

**The flow and distribution of costs and benefits in the Chuliban community  
forest, Dhankuta district, Nepal**

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**Summary**

In Nepal, the number of Forest User Groups (FUGs) and areas of community forest are increasing every year. If these FUGs and community forests are managed properly, they can provide many direct and indirect benefits to the local communities on a sustainable basis. Forests are an integral part of the farming system and ecosystems of Nepal, therefore the sustainability of the two are inseparable. This case study illustrates the importance of a range of social and economic indicators, in addition to the usual environmental indicators, as a measure of sustainability. The identification, quantification and valuation of the costs and benefits associated with the management of a community forest can help the FUG to monitor the sustainability of their management regime. In the case of the Chuliban community forest, the distribution of these costs and benefits among the different forest users was found to be a particularly critical factor that could lead to the long-term success or failure of the FUG.

**INTRODUCTION**

Community forestry is the control and sustainable management of local forest resources, by those who use these resources in multi-dimensional ways for their welfare on an equitable and sustainable basis (Maharjan, 1993). It is now the main thrust of Nepal's forest policy and is aimed at providing basic needs and economic benefits to the rural population. The master plan for the forestry sector of Nepal has defined clear-cut guidelines to put all community forestry management under the control of Forest User Groups, which are defined as a specific group of people who share mutually recognised claims to specified user-rights to a forest (Gilmour and Fisher, 1991). It is intended that this will ensure equitable sharing of costs and benefits among the stakeholders and encourage sustainable forest management in Nepal. So far more than 5,277 FUGs have been formed and a total of 345,914 hectares of forest have been handed over as community forests (MFSC, DoF, 1997). In order to empower the

FUGs to manage community forests on an equitable and sustainable basis, the government has introduced progressive new Forest Acts (1993) and Bye-laws (1995). In spite of these enlightened and forward-looking ideals for the development of sustainable forest management, the equitable sharing of costs and benefits among users and other stakeholders has become one of the most challenging issues. The planning and development of community forestry is a complex process governed by socio-economic, political, ecological, technical and administrative factors. This paper presents a case study of the flow and distribution of the costs and benefits in one of the FUGs of the Dhankuta district. It highlights the need for stakeholders of community forestry to develop equitable cost and benefit sharing processes in order to achieve sustainable management.

## METHODOLOGY

This exploratory study was based on both primary and secondary information:

- All costs and benefits incurred in the management of the Chuliban community forest were identified, quantified and valued as far as possible using Participatory Rural Appraisal (PRA) tools such as focus group discussions, semi-structured interviews and time-line surveys.
- The flow and distribution of costs and benefits in the Chuliban community FUG were assessed with the help of the FUG constitution, its operational plan, records and minutes of its meetings and assemblies.
- Forest users such as women, poor and disadvantaged groups and other ordinary users were randomly selected and interviewed to obtain primary information on the flow and distribution of costs and benefits.
- Finally, all information collected from the users was triangulated with information from neighbouring forest users and with direct observation of management of the Chuliban community forest.

## THE CHULIBAN COMMUNITY FOREST AND ITS FOREST USER GROUP

The Chuliban forest is one of the oldest community forests of the Dhankuta district. It is located in the Dhankuta Municipality Ward No.7 and comprises 15 hectares of chir pine (*Pinus roxburghii*) and *Schima-Castanopsis* forest. According to local people, in 1992 parts of the forest were entirely degraded because of uncontrolled cattle grazing, forest fire and illicit cutting of trees. Aware of the importance of the forest for their subsistence use and for conservation, the local people approached the District Forest Office (DFO) with the aim of setting up a Forest User Group (FUG). The FUG was formed in March 1993 on the basis of traditional user rights. It has an executive Committee of eleven people who prepared the FUG constitution and operational plan (with

assistance from the District Forest Office) for approval by the FUG assembly and the DFO.

