Bamboo

The Golden Opportunity for Wamanang

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Tenzin
June 2007
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About the supporting organisations:

The Participatory Forest Management Project (PFMP) is a five-year Helvetas project (July 2002 to June 2007) financed by the Swiss Agency for Development and Cooperation (SDC) and the Royal Government of Bhutan. The project will be extended till 2012. The project goal is to achieve sustainable forest management and improve rural livelihoods in Bhutan by strengthening the capacity of extension services and local communities to utilise and conserve forest resources, with an emphasis on poverty alleviation and the equitable distribution of benefits.

The Community Based Natural Resource Management program (CBNRM) is implemented by the Council of Renewable Natural Resources Research of Bhutan (CoRRB) with financial support from the Canadian International Development Research Center (IDRC) and advisory support provided by the Netherlands Development Organisation (SNV). The aim of the program is to mainstream community participation in natural resource management through action research, institutional development, networking and capacity building.

The Regional Community Forestry Training Centre for Asia and the Pacific (RECOFTC) is an international not-for-profit organisation based in Bangkok, Thailand, that works closely with partners to design and facilitate learning processes and systems to support community forestry and community based natural resource management. Through strategic partnerships and collaboration with governmental and non-governmental institutions, RECOFTC aims to enhance capacity at all levels and to promote constructive multi-stakeholder dialogues and interactions to ensure equitable and sustainable management of forests and natural resources.

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Cover photos (from left to right): Bamboo resource, Basket-weaving, Bamboo products, Cash generated from the sale of bamboo.

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Or access: http://www.moa.gov.bt/downloads
Foreword

Bhutan has an enviable record in the protection of its natural resources and the progress of its people. We aim to ensure that at least 60% of our total land area of the country will remain under forest in perpetuity, while at the same time improve the livelihoods of our rural communities who depend on this resource and the small, but productive agricultural lands of Bhutan.

In order to further strengthen the link between protecting our valuable natural resources and developing our rural communities, we have been promoting and implementing community-based approaches to forestry and natural resource management. Originally these systems were to assist with the protection of our forests, but more recently such initiatives have taken on a further dimension in Bhutan with the overall goal of poverty reduction in the 10th five year plan. Bhutan is also committed to the United Nations Millennium Development Goals.

Success in community-based approaches to forestry and natural resource management promises to delivery both sustainable resource management and secure livelihoods for our rural communities. But there are also challenges. It is timely for us to reflect on our achievements, but also to acknowledge areas for improvement. Last year’s case studies were received very well. This year’s case study series continue to present an excellent ‘snapshot’ of our current progress, lessons learnt and challenges we will face in further expanding community-based forest and natural resource management in Bhutan.

This case study series was initiated by the Ministry of Agriculture (DoF and CoRRB) and supported by PFMP (Helvetas/SDC), CBNRM (IDRC/SNV) and RECOFTC. Participants from a range of organisations developed their material over a period of three months. The outcomes provide a fascinating insight into the diversity of approaches as well as significantly advancing our understanding of the complexity of community-based approaches.

The Ministry of Agriculture would like to thank the authors of the individual case studies for their valuable contribution and making information available for a wider audience. The Ministry would also like to thank the supporting organisations for their valuable contribution. Without their support, these case studies would not have been possible. We hope that these case studies stimulate others to document their experiences.

We believe that with these, past and future case studies, community-based forestry and natural resource management will be further enhanced for the benefit of all in Bhutan.

