

Managing rattan as a common property: a case study of community rattan management in Nepal

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Abstract—Rattan is one of the most important non-timber forest products mostly distributed and highly traded in Southeast Asia. Out of 600 species in the world, only 7 species occur in Nepal, but these play a significant role in the income generation of communities. However, rattan resource base has been depleted significantly due to overexploitation, immature harvesting and habitat destruction. This paper highlights a case study of community rattan management in the far western development Terai region of Nepal. The income of the community has been increased up to 30 times after the proper management of rattan. Since 1996 the community has earned about US\$ 40 000 each year from the rattan sale and a number of community development activities has been carried out with the funds generated. This is an exemplary work to demonstrate how rattan management can bring positive changes on rural economy, natural resources and social capital.

Key words: Rattan; community forest user groups; management; costs; benefits.

INTRODUCTION

The word rattan was derived from the local Mayan term rotan [1, 2]. It is known as bet in Nepal, India and Bangladesh, and is believed to be derived from the Sanskrit word bethas, which means creeper. Rattan palms include 14 genera and about 600 species in the world [3], a great diversity of which is distributed in Southeast Asia.

One of the most important problems in the development of rattan sector is its poor management state. Like other non-timber forest products, management of rattan is not an easy task. The natural climbing habit, lack of proper inventory method, sporadic distribution, lack of silvicultural know-how of many species and natural exploitation are the main hurdles of proper management. Additionally, there is not much experience around the world so far. However, Nepal has developed better management of rattan through its community forestry approach. Community's long-

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standing lesson learning with natural rattan has given them firsthand experiences of silviculture and management.

Rattans in Nepal

Rattan is considered to be an important non-timber forest product in Nepal. Its existence and value were unknown until the initial survey done by Mr. Chowdhary in 1994 and the detailed survey by Chowdhary and Paudel in 1996 [4]. Ten species of two genera have been reported but only seven species have been identified during the survey by their local and scientific names [5]. The identification and validation was done with the support of Dr. C. Renuka, rattan scientist of Kerala Forest Research Institute (KFRI), India, who visited Nepal in 1999 for this particular purpose [5]. Some of these species were also identified with help of the national herbarium, Kathmandu, Nepal. *Calamus tenuis* is an endemic and widely distributed species throughout the lowland areas of the country. Table 1 shows the distribution of rattan species in Nepal [6–10].

Rattan has been locally used for various domestic purposes but largely as basketry and furniture. Lack of conservation initiatives, improper management

Table 1.
Reported species and their distribution [5]

No.	Species reported	Vernacular name	Other report sources	Distribution
1	<i>Calamus acanthospathus</i>	Gauri Bet	[6–9]	Eastern foothills of the country. Reported in Danabari area of Ilam district.
2	<i>C. leptospadix</i>	Dangre Bet	[8, 9]	Eastern Terai belt nearby marshy land. Reported in Belbari, Morang district.
3	<i>C. latifolius</i>	Phekre Bet	[7–9]	Central mid hills. Reported in Kamletatari, Palpa district.
4	<i>C. inermis</i>	Putali Bet	[7]	Central to Western mid hills. Reported in Tanahun and Surkhet districts.
5	<i>C. tenuis</i>	Pani Bet	[7]	East to west Terai belt nearby permanent water sources. Major distribution in Bardiya and Kailali districts.
6	<i>C. erectus</i>	Tokri Bet	[6]	Central to Eastern Terai region. Possibly in Chitwan district.
7	<i>Plectocomia himalyansis</i>	Himali Bet	[6, 7]	Eastern hilly regions.
Species reported by other sources				
8	<i>C. gracilis</i>		[7]	Not recorded
9	<i>C. khasiyanus</i>		[7]	Not recorded
10	<i>C. rotang</i>		[10]	Not recorded

and unscientific non-sustainable harvesting has resulted into degeneration of rattan forests. The resource base has been depleted significantly over the last few decades [11]. More than 60% of the natural rattan forests have already vanished in different parts of the country. Besides immature collection and over-exploitation by the farmers, habitat destruction is another cause of the depletion of natural rattan [4].

