## PART-II

## FUTURE MANAGEMENT DISCUSSED AND PRESCRIBED

## CHAPTER-7

## 7.1 BASIS OF PROPOSALS

**NEW APPROACH OF FOREST MANAGEMENT**

The Forestry Sector Program draws on the Social Forestry approach which provides for active participation of the communities in the designing planning and execution of Natural Resources Management (NRM) related activities. New planning methodologies have been developed which ensure participation of communities, including women, in the planning and implementation process. The approach in implementation of program activities has been shifted from project to program, which warrants continuation of the activities beyond 2000-2004. Under the program approach there will be flexibility in selecting the area, fixing of the targets and utilization of resources as compared to project approach where limited targets are achieved in non-flexible environment.

Integrated Resource Management Plans (IRMPs) are developed for each RMS under the broad guidelines of the Strategic Plans of RMUs. Village Plans will be prepared for each village using the methodology of Village Resource Land Use Planning (VLUP) developed in Social Forestry Project Malakand-Dir and further refined in FSP during 1996-2000.

The sector approach also implies flexibility in implementation, willingness of the communities to participate and emphasis on the integration of activities in the DFFW structure.

**Process Approach**

Policy reforms Legal reforms Institutional reforms

Capacity Building Resource Inventory (IRMP)

Social Organization Village Plan NRM Activities

**INSTITUTIONAL & LEGAL REFORMS**

FSP, together with the Institutional Transformation Cell (ITC), a Dutch and Swiss-assisted Project, devised a set-up to improve decision-making and ownership of the institutional reforms in DFFW, making use of existing experiences and proposals generated by other projects.

A New Forest Policy was promulgated, a new Forest Act drafted, Forest Commission Act was approved and The Provincial Forestry Round Table was set up and started regular meetings.

**Policy Guidelines**

The Government of Khyber Pakhtunkhwa Forest Policy 1999 defines the following objectives for management of forests in Khyber Pakhtunkhwa:

1. Meeting the domestic needs of the local communities for timber, firewood, grazing and medicinal plants;
2. Increasing the income of the local people by providing them gainful employment while adding value to the traditional outputs of forests;
3. Enhancing the protective functions of watersheds for regulating their water regimes, retarding soil erosion and siltation of reservoirs, and protecting downstream reservoirs and protecting downstream cultivation and infrastructure from flood damage;
4. Managing and rehabilitating range lands so as to harness their full potential through appropriate range management practices such as controlled grazing systems and grass cutting besides other needed interventions;
5. Contributing towards meeting Pakistan’s demand for constructional timber, eco- tourism and medicinal plants;
6. Conserving, promoting, developing and managing fisheries, wildlife, sericulture and other natural resources for the benefit of individuals, communities and societies;
7. Generating income for forest owners of Guzara Forests and shareholders in Protected Forests;
8. Conserving biological diversity;
9. Promoting non-consumptive uses of forests such as eco-tourism and
10. Improving the quality of human environment through promoting urban forestry.

The main principles of the policy have been outlined as:

1. Integrated resource management;
2. Participation of the people;
3. Devolution of authority and responsibility;
4. Promotion of the private sector;
5. Equity;
6. Public awareness
7. Incentives and
8. Cross- Sectoral linkages.

The Instruments of the Policy under Para 5 “Ensuring the sustainability of forest resources” further outline the following objectives:

1. **Biodiversity conservation.**

 Protected areas will be established, zoned in order to ensure adequate biodiversity conservation all over the province. Such areas will mainly be used educational and research purposes;

1. **Protection of ecologically sensitive areas**

 Felling of trees will be reduced in ecologically sensitive areas and integrated social and economic development programs would be introduced in such areas to benefit the local people and educate them in forest conservation;

1. **Evolving and implementing sustainable management systems for the Guzara and Protected forests**

Government will continue its endeavors to devise and implement appropriate sustainable systems for the management of the Guzara and Protected Forests in collaboration with the stakeholders, building on its social forestry and joint forestry management initiatives

1. **Ensuring effective regeneration of forests**

 Government will ensure effective regeneration of forests by making future timber harvesting conditional on the establishment of adequate regeneration in areas from where trees have been harvested

1. **Improving the efficiency of timber harvesting and reducing soil erosion in the mountains**

 Government will continually strive to improve the efficiency of timber harvesting and reduce soil erosion in the mountains through the installation of appropriate infrastructure for sustainable timber harvesting, confining road construction to valley bottoms and relying on cable cranes to bring down timber from the mountains.

1. **Increasing returns to the local communities from timber harvesting**

To increase benefits to local communities from timber harvesting in their areas, Government will mount a programme of HRD in improved methods of trees felling, timber extraction, raising forest nurseries, reforestation and collection and processing of Khyber Pakhtunkhwa. Special attempts will be made for training women in tasks which they can perform effectively. Particular emphasis will be placed on developing the entrepreneurial skills of the local people to enable their being employed as small contractors at appropriate stages in the sustainable management and utilization of forests.

## 7.2. Forest Act and Rules

To give effect to the above policy guidelines, the enabling law i.e. Khyber Pakhtunkhwa Forest Ordinance 2002 has already been promulgated. The objectives of the Ordinance defined under Section-3 (1) are:

Protection, conservation, management and sustainable development of forests; Promotion of the economic, social and ecological well-being of local people of the province, of Pakistan and of international community in conformity with conservation needs, ecological significance and economic value of the natural resources; Involvement of local communities and interested parties in the formulation and implementation of forest policies and forest management; Definition of responsibilities and obligations of the Government, and concessions, rights, duties and obligations of local communities; and Consolidation and updating of existing laws with a view to enacting a comprehensive new law which adopts modern concepts and provides means to make forest protection and administration effective, promotes present-day objectives and in consonance with existing forest policy and environmental laws.

