Forest Resources are Key for People: People are Key for Sustainable Forest Resource Management.

Case studies from Bhutan, India and Nepal

December 2012

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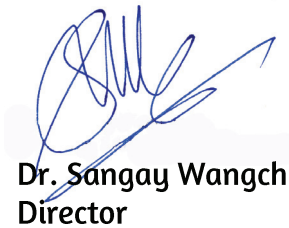
Foreword

Forest resources including non-wood forest products are one of the key elements for sustaining the livelihood of the people. Without involvement of the people, it would be always a daunting task for sustainable management of forest resources. In decades, in the South East Asia region, people have become centre stage for resource management. In many of the south East Asia countries, participatory forest management has moved forward and different modalities of resource management have emerged and are labelled differently as community forestry, collaborative forest management, joint forest management, leased forestry etc. It is evident that people have expressed concern for resource depletion and shown interest and participated in resource management. There are lot of success stories that people have participated in forest resource management and brought back degraded and barren lands into forested land. Community Forestry in Nepal is a classic example of people involvement for sustainable forest resource management and how the people have benefited.

While managing the forest resources sustainably, it is also important to think how best the managed forest resources could benefit people to improve their livelihoods besides acting as a food safety net. Community based enterprise development is one of the ways that could generate substantial amount of cash to the communities. High value NWFP like *Ophiocordyceps sinensis* could provide lot of cash income but at the same time, it is also critical to learn how best this resource could be managed sustainably.

The three case studies from Bhutan, India and Nepal presented here illustrate involvement of people is critical for sustainable forest recources management. Efforts made by the communities should be recognized and appreciated with some incentives if possible. It should not be left to the communities alone for sustainable forest resource management rather they should be supported with some facilities to add value on products.

I appreciate and thank all the authors of the papers for their contribution and also encourage other collegues, researcher, field practioners of the SAARC Member States to contribute papers, so it can be a learning resources for sharing among the SAARC Member States.



Dr. Sangay Wangchuk
Director

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Revisiting the Excellence: Are Community Forests winning Ganeshman Singh Conservation Award sustainable in Nepal ?

A.R. Sharma[1] and K. Kilanbu[2]

Abstract

This paper is based on a study on revisiting the community forests awarded with the prestigious Ganeshman Singh Conservation Award. It seeks to assess characteristics of successful forestry outcomes, using the theoretical framework of Agrawal and Angelsen (2009). The paper is based on an analysis of 178 community forests nominated for the award, along with detailed study of five community forests in Nepal. One of the important learning indicates the limited applicability of the mentioned framework in best practices of community forestry in Nepal. The paper could stimulate policy discourse in formulating criteria and indicators for successful outcomes in community forestry.

Keywords: award, community forest, management, nomination, user group.

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Introduction

The present article is based on study about the success stories of community forest management in Nepal. It focuses on the characteristics of successful community forests based on the nominations for the prestigious Ganeshman Singh Conservation Award (GSCA). The paper further analyzes the features of success along with the documentation of successful stories based on the nominations and awardees from 1998 to 2011 in Nepal.

Forest resource of Nepal: Nepal extends 800 km east to west along the southern slope of the Himalaya. The county is landlocked, and is a narrow strip of land squeezed between two Asian giants, India and China. Nepal is divided into three ecological zones, namely the Terai/ Inner Terai (100-300 m above sea level), the Middle Hills (300-3000 m a.s.l.) and the High Mountains (above 3000 m a.s.l). The Middle Hills, or Mahabharat Lekh, represent the region where Community Forestry (CF) is widespread however, the programme extends throughout the country. Most of the country's forest occurs in the Middle Hills. The Middle Hills also have the greatest ecosystem and species diversity (Sharma, 2010).

Nepal's forest resource constitutes 39.6 percent of the total land area. The area of the forest is about 4.3 million hectares while shrubland measures 1.6 million hectares. Except private ones, the government owns all types of the forest. Nearly one-third forests are being managed by local institutions under participatory forest management regimes. The remaining area is being managed under Protected Area (PA) management system and government managed forests. The PA management system accounts approximate 15 to 17 percent of total forest area. In forestry sector, power and revenue sharing mechanism exist among the stakeholders with varied forms in government owned and protected area system. Moreover, the government holds almost all legal rights in rule making, imposing and revoking participatory practices. The forests together with agriculture and fishery contribute to 32.7 percent of the GDP of the nation.

The forest resource continues to decline at a rate of 1.3 percent annually which is even higher in the case of the Hills and the Mountain. The annual rate of

deforestation in the Hills between 1978/79 and 1994 stood at 2.3 percent per annum while deforestation in the Terai for the comparable period remained 1.3 percent (DFRS, 1999). The Terai region of the country experienced a sharp reduction in deforestation in the late 1990s (DoF, 2005).

There are different studies carried out during different periods report different statistics regarding forest and shrub land areas. The reports published by Forest Resource Survey Office (FRSO) and Land Resource Mapping Project (LRMP), carried out before 1980s, reported more than 6 million hectares of total forest area. The latest available report published by National Forestry Inventory (NFI) showed substantial increase in shrubland areas which was substantially more than reported by the Master Plan for Forest Sector (MPFS). An assessment of the forest inventory is at the offing with Finnish government's support and the outcome of the survey certainly will reflect the impact of community forestry in the restoration of degraded forest areas in Nepal especially in the hilly areas of the country.

Community Forestry in Nepal: Nearly one third of the forest areas (1.66 million hectares or almost 30 percent) throughout the country has been handed over to the local communities as community forests for ensuring communities primarily to fulfil their basic needs of forestry products, besides their active participation on conserving biodiversity, and instigating social development at local level. Nearly 18,000 Community Forest User Groups (FUGs) are managing forests throughout the country and implementing different programmes related with forest conservation and livelihoods improvement. The efforts made so far are not only spatially confined within the communities but are also temporal in nature. Such efforts depend heavily on external support that ripples off with the termination of the projects. Consequently, livelihoods and conservation efforts are not only fragmented but also lack shared vision. Management intervention in the community forests also varies widely by geographical regions often guided by short term gains and lacking concern for long term sustainability and economic gains. Documentation of success stories and following discourse help conservation institutions to devise mechanisms to sustain participatory management of forests in Nepal.

Ganeshman Singh Conservation Award (GSCA): Ministry of Forests and Soil Conservation (MFSC) has a tradition of awarding the best performing Forest User Groups (FUGs) with the prestigious Suprement Ganeshman Singh Conservation Award, named after the veteran political leader of Nepal. The award consists of prize money of Rs 100 thousand along with a certificate of appreciation for the first winner. The FUGs throughout the country can participate in the completion and are to be nominated from the respective District Forest Offices (DFO). The FUGs are monitored and rewarded regularly at various levels, based on the criteria and indicators (Annex-1). Although considerable scholarly efforts has gone into the development of "criteria and indicators" for sustainable forest management of community forests and devising selection criteria and indicators for the best performing community forests in Nepal, such efforts have remained largely theoretical made through formal negotiations by bureaucrats with the office bearers of FECOFUN, the Federation of Community Forestry User Groups, Nepal. However, there was strong criticism of those official criteria being different from that of the villagers (see Pokharel, 2005a, Pokharel, 2005b, Pokharel and Larsen, 2009; Pokharel and Suvedi, 2007). Community Forestry Division in year 2011 revised the criteria and indicators for nominations to the prestigious GSCA with wider consultation among the community forestry specialists and instituted a selection committee which recommended for the successful community forests based on the newly developed criteria and indicators (Annex -2). There is also lack of mechanism to deliver incentives based on their performance or contribution to livelihoods improvement and biodiversity conservation. In long term any mechanism in place for delivering incentives based on performance can make them accountable towards conservation and livelihoods improvement. The study and documentation of success stories largely contribute to identify important characteristics for the success and on long run may contribute to devise mechanism for distributing the benefits and institute benefit sharing mechanism.

Objective

The following are the objectives of the present article:

- Assess characteristics of successful participatory forest management
- Document success stories of community forests based on the nominations and awardees of GSCA
- Way forward based on opportunities and constraints to translate the studies for future replications

Materials and Method

Collection of success stories: To ensure that previous nominations for the prestigious award are properly documented, the information related to the nominations and award for past were collected from the respective agencies.

Photo-1: Research team with CF members at Gaurati CF.

Data Collection: The characteristics of successful community forests were collected from the national FUG database available at Community Forestry Division, Department of Forests, Nepal.

Data Visualization: The Garmin GPS were collected coordinate values of selected awarded community forest, demonstration plot, office, meeting places of FUG and other necessary places to locate on Map using Google Earth. Number of Ganeshman Singh Conservation Award (GSCA) both nominated and awarded community forest user group by district were visualized in Nepal's map using ArcGIS 9.2.

Analysis of Data: Important aspects of the successful community forests were analyzed using the theoretical framework of Agrawal and Angelsen (2009)

appropriate statistical tool such as Chi-square tests were performed for statistical significance and the results were documented. The IBM Statistics SPSS 19 was used to analyze 2*2 contingency tabulation.

Field verification: The research team paid visit to Nawalparasi, Sindhupalchok, Tanahu, Myagdi and Makwanpur to verify and document the successful community forests receiving the prestigious GSCA (Annex 5). The districts were selected on the basis of award and proximity to the centre. The team also held interaction meeting with the concerned stakeholders for better insights and validation. The crux of the discussion was what attributed the most for them in getting the prestigious award. The members of the FUG were also asked to describe what they perceived to be the outstanding management features of the forest and to provide information on the specific elements of demonstrated management performance. The photographs were also used in the context of documentation.

Results

Several community forests were nominated more than once in successive years. The research team was able to collect a total of 178 nominations from 50 districts of Nepal. The nomination lists were available for the year 1998-2002, 2004, 2006 and 2011. The nomination lists for year 2003, 2005 were not available. The MFSC discontinued the award from 2007 to 2010 for unknown reason. The smallest community forest nominated is only 1.36 hectares in area (Baghdharae CF, Kathmandu) though the selection committee of GSCA on year 1999 (1999/3/12) had decided that for nominations to the GSCA award, the community forests should be at least 10 hectares in area. The largest one extends over nearly 2400 hectares (B.P Nagar CF, Doti) – more than total forest area of the smallest district of Nepal (Bhaktapur, 119 sq km, 1994 ha forest area). The diversity in primary management objectives is astonishing. There are forests managed mainly for subsistence forest products such as firewood, fodder and timber. However, other management objectives such as the protection of watersheds or the conservation of biodiversity are also considered as important aspects in community forestry operational plans. The main criteria of Terai based community forests, comprising mainly of Shorea

robusta (Sal), focus on the production of timber as one of the main forest products.

Nominations for GSCA encompassed community forests and individuals with outstanding contribution towards forest conservation in Nepal The scope of this research is limited to the community forests Nominations were most numerous for forests in districts: Dang (9), Kaski (8), Baglung (7) and Terathum (7), Nawalparasi (6), and Chitwan (5), Rolpa (5) and Sankhuwasabha (5). In contingency tables (table 1 to table 4), the category good denotes the nominations from the District Forest Offices (DFO) while those getting the prestigious GSCA are categorized as outstanding. The list of community forests winning GSCA is given in Annex-3.

The quality of the submissions made for the nominations varied widely with many nominees providing supplementary information including excerpts from operational plans, auditor's report , copies of major decisions done by the group, proof of compliance with prevailing forest policies and regulations, Community Forestry Guidelines in particular and other supportive materials. However, Selection committee in year 2011 disqualified several nominations due to the lack of supportive documents. All of the nominations were systematically listed and characteristics for community forests were collated from national FUG database. The google map of study area in Gaurati is given in Map 1. The details of districts of Nepal nominated and wining of GSCA is given in Map 2.