Despite these negative figures, the recent community forestry programme has brought a positive change in the conservation and management of forest resources, including the management of non-timber forest products such as rattan. A few community forest user groups (CFUG) have emphasised rattan as a priority resource to conserve and manage in the community forests.

Community based forest management

Community forestry is a very popular concept applied in forestry programmes in Nepal that evolved in the 1990s after the establishment of democracy in the country. According to this approach, any part of the state forest can be handed over to the local communities who have access to and have been using the patch of the forest over a long period of time irrespective of political boundary. The community has full authority to make decisions on the issues of forest management and utilization, as well as fund management. The community gets all revenues from the forest and is supposed to spend the income on forestry and local development activities. To date some 1.06 million ha of forestland have been handed over to 13 078 community forestry user groups involving 1.4 million households to the benefit of 9 million inhabitants [12].

CASE STUDY: SATI KARNALI CFUG

This paper highlights the case study of Sati Karnali CFUG (community forest user groups), which is a good example of community rattan management in Nepal.

About the community

Sati Karnali CFUG is located in Kailali district, the far western Terai region of Nepal, about 32 km south from the east–west highway (Fig. 1). The fairly large community of 623 households manages 298.5 ha of natural forest, 47% of which (170 ha) is covered with natural rattan (*C. tenuis*) (Fig. 2). The District Forest Office handed over the forest to the community in 1994. The forest is an island in the Karnali River, which is one of the biggest rivers in the country [4, 13].

The rattan forest was highly degraded and virtually no management existed until 1992 when the forest was brought under the community forestry regime. The Indian contractors used to harvest rattan every year and the annual revenue never exceeded NRs. 200 000 (US\$ 2650). Standing rattan was usually sold to Indian contractors, while there was no systematic mechanism of harvesting. Pre harvesting forest fire was the common practice of the harvesting.

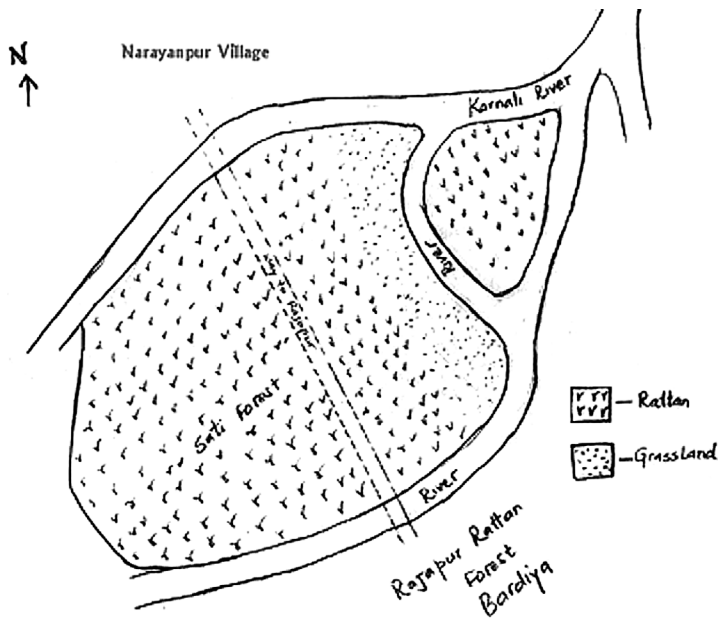


Figure 1. Sketch map of Sati Forest.



Figure 2. Community rattan forest.



Figure 3. Community people busy with rattan harvesting.

Even after the forest was handed over to the community, they continued the previous system for the first few years until a training course on rattan management took place in 1997. With the support of experts, the community prepared a rattan management plan and divided the rattan forest into six blocks for 5 years rotational harvesting. One of the blocks was maintained for research and conservation purposes.

The management plan includes an improved harvesting technique (avoiding pre-burning) (Fig. 3), simple technique for the removal of leaf-sheaths, air seasoning and storage techniques. The details of pre- and post-harvesting techniques of the previous management system and the changes for improvement are given in Tables 2 and 3, respectively.

