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Market-based certification and management of non-timber forest products in Bhutan: Organic lemongrass oil, poverty reduction, and environmental sustainability

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Market-based Certification and Management of Non-Timber Forest Products in Bhutan: Organic Lemongrass Oil, Poverty Reduction, and Environmental Sustainability

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April 2008

ADB Institute Discussion Paper No. 106

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They hope that this case study will contribute to a grand future of sustainable management of lemongrass resources in Bhutan, with just shares going to those who put in the hardest work—the rural communities.

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Abstract

Sustainable management of non-timber forest products is a serious concern of many developing countries. This study documents an innovative undertaking involving the introduction of a market-based organic certification scheme to improve the resource management and processing of lemongrass in poor households in Eastern Bhutan. With its high potential for income generation, organic certification serves as a tool to help achieve the combined objectives of natural resource management and income generation for rural communities through the payment of premium prices and opening of access to export markets.

The study shows that the organic certification has a direct impact on income generation of participating households (distillers, grass collectors, and firewood collectors) and can contribute directly to Millennium Development Goal 1 (MDG1) on income and hunger. However, the findings also show that the premium prices earned by distillers were yet to be translated into higher wages for grass collectors in organic production. With regard to MDG7, direct impacts are apparent in the increased participation of local people in the sustainable management of lemongrass resources, but there has been no improvement with regard to the high fuel wood consumption. Increased efforts must be put into the improvement of the overall production and efficiency of distillation to make organic certified oil from Bhutan competitive with that from neighboring countries. The study also shows organic certification contributing to MDG8 on global partnership for development and MDG3 on gender empowerment.

JEL Classification: Q27, Q12, O31, J16

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1. INTRODUCTION

1.1 Overview of Non-Timber Forest Products in Bhutan

Nestled between the Himalayan Range in the north and the Indian plains in the south, the Kingdom of Bhutan harbors tremendous biodiversity in ecosystems ranging from glacial to subtropical. Forest, which covers 72% of the country's area, is home to many endangered and endemic species. Moreover, the forest is a vital resource for rural communities, providing food, medicines and other household necessities. Beyond subsistence, products extracted from forests are also an important source of cash income for many rural households.

Due to its complex geography and topography, only 7.8% of Bhutan's land area is arable. As a result, non-agricultural activities are a significant source of livelihood for rural people, who form 75% of the population. Of the non-agricultural activities collection of non-timber forest products (NTFPs) are amongst the most important livelihood activities in rural communities of Bhutan. This is evident from the array of NTFP based items (cooking utensils, containers, food products, medicine) that exist in Bhutanese farmhouses. Quantities and number of sellers of NTFP based food and non-food products in the vegetable markets in urban areas show that NTFPs are an important source of income for farmers. However, due to the lack of adequate quantitative data on the benefits of NTFPs, it is difficult to determine statistically how important NTFPs are for the lives of rural farmers. Among the few quantitative studies, a study conducted in western Bhutan found that NTFPs account for 21% of the household diet and 19% of household income (Namgyel P, 1996).

Bhutan's forests contain a wealth of NTFPs. In a single *gewog*[1] in southern Bhutan, 120 species were identified, including 22 edible mushrooms, 4 tea plants, 13 medicinal plants, 15 vegetables, as well as edible oil plants, dyes, cane, bamboo, fruits, incense, yeast and gum (Namgyel P, 2005). Of the large variety of products used by local people, only a few are traded on a commercial basis. Examples of NTFPs traded are listed in Table 1.

Table 1: Name and Use of Commercial NTFPs

Species	Name	Product
Cymbopogon flexuosus	East Indian or Cochin Lemongrass	Oil
Cordyceps sinensis	Cordyceps	Medicinal
Piper pedicellatum	Pipla	Medicinal
Swertia chirata	Chirayta	Medicinal
Tricholoma matsutake	Matsutake mushroom	Edible Mushroom

The export of these products demonstrates the great potential of NTFPs to generate income for rural communities in Bhutan. For example, exports of Cordyceps generate an annual

[1] A gewog or block is the smallest administrative unit in Bhutan. A number of blocks form a district or dzongkhag. There are a total of 20 districts in the country.

income of US$4 million and exports of matsutake mushrooms generate over US$45,000 in income in one community in western Bhutan.

Though there are many forest policies and regulations, very few address specific NTFP issues. Currently, local trade in NTFPs is carried out on an informal basis, with only limited monitoring of the resource base and volumes harvested. The Forest Department has carried out a few studies on specific NTFPs and developed management guidelines to promote sustainable harvesting. However, the lack of quantitative data on potential areas and volumes of NTFP growth is a major obstacle to promoting sustainable trade and export in NTFPs. It is anticipated that the recent drafting of the National Strategy for NWFP Development in Bhutan will pave the way for the further promotion of sustainable and informed NTFP trade in Bhutan.

In light of the current situation of high potential for income generation and need for sustainable harvesting of NTFPs, organic certification is one tool which can contribute to the conservation and management of forest resources and at the same time offer incentives to rural households through premium prices and increased market access. With similar goals, Bio Bhutan, a private enterprise based in Bhutan, initiated organic certification of two NTFPs in 2005 and is currently successfully trading organic certified lemongrass oil (LGO), one of the main sources of non-farm income for farmers in eastern Bhutan.

