Local wisdom values of the Baduy tribe: the potential to develop biology teaching materials of high school grade X

A Faridah1*, Y H Adisendjaja1, S Sriyati1

1 Departemen Pendidikan Biologi, Universitas Pendidikan Indonesia, Jl. Dr. Setiabudi no. 229, Bandung 40154, Indonesia

*Corresponding author’s email: adefaridah@upi.edu

Abstract. The Baduy have a set of customary rules (pikukuh) and habits that are passed on to their offspring through oral language that can fade over the times. Important local wisdom is introduced to students as part of the learning process because it is close to everyday life, one of them through teaching materials. Therefore, the purpose of this research is to analyze the values of the local wisdom of the Baduy tribe to develop biology teaching materials in class X (ten) of High Schools. Data collection through interview, field observations and documentation is analyzed descriptively. The primary data in this study is the Pikukuh tribe in environmental management. The results showed eight pikukuh in environmental management could be appointed to develop teaching materials. Pikukuh contains local wisdom values including conservation values, sustainability values, the balance values of environmental care values, politeness values, discipline values, and cultural values. These values can be internalized into biology teaching materials in one of the basic competencies in class X of Senior High School, namely analyzing information/data from various sources about the ecosystem and all interactions that take place in it and simulating interactions between components in an ecosystem.

1. Introduction
Indonesia has ethnic and cultural diversity. There are 497 types of tribes in Indonesia based on one hundred and two (102) largest tribes spread from Sabang to Merauke [1]. Each tribe has customs with different local wisdom. This local wisdom makes a tribe special. Local wisdom is a basic knowledge obtained from the life that is balanced with nature [2]. It is this balance with nature that makes tribes in Indonesia deserve to be a reflection of sustainable life. This also makes the living environment of indigenous peoples sustainable. One who still holds tightly to the customary rules is the Baduy tribe.

The Baduy tribe is located in the southern region of Banten Province, precisely in Kanekes Village, Leuwidamar District, Lebak Regency. Baduy tribe is a tribe that still adheres to the rules of adat or pikukuh originating from ancestors. The Baduy people see the universe as "one sky sky, one and the other weak". The obligation of the Baduy for taneuh prohibition is to preserve it as best as possible according to the will or message of Karuhun (ancestors). Pikukuh or customs and norms are not only a reference to all their behavior but also guidelines as well as social control of their behavior [3]. The
Baduy are divided into two groups, namely the Outer Baduy and the Inner Baduy. The Inner Baduy community is not permitted to use modern technology in daily life, while the Outer Baduy community has been heavily influenced by modern technology. The Outer Baduy community is a group of people who were banished from the Inner Baduy for violating customary rules. Even so, the Baduy people still maintain a good environment and have a natural ecosystem that is still maintained. Each region is protected by pikukuh and carried out in the habits of the Baduy community. Violations of pikukuh will get sanctions from the adat leader or from nature as something considered sacred. This habit of maintaining the balance of nature can be used as an example for students to keep the ecosystem sustainable [4].

Local wisdom is passed down from generation to generation through oral traditions that develop in the community. This makes local wisdom vulnerable to disappear as the times progress. Therefore, it must be lowered and socialized to the general public so that the local wisdom is also taken care of by people outside the Baduy community. One of them is by providing local wisdom-based teaching materials to students in high school (SMA).

Teaching materials are a set of materials that have been packaged in such a way that they are in accordance with the demands of the curriculum to be taught to students who are able to be in harmony with the development of students [5]. Teaching materials contain material, messages or subject matter in the form of ideas, facts, concepts, principles, rules, or theories that are included in the eyes of training according to scientific disciplines and other information in learning. Teaching materials are also able to facilitate reading and writing activities [6]. Both of these activities support each other and can improve other abilities in the process, such as the ability to think and communicate and militate the environment.

General and uniform teaching materials that are used in all regions of Indonesia, causing the context of local wisdom not conveyed to students. Therefore, one of the innovative teaching materials is teaching materials that internalize the values of local wisdom while remaining based on the basic competencies established by the national curriculum. The teaching material must take the elements of the local environment as media and learning resources. Entering the components that train the skills that must be mastered by students also makes the teaching material more qualified. Therefore, analysis of local wisdom to be integrated into teaching materials needs to be done.

