Do.	101418.00	115596.51	Do.	115596.51	113.9	Do.	113.9

ANNEXURE VI
LIVESTOCK POPULATION IN THE HIMALAYAN REGION 1972*

	Cattle	Buffaloes	Sheep	Goats	Pigs	Poultry
1	2	3	4	5	6	7
Jammu & Kashmir	2057	493	1072	569	1	1654
Himachal Pradesh	2176	544	1040	906	3	189
Uttar Pradesh Hill District	2066	633	413	889	4	269
West Bengal Hill District %	206	20	5	95	11	289
Assam Hill District	131	53	£	53	56	407
Nagaland	93	10	£	18	184	703
Manipur	294	52	2	16	134	938
Mizoram	25	2	1	8	48	603
Tripura	525	20	2	147	44	518
Meghalaya	468	26	18	96	127	975
Livestock Census 1972. (Provisional figures)						
%Livestock Census figures relating to the year 1966.						
Below 500 in numbers						
Note:—Data for Arunachal Pradesh and Sikkim are not available.						

LIVESTOCK POPULATION IN THE WESTERN GHAT HILL REGION*

Hill Areas	Cattle	Buffaloes	Sheep	Goats	Pig	Poultry
1	2	3	4	5	6	7
Karnataka	566	108	11	25	41	383
	2105	455	10	1108	112	8769
Maharashtra	544	330	52	171	1	790
Tamil Nadu	62	18	7	8	&	45
?Based on data supplied by the State Governments with reference to the livestock figures relating to the year 1966						
©Below 500.						
Note:—Data for Goa are not available						