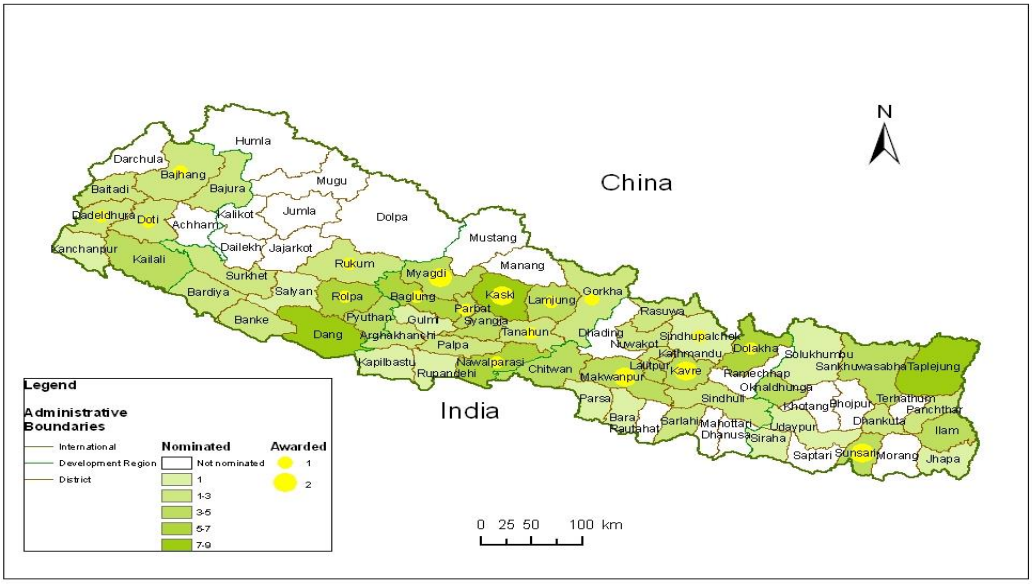
In one of the interaction meetings at Gaurati, Sindhupalchok (see Photo-1) the stakeholders of community forest were asked to describe what they perceived to be the outstanding management features of the forest and to provide information on the specific elements of demonstrated management performance.

They opined that their initiation to establish a revolving fund, with the income from the sale of forest products, and the allocation of NRs 90 thousand for the purpose was one of the important factors contributing to their outstanding performance. The fund was mobilized for improving the economic condition of the poorest of the poor households. The fund was invested in the group comprising of 5-7 individuals and the loan was provided at 12 percent interest rate while the market rate was exorbitant. The other important aspect was the

provision of *sutkari kharcha* (an allowance provided to the women who had just given birth to a baby: Rs 500 for boys and Rs 700 for girls).

Map-1: Gaurati community forest, Sindhupalchok showing various places visited by the research team

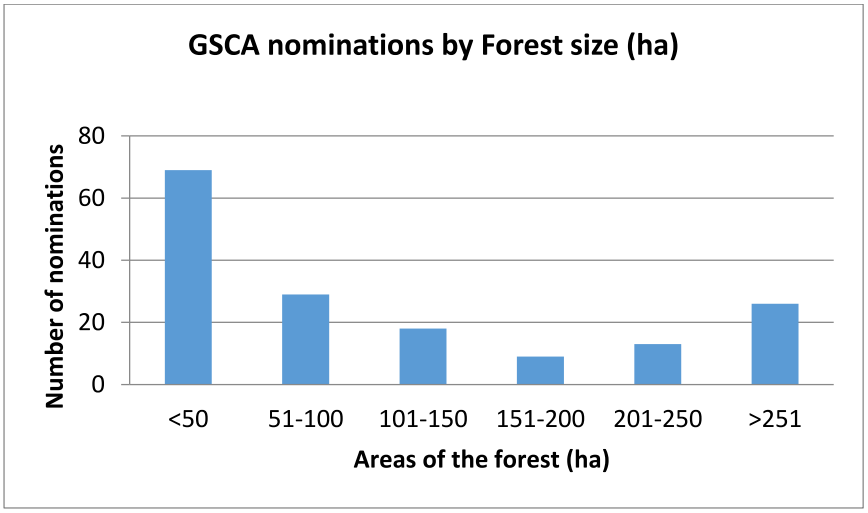
Map-2: Nepal's map showing districts nominated and awarded with GSCA (1998-2002, 2004, 2006 and 2011)



4.1 Area of the forest

Analysis of nominations by forest areas shows that about 42 percent of the nominations are 50 hectares or smaller community forest. The nominations by size of the community forests are given in figure-1.

Figure 1: Frequency of GSCA nominations by size of the forest (ha)



The 2*2 Contingency table regarding size of the community forests (groups) and nominations getting the GSCA award (referred to as outstanding in the table) is as below (table 1):

Table 1: Nominations for the award and awardees by size of the community forest

Area	Outstanding	Good	Total
<50 ha	8	61	69
>50 ha	12	83	95
Total	20	144	164

Chi square = 0.040, Tabulated value of Chi-square for 1 df is 3.841. Since calculated value of Chi square is less than the tabulated value, it is not statistically significant at 5% level of significance.

Note: Missing number of forest areas is 14 (7.9%)

4.2 Group size

We found that 55 percent of the awardees have less than 150 households in their group and ended up with the following 2*2 contingency table.

Table 2: Nominations for the award and awardees by size of the FUG group

Households	Outstanding	Good	Total
<150	11	76	87
>150	9	67	76
Total	20	143	163

The computed Chi-square = 0.024 and tabulated value of Chi-square for 1 df is 3.841. Since calculated value of Chi square is less than the tabulated value, it is not statistically significant at 5% level of significance.

Note: Missing number of size of the FUG group is 15 (8.4%)

4.3 Size of the Working Committee

Analysis of nomination by size of the working committee shows that 87 percent of the nominations had 15 or less members in the executive committee.

Figure 2: Frequency of GSCA Nominations by size of the working committee

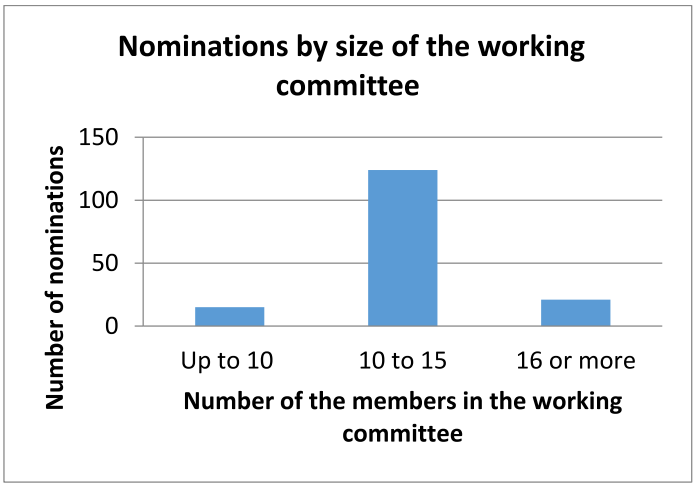


Table 3: 2X2 contingency table for the size of working committee and nominations

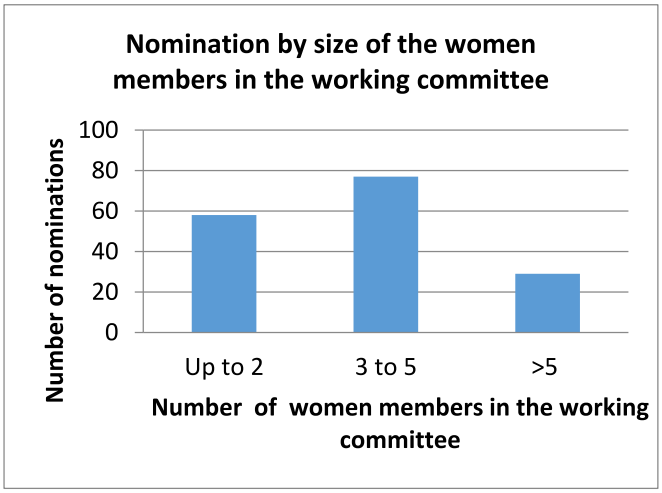
Members	Outstanding	Good	Total
<15	16	123	139
>15	4	17	21
Total	20	140	160

The association between rows (groups) and columns (outcomes) is considered to be not statistically significant. Fisher's exact test. The two-tailed P value equals 0.3040.

Note: Missing number of size of the working committee is 18 (10.1%)

4.4 Women member in working committee

Figure 3: Nominations by Number of women members in the FUG working committee



Note: Missing number of size of the women members is 14 (7.9%)

4.5 Forest type

Figure 4 Frequency of nominations for GSCA by the Forest type

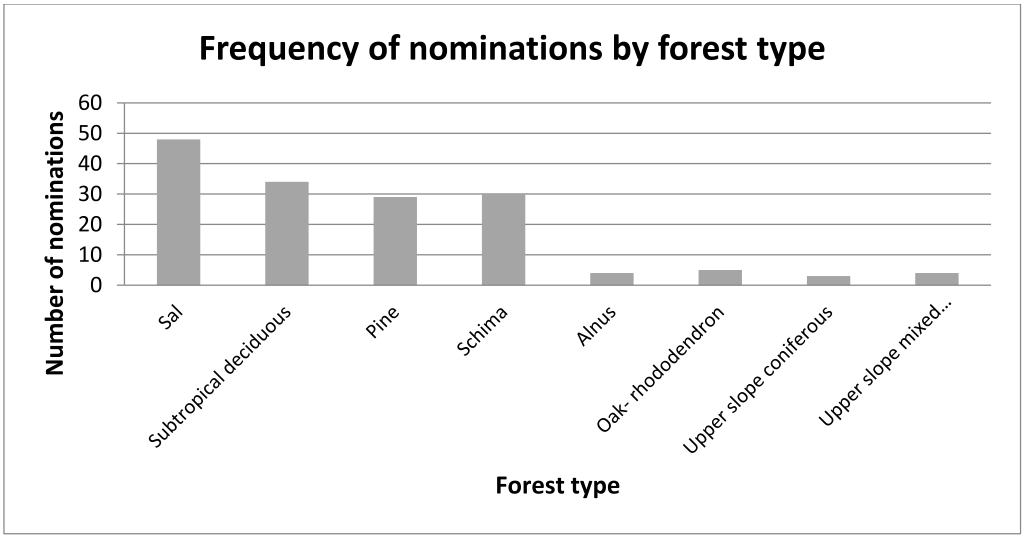


Table 4: 2*2 Contingency table for nominations by forest type

Forest Type	Outstanding	Good	Total
Sal	8	40	48
Non Sal	12	97	109
Total	20	137	157

The computed Chi-square value is 0.960 whereas tabulated value for 1 df is 3.841.
Therefore, the association between rows (groups) and columns (outcomes) is considered to be not statistically significant.
Note: The missing number of forest type is 21 (11.8%)

4.6 Case studies

The research team visited five sites consisting of community forests awarded with the prestigious GSCA. The community forests were selected on the basis of award and proximity from the centre. A summary of characteristics of the community forests selected for the study is given in tabular form (Annex 6). The details about the community forests are given below:

Sundari Community Forest, Amarapuri, Nawalparasi

Sundari CF includes user members of all wards of Amarapuri Village Development Committee (VDC) while the forest is situated in two VDCs, Amarapuri 1,2 and Ratanpur 6,9 respectively. The total area of the forest is 384.75 hectare and includes 1553 households as beneficiaries. The operational plan of the forest was first approved in year 2002 and later amended in 2007. The income from the forest has been invested in forest management and to carry out special programs for poor, women and disabled persons. The FUG possesses its own building that can accommodate up to 40 persons for residential training program. The working committee includes 15 members including five women. The group provides full time employment to 3 persons. The group operates a forest nursery and possesses an herb demonstration plot. There are leaf-plate making and an ayurvedic enterprise owned and operated by the group. The group carries out awareness raising activities through cultural programs against forest fires and climate change. The group has instituted a mechanism of forest patrolling to control the forest fires. The group also conducts training on non-timber forest products, candle making, farming, radio announcer, advocacy for skill development of general users. The group carried out wealth-ranking and sale forest products based on differential pricing of the products. The group has constructed housing for poorest of the poor and 15 families have so far benefitted (Photo 2). The group has provided scholarships and seed money for disabled and genuine students. The disabled persons are provided with orthopaedic boots, sticks, wheel chair etc .

Photo 2: Housing for poorest families of the FUG in Sundari CF.

Taldanda Community Forest, Dulegauda-8, Tanahu

This forest is situated in the northern side of Dulegauda bazaar and was completely destroyed some 35 years back. With ensuing problems arising due to the forest degradation, people realized the need to conserve the forest. In 1993, the forest was handed over to the local community as community forest. The total area of the forest is 84 hectare and the operational plan was renewed in 2008. There are 325 households as beneficiaries of the community forest. The forest is completely protected against illicit felling, forest fire with the construction of fire-lines and regular controlled firing and cleaning. Such activities have resulted into quality and quantity improvement in growing stock of the forest (Photo-3). The forest is protected through self discipline while there is also provision of forest watcher. The user group carries out forest management works as per scheduled in the operational plan and has established a demonstration plot for timber stand improvement. The forests products are distributed on equity basis and the group has so far not done any outside sale. The group has maintained financial transparency with regular public auditing and auditing through registered auditor. The group has invested 35 percent of their income in forest management and development activities. They have also invested more than 10 percent of the amount in pro-poor activities. Women's participation in annual assembly is high. The participants of CF international workshop, Pokhara visited this community forest in 2009. The group has substantially invested in various community level infrastructures including a local hospital. The groups believe that their initiation in establishing an improved grass cultivation plot to promote animal husbandry for income generation has attributed to their success.