The present average growing stock of the rattan forest is 19 840 stems/ha. The size of canes (length and diameter) varies according to the site conditions within the forest. The average length of rattan is 6.4 m with a maximum of 22.5 m, and the average diameter of cane is 2.9 cm with a maximum of 6 cm. General features of Sati CFUG are described in Table 4.

MANAGEMENT PLAN

With the support of the rattan experts the community prepared a rattan management plan. The features of the management prescriptions that were recommended in the plan are summarised in Table 5. During the first rotation (4 years) the yield of rattan was irregular, as a lot of management activities were required and the rattan was

Table 2.
Harvesting and post-harvesting techniques

Activity	Details
Control firing	Control firing is a method to burn weeds, spines and flagella, which remain in the field after harvesting rattan. It is carried out just after the harvesting and bundles of rattan are taken out from the field. It also encourages regeneration of rattan.
Stump height	Rattan should be harvested up to 300 mm above the ground level. However, 150–225 mm of stump is preferred for <i>C. tennis</i> . Lower part or basal part of the rattan is abnormally thick, which is considered less important from the commercial point of view.
Removal of leaf sheath	Rattan has sheath over the whole length, which should be removed as soon as harvested. The sheath can be stripped with the help of sickle or by bending the culm. While bending, each bent should be made in the node. Sheath comes from the nodal part of the culm and by bending it can be broken easily and remove. The Tharu people also use a wooden sandal to remove the sheath of rattan.
Removal of tip	Tip (top of the rattan) is soft and immature, and has no commercial value. Therefore, 450–600 mm of the top portion of rattan is generally removed.
Collection of the rattan derivatives	After the rattan has been harvested, sheath leaves and other derivatives deposited in the field are removed. They may deter the regeneration to come out. In Sati CFUG, leaf sheath and other residual parts are used for the broom making by the Tharu people.
Grading	There are no standard rules followed for grading of rattan in the community. Grading is made according to same thickness, colour, length, and other parameters observed.
Bundling	20 rattans are kept in a bundle. Thick and well quality rattan have a bundle, thin and separate bundle of rattan has separate bundle.
Seasoning	The bundle of rattan is dried for 4–7 days in the full sun. Generally they dry until the moisture content reaches about 25%.
Stocking	Well-seasoned rattan is stored in the storehouse. The storehouse is well aerated and sunny.

heterogeneous according to size and age. However, from the second rotation the yield could be predicted, as the age and size of the rattan in each block were more uniform.

COSTS AND BENEFITS

The forest consists of natural rattan and, therefore, does not require any investments for the regeneration of the resource. Proper protection was enough to restore the growing stock. After the forest fell into their regime in 1994, the community

Table 3.

Indigenous management system of rattan [5]

SN	Activity	Previous system	Remarks and improvements
1	Seed collection	Seeds were not collected in the past except by few individuals for their own private nursery. The seed collection time was generally in Feb.–May when it ripens.	The main shortfall was the harvesting age of rattan. They used to harvest in 2 years rotation, when rattan is not able to produce productive seeds. As the rattan seeds are also easily marketable, they were suggested to harvest rattan in four years rotation so as to get productive seeds.
2	Nursery	Community did not have any nursery. They were fully dependent upon natural regeneration for the revival of rattan forest.	They established one rattan nursery in 1997 after receiving training from experts. They used seedlings for planting community lands and surplus they sell to other communities.
3	Seed treatment	They did not have any knowledge on seed treatment. However an owner of private nursery of adjacent village treated seeds by removing epidermis layer and the inner fleshy parts. He claimed 70% germination.	Soaking seeds in water for 24 hours would give better germination percent. The community practised this method of treatment when they established their own nursery.
4	Rattan plantation	No plantation carried out previously as the rattan seedlings were not easily available and, if available, were expensive (NRs. 10 per seedling).	They required plantation of rattan in some of the areas where natural regeneration was poor. They started enrichment plantation after having their own rattan nursery.
5	Conservation	They have hired forest guards to regularly patrol the forest. In addition, community members also do rotational patrolling in the forest.	The current protection system is highly effective. Community members are committed to stop the illegal harvesting and unmanaged cattle herding.
6	Silvicultural operations	Not any kinds of silvicultural operations carried out in the past in the rattan forest.	Enrichment plantations of rattan, weeding of unwanted shrubs and plantation of fast growing trees are needed for better rattan growth.