1.2 Study Objectives and Content

This case study is a contribution from Bhutan to a regional study on the impact of organic production concepts on the Millennium Development Goals (MDGs) in five Asian countries: the People's Republic of China, Sri Lanka, Thailand, Philippines, and Bhutan, initiated by the Asian Development Bank Institute (ADBI) in Tokyo, Japan in 2005.

In collaboration with ADBI, the authors aim to document the innovative undertaking of introducing certification schemes to improve the resource management and processing of lemongrass, encouraging income generation of poor households in Dozam, Drametse *gewog* in eastern Bhutan. The results directly relate to MDG 1 (eradicate extreme poverty and hunger) and MDG 7 (ensure environmental sustainability). The high employment rate of women as grass collectors is related to MDG 3 (contribute to the promotion of gender equality and empowerment of women) and indirectly fosters MDG 2 (achievement of universal primary education), MDG 4 (reduce child mortality), MDG 5 (improve maternal health) and MDG 6 (combat HIV/AIDS, malaria and other diseases). The establishment of partnerships with internationally accredited certification agencies contributes to achieving global partnerships for a small landlocked country and thus contributes to MDG 8.

The study provides relevant background information on the present situation of the lemongrass oil industry in Bhutan in relation to the country's economy, the main parties involved in the development of non-wood forest products (NWFPs) and the introduction of certification schemes for wild collected lemongrass. This is followed by an explanation of the study methodology and a presentation of study results. We conclude with an analysis of the results with regard to the achievement of the MDGs and recommendations for policymakers and researchers in Bhutan and the region.

2. BACKGROUND

The National Statistics Bureau (NSB) of Bhutan established the national poverty line at a minimum monthly earning of Nu1,096 per person, with an estimated food requirement of Nu688 and non-food requirement of Nu408. The NSB survey estimates 146,100 people from an estimated total population of 630,000 (23.2%) to be below the poverty line. Poverty rates are found to be high in the eastern districts of Zhemgang, Samtse, Mongar, Lhuentse, and

Samdrup Jongkhar (Kuensel 16 January 2008) due to a complex of reasons including the lack of off-farm income opportunities. Most of the poverty is in the rural areas.

Several authors point out that the distillation of lemongrass *(Cymbopogon flexuosus)* has become a major source of income for rural communities for these poverty stricken eastern districts, with a contribution of up to 30% to the annual income (Budur *et al.*, 2005; Lama, B., 2003; Mukhia, P., 2006; Namgyel, P., 2005).

Initiated in 1981 by a private firm, Bhutan Aromatic & Phytochemicals, an affiliate of Tashi Commercial Corporation, and later supported by the Ministry of Economic Affairs through the Essential Oil Development Programme (EODP), the industry produced 115 tons of lemongrass oil from 1998 to 2007 and is the first example of the industrial use of NWFPs in Bhutan.

It is important to note that Bhutan is an exceptional case where lemongrass oil is collected from the wild as opposed to cultivation for the production of essential oil.

Today, the industry contributes seasonal cash income to about 2,000 people in four of the eastern districts (Mongar, Trashigang, Lhuntse and Trashiyantse) where lemongrass occurs abundantly in association with the chirpine forest.

Among the governmental agencies, the Social Forestry Division (SFD) of the Department of Forests (DoF), which is responsible for the provision of technical support, establishment and implementation of the community forest programs, has played a key role in supporting NWFPs for income generation of the rural population and support for the collection and marketing of NWFPs within the boundaries of community forests through the establishment of small scale enterprises (Bhutan Ministry of Agriculture, 2006a).

The focal agency for the promotion, establishment and coordination of activities concerning organic agriculture in Bhutan is the National Organic Program (NOP) of the Department of Agriculture (Bhutan Ministry of Agriculture, 2006b). Together with the Agricultural Marketing Section (AMS) and the Bhutan Agricultural and Food Regulatory Authority (BAFRA), NOP identifies potential export markets for organic commodities and is working toward the establishment of a national certification agency. In accordance with its mandate, NOP along with SFD and Helvetas/SDC Bhutan, supported Bio Bhutan in contracting INDORCERT, an Indian-based internationally recognized certification agency, for the first inspection of lemongrass in Dozam CF in October 2005.

In relation to product development and marketing, the UNDP supported the EODP. This program has been the main development partner for the lemongrass oil industry of Bhutan. With support from EODP and UNDP, the Lemongrass Cooperative, of which Dozam Community Forest Management Group (CFMG) is a member, has been established by the distillers of four eastern districts (Bhutan Ministry of Economic Affairs, 2006). The cooperative is expected to gradually take over responsibility for the marketing of lemongrass oil from EODP.

The main drivers for the certification of lemongrass oil are the private enterprise **Bio Bhutan** (see Box 1) and the **Dozam CFMG** in Drametse *gewog* (see Box 2 and Chapter 2.1).

Box 1: Bio Bhutan

Private enterprise established in 2005

Focuses on product development and marketing of products based on organic certified natural resources for national and international markets.

Collaborates with farmer groups/co-operatives in eastern, central and southern Bhutan.