Photo 3: Taldanda CF showing improved forest condition after hand over to the FUG.

Gaurati Community Forest, Pipaldanda 1,7,8 Sindhupalchok

The community forest extends over 103 hectare and includes 239 households as FUG members. The forest mainly comprises of pine and Schima *spp*. The group members hold the opinion that they were awarded with GSCA for their initiation of establishing the revolving fund. A revolving fund was established with the income from the sale of forest products, with an allocation of NRs 90 thousand and the fund was mobilized for improving the economic condition of the poorest of the poor households. The fund was invested in the group comprising of 5-7 individuals and the loan was provided at 12 percent interest rate. The loan was channelled in the following areas:

- Goat farming
- Loan
- Buffalo farming

Sutkaeri Kharcha (an allowance for women who has just given birth to a baby) was provided to the women having only two children (Rs 700 for girls and Rs 500 for boys). Those group members who were the victims of natural calamities were provided with monetary grants from Rs 400 – Rs 1000. One of the group members who had suffered burns while extinguishing forest fire was also given treatment expenses.

The outstanding students of the local school and the *dalit* (scheduled caste) students were provided with the scholarships and later this activity was carried out by the District Education Office. For some period the group also provided dress allowance for the students from poor families and girls were given priority. The group also invested their fund in levelling the school ground. Group had locally devised strict rules to prohibit forest offences such as digging red soil, cutting branches by confiscating the headband and *doko* (basket). Those suffering from inferno were provided with 25-30 cft timber at free of cost. The group had also planted *Sugandhabal* (Valeriana *jatamansi*) however due to forest fire it was destroyed. The group had planned income generating program but remained unimplemented. The group had also provided *bakal* (strips) to the group members at free of cost to construct the

toilets and due to the incentive 50-60 toilets were made some of them are still functional. With fund crunch the group has now stopped giving *sutkari kharcha*. According to Min Bahadur Shrestha, Secretary of the FUG: While giving continuity to distribution of timber from the wind thrown trees, DFO during morning walk came across and gave instruction to investigate directly from the district forest office, and about 500 cft logs were confiscated (valued at NRS 22,000) and have initiated actions against the office bearers of group. The investigation is nearly complete and most likely the group will be permitted to distribute the confiscated timber within the group.

Ghorlas Community Forest, Ghatan – 3, Toripani, Myagdi

The community Forest User Group (FUG) was established with the objectives: develop, protect, and promote greenery while simultaneously carrying out social activities for the prosperity, progress and welfare of local communities. The FUG committee comprised of seven members with one third representation from women and dalit. The forest ranges from altitude 1618 m to 1910 m and covers an area of 27.64 hectares. The FUG comprises of 156 households among which 106 households are disadvantaged group. The forest consists of Pinus, Schima *wallichi* and Alnus *nepalensis*.

Photo 3: Research team having interaction meeting with Ghorlas FUG members

The FUG has established a garden and nursery of timur (Zanthoxylum *armatum*) with the support of District Forest Office and Federation of Commerce and Industry, District Chapter. The group feels that they were awarded GSCA 2003 for their spectacular works related with forest management, maintenance and preservation of the forest and well-built social activities, income generating programs such as plough making enterprise (Photo 4) and furniture industry. The FUG are still continuing the activities for which they were awarded, and providing services for a betterment of the life of people of this forest user group.

Photo 4: Plough making enterprise being run by the group in Ghorlas

Besides aforementioned activities the group had also provided services such as operational plan revision that were supposed to be provided through DFO's to more than fifty neighboring community forests on their own expenses for the development of community forests. The group regularly submits "Community Forest User Group's Monitoring Form" compiling details information about i) Community Forest's group ii) User group's organization development, social incorporation and rule iii) livelihood and income generating iv) In cooperation between VDC Community Forest Group and Community Forest User Group v) Sustainable forest management to the DFO.

Rani Community Forest, Hetauda Municipality -6, Chaughada, Makwanpur

Raniban, with the literal meaning: queen's forest, is situated six km east from Hetauda market along Kanti Raj Path at Hetauda Municipality, Ward No. 6, Chaughada, Makwanpur district. About three decades ago, the forest was dense with the main tree species Shorea *robusta* (Sal), and wild animals like tiger and leopard. Later on the forest degraded with excessive tree felling with development of the market area. With ensuing environmental problems, the local people realized the need to protect the forest. With the commitment to preserve forest, environment and wild animal, a group of villagers formed Forest User Group in January 6, 1994. The group was later registered legally in District Forest Office, Makwanpur.

Photo 5: Rani Community Forest, Hetauda-6, Makwanpur

Rani Community Forest covers 151.87 hectare, with altitude 460 meters (a.s.l) and composed of natural trees and plantation species (Photo 5). The major tree species are Shorea *robusta*(Sal), Terminalia *tomentosa*, Michelia *champaca*, Eugenia *jambolana,* Lagerstroemia *parviflora*, and Schima *wallichii*. The Rani CF was divided into seven blocks depending upon the nature and characteristics of forest for sustainable forest management and in order to protect forest from fire and natural disaster.

The FUG set up executive committee to govern daily activities and the committee comprises of 11 members out of which 3 are women members. The group consists of 708 households with a population of 4025 (male 2132 and female 1823), among which indigenous and backward population is 1537. The majority of this user group's ethnicity is composed of Brahmin, Chhetri followed by Rai, Tamang, Newar and others.

Since its establishment, Rani FUG has been successfully involved in maintaining social and socio economic development by investing in community and local development activities, such as harvesting and

plantation in forest. They have successfully rejuvenated forest like it was three decades before. The group is undertaking activities such as selling of timber, fuel wood, catering services, local handicraft. The group is famous for its activities and has received numerous awards related with environmental conservation. For that reason, the group also receives numerous observers and study tour groups and observation and membership fees are prominent mode of income sources of the group. The research team noted an important characteristic of the group: very strong motivation amongst FUG for preservation of their forest. The group distributes only non commercial nature of forest products only to the members of the FUG and have so far never adopt selling of timber and fuel wood to the outsiders for commercial motive. They generally sell timber for house construction, school, and furniture enterprise run by the FUG's member at a relatively cheaper price of NRs 500 per cubic feet (for Sal) whereas the current market price is around NRs 4000/cubic feet at Kathmandu valley.

The group's social development activities have indeed benefited the users considerably. Their major priority based programs are drinking water supply, providing loan for various agricultures business at low rates, women awareness program, construction of school and road, renovation of temple. The group has also provided annual scholarships to girl and poor students worth NRs 10,000. The group has also lunched mobile health camp, help construction of rural electrification and various other activities for rapid development of the community.

Furthermore, the group has well maintained and managed the group's assets and Inventory, built up their own office building. They have also promoted transparency, accountability in group's work and have good book keeping system. The group is also disseminating CF related information, besides strong social development activities such as the FUG provided financial support for agriculture business, building house for financially poor members and set up bio gas plant to reduce consumption of fire wood and devising ways to diversify CF's income (For example FUG in fiscal year 2010/2011 had NRs 797,772 while it was merely NRs 90,942 in FY 1993/1994). The group has also created full time employment to three members including women in their office. They have also established good coordination and networking with I/NGOs, and other bodies that benefit them with trainings: herbal plantation and nursery techniques.

The group has successfully won a number of community based national level awards. So far they have won ten awards including "Supreme Ganeshman Singh Forest Conservation Award" in 1999. After winning this prestigious award many CF users from national as well as intentional level visited for observation tours. Rani forest has now become a valuable place to study and learn about CF for forest Master and PhD students and intellectuals.

The research team found that Rani FUG has still kept continuing their activities. The group's executive committee members have also approved plan to translate current manual management of forest assets and inventory, office inventory, accounting, and archive system into computerized system. After that they believe they can deliver their services to FUGs more efficiently and effectively and continue conservation of Rani Forest in sustainable manner and brighter future of members of FUG.

Discussion

Based on the world's experience of successful community forest management (CFM), Agrawal and Angelsen (2009) developed general characteristics of community forest management (box-1). Their work is a serious effort in understanding the attributes of successful CFM, however, the theoretical framework developed needs to be judged based on field experiences. In our study we have tried to assess some of the important characteristics attributing to the successful CFM from the results of this study.

Box-1 General characteristics of successful CFM

Cluster of success factor	Factors contributing to success
Resource system	- Medium to large community forests
- Biophysical	- Well defined, easily monitored boundaries
	- Predictable benefit flow
- User group	- Small to medium sized group (face to face interaction)
• Socio-political	- Interdependent

• Economic	- Homogeneous - Relatively well off - Moderate dependence on resource - No sudden shocks in resource demand - Cultural valuation of forest - Past experience with forest management
Institutional arrangements	- Rules easy to understand and enforce - Rules locally devised - Rules help deal with conflicts - Rules hold users and officers accountable - Effective local enforcement and sanctions - Tenure security - Capacity to exclude outsiders
Context	
• Demographic	Stability of demographic conditions
• Market	Stability of market conditions
• Macro-political	
• Stability of policy conditions	
	Stability of technological conditions
	Government support to reduce collective action Costs

Does size of the forest matter ?

The results and findings shows that while using the theoretical framework of Agrawal and Angelsen (2009), we did not get any support to believe that management of larger forests are more successful than the smaller ones nor we have support on the age-old belief that small is beautiful. We also repeated the analysis for community forests of size 100 hectare but the results were similar.

Size of the FUG group

According to Agrawal and Angelsen (2009), for successful community forest management group size is also a factor contribution to success. Our result shows that there is no significant difference in the success outcome for group size.

Size of the working committee

Agrawal and Angelsen (2009) have not mentioned about the size of the working committee. Our result shows that there is no significant difference between the groups (<15 members and >15 members) and the outcomes based on the size of the working committee.

Are Sal (Shorea *robusta*) forests more successful than Non-Sal ?

The result shows that there is no significant difference between Sal and non-Sal forests regarding successful forestry outcomes. Though, at *prima facie* it seems that nominations of Sal forests are greater as compared with other forest types. The economic values of Sal forests are substantially higher than the others so one can speculate them to be more influential for successful forestry outcomes. This outcome can be quite significant in the context of community forest management however further research on this dimension is beyond the scope of this study.

Socioeconomic characteristics of successful outcomes:

In case studies, the research team tried to explore the contribution of community forests in the socioeconomic condition of the locality. A summary of the latest financial statement is given in Annex 4. The statement shows that CFs are providing various services to the local community even in remote localities where delivery of state services are quite rare. The community forests besides serving the forestry needs, are also catering needs in social, health and education areas.

Conclusion

Agrawal and Angelsen's theoretical framework for successful community forest management though seems useful has limited applicability in successful community forests of Nepal. The attributes such as size of the forest, group size, size of the working committee do not have significant effect on successful forestry outcomes. Moreover, Sal forests are not significantly different from non-Sal forests in successful outcomes. Despite all these important findings, we firmly agree with the excerpts from "**In search of excellence**" (Durst et al. 2005) - One thing is certain, these goals continue to change and evolve and today's excellence may well be tomorrow's mediocrity. In revisiting the excellence, we found that Gaurati CF is lagging behind other community forests and may turn into mediocrity with souring relations with the concerned District Forest Office. Thus, the search for excellence - for those who truly seek it - will thus be a ceaseless endeavour that continues in Nepal.

Way forward

The final outcomes of the study had enlisted important characteristics of Community forests that lead towards successful management. The present study on the success stories of community forests in Nepal will serve as a draft for identifying important attributes for successful community forest management in Nepal and has a solid foundation based on actual data. The amount of prize money has remained same from its inception, hence needs to be increased to at least NRs 1 million for wider participation. We firmly believe that this study will pave way for policy discourse on participatory forest management in the light of the need for future replication of the success stories on participatory forest management in SAARC regions and beyond.

Acknowledgement

We are thankful to SAARC Forestry Centre for giving us opportunity to prepare this paper. The views expressed are those of authors and not necessarily represent the organisation of author's affiliation.

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Appendices

Annex 1: Previous criteria* and indicators for the GSCA developed and used by the Ministry of Forests and Soil Conservation, Nepal.

