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Knowledge system of religious communities in watershed conservation education; case studies in Islamic Boarding Schools in East Java and West Nusa Tenggara, Indonesia

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Abstract. Knowledge of conservation education at boarding school residents grew rapidly since 1990. The residents have variety sources of knowledge and insight which affecting the owner's knowledge. Boarding schools citizen's knowledge becomes a key factor to create the basic, instrumental values and the goal values. The successfulness of knowledge transfer in order to build the values, attitudes and behavior are developing by using multiple methods of environmental education, namely: lectures, training, provision of examples and discussions. The resident's conservation knowledge lodges an interrelated system between inputs, processes, outputs and knowledge outcomes. Knowledge system that is built up is more towards emphasizing on the educational component due to the boarding school's background that has role in developing the citizens through education. Knowledge system that is built has a typical religious communities, but in accordance with the conservation objectives. Purpose of conservation education in general is to find happiness in this world and in the Hereafter a continuous basis. The purpose of conservation education is superior which include objectives to gain happiness in this world and in the Hereafter with ongoing basis comparing to the general conservation.

1. Introduction

Damage to watersheds in Indonesia is one of the unresolved issues and tends to be more concerned about. Various governmental regulations acts have been issued in the hope of improving conditions for a better watershed. The biggest impacts of watershed damage visible in various parts of Indonesia are floods and sedimentation of rivers, lakes and reservoirs. The continuing impact of the state is the disruption of economic activity and prosperity. Research by the Office of the Brantas River Basin [1] showed that the capacity of watershed management is not appropriate and knowledge of society and farmers are the main cause of damage Brantas watershed. This condition is exacerbated by high population growth and development patterns that were built on materialism and secular ideology. The ideology in practice has brought into the lives of many human situation alarming, frightening and even to a certain extent has been sparked and spread the spirit of anger and violence [2,3,4].



Research from United Nation (UN) proves that the ideals of sustainable development of the world appear to have failed. This failure was due to the development of the world suffer from distortion, where humans increasingly lost its way, has no identity, only oriented economy, and increasingly shied away from the transcendental relationship [5].

United Nations Educational, Scientific and Cultural Organization (UNESCO) declaration on environment education in the 21st century in the International Conference on Environmental Education, 2007, is stressing the importance of digging and alterative models and vision for the future of sustainability in educational activities for sustainable development [6]. The declaration also stressed the importance of finding the root cause of environmental problems that are getting worse. After three consecutive declarations were executed in 1987 and 1997, UNESCO environmental education conference in 2007 emphasized the importance of social and cultural studies to be broader, consider the context of changes in educational thinking and learning with changes in teaching methods. Besides, considering the range of learning approaches through formal education that is felt slow to make changes within the improvement, thus, the declaration also emphasized the need for immediacy maintenance of education institutions within the non-formal and informal as well as supporting the growth of a new paradigm in education circles. The recommendation has reminded that environmental education must be rooted in the harsh reality that exhausting development is takes place to plunder the planet's resources at unsustainable levels that have caused climate change and bring people to the brink of unimaginable destruction [7]. Environmental education, according to UNESCO is a process that aims to create a global community that has a concern for the environment and related issues in it, and has the knowledge, motivation, and commitment to work, both individually and collectively in the search for an alternative or a solution to the existing environmental problems and to avoid the new problems of life in the environment.

Indonesia is the country with the largest Muslim population. Population census in 2010 showed that of 240 271 522 inhabitants, as many as 85.1% are adherents of Islam [15]. Given the very large number, it is natural that environmental damage is also addressed to Muslims, besides there is no scientific evidence to refute these allegations. On the other hand, a very large number is a great potential to promote the improvement of environmental damage. Study of ethics of the relationship between man and God and nature, have sought to serve as a model for example, to be able to change the view and help people get out of this extraordinary crisis [14]. This needs to be done, given the religious traditions generally do not provide specific guidelines for responding to contemporary issues such as climate change, desertification or deforestation [11]. Need to avoid the tendency to think about the relationship between Islam and the environment using only "the right approach" that is grounded to the awareness of God rather than the fact of consciousness (morality itself), in other words, turning the region and cultural texts. This distinguishes them from environmentalist groups or conservationist grounded in the environment itself rather than text. Therefore, in addition to being a paradigm problem, the solution must also be made by affirmative action by involving all parties [16].