Introduced organic certification in Bhutan for two NWFPs: lemongrass (*Cymbopogon flexuosus)* in Drametse/Mongar and Pipla (*Piper pedicellatum)* in Nangkor/Zhemgang.

Annual turnover in 2007: Nu6.6 Mio (US$170,000).

Box 2: Profile of Drametse *geog*

Total population: 3,369

710 households covering an area of about 79 square kilometers.

The *geog* is connected to the highway by an 18-kilometer feeder road. Two community schools and one lower secondary school render education services to over 600 children.

The *geog* has one Basic Health Unit (BHU). Over 60% of the population has access to piped drinking water.

Because of poor soil fertility, farm productivity is low. Over 900 acres of land are under dry land cultivation.

Maize is the major cereal crop. Paddy is cultivated in about 180 acres of wetland. Potatoes are the main source of cash income for the people in the *gewog*. Oranges and other fruits are also grown. Resin tapping and essential oil extraction are important income-generating activities among the people in the *gewog*.

2.1 Dozam Community Forest Management Group

The Dozam CFMG is the oldest community forest in Bhutan with an established management plan for 358 hectares of chirpine forest. It was first approved in 1997 for a period of five years, and renewed in 2003. The management plan is now approved until 2013 (Temphel, J. and Beukeboom, H., 2006). Drametse *gewog* forms part of Mongar district.

Though originally conceptualized for the management of timber, the already available management plan and resource assessment, the by-laws, the excellent community organization in Dozam and the interest of the distiller group provided an ideal platform for the Bio Bhutan enterprise to venture into the organic certification of lemongrass oil.

Dozam CFMG has been part of the essential oil producing community since 1981. With five distillers in a total CF area of 358 hectares, the Dozam group represents 0.7% of the

potential area of 50,000 hectares of chirpine forests with associated lemongrass in the Eastern districts. The production of 1.2 tons of oil from Dozam CF accounts for 14% of the average production of 8.9 tons in 2007 (Bhutan Ministry of Economic Affairs, EODP, January 2008). See Photo 1, which shows a distillation unit in the Dozam area.

2.2 Development of the Lemongrass Oil Industry

A complex of environmental and economic factors, including the decrease of grass and firewood resources brought about by unsustainable resource management and price competition from cheaper Indian oil, has led to a decline of LGO production from 17.6 tons in 1999 to 8.9 tons in 2007. The major share of the world's production of lemongrass oil is based on cultivation with high yields per production unit and consequently low production costs as opposed to the high production costs in Bhutan due to the labor requirement for the collection of the grass.

Budur *et al.* (2005) point out that if clear management guidelines are not put into place the industry will suffer if not disappear within a couple of years and thus take away income opportunities for approximately 2,000 people including the distillers, firewood collectors and the mostly female grass collectors.

2.2.1 Resource management

In the past there were (and still are) frequent disputes over land resources among private distillers, and forest fires are a frequent occurrence. While the local people believe that forest fires stimulate the growth of lemongrass, research findings indicate that they favor the growth of weeds such as *Lantana spp*. and *Stipa spp*. leading to declining yields of lemongrass (Dungyel, D. 2002; Budur *et al*., 2005). At the same time forest fires lead to an acceleration of the decline of the firewood resources required for the distillation process. Firewood is sourced through the collection of chirpine and broad-leaved trees based on permits issued by the DoF, or through supplies from Forest Management Units (FMUs) by government-appointed contractors.

The Community Forest Management Plans have led to a reduction of both disputes as well as forest fires.

With regard to the management of lemongrass, organic producers must adhere to international guidelines on wild collection (WHO, 2003; ISSC-MAP, 2007), and the requirements of importing countries such as the EU Regulation EEC 2092 and the NOP of the United States. The most important requirements are:

- Resource assessment and definition of the botanical species that will be collected, including time of harvest.
- Definition of maximum harvestable quantities and annual records of harvesting volumes according to the area defined in the management plan.
- Locally defined good collection practices to ensure the long-term survival of the species.
- A clear description of post-harvest practices: These practices include an assurance that no chemicals have been used over a period of the three previous years. A record must be made of all substances used for cleaning, disinfection and pest control.
- Assurance that commingling with conventional produce is avoided.
- Clear records of training extended and supervision of procedures.

- In order to assure fair distribution of duties and benefits for producers, organic management requires a clearly structured management group indicating the name, address and function of the respective members.

- Transparent records of harvest volume, processing and sales.

Most of these criteria are described in the Community Forest Management Plan. Therefore if the CFMG has a plan for the implementation, the most essential criteria for organic lemongrass oil production will be met.

Once the documentation is prepared and the external inspector is satisfied with the situation in the field, the inspector submits a report to the certification agency as the base document for the issue of the organic certificate.

This certificate is the assurance for the customer that collection and post-harvest management has been carried out in accordance with the standards set for organic wild collection.

2.2.2 LGO Production and Income Opportunities

In contrast to the rather negative scenario for the lemongrass oil industry in Bhutan with a dwindling share in the world markets due to price competition with cheaper Indian oil and the consequent decline of income opportunities for rural communities in Eastern dzongkhags, the organic production of lemongrass offers export opportunities in international niche markets. In particular, the aromatherapy and perfume industry appreciate the unique composition of oil from wild collection with a high content of limonene[2] in addition to the main component of lemongrass oil, citral. Premium prices are offered for high-quality organic certified oil.

