Active *versus* passive management: issues for sustainable development of community forestry in mid hills of Nepal

Vijay P. Singh[1]

Once abounding forest resources of Nepal, due to over decades of continued exploitation, has constantly grown up to a state of deficit associated with ecosystem degradation. This has largely been realised by the threats in all lives of the poor mountain residents of the country. In response, the rural community living in the vicinity of these resources have organised themselves and enforced stern protection measures that act as a shield against usufruct rights of the community. In place of having dynamic equilibrium to the ecosystem through gradual interventions, the present custodial practices have hindered the growing capacity of the resource. The acute shortage of basic forest commodity brought in by the application of such practices and community anticipation to discern benefits beyond subsistence needs in future have put the sustainability of these organisations in to question. The frigid community mentality circumscribed by the hidden concurrence of field staff has to be thawed for any transformation to take place. The study carried out in central mid hill district of Kabhrepalanchowk during late 1999 gives scientific grounds for such transformation. Findings of the study spread over 22 different community forests of the district conclude that active management practices, harmonised with the forest ecosystem and social system, can contribute to sustainable forest management.

Key words: Community forestry, active management, passive management, sustainable development

Situated at the bosom of Himalayas Nepal is known for its copiousness in diverse biological resources, which are the mainstay of the livelihood. The natural resources of Nepal have remained under severe pressure for years to sustain rural and urban human needs. Nevertheless these dwindling resources, coexisting with varied ecological niches across the country, portray the narrative outgrowth of livelihood in the mountains against the gradient of resource richness and deficit. The country has imprudently spent from its heritage to give her a new outfit of development; and in doing so even the inherent buffering capacity of ecosystem was allowed to venture beyond the threshold of recovery. After years of malpractice what appears on every side is dismay and regret for losses against what it has gained. The threats imminent to life support systems in the mountains have unveiled the distressed residents towards perpetual tragedy.

Analysis of the reasons behind the present state in the mountains reveals that people's response to resource deficit situation is guided by indigenous knowledge accumulated over years that does not have any scientific credentials. Former interventions have largely remained supportive to people's prejudices, partly due to inadequate knowledge about renewability of natural resources. One of the common flaws in people centred approaches is that it is weak in adopting innovations and gives a false impression of good functioning at the very outset. In Nepal such approaches have been considered successful in protecting resources presumably for two covert reasons. Firstly, people enjoy their involvement in decision-making within the state-made frame of empowerment. Secondly, the professionals under their revised role are overwhelmed with the capacity of community to organise into functional groups and retain their ability to withstand during crisis.

Success achieved mainly in institutional aspect of community organisation has hardly brought any significant change in resource condition. The willingness to shift from status quo is deaccelerated due to unseen fear that persists in the mind-sets of people. Before taking any favour or opposition to

[1] Biodiversity Advisor, UNDP, Kathmandu, Nepal.

deeply rooted conservative practices, the empirical data have to be validated against the proposed modification.

The natural resources are subject to human interference and the inter-relationship can be observed in many ways. Management practices applied by the local people comprise a set of activities through which changes are introduced in the forest. These activities are linked to management objective of the forest, which is mainly the reflection of users' expectation from the resource. Based on past studies with regard to indigenous forest management systems in Nepal, they can be grouped into two categories. **Active management,** where in addition to traditional use of resource people apply silvicultural activities on purpose to modify forest vegetation, and **Passive management**, where virtually no silvicultural activities are applied and only protection-oriented actions such as collection of forest products are most common. The study was conducted with the primary goal of comparing the two forest management categories in terms of their effects on forest vegetation and the extent to which they contribute to sustainable forest management. However, this paper only encapsulates the findings related to the second objective.

