Impact of Forest Based Micro Enterprises in Rural Livelihood in Buffer Zone of Bardiya National Park, Nepal

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Abstract- A study was conducted to assess the impact of MAPs based enterprises in rural livelihood's financial capital in buffer zone of Bardiya National Park in 2011 A.D. It included purposive sampling of 105 households from four user committees of four VDCs of Bardiya namely, Thakurdwara, Suryapatuwa, Manau and Patabhar. The study was conducted through household survey, key informant survey and focus group discussions. Among 105 respondents, 59 were found to be cultivating mentha, 7 were chamomile cultivators and 39 were found to be cultivating both mentha and chamomile. The findings revealed that mentha and chamomile based enterprises has positive impact on livelihood's financial capital. The T- test showed that the mean annual income in the household increased having positive impact on many household components. A positive impact of enterprise in income from agriculture and livestock is found, however, no significant impact on the off farm activities because of enterprise was seen. The employment opportunities at the local level were found to be addressed. From the respondent's perception, willing to conserve the biodiversity was found to be increased among the IGAs users after being involved in enterprises through the involvement in various conservation activities. Good initiation on adoption of alternative energy for cooking like biogas was found. Strengths, weakness, opportunities and threats (SWOT) of enterprise were studied. A need for further training for farmers in marketing has been identified in order to maximize the quantity and quality of product.

Index Terms- BNP; IGAs; mentha; chamomile; livelihood; biodiversity

I. INTRODUCTION

Nepal has rich biodiversity per unit area having a network of twenty protected areas covering nearly one fourth of the country's total land area (DNPWC 2012) and houses approximately 7,000 species of higher value plants. Because of this fact, Bhuju *et al.* 2007 and MoFSC, 2009 mention Nepal as twenty-fifth most species-rich country in the world. It is estimated that about 750 species are now in use, of which 20% are traded (Kanel, 1999). Medicinal and Aromatic Plants(MAPs) have a potential for contributing to the local economy, subsistence health needs, and improved natural resource management, leading to the conservation of ecosystem and biodiversity of an area (Subedi, 1997). Western regions of Nepal contribute together more than 85% of the total collected of herbs in Nepal (GIZ, 2011). Along with collection, rural people are also cultivating valuable plants in their lands or in forests. In developing countries like Nepal, where five percent of total GDP comes from the trade of NTFPs (Subedi 1998), adopting NTFPs based micro enterprises is one of the most viable options to create employment opportunities and consequently to reduce poverty. Moreover, since Nepalese society is characterized by social exclusion, the development of such enterprises can be the good source of income as well as employment to a relatively wider section of Nepal's population, thereby narrowing down income disparities (Shrestha *et. al* 2011).

Different micro enterprises play a beneficial role in supporting the livelihood of rural people, employment generation using locally available resources as a result there is least difficulty in meeting the basic needs of local people. Forest based enterprises (both timber and non-timber) specially essential oils, have been known to be one of the most effective income generating activities (IGAs) to contribute in poverty reduction, realizing this, the 3 years interim plan (2007-2010) has emphasized promotion of forest based enterprises. The average income in Nepal is low but many more opportunities and options for income generation can be found in urban areas than in rural areas (IUCN 2001). To supplement the low agricultural production in the remote districts of Nepal, the government of Nepal has given due consideration to NTFPs as an effective means to enhance the economic benefits to rural people and to help in improving livelihood, household food security and nutrition (Acharya and Subedi 2004). There is a growing optimism on the potential of community based NTFPs enterprises for improving rural livelihood in Nepal (Kunwar 2009).

The aromatic plants like *Mentha arvensis* (mentha) and *Matricaria chamomilla* (chamomile) are profitable cash crop and because of their unpalatable nature to wildlife, the buffer zone communities of BNP are found to be cultivating these plants through the assistance of various Governmental as well as Non-governmental organizations. The cultivation of mentha and chamomile to improve livelihood and to reduce human wildlife conflict was selected as one of the top 12 community based conservation project in BBC World Challenges- 2011 contest (WTLCP 2012). Studies prior showed that rural people are getting major portion of benefit, instead at the cost of local

people, middleman are enjoying most of the benefits (Oslen 1997, CECI 1999 cited in Karki 2003). In such scenario the income that the rural people are generating via micro enterprises might have less value as compared to their labor cost. The cultivation of aromatic plants in own agricultural land replaces the earlier cultivated crops and the probability of cultivation of high earning crops having high market demand increases. In this context, the constraints, issues, challenges of adoption of intervention strategies and its effect on the livelihood need to be identified. The impact assessment from this study helped to realize the real income that communities are generating from the aromatic plants like mentha and chamomile based micro enterprises and their sustainability for their sustenance.

