Utilization of *sar* culture as teaching material on environmental physics

T G R Hallatu¹, I D Palittin², H A Kaikutui², A K Hermansyah¹, R Purwanty¹ and A Duli²

¹Department of Pre-School and Elementary School Education, Faculty of Teacher Training and Education, Universitas Musamus, Merauke, Indonesia
²Department of Physics Education, Faculty of Teacher Training and Education, Universitas Musamus, Merauke, Indonesia
³Faculty of Cultural Sciences, Hasanuddin University, Makassar, Indonesia

E-mail: ophan_ambon@yahoo.co.id

Abstract. The *sar* culture is a culture owned by the Kanum tribe, one of the tribes that inhabit the Tomer village, Naukenjerai District, Merauke Regency, Papua, Indonesia. This culture forbids humans to take or cultivate an area that has been enforced by *sar*. This study aims to reconstruct indigenous knowledge of the Kanum tribe through the *sar* culture, which is considered important to be applied in the teaching materials of environmental physics. This type of research uses descriptive qualitative research with an ethnoscience approach. Data was taken through interviews with customary leaders and some reliable sources. The results show that the *sar* culture can be used as a teaching material for environmental physics and as a way to keep the nature and culture of the Kanume tribe as well.

1. Introduction

Merauke Regency is one of the Regencies in Papua Province, Indonesia. Merauke Regency The Merauke area is dominated by swamps and forests. The area of the swamp area of Merauke is ± 1,425,000 Ha, and the forest area of the Merauke area is around 4,677,832 Ha [1]. The large area of Merauke Regency makes Merauke rich in natural resources. In addition to natural products, Merauke is also rich in culture, because Merauke has several tribes with their respective cultures.

One of the tribes in the Merauke area that still holds strong culture is the Kanume tribe. The Kanume people themselves inhabit the Sota, Wasur, and Tomer areas, Naukenjerai District. One of the cultures of the Kanume tribe in protecting the forest is through custom/culture known as *Sar*. The *Sar* culture is a culture which in principle prohibits humans from processing natural products from a forest for a certain period of time [2].

The development of science in the education world is increasingly rapidly causing the information to be faster and without limits. Education can be used as the development of culture and the empowerment of a person's potential to inherit culture. One way that culture can be maintained and can remain in
synergy with science is with the *ethnoscience* approach. Learning about science based on local wisdom (ethnoscience) is the process of reconstructing original science in society into scientific science [3].

Physics lessons are one of the lessons that are considered frightening for most students because many students think that taking physics lessons is always related to calculations. In fact physics itself does not only discuss formulas or calculations, but there is some physical material that applies more to the concept. One of them is a branch of environmental physics. Environmental physics is a branch of physics that studies objects physically related to environmental theory concepts including ecological systems and environmental pollution [4].

Based on the background above, this study will discuss the cultural sects of the Kanume tribe as teaching materials for environmental physics.

2. Literature

2.1. Ethno-Science / Indigenous Science

Ethno-science/indigenous science is a study of the culture of society and events related to nature that are found in society. Ethnography is hereditary and is an authentic knowledge of society [5]. Another opinion about the definition of the concept of ethnoscience, namely: "The concept of ethnic leads to a cultural paradigm which reveals that culture is not physical but in the form of knowledge that exists in human memory [6]. Ethnography is the activity of converting scientific science with original science. Indigenous science knowledge consists of all the offensive knowledge about people's lives. This knowledge comes from beliefs that are passed down from generation to generation. The scope of original science knowledge covers the fields of science, ecology, medicine, agriculture, and about the benefits of flora and fauna [7].

Regarding ethnoscience, Sugiyono revealed that *ethnoscience* is one of the qualitative research designs, through cultural studies of a group by conducting observations and interviews with groups that are used as objects of research [8]. Another opinion about *ethnoscience* revealed is that *ethnoscience* studies many classifications to find out which systems are used, to organize the environment and things that are considered crucial by an ethnic, population of a culture. The use of the ethnoscientific approach in this study is because the cultural culture can be reconstructed into scientific science so that it can be used as a teaching material.

2.2. Environmental Physic

Environmental physics is a branch of physics that deals with objects physically which are related to environmental theory concepts including ecological systems and environmental pollution [4]. In environmental physics, environmental pollution is the main study material [4], one of which is examined in environmental pollution is a method of prevention from environmental pollution. Environmental physics also discusses heat energy, temperature, humidity, water vapor, wind, radiation, and the relation of living things to the environment [9].

A statement about environmental physics was also given by Mason and Hughes who stated that environmental physics is the response of living organisms to their environment in terms of processes and environmental problems [10]. The problem in question is a problem that refers to the social and political context.

2.3. Sar Culture

The *sar* culture is a native culture of the Kanume tribe that is associated with nature conservation. This cultural implementation is carried out when someone dies, that is by applying the *sar* to the area that belongs to the deceased person. This was done with the intention of respecting the deceased person [11].

The *sar* implementation itself is coupled with traditional ceremonies which are generally led by traditional heads or elders of the Kanume tribe. An area that is applied to this site is given a *sar* sign called *misar*, with a test that the community knows that the area is being applied to the *sar*. The duration of implementation is at least 1000 days [11]. If in the implementation of the community there are people who violate by taking or processing natural products from the area, they will be subject to traditional
sanctions. According to I Ngurah Suryawan sar intentionally carried out to give punishment to people who intentionally destroy nature, besides that it is also useful for preserving nature [12]. If you find signs such as wood, ties, or areas with sar writing, you can be sure that at the location being applied sar, then don't look for something in that location.

