



Curbing wildlife trade towards biodiversity conservation in Cabadbaran Watershed and Forest reserve in Caraga Region, Philippines

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Abstract

Wildlife trade is generally practiced in the uplands where economic activities are largely dependent on natural resources. The wildlife trade is mainly to supply the demands for exotic food, pets, and for business. To discourage wildlife trade, sustainable livelihood options are recognized to curb the practice. In the Cabadbaran Watershed and Forest Reserve, the landscape is basically forestlands, where wildlife abounds, therefore, illicit trade is rampant. However, aside from wildlife trade, agriculture is regarded as the major source of livelihood among the residents. Abaca (*Musa textilis* Nee) production has been the major source of income for the residents and is recognized as a sustainable livelihood option in the site. Cocoa (*Theobroma cacao* L.) farming is another promising livelihood alternative since its production fits in with the criteria for sustainable livelihood identification. Rainforestation is seen to be another viable livelihood alternative in the uplands since it is compatible with the needs, existing livelihoods, organization, social structure, gender differences and roles, and culture of the people. It is a technology developed utilizing the existing forests as a source of livelihood by integrating economic activities such as mushroom production, fruit tree growing, and ornamental gardening. The identified livelihood alternatives are recognized to improve the way of life in these areas. Moreover, hand-holding and mentoring from the academia, government and non-government organizations to promote sustainable development is viewed to heighten the awareness of the upland dwellers on wildlife conservation.

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Introduction

Wildlife trade is a multibillion-dollar industry involving the trade of any organism, including fungi, plants, and animals sourced from the wild (UNODC, 2020). On the global scale, it involves an estimated 31,500 species of terrestrial birds, mammals, amphibians, and reptiles. This prohibited business is driving species toward extinction. In the whole spectrum of the wildlife trade, the participation and practices of the wildlife hunters and harvesters are generally overlooked. These hunters and harvesters live in the forest margins and other biologically-diverse ecosystems, allowing them to have a closer link with the wildlife. The illegal wildlife trade generally originates in areas where there is a high poverty incidence, particularly in rural areas where economic activities are largely dependent on natural resources (Robinson *et al.*, 2018). Wildlife hunting in the uplands has been a practice for the upland dwellers for food. However, with enterprising individuals recognizing the opportunities to make money out of the wildlife species, hunting and harvesting wildlife become extensive. Wildlife trading has turned into a significant source of cash, particularly among the low-income groups in geographically isolated areas where there are few livelihood opportunities (Roe, 2008).

To curtail the harvesting of wildlife species for trade, rural development is recognized as a viable alternative by providing sustainable livelihoods to communities. The provision of employment discourages the rural folks to hunt wildlife which eventually stops them from engaging in the wildlife trade. Hence, assessment of livelihood options using the Sustainable Livelihood Assessment (SLA) Framework in areas known for poaching and illegal wildlife trade is the first step to solving this offense. The results will provide recommendations and identify sustainable livelihood strategies for future investments. The livelihood assessment identifies gaps in essential socio-economic services closely associated with income generation to curb the illegal wildlife trade in Cabadbaran Watershed and Forest Reserve and reduce the dependence on the wildlife trade.

Material and methods

Conduct the sustainable livelihood assessment

A survey, key informant interviews, and focus group discussions (FGDs) were conducted to assess the current livelihood status in the Cabadbaran River Watershed and Forest Reserve, located in the Province of Agusan del Norte, Caraga Region, Philippines. Snowball sampling was used in the identification of the wildlife trade actors in the wildlife supply chain in the Caraga Region. This sampling technique was used to trace and carefully approach the respondents, considering their connection to the prohibited wildlife trade.