The guiding principles for realization of the above objectives as mentioned under Section 3 (2) are:

The forests shall be effectively protected, conserved, managed and sustainably developed in due recognition of their ecological significance and economic value for the well-being of the present and future generations, and for this purpose forest protection, administration and management mechanism shall be strengthened;

Appropriate production and security of goods and services, at the optimum level shall be achieved at the level of local communities, of the concerned watersheds, and of the province, while continually improving the productivity of forests and safeguarding the national and international concerns regarding forests and forestry; Forests and other natural resources shall be managed as an integral part of the ecological system, of which these are a part; Direct, strong and effective participation of local communities in the sustainable development and management of forests shall be secured and their concessions, rights, duties and obligations clearly defined; The role of Government regarding sustainable development of forests shall, as far as possible, be confined to preparing management plans, setting out objectives and criteria, monitoring progress, promoting research and education, and providing advisory services, while interested parties shall be encouraged to undertake leading role in development activities where the forests are owned by the people or where they are the dominant right holders and The development of public awareness for proper appreciation of the environmental significance and economic value of forests shall be vigorously pursued.

Section 98 (1) of the Ordinance makes obligatory the management of designated forests in accordance with forest management plans duly approved by the Government and Section 98 (5) (a) provides that the forest management plan shall:

“ include description of the forests and other natural resources in the areas covered hereunder, an analysis of the rate at which these resources can be sustainably used and harvested, a detailed listing of the measures proposed for their sustainable management, regeneration, development and provide for conservation of biological diversity, and estimate of the funds required for the effective implementation of the plan, showing expected contributions from beneficiaries for meeting the costs of management”.

The Khyber Pakhtunkhwa Forests Management (Community Participation) Rules 2004 have been notified under the above said Ordinance. The rules define the three levels of plans: strategic, operational and village plans, and constitution of JFMCs, bye laws of JFMCs, roles and responsibilities of Forest Department and JFMCs in participatory JFM.

##  7.3 General Objectives of Management of Bahrain Forests

(a) To manage the forests on scientific basis according to the accepted principles of forest conservancy for the improvement of environment.

(b) To preserve the watershed values of forests by adopting effective measures against erosion and denudation.

(c) To involve the local people in the management of forests with a view to enlist their. Support for protection, utilization and regeneration of the forests.

(d) To meet the requirement of timber, firewood and fodder of the local. population.

(e) To harvest timber for improvement of the forest crop in accordance with the proposals of forestry master plan 1992.

(f) To generate income of the right holders and government ex-chequer.

(g) To preserve and develop the habitat for wildlife and to improve the recreational value of the forests.

## 7.4 Principles of Management

The following principles will be observed to achieve the objectives of management.

(a) The primary method’ of treatment will be a single tree selection system as the forests of Bahrain Tehsil are under alarming pressure of grazing and illicit cutting associated with considerable erosion hazards.

(b) The areas deficient in tree growth will be regenerated with suitable conifer\_ and broad leaved species in order to compensate timber harvesting.

(c) The local people will be involved -in the management of forests by various extension activities.

(d) The local people will be encouraged to utilize dry, dead and diseased trees in the forests for firewood rather than cutting green trees. Moreover, fast growing tree species will be introduced in the area as an alternative source of energy.

(e) The pasture and grazing lands should be improved and maintained by introducing suitable grazing system with the consent of the people.

##  7.5 Constitution of working circles

Keeping in view the objectives of the plan the following three working circles have been constituted for the above mentioned treatments. The crown cover density and development phase of the forest crop have been considered in the allotment of forests to selection and improvement working circles. The area of selection and improvement working circles is contributed by the whole compartments. The management map has been prepared accordingly showing the respective working circles by different colours.

## 7.5.1 Production Working Circle

All the productive forests of Deodar, Kail, Fir and Spruce on moderate to steep slopes have been placed in this working circle. The forests having good density or mature and over mature trees have been allotted to selection working circle. The area extends over 21519 hectares which constitutes 55 % of the total plan area.

## 7.5.2 Improvement Working Circle

All the remaining areas which are not included in the selection working circle have been put under improvement working circle. These areas need protection and improvement due to poor density of the crop or the pole and sub mature stage of the trees or blanks and cultivation in the forest or grazing and illicit cutting of trees. The area of improvement working circle is 17417 hectares which is 45 % of the total plan area.

## 7.5.3 Multiple Use Working Circle

This working circle has been constituted for planting on private and community lands, improvement of pastures and grazing lands, agriculture and extension activities. It covers all the private areas outside the forest boundary which are used by the local people for grazing, cultivation and tree planting etc. Approximately 14300 hectares area will be treated in this working circle.

 Table; 7(A) working circles areas

|  |  |  |  |
| --- | --- | --- | --- |
| **Working circle** | **No. of Compartments** | **Area (ha)** | **%** |
| Selection working Circle | 145 | 21519 | 55 |
| Improvement Working Circle | 129 | 17417 | 45 |
| Community Use Working Circle |  | 14300 |  |
| **Total:** | **274** | **53236** | **100** |

Details of compartment allotted to working circles are in Appendix-1 & 2.

## 7.6 Compartments

The boundaries of various compartments have been corrected and clearly delineated on the maps. The upper and lower limits of the compartments have been fixed with prominent features like nullah, rivers, ridges and roads etc. The compartments have been further divided into sub-compartments having different crop conditions like development phase, crown cover density and species association. Compartment will be the unit of management for treatment.

## 7.7 Period of the plan

This Resource Management Plan has been prepared for a period of 15 years i.e. 2017-18 to 2031-32. The outgoing plan was for 15 years period and expired during 2007-2008.

## CHAPTER-8

## WORKING PLAN FOR PRODUCTION WORKING CIRCLE

## General Constitution

A total number of 145 compartments covering 21519 ha have been allotted to Timber Production Working Circle. These forests are better stocked having 16051 ha stocked area, moderate slopes and do not pose environmental threats to commercial harvesting. List of compartments allotted to production and improvement working circles are available as Appendix-1. & 2.

The specific objectives of management for selection working circle are as under:

1. To meet the demand of local people for timber, firewood and fodder.
2. To maintain sustainability of the forests by harvesting only the surplus yield, if any, for commercial purposes in accordance with the prescription of the plan.
3. To improve the existing forest crop through proper silvicultural marking, technical harvesting operations, afforestation program and protection of the natural regeneration.
4. To guarantee the participation and contribution of the local people in the timber harvesting, afforestation and protection of the forests.
5. To improve the habitat and ecological conditions so as to provide shelter to the wild life.