II. Literature Review

A livelihood is sustainable when it can resist stresses and shocks and maintain or increase its capabilities and assets in present and future both, not compromising the natural resources abase at the same time (Chambers 1992). Increase in income and in food security are the points considered in sustainable livelihood framework DFID, 2009. The study focused on the impact of financial capital for sustainable livelihood.

Importance of NTFPs has been increasingly recognized because of their commercial, socio-economic and ecological values together with use values, ultimately providing livelihood support to many poor rural families of Nepal (Kanel 2002). MAPs have been long used for subsistence, traditional therapies and home remedies (kunwar *et. al, 2009)*. Due to the immense importance of such high value plants, approx. 161 plant species are harvested for commercial transaction, and about 71 community-based enterprises are operating in Nepal (Subedi, 2006). The use of the MAPs begins as an unselective wild-harvested of plants, to a collection of selected species up to cultivation of the most useful ones. MAPs users' community all over the world ranges from remote forest habitants along with indigenous communities to peri-urban people up to commercial companies (Smith Hall *et. al*, 2012).

About 90 % of MAPs is collected from the wild and few % is cultivated however number of problems like lack of market information, paucity of quality seeds prevails in cultivation (Sharma *et.al, 2011)*. Lack of household income makes rural people to depend on high value MAPs (Roy, 2010). Uprety *et. al* 2010 showed that the communities in Bardiya district have engaged in the utilization and trade of several NTFPs in different ways but without paying adequate attention to their conservation. In such scenarios, the present study might revealed that the trend of cultivating aromatic plants mentha and chamomile in own agricultural land solve the unsustainable harvesting of NTFPs leading to the conservation of biodiversity in forest fringe. In addition to this, food insecurity and poor harvest of major cereal crops due to climate change have impelled farmers to compensate the loss of main crops by explore cash-generating activities such as cultivation and trade of valuable MAPs (Synnot, 2012).

III. Research Methodology

3.1 *Study Area and Data Collection*

People of buffer zone of BNP were the study population. Simple random sampling was done to select the first sample and then systematic sampling was done to select the sample size of 104 households from the available household frame list from four user committees. Mentha and chamomile based enterprise was selected because of the following reason:

- The communities in the buffer zone of BNP are participating in cultivation of mentha and chamomile which is actively running enterprises over there.
- WTLCP has been conducting project to improve livelihood by providing seed grant in the Bardiya district.

Study areas are shown in figures below:
Numbers in the circle indicate VDCs,

1. Thakurdwara, 2. Suryaptuwa, 3. Manau and 4. Patabhar

Fig: Map of Nepal showing the protected areas

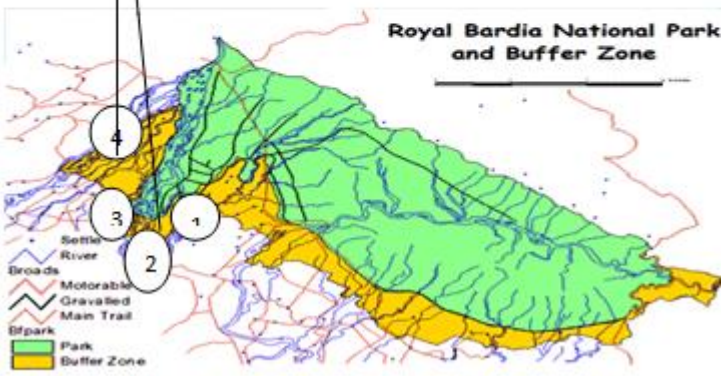

Fig: Map of Bardiya National Park showing study VDCs

Interview schedule was pre-tested prior to field survey for checking the reliability and validity of interview through the selection of 10% of sampled size of 105 respondents in two VDCs Suryapatuwa and Thakurdwara.

