



Traditional ecological knowledge and plant utilization by Mpur tribe's in Kebar, West Papua Province, Indonesia

Budi Prasetyo^{*1}, Simon Sutarno²

¹*Biology Department, Faculty of Science and Technology, Open University, Jl. Cabe Raya, Pondok Cabe, Pamulang sub-district, South Tangerang City, Banten Province, Indonesia*

²*Biology Department, Faculty of Mathematics and Natural Science, Papua University, West Papua Province, Indonesia*

Article published on April 30, 2022

Key words: Ethnoecology, PDM, ICS, FGD.

Abstract

Traditional ecological knowledge has an important role in the preservation of biodiversity. The ability of traditional communities in managing the natural resources and the environment was based on the experiences that slowly grow within a long span of time. The aim of this research is to reveal the traditional ecological knowledge of the Mpur tribe in interacting with the environment around where they live in order to survive. The method used is ethnodirected sampling. To determine the level of importance of environmental units used the Pebble Distribution Method (PDM), in addition to assessing useful plants based on the culture of the Mpur tribe, the calculation uses the Cultural Significance Index (ICS) formula. The result of the observation has found nine types of units there were closely related and effected on the life aspect of Mpur tribe. The nine types of units were: forest (*nirau*), the new farms (*bain bak*), old farms (*bain sunu*), former farms (*bain tub*), grasslands (*niku*), rivers (*war*), swamp (*yawau*), yards (*jandir*), and village. Among the environment unit types, the old farm became the area with the highest level of importance as a food source for Mpur tribe. The results of the ICS assessment of various types of plants showed that the *Arenga pinnata* is a plant that has the highest value of cultural interest compared to other types.

*Corresponding Author: Budi Prasetyo ✉ budi-p@ecampus.ut.ac.id

Introduction

Traditional knowledge is all forms of knowledge owned by traditional communities as a form of accumulation of their experience in interacting with the surrounding environment in the long span of time (Whyte, 2013). The existence of traditional knowledge is important in the management of biodiversity (Mauro and Hardison, 2000), including maintaining the diversity of crops and processing of agricultural land (Dweba and Mearns, 2011). Thus the traditional knowledge is indispensable to maintain the quality of the biodiversity that exists, because the gradation on the quality of biodiversity indirectly affected the existence of traditional knowledge of various ethnic groups, especially in terms of food and medicines (Agnoletti, 2007; Dweba and Mearns, 2011; Cuerrier *et al.*, 2015).

Papua is one of area of which unique both historically and biodiversity that are very interesting to be studied. Besides having a high-rich natural resources (Marshall and Beehler, 2007), Papua also has a high cultural diversity. Papua even claimed as areas with the higher cultural and ethnic diversity than other areas in Indonesia, as reflected in about 269 languages used in this area (Marshall and Beehler, 2012).

Kebar district is one of many areas in Papua that are interesting to be studied. This area is located in the bird's head area (Vogelkop) and inhabited by several ethnic groups, one of them is Mpur ethnic. As other ethnic's life in Papua, ethnic groups in Kebar still rely on the surrounding natural conditions to meet their needs. In utilizing the natural resources on their surroundings, a complex knowledge about resources and how to use it should be required. Knowledge of the landscape and its constituent as well as the techniques used to preserve plant traditionally is the important components in the context of sustainability of a community group.

The presence of synthetic materials in traditional community life, including the ethnic groups in Papua has increased the assumption among the community

that using natural materials required more power especially if it should be taken from the forest which is located far away from home; also the availability is highly dependent on natural conditions. These conditions decrease the inherent knowledge society slowly, and feared to be lost at some point. A study conducted Saynes-Vasquez *et al.* (2013) revealed that life style changes by being far from having interest in nature, including vernacular language as fundamental instrument of knowledge transfer between generations traditionally that has been left caused the degradation of local knowledge of ethnic group. The threat of degradation that occurs in traditional knowledge of community collectively and the importance aspects of traditional knowledge are encourage this research to be carried out. Preserving the traditional knowledge, which begins by documenting the local knowledge, is a concrete action that can be done for the preservation of the nation's intellectual property.

The aim of this research is to reveal the traditional ecological knowledge of the Mpur tribe in interacting with the environment around where they live in order to survive.

