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Some Approaches to Human Ecology and Its Conformity to the State of Indonesian Society (A Comparative Study)

Harihanto

Social Development Department, Mulawarman University, Samarinda, Indonesia

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Abstract:
Comparing several approaches in the theory of human ecology is an interesting activity; since this science was born, until now, several approaches have been developed. This paper compares the three main approaches of human ecology: cultural ecology, ecosystem models, and system approaches. The goal is to identify its advantages, weaknesses, practicality and compatibility with conditions in Indonesia. The method used is the comparison method. Through this method, it is concluded that the system approach is the best and relatively suitable for the conditions and development of Indonesian society compared to the other two approaches. The advantages of this system approach are: (1) viewing humans as rational animals and placing them into social systems separate from ecosystems, (2) connecting social systems and ecosystems through processes of selection and adaptation, as well as energy, matter, and information flows, (3) a holistic scope of study. The placement of the human being into the social system within this approach is in accordance with the empirical facts and what it should be (das sein and das sollen). In terms of human interaction with the environment, human behavior as a rational animal predominates and determines which is what is different from other biotic components. This approach is holistic since it observes all components of social systems and ecosystems to the fullest. Because the results of the study show that the system approach is the most appropriate approach to the conditions of the Indonesians, it is hoped that, in the future, this approach can be used by social researchers, who generally do not use the human ecology approach, but instead use many other approaches (sociology, anthropology, and psychology), to examine Indonesian society.

Keywords: human ecology, comparative study, conformity, Indonesian society.

人类生态学的一些方法及其与印度尼西亚社会状况的一致性（比较研究）

Corresponding Author: Harihanto, Professor, Social Development Department, Mulawarman University, Samarinda, Indonesia; email: harihanto@yahoo.com

摘要：
比较人类生态学理论中的几种方法是一项有趣的活动。自从这门科学诞生以来，到目前为止，已经开发了几种方法。本文比较了人类生态学的三种主要方法：文化生态学、生态系统模型和系统方法。目标是确定其优势、劣势、实用性和与印度尼西亚条件的兼容性。使用的方法是比较法。通过这种方法，得出的结论是，与其他两种方法相比，系统方法是最好的，并且比较适合印尼社会的条件和发展。这种系统方法的优点是：（1）将人类视为理性动物，并将其置于与生态系统分离的社会系统中；（2）通过选择和适应过程以及能量、物质和信息将社会系统和生态系统联系起来。流动，（3）一个整体的研究范围。在这种方法中将人类置于社会系统中是符合经验事实和它应该是什么（存在和达索伦）的。在人类与环境的相互作用方面，人类作为理性动物的行为占主导地位，并决定了哪些与其他生物成分不同。这种方法是整体的，因为它最充分地观察了社会系统和生态系统的所有组成部分。由于研究结果表明，系统方法是最适合印尼国情的方法，因此希望将来这种方法可以被社会研究人员使用，他们一般不使用人类生态学方法，而是使用许多其他方法（社会学、人类学和心理学）来研究印度尼西亚社会。

关键词：人类生态学，比较研究，整合，印度尼西亚社会。

1. Introduction

Since its birth to the present, human ecology studies have undergone a change in approaches. From the beginning of its birth until the beginning of the XXIII century, at least seven approaches developed. In accordance with the nature of science that is cumulative, open to new ideas, and their relative or tentative truths, the theory or approach of human ecology born later is intended to refine previous theories or as alternatives. Therefore, comparing several theories or approaches from a particular discipline, including human ecology is an interesting work.

Among the seven approaches that have been developed in human ecology, three well-known and commonly used approaches are: (1) Julian Steward's theory of cultural ecology, (2) the ecosystem model by Rappaport, and (3) Terry Rambo's system theory.

2. Purpose of the Study

The purposes of the study are to: (1) identify and know the goodness of each approach analyzed, (2) identify and know the shortcomings or weaknesses of each approach analyzed, and (3) to know the approach that best and best suited the conditions in Indonesia.