Field survey was carried out during 25th June to 10th July, 2011. The respondents were interviewed by administrating the interview schedule. At the same time, informal group discussions, participatory observation and key informants survey (Social worker, Ranger, Local leaders, experts, staffs of WTLCP and its partner organizations, NTNC and few beneficiaries) were also done to collect the additional information.

Structured questionnaire was used to gather information on socio-economic condition and income sources then and now after the implementation of IGAs as well as practices adopted for the conservation of biodiversity

3.2 *Methods of Data Analysis*

The collected data were analyzed using both descriptive statistics like mean, standard deviation, percentage, frequency etc and inferential statistics like paired t test. The data analysis was carried out with the help of a statistical package known as 'SPSS' (Statistical Package for Social Science) and MS -Excel programs.

Indexing was used to rank the problems faced by farmers while involving in running an enterprise of aromatic plants. Problems were ranked by giving 5 points scale value for most serious, very serious, serious, less serious and very less serious respectively. The index was computed by using the following formula:

$I_{imp} = \sum (si\ f_i /N)$, Where, I_{imp} = Index of importance, $\sum$ = Summation, s_i = Scale value N = Total numbers of respondents and f_i = Frequency of importance given by the respondents.

IV. Result and Discussions

4.1 Socio economic condition of the respondent

Age, sex, ethnicity, family size, level of education, occupation, farm size etc were categorized and measured.

Respondent's charaterisitics by Sex

Respondent's categories	Male	Female	Total
Mentha cultivators	38 (64.40)	21 (35.6)	**59 (100)**
Chamomile cultivators	5 (71.43)	2 (28.57)	**7 (100)**
Both mentha and chamomile cu ltivators	26 (66.67)	13 (33.33)	**39 (100)**
Total	**69 (65.71)**	**36 (34.29)**	**105 (100)**

Respondent's characteristics by Age

Respondent's categories	Less than 15	15 to 59	More than 59	Total
Mentha cultivators	0	57 (96.61)	2 (3.39)	**59 (100)**
Chamomile cultivators	0	7 (100)	0	**7 (100)**
Both mentha and chamomile cultivators	0	39 (100)	0	**39 (100)**
Total	**0**	**103 (98.1)**	**2 (1.9)**	**105 (100)**

Family size of respondents

Respondent's categories	Small family (<5)	Medium family (5- 10)	Large family (>10)	Total
Mentha cultivators	12 (20.34)	39 (66.1)	8 (13.56)	**59 (100)**
Chamomile cultivators	0	6 (85.71)	1 (14.29)	**7 (100)**
Both mentha and chamomile cultivators	2 (5.13)	28 (71.79)	9 (23.08)	**39 (100)**
Total	**14 (13.33)**	**73 (69.52)**	**18 (17.14)**	**105**

Mean: 7.4, Standard deviation: 2.72

Landholding size of respondents

Distribution of landholding (ha)	Mentha cultivators	Chamomile cultivators	Both Mentha and Chamomile cultivators	Total
Small (< 0.5)	40 (67.8)	5 (71.43)	26 (66.67)	**71 (67.62)**
Medium (0.5 to 1)	16 (27.19)	2 (28.57)	11 (28.21)	**29 (28.16)**
Large (>1)	3 (5.08)	0	2 (5.13)	**5 (4.85)**
Total	**59 (100)**	**7 (100)**	**39 (100)**	**105 (100)**

Mean: 0.54, Standard deviation: 0.5, Range: 0.13 to 5.33

Similarly, from the direct questionnaire survey, the major respondents were found to be Janajati (90.48 percent) followed by Chhetri (7.62 percent) and Brahmin (1.9 percent). Thirty two percent of respondents were just literate followed by illiterate (21.9 percent), primary (20.95 percent), Secondary (13.33 percent), and SLC and above (11.43 percent) respectively. Agriculture remained the major occupation of the respondents.

4.2 *Impact on financial capital*

Gross income before and after adoption of enterprises

To find whether the program has made impact on the gross income of the users after the implementation of the program, paired t- test was done.

