

COMMUNITY MANAGEMENT OF MEDICINAL PLANTS IN NEPAL: PRACTICES AND TRENDS TOWARDS SUSTAINABILITY

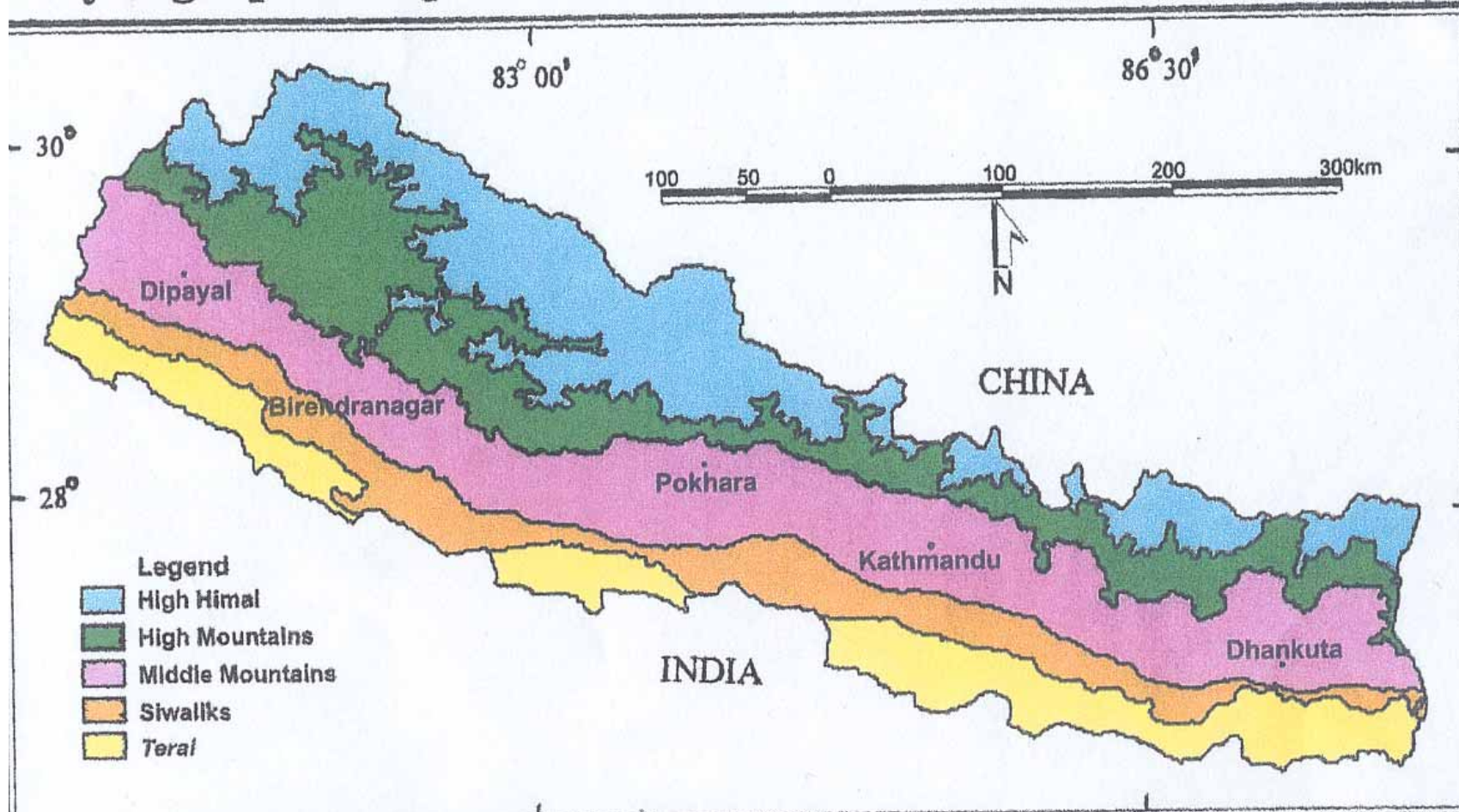
**EXPERT WORKSHOP ON ASSESSING THE
SUSTAINABLE YIELD IN MEDICINAL AND
AROMATIC PLANT COLLECTION**

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NEPAL

Physiographic Regions and Phytogeographic Divisions of Nepal



NEPAL

Area: 1,47,181 sq. kms.