Research done in locations that are considered successful examples of conserving watershed, even the highest earning as environmental savior within the central government. Research was carried out to investigate the knowledge that was acquired and applied to boarding school residents for development of good watershed conservation activities. Research target is religious leaders as well as educators in the field of environment given. Results of this study will hopefully be one of the references in the nature of knowledge development and community education about watershed conservation using religious approach.

2. Theoretical Background

Boarding school is an Islamic educational institution. It's usually has a distinctive pattern of education in both educational materials and delivery methods. The difference is influenced by many factors, but the cultivation of values in order to be strong in attitude of the students is the main aim of education in schools [17]. Many boarding schools are successfully implementing a distinctive educational program, but notes on various matters relating to education were never recorded properly and so difficult to

imitate and disseminate, as well as environmental education about the conservation of forests where knowledge and values are inculcated and delivery methods have not been explored and this knowledge is very important to be used by their successors. This situation is greatly feared that would eliminate the good knowledge that has proven to unsuccessfully be transferred to the next generation, given the state of health of the religious scholars and preachers which pioneering in environmental education that has increasingly weak or have to leave the boarding school because of other duties. It is also important to recognize that the knowledge which can be submitted and used [18].

Boarding school is considered as an institution that has more capabilities in the delivery of environmental values through religious approach. The effort to incorporate religious values in conservation activities should be carried out through educational activities, and in the early stages, this process will be easier if done in boarding schools because they have an adequate knowledge of religious authority [8]. The tendency of a paradigm shift towards the inclusion of environmental education of religious aspects is now spread more widely and faster, though still in the form of concepts, opinions and argument. The development of ecological issues and religion shows that this phenomenon includes the idea of the importance of religious values in the solution of environmental problems is a response to dissatisfaction with the approach that had been done. Various ethical thinkers [9,10,11,12,13,14] argued that by looking at how worse and painful state of the environment and its impact on human life, thus man must not only have to change the course of scientific thinking, but also ethical and theological thinking. Moral and religious value system is needed in moving the feelings of the community, including the preservation of the environment for future generations. Religion became a new hope in environmental conservation efforts, given the values and attitudes that make up the concept of human nature which derived from the early practice of religion and ethics every day in the community. Among the academics and social activists in particular, religion is now recognized not only as a set of teachings (value), dogma or something that is normative, but also seen as a case study of interest about how religion is viewed as the object of study for assessment [12]. Based on a cultural perspective, religion is seen at how the divine religions are historically interpreted and practice into everyday social action. So therefore, religion is not something untouchable (untouchable), but something that can be observed and analyzed, because religious behavior must be seen and felt.

The alignments to analyze the behavior of a person or the public on the environment, there are several theories or models [19,21,20,22,23]. The model used as reference in this study proposed by Fietkau and Kessel [19]. The model consists of five variables that influence either directly or indirectly affect the pro-environmental behavior (Fig.1).

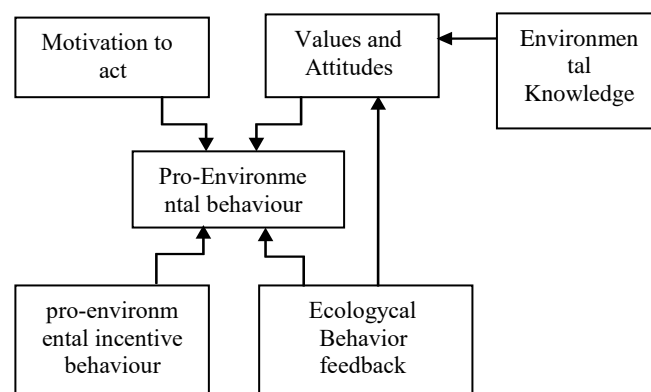


Figure 1. Ecological behavior model [20]

Variable of knowledge (*Wissen*), the main variable model [19] like forming a person's values and attitudes based on shared values and attitudes of a person to act pro-environmentally. Knowledge is an important element for the success and failure of conservation activities. Knowledge is essentially what we all know about a particular object, which includes science, thus science is a part of human

knowledge known to others as well as knowledge of art and religion [24] states that knowledge is the result of "know" and happen after people doing the sensing of a particular object. Knowledge is something that is present and manifest in one's soul and mind due to the reaction, contiguity, and relationships with the environment and natural surroundings. Knowledge is the capacity to understand and interpretation of their results of observations and experience [25].