Table 1: Paired t- Test for income before and after IGAs

Total annual household income before IGAs – total annual household income after IGAs	Mean	S.D	S.E mean	95% confidence interval of the difference		T	Df	Sig.(2-tailed)
				Lower	Upper			
	-12396.780	13060.064	1274.53	-14924.225	-9869.33	-9.727	104	0.000

Note*:* Degree of freedom: 104, Std. Deviation: 13060.064, Std. Error Mean:1274.53,Sig. two tailed: 0.00

Since the calculated value of t is greater than that of tabulated value 1.98, it is found that the income of the respondents varies significantly before and after the implementation of the program. Mean annual household income is found to be increased by Rs.12, 396. This showed that the program has positive impact on income generation of rural households in study area.

Paired sampled statistics of income from different components in households

To find whether the program has made impact on the gross income of the users in different sectors of total household income after the implementation of the program paired t- test was done for individual sectors which are shown in table below:

Table 2: Paired t- test for different components of income before and after enterprise

Change in household income before and after IGAs		Annual income from agriculture (before- after)	Annual income from livestock (before- after)	Annual income from off farm (before- after)
Mean		-9961.06	-981.428	-1644.82
95%Confidence Interval of the Difference	Lower	-12190.07	-1407.95	-3553.14
	Upper	-7732.058	-554.90387	-263.48791
t- value		-8.86	-4.56	-1.76*
d.f		104	104	28
S.D		11517.9540	2203.981	5016.87
S.E		1124.03	215.08	931.60

Based on the above result, income after implementation of IGAs has been found to be significantly different than before. Since the calculated value of paired t is greater than that of tabulated value in income from agriculture and livestock, a positive impact of IGAs in income from agriculture and livestock is found, though the program is found to have no impact on the off farm activities. The calculated value of t is slightly less than that of tabulated value (2.048) in the off farm income of households. The people have found increasing their livestock holding capacity from the income generated from the enterprise.

4.3 *Significant beneficial impacts of mentha and chamomile based enterprises found in the study area are listed below:*

Changes in lives and livelihood due to IGAs

The most effective changes in livelihood because of the mentha and chamomile based enterprises are found to be in mainly two vital components: increment in cash flow in 96 respondents (91.43%) and food sufficiency periods increased in 80 households of respondents (76.19%). Similarly increase in employment opportunities for eleven members was found.

Sources of energy for cooking

Firewood is the major source of cooking followed by bio-gas and LPG respectively. The participation in IGAs has decreased the dependency of firewood however it increased in bio-gas and LPG gas. This shows that there is shift of firewood energy towards the alternative energy sources specially biogas. Eleven members had successfully installed biogas plant after being participated in enterprises.

Households in conserving the natural resources after IGAs

It is found that eleven members of enterprises (10.48%) have installed bio gas, 45 members (42.86 %) involve in tree

plantation of trees having fodder as well as medicinal values like *Azadirachta indica*, *Melia azedarach*, *Artocarpus lakoocha* etc. and 69 of them (65.71%) in fodder and grasses cultivation like *sorghum bicolor* after being involved in IGAs which reflects that the farmers are moving toward the biodiversity conservation activities. They thus are in trend of decreasing their dependency on forest and move towards resource conservation and management.

Employment Opportunity in the study area

The study revealed that about 10.5 percent of the respondents got the part time employment opportunity due to enterprise: 5.7 percent of the respondents got the seasonal job of cultivation in other farm lands (daily wages), followed by 2.86 percent of respondents in processing plants and in the cooperatives (1.9 percent) where oil is collected and money is distributed among the farmers.

Along with positive impacts identification study was meant to address the farmers' problems associated with enterprise in order to make the utmost use and success of enterprise. Production and processing of MAPs, technical skills and knowledge of farmers regarding the production of oil and marketing channel along with paucity of trainings on these aspects were found to be the hindrances for the maximum output of the products in the enterprise.

SWOT analysis

To know the efficiency of mentha and chamomile based IGAs, SWOT analysis was done on the basis of the discussions with the key persons in focus group discussions. Many strengths and opportunities are found for the rural people in such enterprises. Table below shows the SWOT of MAPs based enterprises.