- 35 Forest types
- 75 vegetation types
- 6000 spp. of higher plant species
- 1600 spp. in medicinal uses
- 100 spp. used in regular trade
- 90% of the traded herbs are wild resource based
- 90% of the raw materials exported in raw forms
- 90% raw materials exported to India

NEPAL

- Nepal is an important source of medicinal and aromatic plants in South Asia.
- Every year 15-20 thousand tons of wild plant products of more than 100 species, valued at 15-20 million US dollars, are collected and exported.
- The collection and trade in medicinal and aromatic plants is an important source of revenue to the government and a major source of cash income to rural people.
- Some 20 high demand and high value products constitute about 80% of the value and volume in trade.

The methodology development, use and management efforts carried out in Nepal has been outlined on the basis of the following two case studies:

Case Study – 1

Effort in the Khaptad region (1982-1983)

Khaptad

- A table-land in western Nepal
- Area: 232 sq.km
- Forest: 208.4 sq. km
- Pasture: 23.6 sq. km
- Altitude: 2260-3275m

MAP OF KHAPTAD

Bhattarai: Economic Mapping of 61

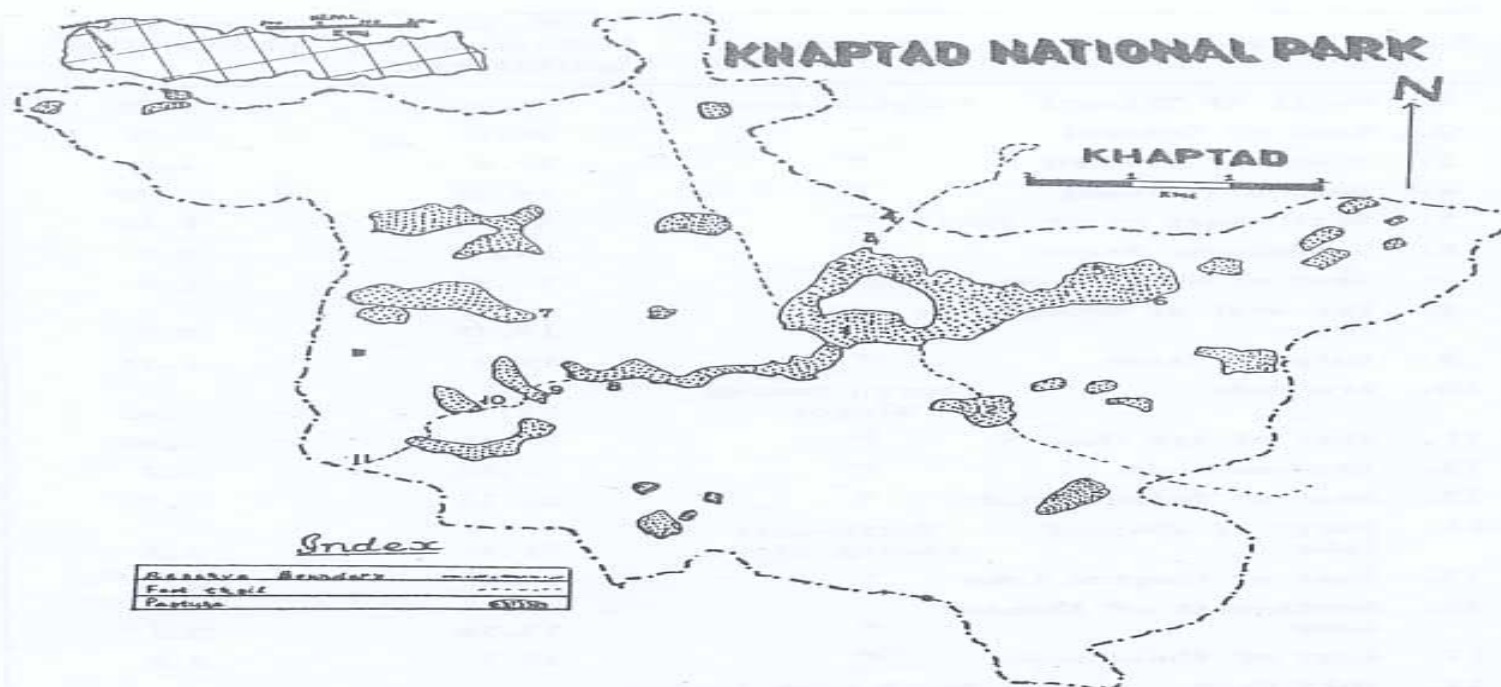


Fig. 3. Map of the study area showing different localities.

1. Triveni (3020m),	2. Ghodadaune Patan (3100m),
3. Are Muda (2800m),	4. Bajaune Muda (2500m),
5. Pulpula Patan (3100m),	6. Khaptad Lake (2920m),
7. Bhelchhado (2440m),	8. Buki Daha (3070m),
9. Suki Daha (3140m),	10. Choyagadne Odar (2620m),
11. Jhigadna (2260m), and	12. Sai Linga (3275m).

- *Skimmia laureola*

Family: Rutaceae

Small Perennial shrub

- Leaves are musk-scented
- Used as an incense and as flavoring agent in food
- Used in folk healing and other cultural practices