Conceptual framework

Sustainability concept

Society depends on forests for a number of goods and services. Forest function is defined as a relationship between society and forest in which needs of society are fulfilled (Van Maaren 1988, quoted in Bos 1994). The extent to which forest fulfils certain function is related to social factors as well as site conditions and characteristics of the forest. This two-way interaction determines the relationship between forest ecosystem and the society. Forest management exploits this relationship through intervention in the forest aimed at fulfillment of certain objective. However, there are restrictions to ecosystem's potential to produce goods and services. If the use is greater than the carrying capacity of the forest, the ecosystem or some of its components degenerate. As a result, the production potential of the forest declines, and consequently the flow of goods and services also decline (Van Maaren 1991, quoted in Bos 1994). In addition to the economic benefits, the forest provides several non-wood benefits to the society. However, the economic benefits should not be optimized at the cost of other non-wood benefits (De Gier 1995).

Till the nineteenth century, the understanding of sustainability covered only the production function of forests aiming at maximum financial gain. Since the 1950s, an increasing number of authors (Plochman 1982; Speidel 1984, quoted in Hummel and Sizykh 1997) have considered ecological and social functions of forests as essential parts of sustainability. Zonneveld's (1990) model of sustainability argues that a sustainable solution falls in the intersection of the three spheres represented by three aspects of management namely social, ecological and economical.

The Brundtland Report on Sustainable Development (Brudtland 1987) implies that use of resource should be adjusted with the carrying capacity of the ecosystem in such a way that the ability of the forest to regenerate itself is not impaired and continuity of produce is ensured. For this to happen the ecological considerations are given priority against social and economic potentials of the forests by keeping level of harvest below the production capacity.

Object, scale and time dimensions

Bos (1994) suggested that management objectives could be expressed into object, scale and time dimension of sustainability. The object dimension represents either the use of the forest as a goal and the state of the forest as a means to achieve the goal or vice versa. Scale dimension means spatial level of sustainability: either the whole forest enterprise of a nation or the individual forest. Time dimension refers to tolerance of fluctuations in a flow of products within a particular period. Based on the situation prevalent in the forests of Kabhreplanchok, the clarification on what object, time and space dimensions of sustainability mean is given. Production of fuelwood, fodder for every day needs, use of leaf litter in making compost to enrich the soil, and timber for emergencies are present needs of the society. The future needs are conservation of soil and water and income generation through sale of timber as well as non-timber products (aromatic and medicinal herbs, cash crops, etc). The flow of these products to society through maintaining the social functions of the forest determines the object. The present and future needs of community are

associated with short and long term objectives of management and determine the time dimension. The inter-relationship between the forest and the society at individual forest level determines the scale of sustainability.

Sustainable management practices must take account of flow of goods and services needed by society, and should be reflected in short and long-term forest management objectives. In Nepal, Community forestry is a multiple-use forestry practice as it volunteers fulfillment of more than one function simultaneously. Diversity of forest products required by the society adds considerable complexity to sustainable management of these forests. Considering supply of products as goal of management and state of forest the means to achieve the goal, management practices must remain subsistent within the capacity to renew the resources. Practices that contribute to deteriorating state of forest are considered unsustainable practices and vice-versa.

Sustainability measurement

If the carrying capacity of the forest is known or a standard existed, then quantifying harvest and growth rate helps to assess the level of resource use, whether it is below or above the capacity of the forest to regenerate. To quantify the resource potential, the data on growth rate based on successive periodic measurements are required. This was neither available nor was possible to collect for the research. Literature review on criteria and indicators for sustainability assessment suggests that standards developed by various organizations lack consistency in scale and space. Further more they have never been tested in community forests of Nepal. This backdrop opens avenue for a new set of criteria and indicators to study forests and social systems. RECOFTC (1992) and Tropenbos (1997) have developed criteria and indicators to compare sustainability of community forests (Table 1). For this study, qualitative indicators are preferred to quantitative indicators because quantitative indicators bear no meaning without a reference value.