Knowledge can be seen on an individual, group, or organizational level, there is in the form of explicit or tacit, structured or unstructured. Explicit knowledge can be recorded and easily managed (e.g. on a computer). While tacit knowledge is generally below our conscious knowledge, even we ourselves cannot realize that we have it. This knowledge includes, among others, insight, intuition, and experience. To him, we need time and personal interaction is quite intense [26,27]. Rediscovery of ecological knowledge at a potential location can be an adaptive management [28] where there is requirement to apply human and ecological [29,30,31] and adaptive strategies for natural management [32] offers prospects for scientists to address the problems that beset conservation biologists and restoration ecologists. Knowledge construction about watershed is created on the community that has proven successful conservation in a long time. The construction of knowledge will be a knowledge structure that consists of variable inputs, processes, outputs and outcomes [33].

3. Methods

The research was conducted from March 2015 to November 2016, at two boarding schools in East Java and West Nusa Tenggara. The two boarding schools are determined as research locations with strong reasons that both have a track record as boarding schools that are very active in carrying out educational activities and conservation of watershed areas. The success of the two *pesantren* is known in Indonesia and even the watershed education and conservation leaders have received environmental awards at the international level.

The determination of informants in both Islamic boarding schools was carried out purposively with the aim to focus the knowledge to be harvested. From each *pesantren*, the main data source was determined by one conservation education actor, namely a senior figure in a *pesantren* who had won an environmental award. While other figures are the helpers of figures who also help conservation education activities with varying amounts from each *pesantren*.

Other data sources are documents owned by informants. Data analysis using Miles and Huberman Model [34] was conducted for source triangulation. While the method of harvesting knowledge is carried out using the stages as suggested by Serrat [35].

Harvesting knowledge is one way to attract and package secret knowledge to help others adapt, personalize, and apply it; building organizational capacity, and preserve institutional memory. The stages of knowledge harvesting are carried out using the method proposed by the Asian Development Bank [35], as follows:

3.1. Focus

Harvesting of knowledge is not done sporadically but rather focuses on information about the knowledge that is owned and used by religious communities in watershed conservation education activities. Thus, information gathering will also only be carried out for leaders or communities who have this knowledge and/or are involved in watershed education and conservation activities. The main consideration of the focus is on the importance of the knowledge that must immediately be known and will be a threat to the environment if not immediately discovered.

Focused data on knowledge explored includes three main things, namely: 1) knowledge of conservation education inputs; 2) knowledge of the conservation education process; and 3) knowledge of conservation education output.

3.2. Find (Finding resource persons/informants)

Planning at this stage is related to logistics operational preparation in the form of tools and research materials and what information will be obtained. Research tools and materials are adjusted to the

target informants who will be used as informants, where locations will be interviewed, age, position in the organization, seniority, and others. The data obtained about this informant will affect the choice of the method used.

3.3. *Elicit (acquisition of knowledge)*

The knowledge acquisition method is done using in-depth interviews, documentation and group discussions. The three methods of obtaining knowledge are a form of triangulation (34). An explanation of the three methods of acquiring knowledge is explained below.

3.3.1. *In-depth interviews.* In-depth interviews are conducted face-to-face and are the most dominant method of acquiring knowledge. While telephone interviews are only done if there is data that requires further clarification. Interviews are conducted in an unstructured manner. This method is used considering that the information obtained will be more in-depth and able to describe the knowledge that was excavated.

