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CONTEMPORARY KNOWLEDGE OF WOODLOT (*MUYONG*) RESOURCE MANAGEMENT: A CASE STUDY OF KEY-INFORMANTS' PERCEPTIONS IN BRGY. KINAKIN, BANAUE, IFUGAO, PHILIPPINES

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ABSTRACT – Woodlot (*muyong*) associated with the rice terraces of Ifugao are continuously exposed to environmental disturbances and economic pressures. There is a need to document the current status of these forest patches so that appropriate conservation measures can be made. This study aimed to document the contemporary perceptions of *muyong* owners towards forest resource management using a case study of Brgy. Kinakin, Banaue, Ifugao. Information about function, plant composition, soil fertility, current problems and protection measures were gathered using semi-structured questionnaires. Results showed that owners associate their *muyong* with its economic functions as resource zone for their households and as water and nutrient recharge zone for their rice terraces. In terms of plant composition, owners enumerated 30 local names and each tree is associated with specific uses. Moreover, knowledge on soil fertility was associated with nutrient enrichment by the vegetation. The following concerns were perceived as problems by the owners: declining number of large diameter trees, lack of manpower, and stealing of wood. Lastly, owners mentioned three existing activities that should be sustained in order to protect the *muyong*, namely: regularity of visit, cleaning and trimming of understory plants and, tree planting especially after every tree cutting.

Key words: Banaue, *muyong*, perception, plant composition, soil fertility, management problems

Introduction

The Ifugao Rice Terraces of the Philippines is one of the most famous in the Asia-Pacific Region (Calderon *et al.,* 2011). Its recorded prominence as a world-renowned landscape started during the American colonization of the Philippines when the terraces were

named as the Eighth Wonder of the World (Madulid, 2010). However, the said distinction as the Eighth Wonder became less popular during the early years of 1990s, when the terraces adopted a new name and was nominated as one of the Heritage Sites in the World. In 1995, after a series of evaluation, site visits and meetings, the Rice Terraces of the Philippine Cordilleras was formally inscribed in the United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage List. The Ifugao Rice Terraces was recognized as an outstanding example of living cultural landscapes, where the traditional techniques and remarkable harmony between humankind and the natural environment exists (UNESCO-Philippines, 2007). Apart from being a World Heritage Site, the Ifugao Rice Terraces was also declared as a Globally Important Agricultural Heritage System by the Food and Agriculture Organization (FAO) of the United Nations in 2002. The FAO (2012) considered the continued existence and viability of the terraces as a manifestation of strong culture-nature connections, marvelous engineering systems, innovativeness and determined spirit of Ifugaos to maximize the use of the mountainous lands for food production.

The establishment and conservation of traditional resource management practices and land use system are possible reasons for the continued existence and viability of the heritage sites. Woodlot system (*muyong-payoh* system) is a unique zoning system that is indigenous to the province. It is almost similar with the indigenous agroforestry system (e.g. field-and grove-system) of England, Japan, Guatemala, and Mexico (Olofson, 1983). It consists of at least five land uses namely communal forest (*ala* or *inalahan*), woodlot (*muyong* or *pinugo*), swidden farms (*habal* or *uma*), settlement areas (*boble*), rice terraces (*payoh*), grasslands (*magulon*) and water bodies and irrigation systems (*litting*) (Conklin, 1980; DENR, 2008; Madulid, 2010). Communal forests are usually located on the top of ridges. The spring in the forest flows to the lower areas where the *muyong* is located. *Muyong* is a privately managed secondary forest (Rondolo, 2001). Located below the *muyong* can either be *payoh, habal,* or *uma*. The arrangement of the three latter land uses varies among ethno-groups (SITMo, 2008).