## Specific management objectives of Production Working Circle.

Management objectives of this working circle are:

1. To restore and rehabilitate these degraded and depleted forests via switch over from consumptive to capitalizing resource use.
2. To promote and internalize Multi-partner integrated natural resource management including Joint Forest management in and around designated forest areas.
3. To improve livelihood, especially of marginalized groups including women folk, through participatory natural resource management.
4. To improve the stocking per unit area and ensure adequate natural regeneration for the foreseen renewal of cut over, depleted, under stocked forests and blank areas.
5. To protect and conserve ecological, watershed and biodiversity function of forests.
6. To accommodate the requirements of local inhabitants for timber, firewood, grazing and fodder on sustainable basis.

##  Method of Treatment

The following operations are recommended to achieve the objectives of selection working circle:

1. In order to conserve the existing forests against converting forests into agriculture land only selection felling should be carried out. Where promoting of natural regeneration is needed B and C grade thinning is recommended along with the main felling so that space and light could be provided to the crop.

The natural regeneration should be encouraged besides artificial planting in the felled over areas. Before planting the soil should be prepared and the undesirable shrubs and under growth should be removed in order to reduce the competition and provide light to the young seedlings. The blanks should also be planted with suitable species preferably deodar and Kail.

1. Area so planted should be properly protected and strict measures against encroachments, fire and grazing should be adopted.
2. Keeping in view the poor condition of regeneration rotational grazing system should be adopted as the complete restriction on grazing is difficult.
3. Soil conservation practices where needed should be adopted.
4. The silviculture treatment has been mentioned in detail in the compartment history files for each stand.
5. Proper and widespread extension should be launched and sustained to guarantee people's involvement, and is an absolute integral component of all technical treatments.

##  Analysis of the crop

The growing stock in selection working circle was estimated by Rela-scope sampling technique also called ‘point’ sampling. The abstract of the stand and stock in immature, sub-mature, mature and over mature stands is given below:

**Table-8(B) Abstract of Stand and Stock**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Species** | **Immature** | **Sub-Mature**  | **Mature**  | **Over Mature**  | **Total**  |
|  **Trees** | **Vol****(cum)** |  **Trees** |  **Vol****(cum** |  **Trees** |  **Vol****(cum** |  **Trees** | **Vol****(cum** |  **Trees** |  **Vol****(cum)** |
| Kail | 10995 | 1596 | 395799 | 377330 | 109944 | 345709 | 32983 | 214247 | 549721 | 938882 |
| Deodar | 51955 | 7447 | 878139 | 653277 | 216575 | 540844 | 77921 | 462864 | 1224590 | 1664433 |
| Fir | 12062 | 2189 | 527188 | 492938 | 196766 | 587332 | 75579 | 512178 | 811595 | 1594637 |
| Spruce | 19885 | 3014 | 536595 | 506576 | 165136 | 498311 | 80995 | 575777 | 802611 | 1583678 |
| **Total** | **94897** | **14247** | **2337721** | **2030121** | **688421** | **1972196** | **267478** | **1765066** | **3388517** | **5781630** |

**Immature (< 20 cm dbh), Sub-mature (21-50 cm dbh), Mature (51-70 cm dbh), Over-mature (70 + cm dbh**)

##  Method of treatment/Silvicultural System

Formation of crop, configuration and topography, deterioration caused to the soil and soil cover by excessive grazing coupled with erratic distribution of age classes and lack of regeneration of Fir and Spruce are the main factors which leave no choice other than the selection system in conjunction with improvement felling.

The method of treatment adopted will be:

1. Commercial harvesting will be carried out in well stocked forests by using harvesting and logging techniques which cause least damage to forests and soil and bring maximum outturn of timber;
2. Depleted and poor stocked areas will be regenerated through natural regeneration and planting where necessary;
3. Local requirements of timber and firewood of the adjacent habitations will be met from well stocked forests;
4. The encroachments on forests being made in surrounding of hamlets shall be stopped and if possible reversed with community participation
	1. **Felling Series**

There will be one felling series with 15 years felling cycle. An exploitable diameter of 60 cm which roughly corresponds with the rotation age of 100 years has been fixed for the coniferous species in production working circle. It has been taken into consideration that the felling should be properly distributed over the entire valleys to satisfy the relevant local concessionists. The felling sequence should be adhered to, unless its change is required by some emergent circumstances which will have to be properly justified. The felling program for the Bahrain Protected Forests is appended in appendix-6

## Yield Assessment

The yield calculation for the selection working circle has calculated as follows:

**Austrian Formula**

AY= I + AG-DG/P

Whereas;

AY= Annual yield per hectare per annum to be harvested

AG=Actual Growing Stock of the forests; it is the standing volume of all live trees per hectare which varies from compartment to compartment in each block.

DG = Desired Growing Stock; in view of forests of Bahrain Tehsil the desired growing stock is assumed as 500 m3 per hectare for this plan.

I = Annual increment per hectare per annum put on by the forests

P=adjustment period; it is assumed as 100 years

 AY= 3.688+360.20-500/100

AY= 2.29 m3 per ha annually

Total annual yield for the Selection Working Circle = Area of Working Circle in ha × Yield per ha

 AY=2.29 X 16051

AY= 36756.79 m3 or say 36757 m3

**Von Mantel’s Formula**

AY= 2 GS/R

Whereas;

AY= Annual Yield

GS=Actual Growing Stock

R=Rotation Age=100 years

 AY= 2x360.20/100

 AY=7.204 m3/Hec

AY= 7.204 X 16051

AY = 115631.40 m3 or say 115631 m3

**Hundeshagen’s Formula**

AY=GSxNY/NGS

Whereas;

AY=Annual Yield

GS=Growing Stock m3/ha

NY=Average Normal Yield of quality class II and III=61 Cft/ac/annum or 4.267 m3/ha

NGS=Normal Growing Stock=500 m3/ha

AY=360.20 X4.267/500 =3.07 m3/ha

AY=3.07 X 16051= 49339.92 m3 or say 49340 m3

**Comparison of Annual Yield by Different formula**

The yield calculated by different formulae is reproduced as below:

1. Von Mantels Formula = 115631 m3

2. Hundeshagen’s Formula. = 49340 m3

3. Austrian Formula = 36757 m3

## Distribution of the prescribed yield among different species

The distribution of prescribed yield among Deodar, Kail, Fir and Spruce on the basis of percentages of these species in the total growing stock is as under:

Total growing stock of all species = 5781630 cum = 100%

Growing stock of Deodar = 1664433 cum= 29 %

Growing stock of Kail = 938882 cum = 16%

Growing stock of Fir =1594637 cum = 28%

Growing stock of Spruce = 1583678 cum = 27%

**Prescribed Annual Yield from:**

1. Growing stock of Deodar= 7462 cum= 29 %
2. Growing stock of Kail=4117 cum=16 %
3. Growing stock of Fir =7204 cum=28%
4. Growing stock of Spruce =6947 cum=27 %

Total prescribed yield for the Plan period = 25730

Total prescribed yield for the Plan period = 25730 X 15 = **385950 m3**

The following reductions in the annual estimated yield have been made;

Right holders domestic requirements=10%=3675 m3

Allowance for mortality, illicit damage for forest conservancy=20%=7350 m3 Total=11025 m3

Thus the prescribed yield from selection working circle comes to 25730 m3 per annum.

## 8.8.1 Utilization percent

The utilization percent has been computed as under:

Utilization percent = Total yield in the plan period × 100

Total growing stock of the Circle

 = 385950 × 100 = 6.68 %

 5781629.81

 Per annum Utilization percent = 6.68/ 15 = 0.45

 **Compartment yield**

The yield of individual compartment has been worked out as follow:

Compartment Yield = (6.68 × Growing stock of the compartment)