3. Results and Discussion

3.1. Cultural Ecology Approach

3.1.1. Some of the Advantages of This Approach

This theory was introduced by Julian Steward, compiled based on the results of empirical research on several cultures of society in various places (cross-cultural), so that its generalizations have a strong foothold. This theory considers that each case that occurs does not stand alone. A wide variety of cultures and environmental conditions have been studied, and an empirical analysis of each group of peoples was carried out before a broader generalization of cross-cultural similarities and differences was made. The generalization of this theory is reinforced by a comparative historical method that looks at the time-back perspective on the phenomena behind the development of a particular culture. Thus, this theory is more general and better than the two theories that preceded it: the deterministic theory of the environment and the theory of possibilism. Another plus of this theory (especially compared to ecosystem models and systems theory) is that it does not involve many parameters. In contrast, ecosystem models and systems theory involve more parameters. In Systems Theory for example, all components of social systems and ecosystems must be observed since, according to this theory, all components of social systems interact with all components of ecosystems. This theory does not analyze which components of the two systems specifically interact and are stabilizers (cybernetic functions). However, on the other hand, this simplicity (because it does not involve many parameters) is a weakness of the ecological theory of culture.

In accordance with the core of this theory, Marshall (Keesing, 1989) found the same various forms of social organization among the Bush people (Bushmen) who lived in the Kalahari Desert on the African continent with the form of social organization among the Shoshoni Indians in Nevada and the Shoshoni-speaking people in the Great Basin of the United States (Ute tribe and Paiute tribe) encountered by the Stewards. Similarly, Meggers (1954) found a similar form of social organization among ethnic groups living in marginalized areas of South America. The cultural patterns (forms of social organization) of the three ethnic groups are generally characterized by living in small, simple, and scattered or fragmented groups under the conditions of a violent, dry, arid, scarce natural environment, scarce water and food sources, or have absolutely no potential for agricultural business. Such a form of social organization is necessary, since coping with such environmental conditions requires high mobility, so that no settlement remains, and only small groups can meet the needs of their subsistence. Marshall and Meggers' findings clearly support Steward's hypothesis. This pattern of social

organization is a product of the process of adaptation of society to the conditions of the natural environment that is limited and is the cultural core of the community concerned. In contrast, different environmental conditions produce different adaptation responses. Salmon in abundance in British Columbia and Alaska causes its inhabitants to be concentrated along rivers. In Peru, where there are many deserts and rarely rains, the inhabitants are forced to live near rivers. Communities in both regions are part of different socio-cultural systems. Each community develops based on a different historical background and performs different adaptation responses.

The concept of cultural ecology can be explained by a number of substantive applications within simple societies to societies of a complex nature, from the most basic level of integration to a higher degree of integration. The theory of cultural ecology analyzes the processes of adaptation together with other processes of change. Additionally, it also studied the interaction of the community with its social institutions and natural environment. Among Shoshoni Indians, for example, Stewards, in addition to analyzing the presence of small groups that are scattered and moving around for most of the year as a product of the process of adaptation to environmental conditions, found that they sometimes camp together in the winter. On other occasions, they also cooperated in hunting and organizing religious rituals as a form of community interaction with their social institutions. Other approaches usually only highlight certain problems, for example: settlement patterns, agricultural development, and land use that occur because of complex interactions within a geographical area. The explanatory formulation of cultural ecology includes the possibility of disease attacks related to social phenomena, which in turn can affect society in the process of adaptation. But the same is also done by systems theory, and even this has been the reason behind the birth of this theory. Unlike the ecosystem model, which places humans in animal and plant ecosystems and interacts within those ecosystems, cultural ecology does not equate aspects of society with biological species. Additionally, cultural ecology includes also an analysis of people's adaptation to their social environment, because a community group in maintaining its life is clearly not only adapting to the conditions of its natural environment but also adapting to the social environment. In adapting to this social environment, they are influenced by processes of interaction with other groups, for example trade (barter), intergroup marriage (assimilation), and so on.

