Local wisdom of Ngata Toro community in utilizing forest resources as a learning source of biology

Yuliana, Siti Sriyati, and Yayan Sanjaya

Citation: AIP Conference Proceedings 1868, 100007 (2017); doi: 10.1063/1.4995217
View online: https://doi.org/10.1063/1.4995217
View Table of Contents: http://aip.scitation.org/toc/apc/1868/1
Published by the American Institute of Physics

Articles you may be interested in

Biological science learning model based on Turgo’s local wisdom on managing biodiversity
AIP Conference Proceedings 1708, 030001 (2016); 10.1063/1.4941146

A reflection on the implementation of a new curriculum in Indonesia: A crucial problem on school readiness
AIP Conference Proceedings 1868, 100008 (2017); 10.1063/1.4995218

The effectiveness of physics learning material based on South Kalimantan local wisdom
AIP Conference Proceedings 1868, 070006 (2017); 10.1063/1.4995182

The learning continuum based on student’s level of competence and specific pedagogical learning material on physiological aspects from teachers’s opinions
AIP Conference Proceedings 1868, 100006 (2017); 10.1063/1.4995216

Science learning based on local potential: Overview of the nature of science (NoS) achieved
AIP Conference Proceedings 1868, 080005 (2017); 10.1063/1.4995189

The impact of ecolabel knowledge to purchase decision of green producton biology students
AIP Conference Proceedings 1868, 100009 (2017); 10.1063/1.4995219
Local Wisdom of Ngata Toro Community in Utilizing Forest Resources as a Learning Source of Biology

Yuliana1,a), Siti Sriyati2, Yayan Sanjaya2

1Master Program of Biology Education, Indonesia University of Education
2Faculty of Mathematics and Science Education, Indonesia University of Education

Jl. Dr. Setiabudhi No. 229 Bandung, 40154, West Java, Indonesia

a)Corresponding author:yuliana_ampana@yahoo.com

Abstract: Indonesian society is a pluralistic society with different cultures and local potencies that exist in each region. Some of local community still adhere the tradition from generation to generation in managing natural resources wisely. The application of the values of local wisdom is necessary to teach back to student to be more respect the culture and local potentials in the region. There are many ways developing student character by exploring local wisdom and implementing them as a learning resources. This study aims at revealing the values of local wisdom Ngata Toro indigenous people of Central Sulawesi Province in managing forest as a source of learning biology. This research was conducted by in-depth interviews, participant non-observation, documentation studies, and field notes. The data were analyzed with triangulation techniques by using a qualitative interaction analysis that is data collection, data reduction, and data display. Ngata Toro local community manage forest by dividing the forest into several zones, those are wana ngkiki, wana, pangale, pahawa pongko, oma, and balingkea accompanied by rules in the management of result-based forest conservation and sustainable utilization. By identifying the purpose of zonation and regulation of the forest, such values as the value of environmental conservation, balance value, sustainable value, and the value of mutual cooperation. These values are implemented as a biological learning resource which derived from the competences standard of analyze the utilization and conservation of the environment.

INTRODUCTION

Indonesian society is a pluralistic society with different cultures and local potencies that exist in each region. Some of local community still adhere to the tradition from generation to generation in managing natural resources wisely. A historical investigation has shown that there have been various inherited ethnic cultures in Indonesia that are reflected in the various number of local wisdom believes, system of rulership, health, subsistence, and system of lineage [1]. In addition, in the Indonesian context, local knowledge is primarily portrayed in terms of local beliefs and customs (adat)[2].

The community of Toro, located in the Kulawi valley, 86 km from the provincial capital of Palu, was granted a high degree of autonomy in the protection and utilization of its surrounding forest resources by the regional Park Authority (Balai Taman Nasional). The area to be managed independently by the community comprises no less than 22,950 ha of secondary and primary forest, successfully re-claimed by the community leaders as “customary village land” (tanah adat). 18,000 ha of the area affected are located within the National Park [2].
The indigenous community of Toro has long recognized the various land-use areas, by way of a detailed description of vegetation, and using a comprehensive system and nomenclature. A rule-based system of resource use was maintained [3]. Toro community still adhere to the tradition of hereditary management of natural resources wisely.