100

**TABLE-8(C) SHOWING COMPARTMENTWISE YIELD**

| **S.NO** | **BLOCK** | **Compartment No** | **Total Area(Ha)** | **Total Tree** | **Growing Stock(m3)** | **Yield(m3)** | **Yield(Cft)** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | BAHRAIN | 2 | 131.00 | 17455 | 38267.11 | 2556 | 90235 |
| 2 | BAHRAIN | 4 | 196.68 | 38346 | 56419.56 | 3769 | 133040 |
| 3 | BAHRAIN | 5 | 192.66 | 16167 | 30424.84 | 2032 | 71743 |
| 4 | BAHRAIN | 6(b)  | 53.42 | 2857 | 10374.35 | 693 | 24463 |
| 5 | BAHRAIN | 7(a)  | 99.96 | 12038 | 26699.15 | 1784 | 62958 |
| 6 | BAHRAIN | 8 | 134.76 | 12855 | 22328.18 | 1492 | 52651 |
| 7 | BAHRAIN | 9(b)  | 96.72 | 8754 | 16079.74 | 1074 | 37917 |
| 8 | BAHRAIN | 10 | 147.79 | 32136 | 41932.32 | 2801 | 98878 |
| 9 | BAHRAIN | 11 | 134.09 | 23844 | 51157.47 | 3417 | 120631 |
| 10 | BAHRAIN | 12 | 176.60 | 30566 | 52052.77 | 3477 | 122743 |
| 11 | BAHRAIN | 13 | 189.06 | 20062 | 53690.83 | 3587 | 126605 |
| 12 | BAHRAIN | 15 | 134.26 | 42480 | 44712.19 | 2987 | 105433 |
| 13 | BAHRAIN | 16 | 124.54 | 32252 | 39103.20 | 2612 | 92207 |
| 14 | BALAKOT | 2a  | 75.00 | 16526 | 14572.95 | 973 | 34364 |
| 15 | BALAKOT | 9 | 226.75 | 46915 | 53872.76 | 3599 | 127034 |
| 16 | BALAKOT | 12 | 122.28 | 17489 | 31602.26 | 2111 | 74519 |
| 17 | BALAKOT | 14 | 124.75 | 23635 | 29669.36 | 1982 | 69962 |
| 18 | BALAKOT | 15 | 254.73 | 40192 | 64772.91 | 4327 | 152737 |
| 19 | BALAKOT | 16 | 178.00 | 28038 | 52392.40 | 3500 | 123543 |
| 20 | BALAKOT | 17 | 133.25 | 26284 | 45271.23 | 3024 | 106751 |
| 21 | BALAKOT | 20 | 238.25 | 64037 | 86339.58 | 5767 | 203592 |
| 22 | BALAKOT | 21 | 75.75 | 16916 | 22119.78 | 1478 | 52159 |
| 23 | BALAKOT | 24 | 107.40 | 17774 | 24298.54 | 1623 | 57297 |
| 24 | BALAKOT | 25 | 228.48 | 37381 | 61077.61 | 4080 | 144023 |
| 25 | BALAKOT | 26(a)  | 120.45 | 18146 | 36232.80 | 2420 | 85438 |
| 26 | BALAKOT | 26(b)  | 72.00 | 18102 | 21128.72 | 1411 | 49822 |
| 27 | BESHIGRAM | 3 | 197.36 | 22790 | 47923.08 | 3201 | 113005 |
| 28 | BESHIGRAM | 4 | 172.25 | 13746 | 42739.53 | 2855 | 100782 |
| 29 | BESHIGRAM | 5 | 72.00 | 11001 | 30680.41 | 2049 | 72346 |
| 30 | BESHIGRAM | 6 | 146.00 | 16899 | 34807.43 | 2325 | 82077 |
| 31 | BESHIGRAM | 7 | 165.90 | 15781 | 26337.11 | 1759 | 62104 |
| 32 | BESHIGRAM | 9 | 147.70 | 17060 | 38615.70 | 2580 | 91057 |
| 33 | BESHIGRAM | 10 | 163.81 | 8417 | 30684.44 | 2050 | 72355 |
| 34 | BESHIGRAM | 11 | 267.00 | 42028 | 87191.75 | 5824 | 205602 |
| 35 | BESHIGRAM | 12 | 121.00 | 9976 | 33860.60 | 2262 | 79845 |
| 36 | BESHIGRAM | 13 | 91.50 | 11770 | 33329.00 | 2226 | 78591 |
| 37 | BESHIGRAM | 14 | 147.45 | 28696 | 46672.98 | 3118 | 110057 |
| 38 | BESHIGRAM | 16 | 103.68 | 27073 | 40563.55 | 2710 | 95650 |
| 39 | BESHIGRAM | 17 | 94.75 | 14788 | 26457.46 | 1767 | 62388 |
| 40 | BESHIGRAM | 22 | 160.44 | 25529 | 61693.76 | 4121 | 145476 |
| 41 | BESHIGRAM | 23 | 168.52 | 27024 | 52460.76 | 3504 | 123705 |
| 42 | BESHIGRAM | 24 | 172.52 | 28674 | 60458.08 | 4039 | 142563 |
| 43 | BESHIGRAM | 25 | 121.00 | 13391 | 22406.02 | 1497 | 52834 |
| 44 | BESHIGRAM | 27 | 181.37 | 30709 | 63010.51 | 4209 | 148581 |
| 45 | BESHIGRAM | 28 | 170.00 | 12471 | 29333.80 | 1959 | 69170 |
| 46 | BESHIGRAM | 30 | 71.00 | 12009 | 26138.69 | 1746 | 61636 |
| 47 | BESHIGRAM | 31 | 155.00 | 24014 | 50054.95 | 3344 | 118032 |
| 48 | BESHIGRAM | 32(b)  | 122.77 | 13923 | 36517.63 | 2439 | 86110 |
| 49 | BESHIGRAM | 33(b)  | 91.00 | 16535 | 31317.72 | 2092 | 73848 |
| 50 | BESHIGRAM | 34 | 146.63 | 24480 | 47601.94 | 3180 | 112247 |
| 51 | CHELL | 6 | 124.72 | 20173 | 36292.36 | 2424 | 85579 |
| 52 | CHELL | 8 | 249.77 | 23661 | 72767.54 | 4861 | 171589 |
| 53 | CHELL | 9 | 215.29 | 14598 | 39155.38 | 2616 | 92330 |
| 54 | CHELL | 10(a)  | 56.25 | 9861 | 17915.14 | 1197 | 42245 |
| 55 | CHELL | 11(a)  | 104.90 | 5913 | 16784.13 | 1121 | 39578 |
| 56 | CHELL | 11(b)  | 81.50 | 14536 | 26511.03 | 1771 | 62514 |
| 57 | CHELL | 12 | 290.13 | 38823 | 67051.09 | 4479 | 158109 |
| 58 | CHELL | 13 | 252.49 | 32477 | 68973.74 | 4607 | 162643 |
| 59 | CHELL | 14 | 102.00 | 19855 | 27703.39 | 1851 | 65326 |
| 60 | CHELL | 15 | 179.65 | 16807 | 37883.22 | 2531 | 89330 |
| 61 | DARAL | 4-b  | 124.65 | 21855 | 23546.54 | 1573 | 55524 |
| 62 | DARAL | 5 | 237.00 | 36928 | 61147.92 | 4085 | 144189 |
| 63 | DARAL | 7 | 310.40 | 37425 | 78047.06 | 5214 | 184038 |
| 64 | DARAL | 8 | 242.00 | 40194 | 84033.19 | 5613 | 198154 |
| 65 | DARAL | 13 | 186.24 | 27871 | 48545.48 | 3243 | 114472 |
| 66 | DARAL | 24 | 169.03 | 17218 | 39068.38 | 2610 | 92125 |
| 67 | DARAL | 25 | 198.00 | 27100 | 58246.49 | 3891 | 137348 |
| 68 | DARAL | 26 | 178.50 | 31472 | 43562.85 | 2910 | 102723 |
| 69 | GORNAI | 1 | 139.91 | 31505 | 55104.23 | 3681 | 129938 |
| 70 | GORNAI | 2 | 181.12 | 30691 | 74341.67 | 4966 | 175301 |