No	Criteria	Indicators with scores for evaluation	Focus	
1	Previous forest area	Barren land (10)	Social and environmental	
		Plantation area (6)		
		Natural forest (3)		
2	Last year's income	Up to 10 000 rupees (6)†	Socio-economic	
		10 000–30 000 rupees (7)		
		30 000–50 000 rupees (8)		
		Above 50 000 rupees (10)		
3	Percentage of expenditure on	Up to 25% (4)	Socio-economic	
	community development	25–50% (6)		
	and forest	50–75% (8)		
		75–90% (10)		
4	Percentage of expenditure on	Up to 10% (10)	Socio-economic	
	administration	10–25% (8)		
		25–50% (6)		
		50–75% (4)		
5	Management mechanism of	Mechanism (2–5)	Social and environmental	
	forest, wildlife and soil	Improvement (2–5)		
	conservation			
6	Forest product distribution	Fair and equity for needy	Socio-economic	
	system	people (10)		
		Proportionately (5)		
7	Non-timber forest products	Income generating (3)	Socio-economic	–

	income generating activities	Employment (3)		
		Scholarship (2)		
		Social works (2)		
8	Women participation in	Up to 10% (2)	Social	
	forestry activities	10–30% (4)		
		30–50% (6)		
		950–80% (8)		
		Above 80% (10)		
9	Physiographic condition	High hills (10)	–	–
		Mid-hills (8)		
		Churia (8)		
		Tarai and Inner-Tarai (6)		
10	Any special activities		–	–

* All criteria are weighed equally

Annex 2: Revised criteria and indicators used by MFSC to award best community forests with GSCA in 2011.

Criteria No.	Criteria	Maximum weightage	Indicator No.	Indicators	Maximum weightage of indicator	Score	Remarks
1	Forest condition before hand over	5	1,1	Naked or fallow land	5		Non Cumulative
			1.2	Natural or mixed forest of moderate condition	3		
			1.3	Natural or mixed forest of good condition	2		
2	Changes in forest Condition after being managed as community forests (at the time of evaluation)	10	2.1	Promotion of greenery in naked or fallow land			Cumulative
			2.	Reappearance of plants and wild animals previously endangered	2		
			2.3	Shrubland converted in to high forest	2		
			2.4	Stand /canopy density increased	2		
			2.5	Quality improvement in regeneration	2		
			2.6	Further deterioration in condition of the forest	0		

3	Forest protection system	6	3.1	Forest protection through self discipline (all users comply with the rule)	6		Non Cumulative
			3.2	Protection through rotation system	5		
			3.3	Provision of forest watcher	4		
			3.4	Adverse impact due to lack of protection system	0		
4	Practice of forest management	15	4.1	Regular and systematic forest management activities (for example presence of trees of good shape and quality)	5		Cumulative
			4.2	Implementation of management prescriptions provided in Operation plan	5		
			4.3	Establishment of Demonstration plots and its replication in silvicultural management practices	5		
5	Forest products distribution system	6	5.1	Equity based with special provisions of timber distribution/sale to marginalized users	6		Non cumulative
			5.2	Equality based – equal distribution	4		

				among the users household			
			5.3	Adhoc basis – no any systematic provision	1		
6	Formation of FUG committee	6	6.1	Inclusive (caste/backward group etc.) with 50% or more women in executive committee including major posts	6		Non cumulative
			6.2	Domination of one group/caste/sex (except women only groups	2		
7	Effectiveness of FUG performance	5	7.1	Regular meetings and assembly as per constitutional provisions	1		Cumulative
			7.2	Information sharing mechanism and handling of grievances	1		
			7.3	Preparation of annual progress report	1		
			7.4	Assessment of users' needs conducted before spending CFUG funds, allocating community land, resources etc	1		
			7.5	Annual planning and auditing report	1		

8	Financial transparency of the FUG committee	5	8.1	Presentation of financial report in public hearing / general assembly and access to all users	3		Cumulative
			8.2	Formation of sub-committee for financial monitoring	1		
			8.3	Public/social auditing	1		
9	Ratio of women's participation in the users assembly	6	9.1	Up to 25%	2		Non cumulative
			9.2	25-50%	4		
			9.3	More than 50%	6		
19	Users participation in annual assembly	5	10.1	Just minimum quorum provisioned by Constitution	2		Non cumulative
			10.2	Between minimum quorum to 75%	4		
			10.3	More than 75% participation	5		
11	Community Forest Fund Mobilization	10	11.1	**Forest improvement (management/development) activities** Below 25% (1),	3		Non Cumulative/ cumulative

				25 – 50% (2) More than 50% (3)			
			11.2	**Pro-poor activities (Soft loans and/or seed money for poor users to support income generating activities)** 35% or above (3) 10-35% (2) Less than 10% (1)	#		
			11.3	Users capability development and awareness training	2		
			11,4	Community and social development activities	1		
			11.5	Other activities	1		
12	Climate change adaptation and mitigation measures	6	12.1	conducted community-level awareness activities	1		Cumulative
			12.2	Incorporated and implemented climate change mitigation and adaptation measures in operation plan	1		

			12.3	Illegal forest felling and encroachment reduced	1		
			12,4	Massive plantation activities	1		
			12.5	Increasing availability of water sources and improved quality of water	1		
			12.6	Reduced soil erosion and/or landslides	1		
13	Proximity and access to government and non government service providers	5	13.1	Closely located (within 3 hrs travel distance, easy access to public service and/or external support)	2		Non Cumulative
			13.2	average (3-6 hrs travel distance, with limited access to public service and/or external support)	4		
			13.3	Remotely located (more than 6 hrs travel distance and almost no access to public service and/or external support)	5		

14	Condition of grazing	5	14.1	Complete control of forest grazing (zero grazing)	5		Non Cumulative
			14.2	Rotational grazing	4		
			14.3	Effort to regulate grazing but partially successful	1		
			14.4	Open grazing	0		
15	Condition of forest fires	5	15.1	Complete prevention of forest fire	5		Non Cumulative
			15.2	Users' immediate involvement in extinguishing the forest fire	3		
			15.3	No involvement of the users in controlling the forest fire	0		

Annex 3: List of Community Forests receiving Ganeshman Singh Conservation Award 2054

Decision to award first, second and third winners NRs 100,000, NRs 75,000 and NRs 50,000 respectively.

GSCA 2055

Decision to provide NRS 75,000 to Laxmi Mahila CF, Prithivinagar palika -8, Gorkha, and NRS 25,000 to Deupanna CF, Peugha VDC-6, Rukum.

Selection Committee meeting dated 2055/12/2 recommended that only CF area larger than 10 hectare be nominated for the award.

GSCA 2056

Gitthapani CF, Rishpata, Bajhang first prize

Rischi khola Mahila CF, Dadeldhura second

Thulodanda gaira salleri , Mijhing Rolpa Third

GSCA 2057

Rani CF, Chughadha, Hetauda, MAKWANPUR First

Lopakha Raniban, Dhikurpokhari, Kaski Second

Galeshwor thulo salleri, Ghatan, Myagdi Third

GSCA 2058

Gaurati CF, Pipaldanda-8 Sindhupalchok First

Pallo Pakho CF, Kuim 3 Itar, Baglung Second

B.P. Nagar CF, B.P. Nagar, Doti Third

GSCA 2059

Gahate CF, Lamjung First

Soti Banarasi CF, Dolkha, Second

Silum Kasmari tatha simsar patle swari Jukepani, Kaski Third

GSCA 2060

Ghorlas CF, Myagdi First

Yalamber CF, Dharan, Sunsari Second

Jhauri CF, Parbat, Third

GSCA 2061

Chuchhaekhola CF, Hetauda na pa 6, Makwanpur First

Koili Mahila CF, Budhakhani VDC – 5, Kabhrepalanchok, Second

GSCA 2063

Hariyali CF, Dharan-19, Sunsari First

Semailal Chaudhari Magheli-5, Jhumki, Sunsari Second

Koili CF, Budhakhani, Kabhrepalanchok, Third

GSCA 2068

Sundari CF, Nawalparasi, First

Taldanda CF, Dulaegauda, Tanahu, Second

Annex 4: Annual Income sources and Expenditure items of GSCA community forests (in NRs)

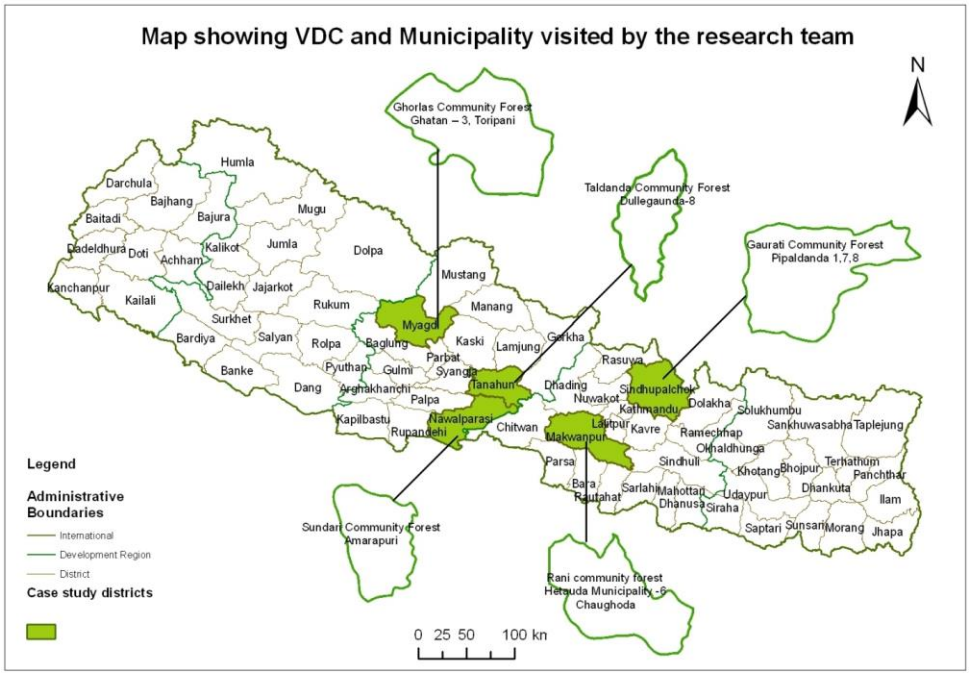
Income code	Source of income	Sundari CF (FY 2010/11)	Taldanda CF (FY 2010/11)	Gaurati CF (2010 Jan-2011/Dec)	Ghorlas CF (FY 2010/11)	Rani CF (FY 2010/11)
1.00	**Sale of forest products**					
1.01	Fuelwood	207,962	54,055	23,000	7,270	60,914
1.02	Timber	22,263	310,078	300,000	208,334	526,794
1.03	Litters/fodder	2,200			18,985	
1.04	Herbs	18,225			1,243	
1.05	**others**	12,905				23,394
2.00	Assistance from Government and non government organisations	135,300				
2.01	Government				50,000	
2.02	Non government		5,501		12,500	
3.00	**Fine/ Punishment**	14,750	2,090		840	2.065
4.00	Entry and membership fee		2,570			
4.01	**Membership fee**	39,660	117,860			15,594
4.02	Entry fee		4,590		9,700	25,350

4.03	Others		7,465	704,007	180	1,261
5.00	Lending from others			518,743		
6.00	Other income	289,765	33,354		8,784	15,625
7.00	Last year's balance		668,687	13,48,780	177,488	66,242
	Total	742,985	12,06,250	28,94,530	307,644	735,176

Expenditure of community forests

Expenditure code	Item	Sundari CF(FY 2010/11)	Taldanda CF (FY 2010/11)	Gaurati CF (2010 Jan-2011/Dec)	Ghorlas CF (FY 2010/11)	Rani CF (FY 2010/11)
2.01	Salary and allowances	381,288	52,805	87,500	12,200	120,520
2.02	Meeting allowance and tea /snacks		7,619		6,150	14,634
2.03	Forest watcher and protection related	91,790		109,000	15,040	21,414
2.04	Training and study tour	15,530				
2.05	Stationary	35,035	2,454	35,000	6,899	58,429
2.06	Rent / equipment			20,500		
2.07	Building	124,752				
2.08	School support		91,000	300,000	25,000	
2.09	Road construction	148,951		350,000	81,000	
2.10	Emergency support					
2.11	Pro-poor programme	55,500	187,916	659,500	78,169	388,754
2.12	Other Miscellaneous	360,291	13,683	694,589	83,366	131,425
	total	1,213,137	355,477	2,256,089	307,824	735,176

Annex 5: Map showing VDC and Municipality visited by the research team for case study



Annex 6: Main features of Ganeshman Singh Conservation Award (GSCA) winning community forests selected for case study

