Making a bridge between livelihoods and forest conservation: Lessons from non timber forest products’ utilization in South Sumatera, Indonesia

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Abstract

Promoting forest conservation as well as the well-being of forest proximate people requires an appropriate balance of regulation, enforcement, and incentives. When regulation and enforcement are minimal, economic incentives for low-intensity and non-deleterious forest use can provide conservation and livelihood benefits. One management option for promoting low intensity and non-deleterious forest use includes the harvest and production of non-timber forest products (NTFPs). This research identifies and examines strategies to promote sustainable livelihoods in a conservation landscape. We assess Pangkalan BULian Village, Musi Banyuasin District, South Sumatra Province using the Community Livelihood Appraisal and Product Scanning (CLAPS) method to describe potential commodities and conduct value chain and market analyses on downstream sectors. Data collection included in-depth interviews, focus group discussions, and household surveys disseminated through snowball sampling. We find that rattan is a priority NTFP due to the presence of abundant raw materials, trained human resources, and potential markets. Actors involved along the value chain are collectors, local brokers, large collectors, small processors, large processors, retailers and end consumers. Profit margins earned along each link of the value chain are around 25%. Thus, we encourage rattan harvest and production as a low-intensity and non-deleterious forest use that can simultaneously benefit local livelihoods and forest conservation in a landscape where protected area rules and regulations are difficult to enforce.

1. Introduction

The relationship between forest conservation and the well-being of forest proximate people is of crucial concern to conserving biodiversity, reducing carbon emissions, and promoting sustainable development (Kanowski et al., 2011; Thompson et al., 2011). In this text, we use the most formal interpretation of forest proximate people: human actors within communities that directly rely on forest landscapes for commercial and/or subsistence needs (Newton et al., 2016). Without specific regulation, enforcement, and incentives, forest proximate communities tend to reduce forest cover in order to provide short-term as well as long-term benefits (see Nurrochmat et al., 2017); however, with the appropriate set of rules and norms, communities are able to conserve forests while benefiting directly and indirectly from forest areas (Birgiantoro and Nurrochmat, 2007; Roslinda et al., 2012; Adalina et al., 2014).

Forest use can be categorized as consumptive and indirect (Gregersen, 1995) as well as deleterious and non-deleterious. Consumptive forest use refers to the collection of extractive goods from a forest: timber, fruit, fodder, bushmeat, etc. Indirect uses include activities that do not result in extraction, including recreation, tourism, education, intercropping, etc. (see Darusman et al., 2001). Deleterious uses decrease or otherwise alter forest cover, a common metric used to measure the efficacy and success of conservation programs (Blackman, 2013). Non-deleterious uses are those which do not reduce forest canopy cover. Fig. 1 presents a conceptual model for considering the intensity of consumptive use and the percent change in forest cover.

We provide the consumptive intensity and percent forest cover change curve –as one of the important indicators for an alarming situation of forest conservation- in order to outline how, as intensity of consumptive forest use increases, the percent of altered (i.e. removed, replaced, etc.) forest cover similarly changes. Two interrelated theories of intensification and land cover change form the basis of this curve. First, the relationship between population and agricultural land...
uses, states and communities often rely on a combination of state agendas, lower-intensity use is crucial. To promote low-intensity forest use in Indonesia (Sunderlin et al., 2005; Wunder, 2003; Wunder et al., 2014; Neumann and Hirsch, 2000; Steele et al., 2003; Wunder et al., 2014; Neumann and Hirsch, 2000; Steele et al., 2003) and around the world have reduced deforestation (Nolte et al., 2013; Ferraro et al., 2015). It is very important to make a bridge between livelihood and forest conservation because “treat” from human activities is often recognized as a proxy for a set of regulations and enforcement aimed to conserve forest area and reduce human impact; indeed, protected area assignment cannot effectively conserve forest areas if it allows and/or promotes high intensity consumptive uses (Willie et al., 2001). However, aligning livelihood opportunities for proximate forest people provides another avenue to conserve forest lands that can reach beyond territorialization, regulation, and enforcement (Vang-Rasmussen et al., 2017) as well as formalization (Erbaugh et al., 2016).

By aligning the livelihood opportunities and incentives for forest proximate people with consumptive but non-deleterious forest use, community managed forests have demonstrated the ability to conserve forest land at a level on par with protected areas (Miranda et al., 2015; Porter-Bolland et al., 2012). This “alignment” of opportunities and incentives is particularly prurient for conservation landscapes that lack sufficient regulation and enforcement necessary to deter forest proximate people from consumptive and deleterious forest use.

