

UNDERSTANDING AND CONSERVING INDIGENOUS KNOWLEDGE ON SUSTAINABLE NATURAL RESOURCE MANAGEMENT IN THE CORDILLERAS ADMINISTRATIVE REGION OF THE PHILIPPINES

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ABSTRACT

The Cordilleras Region of the Philippines has a rich diversity of indigenous knowledge on sustainable resource management. It is the basis for agriculture, food preparation, health care and environmental conservation. This paper aims to integrate the lessons learned from the local people's knowledge on natural resource management. Strategic options on environmental communication and education will be drawn from these findings. Natural resource management strategies practiced by various communities were documented using a variety of Participatory Rural Appraisal (PRA) tools and literature survey. Some of the practices in the Cordilleras like *Muyong* by the Ifugao's and *Batangan* in Mountain Province have sustain the lives of the people by providing steady source of food, construction materials, firewood/fuel and medicine while maintaining forest biodiversity in the region. Shifting cultivation, known as *Uma* system or patch farming, is a traditional crop production system practiced in the Cordilleras to rejuvenate soil fertility. Another indigenous soil fertility management practice in the Mountain Province is *Payew* where sunflower cuttings is incorporated and allowed to decompose in the rice paddy fields during the rice growing season. Natural resource management practices in the Cordilleras have sustained the diversity of forest resources and lives of the local people. Policy makers, scientists and researchers must recognize and include the role of local people's knowledge in management decisions of the country's fragile environmental resources. Development of information exchange campaign (IEC) materials translated into local dialects is vital so that other communities can learn from these indigenous practices.

Keywords: sustainable natural resource management, environmental communication, indigenous knowledge, local people's knowledge

INTRODUCTION

Indigenous knowledge (IK) is a systematic body of knowledge acquired by local people through accumulation of experiences, informal experiments and intimate understanding of the environment of a given culture (Rajasakeran et al., 1992; Tella, 2007). IK is the sum total of knowledge and skills that are acquired by people in a given area which enables them to get the most of their environment (Horsthemke, 2008). It refers to the unique, traditional, local knowledge existing within and developed around the specific conditions, indigenous to a particular geographic area (Tella, 2007). It includes a system of classification and a system of self-management that governs resource use (Appiah-Opoku, 1999). IK is the basic component of country's knowledge system and it represents the successful ways in which people have dealt with their environment in the past (Puffer, 2003). It is holistic and a basis for self-sufficiency and self-determination.

Indigenous peoples inhabit 20% of the planet (Martin and Hails, 1996). In the Philippines, they make up approximately 10-15 per cent of the population (<http://www.iwgia.org/sw16704.asp>). They live mostly on the remaining significant areas of high natural value on the Earth. Their knowledge and cultures, that constitutes their social and livelihood systems, are closely attuned to the natural laws that operate within natural ecosystems. The development of IK systems, covering all aspects of life, including management of the natural environment, has been a matter of survival to the peoples who generated these systems (Tella, 2007). It is the basis for agriculture, food preparation, health care, education and training, environmental conservation, and a host of other activities. IK is embedded in community practices, institutions, relationships and rituals.

Recording and documenting are major challenges because of the tacit nature of IK. It is commonly exchanged through personal communication and demonstration: from master to apprentice, from parents to children, from neighbor to neighbor, etc. Tacit knowledge will have to be converted to explicit form using special methods like storytelling, interactive conversations, sharing experiences and face-to-face communication. Most of the IK are not codified. Codification is defined as the creation of structured information and knowledge sources (Muswazi, 2001). Researchers worldwide have accepted the fact that community involvement in research process is important (Muswazi, 2001). Community involvement serves as a window to the unstructured format of knowledge and experiences which can be codified to facilitate easier access and sharing.