Characteristics/ Features	Sundari CF	Taldanda CF	Gaurati CF	Ghorlas CF	Rani CF
Address	Amarapuri 1,2 and Ratanpur 6,9, Nawalparasi	Dulegauda-8, Tanahu	Pipaldanda 1,7,8 Sindhupalchok	Ghatan – 3, Toripani, Myagdi	Hetauda Municipality -6, Chaughada, Makwanpur
Forest area (hectare)	384.75	84	103	27.64	151.87
No of Beneficiary households	1553	325	239	156	708
Number of FUG Committee members	15	13	10	7	11
Women members in FUG committee	5	5	2	2	3
Full time employment (Persons year)	3				3
Major forest activities	forest nursery, herb demonstration plot	fire-lines, regular controlled firing, timber stand improvement	thinning activities	garden and nursery of Zanthoxylum *armatum*	
FUG run enterprises	leaf-plate making, ayurvedic enterprise			plough making enterprise, furniture industry	catering services

Other development activities	awareness raising activities focused on forest fires and climate change , skill development training, scholarships	35 percent of income in forest management and development activities	scholarships, allowance for women in early motherhood	operational plan revision of fifty neighboring community forests	drinking water supply, loan for various agri-business, women awareness program, construction of school and road, renovation of temple, scholarships to girl and poor students
Ganeshman Singh Conservation Award received year	2011	2011	2001	2003	1999
Main attribute for receiving award	housing for poor and disabled focused program	improved grass cultivation plot, animal husbandry for income generation	revolving fund for income generating activities	Forest management works and plough making enterprise	Forest management works

Ophiocordyceps sinensis a significant nature gift to livelihood of high mountain people of the Bhutan Himalaya: A Review

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Abstract

Ophiocordyceps sinensis as Non Wood Forest Product species does contribute appreciably to the rural communities and thus meet one of the criteria of food security which is envisaged in the development plan programme of the country. Considerably this natural product benefitted and improved the financial situation of the highland (*O. sinensis* growing regions) people of the Bhutan Himalaya. Royal Decree accorded and has environment friendly policy in place for the harvest and sale of this product so that the natural resource is managed sustainably even though it is enlisted in the Schedule I of totally protected species. There was a significance of difference on production of *O. sinensis* between and within the growing regions as it showed F = 7.088 at level p<.05. The total income generated was also significant to the regions, F (2, 46) = 5.460, p = .007. The yield pattern of this product is difficult to understand as it tends to show inconsistent production level. However, most of the year it showed an increased in yield if it is sum for the country. Thus consistence, extensive and long term research is necessary in in-situ state so that its biological and production characters are understood.

Key words: Contribute appreciably, food security, natural product, totally protected, significant, royal decree, managed sustainably.

[3] Has been working for the last 17 years with the Non Wood Forest Product activities of the country
[4] Had been worked for the last 15 years with a various forestry and medicinal plants / fungus research activities of the country

Introduction

Bhutan at the pace of developing, there is a need of suitable management for the sustainable utilization of natural resources more than ever. The natural resources such as Non Wood Forest Products (NWFP) in Bhutan have not been depleted yet to the extent as it has been in other parts of the world. However, there is always a chance of detriment if sustainable management is not practiced. *With food security* as one of Bhutan's main objectives since *8th Five Year Plan,* sustainable management and utilization of natural resources becomes crucially important.

"Food security is defined *as a state where all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preference for an active and healthy life.* Availability, access, utilization and stability are the four pillars of food security" (FAO, 2011). Access to NWFP resources to the rural poor will greatly benefit economically and socially. Approximately 64% of the Bhutanese populations depend on agriculture and are subsistence farmers for which NWFP acts a very imperative and supportive role for a subsidiary means to them. With continuum emergent stress on land, water, capital and labourer, farmers should look a variety of ways and means to increase their income. Eventually, in highland of Bhutan Himalaya, *Ophiocordyceps sinensis* (Berk.) (G.H. Sung, J.M. Sung, N.L. Hywel-Jones and J.W. Spatofora (syn. *Cordyceps sinensis*) is one of NWFP species that has been a great potential to cater off-season employment and generate earnings. According to Darwin, (www.ltsi.co.uk) *Ophiocordyceps sinensis* is the most valuable fungus in the world, with retail prices of over US$30,000 per gram for traditional Chinese medicine. A Darwin project established to monitor the scheme and direct the Royal Government of Bhutan on data on which to base the regulations for harvesting of the fungus. Despite high market prices, the Darwin project ensures Bhutan to maintain a sustainable harvest of *O. sinensis*, protecting the rural communities from a loss of future income.

Currently NWFP is being recognized and gaining limelight in Bhutanese forestry, as it has potential to improve the livelihood of rural people which is practically tangible in some parts of the country's high altitude places. For example, it has been found that 60% of all food comes from forests in the forested areas of northern Thailand (Hoskins, 1990). NWFP, particularly *O. sinensis* is good sources of earning, which will

help to maintain socio-economic state of the rural highland people of Bhutan. Thus it can act as economic return reserves in times of financial shortage of the aforesaid rural people.

The raw materials provided by such NWFP can be used locally in small scale enterprise to produce traditional medicine as has been done by the Menjong Sorig Pharmaceutical (MSP), Ministry of Health, in Kawajangsa, Thimphu. Such enterprise provides opportunity to nomadic populace in generating employment and income. Millions of subsistence level farmers in northeast Brazil rely on cash from NWFPs (May, *et al.*, 1985; cited in Hoskins, 1990). It would be important to Bhutan to identify potential NWFP species that can contribute to the upliftment to rural living standard. Including shrubs Bhutan has 80.89% of overall forest cover (LCMP, 2010). The climatic altitudinal variation in different areas of the country made an advantage to have a great diversity in NWFPs resources which has potential to contribute to socio-economic betterment of the rural population. It led to become Non Wood Forest Products as one of the important forestry development programmes in the government five year plans under the food security of Ministry of Agriculture and Forests.

Therefore, this review article will present the current NWFP legitimacy and economic benefits derived by the nomadic people of Bhutan through harvesting and selling of *O. sinensis* as one of the NWFPs species. Also it will illustrate the quantity, quality according to price fetched and sustainability trend of the cited NWFP resources in different regions of the Himalayan country Bhutan.

Objectives

The objectives of this review article are to:

- Understand how much the *O. sinensis* as one of NWFPs contribute to economy of the highland people of Bhutan and
- Know the variations in annual production of *O. sinensis* and its sustainability in the Himalayan regions of Bhutan

Policy and legislation

Environmental conservation is the national priority in the Bhutanese policy-making. Before 1960s people used to enjoy wild forest resources with no or modest intervention from government side. When in 1961, Bhutan first developmental activities plan i.e. Five Year Plan (FYP) started, the rules and policies began evolving for the management and utilization of natural resources. From there on, natural resources became a centralized programme of the government.

The Forest Act (FA), 1969 and National Forest Policy (NFP), 1974 were in place as the country's first legislation and policy statements that provided legal and policy matter for successful protection endeavour. These FA, 1969 and NFP, 1974 gave much emphasis to the protection rather than the conservation and sustainable utilization of forest resources. Later, FA 1969 has been replaced by Forest and Nature Conservation Act (FNCA) of 1995 which had devolved the management of natural resources to the grass-root level urging local communities to participate in it.

In FNCA, 1995 included the chapter of Social Forestry and Community Forestry that gave access to the use of natural resources legally and sustainably. But this act did not give right to people for collection and sale of *O. sinensis.* Instead it was included in Schedule I of FNCA, 1995 as totally protected species although it was not in the lists of Convention on Illegal Trade in Endangered Species of wild fauna and flora (CITES). According to *Guo,et.al*, 2012, the government of the People's Republic of China also included this species in the National Protection Law for Wild Plants (NPLWP) since 1999 and enlisted *Ophiocordyceps* in Appendix II of the said law. However, the law allowed to harvest and market as per management rule prescribed in NPLWP of 1999.

In 2002 the harvesting of *O. sinensis* was legal only in Lunana geog (western region) under Gasa dzongkhag (Wangchuk, 2004). Subsequently on 17 June 2004, a noble visionary Royal Decree had been granted by His Majesty the 4th Druk Gyalpo, King Jigme Singye Wangchuk to the highland communities to harvest and sale *O. sinensis* legally in the available market. From there on, the nomadic communities of Bhutan had been enjoying the benefits from such highly valuable NWFP resources. NFP, 1974 had been revised in 2011 and called as National Forest Policy of Bhutan (NFPB), 2011. This revised forest policy (NFPB, 2011) bestowed to a great extent that it allows sustainable harvesting of NWFPs following the prescriptions that drawn in management guideline or plan.

Prior to NFPB, 2011, an Interim Framework for the Collection and Management of NWFPs 2009 has been developed to ease the sustainable harvesting and management of 41 NWFP species that included *O. sinensis* too. Later on in 2011, interim framework

has been revised as Interim Framework for Management and Marketing of Non Wood Forest Products, 2011. The revised interim framework included 60 NWFP species that can be harvested and marketed legally by forming NWFP farmers' groups and by following guidelines and norms prescribed in the interim framework.

In 2009-2010, then Social Forestry Division of Department of Forests and Park Services (DoFPS), framed the rules for harvesting and marketing of the *O. sinensis* which gave easy gateway to access over the natural resources by the highland communities. In 2011, that rules had been superseded by Rules and Regulations for Collection / Harvesting and Marketing of *Ophiocordyceps sinensis* for 2011 Season, Royal Government of Bhutan, Ministry of Agriculture and Forests (MoAF). These revised rules came into effect from April 2011 which has immense help to the highland rural people in accessing and availing economic benefits from such natural resources.

Thus, the legal harvesting and collection of *O. sinensis* by the transhumance inhabitant communities became the most important source of income generation. With the legalization, hand picking method of harvesting is followed and discouraged the use of tools with restriction to one month time period for collection and shall not be extended beyond end of June (MOAF, 2011).

Geographical habitat distributions

The *O. sinensis* was first recognized in the cold grassy alpine marshland of mountainous regions in Tibetan Plateau (Hywel-Jones, 2002). As a medicinal boon, it was initially documented by Tibetan physician Nyamnyi Dorje and Lama Palden Zurkhar during 1439-1475 (Winkler, 2008). It is normally found in the alpine ecosystem of the Himalayas and the habitats are characterized by an alpine scree areas, alpine stony desert, shaded meadows, glacial moraine and place with continuous green vegetations (Negi, Koranga and Ghinga 2006). According to Rai (2012), *O. sinensis* growing habitat is characterized by the ground vegetation families of Ericaceae, Rosaceae, Polygonaceae, Cyperaceae, Salicaceae, Ranunculaceae, Primulaceae and Poaceae. The native occurrence range is from 3000-5000 m.a.s.l and the most common occurrence range is from 3500-4500 m.a.s.l in cold and arid environment in Nepal, India and some provinces of China (Sharma, 2004). In Bhutan, it is one of the most valuable medicinal fungus species harvested as the main source of income to the transhumance rural communities (Rai, 2012). It is grown in the alpine regions of Bhutan and distributed patchily with habitats characterized by treeless alpine grasslands at an elevation range of 4200-5200 m.a.s.l (Cannon *et al.*, 2009 and Maczey, Cannon, Dhendup, Hywel-Jones, Rai, 2010). In Bhutan, *O. sinensis* is found in Gasa, Haa, Paro and Thimphu in the western region, Bumthang and Wangduephodrang in the central region and Lhuentse, Trashigang and Trashiyangtse

in the eastern region districts (*Fig.1*). However, the growth and distribution of this species has restricted habitats which grow only in the extreme northern regions of the country. Its growing areas have fluctuating change of temperature which ranges from minimum of -7.40°C and maximum of 7.40°C (Rai, 2012). The population growth *O. sinensis* and prevailing temperature of an area are related to each other as lower the temperatures higher the occurrences of fungus growth (*ibid*).