The total demand for Bhutanese certified lemongrass oil is expected to increase to 3 to 5 tons in 2008, providing income opportunities for 22 distillers and 260 people.

3. STUDY METHODOLOGY

Over two consecutive years, ADBI and the Rural Enterprise Development Programme (REDP) supported three surveys of a total of ninety-six persons including owners of distillation units, operators employed at distillation units, and grass and firewood collectors from organic and conventional management groups in Drametse *gewog*. The surveys were based on structured questionnaires developed in collaboration with ADBI, NOP and Bio Bhutan.[3] A total of eight enumerators were deployed for a period of two weeks to conduct the first survey in June 2006. Two follow-up surveys to complement the results of the first round were carried out with the involvement of a national consultant employed by the REDP in October 2007 (Trumps International Consultancy Services, 2006).

While the main objective of this study was to examine income generation and sustainable management practices through LGO production, the survey also included questions on the impact on overall household income and expenditure, food security, migration, empowerment of women, maternal health and child mortality, and the occurrence of malaria

[2] Limonene: chemical compound (terpene) of aromatic oils, particularly of the citrus family but also found in lemongrass, commonly used in cosmetic products.

[3] Responsible for the development of the questionnaire: Gie Surato ADBI, Tokyo; Kesang Tshomo, NOP-MOA, Bhutan; Karma Yangzom, Bio Bhutan, Bhutan. The questionnaire was based on earlier experiences of the International Fund for Agricultural Development (IFAD) Survey on Impacts of the Agriculture Marketing and Enterprise Promotion Programme carried out in six eastern districts of Bhutan by the IFAD/SNV Project Facilitation Office, MOA, Khangma.

and other diseases. Where relevant, the evaluation and findings from the secondary data have been included in the presentation and discussion of results of this study.

Sample size: Out of a total of 41 distillers in Drametse *gewog,*[4] 12 distillers (nine conventional distillers, three distillers applying organic standards) were selected through random sampling, meaning that the survey covered 29% of the distillers of Drametse *gewog* and 7% of the estimated 172 distillers in eastern Bhutan.

4. PRESENTATION AND DISCUSSION OF RESULTS

4.1 Demographic Profile of Respondents

There were forty-eight respondents from each group (organic and conventional). Of the ninety-six participants, over fifty percent were female, with the majority of the female workers being engaged in grass collection. Thirteen percent of the participants owned distillation units, five percent were operators of distillation units (hired labor), and eight percent owned and operated distillation units. Sixty-three percent of the participants were grass collectors and ten percent firewood collectors (see Table 2).

Table 2: Role and Function According to Gender

	Organic		**Conventional**		**Total**		**Total**
	Female	Male	Female	Male	Female	Male	
Distillers	0	3	1	8	1	11	12
Operators	1	2	0	2	1	4	5
Distillers & operators	0	2	0	6	0	8	8
Grass collectors	27	13	20	1	47	14	61
Firewood collectors	Not included		0	10	0	10	10
Total	**28**	**20**	**21**	**27**	**49**	**47**	**96**

4.2 Employment and Wage Rates

The distillation of lemongrass provides seasonal income for a maximum of six months beginning with the onset of the monsoon rains in May and ending with the decline of vegetation in October. During these six months, the industry employs up to twelve skilled and unskilled laborers per distillation unit including two operators of distillation units (one of which is usually the owner of the unit), six to seven grass collectors and three firewood collectors.

The wage rates paid to operators and grass and firewood collectors are similar irrespective of organic or conventional management practices.

Operators are paid Nu50 per drum of lemongrass. Considering that on average five drums of lemongrass can be distilled over 24 hours, the total wage paid to operators amounts to Nu250 per 24 hours and Nu125 per 12 hours (one shift). The distillation units are run day and night.

Wage rates for **grass collectors** are based on the number of loads carried per day. The weight per load ranges from 25 kg for women to 45 kg per men. The number of loads carried

[4] Information provided by MEA-EODP, January 2008.

per day differs depending on the grass yield and intensity of grass occurrence per area. The survey findings show that men carry on average 3.3 loads of grass per day while women carry 4.9 loads. As a result, the total weight of grass collected per day amounts to approximately 122 kg for women and 148 kg for men. Considering a male/female ratio of 1:1 among the grass collectors, we estimate that an average of 135.5 kg of grass is collected per day. The wage rate for grass collectors is Nu150 irrespective of gender. The lower weight carried by women is compensated by the better quality of the grass, as women are more careful in rejecting unwanted weeds. Therefore the higher quality of the grass collected justifies the lower quantity collected.

Likewise with this difference in grass loads carried per day, the amount of firewood collected per day depends on the distance between firewood collection places and the location of the distillation unit. On average, one **firewood collector** collects and carries up to four backloads or 180 kg of firewood for an average wage rate of Nu150. (See Photo 2, which shows firewood collectors.)

4.3 Cost of LGO Production

The cost of production is calculated based on costs per kg of oil. Costs include the depreciation of the distillation unit[5] over 10 years, operating costs including wage rates of operators, grass and firewood collectors, and the purchase of firewood for distillers located at the roadside. Table 3 shows the total labor cost for the distillation of one kilogram of LGO at Nu371.