Interview activities are supported by the use of audio and video recordings. Interview activities were carried out anywhere in the area where the informants had the opportunity to be interviewed. Interviews were carried out at the informant's residence, in the garden, and in the pesantren. Interviews in the locations where informants acted further strengthened the atmosphere of the interview because it was supported by evidence of the activities of informants in watershed conservation. Interview guidelines are still made to give direction about knowledge that must be explored and not overlooked. Personal relationships between researchers and informants are attempted to have no problems other than about research.

3.3.2. *Documentation.* Documents are needed to triangulate the interview data (23). Documents obtained are in the form of books or papers and freelance writings made by the characters themselves. documents also come from good news published in print and electronic media. The document provides an overview of the consistency of thinking with activities in different time paths. Documents are obtained directly from figures or from their assistants.

3.3.3. *Group Discussion.* Discussion groups are conducted to assist researchers in conducting data validation, examining the knowledge found, analysing using the knowledge of many discussion participants, and deciding whether or not the knowledge obtained by the researcher is correct. The ultimate goal of focus group discussions is to take an agreement that the knowledge found is true and in accordance with the reality in the field.

3.3.4. *Organize.* The knowledge that has been obtained is then processed using qualitative data analysis steps as suggested by Miles and Huberman (34). The knowledge that has been obtained is examined in terms of its content, consistency, coherence, and systematics. This knowledge is then grouped based on logical considerations into conservation knowledge groups which are input, process, and output.

3.3.5. *Package.* The knowledge that has been organized (processed) is then packaged into knowledge that can be the knowledge that can be read by teachers and the wider community in the form of publication of research results and information that can be accessed through the internet or delivered in scientific forums and various pieces of training.

3.3.6. *Evaluate.* Evaluation is carried out by conveying the results of the packaging of knowledge to several parties with an interest in watershed conservation and conservation education. Submission is done through lectures, seminars, discussions, book writing, internet, and other written publications. Evaluation is obtained in the form of feedback on the packaging of knowledge delivered. This feedback is monitored and reviewed at all times and records of repairs are made.

3.3.7. *Adapt.* Knowledge adjustment is carried out for specific purposes according to needs. So far, the knowledge gained can be adjusted to the need for conservation education in general, not only for the conservation of watershed areas. Adjustment of the latest knowledge is carried out by researchers in conservation education activities in schools through the implementation of conservation-based learning models [36].

4. Results

Research found that knowledge plays an important role and determine the success of watershed conservation. This fact shows that the background of the boarding school residents as educators have a huge impact of conservation strategies undertaken. Results showed that before the clerics have training on environmental basis conducted by NGO for one full year, the activities of the residents have not been done intensively. Environmental activity at that time was only had been practiced by the clerics as a private activity and not as an activity that involve more residents or boarding school residents as a form of environmental concern. These activities were not yet required as a necessity for the residents of the boarding school to help citizens systematically, so it just seems as a hereditary activity but not been taught to students or the general public.

Residents need to know about the knowledge position in order to change the boarding school paradigm thinking about the environment. This knowledge serves to broaden student and people insight about their surroundings. Thus, at an early stage, knowledge serves as an instrument to sensitize students and the community about the issues surrounding them. The next stage, knowledge serves to provide reinforcement or mental empowerment and a belief for students and the community. Based on this knowledge, students and the community have a new value on the environment. Based on the held values, the knowledge serves to shape the students and attitudes of human society to be sympathetic to the environment.

Building of conservation knowledge owned by the boarding school is a unique system that is different from the knowledge system [33]. Uniqueness is found in the knowledge materials on conservation that is more educational in activities. This phenomenon is very reasonable considering implementing conservation activities are the educators in the field of religion and the environment. System consisting of input-process-output and outcome is shown in Fig. 3. The residents of boarding school show community knowledge systems as a value system. It is rather different with several research findings that local knowledge disappearing at a rate that may not allow us even to know what value, if any, such systems had [35,36,27].

4.1. Knowledge System of Watershed Conservation Education

The existence of knowledge conservation at these sites can be distinguished by its function, namely to: 1) establish baseline values and instrumental values; 2) build practical skills of technical support activities; 3) predict and manage the results (output) of conservation; and 4) strengthen beliefs about goodness of the world and the hereafter.