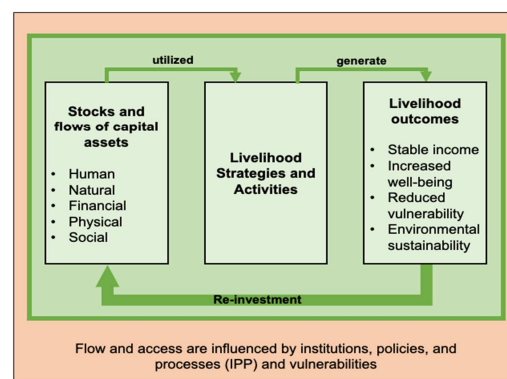


Fig. 1. SLA Framework showing the structure of how livelihoods are designed

The sustainable livelihood assessment (SLA) is patterned on the framework shown in Fig. 1. This covered the aspects related to the socio-economic activities of the residents in the sites and the natural resources utilized for livelihood in the project sites. The assessment focused on the stocks and flows of capital assets, livelihood strategies and activities, and livelihood outcomes. The data were then consolidated and analyzed using appropriate statistical tools.

From the findings of the SLA, recommendations for sustainable livelihoods are shared with the government agencies and local governments as the basis for comprehensive development planning. The recommendations for sustainable livelihood options build on existing livelihood interventions provided by the various organizations/donors/ local government by identifying enabling factors and challenges in terms of the essential services available to support livelihood development for the target villages.

Results and discussion

Understanding the wildlife trade at cabadbaran river watershed and forest reserve

The Philippines subscribes to the deterrence of illegal wildlife trade for ecological reasons and has been actively involved in curbing such trade at the grassroots. Reports on illegal wildlife trade in the Cabadbaran River Watershed and Forest Reserve identified the villages of Mahaba and Puting Bato in

Cabadbaran, a newly established city in Caraga Region, as the major sources of wildlife products. Fig. 2 shows the distribution of wildlife trade actors in the two villages, based on their roles in the trade. In a household, not only one member is involved in wildlife-related activities such as hunting/ poaching and trading. The actor in the wildlife trade gets help from his/her household members in harvesting and selling wildlife products.

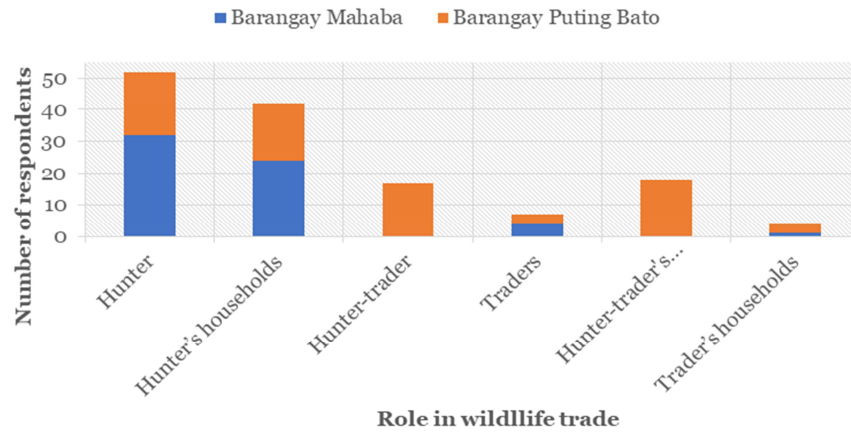


Fig. 2. Distribution of respondents regarding the illegal wildlife trade in Caraga Region

The hunters and the hunter-traders on the site have generally low economic benefits from the sales of wildlife species and products (Fig. 3). The estimated income from the transaction on an annual basis range only from USD 274.04 to USD 916.67. The traders get the highest income level among the players in the wildlife trade, generating an annual income from wildlife sales at more than USD416.67. Across

respondents, the income derived from wildlife hunting/poaching and trading is less than USD416.67 per year. Remarkably, the hunters earn less than USD 125 a year on average. However, for people living in the uplands, the money earned from wildlife species and products is substantial to provide for some of their basic needs.