- Leaves are made into garlands and considered sacred
- Leaves are commercially harvested

Methodology

- 6 Physiographic locations considered based on nature of the land and slopes.
- 30 localities chosen for the random sampling.
- Quadrat size used: 100 sq. m (10 X 10 m)
- At least 40 quadrats along a transect in each locality.
- **Number of plants per unit area and the surveyed area (208.4 sq. km) worked out.**

(Table I) Production of leaves & plants of *S. laureola* in different localities of the Khaptad 'Lekh'

S.N	Localities	Location	Wt.of leaves/plants (gm/harvest)	No. of plants/100m ²
1	North of Triveni	Khaptad proper	20.24	2.35
2	East of Triveni	"	18.0	3.0
3	South of Triveni	"	17.8	1.4
4	West of Triveni	"	19.36	2.05
5	North-west of Triveni	"	17.92	1.45
6	Ghodadaune Patan	"	19.58	2.9
7	West of Ghodadaune Patan	"	17.24	1.4

Table I contd....

S.N	Localities	Location	Wt. of leaves/Plants (gm/harvest)	No. of plants/100m ²
8	Far-west of Ghodadaune Patan	Khaptad proper	17.76	0.95
9	Pulpula patan	”	14.9	1.95
10	Are Muda	North facing slopes	22.7	2.45
11	East of Are Muda	”	24.44	3.05
12	Bjaune Muda	”	24.86	4.2
13	West of Bajaune Muda	”	26.54	5.75
14	North of Khaptad Lake	North-east facing slopes	21.84	2.6

Table I contd.....

S.N	Localities	Location	Wt. of leaves/Plants (gm/harvest)	No. of plants/100m ²
15	East of Khaptad lake	North-east facing slopes	17.2	3.5
16	North-east of Khaptad lake	"	19.56	3.1
17	East of Bhelchhado	"	19.5	2.8
18	Buki Daha	South-west facing slopes	20.46	2.7
19	Suki Daha	"	19.34	2.9
20	Choyagadne Odar	"	22.12	3.3
21	Bhelchhado	"	23.68	4.5
22	North-east of	"	19.46	3.85
23	Jhigdana	East facing slopes	15.6	2.1
24	South of khaptad lake	"	18.38	1.9
25	North of Sai Linga	"	20.02	1.55
	East of Sai Linga			

Table I contd...