2. Methods
This research uses a descriptive method. The subjects in this study were six people in the Inner Baduy tribe, Banten Province, using purposive sampling. The object of local wisdom analyzed is traditional and customary rules (pikukuh) related to environmental management in the Baduy tribe. Data was collected through field observations, interviews and documentation. The data obtained were analyzed descriptively using an analysis model according to Milles and Huberman [7], namely data collection, reduction, data presentation and conclusion.

3. Result and discussion
The data of this study were obtained from the results of interviews with the Inner Baduy community which was supported by observation and research documentation. The primary data in this study is the understanding of the Baduy tribe in managing the environment. Pikukuh contains the rules and way of life of the Baduy community according to the mandate of the ancestors.

3.1. Pikukuh and Baduy habits
The Baduy community has the habit of maintaining and managing natural resources byate entrusted by their ancestors. Baduy people are forbidden to change the nature that existed before they were created. Many experts hypothesize the origins of the Baduy community. However, the Baduy community believes that God deliberately created the Baduy to maintain the balance of nature. The Baduy tribe
considers the nature occupied is a sacred area that must be maintained so that life remains safe. *Pikukuh* is a customary rule that becomes a guideline for Baduy people in carrying out their daily lives.

Baduy is located in the Kendeng Mountain which has a hilly natural topography. Based on interviews with the Baduy tribe, the Baduy natural ecosystem is still very well maintained. Natural ecosystems consist of mountains, valleys, forests, and rivers. Forests in the Baduy region are still rich in biodiversity because people are not allowed to take forest resources. This is believed by the Baduy community that forests are sacred areas that must be protected. There are also artificial ecosystems that are deliberately managed by the Baduy community to support their main life, namely the fields (*huma*), and the fields (*reuma*). According to Iskandar, the Baduy Society divided the area into three zones, namely the lower zone, the middle zone and the upper zone [8].

Iskandar explained that the area in a relatively flat valley forms the lower zone which is used by the Baduy community as a residential zone. Baduy people call this zone a zone of ‘*dukuh lembur*’ which means village forest. This area is generally an open area that is not planted with many types of plants, but the village is approved by the *dukuh lembur*. Village forest (*dukuh lembur*) is very lush overgrown with fruit trees, bamboo, palm and others including *leuit* as rice barns of the Baduy community [9]. Besides, based on observations there are rivers in the *dukuh lembur* adding to the diversity of ecosystems in this region. The community is free to change the airflow, the community must also use soap, toothpaste, shampoo and detergent for bathing and washing. The community defended this area by holding firmly that the ’*pondok teu meunang disambung, lojor teu meunang dipotong,* and the *cai teu meunang dituba*’ which was thrown short to the right and should not be littered. The existence of the prohibition makes Baduy people keep environmental preservation in this region. These habits of living with *pikukuh* are included in table 1 below.

### Table 1. *Pikukuh* and Baduy community habits in the lower zone

| Pikukuh | Mean | Habits | Local Wisdom Value |
|---------|------|--------|-------------------|
| *Pondok teu meunang disambung, lojor teu meunang dipotong* | Short cannot be connected, Length should not be cut meaning it does not exaggerate or reduce what already exists. | Let nature remain as it is. Maintain the authenticity of plant species. In addition, do not use modern technology in everyday life, such as using eating utensils using natural ingredients from plants. | Value of ecosystem balance |
| *Cai teu meunang dituba* | Water sources or rivers should not be defiled meaningfully regulating the condition of water resources to remain sustainable. | Not using soap, shampoo or other chemicals in washing and washing activities, using inorganic fertilizers, synthetic pesticides are also prohibited when planting rice. The community bathing area is about 300 meters from the bridge. | Conservation value |

The second zone or middle zone is above the village forest, this land is used as intensive agricultural land, such as fields (*huma*) and mixed gardens/garden fields (*reuma*). *Huma* is a paddy farm while *reuma* is a former paddy field that is laid down to form secondary forests. This land management system has great potential that has not been understood by people outside the Baduy community. Though this land management system contains local wisdom values that are following ecological principles to be able to preserve natural resources. This area is also protected by *pikukuh*, which is “*ngala kudu menta, mipit kudu amit*” which means taking must ask, harvesting must ask permission. Besides, according to Senoadji some prohibitions must not be violated by anyone including visitors who come to Baduy, such as: prohibited from changing the shape of the land, are prohibited from using chemical technology, are
prohibited from keeping four-legged livestock and when farming must comply with traditional provisions [10]. The bad system of the Baduy community also prohibits the use of synthetic pesticides. Based on the results of interviews, Baduy people have their natural biopesticides in preventing and killing pests. The community believes that when violations of the use of pesticides are violated, it will adversely affect the yields obtained. This farming or *ngahuma* activity is not only a daily activity to fulfill their food needs, but also as a part of the belief that must be carried out by the Inner Baduy community both men and women.