Material and method

Field research

The study was conducted in the Jafai village, Kebar District, Tambrauw, West Papua Province, Indonesia (Fig. 1). Jafai was chosen because it is a residential area for native Kebar which is the Mpur tribe. The topographical conditions of Jafai village are quite varied, from lowlands to highlands, the soil texture is smooth to moderate, the soil is not dusty. Jafai village has an area of 214.7 square kilometers, with a population of around 127 people, and most of them work as farmer (harvest biological resources in the forest).

Data sampling

The Method used in this study was ethnodirected sampling (Adsersen and Adsersen, 1997). The respondents were determined purposively (Tongco, 2007) by using snowball sampling technique (Heckathorn, 2011; Handcock and Gile, 2011).

The use of the technique aimed that the selected respondents are really understand the traditional landscape.

Data analysis

Furthermore, to determine the interest of each the environment units, the Focus Group Discussion (FGD) approach by using the Pebble Distribution Method or PDM (Sheil *et al.*, 2004). In addition, to obtain more complete data, interviews were also

conducted on traditional knowledge of the use of various plant species with 5 resource persons were selected based on the ability of their knowledge in understanding the use of these plants.

The measurement of the importance of each species of plant in relation to the culture of the Mpur tribe is done by calculating the Cultural Interest Index (ICS) (Turner, 1988).



Fig. 1. Location of the study area.

Result and discussion

To reveal the traditional ecological knowledge of the Mpur tribe in interacting with the environment around where they live, the discussion is focused on three things, namely (1) exploring the Mpur tribe's understanding of the environmental units it knows, (2) explores the values of using landscape units in environmental units based on the perceptions of the Mpur tribe, and (3) exploring the use of plants based on the Mpur culture.

The Mpur tribe's understanding of the environmental units it knows

The observations showed that the community of Mpur tribe at Kebar district recognized and divide landscape units into environmental units based on the characters that they understand and experience. Through the observations, there were nine types of lanscape units are closely related and had an effect on aspects of the life of the Mpur community. The nine types of environment units are: forest (*nirau*); the

new farm (*bain bak*), old farm (*bain sunu*), former farm (*bain tub*), grasslands (*niku*), river (*war*), swamps (*yawou*), the yard (*jandir*), and village.

Here are the types of landscape units according to the results known to the Mpur community.

Forest (*nirau*)

The forest or *nirau*, was a great important area for the Mpur life support. Even in some places were considered as sacred territory to preserve its sustainability. From this landscape was where a wide range of needs, especially wood as a building material (*Pometia* spp., *Intsia bijuga*, *Intsia palembanica*), rigging (*Ficus* spp., *Macaranga* sp.), Firewood (*Syzygium* spp., *Ficus* spp., *Premna corymbosa*, *Podocarpus* sp.), medicines also animals prey were coming from. The use of wood as the main material for building home was placing forest as a provider of building material shigher compared to other functions, such as a traditional medicine provider. The role of forests as traditional medicine provider has decresed since Mpur community tend to using medical drugs which were considered faster in healing than the natural one. In addition, the use of natural medicine was considered less practical because they had to go to the forest to pick it up, while medical drugs can be obtained easily. Knowledge of the use of medical drugs in the Mpur can certainly be seen as a positive thing because of their knowledge had developed, unfortunately on the other hand that community often using medical drugs without any proper dosage and direction from medical personnel. This condition was feared will cause resistance to certain drugs, which in turn would prejudice the community itself.

The garden (*bain*), its became the most important element in the life of the Mpur, because it was a primer environment unit due to its function to provide food needs. *Rain* could be differentiated into three groups with each characteristic, as follow:

New garden (bain bak)

It was a newly cleared land for farming and the land that has been cultivated by certain plants but

still immature. Economically, it was a landscape that had not produced because it containd baby plant and not harvested yet. Some types of plants were found in *bain* like peanuts (*Arachis hypogaea*), com (*Zea mays*), tomatoes (*Solanum lycopersicum*), and red onion (*Allium cepa*).

Old garden (bain sunu)

A garden that already produced, it was containing plants that had been harvested like long beans; cassava (*Manihot esculenta*), sweet potato (*Ipomoea batatas*), bananas (*Musa* spp.) and vegetables.