Table 3: Labor Costs per Kilogram of LGO (Nu]

	Wage per day	Wage per 5 drums* distilled over 24 hours*	Wage per kg LGO
Operator	125	250	67
Grass collectors	150	830	221
Firewood collector	150	312	83
Total labor costs	**425**	**1,392**	**371**

* Five drums require approximately 750 kg of grass and 375 kg of firewood with a ratio of 100 kg of firewood required to distill one kilogram of oil.

Only owners of distillation units that are located away from the road are allowed to collect firewood within the CF. Distillers located next to the road are required to purchase it from allotted Forest Management Units through firewood contractors appointed by the Forest Development Corporation Ltd. One truckload comprising twelve cubic meters, or 3 to 4 tons of wood, costs approximately Nu4,000 and is sufficient to distill between 30 to 40 kg of lemongrass oil. As shown in Table 4, costs of production are higher by Nu22 (5%) per kilogram of oil for those distillers who depend on the supply of firewood from government-appointed contractors.

On average, five drums of grass each are distilled over a period of 24 hours, resulting in 3.75 kg of LGO per five drums or 0.75 kg of LGO per drum. Each drum requires 150 kg of grass and 75 kg (1.7 backloads) of wood.[6]

As shown in Table 4, organic producers pay a royalty for the lemongrass oil and a water fee into the CFMG fund (benefiting the entire community). Costs for barrels, transportation charges of the oil to the dry port in Phuentsholing and handling fees of Nu46.0 are paid to EODP as the government marketing agent, although Bio Bhutan facilitates the marketing of the certified oil. This double charge increases the production price unnecessarily.

[5] Based on a purchase price of Nu30,000 and annual production of 230 kg of LGO

[6] Budur et al. (2005) report an average consumption of 99 kg of fuel wood for the production of 1 kg of oil.

Table 4: Cost of LGO Production Borne by Distillers - Different Scenarios (Nu per Kg of LGO)

	Organic management		Conventional management	
	Roadside distillers	Remote distillers	Roadside distillers	Remote distillers
Depreciation of distillation unit	13	13	13	13
Labor costs incl. firewood collection	0	371	0	371
Labor costs excl. firewood collection	288	0	288	0
Purchase of firewood through Forest Development Corporation Ltd.	114	0	114	0
Royalty for firewood	0	6	0	6
Royalty for lemongrass	5	5	0	0
Water fees paid to CFMG	1	1	0	0
Transportation to the collection point of EODP	3	6	3	6
EODP & STCB handling charges*	46	46	50	50
Total cost of production	**470**	**448**	**468**	**446**
Average cost of production	**459**		**457**	

* Includes Insurance, Royalty for lemongrass, Transport from Mongar to Phuntsholing, Barrels, STCB and other charges.

Table 5: Handling Charges Borne by Bio Bhutan for Organic Certified LGO (Nu per kg of LGO)

Item	In Nu per year	In Nu per kg of oil based on 1.2 tons/year
Transportation from Dozam to Thimphu	12,000	10
Cost of food grade barrel	30,000	25
Store rent at Dozam	7,200	6
Shipping costs to Europe	96,000	80
Total	**145,200**	**121**

While the CFMG members bear all costs related to the production of LGO (see Table 3), additional costs of Nu121 for Bio-Bhutan handling charges (see Table 4) and Nu177 per kg of LGO (Table 6) arise for the marketing agent Bio Bhutan for training, for the salary of the field supervisor and for the actual certification costs (as shown in Table 5).

The estimated costs of Nu95,000 for the establishment of the CF management plan (including inventory and farmer group formation) are not included in the cost calculation in Table 5 since the management plan is approved by the Government until 2013.

Table 6: Costs Related to Organic Certification Borne by Bio Bhutan

Item	In Nu per year	In Nu per kg of oil based on 1.2 tons/year
Training	35,000	29
Field supervisor	22,500	19
Certification/annual inspections	155,000	129
Total cost in Nu	**212,500**	**177**

As shown in Table 6, the costs for annual inspections of Nu155,000 (US$3,974) are borne by Bio Bhutan (based on 2007 costs). Since there is no certification agency in Bhutan, inspectors must be invited from abroad and expenses have to be paid for the air travel, daily allowances and fees for certification.

Table 7: Total Cost of Production: Organic Versus Conventional Management (Nu and US dollar)

	Borne by	Organic	Conventional
Average cost of production (Table 4)	Distillers	459	457
Handling charges (Table 5)	Bio Bhutan	121	**
Cost related to certification (Table 6)	Bio Bhutan	177	
Total cost of production in Nu		**757**	**457**
Total cost of production in US$		**19.4**	**12**

** Included in cost of production, see EODP &STCB handling charges in Table 3

The study shows that with Nu757 (US$19.4) per kg of organic certified LGO, the total cost of production increases by 66% in comparison to Nu457 (US$12) for conventionally produced oil.