The Meranti Protection Forest (MPF), located in the Meranti Production Forest Management Unit (FMU) in Batang Hari Leko sub-district, Musi Banyuasin district is one of a number of protection forests in South Sumatra. “Protection forests” are a particular classification of land use type, defined and managed by the state (Law 41/1999). The MPF is adjacent to Dangku Wildlife Reserve, which is part of the Dangku Bentayan Conservation FMU. The Dangku Bentayan landscape has a very high level of biodiversity (Prasetyo et al., 2014; Ministry of Forestry, 2014), including the Sumatran tiger (Imada et al., 2013; Mahanani and Pitria, 2013). However, the landscape is currently under threat from conversion for other land uses, including poaching, illegal logging and wildlife trading (Kumar and Shahabuddin, 2005).

Although the MPF and other regions within the Dangku Bentayan Conservation FMU have been designated as protected areas, regulation and enforcement have not been sufficient to appropriately conserve forest cover. Based on law No. 41/1999 on forestry, deforestation within protection forests is prohibited. However, the MPF is located within an FMU where there exist overlapping claims on 38.5% of its land area (Napitu et al., 2017). Overlapping claims make regulating and enforcing limited human impact in the protection forest area difficult (see Nurrochmat et al., 2012; Nurrochmat et al., 2014), often leading to a misalignment between forest use and forest conservation (Gaveau et al., 2017).

In similar contexts, where protected area regulation and enforcement are outweighed by consumptive economic forest uses, non-timber forest products (NTPFs) have demonstrated an ability to align forest use and conservation (Ticktin, 2004). NTPFs encourage communities to conserve forest landscapes in order to receive both short- and long-term benefits for livelihoods, food, and health security (FAO, 1999). In this manner, NTPFs can support sustainable forest management and conservation strategies (Arnold, 2002), while providing alternative sources of cash income for the rural poor (Dash et al., 2016; Ros-Tonen and Wiersum, 2005; Ndangalasi et al., 2007; Giliba et al., 2010; Kar and Jacobson, 2012). Furthermore, NTPFs contribute significantly not only to the livelihoods of rural residents (Sunderlin et al., 2005; Wunder, 2003; Wunder et al., 2014; Neumann and Hirsch, 2000; Steele et al., 2014), but also to those who are less formally forest proximate people (Newton et al., 2016). That is, people and communities who own homesteads, live in open spaces within towns, or on the urban periphery (Kaoma and Shackleton, 2015).

Planning for livelihood improvement requires analytical tools and

1 In Indonesian context, Meranti refers to all trees of the family of Dipterocarpaceae.
methods for assessing local sustainability. Strategies for such schemes include follow-up plans, which are necessary for a variety of stakeholders, especially governments, in the form of economic instruments that can promise “win-win” solutions for both biodiversity conservation and human (local) livelihoods (Rode et al., 2016) through the processing of NTFPs. Thus, this research examines potential NTFP alternatives for a village in the Dangku Bentayan Conservation FMU (Table 1).

Table 1 NTFPs in Pangkalan Bulian Village.

<table>
<thead>
<tr>
<th>No</th>
<th>NTFP</th>
<th>Utilization</th>
<th>Starting use intensity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rattan</td>
<td>Crafts, raw material</td>
<td>I1</td>
</tr>
<tr>
<td>2</td>
<td>Cikai</td>
<td>Household furniture</td>
<td>I2</td>
</tr>
<tr>
<td>3</td>
<td>Tassei</td>
<td>Crafts</td>
<td>I1</td>
</tr>
<tr>
<td>4</td>
<td>Pandanus</td>
<td>Crafts</td>
<td>I1</td>
</tr>
<tr>
<td>5</td>
<td>Bamboo</td>
<td>Crafts</td>
<td>I1</td>
</tr>
<tr>
<td>6</td>
<td>Rubber</td>
<td>Sales</td>
<td>I2</td>
</tr>
<tr>
<td>7</td>
<td>Sialang honey</td>
<td>Sales, own consumption</td>
<td>I1</td>
</tr>
<tr>
<td>8</td>
<td>Durian</td>
<td>Sales, own consumption</td>
<td>I1</td>
</tr>
<tr>
<td>9</td>
<td>Bitter charm</td>
<td>Sales, traditional medicine</td>
<td>I1</td>
</tr>
</tbody>
</table>

Through this case study of alternatives for community managed NTFPs, our research provides insight into the livelihood options for forest proximate people within a conservation landscape that are consumptive and non-deleterious. We thus provide information on how to align local livelihood and conservation benefits for FMUs across Indonesia, or with a similar tension between protected area regulation, enforcement, and economic incentives. The objectives of the study are: 1. To analyze typical local livelihoods in a village adjacent to a protected area. And, 2. To formulate strategies for providing sustainable livelihoods under protected area management.