Forests have a very important meaning in supporting people's lives in Toro. Toro society divides based on zoning of forest areas and utilizes forest products based on customs regulations that have been agreed for generations. Toro community use forest products only based on need, for example, took the wood for home building materials, rattan, resin, fragrance materials, and medicines as needed. Anyone who violates the customary rules that have been agreed will get traditional sanctions such as fines (givu). The forest utilization regulation their applied are closely linked to the value of conservation and sustainable use of natural resources. Therefore the matter is necessary becomes a particular set of values and give information to the students through learning system.

Indigenous knowledge has been modified through accumulated practical experience and passed on from generation to the next [4]. To fulfill these objectives science teacher need to look outside the four wall of the classroom and school for the sources, the treasure of the society, the local wisdom. Society is a live laboratory for teaching learning process. It is a reservoir of expert in theory and skill in various area of science and neighborhood, a rich source for hands-on learning [5]. Indigenous knowledge maybe integrated into education and thereby, bring the benefits of helping to ‘sustain’ indigenous knowledge and societies to all [6]. Those statements assume that the local a part of social life can use as a learning resource, especially in biology lesson.

Knowledge regarding local wisdom is limited to the elders in a community and be taught orally to children. Learning local content (Mulok) in schools is also assessed to be less because of material relating to the charge confined to the local language lessons or skills like making woven or gardening. Local content contains not only about the potential of natural resources such as plants and animals, arts and crafts of local communities, but includes also the values of local wisdom society in maintaining and managing the natural resources available its region.

The division of forest zoning and regulation of forest harvesting by society Toro has some relevance to the learning of biology. It underlies how important it is to explore the values of local wisdom and serve as a source of learning biology in school to further increase understanding and caring students about the importance of preservation of nature for present and future.

**Literature Review**

Local wisdom is a part of the cultural local knowledge that is formed through a process of learning by way of observation [7]. Local wisdom is local knowledge or indigenous knowledge. Local knowledge is the knowledge that has been tested valid in a local context and accumulated by the local community or people [8]. Local knowledge or indigenous knowledge is not static but dynamic and change overtime. Indigenous knowledge is the knowledge that people in a given community have developed overtime, and continue develop. It is based on experience, often tested over centuries of use, adapted to local culture and environment, and dynamic and changing [9].

According to [10], local knowledge is a collection of facts concepts, beliefs, and perceptions happenings around the world, including how to observe and measure the natural surroundings, solve problems, and validate the information. So that local knowledge is a process of how knowledge is generated, stored, applied, maintained and passed on to younger generations.

Awareness to explore the local knowledge or local wisdom motivated by economic and social progress of the world community, which has been accompanied by a variety of environmental degradation, including water crisis, degraded land, and the events that indicate damage water resources and land. Increasingly, more perceived an increase in both broad and the intensity of their land resources and environmental degradation and pollution both in the biosphere, hydrosphere, and atmosphere. Indigenous knowledge or local wisdom as a collective experience accumulated from generation to generation need to be developed as part of the enriching and complete the assembly of technological innovation sustainable future, including for water and soil conservation [11].

Research for teaching can be integrated with the insertion and cultivation of the values of science in it. Values of science in question include practical value, intellectual value, religious value, socioeconomic value, and educational
The meaning of learning values as a source of human values has not been implemented thoroughly or nationally. In fact there are still many local wisdom values that exist in the community is not fully known by students or not yet integrated into biology learning. So, it takes effort to teach those values to the students.

Value is an ideal standard. According to the term values is used to refer to principles, fundamental convictions, ideals, standards or life stances which act as general guides to behaviour or as points of reference in decision-making or the evaluation of beliefs or action and which are closely connected to personal integrity and personal identity.

Local wisdom-based education is education that teaches learners to get as close to the concrete situation they face daily. Furthermore, suggests the benefits of local educational relevance to the real world of practical application in encouraging the establishment of contextual learning biology. Therefore, the learning of biology must contain a positive attitude and knowledge about the local potential so as to motivate students to learn and develop skills appropriate local potential. Biology plays a role in developing the potential of local resources and to teach about how the use and preservation.