Former garden (bain tub)

It was an old and abandoned garden, because the productivity has been declined. The impairment of productivity was marked by declining agricultural products. This landscape was not well maintained although there some agricultural commodities were found such as bananas (*Musa* spp.), *Ananas sativus*, *Abelmoschus manihot*, *Amaranthus caudatus*, and *Cucurbita* spp.

Grasslands (niku)

Grassland (*niku*) was an area dominated by *Imperata cylindrica*. The grasslands area was one of destination for people to hunt deer (*Cervus timorensis*). It was known that shoots reed were the food of this animal prey (Pattiselano, 2009, Arobaya *et al.*, 2010). Along with population growth and infrastructure development, people now had to travel long distances to hunt these animals.

River (war)

River or *war* in the Mpur language has a great importance role as the main water source for the community. In order Mpur language, the term *war* was also used to refer to water in general. Aside from being a source of water for daily use, the river also supplied building materials wheremainly stone and sand was taken. Although the source of any clean water facilities came from water has been established, for daily activities such as bathing and washing were commonly engaged on river for practical reason and the distance was close enough

with the settlements. Rivers around the Jafai village are generally shallow, rocky and has quite swift stream so there were not many types of fish that can be found in the waters. Rainbow Fish (*Melanotaenia arfakensis*) or in Mpur language called the *ngguer*, a fish species that were often found in river at the sites. Basically *M. arfakensis* was not a type of fish for consumption because it was better known as ornamental fish.

7. Swamp (*yawou*)

Swamp or *yawou* was dominated by species *Metroxylon sago*, *Pandanus connoideus*, *Pandanus* sp., and *Intsia bijuga*. This area was considered important for the community as a place to grow sago that used to known as a staple food. The introduction of rice was one reason for the abandonment of sago as their staple food, although at certain time, the sago starch extracting activities were still done. Some of the respondents suggested that they will take sago on importance occasion to be sold and partly consumed.

Yard (*jandir*)

Yard or *jandir* was a land located around the house with uncertain size. Apart from being a playground for kids, yard became a place to release farm animals and pets such as cows, chickens, pigs, and dogs.

Village

Village become an important element in the Mpur's life as a place to live and interact with each other. In a village there are houses whose owners are related to each other. Village have not a local name like other environment unit. By the information from respondents; it is said that there is no term in the language Mpur to call Village. However, there are also respondents who called the village as *bavejab*, though after further explored *bavejab* actually refers to the hut used as a haven or a temporary resting after doing work in the farm or a long trip.

The values of using landscape units in environmental units based on the perceptions of the Mpur tribe

The farming knowledge has acquired for generations

and has been practiced until today. Every stages in farming were well known by Mpur tribe and they keep doing this in their traditional way.

For women and men of the Mpur, both old and new garden were very important area to them. This type of environment unit was seen as kitchen to them as it provides daily food needs. The high value of this landscape led to most of time allocation during the day was spent mostly by the Mpur women to manage their garden. In addition, the village also importance to women. Besides farming, the Mpur women were also active in conducting household activities such as cooking and other activities, included making crafts such as weaving. After farming or when they were unavailable for farming, the village became a place to perform various activities. The situation was different with men who spend time in the woods for hunting and process black sugar palm. For these reasons, placing farming and forests as an important element for men compared to the other landscapes (Fig. 2).

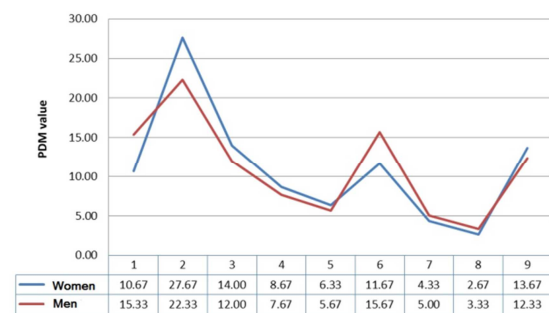


Fig. 2. Assessment of the use of landscape units by gender.

Information: (1) Forest; (2) New garden; (3) Old garden; (4) Former garden; (5) Grassland; (6) River; (7) Swamps; (8) The yard; (9) Village.