The Chuliban FUG is ethnically very hetero-geneous, consisting of groups of Rai, Magar, Newar, Tamang and Brahmin, as well as disadvantaged groups such as Pariyar, Sarki and Bisokarma, spread over seven hamlets of the area. The area is characterised by a subsistence economy with most forest users being farmers, and some being landless labourers. The FUG has specified the following two objectives for the management of the forest:

- to fulfil the basic needs of users for forest products such as fuel wood, fodder and timber on a sustainable basis;
- to increase the greenery of the area. To facilitate management, the forest is divided into ten blocks as shown in Table 1. A forest operational plan outlines the silvicultural operations to be implemented in each of the blocks.

**Table 2** Direct use values from Chuliban Community Forest 1993-97

Forest product (unit)	Quantity produced in the year					(a) Market price (Rs./Unit) (b) FUG price (Rs./Unit)					Total market price (Rs.)	Total price recovered through sales (Rs.)	Total indirect subsidy (Rs.)
	1993	1994	1995	1996	1997	1993	1994	1995	1996	1997			
Green fuel wood (Bhari)	160	200	200	300	200	(a) 25 (b) 0	30	40	50	60	45,000	0	45,000
Air dry fuel wood (Bhari)	70	60	0	0	200	(a) 30 (b) 0	35	45	50	65	17,200	0	17,200
Timber (cubic feet)	0	0	0	1,085	0	(a) 40 (b) 10	40	40	40	40	4,340	1,085	3,255
Poles	0	0	84	42	8	(a) 20 (b) 15	20	20	20	20	2,680	2,010	670
Tree fodder (Bhari)	90	90	90	90	90	(a) 10 (b) 0	10	15	20	25	6,780	0	6,780
Bedding material (Bhari)	600	600	600	600	600	(a) 5 (b) 0	5	10	15	20	33,000	0	33,000
Cut grass (Bhari)	480	480	480	480	480	(a) 5 (b) 0	5	10	15	20	19,200	0	19,200
Red clay for domestic use (Bhari)	311	180	149	96	96	(a) 5 (b) 0	5	5	5	5	4,160	0	4,160
Red clay sold outside the FUG (Bhari)	121	42	37	0	90	(a) 5 (b) 3	5	5	5	5	1,450	1,050	450
Stone (Bhari)	0	0	10	0	0	(a) 5 (b) 10	5	5	5	5	50	100	0
Income from selling ginger*	80	309	413	551	73							1,426	0

\* The FUG collected 5% of the income made by each of the ginger cultivators.

## Forest product collection and distribution

Fuel wood, poles, fodder grasses, leaf litter, other grasses and sometimes timber, red clay and stones are the main products that are collected from the Chuliban forest for the FUG's domestic purposes. The collection and

distribution rules for these forest products are outlined in the FUG constitution and forest operational plan as follows:

- *Fuel wood.* Fuel wood is collected from singling, pruning and thinning operations that are carried out in the 8 to 9 year old *chir* pine plantation. According to the operational plan, each household is required to send one person to carry out silvicultural operations. The fuel wood produced is distributed equally, free of charge, to each of the households. In addition, users can collect dry twigs and branches from the forest throughout the year free of charge.

- *Timber and Poles.* Sometimes timber and poles are available from over-mature trees and the older plantations of the Chuliban forest. The FUG Committee carries out a needs assessment of the users and can provide up to 50 cubic feet of timber and a few poles to those who particularly need timber and poles for house maintenance. For this, users are charged Rs.10 per cubic foot of timber and Rs.15 per pole. These prices are set by the FUG to be lower than those of the free market (where timber costs about Rs. 40 per cubic foot) on the understanding that members use the materials for their domestic needs rather than selling them on.

### Major findings

Strict protection is leading to a gradual improvement, in some areas, of the condition of the Chuliban forest in terms of natural regeneration, crown density and growth. Control of cattle grazing and forest fires have, for the first time, led to a good growth of grass from the rootstock. Similarly, the *chir* pine trees planted by the District Forest Office in some parts of the area are now providing fuel wood and poles of significant commercial value. Nevertheless, as over half of the designated forest area remains under-stocked, there is still a need for enrichment with multi-purpose tree species. In some gullies, the FUG has planted bamboo clumps for various income-generating activities. However, the survival rates of bamboo and some tree species are very low. In addition, the old and mature planted and naturally regenerated forests have not been properly managed with the result that optimum production levels of poles, timber and fuel wood have not been attained. It has, therefore, not been possible to meet the needs of all poor users. Nevertheless, community management of the Chuliban community forest has provided some benefits to the users. In the following section the costs and benefits of management are assessed and their distribution between users analysed.