Adam (2007) cited that Information and Communication Technologies (ICT) plays a vital role in enhancing the availability of IK systems to blend with the modern scientific and technical knowledge. Telephony, cable, satellite, radio, computers, information networks, internet and software are among ICT tools that can help build relations among communities, governments and organizations in terms of the needed services for the poor people. ICT like the internet can be used to: 1) capture, store and disseminate IK; 2) encourage cost-effective form of IK dissemination; 3) produce easily accessible IK information system; 4) encourage the integration of IK into formal and non-formal education and training; and 5) offers a platform in advocating improved benefits of local communities from IK systems.

The Cordilleras Administrative Region of the Philippines has a long history and rich diversity of indigenous knowledge covering all aspects of life including community practices, institutions, relationships and rituals. It is the basis for agriculture, food preparation, health care, education and training, and environmental conservation. Indigenous knowledge should be conserved because it can be put to good use in development practices, through its utilization of cost-effective and sustainable strategies that may help poor people in their daily struggle for survival.

This paper aims to integrate the lessons learned from the local people's knowledge of the Cordilleras on natural resource management. Strategic options on environmental communication and education will also be drawn from these findings aimed at conserving their indigenous knowledge.

METHODOLOGY

The Study Area

The study was conducted in the Cordilleras in selected key study areas: Mt. Province and Kalinga (Fig. 1). However, secondary data collected allowed the study to cover other areas in the region. The Cordillera Administrative Region (CAR) is a landlocked region in central part of northern Luzon, Philippines geographically located at 120° 57' 0 east longitude and 17° 19' 60 north latitude with a total land area of 18,300 km². Cordillera Administrative Region is considered as a major resource base of the Philippines and one of the country's richest regions in natural resources. Generally, the climate in the region is cool in the uplands areas. For example, Baguio City is about 8° C cooler at any month than other lowland areas (www.visitmyphilippines.com). The region is characterized by an average annual rainfall of 500-2500 mm. Rainy season is from May to October while the dry season is from November to April. The Cordillera has a mountainous topography characterized by towering peaks, plateaus and intermittent patches of valleys. The elevation of the region ranges from a minimum of 5 MASL (meters above sea level) in Abra to a maximum of 2,922 MASL in Mt. Pulag, Benguet (www.visitmyphilippines.com).

Methodological Framework of the Study

Two-stage approach was used by the study (Fig. 2): a) documentation process; and b) development of a Database Information System (DIS). The collection of data and information was done thru desktop literature search, literature survey in the libraries and departments of the State College and Universities (SUCs) in the case study sites; and from past and existing studies and projects reports. The collected information was reviewed and indigenous plants with its corresponding uses were identified. Field visits and key informant interviews was also conducted to validate some of the information indicated in the secondary data gathered and to collect additional information from key informants and local farmers in the study area.

After summarizing the gathered data, a DIS was developed to aid in the management of the information for easy access and retrieval. The major groups of indigenous plant utilization

deduced from the documentation process were: 1) organic farming system; 2) indigenous farming system; 3) community health care system; 4) food and food supplements; 5) cultural practices; 6) construction and livelihood; and 7) ornamental, landscaping and gardening.

The DIS contains the list of indigenous plants used for various purposes, their common/local names, distribution, associated characteristics of the area where it can be found (e.g. topography, soil) and the source of information. Indigenous plants are native to a specific area of the country (<http://www.abc.net.au/gardening>). A native plant is a plant which is growing in a particular region having arrived naturally, i.e. without human intervention. (<http://uk.answers.yahoo.com>). Much of the indigenous plants are associated with the indigenous knowledge on resource management in the study area. Thus, knowledge analysis was done and strategic options for environmental communication (print, radio and internet) were drawn from the analysis.