Functional relationships exist among the land uses. For example, the rich biodiversity of the *muyong* provides seeds for the swidden farms under fallow periods (Serrano and Cadaweng, 2005). Conversely, swidden farms can serve as refuge or habitat of forest animals. Another interaction involves the gathering of resources like fuel wood, construction materials, carving materials, food, and medicine from the *muyong* by the households (Rondolo, 2001; Butic and Ngidlo, 2003; Serrano and Cadaweng, 2005). Locals also use the *muyong* as a site of their tribal cultural activities such as burial ceremonies and the *cañao* – a thanksgiving feast for a bountiful rice harvest (Serrano and Cadaweng, 2005). In return, the people manage and protect the forest by cleaning and assisting its regeneration. Moreover, *muyong* is the source of rocks and stone to make walls for new terraces and to repair damaged terrace walls in the *payoh* (Serrano and Cadaweng, 2005). It is the primary water recharge zone for the rice terraces. The water flowing out of the *muyong* influences the overall physical soundness of terrace cultivation (Butic and Ngidlo, 2003) and carries with it rich nutrients that fertilize the *payoh* (Serrano and Cadaweng, 2005).

Despite of the long history and tradition, these functional interactions are threatened since the *payoh* and the *muyong* face serious risk of destruction mainly caused by natural and anthropogenic factors (Madulid, 2010). In 2001, Ifugao Rice Terraces was included in the list of World Heritage Sites in Danger. This inclusion aimed to inform the

international community of threats to its essential values and to encourage corrective actions (UNESCO, 2012). The woodcarving industry, on the other hand, which involves extraction of forest products, contributes to the destruction of *muyongs* (Madulid, 2012). The deterioration of *muyongs*, in turn, leads to soil erosion and decreased water supply, which consequently reduces the productivity of the *payoh*. These interrelated problems have resulted in the abandonment of many terraces (Calderon *et al.*, 2011) that, if allowed to continue, could compromise their very existence.

The scope and objective of this study were to describe the perception of contemporary owners on *muyong* resource management particularly woodlot importance, plant composition, soil fertility, management problems, and protection measures. This will provide socio-cultural perspective about the findings reported by Rabena *et al.*, (2015) on the assessment of *muyong* vegetation in Banaue, Ifugao. Lastly, this benchmark information could contribute in implementing science-based solutions to conserve the traditional forest in particular and the Ifugao Rice Terraces in general.

Methodology

This research employed a case study method of data collection. A semi-structured questionnaire was prepared, pre-tested, and used to gather information about the current knowledge of *muyong* resource management. Seven key-informants served as respondents. Furthermore, observation technique was used to validate the response of the key-informants on the questionnaire.

Results and Discussions

Perceived importance and function

Most key-informants associated *muyong* with its importance to their personal lives. *Muyong* or *pinugo* was regarded as a resource where firewood, housing materials, carving materials, fruits, and sweet potatoes are harvested. Aside from these benefits, *muyong* also functioned for storing and providing water for their households and their *payoh*. Interestingly, this common knowledge about the *muyong* is known through generations and also similar with what Conklin (1980) reported. As a hypothesis, this can be attributed to the mechanism and nature of ownership of *muyong.*

Two of the seven key-informants owned a *muyong*. Ownership was through inheritance from their parents and was handed to them as a wedding gift. On the other hand, the other key-informants do not own a *muyong.* However, their parents owned the *muyong* and they only help in managing the property. In addition, it has been a tradition in the area that an inherited *muyong* owned by a father is passed on initially to the first child. If his mother also owned a *muyong,* the first-born has the privilege to inherit the property. Otherwise, the *muyong* can be handed to the second child. This mode of ownership through inheritance was elucidated by Serrano and Cadaweng (2005). Management, however, is not restricted to the *muyong* owners. Other members of the family were also involved in cleaning, planting, and protecting the *muyong*. *Muyong* ownership is declared in town's registry and the owner pays approximately P200.00 per month. Most of the key-informants lacked information on the land area of their *muyong* (Serrano and

Cadaweng, 2005) although two key-informants revealed an area of 0.04 and six hectares of *muyong* property, respectively.