### IDENTIFICATION OF COSTS AND BENEFITS

Identifying the costs and benefits of community forestry may present no major conceptual difficulties, but can be very difficult to carry out in practice due to

the multiple purpose nature of community forestry (Gilmour and Fisher, 1997). It is

- *Tree fodder.* Users can collect fodder from *Castanopsis*, *Quercus* and *tilke* (*Wendlandia coriacea*) trees free of charge between October and June.
- *Cut grass and bedding materials.* Grasses and bedding material for cattle can be collected freely from the forest.
- *Red clay collection.* The users can collect red clay free of charge for domestic use (on house walls and floors) as long as they do not damage the trees. Initially, outsiders were charged Rs.5 per bhari (head-load of about 30-40kg) of red soil. Special provisions were made for two Tumhere households who are very poor and whose main occupation is selling red clay. They can collect two bharis of red clay every day, free of charge. However, last year, in an attempt to minimise soil erosion inside the forest, the FUG decided to ban all collection of red clay by outsiders.
- *Collection of stone.* Initially, users were able to collect stone from the forest for construction purposes in exchange for payment of Rs.10 per bhari. However, for conservation reasons, the FUG has now decided to stop such collection of stone.

#### Forest protection

The forest is protected from cattle grazing, illicit felling of trees and collection of forest products through a strict system of forest watching overseen by the FUG. Every day two households are required to patrol the forest on a rotational basis. Failure to take one's turn at patrolling leads to a fine of Rs.50, equivalent to a day's wage. Usually easier to identify and estimate the values of costs rather than benefits because they are more tangible. Benefits are also more difficult to compute as they usually occur in the future (Nicolson, 1972). For example, the benefits of afforestation in terms of reduced soil erosion may not show up for many years or even decades. Furthermore, an analysis of the overall costs and benefits of community forestry needs to take into account the many, often apparently insignificant, costs and benefits of small-scale management such as in the Chuliban case. Here, the values of some of the direct economic costs and benefits associated with such management are estimated as follows:

#### The benefits

##### *Direct benefits and their values*

Incomes to the FUG from the collection of fuel wood, poles, timber, leaf, litter, and fodder, grasses, bedding materials, red clay and stone for

construction purposes are taken as the direct benefits. The valuation of timber, poles, red clay and stones is carried out according to the prices fixed by the FUG, whereas fuel wood, tree fodder, grasses and bedding materials are valued using the labour costs for their collection.

#### *Indirect benefits and their values*

The indirect value of community forests refer to social and environmental goods and services that the Chuliban community forest provides. Forest degradation and destruction might imply the loss of many of these environmental benefits, although the extent of the loss would depend on the subsequent land use. Environmental benefits might include a decrease in soil erosion, reduced downstream flooding and siltation, and an RDFN paper 23e - Summer 1 increase in biodiversity. Employment generation, the establishment of an organised FUG, and social integration might be some of the social benefits. It is never easy to estimate the value of indirect forest use as the data requirements are substantial and the linkages between cause and effect are difficult to determine.

#### *The costs*

The costs incurred by managing the Chuliban community forest are the direct costs of management and non-management. The non-management cost is the opportunity cost of alternative land use foregone by maintaining land under forest cover.

#### *Management cost*

The direct costs are the capital expenditures on the nursery operation, the silviculture operation, the protection of the forest, plus recurrent expenditure including FUG institution management such as meetings and travelling.

#### *Opportunity cost*

Keeping land under forest cover precludes the possibility of other land uses. Evaluating the benefits of the next best option to forest cover, or the most likely alternative land use, is a way of assessing this opportunity cost. The range of possible uses of forest land is extensive. The most likely alternative would be to use it for cattle grazing. Taking variations in the carrying capacity and the different livestock into account, the potential value of cattle grazing on land that is now occupied by community forest has been provisionally estimated at Rs.8 per annum per cattle unit.