4.4 Bio Bhutan Sales and Payment Schemes

Over two years, Bio Bhutan's exports of organic certified LGO increased from 306 kg (2006) to 1,200 kg (2007) indicating the interest of customers in Asia, Europe and the United States for Bhutanese certified LGO. Attractive payment schemes including advance payments of Nu20,000 per distiller at the beginning of the distillation season, a higher price of Nu600 in comparison to Nu550 and Nu531 per kg of LGO paid by EODP in 2006 and 2007 respectively, and the cash down payments at the time of delivery have encouraged the CFMG distillers to opt for organic management practices.

The EODP scheme with an initial payment of Nu300 per kg of LGO at the time of delivery and the payment of the balance five months after the end of the distillation season, when the customers of the oil in Europe settle accounts with EODP, lacks incentives.

4.5 Income and Employment

Over the two years of observation, the seasonal income of distillers of the organic management group was in the range of Nu32,000 in comparison to Nu9,300 for the distillers of the conventional group (see Table 8).

Figure 1 and Table 9 show that organic management significantly lengthens the duration of employment. Though the daily wage rate does not differ between the management groups (except for the distillers), the duration of employment increases as a direct result of the higher prices and attractive payment schemes offered for organic products.

Figure 1: Duration of Employment for Hired Labor

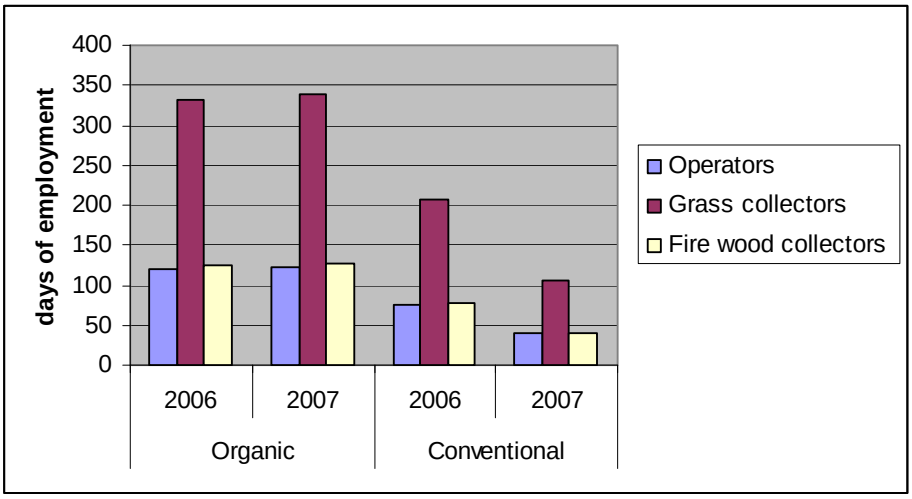

Table 8: Seasonal Income of Distillers Based on Production Figures 2006 and 2007

	Organic		Conventional	
	2006	**2007**	**2006**	**2007**
Average production in kg LGO/distiller	225	230	140	73
Prices paid per kg of LGO	600	600	550	531
Gross income of distillers (average production * price)	135,000	138,000	76,945	38,922
Cost of production: average cost of production (Table 4) * production volume	103,275	105,570	63,980	33,361
Net income of distillers (gross income – cost of production)	**31,725**	**32,430**	**12,965**	**5,561**

Table 9: Employment and Seasonal Income of Employed Labor

	Organic		Conventional	
	2006	**2007**	**2006**	**2007**
Average production in kg LGO/distiller	225	230	140	73
Average number of drums distilled (kg LGO /. 0.75)	300	307	187	97
Operators: Based on 5 drums per 24 hours				
Days of employment	120	123	75	39
Total income in Nu	15,000	15,375	9,375	4,875
Individual income in Nu (based on 2 operators)	7,500	7,688	4,688	2,438
Grass collectors: Based on 150 kg of grass per drum divided by 135.5 kg (average collection quantity per day)				
Days of employment	332	340	207	107
Total income in Nu	49,800	51,000	31,050	16,050
Individual income in Nu (based on 6 grass collectors)	8,300	8,500	5,175	2,675
Fire wood collectors: Based on 75 kg of firewood per drum and an average collection quantity of 180 kg (4 loads)				
Days of employment	125	128	78	40
Total income in Nu	18,750	19,200	11,700	6,000
Individual income in Nu (based on 3 fire wood collectors)	6,250	6,400	3,900	2,000

* Based on daily wages "wage per day" (Table 3)

However, as shown by Table 9, the seasonal income earned by the individuals (operators, grass and firewood collectors) is low given the hard work of often 11 to 12 hours a day and reflects an imbalance of benefit shares for the stakeholders. This is of even more concern in regard to female workers. In comparison to male collectors, they must compensate for the lower weight carried per backload through an increased frequency of trips from the grass collection site to the distillation unit. Yet, the lack of other income opportunities, especially for women who have to attend to their families, obliges them to abide by the current payment system.

4.6 Sustainable Management of Lemongrass Resources

Through intervention and regular training by Bio Bhutan, guidelines for the sustainable management of lemongrass have been established and now form part of the CF management plan in Dozam. The lemongrass guidelines limit the annual harvest to one cut per area and consider the maintenance of the reproductive capacity of the plant through higher cuts at 10 to 15 cm above ground. Forest fires must be (and have been) prevented under the CFMG management plan since 1997.