Perceived plant composition and soil fertility

The awareness of the owners and managers on plant composition and diversity in the *muyong* was elucidated. The local names of trees they mentioned including their uses are listed in Table 1. Most of these trees were also listed by Conklin (1967), Madulid (2010), Baguinon and Miel (2013), and Rabena *et al.* (2015). Hence, this perception affirms the influence of owners and managers on the composition and structure of vegetation in *muyongs*. Indeed, certain plant species can be found in a vegetation stand depending upon the needs of the owner.

Trees used as firewood include (Table 1) *alnos* (*Alnus japonica* (Thunb.) Steud)*, bayyakot* (*Macaranga caudatifolia* Elmer.)*, halinghingon* (*Eurya japonica* Thunb.)*, hanahti* (*Deutzia pulchra* Vidal)*, ihit, palayon* (*Lithocarpus submonticolus* (Elmer) Rehder)*, piwis* (*Ficus ribes* Reinw. ex Blume var. *cuneata* (Miq.) Corner)*, tabangawen* (*Weinmannia luzoniensis* Vidal)*, talanak* (*Astronia cumingiana* Vidal *var. bicolor* (Merr.) Maxw. & Veldk.)*, tower* (*Bischofia javanica* Blume) and *umog* (*Clethra tomentella* Rolfe, ex Dunn.). Branches of these trees are regularly collected from the *muyong*. Non-owners can also gather firewood from the *muyong.* However, collection is limited to dead branches. Moreover, a portion of the *muyong* must be cleaned by the gatherer in exchange of the materials collected (Serrano and Cadaweng, 2005).

On the other hand, the following trees were identified as source of lumber and housing materials (Table 1): *anablon* (*Macaranga dipterocarpifolia* Merr.)*, anartap, archajannum* (*Turpinia ovatifolia* Elmer)*, bitaor* (*Calophyllum soulattri* Burm. f.)*, bortik* (*Decaspermum fruticosum* JR and G Forst.)*, galit-on* (*Syzygium* sp.)*, gutmo* (*Vaccinium whitfordii* Merr.)*, angadien* (*Machilus philippinensis* Merr.)*, hawili* (*Elaeocarpus bontocensis* Merr.)*,* mahogany (*Swietenia macrophyla* King), *odyow, palayon* (*Lithocarpus submonticolus* (Elmer) Rehder.)*, piwis* (*Ficus ribes* Reinw. ex Blume *var. cuneata* (Miq.) Corneri)*, pokkak, tabangawen* (*Weinmannia luzoniensis* Vidal)*, talanak* (*Astronia cumingiana* Vidal *var. bicolor* (Merr.) Maxw. &Veldk.) and *tower* (*Bischofia javanica* Blume). According to one informant, the frequently used tree for house construction is the *bitaor* (*Calophyllum soulattri* Burm. f.) while *gutmo* (*Vaccinium whitfordii* Merr.) is usually used as posts. Customarily, for every tree harvested, two replacement trees must be planted and a large portion of the *muyong* must be cleaned (Serrano and Cadaweng, 2005). Furthermore, the owner reserves the right in allowing a person to harvest and in specifying which tree can be harvested. In addition, a tree named *pulot* (*Desmodium sequax* Wall) was identified as fencing material.

Wood from the *muyong* is also collected and carved into religious relics, household utensils, and artistic figurines (Serrano and Cadaweng, 2005). The key-informants listed the following trees as source of raw materials for carving (Table 1): *alnos (Alnus japonica* (Thunb.) Steud)*, anablon* (*Macaranga dipterocarpifolia* Merr.)*, archajannum* (*Turpinia ovatifolia* Elmer)*, balanti* (*Mallotus mollissimus* (Geisel.) Airy Shaw)*, bayyakot* (*Macaranga caudatifolia* Elmer.)*,* melina (*Gmelina arborea* Roxb.), *tabangawen* (*Weinmannia luzoniensis* Vidal)*,* and *tipanglan* (*Cyathe*a sp.). Additionally, two trees namely *alimit* (*Ficus minahase* (Teijsm. & de Vr.) Miq.) and *lablabong* were believed to hold water in the *muyong*. Fruit trees like avocado were also present in the *muyong* which serve as source of food for the owners.