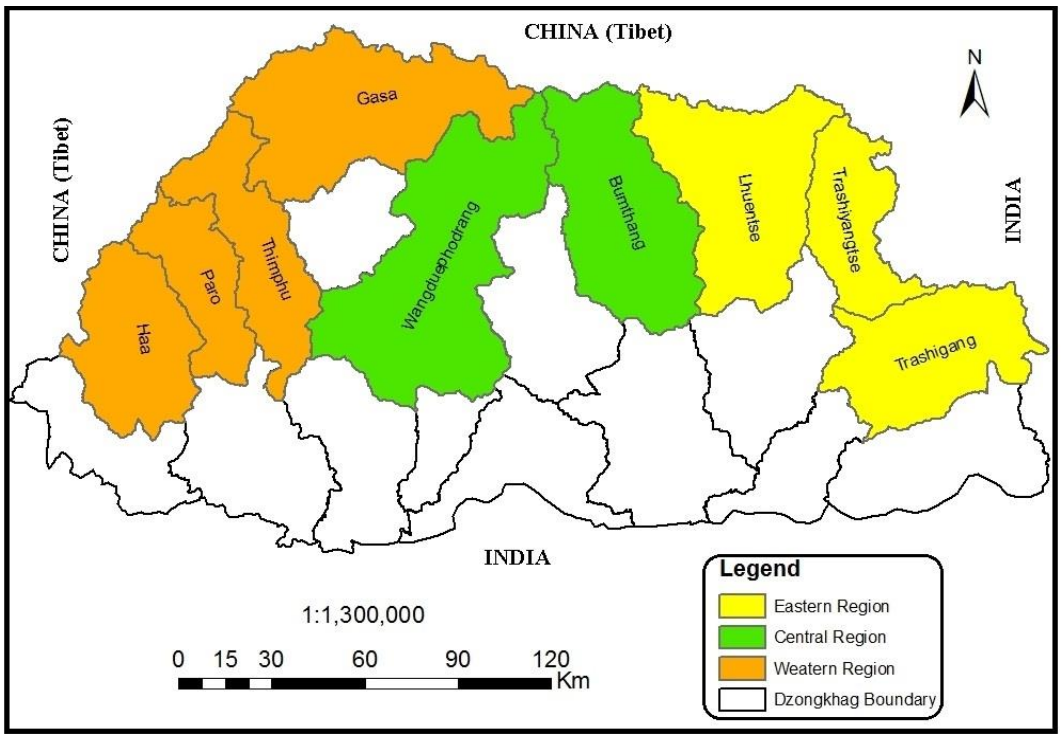

Figure 1: Map showing *Ophiocordyceps sinensis* growing districts in Bhutan

Methods

The series of primary data was collected from the different *O. sinensis* auction yards. A team comprising from Department of Agriculture and Marketing Cooperative (DAMC) and Social Forestry and Extension Division (SFED) under MoAF was involved for information recording during the entire auctioning process. A total of nine years data was collected (2004-2012) for analysis and deducing overall findings and conclusion of the products harvested.

The number of available literatures, reports, documents and news articles were also reviewed extensively to ascertain the information appropriateness and present in this write-up.

Data analysis

To analyze the gathered data, SPSS and Microsoft Excel spreadsheet were used. The statistic tools like, one way ANOVA along with post hoc tests for multiple comparisons and Non-parametric Mann-Whitney *U*-test were employed. One way ANOVA shows the significance difference at .05 level of significance and post hoc comparison determines exactly which means differ with which variables. Likewise Mann-Whitney *U*-test shows the ranking and significance of the selected variables at .05 and .001 levels.

Results and discussions

Results

The production significance of *O. sinensis* in different regions was significant, F (2, 46) = 7.088, p = .002. There was significance of difference (Calculated F = 7.088 ≥ critical value in distribution table F = 3.23, p<.05) on production of *O. sinensis* between and within the growing regions. The total income generated from this natural product (O. *sinensis*) to the regions was also significant, F (2, 46) = 5.460, p = .007. There was significance of difference (Calculated F = 5.460 ≥ critical value in distribution table F = 3.23, p<.05) on the total million ngultrum fetched between and within the regions by aforesaid product. Similarly the selling rate Kg^{-1} and contribution as royalty in millions ngultrum of this NWFP natural resource was highly significant (*Table 1*).

Table 1: One way ANOVA to determine significance of difference among different variables

Dependent variables	Sources	*df*	*MS*	*F*	*p*
Production in Kg	Between Regions	2	42458.257	7.088	.002
	Within Regions	46	5989.865		
	Total	48			
Rate per Kg in Million Ngultrum	Between Regions	2	.037	4.021	.025
	Within Regions	46	.009		
	Total	48			

Amount fetched in Million Ngultrum	Between Regions	2	599.365	5.460	.007
	Within Regions	46	109.767		
	Total	48			
Royalty in Million Ngultrum	Between Regions	2	1.751	5.852	.005
	Within Regions	46	.299		
	Total	48			

**p<.05*

The post hoc test like Bonferroni for multiple comparisons also deduced that the all variables taken for test was highly significant at the .05 level, *p* = .002, .040 and .007 respectively (*Table 2*). This result clearly shows that *O. sinensis* as one of NWFP species which is very much significant to the nomad peoples' livelihood and even to Royal Government since it contributes a lot amount as Royalty (*Table 3*).

Table 2: Post hoc tests for multiple comparisons of the listed variables between different regions

Dependent variable		(I) Region	(J) Region	Mean Diff. (I-J)	Std. Error	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
Production in Kg	Bonferroni	Central	Eastern	109.522*	29.252	.002	36.839	182.205
		Eastern	Central	-109.522*	29.252	.002	-182.205	-36.839
Rate per Kg in Million Ngultrum	Bonferroni	Western	Eastern	0.085*	0.033	.040	0.003	0.168
		Eastern	Western	-0.085*	0.033	.040	-0.168	-0.003
Amount fetched in Million Ngultrum	Bonferroni	Central	Eastern	12.845*	3.960	.007	3.006	22.684
		Eastern	Central	-12.845*	3.960	.007	-22.684	-3.006
Royalty in Million Ngultrum	Bonferroni	Central	Eastern	0.704*	0.207	.004	0.191	1.218
		Eastern	Central	-0.704*	0.207	.004	-1.218	-0.191

* The mean difference is significant at the 0.05 level.

Table 3: *Ophiocordyceps sinensis* data for entire regions (2004 - 2012)

Year	Total quantity (Kilogramme)	Total amount fetched (Million Ngultrum)	Total royalty collected (Million Ngultrum)	Average rate (Million Ngultrum Kg^{-1})
2004	175.53	12.82	0.64	0.05
2005	57.13	16.82	0.26	0.17
2006	506.665	42.92	3.14	0.08
2007	140.367	41.15	0.96	0.27
2008	685.047	95.30	4.77	0.12
2009	594.721	77.79	4.16	0.10
2010	550.652	89.21	3.79	0.17
2011	169.00	72.67	1.18	0.43
2012	235.89	150.97	1.65	0.64

Sources: SFED / DoFPS[5] and DAMC / MoAF[6], 2012

Table 4: Region-wise ranking of production, rate kg^{-1}, total amount generated and total amount contributed as royalty by *O. sinensis* as per the data collected and deduced through Mann- Whitney *U*-test

Variable	Region	N	Mean	Std. Deviation	Median	Significance
Total amount	Western	21	7.674	11.409	21.62	**
generated	Central	14	7.674	11.409	21.43	ns
(Million Nu.)	Eastern	14	7.674	11.409	12.57	**
Total	Central	14	55.308	86.657	22.64	**
production (Kg)	Western	21	55.308	86.657	21.86	***
	Eastern	14	55.308	86.657	12.21	***
Rate (Million Nu.	Western	21	0.111	0.102	21.33	**
Kg^{-1})	Central	14	0.111	0.102	18.46	**
	Eastern	14	0.111	0.102	13.00	**
Total royalty	Central	14	0.361	0.600	22.14	*
(Million Nu.)	Western	21	0.361	0.600	21.19	**
	Eastern	14	0.361	0.600	13.21	**

Note significance levels: **ns** not significant at level $p \leq 0.05$, * = significant at level $p \leq 0.05$, ** = significant at level $p \leq 0.001$, *** = significant at level $p \leq 0.001$.

[5] Social Forestry and Extension Division / Department of Forests and Park Services
[6] Department of Agriculture and Marketing Cooperative / Ministry of Agriculture and Forests

The table 4 shows the Mann-Whitney *U* test for different variables like total amount generated, total production, rate Kg^{-1} and total royalty shows their rank by comparing between and within the regions. The ranking showed highly significant ($p < 0.05$) difference in medians of different variables from region to region. This means, the amount generated from *O. sinensis* was significant and among all, western region ranked the highest in fetching financial amount. But central region showed not significant in comparison to western region since there was a negligible difference in their median of the benefit and eastern region yet showed significant ($p \leq 0.001$). The production of *O. sinensis* was also showed significant and highly significant ($p \leq 0.001$) respectively in all regions. The selling rate of was significant ($p \leq 0.001$) and total royalty contributed was significant ($p \leq 0.05$, $p \leq 0.001$ respectively) in all the regions. Likewise the ranking follows in the same manner for all variables as shown above (*Table 4*).

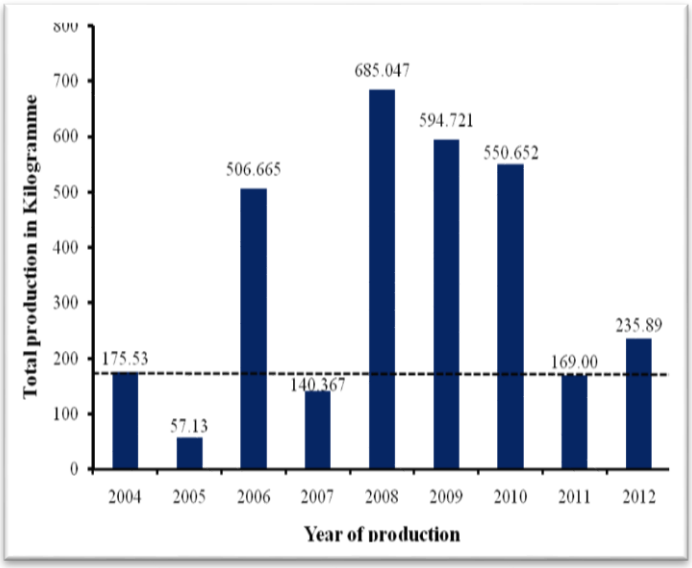

Figure 2: Total production of entire region (2004 - 2012)

The figure 2 (also table 3) showed the total production of *O. sinensis* for all regions in Bhutan from the year of legalization by Royal Decree (2004) till 2012. It illustrated that the production was never constant or rather it was unpredictable. If the production of legalized year kept as baseline data (set as 175.53Kgs) then most of the year the production was increased except in the year 2005 with 57.13Kgs, 2007 with 140.367Kgs and 2011 with 169.00Kgs. The highest production was 685.047Kgs in the year 2008. At-least up to 2012, it can be predicted as the production was in a positive trend where the harvest of this natural resource product was not in the detrimental phase.

Discussions

Yet, *O. sinensis* is not the endangered fungus species which is why it is not in the IUCN Red List of Endangered or Threatened Species category. Thus, it is not included in the Appendices list of CITES. However, Bhutan has enlisted in Schedule I as totally

protected species according to FNCA, 1995. Even China put this as an endangered species in Appendix II of NPLWP since 1999 (Wang and Yao, 2011 and *Guo,et al*, 2012). But can be harvested legally following certain procedures implemented by the government.

In 2002 when the harvesting of *O. sinensis* was legal only to Lunana block (western region) under Gasa district, the living condition of about 158 households of that block has reportedly improved (Wangchuk, 2004). Therefore, it is one of the significant NWFP species which has pivotal functions in generating off-farm economy, providing opportunity of part time employment to the nomadic people of Bhutan. It has a great potential as natural resource product to reduce poverty improvising the better rural livelihood of the highland communities provided; the communities adhered to the government implemented management practices to harvest and market the product. Wangchuk, Norbu and *et al.* (2012) stated that an annual income from the sale of *O. sinensis* is about Nu.23,000.00 household^{-1} in central regions (Bumthang and Wangduephodrang) and it is a good sum of money to rural people without having to invest on the farm input. In alpine region, 30% of the people has about 80 – 100% of their income only from the sale of that product and even claimed to build houses and purchased household supplement. Meanwhile 93% of the *O. sinensis* harvester acclaimed to have financial gain (*ibid*). Lingshi community in western region counts a huge amount of money (*Table 3*) by selling *O. sinensis* (Kuensel, 27 Oct. 2012). Nepal also acknowledged the significance contribution of *O. sinensis* as it has been considered to uphold the livelihood in rural areas (Christensen *et al.,* 2008 cited in Devkota, na; and Bhushan, 2011).