The role of men was very prominent at the opening of a new garden, while maintenance until harvest period was jointly conducted, even though through the observations it indicated that women were more dominant. This was because after opening the farm, men typically looked for other jobs such as hunting, logging and other building materials so that the allocation of time to take care of the farm less than women (Fig. 2).

The use of plants based on the Mpur culture

Following is a review of the results of the assessment of the use of plants using ICS. The highest form of plant utilization was for building materials. Building materials here as construction material either pole or frame of a traditional house. While in modern construction, it was only using a few specific types such as *I. bijuga*, *I. palembanica*, *Pimelioidendron* sp. and *Pometia* spp. As medicinal plants, mostly only for their knowledge as it was rarely found in practical use. The availability of medical drugs was a major factor of the use of medicinal plant has been abandoned. Besides as building materials, the availability in nature was still relied upon for other purposes such as woven materials and rigging. Here were the results of ICS assessment on top ten plants with ICS (Fig. 3).

ICS high value was shown on plant species *Arenga pinnata* or commonly named as black sugar palm. For the Mpur community it played an important role, as a source of alcoholic beverages (wine) which were consumed by most men of Mpur in their social interaction. It was also used as craft materials and ingredients to make fire.

In generations, this utilization has inherited and has significance in the order of the local culture. *Manihot utilisima* was another important staple food besides rice. As a rice's condiment, this plant was also used as fodder, especially for pigs. Other plants that have an ICS high value are *Areca catechu* or betel nut and *Piper betle* or betel. Chewing betel nut and betel (chewing) was particularly common for community in Papua, including the tribal communities Mpur at Kebar. Chewing activities carried out every day by most community. Besides the high level of consumption, both types of these plants simultaneously was also used as material for certain rituals such as summoning the spirits of the elders who had died. Betel and betel nut has become part of the cultural trip for Mpur tribal society until this presentday, so that its presence was very important. ICS assessment results has no shown any economic value of the species above, so that some of plant

species with high economic value such as *Biophytum petersianum*, *Intsia bijuga*, and *Intsia palembanica* in fact considered have a low value of ICS. *B. petersianum* was a kind of herb that was known by the public as Kebar grass. This species has a high selling value because of its function to improve fertility (Lefaan, 2014). While *I. bijuga* and *I. palembanica* known as ironwood have high selling price in the market as a building material. The ICS assessment only collaborate on aspects of the use, intensity and exclusivity of each species, and did not accommodate the economic value of that type (Fig. 3).

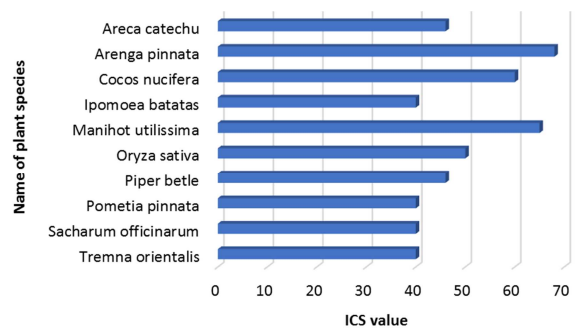


Fig. 3. Ten types of useful plants that have the highest ICS value.

Although the use of plants was still done until today, especially for things such as building materials, food and other essential needs that originally from plants, however, the knowledge of the young generation with regard the utilization of plant species traditionally tend to decrease. The lack of knowledge of young people concerning resource utilization traditionally has indicated the degradation of local knowledge of them. It can be seen from the minimum of information that can be obtained from the younger generation regarding the use of plants at the sites.

Traditional conservation system based on ecosystem in the form of customary land tenure was a form of protection against biological resources traditionally which have been existed for generations. The following is an explanation of the protection of animals and plants used by the Mpur tribe. Mpur community collectively and personally did not specifically conduct the conservation of a species, both animal and certain plants in the wild. Search

results obtained that protection or conservation was conducted based on ecosystems, where they protect plants, including animals in the form of protection of the forest ecosystems.

Form of ownership or communal forest was one form of ecosystem-based conservation that still applied today. This system ensured minimum access from the outside parties to the region, so that could minimize any disturbance on it. The concept of this kind of protection is actually a nature reserve that is equivalent to nature conservation. In this concept, any exploitation activities for both animals and plants were strictly not allowed occurred in protected areas.