Table 1: List of criteria and indicators

Principle: Social and ecological forest functions are maintained		Indicators
	1. Community forest boundary is clearly demarcated	Input, Qualitative
Indicators	2. No boundary dispute does exist.	Input, Qualitative
	3. Community forest operational plans are legally approved	Input, Qualitative
Criteria 2: Traditional user rights and property rights are secured		
	1. Forest users right and property rights are clearly defined in operational plan	Input, Qualitative
Indicators	2. Rules exist for collection of forest produce	Input, Qualitative
	3. Traditional use of forest produce is continued	Output, Qualitative
Criteria 3: Community participation is enforced		
	1. People share activities regarding protection of forest	Process, Qualitative
Indicators	2. People participate in silvicultural activities.	Process, Qualitative
	3. People share in collection of forest produce	Process, Qualitative
Criteria 4: Continuity of forest produce is ensured		
	1. Forests are divided into blocks	Input, Qualitative
Indicators	2. Blocks are effectively used for management purposes	Input, Qualitative
	3. Multiple use species are present	Output, Quantitative
	4. Proportionate diameter distribution is maintained	Output, Quantitative
	5. Priority plant species are favoured	Output, Quantitative
Criteria 5: Community forest operational plans are successively implemented		
	1. Forest user group meetings are regularly held	Process, Qualitative
Indicators	2. Present and future management objectives are clearly stated	Input, Qualitative
	3. Violation of rules is controlled	Process, Qualitative
	4. Amendments in operation plan have been made as necessary	Process, Qualitative
	5. Community fund is created and effectively utilised	Process, Qualitative
	6. Actions taken are congruent with management objective	Output, Qualitative
Criteria 6: Equity in benefit distribution is secured		
Indicators	1. Clear harvest rules do exist	Input, Qualitative
	2. Quantity and schedule for collecting forest produce are fixed	Input, Qualitative
Criteria 7: Conservation of forest ecosystem is ensured		
Indicators	1. Forest soil and water is protected	Output, Qualitative
	2. Species diversity is maintained	Output, Quantitative
	3. Natural regeneration is maintained.	Output, Quantitative
	4. Crown cover of the forest is maintained	Output, Quantitative

Methods applied

Scoring, grouping and weighing of indicators

The responses for qualitative indicators were in the form of "yes", "no", "present" or "absent". To transfer these responses into numeric values 'zero-to-one scoring transformation' was used. Based on presence or absence of an indicator and its contribution to sustainable management, scores were assigned to these responses in the scale of either" 1 to 0" (for presence of an indicator) and "0 to 1" (for absence of an indicator). The indicators are grouped into four basic streams of forest and social system, namely 1) Pre-condition 2) Action 3) Implementation and 4) Outcome (Table 2). Pre-condition refers to pre-requisites for management. Both Action and Implementation are taken as process indicators. Actions refer to activities required to keep the management going on and include activities, which ensure participation in management, protection of forest, and management practices being applied. In implementation, activities used to monitor the actions taken to continue the management process are considered. Weight has been assigned to each indicator against its relative importance in input-output-system. Pre-conditions and Action indicators are given relatively less weight in comparison to Implementation and Outcome indicators.

Sustainability index

For the purpose of comparison, sustainability indices are generated for individual stream and based on that overall sustainability index is calculated. Formula used for calculating Sustainability Index for Individual Stream, (SIIS) and Overall Sustainability Index, (OSI) are.

$$SIIS = \frac{Sum\ of\ Weighted\ Scores\ of\ Indicators}{Number\ of\ Indicators\ in\ a\ Stream}$$

$$OSI = \frac{Sum\ of\ SIIS}{Number\ of\ Streams}$$

At this point, it must be realized that a degree of subjective judgement may have been introduced in formulating criteria and indicators, scoring and assigning weights to indicators. In semantic process of defining indicators and lack of guidance in assigning weight to them (Lowe, 1995) source of subjective biases can not be avoided.