In relation to historical changes of tree density, key-informants emphasized that their *muyongs* in the late 1960s had higher tree density and there were more large-diameter trees compared to present day condition. Increase in human population was perceived by an informant as one reason for the depletion of woody trees. Possibly, this can be attributed to an increase in number of users. However, another informant believed that at the family level, more members in the family would mean more manpower to maintain and protect the *muyong*. Introduction of chainsaw and large knives in the area was mentioned by another informant as reason for the depletion of trees. These tools can facilitate easier harvesting of trees. Conversely, Serrano and Cadaweng (2005) suggested wood carving industry as one possible reason for the decline in tree density especially during the boom years of the industry in early 1970s.

Alternatively, there were key-informants who observed higher plant composition and plant diversity in their *muyong* at present times compared before. This could be possible especially if the manner of *muyong* establishment was through regeneration of fallow swidden land. More trees are expected to grow after 20 years of natural succession (Serrano and Cadawen, 2005). However, this process can be hastened through assisted natural regeneration techniques (Butic and Ngidlo, 2003) like enrichment planting and transplanting of fast-growing reforestation species. Key-informants mentioned the availability of these seedlings from barangay nurseries since the government supports this initiative. However, it can be noted that some of the reforestation species are exotic to the *muyong* including *Alnus japonica* (Thunb.) Steud.*, Gmelina arborea* Roxb. and *Swietenia macrophylla* King. This may pose threats to the plant diversity of the *muyong* (Butic and Ngidlo, 2003).

In terms of soil fertility of the *muyong*, key-informants indicated higher nutrient level of the soil during the 1960s compared to the present level. This was attributed to the darker coloration of the soil mainly caused by more dense vegetation in the past. Alternatively, irregular visit and cleaning could also affect the level of soil nutrients. Cleaning involves removal of grasses, herbaceous plants, and tree branches. Key-informants believed that when these materials were left in the forest floor, the soil would be darker.

Perceived problems and protection measures

Key-informants mentioned three problems about their *muyong*. First of these problems is the decrease in the number of large diameter trees in their *muyong*. Harvesting of immature trees was identified as one of the reasons. As a result, benefits from these trees could not be maximized which could influence the ecological functions of the *muyong* like cycling of nutrients, habitats of animals and production of biomass among others. Similarly, socio-economic importance can be affected being *muyong* as the source of lumber, firewood, carving materials and food for the local communities (Conklin, 1980; Butic and Ngidlo, 2003; Camacho *et al.,* 2012). Key-informants revealed that customary laws on cutting trees (Serrano and Cadaweng, 2005) were not fully practiced in their community. For example, the owner had no control as to which trees can be cut and how many trees can be harvested.

Secondly, the lack of manpower in maintaining and protecting the *muyong* is a problem in their *muyong*. Immediate family members were not available to perform activities related to planting, cleaning, and protecting the *muyong.* For that reason, there were instances that other members of the community were hired to clean the *muyong* or

specifically, to ensure proper distances of trees. Possibly, this added to the financial concerns of the household. Thus, *muyongs* may not be properly maintained and protected.

The third problem is the stealing of wood from the *muyong*. The negligence of the owner or family members in visiting the *muyong* was stated as one possible reason. Also, change in attitude among members of the community, from *bayanihan* mindset to self-interest, was emphasized.

The key-informants mentioned three activities that should be continually practiced in order to protect and conserve the *muyong*. First, *muyong* must be visited regularly to monitor the growth of the trees and guard other locals collecting materials from the property. Second, grasses must be removed and tree branches must be trimmed. Key-informants claimed that this activity facilitates the growth of the trees especially the newly planted seedlings in the *muyong.* Lastly, more trees must be planted especially after harvest. Moreover, some key-informants stated that any seedling along the trail in their *muyong* or in other *muyongs* can be used as planting material. On the other hand, other key-informants specifically mentioned alnos, melina, mahogany, *bulilising*, *dalakan,* and *palayon* as their planting materials.