While the management of lemongrass has certainly improved through the inclusion of guidelines into the CFMG management plan (see Photo 3 for a demonstration of correct grass collection technique presented by a CFMG member in Dozam), the issue of critically high firewood consumption of about 75 kg per kg of LGO requires urgent action by the government and non-governmental organizations as it put pressure on forest resources in

general. Trials for improving the efficiency of existing distillation units, the identification of alternative energy sources through the recycling of distilled grass, and the introduction of alternative energy sources (electricity from hydropower, solar energy) in collaboration with UNDP-Global Environment Facility (GEF) Bhutan and Bio Bhutan will be initiated in 2008.

5. ORGANIC CERTIFIED LGO CONTRIBUTES TO THE MDGS IN BHUTAN

Bhutan's Tenth Five Year Plan (2008-2013) focuses on the MDGs, and has poverty reduction as its key development theme and objective. To achieve **MDG 1 (eradicate extreme hunger and poverty)** the government aims to raise agricultural productivity and promote other rural income.

In this context, the present study shows that organic certification of lemongrass producing areas under the CF programme has a direct impact on the promotion of off-farm activities in rural areas. Over the past two years Bio Bhutan has opened niche markets in Asia, Europe and the United States and sold organic LGO at CIF[7] rates of US$20-23 per kg of oil. The higher price offered for organic certified oil from wild collection in 2007 made it possible to increase the profit shares of organic distillers to US$3.6 per kg of LGO with a 30% profit, as compared to US$2.4 per kg with a 13% profit for conventional distillers that are paid by EODP[8]. Along with incentives such as advance payments at the onset of the season and cash down payments at the time of delivery, oil production has increased from an initial 500 to 600 kg produced by the CFMG to 1.2 tons in 2007. However, the profit increase has not yet resulted in higher daily wages for the workers.

The total demand for organic certified LGO in Bhutan is estimated as 3 to 5 tons for 2008. At current production rates of 230 kg of oil per unit the potential demand would provide greatly improved income for 22 distillers and 264 associated workers (operators, grass and fire wood collectors). Given the current production of 10 tons of oil in Bhutan, the share of organic oil would then constitute 40-50% of the annual LGO production and increase gross income from the industry by US$55,000. To tap into this potential, more area under lemongrass needs to be put under CF management. At the moment at least two more lemongrass-based CFs are in preparation.

However, income shares are not equally distributed amongst the stakeholders of the industry. While the owners of the distillation units benefit to a great extent from increasing prices, the daily income of the operators and grass and firewood collectors has remained at the same level as that of conventional producers. As shown in Table 9, the income of the operators, and grass and firewood collectors, increases only due to the longer working season. It will be desirable for the recently formed lemongrass cooperative to address the issue of raising the income of the collaborating groups in order to distribute benefits more evenly amongst the stakeholders and to improve the working conditions.

The costs for external certification are presently borne by Bio Bhutan and are relatively high. With an expansion of the area under certification, costs for certification per kg of LG would fall and thus enhance the benefits for the Dozam CFMG and new groups who opt for the management of lemongrass under the Government's CF programme. With the expected establishment of a National Certification Agency in Bhutan, the costs of certification could be reduced even more and thus further benefit the communities.

MDG 7 (Ensure environmental sustainability). The Bhutan Millennium Development Goals Needs Assessment and Costing Report (2006-2015) (Bhutan Planning Commission,

[7] CIF: "Cost Insurance Freight," meaning that the shipping costs are included.

[8] Figures derived from table 4 and prices paid to distillers (chapter 4.4)

2007) stipulates a direct linkage between environmental conservation and people's livelihoods. Based on the findings of this report, the Tenth Five Year Plan foresees increasing participation by local people in the management and governance of natural resources through community forestry and community-based forest management. In this line, the study has demonstrated the capacity and willingness of Dozam CFMG to adhere to national legislation (Bhutan Ministry of Agriculture, 2006) and International Standards (WHO, 2003; ISSC-MAP, 2007) on good agricultural and collection practices for the sustainable management of medicinal and aromatic plants through the development, application and monitoring of guidelines for the sustainable management of lemongrass resources.

Regular training of communities in the application of overall concepts of organic production, and the provision of technical expertise for the management of natural resources by the private sector (see Photo 4, which illustrates the training provided by Bio Bhutan for CFMG members) has heightened public awareness of the importance of sustainable resource management based on economic and environmental considerations.

However, ensuring the sustainable supply and use of fuel wood requires further research into how to improve the current distillation system in collaboration with government and non-government agencies.

Reducing inputs (labor and resources, mainly firewood) will lower production costs and thus increase the returns of those communities who are willing and able to participate in the organic certification process. As such, organic certification can become a promising tool for transferring payments for environmental services by farmers, thus contributing further to poverty reduction.

In the medium and long term, the improvement of the current technology combined with the awareness program initiated by the private sector will result in efficient and sustainable management of firewood resources with a reduced burden on the public sector in terms of environmental protection.