### **THE FLOW OF COSTS AND BENEFITS IN THE CHULIBAN COMMUNITY FOREST**

The overall economic impact of conservation and sustainable management of the community forests will be the sum of benefits less the sum of costs. The flow of benefits from the forest, in terms of the quantities of different products collected in the first five years, is shown in the left-hand columns of Table 2. The financial returns from the Chuliban forest were calculated using the prevailing market prices shown in the adjacent columns. Where products were used for subsistence rather than being sold, their value was considered to be an indirect subsidy. The figures in Table 2 include only the direct use values of the forest, so the indirect use values (environmental services) and non-use values (option and existence values) are excluded. A simple cost-benefit analysis was carried out, considering only those economic flows arising within the Chuliban FUG. The important externalities of reduced downstream flooding and siltation reduced urban migration and demonstration effects to other regions of Nepal were ignored. Hence, the study has a rather conservative bias. The flows of costs and benefits from the Chuliban community forest were extrapolated to a 50 year rotation, based on the assumption that, within this period, any plantation or naturally regenerated forest would be ready for harvesting under a selection system.

**Table 1** Operational Plan for Chuliban Community Forest

Block No.	Area in Ha.	Forest type	Condition	Estimated yield (timber, poles, fuel-wood) in ton/ha/yr	Prescribed silvicultural operation	Year in which operation will be carried out
I	2.00	Pine forest	Good	2.5	Planting in blank areas and thinning in planted areas	1993
II	1.00	Pine forest	Poor	0.5	Weeding, planting and pruning	1994
III	1.25	Pine forest	Poor	0.5	Weeding, planting, pruning and income-generating activities	1993
IV	1.25	Katus ( <i>Castanopsis</i> spp.) and Pine forest	Good	7.0	Planning, cleaning and thinning	1995, 1996
V	1.69	Katus and other broad-leaved forest	Average	6.0	Singling and planting	1998
VI	1.50	Pine forest	Average	3.5	Thinning	1997
VII	1.50	Pine forest with some Sal trees	Average	1.0	Planting and pruning	1999
VIII	2.00	Sub-tropical deciduous hill forest	Poor	0	Planting and protection	2000
IX	1.75	Sub-tropical deciduous hill forest	Poor	0	Planting and protection	2001
X	1.00	Sal and Pine forest	Poor	1.25	Planting, pruning and income-generating activities	2001

Source: Chuliban Community Forest Operational Plan (1993)

The Internal Rate of Return (IRR) criterion was adopted for this study. It can be considered as the discount rate, which equates future benefits to future costs, or the effective rate of interest applicable to the investments. The costs and benefits for the years beyond 1997 were estimated based on the actual costs and benefit flows associated with the management of the Chuliban forest. Wherever possible, prices of forest products were taken from Dhankuta transactions. However, as many of the flows do not involve monetary transactions, community based prices may be poor estimations of economic value. The returns from the mixed pine and hardwood plantations were estimated on the basis of yields of timber, fuel wood, fodder, litter and grass observed from similar community forests. Depending on whether the FUG or government price for timber was used, the IRR of the Chuliban community forestry comes to about 3% and 6% respectively. Both of these are lower than the interest rates provided by the commercial banks of Nepal for fixed deposits or saving accounts. They are also far lower than the financial IRR (39.3%) and the economic IRR (64.9%) estimated in the 1988 Master Plan for the Forestry Sector of Nepal for a 100Ha protected community forest similar to that in Chuliban.

The low IRR has a number of possible explanations. One is that the management of the Chuliban community forest is an inefficient investment of resources, and that the FUG needs to manage the forest more intensively to increase productivity. But a second is that the prices used in the analysis underestimate the real values of the forest products, especially the home consumption values, to the local people. A third is that the real value of the forest is not so much in the tangible as in the excluded non-tangible values. A fourth is that a low interest rate may be acceptable if there are limited alternative investment to them does not have a significant impact on their domestic life. These differing levels of dependence on the forest resources have major implications for the future sustainability of community forest management.