2. Study site overview

The study site, Pangkalan Bulian village, is located within the Meranti FMU and Dangku Wildlife Reserve landscape. More generally, Pangkalan Bulian village is located in Musi Banyuasin district, in South Sumatra province (Fig. 2).

Pangkalan Bulian villages covers an area of 554.21 km², with a population of approximately 2526 people (BPS, 2015; BPS Musi Banyuasin, 2015). The village’s 546 households are comprised of 1206 males and 1320 females. Primary livelihood strategies within Pangalan Bulian include plantation forest development, agriculture, palm oil and rubber plantations, as well as kerosene and gas mining. Satellite image analysis in 2016 show the amount of pressure on forests where the remaining forest cover area is about 64% of secondary forest with medium and low density. While the use for agriculture and gardens, especially rubber reached, 16% (Yunardy et al., 2017). This pattern of clearing land for tree plantations, especially rubber and oil palm, is a common driver of deforestation in Sumatra (Miyamoto, 2006; Field et al., 2009; Euler et al., 2017). Beyond these livelihood activities, members of Pangkalan Bulian often use NTFPs for both subsistence and commercial activities.

In Pangkalan Bulian, rattan is gathered and sold as a raw material for producing handicrafts and furniture. Wild rattan growing in MPF covers a total area of approximately 5000 ha. Local people harvest rattan for subsistence and sell it to generate income. Rattan consumers or users are distributed throughout rural and peri-urban areas as well as cities.

In addition to rattan, villagers also sell honey, which provides seasonal employment opportunities. *Apis dorsata* giant honey bees produce honey in *Sialang* trees in most parts of MPF and Dangku Wildlife Reserve (Suhesti and Hadinoto, 2015). There are eight harvesters in the village, each of whom harvests 1–4 *Sialang* trees. Each tree contains 25–120 nests/colonies, while each nest/colony can produce from 20 to 40 kg of honey per season. There can be 2–3 harvests a year depending on seasonal conditions. The number of wild flowers providing sources of nectar has begun to decrease and affect honey production.

Rubber trees constitute a special category of NTFP, as rubber is a major source of income for many rural people in South Sumatra, including villagers in Pangkalan Bulian. The trees produce latex, which local people tap every day from the approximately 500 ha of rubber plantations owned by the community.

Although the harvest and sale of durian provides a viable product from low-intensity forestland use, it is not a feasible alternative for many village members. The 2015 fires that occurred across Sumatra depleted the mature durian trees. Few fruiting trees still remain.

Other types of NTFPs such as *pandanus*, *cikai*, and *tassel*, and bitter charm are found in this village, but are neither abundant nor widely harvested or sold.

3. Materials and methods

Data were collected on the natural, physical, financial, human and social aspects of the community. Using the Sustainable Livelihoods Framework (SLF) (Chambers and Conway, 1992; DFID, 1999), we adopted a combination of qualitative and quantitative methods (DFID, 2001). We collected data using a survey form filled out through two focus group discussions (FGDs) of 10–25 people, 10 individual in-depth interviews, 10 key informant interviews, and field surveys using Community Livelihood Appraisal and Product Scanning (CLAPS) methodologies (Tarigan et al., 2015). We also conducted value chain and market surveys to select NTFPs for study, in order to describe the full range of activities required for bringing products or services from conception, through the intermediary phases of production (transformation and producer services inputs), up to delivery to end consumers (Velde et al., 2006; Kaplinsky, 2000).

Data from the FGDs, key informant interviews and field surveys were analyzed qualitatively using strength-weakness and opportunity-threat (SWOT) analysis. The qualitative data were also analyzed collectively with participants during data collection using CLAPS. According to CLAPS methods, there are five categories of factors that determine superior products: the abundance and distribution, the difficulty level at harvest, the distance from the public, ease of production, and the relationship with the forest management. We scored each of these factors based on information gleaned from our data collection methods. We then used the SLF to analyze local livelihood systems in Pangkalan Bulian, and SWOT analysis to formulate appropriate strategies for improving community livelihoods within a framework of biodiversity conservation.