Table 3: Strengths, Weaknesses, Opportunities and Threats of MAPs based enterprise

Strengths	Weaknesses	Opportunities	Threats
Unemployment problem being addressed slowly.	Lack of marketing link for common people.	Inclination towards commercial farming.	Domination of middleman/ brokers in marketing.
High demand of products in both domestic and international markets.	Fluctuation in market price.	Increase in agro-tourism	Probability of loss of bio diversity due to mono cropping of aromatic plant.
Decreased risk of damaging crops by wild animals thereby reducing human- wild animal conflict.	Lack of market information.	Increase in women empowerment	Probability in decreasing food security as mentha and chamomile are replacing the major food crops.
Group formation among the local people and improved relation between farmers.	Inadequate monitoring and follow up after the project intervention.	Developed Leadership among the community people.	
Skill and knowledge sharing/enhancement among the local people.			
Increased awareness on biodiversity conservation.			

V. Conclusion

From the study it is found the financial capital of livelihood asset is being positively addressed due to mentha and chamomile based enterprises. High percentages of farmers were found to be cultivating mentha, followed by both mentha and chamomile and chamomile only. The findings suggests that aromatic plants mentha and chamomile based enterprises have enough strengths and opportunities to uplift the livelihood of rural people. Increase in the household income due to mentha and chamomile based IGAs make farmers easy access to the various household affairs. The people seemed inclined towards various conservation activities as a result they are being aware about biodiversity conservation. Shift from the traditional energy sources of cooking i.e firewood towards the biogas was seen after the program implementation which is promoting alternative sources of energy. Further, impact on biodiversity conservation was found to be positive among the respondents after being involved in IGAs via various natural resource conservation activities. Buffer zones itself being the most ecologically sensitive zone, the population of study area were found be satisfied from income of mentha and chamomile cultivation over the poor harvest and loss of major crops thereby decreasing pressure on medicinal plants in the wild. It ultimately enhances bio-diversity conservation with increased production of farmland through MAPs integration.

VI. Future Research

Since the people of BNP are cultivating aromatic plants mentha and chamomile in their own agricultural land, and only people's perception method is used in this study to study the impact on biodiversity, soil fertility test in an agricultural land and overall impact on bio-diversity due to plants based enterprises would be the scope for future research.

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References

[1] Acharya, D. &Subedi, R. 2004: Community Forestry in the High Altitude Areas: Capturing the Experiences of the Midhills.

[2] Bhattarai, N.K and Subedi,B. 1998. Community Managed Enterprise: Participation of Rural People in Medicinal and Aromatic Plants Conservation and Use, A paper prepared for the International Conference on Medicinal Plants, February 16-20, Bangalore, India

[3] Bhattarai S, Chaudhary RP, Taylor RSL: Ethno-medicinal Plants Used by the People of Nawalparasi District, Central Nepal. Our Nature 2009, 7:82–99.

[4] Bhuju, U. R., P. R. Shakya, T. B. Basnet, S. Shrestha. 2007. Nepal Biodiversity Resource Book. Kathmandu: United Nations Environment Programme and Ministry of Environment, Science and Technology, Government of Nepal.

[5] Chambers, R. 1992: Sustainable Rural Livelihood: Practical Concepts for the 21st century'. IDS Discussion Paper: IDS.

[6] DFID 1999: Department for International Development. Sustainable Livelihoods Guidance Sheets. Available: http://www.livelihoods.org.

[7] DNPWC 2012: Annual report (2011- 2012), Department of National Park and Wildlife Conservation.

[8] Government of Nepal (GoN),2004: Herbs and Non timber Forest Product Development Policy. Kathmandu, Nepal: Department of Plant Resources.

[9] Industrial policy 2010, Ministry of Industry, Government of Nepal

[10] IUCN 2001: The Role of Forest Food Resources in Village Livelihood Systems: A Study of Three Villages in Salavan Province, Lao PDR.