Sangay Thinley
Secretary
Ministry of Agriculture
Acronyms

BWS  Bumdelling Wild Life Sanctuary
CF   Community Forestry
DoF  Department of Forests
DYT  Dzongkhag Yargay Tshogdu (District Development Committee)
GYT  Geog Yargay Tshogchung (Geog Development Committee)
NWFPs  Non Wood Forest Products
Nu.  Ngultrum (*Bhutanese currency*)
PRA  Participatory Rural Appraisal
RNR  Renewable Natural Resources
SEZAP  Second Eastern Zone Agriculture Project
WCFBM  Wamanang Community Forest for Bamboo Management

Glossary

Dzongkhag  District
Geog  Block (Administrative level below District)
Ridam  Banned season or restricted period
Tsamdro  Registered Grazing Land
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Abstract

This paper highlights the group formation process and steps undertaken for the development of the management plan for bamboo (Borinda grossa) and the group bylaws to support the rural livelihood of the Wamanang community in the multiple and buffer zones of the Bumdelling Wildlife Sanctuary.

The main purpose of this paper is to show the positive impact of the management plan for bamboo on community development and the generation of income both at community and household levels. Based on sustainable harvesting amounts defined through a participatory inventory of the resource, annually the group can earn up to about Nu. 540,000 from the sale of bamboo culms.

At the household level, farmers can earn about Nu. 200 per day by producing and selling mats and baskets. This is almost double the income they would generate through daily wages from labour contribution to government work. However, there is even much more potential if new technologies for product development and diversification are introduced.

Therefore, the authors believe that Borinda grossa has good potential to meet farming subsistence needs and income generation needs, without compromising the resource’s sustainability.
1. Introduction

There are 75 genera and 1,250 species of bamboo in the world and out of which 14 genera and 50 species are widely distributed across Bhutan. The species *Borinda grossa* is one of the important high altitude commercial bamboo species of Bhutan and is found between 2,600 metres and 3,200 metres, often in association with hemlock (Stapleton 1994). It is naturally restricted to wetter temperate mixed coniferous forests, however it is also cultivated in other areas.

The Wamanang Community Forest for Bamboo Management (WCFBM) is located in the Bumdelling Wildlife Sanctuary (BWS) in Trashi Yangtse Dzongkhag, towards the northeast of Bhutan. The sanctuary ranges from 1,500 to 6,450 metres in elevation with a total area of 1,545 km². As per the Forest and Nature Conservation Rules of 2006 (DoF 2006) and sanctuary regulations, activities such as house construction, cultivation, collection of timber, firewood, Non Wood Forest Products (NWFPs) and sustainable management of resources are allowed for communities residing in the multiple and buffer zones of the Wildlife Sanctuary. The WCFBM has been established to sustainably manage bamboo (*Borinda grossa*) within the BWS. In the five villages of the WCFBM, *Borinda grossa* is considered to be the most important resource among the NWFPs and is fundamental to rural livelihood development. The communities heavily depend on it for fencing, roofing, ceilings, ropes, baskets, firewood sheds, cow sheds, guarding sheds and various handicraft items. They consider it like money in the bank, and strongly depend on the bamboo for their livelihood and income generation.

On the other hand, the increasing population combined with resource scarcity in neighbouring geogs, has significantly increased the pressure for collection of bamboo in the WCFBM area over the last few years. The Wamanang community is now concerned that there is likely to be a depletion of bamboo in the most accessible areas.

In order to limit outsider pressure on the resource, as well as to better protect the forest, the WCFBM Group was formed in 2004 with technical help from the Dzongkhag Forestry Sector, the Wildlife Sanctuary and RNR Sectors. The objective of the group is to manage the bamboo on a sustainable basis. The community forest management plan of this group was officially approved by the Department of Forests (DoF) and handed over to the community on the 14th March 2007. The current case study explores how successful community based management of bamboo can contribute to the rural livelihood of communities
living within the Bumdelling Wildlife Sanctuary.

The case study will provide a brief overview of the socio-economic context of the community and their traditional bamboo management systems. It also describes the group formation process, the expected benefits in terms of sustainable management and income from the resource for rural development.