Table 2 below shows the *pikukuh* and habits that are carried out by the Baduy community.

| Pikukuh                     | Mean                        | Habits                                                                 | Local Wisdom Value       |
|-----------------------------|-----------------------------|------------------------------------------------------------------------|--------------------------|
| *Ngala kudu* menta, *mipit kudu amit* | Harvest must ask permission, take must ask meaningfully Utilizing natural resources must ask permission from *karuhun*. | Every family head has a *huma* which must be processed. The activity of utilizing any natural resources in the Inner Baduy must ask permission from the *karuhun*, namely by performing a ceremony. As in harvesting rice, it should not be arbitrary. Working on land may not use modern technology. The community must ask tribal chief (*Puun*) for a good day to harvest rice. Next, the *mipit* ceremony is carried out by reading offerings. Furthermore, the first picking of rice must be done on *pungpuhunan* rice planted first. Next, picking rice besides the one in the *pungpuhunan*. When harvesting rice there should not be a single bit of rice falling to the ground. The habit of people in planting rice accompanied by traditional ceremonies is a traditional habit that needs to be preserved. As well as performing rituals asking for permission is a form of courtesy towards nature that has given crops. | Environmental care value |
|                             |                             |                                                                        | Decency value             |
|                             |                             |                                                                        | Culture value             |
|                             |                             |                                                                        | Disciplinary value        |

In addition, Satriadi revealed that before *Nga-huma* was conducted, the Baduy tribe held a *Narawas* traditional ceremony. [11] *Narawas* was the earliest stage in *ngahuma*, which was the activity of clearing land from grass and trees which could disrupt the growth of rice plants. This cleaning activity was carried out simultaneously when the traditional ceremony took place. The Baduy community will not carry out the training without traditional ceremonies, nor do they carry out the narratives at all because they are afraid of being exposed to *bebendon* which results in an accident or their rice crop is unsuccessful.

The third zone or upper zone is the area at the top of the hill. This area is a conservation area that should not be made for fields, it only can be used to collect honey limitedly. Baduy people refer to this area as "leuweung kolot" or "leuweung titipan", which means that the old forest or the safekeeping forest must be preserved. This *Leuweung kolot* is also protected by a great-grandfather's mandate that reads 'Larangan teu meunang dirusak' or a prohibited forest that cannot be damaged as shown in the following table 3. If the community violates this prohibition, they will get punishment from both traditional officials and their nature.
Table 3. Pikukuh and Baduy community habits in the lower zone

| Habits | Mean |
| --- | --- |
| **Larangan teu meunang dirusak** | Prohibition must not be damaged meaningfully. No one should enter the forest forbidden, let alone use natural resources in the prohibited forest. |
| **Gunung teu meunang dilebur** | The mountain must not be destroyed, meaning the determination of the Baduy community to protect and preserve the land, plants, water and air provided by the mountain. |
| **Lebak teu meunang dirusak** | Valleys should not be damaged, meaning the determination of the Baduy community to protect and preserve the valley. |
| **Prohibition** | The forest is prohibited as a sacred place for the Baduy community and must be preserved. Forest preservation is a useful prohibition for the sustainability of all living systems within the prohibited forest and its surroundings. People who violate the prohibition and enter the forest will be subject to a penalty in the form of working hard for three months. For three months, people who break the rules can also make amends by giving sacrifices, such as ten betel leaves, jambe, gambir, lime, two meter white cloth, a keris, and redemption money (panyecep). |
| **Do not damage or divide the mountain to make ends meet. Keeping the mountain is useful for preserving natural life and the Baduy people who live in the hills so that they remain until the next descendants.** |
| **Don't cut down trees in the valley. Do not change the shape of the valley land. Do not make the valley a settlement.** |

| **Local Wisdom Value** | Conservation value | Disciplinary value | Sustainability value |

3.2. Potential material in the local wisdom of the Baduy tribe

There are much local knowledge that has been owned and run by the Baduy community in managing and maintaining the environment. The habits that are carried out still hold the principles of ecosystem balance. Ecosystem balance is the ability of the ecosystem to resist various changes in the system as a whole, in other words, the ecosystem is in a state of homeostasis [12]. The ecosystem has a component of the ecosystem that is harmonious and balanced so that when disturbances come, it can fight the situation.