Conclusion and Recommendations

Through the years, the community has developed local knowledge on the ecological functions and relationships of the *muyong* with other components of the land use system. Owners are aware that the *muyong* is the source of water and nutrients for their rice terraces. They have local ecological knowledge on *muyong* plant diversity and soil fertility and have developed indigenous ways of enriching and maintaining the floral composition of the *muyong*. Moreover, they can recognize management problems and suggest ideas in solving them. Hence, this study attests to the rich ecological knowledge of the present owners in managing forest resources.

It is recommended that local knowledge on *muyong* plant diversity, soil fertility, and ecosystem services be continuously and actively passed on to the next generation. This can be realized by capacitating the youth on ecosystem structure, functions and services of the Ifugao Rice Terraces (IRT) landscape through community and school-based programs like youth camp, development of information and education materials, curriculum improvement, and teachers' training among others.

In addition, similar quantitative studies must be done using larger sampling size and spatial scale to verify the results. Documentation of contemporary forest resource management practices, analysis of their causal mechanisms, and assessment of their implications to present and future ecosystem functions and services (e.g. tree harvesting practices and its ecological effects on seedling or pioneers regeneration dynamics; spatial and temporal patterns of forest cleaning and trimming; suitability studies of planting materials; economic, social and ecological impacts of exotic trees like *Alnus*, *Gmelina* and *Swientenia;* population and tourism pressures on firewood and timber utilization among others) is also recommended. Results from these researches will help establish the most relevant institutional and development intervention towards conservation of *muyong* in particular and sustainability of the IRT in general.

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Statement of Authorship

The first author conducted the literature search, fieldwork and data collection, prepared the conceptual framework, identified thematic points, formulated recommendations, and undertook the writing up. The second author initiated the concept, identified some issues, and reviewed the paper.

References

Calderon, M.M., N.C. Bantayan, J.T. Dizon, A.J.U. Sajise, A.L. Codilan, & M.G. Salvador. (2011). *Capacity for the Conservation of the Ifugao Rice Terraces: The Hungduan Farmers of Ifugao*. Philippines: SEARCA.

Camacho, L. D., M. S. Combalicer, Y. Yeo-Chang, E. A. Combalicer, A. P. Carandang, S. C. Camacho, C. C. de Luna, & L. L. Rebugio. *Traditional forest conservation knowledge/technologies in the Cordillera, Northern Philippines.* Forest Policy and Economics 22: 3 – 8.

Butic, M. & R. Ngidlo. (2003). Muyong forest of Ifugao: Assisted natural regeneration in traditional forest management. In Dugan, P. C., Durst, P. B., Ganz, D. J. and McKenzie, P.J. (eds.), *Advancing Assisted Natural Regeneration (ANR) in Asia and the Pacific*. Food and Agriculture Organization (FAO) United Nations (UN). Bangkok, Thailand. Retrieved from http://www.fao.org/docrep/004/ad466e/ad466e06.htm. Accessed: 31 July 2016.

Conklin, H. C. (1967). *Ifugao Ethnobotany 1905-1965. The Beyer-Merill report in perspective.* Economic Botany 21(3): 243-272.

Conklin, H. C. (1980). *Ethnographic Atlas of Ifugao: a study of environment, culture and society in Northern Luzon*. New Haven: Yale University Press.

Department of Environment and Natural Resources. (2008). *Conservation and Adaptive Management of Globally Important Agricultural Heritage Systems (GIAHS): The Ifugao Rice Terraces Philippine Project Framework.* Retrieved fromhttp://www.fao.org/fileadmin/templates/giahs/PDF/Ifugao_Rice_Terraces.pdf. Accessed: 31 July 2016.

Food and Agriculture Organization. (2012). *Globally important agricultural heritage systems.* Retrieved from http://www.fao.org/giahs/giahs-sites/asia-and-the-pacific/ifugao-rice-terraces-philippines/en/. Accessed: 31 July 2016.