Criteria for study area selection

Two criteria were used to identify study forests under two categories: one with active management and the other with passive management. First criterion was that forests were identical in origin and the second one that difference in two categories remained in level of management practices applied. Identical forests meant that the forests had similar development history in terms of physical conditions and species composition. To ascertain this, a topographic map of 1: 25,000 (based on 1992 aerial photographs) was used to find the location of forests in three range posts (Janagal, Mahadevsthan and Khopasi) within an acceptable degree of variation in slope, aspect and altitude. From a list of legally handed over community forests, 30 forests were identified and delineated on topographic map within two categories with the help of local forest rangers. The fulfillment of second criterion was ascertained by review of operational plans (management agreement between community and the government) field visit made to the forest area and holding talks to the members of forest users. The bases used to distinguish level of management between two categories were 1) limit on use of forest resource and 2) application of silvicultural operations like singling, pruning and thinning. Eventually 22 forests were selected of which 11 had a strong evidence of active management and another eleven forests had passive management (Table 3).

Table 2: Weight assigned to indicators

Pre-requisites (Input) 10% weight	Action (Process) 20% weight	Implementation (Process) 30% weight	Outcome (Output) 40% weight
1. Operational plan	1. Participation	1. Meetings	1. Produce continuity
2. Boundary	2. Protection	2. Offences	2. Objective agreement
3. Amendments	3. Management practices	3. Funds	3. Beneficiaries
4. Block division			4. Soil erosion
5. Rules			

Study forests

The dominant tree species in the study forests are *Schima wallichii, Castanopsis tribuloides and Castanopsis indica.* Most of the species found in this forest are important sources of fodder, fuelwood and timber for local population (Stainton 1972; Thomson 1986). The forests are generally two storied in structure, rich in species composition and generally evergreen with a minor deciduous component and have strong coppicing ability. Many forested areas in the region are almost entirely of coppice origin (Thompson 1986). The multiple requirements have placed the forest at intense pressures. Some communities have collected products on sustainable basis, while others have converted the forest into shrub land. More than 50% of the terrain in the district is covered with forests and shrub lands. Forest density and tree maturity vary considerably. More than half of the forests have a very low crown density and are covered with immature or small timber.

Inventory data and variables measured

A systematic sampling design was applied due to its convenience on slopes. Concentric nested circular plot design was used for data collection on various attributes of vegetation and topographic variables at each sampling point. Acharya (1996) previously used this design for bio-diversity study in the same forest type in Nepal. The design consisted of three concentric circular plots originating from the same plot center - seedling plot of 50 m^2, sapling plot of 200 m^2 and tree plot of 400 m^2. A lay-out of 30 plots in each set of eleven forests was done following the rule that at least two plots were to be located in each forest with approximately one plot per 10 ha. Data on three different variables were collected for this study. They were 1) variables which were indicators of harvesting plant biomass (number of stump, height of cut number of coppice), 2) variables which were indicators of structural attributes of the vegetation (species count, DBH, top height, crown diameter, crown cover, life forms) and 3) physiographic site variables (altitude, slope aspect).

Data capture on social aspects of management

The purpose of the social data collection was to solicit information about the social aspects of forest management such as kinds of management practices applied, forest product need, choice of priority species and future thinking on forest management by the local people. Qualitative indicators selected for sustainability measurement are directly related to the functioning and organizational aspect of social system and need social data to be collected. "Key informant survey", a widely accepted method in Rapid Rural Appraisal (RRA) technique, (Jackson and Ingles, 1995), was applied.

Results and discussion

Management practices

Thinning, cleaning, singling and pruning were the main activities in the active management forests. The significant difference in number of stumps in two management categories explains its strong linkage

Table 3: List of forests under two categories

Active Management				Passive Management			
Name of forest	Code	Area (ha)	No of plots	Name of forest	Code	Area (ha)	No of plots
Bhasme Pakha	1	13.25	2	Bhagwan Thumaki	1	42	3
Bule	2	17.92	2	Bhote Patal	2	41.25	3
Dharapani Bisauni	3	13.05	2	Chandika Ban	3	12.96	2
Gokhureshwar Ban	4	21.5	2	Dhobikhola	4	17.32	2
Indreshwar "gha"	5	61.4	4	Dibdol Taulakh	5	59.56	4
Indreshwar "ka"	6	49.5	4	Indreshwar "ga"	6	17.8	2
Jyalachitti	7	25.29	2	Jwaladevi	7	30.19	3
Nala ko Ban "ga"	8	20	3	Mayaltar Dhaneshwari	8	35	3
Nala ko Ban "kha"	9	30	3	Nala ko Ban "ka"	9	15	2
Pandey Ban	10	25	2	Namdikhola	10	45	4
Sardadevi	11	44	4	Satti ko Ban	11	3	2
Average		29.17				29.01	
Total		320.91	30			319.08	30