This study will provide a strategy to promote the most prospective Non Timber Forest Products (NTFPs) that is able to become a bridge between livelihoods and forest conservation based on the local needs (Fig. 3).

NTFPs gave multiple benefits for local people such as daily needs for food, feed, housing materials, etc. (subsistence), reserved assets to harvest when people need cash (savings), and products to sell (generating income). NTFPs are also an important part to implement conservation strategy. According to Law 32/2009 on Environmental Management and Protection, conservation has three main components: protection, preservation, and utilization of natural resources. Besides non-extractive activities (ecotourism, education, etc.), utilization of NTFPs are usually also allowed in protected forest area (see Nurrochmat et al., 2017).

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2 Indonesian – laungkap (*Arenga obtusifolia*).
4. Results and discussion

4.1. Typical livelihoods of communities living adjacent to protected areas

Protected area and community livelihood linkages are based on internal and external factors that impact community socioeconomic activities (Stone, 2013). In this regard, DFID (1999) suggested that internal factors refer to the context of livelihood capital assets including human, natural, physical, financial, and social capital; and external factors affecting livelihoods are the vulnerability contexts in which households live, including the dimension of exposure to external shocks, stresses, and risks, and the dimension of defenselessness.

A community living adjacent to the MPF and Dangku Wildlife Reserve landscape in Pangkalan Bulian provides the context on which this study’s discussion focuses. In general, households in the study area have been engaged in farming, hunting, fishing, and in many cases artisanal kerosene mining. Rubber crops are a predominant livelihood source for the community. However, findings from this study reveal earnings from rubber crops are in decline, with unstable prices driving this trend. There are no farmer groups or cooperatives in the village, and as consequence individual farming households often have no alternative but to accept whatever prices are offered by middlemen or factories for their raw product (latex).

This study adopted qualitative variables from Mahdi and Schmidt-Vogt (2009), including human capital assets determined using labor and education variables; natural capital assets using forest resource and land variables; physical capital assets using irrigation infrastructure, road infrastructure, farming inputs, and processing variables; financial capital assets using cash income, credit and tax subsidy variables; and social capital assets using equity and institutional participation variables.

4.1.1. Internal factors: livelihood assets

We analyzed and interpreted the data collected through CLAPS surveys, focus group discussions, household interviews, key informant interviews, and secondary data in light of a community capital framework (Fig. 4, Table 2).

Human capital assets were relatively low. Currently, village members receive some income from rubber and kerosene, and there are a few personal money lending services (tauke). Primary income sources are primarily from natural resource extraction and harvest, including rubber and traditional kerosene mining. Some people work on a seasonal basis, crafting rattan and harvesting honey. Some additional capital is obtained from investors, more often than not these investors are certain families in the village who act as brokers. Poor households in the village have little access to education. Although some local institutions provide scholarships and skills training for children, however
their scope is extremely limited.

Most villagers only being educated to elementary school level and none having attended higher education. The community is also vulnerable to health issues because of its exposure to unhealthy environmental conditions, and the threat of smoke from forest fires that now break out almost every year. The village has only one midwife and two traditional healers, and has no community health center.

Natural capital is relatively high. Diverse resources in the village include forest products, including fruits and vegetables, medicines, honey, and wood for building. Land ownership levels are very low. Much of the land surrounding the village is classified as state forest and is managed by large companies granted concessions by the government. Local people are only allowed access to harvest NTFPs. There are seven dominant NTFPs available for harvest: rattan, sialang honey, cikai, tassel, pandanus, bamboo and pasak bumi. Based on the CLAPS method, rattan is NTFP with the highest score (Table 3).

Table 3
CLAPS Score (NTFPS Product).