3.1.2. Some of the Shortcomings or Weaknesses of Cultural Ecological Theory

Additionally, the theory of cultural ecology also has many weaknesses or shortcomings, as described below.

In the theory of cultural ecology, the cause-and-effect relationship between environmental conditions and the cultural core that develops within a society is drawn based on historical analysis of the background of the formation and tracing of the adaptation process, so the validity of the data showing the existence of that relationship is debatable. The functional relationship between the two is not immediately clear. Even if this functional relationship can be demonstrated, which means that a certain function can be performed by a certain social organization, then, according to Nagel, it is necessary to prove that the function is not performed by other organizations and no other organization can perform that function. This proof is almost impossible, since it is seen that the functions performed by the same or similar organizations vary greatly, and it is noticeable that there are human abilities in forming new institutions. Although, for example, it is evident that there is a significant correlation between adaptation processes and certain cultural traits, there must be further substantiation of the cause and effect. In fact, social science experts sometimes consider certain "social" factors determinants in the occurrence of certain ecological adaptations.

Different ecological adaptations may occur in groups of people who have similar historical backgrounds. The Indians in California and the Great Basin, for example, have almost the same hunting and food-collecting equipment, although their historical backgrounds are different. The flora and fauna resources in California are sufficient to support a population of 30 times the population of the Great Basin Indians. California Indians settled in more developed settlements, while the Great Basin Indians split into small groups that were widely dispersed most of the year and gathered only during the hunting season in camps where the same family was not always present (Steward, 1968).

Although, according to Steward, the core parts of the culture of the social system are: (1) the division of labor, (2) the size and stability of local groups and their spread, and (3) settlement provisions or patterns, subsequently Stewards and their followers viewed the technology and production of subsistence and social organization (Keesing, 1989). All three, according to Steward, are places where food and other rare items are produced, controlled, and distributed, as a core part of a socio-cultural system where selective pressure is the most direct.

In introducing this theory, Steward did not analyze cultural elements that act as stabilizers or destroyers of the environment. In fact, the relationship between humans and their environment is complex and reciprocal. So, in addition to exploitation technology, which is a product of the process of human adaptation to environmental conditions, in contrast, humans also influence their environment through certain cultural elements as well, including the exploitation technology itself. Environmental exploitation using a certain culture can affect the environment drastically, both in a positive sense (maintaining or increasing carrying capacity) and in a negative (destructive) sense, which will ultimately affect the culture itself (as a reaction). In the case of bush burning, irrigation canal creation, and

swampland usage, a culture will increase its source. In the case of excessive land burning, draining mineral reserves, a culture will damage or reduce fundamental cultural aspects.

The theory of cultural ecology limits the study of human ecology to only the core of culture and discusses it from a cause-and-effect perspective, the core of culture as an effect and environmental conditions as a cause. In fact, as already mentioned above, the relationship between humans and their environment in addition to the complex is also reciprocal.

Although the theory of cultural ecology is compiled by studying various cultures and environments, it still cannot provide analytical formulations, theoretical or ideal models of cultural change. In his analysis, Steward did not consider that with the discovery of new technologies that could improve human ability to regulate and control the environment, the important value of culture and the environment changed, and the adaptation process became complex and had new aspects (Steward, 1968). For example, cultural values changed from humans as environmental conservationists to conquerors of the environment, important environmental values changed from just being a place to live and forage to being a fulfillment of human desires, and the emergence of economic aspects in the process of adaptation.

The explanation from the viewpoint of cultural ecology requires conceptual affirmation of culture since the different components of a culture give different reactions to the adaptation process. Additionally, socio-cultural systems with different levels of integrity greatly influence the interaction of biological, cultural and environmental factors. Community groups that have the technology to develop their environment beyond the ability of their parent group will be able to use resources, both inside and outside the area controlled by the parent group. The adaptation response of a more complex society is quite different from the response of a simple society that adapts mainly only to its own environment.