Natural ecosystems that are still well-maintained provide a place for animals and plants to grow and reproduce properly. The interactions that occur in it also take place in a balanced manner. This makes the learning resources separate for students. The availability of food crops and timber producers is the main commodity in Baduy forest, such as rambutan (Nephelium lappacheum), duku (Lansium domesticum), mangosteen (Garcinia mangostana), durian (Durio zibethinus), sugar palm (Arenga pinata), bamboo (Bambusa sp) and sengon (Albizia sp). The tall and lush tree headings covering the Baduy region also make Baduy a producer of forest honey. All of the forest products are used to meet the needs of the community. The availability of various biotic components and typical biotic components makes Baduy have a high biological diversity.
Based on the results of interviews, unique land management areas like reuma are only found in Baduy. Reuma is a former huma land that has been re-planted with fruit plants and has been sterilized for more than 2 years, making the land undergo secondary succession. This has been done by the Baduy community for generations. Senoadj mentioned that reuma for many years will experience a renewal of nutrients and become a secondary forest that can be reused as human resources [10]. Returning the land to huma again also cannot be done carelessly. Must-have criteria for large diameter woody trees and high shrubs. Land clearing for huma was carried out with a series of traditional ceremonies as an event asking permission from Karahun.

Based on the natural potential and local wisdom possessed by the Baduy, many things can be explored from the forest, mountain, valley, river, huma and reuma ecosystems. The existence of plants and animals that live in it can be used as examples to understand theories such as biotic and abiotic components, the organization of life, the role of organisms in ecosystems, interactions between ecosystem components, succession, and ecosystem balance. Students are not only invited to discover facts and develop concepts, but also to set an example in protecting the environment sustainably. Based on the 2013 curriculum, it corresponds to the basic competencies of class X (ten) at 3.10 analyzing information/data from various sources about the ecosystem and all interactions that take place in it and the basic competence 4.10 simulates the interactions between components in an ecosystem [13].

4. Conclusion
The powers of the management environment including Gunung teu meunang dilebur, Lebak teu meunang dirusak, Pondok teu meunang disambung, Lojor teu meunang dipotong, Mipit kudu amit, Ngala kudu menta, Cai teu meunang dituba, Larangan teu meunang dirusak. The values of local wisdom as the value of conservation, sustainable value, balance value, environmental care value, decency value, discipline value and the value of culture. The value of local knowledge can be internalized into the material class X based on competence 3.10 analyze information/data from various sources on the ecosystem and the interaction that takes place in it and the basic competencies 4.10 simulate the interaction between the components in an ecosystem.

5. References
[1] Arifin E N, Ananta A, Wahyu Utami D R, Budi Handayani N, and Pramono A 2015 J. Asian Population Studies 11 3 233–256
[2] Miss Roikhwanphut Mungmachon 2012 J. Int. Journal of Humanities and Social Science 2 13
[3] Suparmini et al 2013 J. Penelitian Humaniora 18 1 p 8-12
[4] J Iskandar dan Budiawati S.Iskandar 2017 J Biodiversitas 18 3 928-938
[5] Saeful Anwar 2017 Pengolahan Bahan Ajar (Bandung: Pascasarjana Universitas Pendidikan Indonesia)
[6] Yayah Churiyah 2010 Komunikasi Lisan dan Tertulis (Bandung: Universitas Pendidikan Indonesia)
[7] M Matthew 1987 Qualitative Data Analysis (London: Sage Publications)
[8] J Iskandar 2018 J. Biodiversitas 19 p 1334-1346
[9] J Iskandar 1998 Dissertation (United Kingdom: University of Kent at Canterbury)
[10] G Senoadj 2003 Kearifan Lokal Masyarakat Baduy dalam mengelola Hutan dan Lingkungannya (Yogyakarta: Pascasarjana Universitas Gadjah Mada)
[11] Y Putu Satriadi 2015 J. Patanjala 7 3 p. 559-574
[12] Rasosoedarmo, Soedjirin, K Kartawinata, and A Soegiarto 1985 Pengantar Ekologi (Jakarta: Fakultas Pascasarjana IKIP Jakarta)
[13] Kementrian Pendidikan dan Kebudayaan 2016 Silabus Mata Pelajaran Sekolah Menengah Atas (SMA/MA) Mata Pelajaran Biologi (Jakarta: Kementrian Pendidikan dan Kebudayaan)