RESULTS AND DISCUSSION

Indigenous Plants in Natural Resource Management

Several indigenous plants in the Cordilleras were used in afforestation, agroforestry, watershed related activities and erosion control as means to natural resource management. A leguminous tree (*Albizia procera*) locally known as “ahlar”, “adaan” or “kalai” is being used as shelter belt, erosion control and forestry planting in several municipalities of Kalinga and Abra (Table 1). *Albizia procera* is a fast growing nitrogen-fixing tree that grows well in moist areas (www.winrock.org/fnrm/factnet/factpub/). It forms a thin layer of spreading canopy crown providing shade in agroforestry systems. It is also good for erosion control due to its stout taproot and wide-spreading lateral roots. All throughout the central Cordillera, *Bambusa blumena* (“kauyan tinik”) is used in afforestation activities, stabilization of unstable and eroding slopes and banks. Bamboo clumps provide anchor, minimize movement of materials and stabilize slopes particularly riverbanks.

Two species were identified as potential agroforestry tree species namely a) *Erythrina orientalis* belonging to the family Fabaceae; and b) *Trema orientalis* that belongs to family Celtidaceae. Both species can serve as shade tree for coffee, cacao or other plantation crops. *Ficus nota* (“tibig”, “piwis”, “tabbog”), *Ficus pseudopalma* (“niogniogan”, “adiagi”, “kadiabung”, “tarabang”), *Lithocarpus ilanensis* (“palayon”, philippine oak, “pallay”, “poschan”, “pallayan”) and *Wrightia pubescens* (“lanete”, “lanoti”) are good tree species for watershed rehabilitation. Their wide canopy provide soil cover that protects the soil surface from rainfall impacts and minimizes soil erosion.

Tithonia diversifolia (sunflower) is widely used as organic fertilizer in many farms in Benguet and Ifugao. They have observed that rice plants fertilized with sunflower cuttings have better growth, robust stalks and higher grain yield. Key informants interviewed in Kalinga also noted that they used sunflower as organic fertilizer though not as widely used in Benguet and Ifugao.

Forest Management Strategies

In the mountainous areas of the Cordilleras, *muyong* or *pinugo* is an important part of agroforestry system to protect the farms below from erosion and runoff, maintaining soil fertility and biodiversity (Serrano and Cadaweng, 2005; Abannag et al. 2006; Comia, 2000). It is the unique way of life of tendering forest practiced by the Ifugaos that is internationally recognized to be an ideal resource management strategy (Butic and Ngidlo 2003). In other areas in the region, it is known as *lakon* or *komunal* (Mt. Province) and *imung* (Kalinga) (Abannag et al., 2006).

In the woodlots of *muyong*, agroforestry system can be observed. The practitioners of *muyong* commonly integrate tree crops and herbs with the natural vegetation of *muyong* (Butic and Ngidlo 2003). The practice is commonly binded to the religious belief system of the people and economic values of trees and crops. *Muyong* are privately owned, inherited and manage properties (Butic and Ngidlo, 2003; Serrano and Cadaweng, 2005). It provides food, housing materials, home furnishing, firewood/fuel, medicinal herbs at the same time maintaining the biodiversity and ecological balance in the area. However, no records have been found yet to show when and where the practice began (Serrano and Cadaweng 2005). Three probable reasons of *muyong* emergence were documented by Bagong Pagasa Foundation Inc. (BPFI) as cited by Serrano and Cadaweng (2005):

1. The evidence suggests that the ancestors of Ifugao were well aware of the relationship between the existence of forests and stable water supplies. In the same way that the Ifugao people exercised ingenuity and creativity in carving the terraces to support their tribal livelihoods, they also designed and established *muyongs* to create a stable source of water for their *payohs* (rice field);
2. *Muyong* establishment was reinforced when it became apparent that sources of fuelwood near Ifugao settlements were becoming depleted; and
3. There are indications that some early *muyongs* were started by a low caste in Ifugao society – the *nawotwot* – as a means of uplifting their economic and social standing in the community. Ownership of large areas of *payohs* and *muyong* are indicators of high social status or affluence in Ifugao culture.