Knowledge of environmental education and watershed conservation form the material for the formation of basic values. This knowledge must be tempered with the knowledge or ability to establish methodological instrumental values. The boarding school is very emphasized the methodologies to develop instrumental values. This requirement is very visible in the teaching lodge which said that "method is more important than the content". Based on these principles, the ability to develop and implement methods should be possessed by every teacher in conservation. Methods will affect the success or failure of any program, including education and conservation. Knowledge and methods is the material to construct instrumental values. Technical knowledge is helping a person or group of people to realize the instrumental values in conservation. In overall, actions of conservation indicate as the behavior of worship and have religious values. Behavior of worship is aimed at achieving goals or terminal values such as goodness in this world and good in the Hereafter. Based on these findings, it can be concluded that knowledge is the critical success factors of conservation. However, knowledge cannot be stand alone as it must be able to establish the values, attitudes and skills in the field of

conservation.

The study of knowledge systems has been carried out towards the community in community forests [37]. The study illustrates the need for knowledge (input) to take action on community forest conservation, knowledge about how to take actions (processes) and knowledge about the results obtained (output). This study not only found the three elements of knowledge, but also the knowledge related to the outcomes as shown in Figure 2.

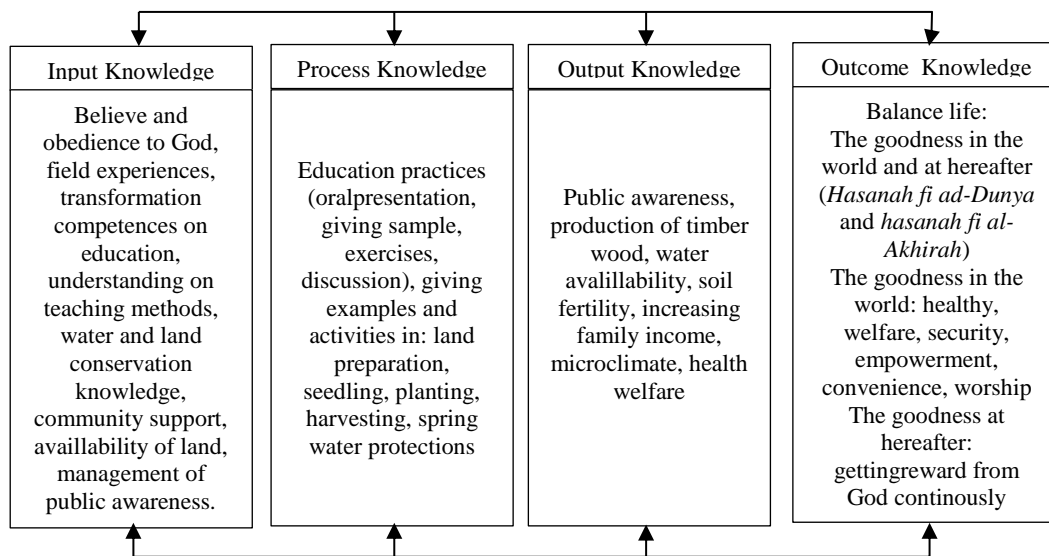


Figure 2. Knowledge of watershed conservation education component system

4.2. Input Knowledge of Conservation Education

Input knowledge of conservation education consists of high confidence and obedience to God, the knowledge component obtained from various literature sources and field experience. The other component is the ability of the material transformation of proselytizing, understanding the methodology or process of education and conservation methods, the ability to give an example, public awareness, support personnel, availability of land and capital. The knowledge used by the lodge comes from the holy book of Qur'an and some books of fiqh. Another source is through sensory experiences and the results of reading and contemplation of natural phenomena. The ability and experience of the people higher up in the environment sector continued to show high ability in concept and implementation in the field. The power of believing of boarding school residents on Lord reward of every good deed, encouraging citizens to act to preserve and be an example to the wider community

Almost the entire watershed conservation knowledge gained by the students and community was originally derived from information submitted by clerics of boarding school. In the following years the knowledge of boarding school residents and community is derived from governmental agencies that are responsible for the environment. The ability of clerics in the acquisition of knowledge about the environment is the key to determine the success of environmental education processes and products. The clerics of boarding school had gained knowledge by themselves about environmental conservation which comes from the observation through the senses of both observation and education or training. The next source of knowledge is from Islamic books that related to the environment. The last source is cleric's intuition which concern about the phenomenon in surrounding environment. The cleric's intuition is developing when dealing with environmental issues as they were demanded for solving any problems using their knowledge. The ability of combining the meaning derived from experience, reading and reflection is then called by the clerics as the ability to transform. Cleric's ability to transform knowledge to conduct environmental education is an important capability that determines the success of conservation.