In his analysis, Steward also did not realize that with the development of technology, the process of directly adapting to the environment is diminishing. The lifestyle of the sub-urban community that works in the city, for example, can be divided into two: (1) some are customary in their home areas; (2) some come from where they work. The two cultures are different from each other, and they are not the result of adaptation to the environment. An example is the pattern of life of executives in New York.

In the cultural ecology approach, it is stated that in addition to the core culture, which is the result of adaptation to the natural environment, there are also non-core elements that are the result of adaptation to the social environment through diffusion of traits from society. Historical explanations, however, suggest the existence of a separate group form because of revolutionary developments. They come from somewhere, and then occupy another place instead of going through the diffusion process. As evidence is the presence of patrilineal hunting groups in South Africa, Australia and Tasmania.

3.1.3. Practicality of the Human Ecological Approach

In addition to many advantages and disadvantages as described above, the theory of cultural ecology has practicalities, as described below.

Because this approach does not involve many parameters, it is relatively more practical for development planners and implementers than systems theory, which involves many parameters. Applications or research using this approach can be started by only paying attention to aspects that are thought to be the cultural core of the community concerned. An example of this aspect is exploitation technology because empirical studies show that in ancient societies where the main problem was survival, differences in social systems turned out to be closely related to the way people exploited their environment. Additionally, according to Stewart, exploitation technology is one of the core parts of the socio-cultural system where selective pressure is most direct.

3.1.4. Conformity of the Cultural Ecological Approach to Conditions in Indonesia

If it is related to the current conditions in Indonesia, by the past history, the application of the cultural ecology approach is not entirely correct. This approach seems only appropriate if it is used to look at the socio-political system that is developing in Indonesia. As Stewart said, besides being the result of adaptation to natural environmental conditions (through exploitation technology, population patterns, and socio-economic organization), it is also shaped by the diffusion of other societal traits. The socio-political system that has developed in Indonesia so far, aside from being the result of adaptation to the conditions of the natural environment, is also influenced by the traits of other nations, especially the Dutch, which had colonized Indonesia for about 3.5 centuries. This can be seen, among other things, from the education system, law and social services, which still refer to or are a product of the Dutch colonial government.

Likewise, if this approach is used to look at exploitation technology or production methods that are developing among the Indonesians, this approach is actually more inaccurate or inappropriate. According to this approach, exploitation technology that develops in a society is usually the core of culture, which is part of a socio-cultural system that is under selective pressure directly from its natural environment, so that it is merely the result of adaptation to the conditions of the natural environment. The sedentary farming system (paddy field system) on the island of Java, for example, can be seen because of adaptation to fertile soil conditions and many people (labor). The soil on the island of Java is relatively fertile because many active

volcanoes are a source of minerals needed by plants through their eruptions, so the land can be cultivated throughout the year. A large population also supports this system because this agricultural system requires a relatively large number of workers.

If this view is correct, the paddy field system should only develop in areas that receive water supply throughout the year – mountainous areas and around water sources. However, in reality, this rice field system extends to every area in Java, including areas that only get water supply from rain (rain fed rice fields), which can only be planted with rice once a year. In the dry season, many of them are left fallow or planted with secondary crops because they cannot be planted (lack of water). Even if crops are planted, the yield is usually not much because there is too little water, except in the transition season ("labuh," Java), which is the beginning of the rainy season.