School provide service for different education needs of the local community, facilitate development of education professional and education structures, disseminate knowledge and information to the next generation, and contribute to the formation of a learning society. The implementation of human resource management concept is directed at individual that can be harmony with the demands of situation (environment) to display superior performance. Furthermore, some implication for the teacher of science to employ the learning model in order not only to increase students’ knowledge but also awareness of the environment problems.

METHODS

This research is a qualitative descriptive using Naturalistic Inquiry approach with the aim to describe the values related to people’s behavior patterns Toro in zoning of the forest, regulation in land use, and regulation in of the forest harvesting. Data was collected by observation and in-depth interview with 4 key informants. The information collected is related to the regulation and use of forest products which is managed by Ngata Toro community. This research was conducted in the village of Toro, District Kulawi, Central Sulawesi province. The researchers used tools to facilitate the collection and analysis of data is a field notes, voice recorder, camera, and indicator values. These instruments are used to collect data in the form of information that is expected to be complementary the information required in accordance with a research focus. Data analysis using interactive model Miles and Huberman which consists of data collection, data reduction, data display, and conclusion drawing/verification. Indicators of local values that serve as a source of learning in this study was adapted from previous research that is Indicator values of local wisdom in the form the value of environmental conservation, balance value, sustainability value, and value of mutual cooperation.

RESULTS

Zoning of the Forest Community Ngata Toro

Forests have a very important meaning for the people of Ngata Toro. They consider the forest is part of their lives so that they are obliged to maintain and use the forest wisely, which is consistent with their philosophy that Hintuvu and Katuvua. Hintuvu is the relation between human beings while Katuvua a human relationship with nature.

Further elaboration of the philosophy of value contained in the rules which are hereditary inherited that MopahilolongaKatuvua (taking care of nature wisely). According to their view that the universe is composed of three interacting components, namely human (Tauna), animals (Pinatuvua), and herbs (Tinuda). The third component is an integral and complementary and human as a creature given various advantages should utilize nature.
wisely so that the natural balance is not disturbed. One application the value of those philosophy of community Toro, divided the forest into several zones based on its utilization, namely:

1. **WanaNgkiki**, in the form of forest areas located in the highest mountain peaks are located far away from the village. This region is dominated by thick moss on the ground level, there are also big trees with moss, and a bit of grass, several species of birds, as well as a source of clean air (*winara*).

2. **Wana**, the region under *wanangkiki*, primary forest of trees large habitat protected animals such as dwarf buffalo, hog deer, various kinds of animals. This area is a catchment area during the rains. This area is strictly forbidden in open fields or cut down trees. However allowed to perform the activity collect forest products such as rattan, resin, pharmaceuticals and fragrances.

3. **Pangale**, the next forest forested transition between primary and secondary forests. Most of the forest area is ever opened by the precursor into the garden and then it was abandoned decades ago, succeeded be similar to primary forests. In this zone has been allowed to cut timber for building houses with through rules or regulations that have been agreed upon by the community and traditional institutions.

4. **Pahawapongko**, a former plantation forest area that has been left more than 25 years and already resembles **Pangale**. The trees growing in it also has a large diameter so that the necessary *pongko* (footing made of wood that is high enough) to facilitate to cut down. Is intended that the logging as timber saplings growing near the felled trees can grow back and replace (*pahawa*) a felled tree. This region does not have the right to private ownership, with the exception of tree resin by the first process.

FIGURE 1. Zoning of (a) *Wana ngkiki*, (b) *Wana*, (c) *Pangale* and, (d) *Pahawa pongko* (Yuliana doc)
5. *Oma*, a former orchard land are deliberately allowed to be reproces sed within a specified period. In this area already are personal rights based on the people who first cleared the land. *Oma* is also an area that is overgrown with species of medicinal plants as well as habitat for small birds and insects. *Oma* land is divided into three categories:
b. *Omangura*, in the form of ex-farm land deliberate 5-15 years left. Trees that grow still small so that they are easy to be reopened.
c. *Omangkuku*, included in the category of former farm land most young yet is rested about 1-3 years old. This land is still dominated by weeds, grasses, and shrubs.

6. *Balingkea*, are agricultural lands that have been reduced fertility, but this land can still be processed for planting crops such as corn, vegetables, beans, peppers, tomatoes, and so forth.