4.3. *Process Knowledge of Conservation Education*

Believed by boarding school residents that their knowledge will not transfer properly if it is not done in a way or method either. As one of the processes, methods of conservation education expressed as a very important thing to do. The method is important as the principle of boarding school residents which reads: at *Tariqaatu ahammu min al-maddah, al-mudarrisu ahammu min al-tariqah, ruhu wa al-mudarrisi ahammu min al-mudarris*. Meaning: This method is more important than the material, the teacher is more important than the method, and the soul of the teacher is more important than the teachers themselves. Based on this knowledge, it is believed that the method and the teachers who have a good soul in a process is a requirement for educational and conservational works.

Educational methods are known and applied by the lodge consists of lectures, exercises, giving examples and discussion. Lecture conducted on college students and the general public. This method is performed to improve the knowledge of students and the community about the importance of preservation associated with the commandments of God. Training methods (*riyadhah*) made with reference to the book in the classical Islamic education. Used classics written by Al-Ghazali to infuse personality. Stages of education consist of stages: *taqalluh* (coercion), *ta'awudz* (habituation), *muwadzahah* (chase), and *dhawam* (continuous). Method of deliberation is applied only to the general public. The application of this method is done after the public aware of the importance of conservation. Deliberation conducted to determine the types of activities, planning and preparation of action plans.

Deliberation done well in study groups or in small group meetings for conservation. Residents of boarding school average positioning itself as a facilitator of discussion. This position is believed to be a form of solidarity instill trust between community residents lodge. The presence of the lodge is considered very important to maintain the belief that the activity is a serious activity. Instance method implemented based on the premise that the best educational method is through an example. Method of convincing examples of students and society in a given subject matter, whether delivered in the form of lectures, training or consulting. Giving examples show better results as seen directly.

4.4. *Output Knowledge of Conservation Education*

The output knowledge related with two main points, namely the awareness and benefits provided by trees. Meanwhile, students and public awareness should be created through a variety of applied educational methods. Awareness will be the basis for conservation activities which independently sustainable. Awareness of students can be seen when they have passed in which they perform their observation activities in where they live. While awareness in the community can be seen from their participation in meetings and actions that produce concrete evidence in the form of forest trees that grow well. Different types of trees planted will provide different benefits in accordance with the characteristics of the tree. Trees will provide certain benefits. Variations in the types of plants that grow will provide a variety of benefits.

Some of the boarding school residents have deliberately planted trees with high variation. Planted trees with a variety of types of behavior which are usually reserved for high school activities. High species variation is expected to provide more knowledge to students and the community. Region with a high variation of the planted trees is used as a medium of education. Knowledge of various types of trees is connected by boarding school residents as significant economic, social and ecological. The ability of trees to provide more benefits to the environment and human well-being referred to as one of nature's balance.

Knowledge of soil types associated with soil characteristics. The type of soil in the study area is referred to as "the land of unloading" or loose soil easily when exposed to rain. Several other properties of the soil is called soil rather white and slippery when wet rain. Based on soil maps of Sumenep Forestry and Plantation, information had obtained that the soils formed from sedimentary rocks belonging to the complex soil Mediterranean of grumusol, regosol and litosol. This soil type according to boarding school residents is difficult to absorb rainwater, including absorbing into the ground. Thus, efforts to save land and water in the watershed is to plant different types of crops that

benefit to the economy, water and fertilize soil that hold runoff water carrying soil particle. Some of the boarding schools are still implementing monoculture conservation with economic and conservation goals. Type of monocultures planting by residents lodge no better results when compared with planting using polyculture system. Planting using polyculture system consists of different types of timber plants, fruits and food crops or medicines. Awareness of the public thinking about conservation methods using conservation watershed vegetative is shown in Fig. 3.