2. Background

Between 2004 and 2007, the Wamanang Community Forest for Bamboo Management group (WCFBM) was formed for the management of bamboo over an area of 320 ha. The group consists of 97 households from five villages (Wamanang, Sep, Durchen, Phumpodi and Langmadung). On the 14th March 2007, the forest area was handed over to the group as a community forest. The forest has been divided into three blocks (see Figure 1), namely Kyudung/Chamila, Tokaphu/Nidrang and Leiling/Shawangla. All three blocks are above the communities and it takes up to three hours walk to reach them.

The WCFBM group lives in the buffer and multiple zones of the Bumdelling Wildlife Sanctuary (BWS) and stretches over two geogs, namely Bumdelling and Yangtse. The forest consists of mixed broadleaf and conifer species associated with abundant bamboo (*Borinda grossa*) in the understory. This bamboo species has culms up to 10 m tall and up to 4.5 cm in diameter. The leaves can reach 25 cm in length. It is easily distinguished from the other frost hardy bamboos by its large finely grooved culms which are pale blue in colour (Stapleton 1994).

![Figure 1: Block division of Wamanang CF](image)

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1 The BWS includes a core zone, a multiple use zone and a buffer zone. While the core zone has a total restriction of any activity (only research and grazing in very exceptional cases), the multiple and buffer zones allow implementation of activities and collection of certain products (pasture, fuel wood, construction wood, NWFP) by the communities. Community Forestry is mainly confined to the multiple zones and only in exceptional case in the buffer zone.
2.1. Socio-economic context

About 99% of the households in Wamanang own agriculture land, ranging from three to 3.5 acres per household. About 90% of the households own cattle. Potatoes are the main cash crop grown widely in the valley followed by chilly, livestock products, and the collection of NWFPs such as bamboo, ferns, mushrooms and Daphne (used for handmade paper). Farmers also grow paddy, millet, maize and buckwheat for their staple food. The living standard of the people has improved since the opening of a school and a farm road, which provides better access to the local market.

A wealth ranking exercise conducted in 2007 (see Figure 2), classified the households based on their average daily income. Using this, the current study gathered information through interviews with ten houses of each category, ‘rich’ (Nu. 370/day), ‘medium’ (Nu. 75/day) and ‘poor’ (Nu. 45/day). The information covers:

- Sources of income (see Table 1);
- Amount of bamboo harvested as per the permit system (see Table 2);
- Demand of bamboo mats from contractors;
- Labour input for bamboo collection and weaving; and
- Use of bamboo for different purposes.

As can be seen from Table 1, income generated from the villagers’ sale of labour is significant for all three categories, particularly for the poorer households, since they own no land.

### Table 1: Contribution of different resources to household income

<table>
<thead>
<tr>
<th>Source of income</th>
<th>Income (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rich households</td>
</tr>
<tr>
<td>Non Wood Forest Products</td>
<td>0.9</td>
</tr>
<tr>
<td>Livestock</td>
<td>8.6</td>
</tr>
<tr>
<td>Agriculture Crops</td>
<td>5.3</td>
</tr>
<tr>
<td>Cash Crops</td>
<td>4.3</td>
</tr>
<tr>
<td>Government Service</td>
<td>5.4</td>
</tr>
<tr>
<td>Sale of Labour during the Farming Off-Season</td>
<td>75.3</td>
</tr>
</tbody>
</table>

**Figure 2: Wealth ranking separately with women and men**
2.2. Traditional bamboo management systems

In the early 1960s, the rights of communities over forest resources were confined to their immediate geographical locality. At that time, people from outside the communities had to request access to the forest resources and pay for the products by giving rice or millet. There used to be a restricted period of access to the forest from June to August, in respect of a local deity. It is believed that entering into the high forest and mountain tops during this time brought bad weather in the form of hailstones and heavy showers that damaged agriculture crops during the time of harvest. Community members were also restricted from collection and grazing during the bamboo shoot formation period.