<table>
<thead>
<tr>
<th>No</th>
<th>NTFPs</th>
<th>Criteria</th>
<th>Final score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rattan</td>
<td>a 3 b 3</td>
<td>15</td>
</tr>
<tr>
<td>2</td>
<td>Sialang Honey</td>
<td>a 3 b 3</td>
<td>14</td>
</tr>
<tr>
<td>3</td>
<td>Cikai</td>
<td>a 3 b 3</td>
<td>13</td>
</tr>
<tr>
<td>4</td>
<td>Tassel</td>
<td>a 3 b 3</td>
<td>13</td>
</tr>
<tr>
<td>5</td>
<td>Pandanus</td>
<td>a 3 b 3</td>
<td>13</td>
</tr>
<tr>
<td>6</td>
<td>Bamboo</td>
<td>a 3 b 3</td>
<td>13</td>
</tr>
<tr>
<td>7</td>
<td>Bitter Charm</td>
<td>a 3 b 3</td>
<td>11</td>
</tr>
</tbody>
</table>

Note: a: Abundance and distribution of product, b: Relative difficulty of harvest, c: Distance from population center, d: Ease of propogation, e: Alignment with forest conservation and current management strategies.

In terms of social capital assets (Bebbington, 1999), the village was once a population center during the Sriwijaya dynasty, a history that has influenced governance and livelihood systems as well as other activities. Our data collection indicate a high level of local pride which has in

4.1.2. External factor: forest management context

Forestry Law No. 41/1999 provides for the establishment of Forest Management Units (FMUs) to facilitate the preservation of forest areas as permanent forests as a basis for sustainable forest management. In addition, FMUs were developed as a strategic solution for conflict resolution (Baplan, 2006; Kartodihardjo, 1998; Kartodihardjo, 2011; Kartodihardjo et al., 2011), and as a key element of forest governance reform for managing and reforming the domestic forestry sector, and embracing REDD+ and related initiatives (Kim et al., 2015; Sahide et al., 2016).

Under Law 23/2014 on Regional Governance, which came into effect in 2016, forestry sector governance is shared between central and provincial governments. Under this regulation, the authority to establish FMUs will remain with the central government; however, authority over management has shifted from the district to the provincial level. In this regard, authority over forest management relates mainly to FMUs. However, Steni (2016) reveals that there are no fundamental changes regarding licensing regimes in the new regional governance law. For example, business permits for non-timber forest product utilization remain under Ministry of Environment and Forestry (KLHK), provincial
and district/municipal government authority.

Conversely, referring to Minister of Home Affairs Regulation 61/2007 on Technical Guidelines for Managing the Finances of Public Service Agencies, FMUs can implement the Sub-National Public Service Agency Financial Management Scheme (PPK-BLUD). Even though this is relatively new, production forest and protection forest FMUs with a regional government agency (SKPD) or regional technical implementation unit (UPTD) status may apply the PPK-BLUD scheme to the management of their finances (Ministry of Forestry, 2013). Thus, FMU management is not necessarily a “one-size fits all” policy, but rather, it varies from location to location and over time.

4.2. Strategies for ensuring sustainable livelihoods in protected areas

4.2.1. Promising NTFPs in the protected area: Rattan

Stone (2013) recognizes the crucial role NTFPs can play in livelihood development and resource conservation in the context of a protected area such as the MPF Dangku landscape. In this case, rattan is a promising local NTFP, the utilization of which has great potential for individuals and groups in respect to the ecological and social aspects of protected area management.

Rattans include over 600 palm species that grow through and over other vegetation (Hirschberger, 2011) in wet tropical forests (Janumiro, 2000), including the intact forest in MPF. Rattan, as a product derived from these climbing palms, has a relatively high commercial value. In addition to being a source of foreign exchange, it is exploited as a livelihood source for surrounding communities.

Table 4 presents the results of a value chain survey on the contributions of different rattan species for collectors in Pangkalan Bulian. Using CLAPS, priority products were selected by assigning scores to NTFPs available in the village based on several criteria including: their abundance and distribution, levels of difficulty involved in their harvest, their distance from the village, their ability to reproduce, and their relationship with prevailing forest management.

Indonesia produced 26,854 tons of rattan in 2013 (MoF, 2014), and Indonesia is the world’s largest rattan producer, currently producing an estimated 80% of the raw materials used in rattan products (Myers, 2015). Indonesia’s market share of rattan production has increased consistently, from 14% in 2006, to 69% in 2010 (UN Comtrade, 2018).

South Sumatra is one of the areas with a high abundance of rattan species. According to the South Sumatra Forestry Office (2015) the highest percentages of rattan are found in permanent production forest (47%), natural forest (23%) and protected areas (14%). Nearly 90% of rattans in Indonesia are found in natural forests where harvesting remains limited (Myers, 2015). This indicates that with the rattan growing in South Sumatra – which amounted to 120,586 tonnes in 2015 – opportunities remain for developing rattan industries. There are currently around 400 rattan crafts’ persons in South Sumatra with each SME having a furniture production capacity of 10 units every 5 days. These are located in all districts in South Sumatra and involve 601 households – 546 of which produce for personal use while 55 produce for sale – harvesting rattan in forest estate areas (BPS, 2014).