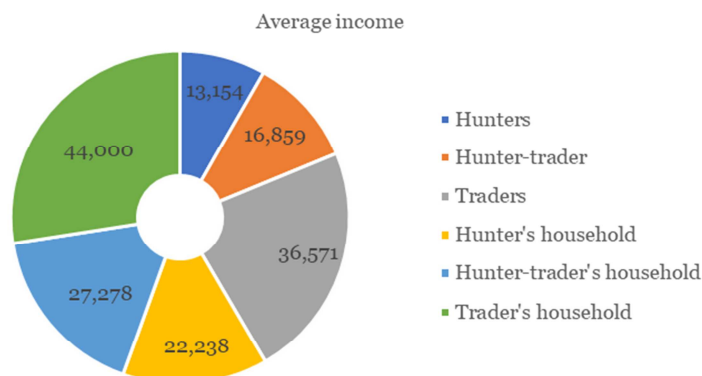


Fig. 3. Average income (in Philippine Peso) of the actors in wildlife trade in the Cabadbaran River Watershed and Forest reserve

Criteria for assessing livelihood options

The critical part of assessing livelihood options is the identification of possible livelihoods that households/communities can engage in for them to leave the illegal trade of wildlife. Thus, different criteria were laid down to assess the different livelihood options. The questions in the surveys were framed to give a picture of the agricultural, forestry-based or tourism-based livelihood opportunities and constraints. These include: a) building on and enhancing the existing livelihood strategy; b) diversifying the current livelihoods; c) providing alternative livelihood strategies; d) maintaining the existing livelihood strategy.

According to the Sustainable Livelihood Approach, the key criteria to assess the available and potential options include the social feasibility which considers compatibility with the needs, existing livelihoods, organization, social structure, gender differences and roles, and culture. The second is technical feasibility which evaluates using parameters such as management intensity, technological complexity, risk level, and economics. The support infrastructure and enabling policy environment is likewise important in identifying feasible livelihood alternative. The fourth criterion is market feasibility which examines the value chain to identify opportunities, constraints, barriers to entry. The long-term sustainability plan should be considered to see if the local stakeholders are capable to sustain their livelihoods even after the termination of the technical assistance and external funding support.

Livelihood assessment in mahaba and puting bato within the Cabadbaran watershed and forest reserve

The majority of the population covered by the Cabadbaran River Watershed and Forest Reserve (CRWFR) is dependent on agricultural production as the main source of livelihood. A small proportion of the population is dependent on forestry using non-timber forest products for livelihood and engaged in forestry using timber forest products (CSPL SEAMS, 2018). Of the residents, the majority joining the labor force are aged 15-64 years. Livelihood projects were

given to registered people's organizations (POs) in the area such as: Kooperatiba sa Katawhan sa Mahaba para sa Kalambuan (KKMPK), Mahaba Tribal Organization (MaTO) and Mahaba Mamanwa Indigenous People's Organization (MAMAMIPO).

On the income among households in the CSPL, only 0.03% earned USD 104,166.67–USD 838,708.33 annual household income. In Mahaba and Puting Bato, USD 2,083.33–USD 4,166.65 annual household income is reported by most of the respondents. The highest annual revenue is from agriculture, with total annual revenue of USD30,710. The livestock/poultry raising earned USD6421.56 annual revenue, forestry (nontimber forest product) earned USD 3,565.77 while forestry (timber forest product) generated USD 1989.98 annual revenue. While agriculture is regarded as the major source of livelihood in Mahaba and Puting Bato, the farming system employed is swidden farming with sweet potato and banana as the primary crops (ILO, 2010). In 2012-2014, a government project of the Fiber Development Authority (FIDA) to improve the abaca production in Mahaba and Puting Bato was implemented. This project has been a source of income for the farmers for supplying abaca fiber in nearby markets.

Sustainable livelihoods based on abaca production

Abaca (*Musa textilis* Nee) is one of the export crops of the Philippines because of its wide range of uses. It is regarded as an industrial crop and an important source of employment in rural areas. As an export crop, it brings foreign exchange earnings to the Philippines. Abaca is an indigenous plant species in the Philippines, and is well suited in areas near forested lands since exposure to intense sunlight in open land causes the slow growth of the plants during the first three years. In Caraga Region, abaca is generally planted as intercrop to Falcata (*Falcataria falcata* (L.) Greuter & R. Rankin). Falcata has small leaves, which are suited to provide only partial shading to abaca. Overshading of abaca can result in etiolation as plants tend to reach out to light and can cause weakening of the fiber.