2.4. Material Teaching
Learning that is interesting, effective and efficient certainly requires innovative teaching materials. For this reason, a professional teacher is required to be creative in being able to develop teaching materials that are innovative, varied, interesting, contextual and in accordance with the needs of students. Teaching materials are a set of learning tools or facilities that contain learning material, methods, explanations and ways of evaluating which systems are interesting and systematic in order to achieve the expected goals, namely achieving competence or sub-competence in all its complexity [8].

The teaching material referred to in this study is teaching material in the form of writing, in which the original knowledge of the Kanume tribe concerning the cultural sarcasm contained, which will be reconstructed into scientific science. These teaching materials will later be used in environmental physics courses.

3. Method
This research was conducted in Tomer village, Naukenjerai District. Tomer Village is a village where the Kanume tribe lives. The research method used was descriptive qualitative with the ethnoscience approach. Data retrieval is done by interviewing several people, such as village heads, traditional leaders, and traditional elders. Data that has been obtained, analyzed using descriptive analysis techniques.

4. Result
Based on the results of observations and interviews with one of the Kanume tribal elders, information is obtained that the Kanume tribe that inhabits the Tomer area, Naukenjerai is divided into several clans, namely the Ndimar, Mbanggu, Gelambu, and Kul genera. Besides Tomer village, the Kanume tribe also inhabits several villages in the Naukenjerai district and Sota district. The villages include Onggaya, Tomerau, and Kondo in the Naukenjerai district, while in the Sota district they are in the Yanggandur and Rawa Biru villages.

Sar is a native culture of the Kanume tribe that is related to the environment. In principle, the culture of sar prohibits humans from taking or processing something from the place where the sar is applied. Sar implementation is carried out if there are people who have died, and the place where the sar is applied is the land or hamlets belonging to the deceased person. the time for implementing sar is approximately 1000 days.

Sar culture is a very sacred culture. The implementation began with a traditional ceremony attended by all Kanume tribesmen. The place applied by the sar is given a sign according to each clan. The mark given is in the form of a coconut palm tied up, and each clan has its own binding method. The giving of this mark is intended so that the community knows that the place is being applied to the sar and they do not violate. If someone violates, it will be subject to customary sanctions.

Indirectly, sar culture influences nature conservation. At a time when there is no human being taking or processing something from the place where the sar is applied, all living things that live in that place, whether plants or animals can grow and reproduce without interference. This can make the population of plants or animals increase rapidly. Enforcement of plants is also useful for maintaining the preservation of plants and animals that are rare or endangered.

Sar culture is also useful in reducing the greenhouse effect, which is the absorption of carbon dioxide gas [2]. Trees, which are the best absorbers of CO_2, can grow well in places where they are applied. This makes, sar culture can be one way or alternative to reduce the greenhouse effect.
4.1. Sar Culture As A Material Teaching of Environmental Physic

Environmental physics is a branch of physics that talks about environmental problems that are examined in physics. The settlement of environmental problems is also expected to be solved by physics too. Physics learning is done with two motivations, namely increasing students' understanding of environmental problems and also creating realistic work perspectives for physicists [10].

One of the materials discussed in environmental physics is nature conservation and global warming. As is known, one of the problems that are being talked about at this time is the two things. Scientists and governments in every world, think of various ways to be able to preserve nature and also reduce the occurrence of the greenhouse effect. Many ways are done, both in a traditional way and in a modern way.

Sar culture which in principle can preserve nature can be explained in environmental physics. When a place is implemented sar, all that is in it, both biotic and abiotic components can function properly. Biotic components, in this case, are plants and animals, can reproduce well without interference. In addition, the activity of plants with these animals can also take place well. Abiotic components can also interact with biotic components properly. If the interactions that occur are going well, a balance of the environment will be created so that everything in them can live well.

Plants that can live well without interference from a human can be a good CO₂ absorbent. Through the process of photosynthesis, plants absorb CO₂ and will release O₂ gas which will be used by other animals and plants. The absorption of CO₂ gas by a plant depends on the surface area of the plant leaves. The more leaf surface area, the more CO₂ gas is absorbed. If the plants in the place where the sar is applied grow without any interference, indirectly, the tree can also absorb large amounts of CO₂.

The explanation of the ethnoscience of this great culture can be used as material or teaching material in the study of environmental physics. The existence of this material aims to facilitate students to easily understand the concept of nature conservation and global warming. As well as students can contribute directly to maintaining and preserving nature. In addition, the purpose of making this cultural material is so that students know about the culture of Merauke and can preserve the culture.

5. Conclusions

Based on the results of the study it was obtained that the sar culture in the Kanume tribe can be studied from scientific concepts so that it can be a teaching material for students. It is expected that the teacher can correlate between the knowledge of the community and the scientific concepts that exist in the school so that learning is expected to be more meaningful. In addition, through the sar, students can get to know their culture more.

The next step for researchers is to explore the traditions and culture that exist in Merauke Regency, so that it can be reconstructed into scientific knowledge, to become a source of learning for students.

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