The study by Rondolo (2001) as cited by Butic and Ngidlo (2003) showed that about 264 plant species (belonging to 71 plant families) mainly indigenous can be found in *muyong*. It is mostly dominated by the plant family Euphorbiaceae followed by Moraceae, Meliaceae, Leguminosae, Poaceae, Anacardiaceae and Rubiaceae. Some indigenous plants that can be found in *muyong* are *Cajanus cajan* (“kardis”, cadios), *Calamus manillensis* (“litoko”, “lit-tu”, “lituku”, edible rattan), *Areca catechu* (betel-nut, “walimbuwa”, “muma”), *Piper* spp. and some citrus species. In old *muyongs*, indigenous trees mainly dipterocarp such as *Shorea contorta* (white lauan, “aruas”, “apnec”, “apnit”) and *Shorea guiso* (guijo, “tafangew”, “tafiangew”) can be found.

Batangan or *Saguday* is an indigenous forest management system in the Mt. Province with the primary purpose of source of timber materials (Abannag et al., 2006). In this system, a

clan size of 1 to 20 manages a piece of forestland typically with a land size between 0.5 to 10 hectares (Pulhin et al., 2005). All members of the clan managing the *batangan* have equal rights and direct access to the resources in *batangan*. This forest management system is governed by five objectives of living: health, prosperity, abundance, nature and peace (Pulhin et al. 2005). *Batangan* is also managed for food, medicine, clean water and cultural values such as wood carvings for icons. Like the *muyong*, the management and conservation of *batangan* is done by selective tree cutting, thinning, pruning, underbrushing and weeding. Hardwood and fruit bearing trees are also planted in thinly populated areas of the *batangan*. Most commonly found indigenous tree in *batangan* is *Pinus kesiya* Royle Ex. Gordon (pine tree). Mature pine trees that bear lesser cones in *batangan* are more often cut if wood is needed for house construction. Some customary laws associated with *batangan* as cited by Abannag et al. (2006) are: 1) prohibition and punishment of poaching within the area; 2) non-community members are not allowed to exploit forest resources without permission and consent from the community leaders; and 3) banning of commercial sale and transport of timber products.

Soil Fertility Management of Food-Based Production System

In the Cordilleras, shifting cultivation is a common practice in the uplands as a system of food production. Shifting cultivation or swidden farming is the practice of subsistence upland farmers in cultivating food crops in a patch of cleared forest area (Miguel et al., 2006). Continuous cultivation of forest area usually last from 2 to 3 years. The land is left for fallow while the farmers shift to other areas to grow crops. Indigenous people are aware of the importance and value of trees and forest litter in soil fertility and do careful selection of forest areas to be cultivated (See and Sarfati, 2003). Generally, forest areas with secondary growth are selected for cultivation while those areas with fruit trees, lumber and other valuable plants are avoided from burning. Costales (1993) as cited by See and Sarfati (2003) defined burning as “the controlled application of fire to wildland fuels in either a natural or modified state and under specific environmental conditions which allow the fire to be confined to a pre-determined area and at the same time produce the intensity required to attain planned resource management objectives”.

Among the Bontocs, as well as other indigenous people of the Cordillera, this method has long been part of their indigenous knowledge and agricultural system. The people use the method for site preparation, for improving the growth of mature grasses, for hunting and to efficiently eliminate weeds and poisonous plants or vines that may harm them. Prescribed burning also improves soil fertility and makes it easier for them to shape their mountains into farms.

Uma is a rainfed upland shifting cultivation found in the sloping areas of the mountain that cover at least 500 m² of land (Magcale-Macandog and Ocampo 2005). In the province of Kalinga patch cultivation is the common term for shifting cultivation (Miguel et al., 2006). Farmers choose sites that are not stony, sloping but not too steep and where trees are more than 20 years old (Magcale-Macandog and Ocampo, 2005). All trees are cut while the cleared area is burned to easily remove weeds and shrubs. The wood from the cut trees are used for building the farmers' house and storage room for the crops to be grown. In Mt. Province, chosen *uma* fields are usually heavy or clayey soils to resist soil erosion and are planted to sweet potato, squash,

millet, beans, peanut, maize and onion. Woody shrubs such as *Tithonia diversifolia* (sunflower) and *Gliricidia sepium* (“kakawate”) are planted as boundary fence of the uma field to protect the crops from stray animals (Magcale-Macandog and Ocampo, 2005).