| 71 | GORNAI | 3(a)  | 99.00 | 16994 | 22900.84 | 1530 | 54001 |
| 72 | GORNAI | 4(b)  | 197.58 | 10667 | 23793.87 | 1589 | 56107 |
| 73 | GORNAI | 5(a)  | 32.70 | 5584 | 11683.77 | 780 | 27551 |
| 74 | GORNAI | 7 | 153.17 | 19112 | 41783.68 | 2791 | 98528 |
| 75 | GORNAI | 8 | 191.25 | 21987 | 29320.01 | 1959 | 69138 |
| 76 | GORNAI | 10 | 142.00 | 23496 | 53324.25 | 3562 | 125741 |
| 77 | GORNAI | 11 | 157.36 | 43582 | 66270.01 | 4427 | 156267 |
| 78 | GORNAI | 13 | 154.40 | 14850 | 39582.46 | 2644 | 93337 |
| 79 | GORNAI | 14 | 199.17 | 28554 | 54698.01 | 3654 | 128980 |
| 80 | GORNAI | 15(a)  | 64.75 | 13177 | 20479.21 | 1368 | 48291 |
| 81 | GORNAI | 15(b)  | 108.42 | 16504 | 27189.98 | 1816 | 64115 |
| 82 | GORNAI | 16(b)  | 105.66 | 9893 | 15241.88 | 1018 | 35941 |
| 83 | GORNAI | 19 | 120.00 | 17427 | 21161.21 | 1414 | 49899 |
| 84 | GORNAI | 20(b)  | 86.00 | 2407 | 5213.39 | 348 | 12293 |
| 85 | GORNAI | 22(b)  | 56.00 | 11054 | 12412.47 | 829 | 29269 |
| 86 | MANKIAL | 2 | 96.30 | 22071 | 33130.42 | 2213 | 78123 |
| 87 | MANKIAL | 3 | 182.25 | 23718 | 45635.23 | 3048 | 107610 |
| 88 | MANKIAL | 9 | 183.79 | 26852 | 46269.05 | 3091 | 109104 |
| 89 | MANKIAL | 10 | 182.76 | 52293 | 41416.25 | 2767 | 97661 |
| 90 | MANKIAL | 12 | 201.46 | 39191 | 74743.85 | 4993 | 176249 |
| 91 | MANKIAL | 13 | 153.34 | 30971 | 32360.53 | 2162 | 76307 |
| 92 | MANKIAL | 14 | 101.33 | 23586 | 29822.38 | 1992 | 70322 |
| 93 | MANKIAL | 17 | 114.00 | 31769 | 30603.68 | 2044 | 72165 |
| 94 | MANKIAL | 18 | 267.71 | 30342 | 44804.17 | 2993 | 105650 |
| 95 | MANKIAL | 19 | 259.69 | 56350 | 55465.35 | 3705 | 130790 |
| 96 | MANKIAL | 20 | 255.63 | 35102 | 73181.16 | 4889 | 172564 |
| 97 | MANKIAL | 22 | 44.75 | 7970 | 14787.27 | 988 | 34869 |
| 98 | PIA | 6 | 142.45 | 21812 | 37199.22 | 2485 | 87717 |
| 99 | PIA | 7 | 121.81 | 23414 | 27154.17 | 1814 | 64031 |
| 100 | PIA | 8 | 142.36 | 24025 | 28421.19 | 1899 | 67018 |
| 101 | RAMET | 1 | 183.25 | 44856 | 66257.83 | 4426 | 156239 |
| 102 | RAMET | 2(a)  | 112.37 | 35451 | 41944.60 | 2802 | 98907 |
| 103 | RAMET | 2(b)  | 116.32 | 20619 | 27888.96 | 1863 | 65763 |
| 104 | RAMET | 3 | 83.35 | 11799 | 15928.60 | 1064 | 37560 |
| 105 | RAMET | 7(a)  | 106.07 | 27940 | 33608.31 | 2245 | 79250 |
| 106 | RAMET | 7(b)  | 45.52 | 6398 | 9147.76 | 611 | 21571 |
| 107 | RAMET | 8 | 188.10 | 23132 | 34846.75 | 2328 | 82170 |
| 108 | RAMET | 9 | 203.00 | 22296 | 28400.22 | 1897 | 66969 |
| 109 | RAMET | 10 | 206.49 | 24229 | 56131.80 | 3750 | 132361 |
| 110 | RAMET | 11 | 261.91 | 63889 | 93535.13 | 6248 | 220560 |
| 111 | RAMET | 13 | 167.17 | 46004 | 47399.80 | 3166 | 111771 |
| 112 | RAMET | 14 | 211.52 | 30221 | 70519.11 | 4711 | 166287 |
| 113 | RAMET | 17 | 193.67 | 26284 | 29044.69 | 1940 | 68489 |
| 114 | RAMET | 19(a)  | 81.75 | 8092 | 26432.93 | 1766 | 62330 |
| 115 | RAMET | 20 | 130.25 | 22314 | 30600.65 | 2044 | 72158 |
| 116 | RAMET | 22 | 152.23 | 8818 | 23053.24 | 1540 | 54360 |
| 117 | RAMET | 23 | 217.07 | 30150 | 43072.09 | 2877 | 101566 |
| 118 | RAMET | 24 | 178.59 | 31917 | 73781.84 | 4929 | 173981 |
| 119 | RAMET | 25(b)  | 120.54 | 17685 | 33595.08 | 2244 | 79219 |
| 120 | RAMET | 26(b)  | 125.17 | 16049 | 27511.99 | 1838 | 64874 |
| 121 | RAMET | 27(a)  | 112.66 | 29030 | 35008.42 | 2339 | 82551 |
| 122 | TIRAT | 5 | 163.19 | 27838 | 36393.31 | 2431 | 85817 |
| 123 | TIRAT | 6(a)  | 108.00 | 25869 | 40200.48 | 2685 | 94794 |
| 124 | TIRAT | 6(b)  | 75.00 | 11400 | 15995.53 | 1069 | 37718 |
| 125 | TIRAT | 7 | 201.94 | 22932 | 61604.32 | 4115 | 145265 |
| 126 | TIRAT | 12(b)  | 47.35 | 4643 | 8840.62 | 591 | 20847 |
| 127 | TIRAT | 13 | 181.01 | 23095 | 34572.11 | 2309 | 81522 |
| 128 | TIRAT | 14(a)  | 156.69 | 22330 | 29103.26 | 1944 | 68627 |
| 129 | TIRAT | 14(b)  | 38.66 | 998 | 4880.55 | 326 | 11509 |
| 130 | TIRAT | 15(a)  | 76.80 | 3648 | 8948.09 | 598 | 21100 |
| 131 | TIRAT | 15(b)  | 39.24 | 1471 | 3233.36 | 216 | 7624 |
| 132 | TIRAT | 16 | 157.00 | 24228 | 54599.30 | 3647 | 128747 |
| 133 | TIRAT | 17 | 118.50 | 11070 | 32413.63 | 2165 | 76433 |
| 134 | TIRAT | 18 | 155.40 | 27555 | 50737.28 | 3389 | 119641 |
| 135 | TIRAT | 19 | 222.58 | 18613 | 35610.44 | 2379 | 83971 |
| 136 | TORWAL | 1 | 157.89 | 37686 | 41696.44 | 2785 | 98322 |
| 137 | TORWAL | 2 | 144.00 | 22836 | 50073.58 | 3345 | 118075 |
| 138 | TORWAL | 6 | 124.27 | 39820 | 49082.79 | 3279 | 115739 |
| 139 | TORWAL | 7 | 144.88 | 23822 | 49903.60 | 3334 | 117675 |
| 140 | TORWAL | 8 | 144.32 | 27489 | 42134.52 | 2815 | 99355 |
| 141 | TORWAL | 9 | 140.35 | 28691 | 56494.96 | 3774 | 133217 |
| 142 | TORWAL | 10 | 194.38 | 28415 | 51081.70 | 3412 | 120453 |
| 143 | TORWAL | 16 | 158.25 | 39673 | 66589.37 | 4448 | 157020 |
| 144 | TORWAL | 19-A  | 106.02 | 6328 | 10802.52 | 722 | 25473 |
| 145 | TORWAL | 20 | 106.02 | 27144 | 34748.99 | 2321 | 81939 |