However, *O. sinensis* is endemic to an alpine region which is one of the most valuable medicinal fungi in the world. Its huge commercial demand has led to excessive harvest and a dramatic decline in its population (Zhang; Xu; and *et al.* 2009). In Bhutanese context, it is very difficult to understand and conclude sustainable harvesting of *O. sinensis* (*Table 3 and Fig. 2*). In Bhutan, every year there are substantial variations found in overall production of *O. sinensis* (Table 1, 3 and Figure 2) in different regions. The research studies by Cannon *et al.* (2009) and Rai (2012) reported that there are substantial annual variations in overall production of *O. senensis* in Bhutan. The annual production variations could be due to that the infected fungus caterpillars stay dormant underground for long period of time (Cannon et al., 2009) and host caterpillars may feed on host of the plants for about 2-3 years (Hywel-Jones, 2002). According to Rai (2012), the prevailing temperatures of an area play vital role for the production of fungus and related to production, as higher the temperature, lower the production of fungus. Nevertheless, it can be said, most of the year the production has gone up in comparison to the production of the legalized year 2004. Till date, the trend for harvesting of *O. sinensis* in Bhutan has not gone down and seems

sustainable but sustainability cannot be ascertained unless we know the information on cross borders illegal activities. Many Bhutanese legal collectors illegally sale *O. sinensis* outside Bhutan (Tibet) and auction only if there are attractive prices offered. The illegal processing and marketing of products would impact on understanding sustainable *O. sinensis* harvesting and would be difficult for the decision makers.

Conclusions

Among all NWFP species, *Ophiocordyceps sinensis* is the most significant fungus species in the world that has been benefitting to livelihood of the high mountains people of Bhutan Himalaya. It is of course found in scattered places in the country. Bhutan is referred as a place of wild medicinal plants having an immense potential to earn money but because of legalization to harvest of this fungus, the alpine communities has made a paradigm shift to *O. sinensis*, neglecting the collection of other wild medicinal plants. This has led to MSP in getting less quantity (facing a bit difficulty in meeting their wild medicinal plants demand) of wild medicinal plants as raw materials for the production of indigenous medical drugs.

Financially *O. sinensis* has contributed significantly to the highland people because of which the communities able to build good living houses and used to spend on individual household supplementary. The benefit by this product goes not only 158 households of Lunana block but to all nomadic people of the nine districts of Bhutan. This natural product not only gained to highland communities but also added million of ngultrums to the Royal Government of Bhutan by means of Royalty (*Table 3*).

Way forward

It is quite complicated to understand the sustainability of *O. sinensis* yield from its natural state (*Fig.2*). Although, Research Department has been into this activity for some years, yet it is important to do intensive in-situ research in order to understand the following facts of this wild fungus:

- Ecological/habitat studies (includes all biophysical factors like soil types and soil nutrients, micro-climate, slope, aspects, vegetation etc.) with its ecological zone
- Detail biological life cycle studies
- Laboratory analysis for the constituents of *O. sinensis* for products information is important to the traders and importers
- Fungus maturity period in different *O. sinensis* growing locations and its alien factors which promote or deteriorate its growth

- If the fungus has alternate growing or maturity year similar that of some trees like good or bad seeding year
- Try to explore other new places for its availability so that it can be harnessed into the harvesting regime

For the value added and sustainability of fungus, a bio-prospecting will be a brilliant concept as new laboratory has established recently (in 2012) by the National biodiversity Centre at Serbithang, Thimphu Bhutan.

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A Proactive Initiatives of MP Minor Forest Produce(T&D) Cooperative Federation in NTFP Resource Augmentation and Value Addition – A Case Study of MFP-PARC

R.R.Okhandiar *I.F.S* [7]

Abstract

India's forestry, though more than 14 decades old, is still timber centric. Our National Forest Policy - already 22 years old - underlined the importance of NTFP for the livelihood of forest dependant communities even then our Working Plans are still being updated for the timber species only. This is high time we reorient ourselves & include the concerns of NTFP in our everyday forestry. Government of Madhya Pradesh has appointed MP Minor Forest Produce (Trade & Development) Cooperative Federation as nodal agency of the state to play a proactive role in NTFP related business and thereby offer better livelihood opportunity to forest dwellers. It is precisely in this area, i.e. mainstreaming of NTFP aspects in our forest management system, that center like Minor Forest Produce Processing and Research Centre established in Bhopal (MFP-PARC) is playing a very important role in adding value to NTFPs collected by village level primary cooperative societies. In the field of herbal awareness generation, conservation & value addition of Medicinal Plants , this center has became a role model for others government department of the country to follow.

Keywords: NTFP, Minor Forest Produce, Ayuerved, MFP-PARC

Introduction

Madhya Pradesh -- the very heart of India, is not called so only because of its location in the centre of the country but because it offers diverse experiences in art, culture, religion, history and also endowed with extensive forest cover with rich floral diversity - 2751 recorded species. The natural beauty of the State is equally varied. With plateaus and plains that are intersected by meandering rivers and dotted with

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hills and ravines, nearly one third of the State is under green forest-cover, offering an exciting panorama of wildlife engulfed with vividness of forest flora.

The magic of forests of Madhya Pradesh is further enhanced due to availability of wide variety of Non-Timber Forest Produce (NTFP), originating from diverse sources ranging from large plants to micro flora consisting of heterogeneous products, constituting a critical lifeline for the poor tribal and other forest dwellers by providing them family sustenance and livelihood means. Out of 16 Agro climatic zones in India, 11 are represented in Madhya Pradesh. This explains the range of soil and climatic conditions prevailing in this state. This is why; most of the tropical NTFP which includes medicinal herbs is naturally found in Madhya Pradesh. The State with geographical area of 0.308 million sq. km. and 95220 sq. km. of lush green forests has a vast potential to develop itself as a mega production centre of NTFPs and medicinal plants of diverse types. This is also the long term strategy of Madhya Pradesh government regarding NTFP management in the state.

Non Timber Forest Produce Policy

Non timber forest produces (NTFPs) have served as an engine of livelihood promotion for the forest dwellers in a number of interventions made by Government of Madhya Pradesh. Subsistence agriculture, wage labour and collection, processing and sale of forest produces form the important livelihood basket of the people of state. The major forest produces collected in MP are *mahua(Madhuca indica), amla(Embilica officinalis), chironji, bhilma*, honey, *shikakai*, soap nut, gum *karaya* (*Stirculia urens*) *tendu(Diosporos melanoxylon) leaves*, *sal(Shorea robusta)* seed and various other medicinal plants. People are usually engaged for varying periods ranging from two to six months in NTFP collection and its sale. As regards returns, it varies from 20-40 percent of the total household income. But this income is not evenly spread and comes at a particular period of the year especially during the agricultural lean season.

Management, collection as well as its trade of NTFP was always a very important agenda of Government of Madhya Pradesh (GoMP) for providing livelihood opportunity to tribals and forest dwellers. The two stated objectives of policies of GoMP relating to management of NTFPs including procurement, storage, processing, disposal and utilization are **"conservation of resources"** and **"welfare of the tribals and other forest dwellers"**. To look after and manage the entire trade as well as

development aspect of NTFP, a cooperative agency was created in 1984 by the GoMP which has a three tier cooperative structure called Minor Forest Produce Federation.

Till mid 1990s, GoMP followed a policy of nationalization of produces and designated MPMFP Federation to have monopoly rights over procurement and trade of NTFPs. With the enactment of Provisions of Panchayats (Extension to Scheduled Areas) Act 1996, ownership of NTFPs was handed over to Gram Sabhas. This ended monopoly rights and brought multiple players, small and big, into the arena. But Government of Madhya Pradesh still retained monopoly rights over some NTFPs like Tendu leaves, Sal seed and Kullu gum. As of now, the nationalized NTFPs are still being managed, traded and governed by MFP Federation because it was the existing arrangement prior to the enactment of Panchayati Raj Act in 1996 and the trade of these products was also well established. Any disruption in this would have adverse effect on the business which would have adversely affected the local NTFP collectors and their livelihood. Further, the existing arrangement does not in any way violated the spirit of Panchati Raj Act, as the profit from trade of nationalized NTFP were returned back to the tribal. MFP Federation took only one rupee as commission for its intervention. NTFPs collectors are made share holder of this system where they not only share the profit but their elected representative takes important decision in the matter of its trade and conservation of the resource. In a way, it is one of the most established and proven successful model of participatory management of NTFP resource in the country.

It is a well established fact that ever increasing anthropogenic pressure on our forests and commercialization and globalization coupled with inappropriate harvesting regime of NTFPs have degenerated the main resource into an Open Access Resource (OAR) and consequently causing its depletion. The poor knowledge base – Traditional as well as Scientific, disaggregate nature of NTFP harvesting and its marketing, economic weakness of the NTFP collectors and lack of collective bargaining power of the gatherers has resulted into institutional neglect of this sector.

Challenges of NTFP Trade

However, in recent years, there is a renewed interest in NTFP related products, nationally as well as internationally, especially due to its health and nutritional related benefits. This provides an appropriate opportunity for the organization (GO, NGOS) to gear up the institutional mechanism for sustainable production, harvesting,

value addition and marketing of NTFP related products. At each stages of value chain of NTFP, scientific and technical inputs are required which is one of the most important challenges before us.

Madhya PradeshState Minor Forest Produce(T&D) Federation Ltd. (MPMFP Fed.)

The **Madhya Pradesh State Minor Forest Produce (Trade & Development) Co-operative Federation Limited** was formed in 1984 to promote development, trade and marketing of various NTFPs, including medicinal plants on a model, making NTFP collectors as share holder of this trade. National Forest Policy, 1988 also has laid emphasis on managing Non Timber Forest Produce (NTFP) in such a way that maximum benefits is transferred to forest dwellers as it is associated with their livelihood. MPMFP Federation is a 3-tier cooperative structure with Primary Cooperative Societies at the lowest (village) level comprising of collectors/gatherers of NTFPs, Jila Union at District level (DFO as ex-officio Divisional Manager) at the middle level and the apex body (with Principal Chief Conservator level officer as Managing Director) at the state level. At village level there are 1066 Primary Forest produce Co-operative Societies & at district level there are 62 District Forest Produce Co-operative Unions. At each level of functioning, there is an elected body of executive committee. The MFP Federation co-ordinates collection and processing of nationalized forest produce, namely Tendu leaves (the leaves of *Diospyrus melanoxylon),* used for rolling small cigars, Sal Seed (*Shorea robusta*), & Kullu Gum (*Sterculia urens*) through Primary Forest Produce Co-operative Societies in the State and arranges marketing of these produce. In addition, other non-nationalized NTFPSs are also being collected and traded by the Primary Forest Produce Co-operative Societies. The profit earned from the trade of NTFPs is returned back to collectors. A part of the profit is ploughed back for the development and maintenance of NTFP and Forest resource for its sustainable management.

Besides collection, processing and marketing of nationalized NTFPs, MPMFP Federation is actively engaged in the various other aspects of non nationalized NTFP and Medicinal and Aromatic Plant (MAP) resource development, its collection, processing, value-addition and marketing through various outreach programmes.

The Strategy

The broad strategy of NTFP and Medicinal Plants in the state is that of conservation and development within the forests *(in–situ*) as well as outside the forest*(ex–situ*) on one hand and encouragement for the processing and marketing on the other hand. The MFP Federation has not only aimed for sustainable harvesting of NTFPs and thereby providing livelihood opportunity to forest dwellers but has also made a comprehensive long term plan for value addition and marketing of NTFP related end products through scientific . This will not only enhance the income of NTFP collectors but will also let common people to get pure herbal products at right price. It is in this background, the vision envisaged in NTFP-Medicinal Plant development strategy of GoMP read as follows **"Stimulate and strengthen the partnership between Government, Herbal Industries, Scientific Community and growers/ producers/ farmers/tribal to project, promote and protect traditional herbal healthcare systems and products by being associated more with each other so that the system may begin to work more organically as interconnected systems as opposed to isolated island."**

In order to strengthen the low-end of technology with special reference to value addition in medicinal plants for rural employment and to give a commercial shape to the entire activity, Federation has set up many small and medium processing centre (Bhopal, Rewa, Rehti, Chindwara, Dewas, Katni) mainly to provide assistance in producing globally acceptable medicinal plants based quality material.

MFP-PARC

Minor Forest Produce Processing and Research Centre (MFP-PARC) is one of the major herbal processing centre set up by MFP Federation. Federation has tried successfully to synergize the efforts of various agencies for NTFP development program in establishing this centre. It has collaborated with many state and central government organization in this endeavor. In 2003 Federation has joined hand with Mandi Board (M. P. State Agricultural Produce Marketing Board) and started a jointly financed venture for NTFP processing and value addition in Bhopal. Under this project one such ambitious NTFP processing unit - **Minor Forest Produce Processing and Research Centre (MFP PARC)** - was established at Barkhera Pathani, Bhopal. A financial aid of Rs 402.00 lakh was granted by Mandi Board for infrastructure development, setting up of research laboratory and purchase of processing equipments.