Payews (terraced irrigated fields) are irrigated pond terraces usually with an area of 100-250 m² (Magcale-Macandog and Ocampo, 2005). The terraces in mountains were manually built by the ancestors of the farmers in the region for rice and sweet potato cultivation. To effectively control soil erosion, the packed clay walls of the terraces were later replaced with rocks. These terraces usually have clayey soil and are primarily used for irrigated rice cultivation. Sweet potato, cabbage and green onion are other crops that can be grown in the terraces after rice harvest. Like in *uma*, sunflower is also used in this type of indigenous food production system to effectively manage the soil fertility. The sunflower leaves and twigs are incorporated into the paddy soil two months before crop planting allowing the decomposition process to proceed so that nutrients are released for rice crop uptake during the growing season (Magcale-Macandog and Ocampo, 2005). The sunflower leaves and twigs are only applied before rice cultivation. No further application is done for the second cropping (sweet potato) because farmers believe that it is not necessary due to the residual organic fertilizer from the rice crop. This process allowed slow release of nutrients from the decomposing sunflower leaves and twigs thus farmers believed that their crop production in *payew* is sustained. They also believe that the practice of incorporating sunflower helps rejuvenate the soil that results to vigorous crop growth, loosens the soil and prevents rotting of sweet potato (Magcale-Macandog and Ocampo, 2005).

Options for Environmental Communication

The indigenous knowledge on resource management discussed has been widely used in the region for decades. In other provinces of the region, the practice may differ but it has the same objective. The lessons learned from these documented indigenous practices can be replicated to other upland areas and popularize through the use of various strategies in Information Exchange Campaigns (IECs) for environmental communication. One approach is by producing leaflets or brochures and posters that can be distributed to the local communities. However, it must be noted that not all residents, farmers or indigenous people of an area can read particularly English and Filipino language. Thus, to address this problem, translation of the leaflets or brochures and posters to local dialect of the target area can be beneficial. The local radio station in the community can also be tapped by airing a radio skit discussing one or two popular indigenous practice on sustainable natural resource management. Again, the conversation or discussion of the radio skit must be translated to the local dialect. In an attempt to disseminate the indigenous knowledge on natural resource management, the internet is an essential venue for global form of environmental communication. Websites and online databases are very useful tool and play an important role in educating, sharing and publishing indigenous knowledge on resource management to researchers, policy makers, scientist and students among others. Clearly, it is recognized that Information and Communication Technologies (ICT) plays a vital role in enhancing the availability of IK systems.

It is envisioned that these strategies on environmental communication can reach a wider audience that can adopt and learn from the knowledge that have sustained the lives of the people and environment in the Cordilleras.

CONCLUSIONS

Natural resource management practices in the Cordilleras have sustained the diversity of forest resources and lives of the local people. Policy makers, scientists and researchers should recognize, impart and include the role of local people's knowledge in management decisions of the country's environmental resources. Development of Information Exchange Campaign (IEC) materials for environmental communication including brochure, flyers and radio skit that are translated into local dialects is vital so that other communities can learn from these indigenous practices and in order to conserve this IK for future generations. Finally, ICT plays an important role in immediate dissemination of IK systems relating to sustainable natural resource management.