S.N	Localities	Location	Wt. of leaves/Plants (gm/harvest)	No. of plants/100m ²
26	Far-east of Triveni	East facing slopes	18.2	1.8
27	South of Sai-Linga	South-east facing slopes	19.3	1.5
28	South-east of Sai-Linga	"	16.1	1.55
29	South of choyagadne Odar	"	17.9	1.7
30	South of Buki Daha	"	17.5	1.35

Table II - Synopsis of average Production in different aspects.

S.N	Localities	Wt of Leaves/Plant (g/annum)	No. of Plants/100m ²	Prod. Of Leaves/100 m ² (g/annum)
1	Khaptad proper	36.18	1.94	70.19
2	North facing Slopes	49.27	3.86	190.18
3	North-east facing slopes	39.05	3.00	117.15
4	North—west facing slopes	42.02	3.45	144.97
5	South-east facing slopes	35.40	1.53	54.16
6	East facing slopes	36.10	1.84	66.42
7	The entire area under study	39.17	2.52	98.71

Leaf Productivity

- 100 random plants considered, once in each of the 30 localities to estimate the average leaf production per plant and/or per unit area;
- All leaves except for few terminal and immature ones collected for the assessment.

Table III- Percentage of essential oil in the fresh leaves of *Skimmia laureola* collected from different localities in the Khaptad 'Lekh'

S.N	Locality of collection	% of essential oil
1	Triveni	1.00
2	Ghodadaune Patan	1.10
3	Pulpula Patan	1.00
4	Are Muda	1.12
5	Bajaune Muda	1.11
6	Khaptad Lake	0.98
7	Bhelchhado	0.95
8	Buki Daha	0.95
9	Suki Daha	0.98
10	Choyagadne odar	0.93
11	Jhigadana	0.95
12	Sai Linga	0.93

Results

- Production of leaves per plant/harvest: 19.58 g
- No. of plants/100 square meter: 2.52
- Production of leaves per 100 sq. m/harvest: 49.34 g
- Production of leaves/harvest from 208.4 sq. km: 102.824 ton
- Production/2 harvest/year: 205.648 ton
- Essential oil content of leaves: 1% w/v
- Total essential oil available/year: 2056 liters

60% leaf harvest in experimental plots suggested assured sustainability

- Sustainable harvesting of leaf: 123.388 ton
- Essential oil: 1233 liters

Finally:

- During the next season, one monitoring harvest was done in a previously (60%) harvested 5 ha plot.
- While the average number of plants/unit area was nearly the same, the production of leaf (60%) was increased by about 19% (14.800 kg: 17.600).
- It suggested that the harvesting intensity can be increased considerably beyond 60%.

International Centre for Integrated Mountain Development (ICIMOD)

Medicinal and Aromatic Plants Programme in Asia (MAPPA)

MAPPA covers three principal research themes:

- a. Conservation of biodiversity through sustainable use
- b. Expansion of livelihood opportunities, and
- c. Safe and effective traditional medicine system for primary health care.

Community Forestry in Nepal

- In Nepal, the management of the national forest is being systematically handed over to the community of users. As a group, they share the rights and responsibilities of using and managing the forest;
- About 21% of the national forest totaling 11,85,565 ha represented by 14,227 forest patches have been handed over to the local community of users for management;
- The program has benefited 16,35,664 households representing about 29% of the country's population;
- Recently, the Community Forest User Groups (CFUGs) have emerged as a viable force for conservation and sustainable management of biological resources in the country;

Case Study – 2

CMAPSL, Nepal project

- Baitadi district : 10 CFs
- Darchula district : 8 CFs

Important plant species considered

- *Valeriana jatamansii* (perennial) (Root/rhizome)
- *Paris polyphylla* (perennial) (Root/rhizome)
- *Swertia chirayita* (biennial) (Whole plant)
- *Zanthoxylum armatum* (perennial) (Fruits)
- *Angelica glauca* (perennial) (Root/rhizome)
- *Bergenia ciliata* (Perennial) (Root/rhizome)

Assessing Resources for Sustainable Harvesting and Management

- The District FECOFUN and Community Forest User Group members are trained to produce Trainers who provide training and assistance to the Community Forest User Group members and work together.