In consequence of the overall aims and objectives of the project of establishing MFP-PARC, the Centre is being developed to do processing and value-addition of some of the NTFP based raw materials into Ayurvedic proprietary and patent drugs, nutraceuticals and herbal cosmetics products. MFP-PARC is also engaged in creating awareness for the conservation of wild wealth of NTFP in general and Medicinal & Aromatic Plants in particular. This centre is also supporting forest dependent communities to earn their livelihood by assisting them through sustainable harvesting, primary processing and marketing of NTFPs. The main focus areas of operation of this centre are

Quality control & development of standards.

- Development of processing technology for NTFP.
- Spreading awareness about herbal wealth.
- Marketing assistance for NTFP & its products.
- Processing & marketing of honey & other herbal products.

MFP-PARC is the largest & state-of-the-art manufacturing unit of Ayurvedic and Herbal product in the state under government sector. Its products are sold under registered trade name of ***Vindhya Herbals.***

Location

Minor Forest Produce Processing & Research Centre, Bhopal is housed in a natural habitat and sylvan surroundings in south-east of Bhopal city, in precincts of Bharat Heavy Electricals Township. The centre is spread over a land area of about 5 acres neighboring revenue villages Pathani, Laharpur adjoining newly developed township of Saket, Shakti Nagar and Avadhpuri. The lost avian profile and abandoned piece of forest land has come to life since the establishment of this centre. The place is well connected by network of roads, rail heads and places of herbal interest.

Resource Mobilization

As stated above, it took efforts in terms of financial help and technical guidance of many organizations in establishing this centre. In the day to day governance it is a highly challenging task to mobilize various government organizations and dovetail their schemes to finally bring out a successful project, and this challenge was well accepted by Federation. In establishing this centre, financial grant were received from

MP Mandi Board, Ministry of Tribal Affairs -GoI, Department of Ayush-GoI, National Medicinal Plant Board-GoI, TRIFED, UNDP besides MP Forest department.

Infrastructure

Within the campus of MFP-PARC, the infra- structure comprises civil infrastructure of various sections as per GMP & ISO norms, such as Honey processing, Herbal powders/ capsules /tabletting /Asva-arishta/ Ointment production units, Quality assurance laboratory, Raw material storage godowns, Herbal nursery, Vermi-compost shed besides other basic civic amenities; like, water, sewage disposal, road-network, electricity back-up system etc.

Human Resource

Initially, a senior Indian Forest Service Officer was posted as Chief Executive Officer as the team leader of the centre, assisted by a deputy manager, a range-officer, two foresters and few skeleton office staff. To man and service the Research and Development centre, professionals were recruited on contract basis. Gradually, as the activities of the centre expanded and consolidation process took place, more and more staffs and professional were either recruited on contract basis or posted on deputation from Forest department. Presently, the centre is being run by a team of 31 members which comprises one CEO, one ACF, one deputy ranger, six forester/FG, three clerical staffs, one microbiologist, one taxonomist, one ayurvedic pharmaceutical doctor, five ayurvedic doctors, one training assistant and five other staffs. The staffing structure of the centre has been approved by Board of Director of MPMFP Federation. In future, as the scope of operation will expand and diversify, more professional will be employed. While designing the HR structure for the centre, all attempts were made to keep the staffing structure as thin and smart as possible to maintain this centre as profitable running centre.

Research and Development

A Laboratory equipped with all the facilities for herbal raw material testing was established and along with procedure for standardization was also taken up besides the routine work of herbal testing. The laboratory constitutes three main sections, namely, Taxonomy (Botanical Identification), Analytical Chemistry and Micro-biology sections. Each section was entrusted to a Scientist in-charge and Lab.

Assistant for carrying out specialized task of research and development of various protocols. A few scientific papers have been also been published from MFP-PARC.

This laboratory is well equipped for assessing the identity, purity, strength of NTFP involving visual macroscopic and microscopic examination, use of thin layer chromatography, determination of foreign matter, ash, water and volatile matter, volatile and fixed oils, swelling index, foaming index, characteristic marker compounds including quantification of contaminants such as pesticide residue, heavy metals and micro-organisms.

The laboratory setup for R & D and QC work is well equipped with the advanced technology instruments/ equipments such as, Gas Chromatograph, High Performance Liquid Chromatograph, U V-vis Spectrophotometer, FTIR, Computerized moisture analyzer, High precision electronic balance, High precision Electronic Microscope for powder microscopy, Muffle furnace, Gel electrophoresis, PCR, Stability chambers, HPTLC and other peripherals required for quality evaluation of the plant produce.

Quality Control and Standardization Development Program

Under this program, analysis of different active elements or marker constituent present in different medicinal & aromatic plants has been taken to make them commercially viable. The awareness of Quality parameters prevailing in the national and international market has been provided to the cultivators/collectors aiming at production of good quality raw material. NTFP/Herbal examination (testing) facility of this lab has been also made available to general public.

Quality Control Laboratory at MFP-PARC offers:

- Development of testing methods for quality evaluation of medicinal plants.
- Study the quality parameters of the raw material prior to processing and of the finished products.
- Testing the plant drug during simple industrial processing techniques such as pulverizing, sieving, grading, straining etc.
- Testing of commercial samples of plant drugs - crude and finished products.
- Establishment of quality standards particularly in absence of local standards regarding the moisture, purity, forms etc.
- Generating data of the quality picture of honey in the state and providing world class testing facilities for honey to the collectors.

Development of Processing Technology

In order to strengthen the low end of technology with special reference to processing and value-addition in medicinal plants for rural employment and to give a commercial shape to this activity, MFP Federation has extended the arena to many NTFP based products such as Honey, Gums, Aonla, Ashvagandha, Kalmegh etc. by setting up chain of processing unit at Sehore, Narsinghpur, Satna, Katni, Rewa, Hoshangabad, Chhindwada, Gwalior etc. These centers are managed and operated by respective Primary cooperative society. Technical help and other assistance are being given by MFP-PARC. In future, it is planned to bring all processing centre under one umbrella with an objective of developing each centre specialized in processing and manufacture of unique products.

Honey processing

MFP-PARC has a modern honey processing unit where natural honey collected from forests is processed by a state-of-the-art processing plant designed in consultation with Central Bee Research Institute (CBRI), Pune, India. The Annual capacity of the plant is 24 tonnes. The processed honey is marketed as Vindhya Honey. Although, potential of rock honey production in MP is huge but it is not being well tapped as the network for its collection is not well established.

Herbal Processing Section

In this section the raw material obtained from primary collectors is processed as per GMP norms and converted into classical *Ayurvedic* medicines as well as patent herbal products. These production operations are supervised by well qualified & highly experienced A*yurveda* professionals. The center has a state of the art processing facility to produce herbal and ayurvedic products from natural herbs and other ingredients. Currently, the center is producing about 250 such herbal products under GMP & ISO 9001:2000 certifications. For this production activity, the raw materials are procured mainly through the primary forest produce co-operative societies. In addition to these societies, the raw material is also procured from JFMCs, self help groups and cultivators of MAPs.

The classical and patent Ayurvedic herbal products comprises of Single Herbal Churna; Classical herbal churna, Ayurvedic oils, Asavas and Arishtas, Vati/Gutika/

Tablet, Guggulu, Ras/Mandur/Bhasma, Pak/Avlehas; Patent creams/ointments, Patent capsules and other items such as Nutraceticals, Dental powders and Aonla supari etc. Nearly 300 tonnes of raw material is consumed and processed annually. The number of products manufactured under various categories is given in Table

Table 2: Number of products under various categories manufactured

S.No	Product Category	Number of Products
1	Classical Ayurvedi Churnas (Single & Compound)	120
2	Patent Herbal Capsules	30
3	Ayurvedic Oils	21
4	Aasavas & Aarishtas	25
5	Patent Ayurvedic Churnas	6
6	Patent Creams & Ointments	4
7	Vati/Gutika/Gugglu	34
8	Paak/Avleha	3
9	Mandur/Bhasm	4
10	Honey	1

The unit is equipped with GSP(Good Storage Practices) storage facilities for raw material storage sourced from primary societies. There are three godowns housed in the campus, constructed with the assistance made available by NMPB(National Medicinal Plant Board), Ministry of Tribal Affairs and MFP Federation. The godowning capacity of the unit is nearly 300MT.

Some of the unique speciality of products manufactured in MFP-PARC under Vindhya Herbal brand is

- Product of a unit which is a largest successful cooperative body in the state.
- Mostly all products are organic in nature.
- Our products are tested in state-of-the-art in-house laboratory.
- Most of the raw material is sourced from village level minor forest produce cooperative societies.
- ISO 9001: 2000 and GMP (Good Manufacturing Practices) certified unit.

- Training programs are organized to inculcate awareness about good harvesting practices among the collectors of medicinal & aromatic plants.
- Training programs are also organized for farmers to impart agro-techniques associated with medicinal plants cultivation.
- Profits are paid back to the primary cooperative societies.

Training and Herbal Awareness Program

Looking to the interest of the people in the traditional healing system and the use of herbal products the knowledge of the medicinal plants formulations, their consumption pattern and other aspects is made available to students, farmers, small cultivators and people at large through Herbarium, Gene Bank establishment, well developed nursery and demonstration of technique of producing vermi-compost/bio pesticides. Training is imparted to tribal/farmers so that herbal awareness reaches the masses. Regular study and demonstration tour of the centre is also conducted for the students of pharmacy colleges. Awareness generation is also done by organizing Van-melas, seminars, nukkad-sabhas, buyers-sellers meet, debates, competitions and through participation in other trade fairs.

Marketing

Marketing of finished herbal and ayurvedic product has always been one of the most challenging tasks for MFP-PARC. Further, there was also lack of marketing experience available with the federation except marketing of nationalized raw NTFPs which were monopolized items. Marketing of products required market survey, study of competition from rival brands, status of marketing network and understanding business relation among dealers' sealers and doctors. It also required developing our own brand and publicizing it in the public. An attractive scientific packaging, appropriate pricing and fixation of commission for dealer and agent were also required to be done.

The retail marketing of Vindhya Herbal products in Madhya Pradesh is done by a chain of sale outlets named as **"Sanjeevni Ayurveda"** in various districts. These are exclusive sale outlets of Vindhya Herbal products. At these centers qualified Ayurvedic doctors also give their services to common people. At present there are 26 Sanjeevni Ayurved sale outlets all over the state.

Use of modern information technology has been also made to start online marketing of the Vindhya Herbal products. Now anybody within the country can purchase these products through Vindhya Herbal online market website www.vindhyaherbals.com.

Besides, retail market Ayurvedic (AYUSH) department of various states is also one of the most important bulk buyers of Ayurvedic products. To tap this market potential, representative of MFP-PARC visited each and every AYUSH department of the states to understand their requirement and as per their need and requirement, products were developed and manufactured. MFP-PARC invited the officials of AYUSH-GoI and officials of other states ayurvedic department to personally inspect the production centre. After, visit of the centre almost all departments were highly satisfied. Simultaneously, to standardize the production process, MFP-PARC also took special initiative to get ISO and GMP Certification. All these efforts and continuous endeavor for improvement at each and ever stages of production process helped MFP-PARC to get confidence of State Government Ayuervedic departments and consequently bulk supply order from Haryana, Rajasthan, Andhra Pradesh, Orissa, Madhya Pradesh were obtained. Department of AYUSH – GoI also recognized and gave the status of state Pharmacy to this centre.

Recognition received

A. Department of AYUSH, Ministry of Health & Family Welfare, GOI, highly appreciated the role of this center in the development of NTFP sector for the health benefit of common man and conferred the status of "Center Of Excellence" on this center. Also, the department of AYUSH sanctioned a grant-in-aid of Rs. 5.00 crores to up-grade the laboratory of this center to a national level laboratory titled "Center Of Excellence for Herbal Quality Testing".
B. Similarly, the Inspector General of Forest, GOI visited this center and recommended it to be included in the list of institutions providing one week compulsory training to IFS Officers. Accordingly, a one week compulsory training course on "Community Participation, Resource Augmentation & Value addition in NTFP Sector" has been granted to this center.
C. The Times Of India, a very well known name in national press, proposed to bring out a supplement on herbal remedies for Vindhya Herbal brand. Accordingly, a supplement titled **"The Times of India Wellness Guide- Mind, Body, Spirit & You"** has been brought out by them.

Conclusion

MPMFP Federation is a state effort for improving the livelihoods of tribals and other forest dwellers.The structural effort of organizing people dependent on forest produces was backed up by investments in research, extension, putting up warehouses, processing plants and marketing including certification and brand building. An institutional mechanism for collection of a large number of NTFPs was established in M.P.. NTFPs which were not processed earlier are being processed now. Standard processing techniques for a number of produces have been developed. A retail chain and a brand, *Sanjeevani*, to take the product to the consumers are in place.

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