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FIGURES

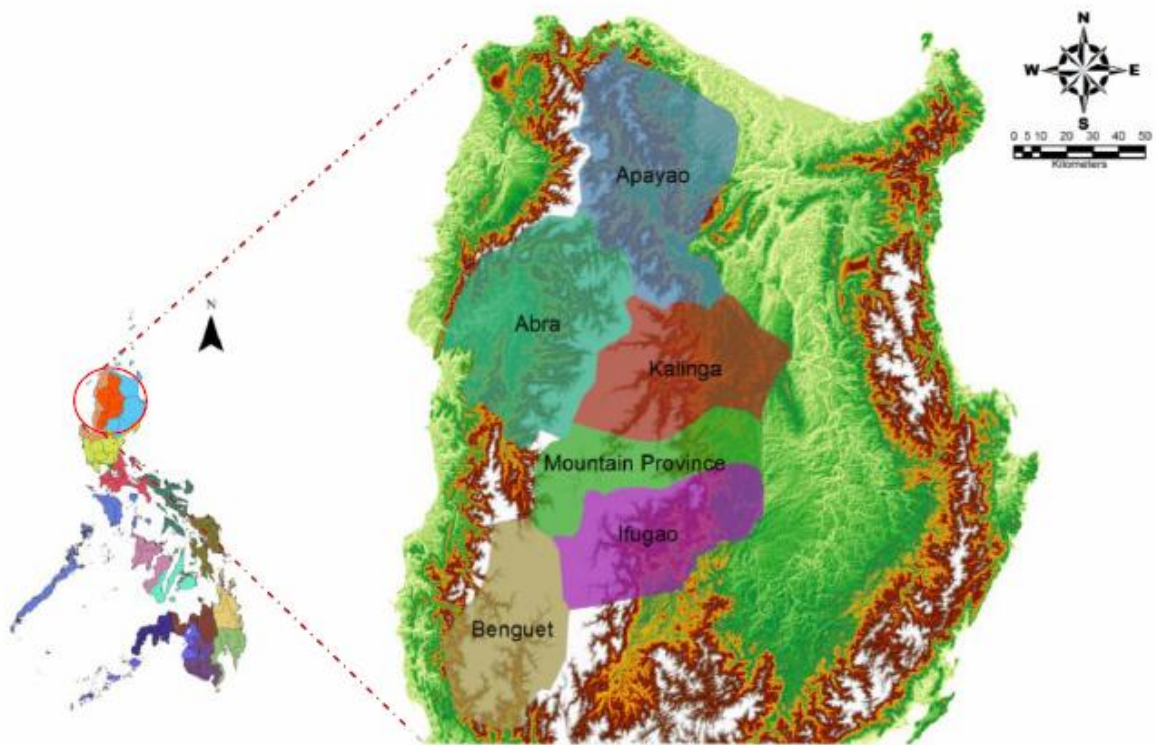


Figure 1 Location of map of the study area.