After the nationalisation of forests (1969) and the establishment of the Bumdelling Wild Life Sanctuary (1998), access to the forest resources was based on a permit system. The permit was issued to the villagers by the Forest Department for the collection of bamboo and other NWFPs, but only for home consumption. For the commercial sale of the bamboo, a permit was issued separately to contractors. Given this relatively open access, the villagers started to fear the depletion of forest resources.

According to the individual household survey, the actual permits sanctioned by the Department of Forests, prior to the handing over of the Community Forest, are shown in Table 2.

Each household on average, used to get a permit to collect between 400 to 500 bamboo culms, which is far below the actual collection amount (see Table 3). The culms that are less than one-year-old are used to weave baskets and those between one to two years are used for mat production (see Figure 3).

Table 2: Actual collection of bamboo based on permit systems

<table>
<thead>
<tr>
<th>Village</th>
<th>Number of households</th>
<th>Number of culms</th>
<th>Total culms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wamanang</td>
<td>67</td>
<td>590</td>
<td>39,530</td>
</tr>
<tr>
<td>Yangtse</td>
<td>30</td>
<td>300</td>
<td>9,000</td>
</tr>
</tbody>
</table>

Figure 3: Bamboo products (mat and basket)
3. Group Formation Process

The group formation process started in 2004 and concluded in 2007 with the handing over of the forest to the community (see Figure 4). The user group was identified based on the use of *Borinda grossa* and the perceptions of the farmers in terms of better management of the resource. The group was formed with the help of Dzongkhag Forestry sector, Bumdelling Wildlife Sanctuary, Geog Yargay Tshogchung (GYT), Renewable Natural Resources (RNR) sector, Second Eastern Zone Agriculture Project (SEZAP) and Dzongkhag Yargay Tshogdu (DYT). The planning process included PRA exercises, policy sensitisation, site selection, submission of application to the Department of Forest, participatory mapping, gender training (emphasising the importance of participation and the level of decision-making for men and women), group strengthening, awareness raising on community forestry rules, village meetings, exchange visits to some of the community forest areas in neighbouring Dzongkhags, resource assessment and finally drafting of the management plan. The formation process was extremely

![Figure 4: The Wamanang CF management group](image)

### Table 3: Potential annual harvestable culms

<table>
<thead>
<tr>
<th>Block</th>
<th>Area (ha)</th>
<th>HH</th>
<th>Growing stock (total no. culms)</th>
<th>Annual harvest (culms/year)</th>
<th>Domestic use (culms/year)</th>
<th>Potential for selling (culms/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Block 1 (Kyudung/Chamila)</td>
<td>90</td>
<td>10</td>
<td>350,512</td>
<td>34,240</td>
<td>16,000</td>
<td>18,240</td>
</tr>
<tr>
<td>Block 2 (Tokaphu/Nidrang)</td>
<td>160</td>
<td>62</td>
<td>3,283,200</td>
<td>231,480</td>
<td>49,600</td>
<td>181,880</td>
</tr>
<tr>
<td>Block 3 (Leiling/Shawangla)</td>
<td>72</td>
<td>25</td>
<td>6,450,960</td>
<td>678,240</td>
<td>20,000</td>
<td>658,240</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>322</strong></td>
<td><strong>97</strong></td>
<td><strong>10,084,672</strong></td>
<td><strong>943,960</strong></td>
<td><strong>85,600</strong></td>
<td><strong>858,360</strong></td>
</tr>
</tbody>
</table>
important to strengthen the capacity of the community in maintaining good governance and equitable benefit sharing processes.