Madulid, D. A. (2010). *Plant Diversity and Conservation of the Woodlots of Ifugao.* Philippines: UNESCO National Commission of the Philippines.

Olofson, H. (1983). I*ndigenous agroforestry systems.* Philippine Quarterly of Culture an Society 11:149-174.

Rabena, M. A. F., D. M. Macandog, V.C. Cuevas & M. V. O. Espaldon. (2016). *A Vegetation Inventory of a Traditional Secondary Forest (Muyong) in Kinakin, Banaue, Ifugao, Northern Luzon, Philippines.* Philippine Journal of Systematic Biology, 9, 10-32.

Rondolo, M. T. (2001). Fellowship Report. Tropical Forest Update, 11(4), 22-23.

Save Ifugao Rice Terraces Movement. (2008). *Impact: The Effects of Tourism on Culture and the Environment in Asia and the Pacific: Sustainable Tourism and the Preservation of the World Heritage Site of the Ifugao Rice Terraces, Philippines.* Save the Ifugao Terraces Movement. Bangkok, Thailand: UNESCO.

Serrano, R.C. & E.A. Cadaweng. (2005). *The Ifugao Muyong: Sustaining water, culture and life*. Retrieved from http://www.fao.org/docrep/007/ae542e/ae542e05.htm. Accessed: 31 July 2016.

UNESCO-Philippines. (2007). U*nderstanding the Cultural Heritage of the Philippines and the World.* Greenhills, San Juan City: Operation Brotherhood Center.

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Table 1. Plants known by *muyong* owners and their perceived uses.

NO.	LOCAL NAMES	SCIENTIFIC NAMES	FIRE-WOOD	CONSTRUCTION OR LUMBER	WOODCAR-VING	FOOD	OTHERS
1	Alimit	*Ficus minahase* (Teijsm. & de Vr.) Miq.					⁄
2	Alnos	*Alnus japonica* (Thunb.) Steud	/		/		
3	Anablon	*Macaranga dipterocarpifolia* Merr.		/	/		
4	Anartap	*Neonauclea reticulata* (Havil.) Merr.		/			
5	Angadien	*Machilus philippinensis* Merr.		/			
6	Archajannum	*Turpinia ovatifolia* Elmer		/	/		
7	Avocado	*Persea americana* Mill.				/	
8	Balanti	*Mallotus mollissimus* (Geisel.) Airy Shaw			/		
9	Bayyakot	*Macaranga caudatifolia* Elmer	/		/		
10	Bitaor	*Calophyllum soulattri* Burm. f.		/			
11	Bortik	*Decaspermum fruticosum* JR and G Forst		/			
12	Galit-on	*Syzygium* sp.		/			
13	Gmelina	*Gmelina arborea* Roxb.		/	/		
14	Gutmo	*Vaccinium whitfordii* Merr.		/			
15	Halinghingon	*Eurya japonica* Thunb.	/				
16	Hanahti	*Deutzia pulchra* Vidal	/				
17	Hawili	*Elaeocarpus bontocensis* Merr.		/			
18	Ihit	for verification	/				
19	Lablabong	for verification					/
20	Mahogany	*Swietenia macrophyla* King		/			
21	Odyow	for verification		/			
22	Palayon	*Lithocarpus submonticolus* (Elmer) Rehder	/	/			
23	Piwis	*Ficus ribes* Reinw. ex Blume var. *cuneata* (Miq.) Corner	/	/			
24	Pokkak	for verification		/			
25	Pulot	*Desmodium sequax* Wall					/ (fence)
26	Tabangawen	*Weinmannia luzoniensis* Vidal	/	/	/		
27	Talanak	*Astronia cumingiana* Vidal *var. bicolor* (Merr.) Maxw. &Veldk.	/	/			
28	Tipanglan	*Cyathe* a sp.			/		
29	Tower	*Bischofia javanica* Blume	/	/			
30	Umog	*Clethra tomentella* Rolfe, ex Dunn.	/				