MDG 2 (Achieve universal primary education): The Tenth Five Year Plan will focus on improving enrolment from the present 79% at the primary level, the quality of education at the primary and secondary levels and raising the adult literacy rate from the current 53%. The direct impact of the introduction of organic management practices on the achievement of universal primary education cannot be expected over just two years of observations. However, increased cash income from off-farm activities such as the distillation of lemongrass oil will contribute to raising living standards, enabling families to release their children from farm and household chores to attend school.

MDG 3 (Promote gender equality and empower women): The Bhutan Millennium Development Goals Needs Assessment and Costing Report (2008-2013) (Bhutan Planning Commission, 2007) states that "women in farming communities are highly vulnerable as they comprise a large portion of poor rural households as many of them are unpaid family workers or earn very low wages." In this regard, the study shows that women constitute over 50% of employed labor and thus are indispensable stakeholders in the lemongrass oil industry. Women are mostly employed as grass collectors, and are more efficient than their male colleagues. We have shown however that women carry less weight than men and must compensate for the lower weight of their backloads through a higher number of loads carried per day, which places a heavier burden on their shoulders. At the same time, women, who have fewer alternatives to income generation through off-farm activities than men, adjust to the difficult working conditions as grass collectors, and make significant contributions to overall household income, thus strengthening their position within the family.

No direct impact of organic practices can be demonstrated on **MDG 4 (reduce child mortality), MDG 5 (improve maternal health) or MDG 6 (Combat HIV/AIDS, malaria and other diseases)**. However increased income, particularly for women, contributes to better living standards and consequently to an improvement of the overall health status (but the difficult working conditions contradict this). The Ninth Five Year Plan of Drametse (Bhutan Mongar Dzongkhag, 2002) foresees the construction of two outreach clinics and six water schemes for the supply of safe drinking water for the benefit of 308 households. The rehabilitation of an existing water scheme in Zhangkhar community is underway. As plans are made in a participatory manner, it can be foreseen that people will invest part of the income earned from the production of organic certified oil into the development of health services and public water schemes.

International trade in innovative products such as certified organic lemongrass oil from wild collection requires adherence to international standards of certification and contributes thus to achieving **MDG 8 (develop a global partnership for development)** with a particular focus on landlocked and small countries. With Bio-Bhutan, EODP, and Lemongrass Cooperative as partners of the community, this will ensure a durable and sustainable relationship and enhance development.

6. RECOMMENDATIONS

The following recommendations can be derived from the conclusions of this study:

1. **Establish a national certification agency** to reduce the costs of certification with the aim of strengthening the bargaining power of the private sector. Until the certification agency is in place, state subsidies for the certification of CFs concerned with lemongrass distillation can be used to foster the development of this sector.

2. **Raise the scale of organic production of wild collected NWFPs** including lemongrass by increasing the number of CFs in collaboration with the Social Forestry Division and the private sector represented by producer groups and marketing agencies.

3. **Raise competitiveness.** First hand experience proves that prices paid for organic certified lemongrass oil must be competitive with neighboring countries (India, Nepal). Major efforts must be put into: (i) technology improvement to reduce fire wood consumption and make distillation more efficient, (ii) product development and (iii) marketing of products based on organic certified oil.

4. Further research is required to identify **alternative and renewable energy sources** for the distillation of oil and to enhance the overall efficiency of distillation equipment.

5. The **sharing of benefits** and improvement of the difficult working conditions require further attention from the communities and their partners.

6. In addition to marketing, the Lemongrass Cooperative should address resource management (and CF management plans) and the equality of the workers.

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Appendix 1: Abbreviations

ADBI	Asian Development Bank Institute
AMS	Agricultural Marketing Section
BAFRA	Bhutan Agriculture and Food Regulatory Authority
CF	community forest
CFMG	Community Forest Management Group
DoF	Department of Forests
EC	European Commission
EODP	Essential Oils Development Programme
EU	European Union
FAO	Food and Agriculture Organization
FMU	Forest Management Unit
FRDD	Forest Resources Development Division
IFAD	International Fund for Agricultural Development
IFOAM	International Federation of Organic Agriculture Movements
ISSC-MAP	International Standard for Sustainable Wild Collection of Medicinal and Aromatic Plants
LG	lemongrass
LGO	lemongrass oil
MDG	Millennium Development Goals
MEA	Ministry of Economic Affairs
MOA	Ministry of Agriculture
NOP	National Organic Programme
NSB	National Statistic Bureau
Nu	ngultrum (Bhutanese currency)
NWFP	non-wood forest product
REDP	Rural Enterprise Development Programme
RGOB	Royal Government of Bhutan
RNR	renewable natural resources
RNRRC	Renewable Natural Resources Research Centre
SDC	Swiss Agency for Development and Cooperation
SFD	Social Forestry Division
UK	United Kingdom
UNDP	United Nations Development Program
USA	United States of America
WHO	World Health Organization

Appendix 2: Glossary

Dzongkhag: District (second level of administration)

Gewog: Sub-district (third level of administration)

Lemongrass oil: essential oil extracted from lemongrass (*Cymbopogon spp.*) through water distillation

Measurement Units:

- ac acre = 0.4047 ha
- kg kilogram

Drum: One distillation drum holds 150 kg of grass

Backloads:

- A man can carry 45 kg per backload
- A woman can carry 25 kg per backload

Exchange rates: US$1 = 39 Nu (Bhutanese Ngultrum)