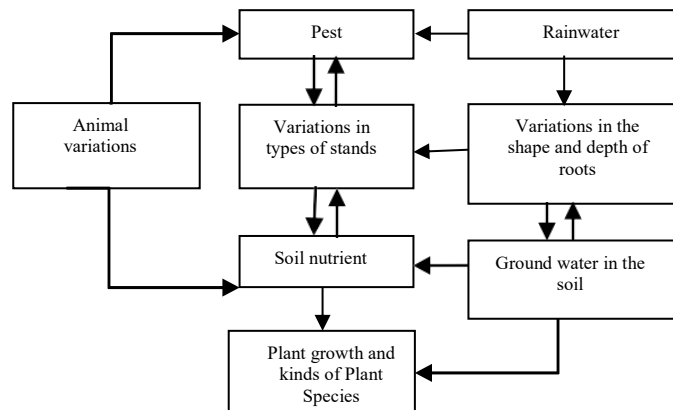


Figure 3. Knowledge about output of watershed conservation “nature balance using vegetative variation”.

Planting trees with various types have advantages over monoculture. Some of these benefits by resident’s lodge are the emergence of various types of animals to control pests or diseases that would ruin the staple crop. Variations in the type of plant will also produce waste to improve soil nutrients. While the roots of different plant species have different abilities to penetrate the soil. The difference in the ability of roots to penetrate the soil will help water into go through the soil in different variations. Increased nutrients and water in the soil causes plants to grow well. The entry of rain water into the soil causing water availability can be maintained. The complexity of plants and animals in the ecosystem is known by residents to produce more complex ecosystems. The complexity of the ecosystem will maintain a more balanced environment. Knowledge of conservation of the type implied by the knowledge that supports watershed conservation. Some researchers refer to this knowledge as traditional knowledge [27].

4.5. Knowledge Conservation Education Results

Knowledge of the results of conservation education is divided into two forms. The first form is the forms that can be seen and enjoyed as a universal good. Kindness is obtained as a result of the product (output) conservation. The second form is the only good that will be obtained in the afterlife. The second form is a gift or reward for the kindness of God to keep the earth from damage and perform kindness to provide more benefits for humans and the environment. Good in the world that is obtained is safety and environmental health, empowerment and well-being, as well as the convenience of worship. Security quieter environment causes people to worship, protected from environmental threats and even fights between fellow citizens due to limited natural resources. Economic welfare through conservation can be achieved through the method of complex thinking [38][39]. Healthy people are more awake as much clean water that can be used for household needs. Water is also a key ingredient for perfectly conducting religious activities. Empowering communities grew because natural resources are processed and used to enhance prosperity. Happiness world through conservation obtained as prayers were submitted to God.

Knowledge of the population made by boarding school resident's goodness in the hereafter support sustainable conservation. Hereafter believed kindness and consideration are expected to be obtained on a continuous basis even though people have died. Conservation being the key word for the balance of

nature as they relate to the goodness in the world and in the Hereafter an ongoing basis. This knowledge provides a new understanding of the phenomenon of human-environment interactions are controlled by scientific thought - religious. Community conservation awareness can be used as knowledge about the sustainability of watershed development [40].

These findings also suggest that knowledge cannot stand alone. In fact, people have knowledge about the values of trust that cannot be proven (the Hereafter). This perspective explains that value-free knowledge. The same knowledge can produce different values in different people. Research shows increasing awareness of ethics requires innovative and policies to maintain ecosystem function. Ethics comes from God and the growth in the community.

5. Conclusions

Conservation education knowledge of boarding school residents has developed well after the training. The main function of knowledge is to build awareness and conservation values in personal and community students. Knowledge is needed to provide more meaning to the phenomena of the environment. Given meaning that better education will provide better results. Knowledge of conservation of boarding school residents includes knowledge about the input, process, output and outcome. This knowledge forms the system of knowledge about the typical citizen of watershed conservation in boarding school residents of An-Nuqayah, Sumenep East Java that can be disseminated to other places.

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