with the level of biomass harvested from the forests. In active management, harvesting activities are part of the silvicultural practices that are regularly applied according to the rules mentioned in the operational plan. In passive management category, harvesting is not a scheduled and planned practice and occurs through violation of rules.

Social aspects of forest management

Table 4 shows the difference between the two categories of forests as regards organisation of activities, functioning of users group and implementation of operational plan. Some points are elaborated below:

1. In Active Management, in addition to what people collected traditionally (leaf litter, small and large fuelwood from dead and dying branches and trees) the community is collecting green fuel wood and large timber, which comes through silvicultural operations and income is generated through sale of surplus product. This verifies the conclusion from previous study that an established user group is capable of obtaining benefits beyond their subsistence needs (Jackson and Ingles, 1994). In Passive Management, use is more conservative and harvesting of green products is uncontrolled.

2. In case of Active Management, apart from the sale of produce, income from community forests is generated through levying membership fees and fines or penalties (Hunt *et al.* 1995). The community fund is being used in maintaining nurseries, planting medicinal herbs and other cash crops. A part of community income was used in community welfare activities like construction of a community-training hall and contribution to schools, roads, and drinking water and soil conservation projects.

3. In active management, the protection through paid watchman is gradually replaced by community protection, which is more effective in regulating the harvest. The higher degree of participation is not observed in protection activities, collection of produce and application of silvicultural operations. In Passive

Table 4: Summary of findings of social data analysis

S N	Aspect of management	Active management	Passive management
1	Boundary	Demarcated, no dispute	Demarcated, dispute present
2	Block Division	Blocks used for management purposes	Blocks not used for management
3	OP Implementation	Mostly under second and third phase	Mostly under first and second phase
4	Amendments in OP	Amendments were made in operational plans	No amendments done
5	Use of forest produce	Present use is more than traditional use	Present use is more conservative
6	Participation	Ensured in protection and collection of produce & other activities	Participation is seen in protection only
7	Management Practices	Silvicultural operations, collection and protection activities	Only collection of dead trees and protection activities are practiced.
8	Distribution Pattern	Scheduled activities, quota are fixed and concession rules exist	Not organized in terms of schedules, quota and rules
9	Management objective	Equal priority to soil and water conservation and production	Priority to soil and water conservation
10	Forest offences & penalties	Offences controlled	Offences uncontrolled, violation of rules exist
11	Community funds	Fees levied against produce and fund exists	No funds exists and fees levied is very little
12	Meetings	Meetings regular	Irregular meetings
13	Protection	Effective community protection	Protection through watchman
14	Agreement with future objective	Actions are taken according to future objective of management	Actions do not comply with future objective
15	Beneficiaries	Most users are benefit	A part of users benefit
16	Income Generation	Activities started	Nothing done
17	Other activities	Fund used for other community development activities	Nothing done

management, no activities except collection of dead dying trees are performed, and division of a forest into blocks is meaningless.

4. Product distribution pattern is more organized in Active Management. To ensure equity in distribution, rules exist for scheduling the activities, fixing the quota for how much forest produce can a household collect and how to organize the collection. In some cases, Passive Management rules for closing and opening of forests for collection but not practiced, as collection of forest produce continued throughout the year in every block of the forest. An institutional framework for sharing the benefits (either cash or subsistence) is an essential part of active community forest management. If costs and benefits are equally distributed among the members, adherence to regulation is more likely.