Technical Assistance, Training and Capacity Building efforts included

- General information on medicinal plants, life-cycle, useful parts, harvesting, regeneration, value-addition/processing, trade, and propagation techniques;
- Resource assessment, over-harvesting, under-harvesting, harvesting techniques and sustainability issues;
- Establishment and initiation of *in situ* experimental plots for each species to subject different types and intensities of harvesting and regeneration studies;
- Establishment of community nurseries for each of the considered MAP species.

- Practical training on nursery techniques, production of seedlings and their management;
- Regeneration issues, *in situ* management, enrichment plantation;
- Exchange visits and observation tours

Resource Assessment in a Community Forest

- ‘Walk-through Survey’ and record the relevant baseline information;
- Identify and determine the ‘Blocks’ for each species
- Demarcate the considered MAP ‘effective area’ in each block and determine the area covered by a particular MAP species;
- Assess the resource through sampling technique using transect and quadrat methods;
- Determine the available resource in the effective area;
- Determine the sustainable quantity to be harvested.

Sampling Technique Used

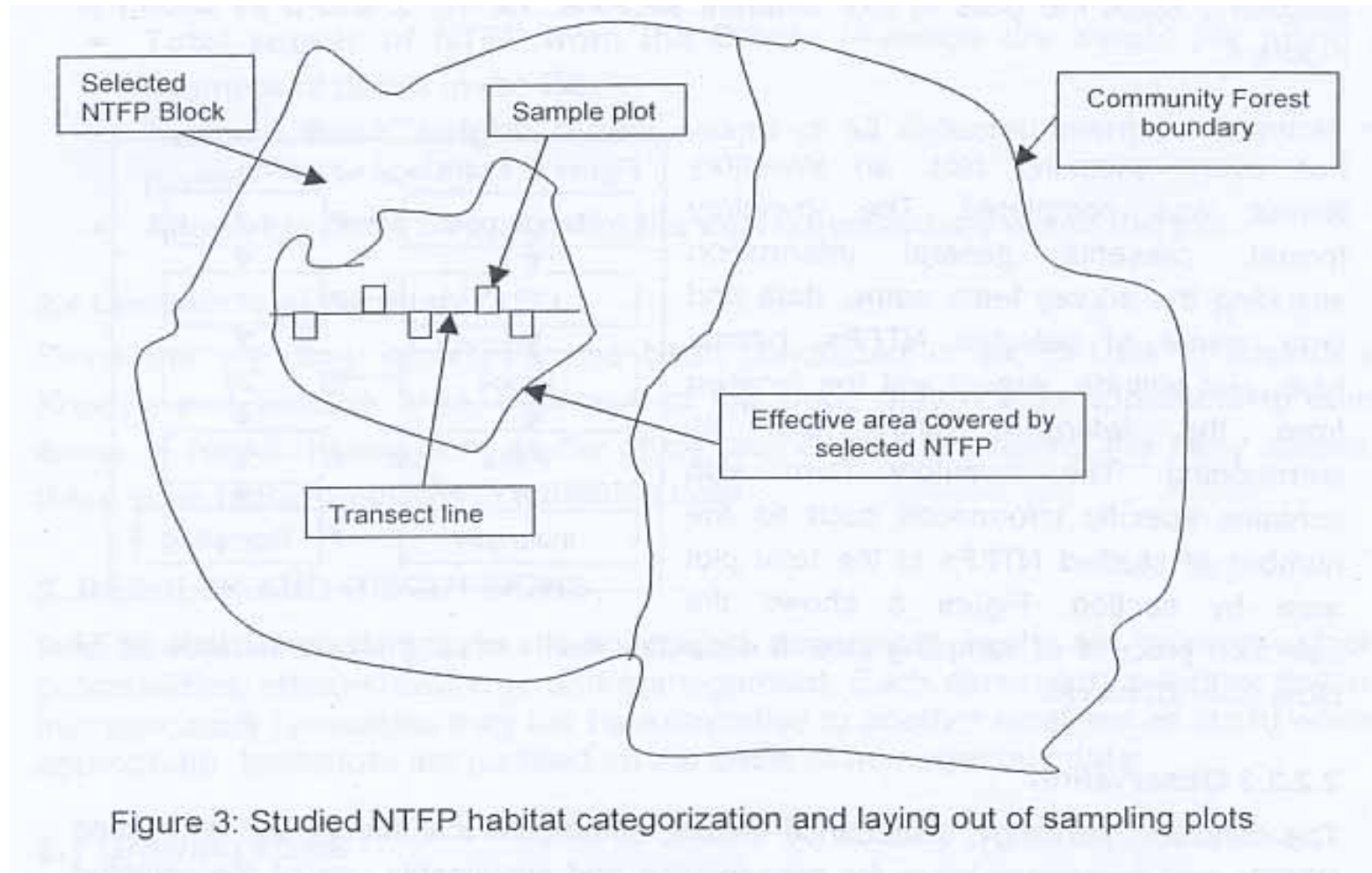


Table IV: Block Description, area and density of NTFPS in CFUGS