Rattan processing in Indonesia involves around 297 species (9 genera) (Witono, 1999). Fifty of these species have economic value (Hermansjah, 1982), but only 10 are found in Pangkalan Bulian village (Table 4). Of these ten species, four are currently being harvested and sold.

Value chain analyses have emerged in the new research agenda for NTFPs (Jensen, 2009). Entrepreneurship and innovation by actors in the market for NTFPs cannot be fully understood without a proper understanding of the position and behavior of actors in the NTFP value chain (Velde et al., 2006).

Our research indicates that rattan from Pangkalan Bulian passes through several different hands before ultimately arriving in those of the end consumer (Fig. 5).

Further, we find that the more stages passed along the value chain, the higher the price of the end product (see Table 4). Profit margins at each stage are around 25–30% (calculated using full costing). This indicates an opportunity for the community to increase its profit margin by processing rattan directly on a larger scale rather than using traditional methods.

The lengths of value and supply chains in rattan businesses are influenced by rattan’s characteristics. Rattan grows naturally in forests and in villages that are often difficult to access using transport. This affects rattan harvesters’ ability to access markets that are typically located in cities. Transport costs make selling rattan cost prohibitive with the quantities of supplies involved. Harvesters, who gather NTFPs in protected forest areas, are the people most instrumental in forming rattan trade or marketing chains. In Pangkalan Bulian, five harvesters began doing so in 2014, with a harvest coordinator providing a boat for transportation.

According to Myers (2015), communities often consider rattan harvesting to be an alternative employment for supplementing income. However, the viability of rattan production across Indonesia, and specifically in Pangkalan Bulian indicate an opportunity to expand the contribution this NTFP makes to local livelihoods. This expanded contribution can promote less intense forest uses over those uses that are more intensive and deleterious.

Collectors are individuals or groups of people who buy harvested rattan and sell it. Collectors can be found at the village, sub-district, and district levels and they may operate across district, province, or islands. Collectors operating from the district capital, Sekayu, include inter-island traders, who supply rattan to Cirebon in West Java or to medium-scale furniture producers in Lubuk Linggau and Prabumulih in South Sumatra.

Rattan entrepreneurs in Indonesia are often involved with the Indonesian Rattan Furniture and Handicraft Association (AMKRI) and/or the Indonesian Furniture Association (ASMINDO) as well as with the

<table>
<thead>
<tr>
<th>No</th>
<th>Local name</th>
<th>Scientific name</th>
<th>Village collectors</th>
<th>Sub district collectors</th>
<th>District collectors</th>
<th>Industries in Java (IDR per quintal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sega Air&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Calamus exitis Griff</td>
<td>–</td>
<td>–</td>
<td>120,000</td>
<td>600,000</td>
</tr>
<tr>
<td>2</td>
<td>Mangan&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Korthalsia echinometra Beccari</td>
<td>–</td>
<td>–</td>
<td>110,000</td>
<td>700,000</td>
</tr>
<tr>
<td>3</td>
<td>Semambu&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Calamus scipionum Loure</td>
<td>–</td>
<td>–</td>
<td>110,000</td>
<td>700,000</td>
</tr>
<tr>
<td>4</td>
<td>Sega Punh&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Calamus hordeusis Bl.</td>
<td>–</td>
<td>–</td>
<td>130,000</td>
<td>750,000</td>
</tr>
<tr>
<td>5</td>
<td>Getah</td>
<td>Daemonomorpus rubra Mart.</td>
<td>50,000</td>
<td>150,000</td>
<td>200,000</td>
<td>600,000</td>
</tr>
<tr>
<td>6</td>
<td>Senti/Peledas</td>
<td>Calamus javensis Bl.</td>
<td>150,000</td>
<td>300,000</td>
<td>330,000</td>
<td>1,000,000</td>
</tr>
<tr>
<td>7</td>
<td>Lacak</td>
<td>Calamus crinatus Bl.</td>
<td>150,000</td>
<td>300,000</td>
<td>340,000</td>
<td>1,200,000</td>
</tr>
<tr>
<td>8</td>
<td>Selinit</td>
<td>Calamus optimus Becc.</td>
<td>250,000</td>
<td>400,000</td>
<td>500,000</td>
<td>2,000,000</td>
</tr>
<tr>
<td>9</td>
<td>Manau Φ &gt; 3.3 mm&lt;/sup&gt;</td>
<td>Calamus manan Misqel</td>
<td>–</td>
<td>7500/bail</td>
<td>13,000/bail</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Manau Φ &lt; 3.3 mm&lt;/sup&gt;</td>
<td>Calamus manan Misqel</td>
<td>–</td>
<td>11,000/bail</td>
<td>17,000/bail</td>
<td></td>
</tr>
</tbody>
</table>