Table 1. Local benchmarking, abaca farming: typical vs. good (in Philippine Peso or PhP per hectare)

| Parameters* | Typical farm | Good farm | GAP |
|--|--------------|-----------|--------|
| Average yield per ha (kg) | 667 | 1,334 | 667 |
| Peak yield per ha (kg) | 750 | 1,700 | 750 |
| Average establishment cost per ha (Year 1) | 38,295 | 68,045 | 29,750 |
| Average cash outflow per ha per year (PhP) | 22,610 | 51,930 | 29,320 |
| Price per kg (farmer's selling price) | 60 | 60 | 0 |
| Average cash inflow per ha per year (PhP) | 36,000 | 86,400 | 50,400 |
| Average net cash flow per ha per Year (PhP) | 13,390 | 34,470 | 21,080 |
| Average Area to get preferred net income of Php 94,000 (poverty threshold, 1st half 2012) (ha) | 7.02 | 2.73 | 4.29 |
| Average cost per kg (PhP/kg) | 37.68 | 36.06 | 1.62 |
| Payback period (years) | 5.22 | 4.03 | 1.19 |
| IRR (percent) | 39 | 44 | 5 |

*Years 2-10 are considered in the average values

Source of basic data: Actual farmer's field and Abaca Technoguide

Source: The Philippine Abaca Industry Roadmap 2018-2022

The essential information that is needed in abaca farming is on the potential returns of investment. In Caraga Region, the Fiber Industry Development Authority (FIDA) has provided this basic data as a reference. As shown, the average yield per hectare is 667 kg for a typical farm and a farm adopting Good Agricultural Practices (GAP). In a Good Farm, the yield is higher at 1,334 kg/ha. The Internal Rate of Return (IRR) is 39% for a Typical Farm, 44% for a Good Farm, and only 5% for a farm adopting GAP.

In terms of yield per hectare, Northern Mindanao has the highest yield with 1,255.2 kilograms per hectare, followed by ARMM with 981.6 kilograms per hectare. This shows the potential of the area for abaca production. Exports of abaca fiber averaged 9,841.4 MT per annum from 2006 to 2015. Europe (mainly Germany and UK) is the key destination of the Philippines' abaca fiber. The Japanese market is the second most crucial destination. Japan continued to influence abaca trade in the region accounting for the biggest market of 3,651 MT or 37 percent of the 5,000MT annual average Asian imports.

New abaca product innovations

As innovative product development continues to rise due to the demands for biodegradable and green products, the use of abaca to replace materials that

can harm the environment has expanded. Using abaca leads to innovations toward exploring methods to address socio-economic and environmental issues. Thus, the abaca fiber is used as teabags, tea cloth, novelty items, meat casing, grocery bags, and many other uses. The concepts and designs in product development are aimed to produce environmentally sound, renewable, and sustainable materials. According to a report on the Present Directives for Product Development, the leading contenders for replacing wood and glass fibers are leaf fibers that include abaca.

This shift towards innovative product development using green materials is another potential for abaca. Studies at the Department of Science and Technology-Industrial Technology Development Institute (DOST-ITDI), in collaboration with the Korea Institute of Materials Science (KIMS) have shown that the locally-sourced abaca fiber composites reduce the weight of automotive parts by about 60 percent. The lower density saves nearly half the energy consumed by conventional tricycles made of GI sheets and metal. The abaca composite also absorbs impact much better than metals. Hence, most interiors of more than 80 percent of cars worldwide are made of natural fiber composites.