Sustainable management practices

The comparison based on qualitative indicators clearly indicate that the active management practices fulfill the necessary conditions for sustainable management such as security of use rights, tenure, equity in benefit distribution and participation. Sustainability indices calculated for both categories of forests (Table 5) testify that active management practices provide better opportunity of resource utilization and people are capable of fulfilling their present and future needs. The active management forests are modified through application of silvicultural treatments in such a way that users have more opportunity to utilize the resource. The passive management forests, where collection of only dry materials is allowed, management objectives are not likely to be fulfilled. Albeit the community wants to manipulate the forests in order to bring it into income potential state no actions are taken to do so, indicating a gap between the future management objective and readiness to adopt congruent practices.

The results on social aspects of forest management are verified against the results of analysis of quantitative data collected on forest vegetation. Some points are discussed below:

- Sustainable management needs a continuous produce-flow, which can only be ensured if there is a sufficiently large number of stems in smaller diameter classes and there is a good growing environment for them. The larger number of stems in lower diameter classes, large number of seedlings and significantly higher sapling height and crown diameter in Active Management assure that such practices are directed towards continuity of produce-flow. In passive management forests, only conservative resource-use practices are applied, which do not contribute to income generation and do not even meet the subsistence needs of the community. This is why under passive management forests, harvesting is unscheduled, participation is poor in protection activities, benefit distribution mechanism is not effective and plans are poorly implemented.
- In active management forests, where harvesting activities like thinning and singling are more organised and stems should be cut according to rules a bigger consistency in height of cut would be expected. The significant correlation (at α = 0.05) between coppice number and stump height for the two diameter classes of stumps and the

Table 5: Sustainability index

Streams	Sustainable index (SIIS)		Difference (%)
	Active management	Passive management	
Pre-condition	0.09	0.05	44
Action	0.19	0.08	57
Implementation	0.29	0.16	44
Outcome	0.36	0.24	33
OSI	**0.24**	**0.13**	45

Note: OSI- Over all Sustainability Index, SIIS, Sustainability Index of Individual Stream

relatively smaller variation (σ) in stump height found in the active management forests bears out this consistency in height of cut. In the passive management forests however, no such consistency in height of cut is seen, which indicates that people venture into the forests to cut trees illegally and are not much interested in systematic harvesting at regular heights but rather cutting down a tree quickly and making a fast exit from the forest.

- Effects of harvesting are seen in sapling and tree species distribution. In active management forests, less preferred species like *Lyonia ovalifolia* and *Symplocos pyrifolia* are heavily cut (presence of more stumps and very few saplings and trees) and priority species like *Schima wallichii* are more frequent (presence of few stumps, and more saplings and trees). In passive management category, the less preferred species (*Lyonia ovalifolia* and *Symplocos pyrifolia*) are more frequent and the priority species (*Schima wallichii*) is heavily cut.
- The effect of management is seen in sapling height and sapling crown diameter, which was significantly greater in active management. In active management forests old trees are cut down, dead, dying and diseased trees are removed, and cleaning of bushes is done to favour saplings to grow fast. In passive management forests, where no such activities are carried out, trees overtop saplings and their growth is inhibited. The higher number of stems in bigger diameter classes, which influence the canopy, explains the higher crown closure in passive management forests.

Conclusion

Following conclusions are drawn from the study:

- Active management practices satisfy the conditions of sustainable management and secure the resource potential for continuous flow of produce in future. They provide opportunities for better resource utilization and income generation from the forests. They further contribute to higher degree of participation; and ensure effective protection and benefit distribution mechanisms.
- Carefully chosen qualitative indicators can be used to generate sustainability index at community forest level and on the basis of that index level of management between forests can be compared.
- There is an increasing need of managing community forests for sustainable objective of income generation

Recommendations

"Increasing opportunities for more resource utilization through substituting the passive management practices by active management practices is necessary to keep the forest conditions in a dynamic state which can fulfill the growing and changing needs of the society". But caution should be taken in optimizing the material benefits, and the role of forests in conservation of soil and water should be equally considered.

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