![Zoning of (a) Omantua, (b) Omangura, (c) Omangkuku, (d) Balingkea](https://example.com/figure2)

**FIGURE 2.** Zoning of (a) *Omantua*, (b) *Omangura*, (c) *Omangkuku*, (d) *Balingkea*. (Yuliana doc)

**B. Regulations on Land Use Community Ngata Toro**

There are two categories related to land tenure or ownership of natural resources in Toro, namely the right of joint ownership or collective (*Huaka*) and private ownership of land (*Dodoha*). Regulation or use of forest products involves harvesting patterns of regulation and sanctions for noncompliance.
1. Joint Property Rights (*Huaka*)
   Co-ownership rights (*Huaka*) covers an area *wana ngkiki, wana, pahawa pongko, and pangale* with all the natural resources that exist in it except a tree resin that already have the right of private ownership by the first process. Not allowed capture of forest resources such as rattan for commercial purposes and timber for building houses should permit and approval through the Institute of Traditional and Village Government agencies.

2. Individual Property Rights (*Dodoha*)
   Private property rights covering *oma (oma ntua, oma ngura, and oma ngkuku)* and *balingkea*. Private property rights include the right of ownership of large families or individuals.

C. Regulations of the Forest Harvesting
   Regulation of harvesting in society Toro called with *Ombo*. *Ombo* literally can be interpreted as a moratorium is a delay, in terms of delay harvesting of rattan collectively form within the specified time period or may be referred to as the rotation period rattan collection. *Ombo* rattan agreed that every 5 years and it can be taken in age more than three years. In the rattan-making process is not allowed to bring the engine lumberjack, strom, airsoft guns, poison fish, set traps, destroying animal habitats, and other destructive behaviors that destroy nature. The existence of such restrictions is to provide conditions to the citizens that the main goal of society is only taking rattan. In addition, the prohibition to attract cane through the watershed when the rice begins to bear fruit because it will affect crops such as rice contain much less (empty), which in *nakahoana*.

   Timber extraction is only permitted for domestic needs such as building custom homes, private homes or public facilities and not allowed to take a massive wood and traded. The harvesting of firewood for such purposes can be taken from private property or land *oma* large families respectively and also rattan collection for everyday purposes not through the traditional institutions of deliberations.

   In taking the timber and land clearing should also consider the location of the topography of the land to be harvested wood or clearing new land. That activity should be considered are; 1) the timber harvested must have a diameter of over 50 cm, 2) the distance between trees felled at least 100 meters, 3) prohibited from cutting down trees and clearing land on sloping terrain (*taolo*) above 45 degrees, close to springs, and close to the river. In addition, the uniqueness of techniques in cutting trees using a footing of wood is quite high (*pongko*) with the aim that the wooden tillers under the tree is not damaged and the stumps of wood that felled can sprout again so it can be a substitute (*pahawa*) trees that have been cut, is loaded with conservation efforts both in terms of the value of balance with nature as well as the value of sustainability in the utilization of natural resources.

   The phenomenon mutual cooperation is still very strong visible in everyday life such as the Toro community cultivate farmland, carrying forest products such as rattan and wood from the forest to the village and also help strengthen one another if any of the unfortunate members of society.

D. Meaning Local Wisdom
   Based on the analysis of local wisdom of community tradition Toro in land use and forest contains the values, such as:

1. The value of environmental conservation
   With the right of joint ownership *wana ngkiki, wana, pangale, and pahawa pongko* closely associated with efforts conservation environment because people will remind each other to take forest products and will report to customary institutions if there is one who violates the rules set in collect forest products in the region. Value preservation of the environment is also evident from the way of opening new land or withdraw wood with attention; felled timber should have a diameter of over 50 cm, the distance between trees felled at least 100 meters, is allowed to cut trees on sloping land (*taolo*) above 45 degrees, near the springs, and close to the river flow. If there are activities such as logging in these areas will lead to soil water content is reduced during the dry season and resulted in flooding and landslides during the rainy season because the trees that act as a deterrent to erosion and soil water storage is no longer there. Conservation value is closely linked to the philosophy *Katuvua*.