[11] Kanel, K.R. 1999. Strategic Review of Medicinal and Aromatic Plants and their Utilization in Nepal, Mimeograph, International Development Research Centre (IDRC), New Delhi

[12] Kanel, K. R. 2002: Non-timber Policy Issues in Nepal. Paper presented in the 3rd SEANN workshop on community based NTFP Management, Kathmandu (8-9 April 2000)

[13] Kunwar et. al 2009: Non-timber forest products enterprise development: regulatory challenges in the koshi hills of Nepal, Livelihood &Forestry Programme (LFP), Nepal, Forest action Nepal 8(2): 39- 50

[14] Kunwar RM, Nepal BK, Kshhetri HB, Rai SK, Bussmann RW: Ethnomedicine in the Himalaya 2006: a case study from Dolpa, Humla, Jumla and Mustang district of Nepal. J Ethnobiol Ethnomed , 2:27. www.ethnobiomed.com/ content/2/1/27.

[15] LFP 2009: Community Forestry in Nepal: promoting Livelihoods, Community Development and the Environment

[16] MEDEP/ UNDP 2010: Micro Enterprises Development for Poverty Alleviation. UNDP Report Vol. (I).

[17] MoFSC. 2009. Nepal fourth national report to the Convention on Biological Diversity. Kathmandu: Ministry of Forest and Soil Conservation, Government of Nepal Northern India. Economic Botany 52:279-292

[18] New Era 2002: Report on Final Program Performance on Ban Udyam (BU). Kathmandu, Nepal.

[19] Olsen, C.S. 1998: The trade in medicinal plants from Nepal: status and possible improvements. In: Medicinal plants: a global heritage. Proceedings of the international conference on medicinal plants for survival, 16–19 February, Bangalore, India: International Development Research Centre, South Asia

[20] Oslen, C. S.1997, Commercial non-timber forestry in central Nepal: emerging themes and priorities. (PhD dissertation). Copenhagen: Royal Veterinary and Agricultural University.

[21] Pouliot. M, 2011: Relying on nature's pharmacy in rural Burkina Faso: Empirical evidence of the determinants of traditional medicine consumption, Social Science & Medicine 73 (2011) 1498 to 1507.

[22] Roy. R. 2010. Contribution of NTFPs to livelihood in Upper Humla, Nepal: A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Natural Resources Management, Asian Institute of Technology School of Environment, Resources and Development, Thailand

[23] Sharma, P. and N.Shrestha. 2011. Promoting Exports of Medicinal and Aromatic Plants (MAPs) and Essential Oils from Nepal; South Asia Watch on Trade,Economics and Environment (SAWTEE) Nepal.

[24] Shrestha, K. K.,Tiwari, N.N., Rajbhandary, S., Poudel, R.C.,Uprety, Y. 2004: Ethnobotany in Nepal: Review and Perspectives. Kathmandu: WWF-Nepal.

[25] Smith,C., Larsen, H.O., Pouliot, M. 2012: People, Plant and Health, A conceptual framework for assessing changes in medicinal plant consumption, journal of ethnobiology and ethnobotany 1-11

[26] GIZ, 2011. Medicinal and aromatic plants: Poverty impact assessment of proposed trade support measures in Nepal's MAPs sector. Kathmandu: GIZ

[27] Subedi, B. P. 2006: Linking Plant-Based Enterprises and Local Communities to Biodiversity Conservation in Nepal Himalaya. Department of Forestry, Kumaun University,Naini Tal, Uttaranchal, India

[28] Subedi, B. P. 2000: Policy and Regulatory Environment for the Conservation and Utilization of Himalayan Medicinal Resources in Nepal.

[29] Subedi, B. P. and Bhattarai N. K. 1998: Community Managed Enterprise: Participation of Rural People in Medicinal and Aromatic Plants Conservation and Use. A paper prepared for the International Conference on Medicinal Plants, February 16-20,Bangalore, India.

[30] Synnot. P. 2012. Climate Change Agriculture and Food Security in Nepal: Developing Adaption Strategies and Cultivation Resilience

[31] Uprety Y, Asselin H, Boon EK, Yadav S, Shrestha KK 2010: Indigenous use and bio-efficacy of medicinal plants in the Rasuwa District. Central Nepal. J Ethnobiol Ethnomed, 6:3.

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