made efforts aimed at conservation so as to revive the degraded resource. Each community household participated in rotational patrolling in the beginning, which did not include any direct cost. However, the community later on hired a few forest guards after they had earned money out of the resource selling.

The actual costs of rattan management, therefore, mainly involve labour cost of harvesting, leaf sheath removal and transportation. In addition, the regular costs of administration and staff salary could also be counted though these costs are not only for the rattan management but also for the whole community forestry process and

Table 3.

(Continued)

SN	Activity	Previous system	Remarks and improvements
7	Harvesting	The traditional harvesting system was highly unscientific. The community used to sell green rattan to an Indian contractor at lump sum basis. The contractor employed Indian labour for the harvesting. Local users believed that they did not have basic skills as compared to the Indian labours that they believed were faster and more efficient for this purpose. The general practice was to set fire in the rattan forest before the harvesting to avoid insects and to make the harvesting work easy.	Contracting and hiring Indian labours have significantly reduced their net income from the rattan. It would be economically beneficial to the local community if they harvested rattan by themselves. Additionally it would give employment to the local people. Setting fire on rattan forest before the harvesting must be discouraged as it degrades the quality of rattan and destroys regeneration of associated species.
8	Post-harvesting	No post-harvesting and value addition works done in the past.	Post-harvesting would add value of the rattan. Proper drying and oil curing of rattan.

Table 4.

Main features of the Sati CFUG [13]

Total area of community forest	298.5 ha
Rattan forest area	170 ha
Number of community households (beneficiaries)	623 from 2 VDCs: Naryanpur VDC ward numbers 7, 8 and Dhansingpur VDC ward number 2
Start of community forestry	1994
Number of rattan forest blocks	6 (the area of the blocks vary from 20 ha to 40 ha with an average area of 30 ha). Block number is 6 very small and only for research purpose
Major associated species	<i>Acacia catechu</i> , <i>Dalbergia sissoo</i> , <i>Bombax ceiba</i> , <i>Albizia lebbek</i> , <i>Albizia procera</i> , <i>Trewia nudiflora</i>
Density of associated trees	About 200 per ha
Climate	Tropical. Temperature ranges from 15 to 43°C with an annual average of 23.7°C
Soil type	Alluvial
Fauna	Leopard, wild boar, python, deer, peacock, jackal
Non-wood products	Elephant grass, medicinal plants, rattan

are not included here. The total cost of rattan harvesting, leaf sheath removal and transportation from harvesting site to depot is calculated at NRs 2–3 per kg of dry rattan [14].

Table 5.