CF Area(ha)	Block No.	Block Name	Block Area(Ha)	Selected NTFPs for inventory	Effective Area (Ha)	Density /ha
Niglasaini 227.9	1	Salamdhar	56.774			
	2	Bhimakhatal	59.579	Chairayita	0.31	6300
				Sugandhwal	1	58000
				Banhaldi	2.31	3100
	3	Khalidanda	85.716	Chirata	8.36	5812
				Bhutkesh	2.25	14200
				Sub-total		14.23
4	Sallabasa	42.205	--	--	--	--

Table IV contd.....

CF Area(ha)	Block No.	Block Name	Block Area(Ha)	Selected NTFPs for inventory	Effective Area (Ha)	Density /ha
Sidhanath 205.9	1	Okhaldhar	56.65	Chairayita	5.18	6683
	2	Saturi	22.81	Chairayita	0.78	3600
	3	Katal	25.97	Chairayita	1.25	4900
	4	Salmari Timale	60.87	Sugandhwal	1.82	50700
	5	Chaumala Thadidhaar	40.87			
				Sub-total	9.03	

Table IV Contd....

CF Area(ha)	Block No.	Block Name	Block Area(Ha)	Selected NTFPs for inventory	Effective Area (Ha)	Density /ha
Sigas 286.72	1	Sallyadi Ban	81.592	--	--	--
	2	Khallidanda Ban	80.777	--	--	--
	3	Gopha Ban	185.625	Sugandhwal	1.75	12025
				Chairayita	4.25	67500
	4	Patherkhani Ban	38.788	Chairayita	2.25	8600
				Sub-total	8.25	

Table IV contd....

CF Area(ha)	Block No.	Block Name	Block Area(Ha)	Selected NTFPs for inventory	Effective Area (Ha)	Density /ha
Durgabha wani 105	1		26.125	Pakhanbed	2.44	2633
	2		28.752	--	--	--
	3		55.825	Sugandhwal	8.68	41150
				Pakhanbed	1.87	13700
				Sub-total	12.99	

Table IV Contd....