##  Establishment of Regeneration

Establishment of regeneration in these depleted and degraded forests is need of the time else the prevailing condition of these forests will aggravate further. Most of the forests are deficit in regeneration due to uncontrolled unscientific grazing throughout these forests. Besides, the existing harvesting practices are detrimental to the establishment of regeneration. Thus there are hardly any chances for success of trees regeneration under the prevailing circumstances. It would be possible only through active participation of the local communities in the process of JFM to identify and close such areas for grazing at least for 5-7 years.

As a rule, reliance will be made on natural regeneration. Artificial planting inside forests will be made only in those areas where re-introduction of broad leaved and/or conifer species is required or blanks areas are of such extent that there are no chances of dispersal of seed from the adjoining forests. Artificial planting is very expensive, especially in these forests, therefore, it shall be undertaken in cases where there is strong need for it and the communities are willing to offer protection to such areas against grazing.

## Choice of Species

The mixed as well as pure stands of fir, spruce, deodar and Kail are found in these forests. Fir and spruce along with some Kail trees occupy the higher altitude while deodar grows on lower elevation where the conditions are suitable for its growth. Deodar will be given preference over all other species in its own ecological zone due to its high profit value. In fir, spruce and Kail zone preference will be given to Kail provided the aspect and ecological conditions are promising. The regeneration of spruce is easily obtained besides its rapid growth; therefore, spruce will be preferred against silver fir. Generally mixed crop of conifers and broad leaved shall be preferred over pure stands to facilitate ecological stability. Broad Leaved species will be planted in wet places and depressions to protect soil against erosion and to provide fodder.

## Trees counting towards yield

All green and dry trees of Deodar, Kail, Fir and Spruce measuring 20 cm and above removed illicitly or in any other operation from any forest included in this working circle will be counted towards prescribed yield.

## Marking of dry/windfall trees

During forest inventory it was observed that trees have died in over mature fir forests due to natural death while in blue pine and deodar forests due to deliberate fires. However, it was also observed that dry and windfall trees are not cut by the contractors because (i) dry trees are very difficult to cut and saw and (ii) dry trees have very small amount of timber as most of trees are rotten, particularly in case of fir. The usual practice is to cut best quality green trees under the guise of dry/wind fall trees. Dry/wind fall trees in future shall be utilized for local needs. It must be ensured by the DFO personally that only marked dry/wind fall trees are cut.

## Marking Rules

The following marking rules shall be adhered to:

1. In view of the importance of forests and the growing pressure of communities viz a viz royalty purchasers to remove maximum possible timber from each forests in shortest possible time, it is obligatory on the DFO concerned to personally carry out markings with the sole objective of enhancing quality and vigor of the remaining crop. The DFO will be personally held responsible for correctness of the marking;
2. Great care shall be taken by the marking officer for correctness of the main making and there is no provision for supplementary marking.
3. Only trees of 60 cm dbh and over shall be removed in the main marking;
4. Highest priority shall be given to dead, dying, diseased and malformed, moribund and other defective trees will be marked provided their retention is not required for soil protection.
5. Selection system shall be applied in uneven-aged forests where regeneration is established and in dense patches of mature and over mature trees, fellings shall be made in groups of 2-3 trees to create gaps for natural regeneration;
6. No trees shall be felled on steep slopes subject to soil erosion or on other sites where regeneration has no chances after removal of the existing trees;
7. The making shall be evenly spread over the entire well-stocked part of the compartments;
8. No tree adjacent to cultivation and habitation or on border of the compartment up to 30-40 meters should be marked.
9. No broadleaved trees shall be marked for commercial sale.

## Permissible deviation from yield

The deviation from the prescribed yield should be discouraged due to the fact that great deal of degradation has already occurred in most of the forests and drastic depletion of growing stock has taken place in compartments already harvested. The concept of sustained yield has not been applied in the past and the thrust is on removal of maximum timber in shortest possible time.

## Harvesting Mechanism

The prevailing harvesting operations are carried out by FDC through (contractors and labor) not having even purest concept of environmental and biodiversity considerations. Trees are felled and sawn into scants and logs in crude manner and the timber is brought down on steep slopes through sliding or rolling in haphazard manner which causes great damage to soil and the remaining crop. Timber for local use is also harvested in such a thoughtless way that not only forest patches are clear cut but the poles/trees are slid on steep slopes vulnerable to erosion. As a result, deep gullies are common on slopes, particularly above habitations and this phenomenon is widespread throughout the area. There is urgent need to stop these wasteful and destructive harvesting operations and instead introduce improved harvesting techniques, which would not only be environmentally desirable but also would reduce timber wastages and enhance productivity of forest workers. In this regard, the following actions are required to be taken on urgent basis:

* Introduction of improved tools and equipment of harvesting in mountainous areas;
* Training of forest workers, communities and Forest Department staff in the improved harvesting methods;
* Making obligatory on the FDC contractors/communities/JFMCs to adopt the improved harvesting methods.

## Timber requirements for domestic purposes

The timber requirements for domestic and community needs by the local population are calculated as under:

**Table-8(E)**

|  |  |
| --- | --- |
| Total population  | 130000 |
| Average household size | 7.97 |
| No of existing houses | 9688 |
| Average life of a house in the area | 40 years |
| Number of houses required to be replaced during the plan period of 15 years | 3633 |
| Average increase in the No of households | 1% per annum |
| Total No of new houses to be constructed during the plan period | 3633+364=3997 |
| Timber requirements for new construction | 3.54 cum |
| Timber requirements for repair | 0.17 cum |
| Timber requirements for new construction | 14150 cum |
| Timber requirements for repairs | 680 cum |
| Total timber requirements | 14830 cum |
| Taking it as sawn timber the standing volume will be double the calculated quantity assuming average out-turn % at 50% | 29660cum |
| Allowance for rural uses (construction of culverts, bridges, schools, hospitals, and other such buildings etc.) Add 20% of the above | 5932 cum |
| **Total**  | **35592 cum or 2373 cum/Annum** |

All the domestic timber requirement cases will be placed before the VDC/WO by the individual members which by a written resolution will send these cases to DFO Kalam Forest Division who after verifying the genuineness of all such cases through joint verification team of VDC/WO, social and territorial staff will issue permit for such demands. It is foreseen that this procedure will build management confidence in the VDC/WO partner set ups.