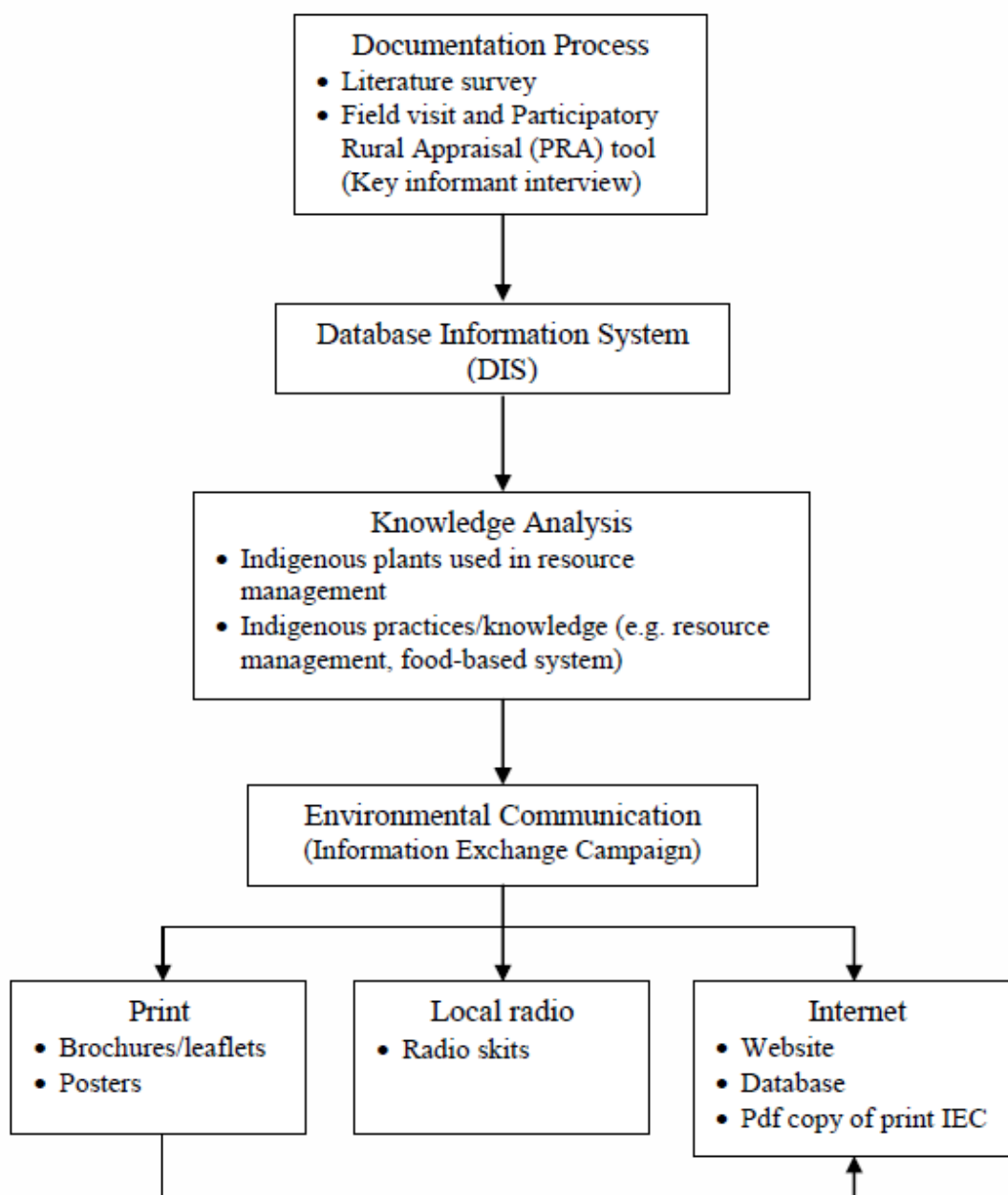


Figure 2 Methodological framework of the study.

TABLES

Table 1 Indigenous plant species in the Cordilleras utilized for various natural resource management.