The physical costs of guarding the forest are borne solely by the Chuliban FUG members. Given the nearby urban markets for fuel wood and other forest products, the Chuliban FUG members are losing a potential income by strictly limiting exploitation. Most of the Chuliban forest users are also highly dependent on forest products for their subsistence needs and are too poor to replace these from other more costly sources. Thus, although the conservation benefits of the Chuliban community forest are not only local, but also national and global in nature (including other stakeholders such as visitors, as well as indirect, option and existence values), the costs of management fall largely within the FUG. Yet these forest-adjacent dwellers are the least able to bear the long-term financial costs of conservation, thereby jeopardizing its financial sustainability.



## User participation

The inequitable distribution of costs and opportunities is probably the case for this community. Possibly there is a combination of all these factors in the apparently very low return to the forest investment.

## WHO GAINS AND WHO LOSES?

In assessing the costs and benefits of community forestry, it is important to take into account who bears the costs and who receives the benefits. The primary stakeholders in the Chuliban community forest are the FUG members, who include different interest groups and people of varying economic status. Other stakeholders include the District Forest Office, the Nepal UK Community Forestry Project, the NGOs who provide technical support and raise awareness among the users, and the national and international visitors who come to the Chuliban for study purposes. All these groups obtain some direct and indirect benefits from the Chuliban community forest, and may bear both direct and indirect costs. During the study it was noticed that most poor and disadvantaged users seemed unhappy about the distribution of costs and benefits. At present the main forest products distributed are fuel wood, poles, timber, and fodder grasses, bedding materials, red clay, stones and other grasses. According to the forest operational plan, about two bharis of fuel wood are distributed to each household every year. In reality, however, two bharis of fuel wood are insufficient to meet the needs of any household. With respect to fuelwood, there-fore, the opportunity cost of the community forest is very high for poor users. For rich users who have trees on their private land and can afford to spend time on forest management, the share of forest products allocated benefits has already had an adverse effect on the participation of users in the Chuliban FUG. In 1993, 111 households joined the new Chuliban FUG. In 1995, two additional families, who were comparatively rich and could afford to devote time to forest management, joined the FUG. By 1997, however, only 93 households were participating. Furthermore, about 50 poor households who were identified as bonafide forest users never joined the FUG because of inequitable cost and benefit distribution. The main reasons for the decreasing levels in the participation of the Chuliban community forest are identified as follows:

- The forest protection system introduced by the FUG was very costly and inappropriate for poor users from the equity and the sustainability point of view. Most poor families could not afford the time to patrol and protect the forest, as the opportunity cost of foregoing an income of more than Rs.50 per day working as labour in the local markets was just too great. On the other hand, the FUG constitution required them to forfeit Rs.50 per day if they did not participate in the patrolling of the forest.

**Table 3** The rise and fall of ginger cultivation

Year	Area under ginger cultivation in Ha.	No. of households involved	No. of women involved
1993	0	0	0
1994	0.5	13	26
1995	1.5	26	52
1996	2.5	51	102
1997	0	0	0

*Source: Chuliban FUG record (1997)*

- Poor users with small families (and thus a limited number of wage earners) were particularly unhappy with the rules imposed by the FUG. For them most of these rules are inequitable. On the one hand they depend entirely on the Chuliban forest for fuel wood, on the other the opportunity cost they incur for managing the forest cannot be borne whatever the potential benefits may be.
- Direct benefit flows from the Chuliban forest are too low at present to meet the needs of poor householders. In fact, the FUG has not managed to maximise the direct benefits of the forest. Even attempts to introduce a range of income generating activities to attract women and poor users have not met with much success. Table 3 shows, for example, the number of women and poor households involved in the cultivation of ginger. Though benefit flows from this programme appeared to be beneficial, the intensive use of the forest land without addition of manure and decreasing. This decreasing trend in the participation of users will make it difficult to achieve the asserted goal of community forestry.