Because of the difficult terrain with its steep slopes, dense bamboo vegetation (see Figure 5) and long walking distances from the village, for the resource inventory it was decided to use a “stratified selective sampling” method. This method provided reliable data and made optimal use of the available time and human resources. Each block was divided into sub-blocks, based on the density of the bamboo. Since bamboo is not distributed over the entire forest area, an assessment of the percentage of the productive area was done in each sub-block. In this way, severely degraded and/or inaccessible areas were left out of the inventory. In the productive area of each sub-block, the bamboo stock was measured in a number of sample plots each ten by 25 metres. The number of sample plots depended on the heterogeneity and the size of the sub-block. The locations of the sample plots were carefully selected to ensure that the bamboo stock could be considered as representative of the entire sub-block. Measurements included the general condition of the bamboo clump (good, congested, damaged) and the number of culms younger than one year, one-year-old, two-years-old and three years old per clump. Furthermore, the number of harvestable culms was recorded based on local knowledge (mostly one year or two-year-old culms, in good health, straight, green, about five metres long and with a diameter of two to four cm). The sustainable harvesting levels were assessed based on the inventory results (see Annex 1).

4. Management Plan and Group Bylaws

4.1. Summary of the management plan

The Community Forest Management Plan (Wamanang CF 2006) defines (i) management prescriptions for the bamboo resource, (ii) participatory monitoring mechanisms, (iii) the growing stock and annual harvestable limits, as well as, (iv) the potential for income generation for the group. Since it is approved by the Department of Forest (DoF) it also provides the legal rights for effective management and
utilisation of the bamboo resource. The objectives of the plan are to enhance the resource’s condition and to improve the livelihoods of community members. The plan addresses domestic household needs and potential for commercialisation. The management details for each forest block are shown in Table 3. The growing stock and maximum annual harvesting limits were assessed by the community in collaboration with Dzongkhag Forestry Sector and BWS. In order to be on the safe side and also to consider the labour and market constraints, the annual harvestable rate was defined assuming that only 50% of the potential harvestable culms will be used.

Based on the prescription given in the management plan, bamboo collection shall be done from September to April only. In case of an emergency where bamboo has to be supplied outside the collection period, the management committee shall make a decision and send a committee member, along with the bamboo collector, to ensure that there is no damage to young shoots. The movement of cattle will not be allowed during the bamboo shoot formation period and ridam (the banned season from June to August). Cattle have to be herded in registered tsamdro and improved pasture land during this period.

4.2. Group bylaws

Good governance of the group (transparency, accountability and equity-sharing) has been defined in the group bylaws, which cover the following issues:

1. Membership arrangement
2. Group management by a selected committee
3. Decision-making process
4. Conflict resolution procedures
5. Fund development and mobilisation
6. Equity in benefit sharing
7. Roles of the BWS management
8. Monitoring and Evaluation

The community fund includes membership fees, fees from the sale of bamboo, penalties and donations. The benefits derived from the different sources (monetary and non-monetary) can be equally accessed by the WCFBM group members. There is provision for supporting disadvantaged people and the poorest members of the community, in the form of a low interest loan (20% interest) in times of sickness and death. The group also provides loans to non-members of the group, but at 30% interest rate.
Specifications are made for assistance to community welfare development programs. Last but not least, compensation arrangements have been defined for those who provide services to the WCFBM group, such as the chairperson, secretary, treasurer and committee members. All decisions are made at the general meeting (see Figure 6).

5. Expected Impact of Bamboo Management on Rural Livelihoods

5.1. Importance of bamboo for the farming system

A resource ranking exercise was conducted with a sample of thirty households, with an equal ratio of men and women. Those involved were given 100 beans and asked to distribute them between different resources according to their importance for income generation (see Figure 7).

This shows that the community prefers bamboo and considers it as one of the most important resources to be

Figure 6: General assembly of the group

Figure 7: Distribution of 100 beans
managed by the CF group. The main uses are for fencing, roofing matting, ceiling, panelling and window frames (see Figure 8).

Less than one-year-old bamboo culms are used for basic basket-weaving and ropes. The increasing shortage of timber makes bamboo more valuable and both members of the group and outsiders are consuming increasing quantities.

5.2. Potential income at the household level

Farmers can generate considerable income by producing different types of mats and baskets that can be sold on the local market. The time required to produce these products is summarised in Table 4.