Management activities

Year	Activities
Year 1	<ul style="list-style-type: none"> ● Demarcation of 5 blocks by using natural boundary or by making fire lines. ● Total harvesting (clear cut) of all the rattan in block 1 and selective harvesting in other blocks. In selective harvesting, only mature rattan above 1.5 m high should be harvested (not more than 25% of the total growing stock). ● Very old trees in all the blocks should be harvested. Enrichment plantation of <i>Dalbergia sissoo</i>, <i>Acacia catechu</i>, <i>Trewia nudiflora</i> and <i>Bambax ceiba</i> is to be done at the spacing of 6 m. ● Some of the pocket areas where rattan is sparsely distributed, enrichment plantation should be done at the spacing of 2 m.
Year 2	<ul style="list-style-type: none"> ● Weeding is required in block 1 (last years' clear-cut area) as the regeneration will be started and weeds might retard the growth. ● Enrichment plantation of rattan in block 1 in the areas where the natural regeneration is not well. ● Total harvesting of block 2. Selective harvesting in block 3 and 4 where mature rattans more than 5 feet high would be harvested. The total harvesting should not exceed 25% of the total growing stock.
Year 3	<ul style="list-style-type: none"> ● Weeding in block 2 (last years' clear-cut area) where natural regeneration is already started in the third year. ● Enrichment plantation of rattan in block 2 in the areas where nature regeneration is not enhanced. ● Total harvesting of block 3. Selective harvesting in block 4 where only mature rattan above 5 feet high should be harvested not exceeding 25% of the total growing stock.
Year 4	<ul style="list-style-type: none"> ● Weeding and enrichment plantation of rattan in block 3. ● Total harvesting of rattan in block 4.
Year 5	<ul style="list-style-type: none"> ● Weeding and enrichment plantation of rattan in block 4. ● Total harvesting of rattan in block 5. ● Selective harvesting of block 6 which is just for the research purpose.
Year 6	<ul style="list-style-type: none"> ● Weeding and enrichment plantation of rattan in block 5. ● Total harvesting in block 1 and block 6. ● No selective harvesting from the second rotation. ● Maintenance of block demarcation (fire lines).

On the other hand, there are several benefits derived from the rattan. The main benefits come from the selling of raw rattan, rattan seeds and seedlings. The annual production of canes is 6–8 ton (dry weight) per ha. The net benefit from 1 ha of rattan forest, without including the cost of administration of community forestry users group, is given in Table 6. Selling at auction at a minimum price of Rs. 30 (US\$ 0.40) per kg results in about US\$ 2000 per ha annually. The total annual income is 4 to 5 million NRs (about US\$ 50 000–65 000 per year; Table 7). The income per year is about 25–30-times more than in the previous unmanaged condition.

A summary of basic data is as follows.

Table 6.
Net benefits from 1 ha rattan cane

Growing stock per ha (kg)	19 840
Green weight with leaf sheath (kg)	24 600
Green weight without leaf sheath (kg)	18 450
Sundry wt. (green wt × 0.3, kg)	5535
Average rate per kg	30
Gross benefit (NRs)	16 060
Cost of harvesting per kg (NRs)	3.0
Total cost for 1 ha (NRs)	16 600
Net benefit (NRs)	149 450

Green weight of rattan with leaf sheath is 1.24 kg per cane with a cane height of 6 m. The weight difference of rattan with and without leaf sheath is 25%. The net benefit does not include administration costs. The administrative and management costs are assumed to be about 25% of the total income.

Table 7.
Average net benefits per year

Item	Quantity (average)	Benefit per unit	Gross benefit (NRs)	Administrative costs (NRs)	Net benefit (NRs)	Net benefit (US\$)
Rattan cane	32 ha	149 450	4 782 550	1 195 640	3 586 900	48 470
Rattan seeds	125 kg	300	37 500	9375	28 125	380
Rattan seedlings	1000	10	10 000	2500	7500	101
Total					3 622 500	48 950

US\$ 1 = NRs 74.

Average annual area of harvesting = 32 ha, annual yield = 5–8 ton (dry weight), annual income before management ≤ NRs 200 000 (US\$ 2650), annual income after management = NRs 4–5 million (US\$ 50 000–65 000).

The community has also a rattan nursery where they produce and sell thousands of seedlings every year at the rate of Rs. 10 (US\$ 0.13) per seedling and they also sell rattan seeds at the rate of Rs. 300 (US\$ 4.0) per kg. They collect 100–150 kg of rattan seeds every year.

The community decides on the expenditure of the income. Generally the income is spent on rural infrastructure (school, road, sanitation), rural development programmes (education, health, training, etc.) and other forest development programmes. The community has recently built a big storage hall and an elegant office financed by rattan income [11].

CONCLUSIONS

Management of rattan does not have a long history: therefore, there is little knowl- edge and experience in this field so far. However, progress is being made in Nepal, allowing local communities to manage natural resources by their own decisions.

This has benefited rattan significantly. The degraded rattan resources in community-managed areas have been restored and income has increased considerably. The replication of a similar approach could enhance the management of rattan in other countries as well.

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