Conclusion

From the research results and discussion can be drawn up some conclusions that the Mpur tribe have a very high level of dependency towards the condition of their natural surroundings, and have a good knowledge about the landscape and its management. Most of plants need to be obtained from natural stocks mainly for building materials, medicines, and rigging. Although the dependence on plant resources was still felt, but the observations were indicating the decrease in the quality of traditional knowledge which was visible from the minimum of knowledge of young people about the use of plants, especially in medicine. Mpur community were not familiar with the species preservation system, hut they has indirectly conducted ecosystem-based conservation in the form of traditional or customary land tenure as well as a form of protection against biological resources traditionally.

Acknowledgement

Authors are thankful to the community in Kebar whose cooperation during data collection, and also knowledge that they shared with us. This research was supported by LPPM, Open University, Indonesia.

References

Adersen A, Adersen H. 1997. Plant from Reunions Island with Alleged Antihypertensive and Diuretics Effects an Experimental and Ethnobotanical Experience. *J. Ethnopharmacol* 58, 189-206.

Agnoletti M. 2007. The Degradation of Traditional Landscape in a Mountain Area of Tuscany during the 19th and 20th Centuries: Implications for Biodiversity and Sustainable Management. *For. Eco. Manage* 249, 5-17.

Arobaya AYS, Iyai D, Sraun T, Pattiselanno F. 2010. Forage Food of Timor deer (*Cervus timorensis*) in Manokwari, West Papua. *Animal Production* 12, 91-95.

Cuerrier A, Turner NJ, Gomes TC, Garibaldi A, Downing A. 2015. Cultural Keystone Places: Conservation and Restoration in Cultural Landscapes. *Journal of Ethnobiology* 35, 427-448.

Dweba TP, Mearns MA. 2011. Conserving Indigenous Knowledge as The Key to The Current and Future Use of Traditional Vegetables. *International Journal of Information Management* 31, 564-571.

Handcock MS, Gile KJ. 2011. Comment: on The Concept of Snowball Sampling. *Sociological Methodology* 41(1), 367-371.

Heckathorn DD. 2011. Comment: Snowball versus Respondent-Driven Sampling. *Sociological Methodology* 41(1), 355-366.

Lefaan PN. 2014. The Influence of Kebar Grass Infuse to Mice (*Mus musculus*) Spermatogenesis. *Jurnal Sain Veteriner* 32, 55-67.

Marshall AJ, Beehler BM. 2007. *The Ecology of Papua*. Periplus Editions, Singapore 1467 pp.

Mauro F, Hardison P. 2000. Traditional Knowledge of Indigenous and Local Communities: International Debate and Policy Initiatives. *Ecological Applicationis* 10(5), 1263-1269.

Pattiselano F, Arobaya AYS. 2009. Grazing Habitat of the Rusa Deer (*Cervus timorensis*) in the Upland Kebar, Manokwari. *Biodiversitas Journal of Biological Diversity* 10(3), 134-138.

Saynes-Vasquez A, Caballero J, Meave JA, Chiang F. 2013. Cultural Change and Loss of Ethnoecological Knowledge Among the Isthmus Zapotecs of Mexico. *Journal of Ethnobiology and Ethnomedicine* **9**, 40.

Sheil D, Puri RK, Basuki I, van Heist M, Wan M, Liswanti N, Rukmiyati, Sardjono MA, Samsedin I, Sidiyasa K. 2002. Exploring biological diversity, environment and local people's perspectives in forest landscapes: Methods for a multidisciplinary assessment. Center for International Forestry Research, Bogor.

Tongco MDC. 2007. Purposive Sampling as a Tool for Informant Selection. *Ethnobotany Research & Applications* **5**, 147-158.

Turner NJ. 1988. The Importance of a Rose: Evaluating The Cultural Significance of Plants in Thompson and Lillooet Interior Salish. *Amer Anthro* **90**, 272-290.

Whyte K. 2013. Indigenous Women, Climate Change Impacts and Collective Action. *Hypatia: a Journal of Feminist Philosophy* **29**, 599-616.