<table>
<thead>
<tr>
<th>Name of village</th>
<th>Number of households</th>
<th>Collection time</th>
<th>Production time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wamanang</td>
<td>10</td>
<td>2 hours</td>
<td>2 hours/mat or 2 basket/ hour</td>
</tr>
<tr>
<td>Wamanang</td>
<td>25</td>
<td>3-4 hours</td>
<td>2 hours/mat or 2 basket/hour</td>
</tr>
<tr>
<td>Sep Langmadung</td>
<td>62</td>
<td>4-5 hours</td>
<td>2 hours/mat or 2 basket/hour</td>
</tr>
<tr>
<td>Durchen &amp; Phumpodi</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For instance a community member can make one bamboo mat per day and sell this for Nu.200 (depending on market demand and competition from other products). This is double the income gained from selling their labour at the daily average legal wage of Nu.100 (for an eight hour working day). Therefore the farmers have the potential to generate income through the sale of bamboo, even if current bamboo product prices remain the same. The community can also sell it as bundles (see Figure 9).

5.3. Potential income at community level

The group is allowed to sell bamboo from the CF area based on the management plan and bylaws. To calculate the annual income for the community from the harvesting of bamboo, an assumption is made that only 50% of the harvestable amount of culms is collected. This will further ensure the sustainability of the management.
As shown in Table 5, the community group has come up with two different rates for the sale of bamboo culms depending on who is buying the bamboo. For group members, Nu. 25 for 100 bamboo culms is charged and for non-members, Nu. 60 for 100 culms is charged.

As shown in Table 5 the group has the potential to earn about Nu. 536,416 per year. If on-farm value adding of bamboo occurs, the potential income generated by the community members can be even higher.

Table 5: Potential Annual Income for the Community Group

<table>
<thead>
<tr>
<th>Market</th>
<th>Amount of harvestable culms</th>
<th>Selling Price for 100 culms</th>
<th>Potential total annual Income (Nu/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home consumption</td>
<td>85,600</td>
<td>Nu. 25.-</td>
<td>21,400</td>
</tr>
<tr>
<td>Market</td>
<td>858,360</td>
<td>Nu. 60.-</td>
<td>515,016</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>536,416</strong></td>
</tr>
</tbody>
</table>

The management plan and bylaws also allow for the collection of donations, membership fees, penalties and fees from the sale of bamboo. Table 6 shows the income that has already been generated within one month from the official registration of the group. This can be utilised to support the poorest of the community in the form of soft loans, renovation of the community temple and financial assistance to disadvantaged groups.

Table 6: Effective Income generated in one month period 2007 by the community

<table>
<thead>
<tr>
<th>Sources of income</th>
<th>Amount (Nu.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Donations</td>
<td>3,620</td>
</tr>
<tr>
<td>Membership fees</td>
<td>5,620</td>
</tr>
<tr>
<td>Fees from sale of bamboo</td>
<td>1,790</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>11,030</strong></td>
</tr>
</tbody>
</table>

6. Conclusion

Bamboo has been used from time immemorial for a variety of purposes in the daily life of the Wamanang Community. Mainly due to its value, it holds an important position among the NWFPs. Therefore, the indigenous knowledge and experiences of local communities should be promoted, but at the same time new technologies should be introduced in order to diversify products that can be manufactured and commercialised by the community.

Prior to the WCFBM group formation, the individual community members had to get a permit for collecting bamboo culms and pay royalties to the Government. Since the establishment of the WCFBM, this revenue is being collected by the group for the benefit of the community. Therefore, the WCFBM
group has helped regulate the actual collection of fees and bamboo, which contributes to their own development. The WCFBM programme is also contributing to the generation of income at the community and household level by the selling of bamboo culms and products to contractors as well as to the group members themselves. The management plan also has provision for the lending of money from the community fund at minimal interest rates, which contributes to positive socio-economic improvements for rural people.

The community fund itself is an income stimulating activity as funds can be provided as small credit and loans to the members as well as paying operational costs to help manage the group.