## CONCLUSION AND SUGGESTIONS

This case study has shown that the present management process of the Chuliban community forest needs to be improved to increase its productivity and distribute its direct and indirect benefits to the users on an equitable basis. At present, the inequitable sharing of costs and benefits is causing a growing number of women, poor and disadvantaged users to leave the FUG every year. If this trend continues Chuliban community forestry may be on the verge of failure. In fact, users can be motivated to rationalize forest use only if they themselves benefit from improved forest management. Equitable benefit-sharing and decision making processes are fundamental factors in the sustained

development of community forestry. In this context, the identification, valuation and analysis of costs and benefits can help the FUGs to define options for distributing costs and benefits on an equitable, efficient and sustainable basis. This case study suggests the following:

1. There are many more costs and benefits (quantifiable and unquantifiable, measured and unmeasured, currently considered and disregarded) which need to be incorporated into the cost-benefit analysis than is presently the case. It would, however, be a major task to identify, classify, quantify and value them sufficiently for use in community level decision-making. This is particularly true for externalities which, in the case of Chuliban, fertiliser led to a significant reduction in the production of ginger in 1997. This was a considerable loss to the users and they suspended ginger cultivation. Other activities such as the production of souvenir items using pine needles (Table 4) have been similarly short-lived.

Thus, although the FUG seems to have had noble ideas of involving the poor and women in activities that will generate an income, these programmes could not run on a sustainable basis due to inadequate financial support and inefficient community forest management. The lack of sufficient benefits to outweigh the costs associated with forest management resulted in many poor users leaving the FUG. Not only has this situation introduced inequity, but it has also increased the risk of forest products being stolen.

These problems appear to be very common in other FUGs in Nepal. It has been noticed that in many FUGs where input is higher than output, participation of poor users would include the adverse impacts on the livelihoods of poor woodcutters and higher fuelwood prices for urban dwellers.

2. The important issue of the distribution of costs and benefits must be resolved in such a way that all users, including women, the poor and the disadvantaged, are encouraged to participate in effective forest management. Recently, for example, the Chuliban FUG assembly decided to change its forest protection system. Instead of a rotation, they have now hired one forest watcher and agreed to collect Rs.10 per month from each household to cover the cost. As this forest protection system does not impose too great a financial burden, the participation of some low income households has begun to increase.

3. Once the distribution issue is resolved, the productivity of community forests should be improved by introducing cost-effective and simple forest management techniques. These can include income-generating activities, such as intercropping with ginger or medicinal herbs, to encourage women, poor and disadvantaged users to participate in community forestry.

4. To maintain the sustainability of community forestry it is essential to focus on the gender equity aspect of the FUG. As women, poor and disadvantaged users of community forestry need special assistance, there should be particular focus on these groups while introducing cost and benefit distribution systems. This can help to increase the participation of women, poor and disadvantaged in community forest management.

**Table 4** The rise and fall of souvenir production by women

Year	No. of women forest users involved	Activity carried out	Income generation (Rs.)
1993	23	Training to produce - souvenir items	-
1994	25	Production of souvenir	300 items
1995	25	Production of souvenir	325 items
1996	25	Production of souvenir	not sold items
1997	0	Programme is stopped	0

*Source: Chuliban FUG record (1997)*

5. Integration of knowledge of resource management and social learning is one of the main strategies for sustainable community forest management. District Forest Offices and community forestry projects could help FUGs to carry out action research on community forestry processes, including the identification and distribution of costs and benefits. For this, FUG trimester networking meetings and other informal discussions could be the appropriate forum for interactive or participatory learning.

6. In the hills of Nepal most of the community forests lack easy access and have, therefore, not been of great commercial value. In addition, existing Forest Acts and Bye-laws are often inadequate when it comes to dealing with the commercialization of community forest products. Where possible, if FUGs can produce a surplus of forest products, they should be encouraged to sell these products commercially. By doing so, other stakeholders, who are not adjacent to a community forest, can also benefit from improved forest management. Any profits should be used for community development without marginalising the poor and disadvantaged.

7. Lastly, as the identification, quantification and valuation of costs and benefits can assist users in decision-making processes, the FUGs should be helped to identify all direct and indirect costs and benefits of community forestry. If undertaking an economic analysis is difficult for them, due to the ex-ante imprecision of inputs and outputs, they should be helped to address the issues of cost-effectiveness, affordability and financial sustainability. Where a full cost-benefit analysis may not be feasible an attempt should be made to compare the likely magnitude of inputs and outputs in community forestry.

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