All prices are in Indonesian Rupiah (IDR) and come from primary research in 2016 (USD 1 = IDR 13,361 according to the foreign exchange rate of Bank of Indonesia (Indonesian Central Bank).

* Pangkalan Bulian rattan species not harvested or sold.
From the SWOT analysis, we determined strengths versus weaknesses (SW), as well as opportunities versus threats (OT), for increasing rattan production by matching and converting internal and external factors (Table 5).

The SW strategies are aimed mainly at those characteristics found in the case study that indicate advantages and disadvantages over others, providing a possible internal strategic planning framework. Meanwhile, the OT strategies principally try to determine elements in the environment that could be advantageous or cause trouble in terms of an external strategic planning framework. Finally, the SW and OT strategies were combined into a complete strategic planning framework by taking both internal and external factors into consideration.

Livelihoods are considered sustainable if they can respond to and recover from stresses and shocks and maintain or enhance capabilities, assets and activities, both now and in the future, without damaging natural resources (Tarigan et al., 2015). Based on the SWOT analysis and Sustainable Livelihoods Framework (SLF) outcomes, we propose a strategic planning framework for NTFP enterprises in the village that focuses on clarifying internal strength-weakness strategies and external opportunities with biodiversity conservation and livelihoods as its comprehensive targets.

The essential focus of many rural livelihood development policies are the institutions, rules and customs, land tenure, markets and state agencies (Bebbington, 1999). Rules and support programs can encourage community development, while changing livelihood strategies can mean that households, in response to changes in the natural resource management context, increasingly search for non-agricultural sources of income and gain more direct access to capital assets (Mahdi and Schmidt-Vogt, 2009).

Developing rattan processing businesses is essential for shifting villagers’ habit of harvesting and selling raw materials. Harvesters should be directed toward creating small industries to shorten the supply chain, and to start cultivating rattan. This would prevent raw material shortfalls, destruction of natural forest, and any conflicts with forest conservation interests as happened in the Lambusango Forest Reserve on Indonesia’s Buton Island (Widayati and Carlisle, 2012).

There are many opportunities for providing added value along the value chain. Alternatively, the value chain could be shortened in order to increase profit margins. The way to do so is for villagers to produce rattan products themselves using the cane they harvest. Previous research has found that farmers who participate in downstream value chain activities for small and medium enterprise furniture businesses provide an increased amount of raw material for furniture production (Erbaugh et al., 2016). Should this finding hold for rattan processing in Pangkalan Bulian, village members may benefit from an increase in rattan processing and thus be incentivized to harvest or propagate rattan.

For the Pangkalan Bulian village to increase rattan production, we suggest the following: 1) FMUs and the community rehabilitate rattan plants to ensure a sustainable supply of raw materials. Rehabilitation is carried out while maintaining existing trees in protected forests. This is what made the difference with agroforestry systems (García-Fernández and Casado, 2005). In this process, only the enrichment of rattan species is carried out while maintaining the natural condition of the protected forest without damaging the existing ecosystem structure. In addition, the rattan types will be endemic species that are fast growing.

Ministry of Environment and Forestry, Ministry of Cooperatives and SMEs and the Ministry of Industry and Trade at the district, provincial and national levels. The community could join these associations in order to scale up its business.

Indonesia’s rattan industry is centered in Java, though raw materials come from islands outside Java (Myers, 2015). Destinations for the inter-island rattan trade are Java (57%), Makassar (31%), and other regions (12%). Statistical data show the trade in rattan from Kalimantan has fallen since 1995, to only around 291,992 tons (0.13%). The demand is currently met with rattan from Sulawesi at 193,955,984 tons (99.60%) and other regions at 471,663 tons (0.83%). The highest area for sales is Surabaya at 192,540,661 tons (98.97%), Jakarta 1,364,319 tons (0.7%), and other areas 814,659 tons (0.33%) (Januminro, 2000).