During the case study process, the farmers have expressed their gratitude to the Ministry of Agriculture and in particular to the Department of Forest for providing the legal rights for the WCFBM group to manage the resource.

The authors would like to recommend to the relevant agencies to build good networking systems among NWFP stakeholders to enhance information on product diversification, market channelling and product quality.

This case study also indicates that *Borinda grossa* offers good opportunities and potential to generate income both at the household and community level without compromising long-term sustainability of the resource.

**Acknowledgment**

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Last but not least, we would like to thank Mr. Peter Stephen (RECOFTC) for providing the valuable inputs and guidance in writing the case study in the lovely atmosphere of the Wangdicholing Resort.
References


<table>
<thead>
<tr>
<th>Sub-block</th>
<th>Area (Ha)</th>
<th>Prod. area No. of Plots</th>
<th>Young culms &lt; 1 year</th>
<th>Culms 1 year +</th>
<th>Culms 2 year +</th>
<th>Culms 3+ year</th>
<th>Total no of culms of more than one year (column 5, 6, 7)</th>
<th>Harvest-able (culms/yr)</th>
<th>Proposed harvest (50% column 9)</th>
<th>Proposed harvest in % of total culms (column 10/8 x 100%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kyudung (protection)</td>
<td>60.0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.0</td>
</tr>
<tr>
<td>Kyudung (poor)</td>
<td>6.6</td>
<td>6.6</td>
<td>1</td>
<td>1,848</td>
<td>7,392</td>
<td>6,600</td>
<td>23,496</td>
<td>37,488</td>
<td>2,640</td>
<td>1,320</td>
</tr>
<tr>
<td>Kyudung (medium)</td>
<td>12.8</td>
<td>12.8</td>
<td>1</td>
<td>11,776</td>
<td>28,672</td>
<td>20,992</td>
<td>92,160</td>
<td>141,824</td>
<td>23,040</td>
<td>11,520</td>
</tr>
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<td>Kyudung (good)</td>
<td>10.0</td>
<td>10.0</td>
<td>1</td>
<td>16,000</td>
<td>30,400</td>
<td>42,000</td>
<td>98,800</td>
<td>171,200</td>
<td>42,800</td>
<td>21,400</td>
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<tr>
<td>Tokaphu</td>
<td>60.0</td>
<td>54</td>
<td>5</td>
<td>112,320</td>
<td>241,920</td>
<td>239,760</td>
<td>511,920</td>
<td>993,600</td>
<td>110,160</td>
<td>55,080</td>
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<tr>
<td>Nidrang</td>
<td>100.0</td>
<td>90</td>
<td>6</td>
<td>342,000</td>
<td>558,000</td>
<td>594,000</td>
<td>1,137,600</td>
<td>2,289,600</td>
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<tr>
<td>Shawangla</td>
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<td>10</td>
<td>1</td>
<td>41,600</td>
<td>53,600</td>
<td>52,800</td>
<td>111,600</td>
<td>218,000</td>
<td>21,600</td>
<td>10,800</td>
</tr>
<tr>
<td>Leiling</td>
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<td>5</td>
<td>1,021,680</td>
<td>1,369,440</td>
<td>1,827,360</td>
<td>3,026,160</td>
<td>6,232,960</td>
<td>1,334,880</td>
<td>667,440</td>
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<tr>
<td>TOTAL</td>
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<td>14</td>
</tr>
</tbody>
</table>

Harvestable amount of culms per year in each (sub) block from resource inventory.

Annex I
A Series of Case Studies on Community-Based Forest and Natural Resource Management in Bhutan, 2006


Bridging the Knowledge: A Journey into Local Experience for Community-Based Management of *Cane* and *Yula*. By Tshewang Dorji and Robin aus der Beek. June 2006.


A Series of Case Studies on Community-Based Forest and Natural Resource Management in Bhutan, 2007


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