Abaca typically grows better in mountainous areas in association with various forest species. Presently, abaca is grown in monoculture in secondary forests and under coconut plantations. It is the source of cash income for upland households with abaca as a cash crop together with various subsistence crops (Lacuna-Richman, 2002). This makes abaca a suitable crop for integration in the reforestation farming system and in Falcata-based agroforestry system in the uplands of Mahaba and Putting Bato (Gregorio *et al.*, 2020; Hutler *et al.*, 2003). Abaca and Falcata agroforestry system can create a diversified multi-storey ecosystem that reduces soil erosion and the disturbance of the natural soil nutrient dynamics. The integration of abaca in the reforestation farming system will be the basis for transforming the subsistence level monoculture into a community-based reforestation farming that assumes the natural ecosystem dynamics of an agriculture-forest ecotone. Thus, abaca production has the potential to provide a sustainable livelihood option to the upland dwellers aside from rehabilitating the degraded uplands.

Cocoa production for sustainable livelihood option

The production of cocoa (*Theobroma cacao* L.) in Caraga Region has gained momentum in recent years due to the Department of Agriculture program promoting cocoa as a high-value crop. Cocoa is identified as a crop to be incorporated in the National Greening Program (NGP) of the government. The Bureau of Soils and Water Management (BSWM) identified the areas of Mahaba and Putting Bato in Cabadbaran as highly suitable areas for cocoa production. Identified as a crop for re-greening the Philippine uplands and as the source of livelihood under the Community-Based Forest Management Agreement (CBFMA), the maintenance of cocoa nursery and planting of cocoa in both monoculture and agroforestry systems can be a sustainable livelihood for the people.

In addition to the government's program on cash-for-work in tree planting and tending of the newly planted trees under the NGP, nursery and seedling production can promote food security in the area. Although cocoa production is a new project,

there is vast potential for the cocoa industry in the area. The government, through the Department of Agriculture (DA), Department of Science and Technology (DOST), and the Department of Trade and Industry (DTI), has initiated the support system for cacao production. The DOST has a program that links the cacao growers to technology providers in making use of the cacao beans for high-end products such as chocolate, cosmetics, and nutraceuticals. The DTI has provided training on entrepreneurship and led the cacao growers to the markets, both local and international. The Caraga State University (CSU) is also providing support to the cacao farmers in the primary processing of cacao by developing farm machines such as the cacao fruit opening device and cacao seed dryer. The processing of cacao beans can improve the sustainability of the local cacao industry in Caraga Region.

Agro-ecological and cultural tourism

The Caraga Region is home to several tribal groups, representing 34.7% of the region's population. The Manobos have an enormous population among the ethnic minorities, found in Agusan del Sur and Agusan del Norte. Other cultural groups in the region with a significant population were the Kamayo, Higaonon, Banwaon, Umayamnon, Kalagan, and Mamanwa. The indigenous peoples are also dwelling in the Cabadbaran River Watershed and Forest Reserve. They have been considered in the tourism programs that promote culture and agro-ecological ventures. The culture of the indigenous peoples in the Cabadbaran River Watershed and Forest Reserve is an excellent addition to the already-known tourism packages in the locality, such as the ancestral houses and archeological artifacts that unveil Cabadbaran's historical journey. The cultural dimension of the city's tourism is matched with the mesmerizing landscapes of the designated Cabadbaran-Santiago Nature Park. The City Tourism Office has included in its tourism packages nature-based adventures such as trekking to the pristine sceneries, cool dips, and splashes in the mountain lakes and waterfalls in Mahaba and Putting Bato. The upland dwellers can gain employment as tour guides and for their projects aligned to the theme of agro-ecological and cultural tourism of the region.

Strengthening support system for the sustainable livelihood opportunities to curb wildlife trade

The Cabadbaran Watershed and Forest Reserve, although a haven for species richness, is under threat of ecological degradation. The major threats facing the CSPL range from environmental, socio-cultural, economic, and institutional complexities. The environment faces watershed degradation, biodiversity loss, and water pollution resulting from the needs of people to survive. The locality also faces issues such as unsustainable livelihood endeavors, and the indigenous people who are rightsholders of the ancestral domain title are selling their rights to outsiders or migrants to the community. The Protected Area Management Board (PAMB) has been organized to oversee the planning for developing the newly created natural park, thus still lacking empowerment as to their duties and responsibilities. The PAMB needs more training and educational activities to truly perform its mandates. Budget insufficiency and overlapping tenurial instruments are also among the problems in Protected Area Management.