## CHAPTER-9

## WORKING PLAN FOR IMPROVEMENT WORKING CIRCLE

## 9.1 General Description

The improvement working circle includes those forest compartments which have not been placed under selection working circle and where no sample plots were taken. Such stands are generally under-stocked, deficient in regeneration and are growing on steep slopes with numerous blanks which render them unsuitable for commercial exploitation. This working circle is represented in all the compartments as all such stands which are not suitable for timber harvesting have been assigned to improvement working circle. The reasons for allotment of such stands to this working circle are:

(a) In some stands the crop is wide open having density less than 40% which cannot be commercially exploited for the reasons of soil and water conservation.

(b) Most of the stands have pole and sub mature crop.

(c) In certain areas the crop is of irregular nature rendering it difficult to separate the workable stands from the rest of the crop.

(d) In some stands the average stocking is fair but the terrain does not permit them to regular working due to steep and precipitous slope.

(e) Some stands carry broad leaved species with small proportion of conifers.

The scrub forests included in this working circle are subjected to lopping and heavy grazing because they are situated near the habitation. In pure scrub forest *Qurcus ilex* is common, the regeneration of which is discouraging.

## 9.2 Area Distribution

The total area of this circle is 17417 ha which 45% of the working plan area is. Out of the total area of improvement working circle the area under agriculture and habitation is 950 ha whereas the blank area is 5793 ha. The compartment wise area distribution of improvement working circle has been given in Annexure-II, whereas the block wise area distribution is given in table: 9(A)

 **Table: 9(A) Block wise area distribution of Improvement working circle**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **BLOCK NAME** | **STOCK AREA(Ha)** | **BLANK(Ha)** | **AGRICULTURE****(Ha)** | **GROSS****AREA(Ha)** |

BAHRAIN

|  |  |  |  |
| --- | --- | --- | --- |
| 490.42 | 169.14 | 25.00 | 684.56 |

BALAKOT

|  |  |  |  |
| --- | --- | --- | --- |
| 1582.00 | 545.62 | 125.15 | 2252.77 |

BESHIGRAM

|  |  |  |  |
| --- | --- | --- | --- |
| 881.75 | 452.02 | 202.88 | 1536.65 |

CHEL

|  |  |  |  |
| --- | --- | --- | --- |
| 634.79 | 299.56 |  239.50 | 1173.85 |

DARAL

|  |  |  |  |
| --- | --- | --- | --- |
| 2265.43 | 1011.99 | 24.44 | 3301.86 |

GURNAI

|  |  |  |  |
| --- | --- | --- | --- |
| 623.40 | 426.38 | 38.69 | 1088.47 |

MANKIAL

|  |  |  |  |
| --- | --- | --- | --- |
| 1065.12 | 577.81 | 32.75 | 1675.68 |

PIA

|  |  |  |  |
| --- | --- | --- | --- |
| 407.89 | 346.20 | 140.37 | 894.46 |

RAMET

|  |  |  |  |
| --- | --- | --- | --- |
| 696.00 | 967.75 | 26.40 | 1690.15 |

TIRAT

|  |  |  |  |
| --- | --- | --- | --- |
| 677.04 | 338.00 | 37.29 | 1052.33 |

TORWAL

|  |  |  |  |
| --- | --- | --- | --- |
| 1037.19 | 554.37 | 57.75 | 1649.31 |

TOTAL

|  |  |  |  |
| --- | --- | --- | --- |
| **10361.03** | **5688.84** | **950.22** | **17000.09** |

## 9.3 Objectives of Management

The objectives of management of improvement working circle are:

(a) To involve the local population in the protection of forests and all kinds of improvement and developmental activities by effective extension program.

(b) To protect and improve the existing vegetation to make it suitable for commercial use in the future by intensive protective measures of natural regeneration and artificial planting.

(c) To check and control denudation of the hill slopes and improve upon the watershed values by soil conservation practices suitable to the site.

(d) To improve the habitat and ecological conditions so as to provide shelter to the wild life.

##  9.4 Method of Treatment

The forests of this working circle occupy 45% of the total working plan area which cannot be exploited at present due to poor stocking, pole and sub mature crop, steep slopes and un-established regeneration. Therefore protection and improvement becomes very much essential in which the local people should be actively involved. The blank areas should be planted with coniferous and fodder species, the area planted must be closed to grazing and all other operations except grass cutting. Only improvement felling is to be carried out by removing dead, dry, diseased and unsound trees. Thinning may also be carried out in dense patches according to the requirements of the site and crop. The material so extracted will be utilized for meeting the needs of the local people.

##  9.5 Planting Program

The past experience has shown that regeneration of blank areas by natural means is not promising; therefore extensive planting program will be needed to cover the existing blanks with most suitable species. The broad leaved species will be given preference in moist depressions and erosion sensitive areas. In order to cover the entire area in a systematic way a planting program has been prepared as given in appendix-17. This program has to be properly executed and planting areas strictly protected from grazing etc.

##  9.6 Soil Conservation

All possible anti erosion measures should be carried out on the loose sites and nullahs through planting of soil binding species and making of engineering structures such as check dams, gully plugging, spurs and terracing etc. so as to stabilize the soil. The structure so built should be planted with suitable species subsequently.

##  9.7 Regulation of grazing

The grazing pressure on these forests is very high and the complete closure of forests is virtually not feasible. Thus periodic closure to grazing and browsing i.e. rotational grazing should be exercised after getting the confidence of the locals. The duration of closure will depend upon the requirement of the crop, plantation and razing capacity of the adjoining areas of the locality where grazing is allowed.

##  9.8 Yield

No yield by volume or area has been prescribed in this working circle. Thinning, cleaning and improvement felling will be carried out at the discretion of Divisional Forest Officer in all the areas. Such timber harvesting will be utilized to meet demand of the local people for firewood and construction of houses, mosques and bridges etc. and departmental requirements if any. It is assumed that 60% local people will be met from the improvement working circle as explained in chapter-6 of part-II.

##  9.9 Implementation Strategy

The main issues in the sustainable forest management are illicit cutting of trees, encroachment upon forest land and unsystematic grazing of livestock. For the protection of forests against these problems the forest department will have to adopt an effective strategy. The department should fulfill the genuine demands of the local people for confidence building which will encourage the local people to participate in the afforestation, utilization and protection activities. The timber harvesting for commercial purpose has got a profit value in the minds of the people which should be used as a tool in engineering a mechanism for the protection and improvement of existing forests.