2. The value of the balance
   Living in harmony with the natural visible from rule, the division of land zoning based on limited utilization area and intensive utilization. Limited use zones found in the area of, *pangale*, and *pahawa pongko* whose
management is set based on the results of joint deliberation. While the intensive use zones in land oma and balingkea who already have private property rights so that people do not have any reason to open up land in limited zone, thereby directly will provide control functions of society and traditional elders to the environment and natural resources in it, will be supported in a pattern of ecological balance. Value balance is also reflected in the balance with regard cycle of rice cultivation, namely the prohibition to pull the rattan through the watershed when the rice begins to bear fruit because it will affect crops such as rice much less contain (hollow), which in nakahoana and the prohibition on cutting of fruit trees which are a food source animals such as birds or felling of trees and clearing in riparian areas or near springs, also rules for using tree felling techniques using a wooden footing (pongko).

3. The value of sustainability

The value of continuity is evident from the way in the form of cane harvesting by (ombo/raombo) and tree felling techniques using a wooden footing (pongko). Ombo in the form of a moratorium on harvesting forest resources such as rattan with a 5-year period according to the needs of society. Rattan taken just kind of rattan was ready for production that is older than 3 years. Rattan collection with this period provides an opportunity to grow productive cane. It is intended to maintain the balance of forest ecosystems and sustainable utilization of forest products in order to support community needs. Additionally rotation patterns of land use from oma ntua became productive land, then balingkea, oma ngkuku, oma ngura, then back to oma ntua contains the value of continuity in land use and ecologically to create stability in the pattern of land use and natural resources.

4. The value of mutual cooperation

Value of mutual aid still very strong within the everyday people who follow the philosophy Hintuvu Toro. The phenomenon of mutual cooperation visible in the everyday life of society Toro among others in the processing of agricultural land, managing the forest resources collectively, bring forest products such as rattan and wood from the forest to the village, repair traditional houses, houses of worship, marriage ceremony, and also mutually reinforcing if any member of society unfortunate.

E. Identification of Local Wisdom Values in Society Utilization of Forest Resources Ngata Toro

The pattern of the distribution of forests and land and forest product utilization by the community Ngata Toro is a local knowledge-based conservation that aims to preserve the environment and use of natural resources and sustainable. Local knowledge is important to be exhumed and returned to the students are teaching, in this case serve as a source of learning biology.

AETC (Association For Education Communication and Technology) in [22], classified source of learning in to six, there is Messages, People, Materials, Devices, Techniques, and Setting (Environment). Based on the statement, the values of local wisdom of Ngata Toro community in managing forest resources can be used as learning resources that human interaction with environment.

The result can be used as input in preparing biological learning resources relating to the standard of competence to analyze the utilization and conservation of the environment in high school. The result also can be taken into preparing matter that related with preservation of the environment and respect of student to local wisdom and their potential region for increase their good attitudes.

CONCLUSION

Local wisdom is one of the cultural heritage of Indonesia characteristic that is important to explored, maintained, and learned to students through the learning process. The main goal of local wisdom in the community is the conservation and sustainable use of natural resources. The value of local wisdom in zoning of the forest, regulation in land use, and regulation in of the forest harvesting of Ngata Toro community have indentified values, such as, the value of environmental conservation, balance value, sustainable values, and the values of mutual cooperation. Local wisdom is important to extend with the next generation because local knowledge is relevant principles and values inherent in sustainable development. These values are implemented as a biological learning resource which derived from the competences standard of analyze the utilization and conservation of the environment.
ACKNOWLEDGMENT

1. Lembaga Pengelola Dana Pendidikan Republik Indonesia (LPDP RI) as a sponsor in this research.
2. Dr. Bambang Supriatno, M.Si as the Head of the Biology Education Department of the Graduate School of Indonesia University of Education.
3. Dr. Hj. Siti Sriyati, M.Si and Dr. Yayan Sanjaya, M.Si, as a supervisor who always provide input and guidance to the author.
4. Mr. Mulyanto Dharmawan (Head of Toro Village), Mr. Naftali B. Porentjo (Leader of Community Ngata Toro), Mrs. Rukmini P. Toheke (coordinator of Tina Ngata, Toro), Mr. Said Tolao (coordinator of Tondo Ngata), thank you for cooperating and providing great information to the Author.
5. To both parents, thank you for the prayers that were offered for the smoothness of the study of the author, as well as to the beloved husband and Ananda Saifany Al-Khanza who always faithful to accompany and give great support to the author.

REFERENCES