Thus, to achieve the goals of conserving the resources in the CSPL, the fundamental management strategies are: a) management zoning; b) climate change adaptation and disaster risk reduction mainstreaming; c) collaborative management; d) community-based resource management; and e) sustainable financing mechanisms. To improve the management of the new CSPL nature park, development programs have been outlined. These include: a) Policy Development Program; b) Capacity Development Program; c) Livelihood Development Program; d) Climate Change Adaptation Development Program; e) Research and Development Program; and f) Information Management Program. The CSPL covers total land coverage of 19, 199 hectares, where 11, 601 hectares is opens and closed forest demarcated and delineated for Strict Protection Zone. The remaining 7, 598 hectares is for Multiple Use Zone, distributed unevenly for shrubland, grassland, perennial crops, wooded grassland, and inland water.

The full-swing implementation of the CSPL Management Plan is the key to curbing the illegal wildlife trade in the area. When the livelihood development component of the CSPL will be supported by both the government and non-government organizations to fully implement the program, the dependence of the locals on wildlife trading as a source of additional income will be reduced, if not stopped. The DENR, DSWD, NCIP, and the LGUs of Agusan del Norte, Cabadbaran City, and Santiago must pursue the implementation of the CSPL Plan. Likewise, effective monitoring and evaluation of the various livelihood projects be conducted to ensure success.

Education and cultural appreciation of the upland dwellers

Education and cultural appreciation of the upland dwellers who participated in the wildlife trade are essential steps to reduce the prohibited occupation. This approach may take time and resources to convert the current trade players to be vanguards of nature; however, this is sustainable. Relevant policies and frameworks are essential in developing effective programs for the necessary plans of intervention and institutionalization of efforts. In educating the locals to engage in sustainable livelihoods, it is crucial to assess their strengths, weaknesses, opportunities, and threats (SWOT). Stakeholders Analysis and Mapping is likewise necessary to identify the stakeholders who have the power and influence to make the proposed sustainable livelihood options work. Massive capability building through training and workshops is important to properly prepare them for undertaking livelihood shifts. With the right approach and intervention, the current trade players can use their strengths to pursue socio-economic upliftment with livelihoods that do not compromise wildlife and other natural resources. Balancing the needs of people for livelihood with the impact on species survival remains a challenge (Hughes, 2021). Finding systems that support long-term species survival, that are equitable, and do not destabilize livelihoods have been always tough. Efforts to combat wildlife trade highlight the need for a strategic plan adopting policies that are proactive, which is especially important because

species can quickly become endangered as humans continue to harvest and trade across the tree of life (Scheffers *et al.*, 2019).

Conclusion

The Cabadbaran Watershed and Forest Reserve is basically forestlands with abundant faunistic composition which becomes the source of wildlife trade. Wildlife trade has been extensive in the last five years; hence, livelihood options are assessed to curb this activity. Agriculture is the major source of livelihood among the residents in the villages within the watershed. Abaca production has been a source of income for the residents for 6 years by supplying abaca fiber in nearby markets. Abaca is naturally growing in the site and the residents have been used to processing the nature-planted abaca for fiber. Hence, abaca production is recognized as a sustainable livelihood option in the site. Cacao production is another promising livelihood alternative. The production of cacao fits in with the criteria for sustainable livelihood identification. Rainforestation is another viable livelihood option in the uplands since it is compatible with the needs, existing livelihoods, organization, social structure, gender differences and roles, and culture of the people. Agri-food and cultural tourism are also promising livelihood options to curb wildlife trade. Moreover, hand-holding and mentoring from the various government organizations, academia, civil society organizations are necessary to heighten the awareness among the residents to ultimately discourage the people in engaging in wildlife trade.

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