Indonesia exports raw and semi-finished rattan to Hong Kong, Taiwan, Singapore, Italy, South Korea, the Netherlands and Spain. The main export destinations for finished products are Japan, USA, Taiwan, Singapore, Korea and Hong Kong (Agus, 2001). Global market demand for raw rattan in 2006 was approximately 1.64 million tonnes (Setara Foundation, 2011).

Professional institutions, such as employer associations, research organizations, and governments have yet to address individuals who harvest rattan. Our analysis indicates that policies to support the commercialization of rattan would also need to be tailored to each stage of the value chain (Velde et al., 2006). Growth-based poverty reduction approaches have focused on the private sector, and particularly on small and medium enterprises, such as those involved in rattan chains (Tieguhong et al., 2015).

4.2.2. Livelihood strategies for the protected area

From the SWOT analysis, we determined strengths versus weaknesses (SW), as well as opportunities versus threats (OT), for increasing rattan production by matching and converting internal and external factors (Table 5).

The SW strategies are aimed mainly at those characteristics found in the case study that indicate advantages and disadvantages over others, providing a possible internal strategic planning framework. Meanwhile, the OT strategies principally try to determine elements in the environment that could be advantageous or cause trouble in terms of an external strategic planning framework. Finally, the SW and OT strategies were combined into a complete strategic planning framework by taking both internal and external factors into consideration.  

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<table>
<thead>
<tr>
<th>Scheme 1</th>
<th>Scheme 2</th>
<th>Scheme 3</th>
<th>Scheme 4</th>
<th>Scheme 5</th>
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<tbody>
<tr>
<td>Harvester</td>
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<td>Village collector</td>
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<td>Traditional Craftsman</td>
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<td>Sub district collector</td>
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<td>Large-scale industry in Java</td>
<td>Large-scale industry in Java</td>
<td>Small-scale craftsman in South Sumatra</td>
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<td>Traders in all areas of Indonesia</td>
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Fig. 5. Rattan value chain schemes.
and can be used as a processed material (Peters et al., 2013); 2) improve the quality and technique of harvesting. The harvesting technique gives stronger adverse effects on understory vegetation density, including tree saplings and seedlings (Widayati and Carlisle, 2012). Besides that, the quality of processed products must meet consumer standards; 3) establish partnerships with third parties (banks and investors) for financial/venture capital support to increase capacity (to this end, work plans and feasibility studies will be necessary before submitting any proposals) (Moktan et al., 2016); 4) increase business management capacity to become more efficient and effective (Scheba and Mustalahlit, 2015); and 5) hold stakeholder business meetings with manufacturers, financiers, processors, and traders/retailers. Such steps would improve conservation, as well as the utilization and preservation of genetic resources (Kalima and Jasni, 2010).

5. Conclusion

To ensure local well-being while promoting forest conservation, an appropriate balance of regulation, enforcement, and incentives are required to promote conservation agendas and local livelihoods. The Dangku Bentayan conservation FMU has experienced rapid forest cover loss over the past decade. Overlapping claims have made it difficult for regulation and enforcement to enforce only indirect or low-intensity forest uses. This research investigates possible economic alternatives for incentivizing low-intensity and non-deleterious forest use for community members living in the conservation landscape. Through the careful investigation of economic alternatives, we find that rattan may provide a low-intensity, non-deleterious forest use option for people and communities adjacent and within the Dangku Betayan conservation FMU.

Rattan collection and production promotes low-intensity, non-deleterious forest use that contribute to promoting low-intensity, non-deleterious forest use that yields a high-value NTFP for members of Pangkalan Bulian village. Rattan is readily available, and its collection materials are in plentiful supply and are relatively accessible to the community. Factors supporting the choice to process rattan are villagers' processing capacity and a high market demand for rattan products.

The study discusses value chains, market potential and the possible business opportunities afforded by adding value at each point along the value chain. Several comprehensive strategies are discussed, with collectors expected to switch immediately to become rattan processors as well as collectors. Strategic steps to take include FMUs and the community rehabilitating rattan plants to ensure sustainable raw material supply; improving the quality and quantity of products; building partnerships with banks and investors for venture capital support; making business management more efficient and effective; and marketing through business meetings with manufacturers, financiers, processors, traders and retailers.

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