CF Area(ha)	Block No.	Block Name	Block Area(Ha)	Selected NTFPs for inventory	Effective Area (Ha)	Density /ha
Gwalek 189.32	1	Gwani Ban	36.48	Chairayita	7.72	6342
	2	Daudi Khalek Ban	60.23	Chairayita	3	11500
	3	Basai Ban	18.84	Sugandhwal	9	23555
				Banhaldi	2.31	3100
		Basai Ban	18.84	Pakhanbed	2.62	9100
	4	Belepatal	51.32	Satuwa	5.62	3200
	5	Dekhola majar khola Ban	22.45	Pakhanbed	3.68	23400
				Sugandhwal	1.62	8950
				Chairayita	4.25	16500
				Sub-total	37.51	

Table IV Contd...

CF Area(ha)	Block No.	Block Name	Block Area(Ha)	Selected NTFPs for inventory	Effective Area (Ha)	Density /ha
Kedar 169.436	1	Thulokhola	40.438	Satuwa Pakhanbed	3.37. 2.25	3933 11450
	2	Bakinneeija r Ban Serikedar	28.375	Chairayita	1	6600
	3		48.844	Sugandhwal	3.5	20633
	4	Goyalani Ban	20.27	Pakhanbed	3.35	11433
	4	Goyalani Ban	20.27	Pakhanbed	3.85	9500
	5	Dhajahalla	30.509	Chairayita	2.5	13700
				Sugandhwal	2.25	22250
				Sub-total	22.07	

Table V: Effective area of species in the individual CFUGs

CFUG	Area (ha)	Species	Effective area
Niglasaini	227.9	Banhaldi	2.31
		Bhutkesh	2.25
		Chirayita	8.67
		Sugandhwal	1
			14.23
Sidhanath	205.9	Chirayita	7.21
		Sugandhwal	1.82
			9.03
Sigas	286.72	Chirayita	6.5
		Sugandhwal	1.75
			8.25

Table 5: Contd.....

Durgabhawani	105	Pakhanbed	4.31
		Sugandhwal	8.68
			12.99
Gwallek	189.32	Chirayita	14.97
		Pakhanbed	6.3
		Sugandhwal	10.62
		Satuwa	5.62
			37.51
Kedar	169.43	Chirayita	3.5
		Pakhanbed	9.45
		Sugandhwal	5.75
			18.7
Total	1184.27		100.71

Based on the training and technical assistance, the CFUGs also practiced:

1. Harvest mature plants, after seeds are mature.
2. Employ enrichment plantation in case of immature and poor populated sites.
3. Underground parts:Harvesting 66% of the resource
Leaves: 75-80 %
Fruits/seeds. 90-95 %

4. Conduct periodic regeneration surveys and, if needed, enrichment plantations in the harvested sites
5. Use traditional knowledge and data from the experimental plots on the optimum productivity of a species in relation to time period which, according to them, varies from species to species.
6. 'Rotational Harvesting Practices' to give sufficient time for the vegetative growth of the species as well as to get the increased amount of the harvest.

Examples

- Annual harvesting for *Zanthoxylum armatum* (Tree; fruits)
- Two years for *Swertia chirayita* (Biennial herb: whole plant)
- Two years for *Valeriana jatamansii* (Perennial herb: rhizome)
- Three years for *Angelica glauca* (Perennial herb: root)
- Three years for *Paris polyphylla* (Perennial herb: rhizome)

Conclusions

1. Resource assessment is aimed at sustainable harvesting for the conservation compatible management goals.
2. Due to lack of justified methods, resource assessment always ends at resource estimation.
3. Almost any form of harvesting has an impact on the structure and function of plant populations.
4. Harvesting can be considered sustainable if the harvest has little or no long term harmful effect on the populations being extracted, when compared to equivalent natural populations not subjected to harvest.

Conclusions contd..

5. There are ways to exploit the non-timber resources produced by plant populations with the minimum of ecological damage. Doing so, however, requires management.
6. Baseline data about the size-class structure and yield characteristics of the population must be collected, regeneration surveys must be conducted, harvest levels must be periodically adjusted, and, in some cases, remedial treatments such as enrichment planting or weeding must be initiated.
7. Awareness creation, skill-based training and capacity building are necessary pre-requisites for the conservation compatible management of medicinal plants.

THANK YOU