Species Name	Local/Common Name(s)	Family	Growth habit	Distribution	Utilization	Source(s)
<i>Albizia procera</i> (Roxb.) Benth.	ahlar, adaan, kalai	Leguminosae	Tree	Lamut and Aguinaldo, Ifugao; Tanudan and Pinukpuk, Kalinga; Baay, Abra	shelter belts, forestation plantings and erosion control	CECAP, 2003
<i>Albizia procera</i> (Roxb.) Benth.	ahlar, adaan, kalai	Leguminosae	Tree	Lamut and Aguinaldo, Ifugao; Tanudan and Pinukpuk, Kalinga; Baay, Abra	species believed to have insecticidal properties	CECAP, 2003
<i>Bambusa blumeana</i>	kauayan tinik	Graminae	Shrub	throughout Central Cordillera region	used for afforestation activities; used to stabilize unstable and eroding slopes and banks	CECAP, 2003
<i>Bischofia javanica</i> (Blume)	tuai, tu-wor, tu-wol, tuwirl, tuwel, towe	Euphorbiaceae	Tree	Lubuagan, Kalinga; Central Cordillera	some farmers in Asipulo, Ifugao collect the leaves of the tu-wor to use as green manure for ricefields	CECAP, 2003
<i>Erythrina orientalis</i> L. Meril	dapdap, bubug, sabbang, sablang, kabkab, sabrang and gabgab	Fabaceae	Tree	wide range of areas in Kalinga and Abra; Lamut, Kiangnan and Asipulo, Ifugao	has potential as shade plant in agroforestry system; it is claimed that it can serve as a shade plant for coffee	CECAP, 2003
<i>Ficus minahasae</i> (Tejism & de Vr.) Mig	hagimit, alumit, alimit, sabfog	Moraceae	Tree	Central Cordillera	used to conserve water near coffee trees	Key Informant interview, 2008
<i>Ficus nota</i> (Blanco)	tibig, piwis, tabbog	Moraceae	Tree	Central Cordillera	water-indicator species used in watershed rehabilitation purposes	CECAP, 2003
<i>Ficus pseudopalma</i>	niogniogan, adiagi, kadiabung, tarabang	Moraceae	Tree	Lamut and lower Aguinaldo, Ifugao; Pinukpuk and Tanudan, Kalinga; all upland municipalities of Abra	watershed species; serve as temporary ground cover on degraded areas	CECAP, 2003

Table 1 Continued...

Species Name	Local/Common Name(s)	Family	Growth habit	Distribution	Utilization	Source(s)
<i>Lithocarpus ilanosis</i>	palayon, phillipine oak, pallay, poschan, pallayan	Fagaceae	Tree	Chatol, Barlig, Mountain Province; Balbalan, Mayoyao, Kiangnan, Hungduan and Banaue, Ifugao	good watershed species	CECAP, 2003
<i>Mangifera altissima</i> L.	paho, pahutan, malamanga, pau, appau	Anacardiaceae	Tree	Benguet; Lagawe, Kiangnan, Asipulo and Lamut, Ifugao	seedlings can be used as rootstock in grafting mango as it has good rooting ability, resistant to pests and diseases and can compete for water, food and sunlight	CECAP, 2003
<i>Melia dubia</i> Cav.	bagalunga, balasang tree	Meliaceae	Tree	Lubuagan, Pasil, Balabalan and Tinglayan, Kalinga	bark, fruits and leaves are believed to have insecticidal properties	CECAP, 2003
<i>Pinus kesiya</i> Royle Ex. Gordon	pine tree	Pinaceae	Tree	Benguet, Mt. Province and Ifugao	mulching material	Bawang and Lapade, 1992; Magacale-Macandog and Ocampo, 2005
<i>Pterocarpus indicus/vidalianus</i>	narra, Philippine Rosewood, taggay tree, sahhay	Fabaceae	Tree	Pinukpuk, Tanudan and Balbalan, Eastern Tinglayan, Kalinga; in all upland municipalities of Abra and Lamut and Kiangnan, Ifugao	used to control soil erosion	Key Informant interview, 2008
<i>Tithonia diversifolia</i>	lagpaw, mirasol, marapait, sunflower	Asteraceae	Shrub	La Trinidad, Benguet	organic fertilizer	Litilit, 2005; Magacale-Macandog and Ocampo, 2005; Key Informant interview, 2008
<i>Trema orientalis</i> L. Blume	anabiong, arandong, anardong, hubudos, lanai	Celtidaceae	Tree	Central Cordillera	afforestation/reforestation; has potential for agroforestry; provide shade for coffee, cacao or other plantation crops	CECAP, 2003
<i>Wrightia pubescens</i> R. Br. spp laniti (Blanco) Ngan	lanete, lanoti	Apocynaceae	Tree	widely distributed in the Central Cordillera	water indicator; used in watershed rehabilitation purposes	CECAP, 2003