From the facts and explanations above, the sedentary agricultural system that developed on the island of Java is more of an adaptation of the community to the population. The increasing number of residents causes the land to be narrower to be used as shifting fields or hunting grounds. Additionally, the growing population also demands a more reliable supply of food and have to live sedentary lives, not moving (as nomads) as before. Even if at the previous stage they were not familiar with the shifting cultivation system, it means that the shift occurred directly from the gathering, hunter and gatherer communities to the sedentary farming communities. This happens because, after the population increases, subsistence by collecting wild food ingredients from nature, hunting, and looking for fish is no longer effective, unreliable, the hunting areas are getting narrower, wild food ingredients and game animals and fish are decreasing in population. Rambo and Sajise (1984) stated that the pressure of population growth and resource requirements have changed the role of human ecology. Humans turn into environmental managers, who are assumed to be responsible for the planning, development and maintenance of the ecosystems on which they depend for their survival (Rambo & Sajise, 1984). Meggers (1954) found that at the level of tropical forest culture in South America, where the population began to increase and began to live a sedentary life, exploitation technology (subsistence) evolved from gatherers, hunters and fishers to slash and burn techniques cultivation.

Based on the facts and explanations above, it can be concluded that the exploitation technology that develops in a society is not only determined by the conditions of the natural environment, but can also be determined by the social conditions of the population. The relationship between technology or production methods with social conditions of the population is not only one-way (in the sense that exploitation technology affects population patterns) as stated by Steward so far, but can also go back and forth (in the sense that population can affect exploitation technology). With the same explanation, the Dayak people on the island of Kalimantan, who currently still practice shifting cultivation, will one day also practice sedentary agriculture if the population pressure is such that it is no longer possible for them to shift cultivation. This shifting cultivation system is not solely the result of their adaptation to barren or nutrient-poor soils (most of the nutrients in the tropical rain forests of Borneo are bound in forest vegetation, most of the soil there is red-yellow podzolic soil, which is relatively acidic with low base exchange capacity), but also the result of their adaptation to relatively large land (forest).

Another evidence that the exploitation technology that has developed in Indonesia so far is not entirely the result of community adaptation to the conditions of the natural environment, but also (and maybe even solely) the result of adaptation to population growth is the fact that the ancestors of the Indonesians were known as sailors. masters from Indochina who came to Indonesia by traversing thousands of nautical miles, but why is the exploitation technology that has developed in Indonesia up to now not in the marine sector, but in agriculture? Why does most of Indonesia's population today actually live as farmers even though most of Indonesia's territory is in the form of oceans? At the beginning of the arrival of the ancestors of the Indonesians from Indochina, of course, they lived in coastal areas because they came by sea and were still developing exploitation technology in the marine sector (fishing technology). However, after their numbers grew and the coastal area was relatively dense, they began to move inland looking for a place to live and become gatherers, hunters and gatherers, before finally developing exploitation technology by using permanent cultivation. In addition to being farther from the sea, fishing in the sea has a greater degree of uncertainty and risk (depending on the season) than farming. Based on the discussion above, the theory of Cultural Ecology seems inappropriate and cannot be used to explain the conditions that develop in Indonesia.

4. Ecosystem Model

4.1. Ecosystem Model Advantages

The ecosystem model places humans as components of an ecological system (ecosystem), both as biological beings and as intelligent beings (Homo sapiens, animal rational) in accordance with their natural nature, so that analysis of the dynamics of human behavior toward their natural environment can be done by applying the concept of ecology (Vayda & Rapapport, 1968). This is its meekness, in addition to being an advantage. The relationship between reciprocal physical, biological and socio-cultural components is integrated into an analysis system, namely an ecosystem. The cybernetics model is also applied in this theory to explain the condition of systems that are in a stable or changing state. Rapapport's (pioneer of this approach) research on the Tsembaga Maring culture in Papua New Guinea is a classic example of the successful application of this

approach. In this study, Rapapport found that cultural components, namely ritual ceremonies in the form of pig-cutting parties (Kaiko) and wars between groups, are key factors that regulate the dynamics of socio-cultural interaction with nature. The Kaiko party and the war between the groups have turned out to have served as mechanics of the homeostatic process for the ecosystem in which the Tsembaga people live, namely a tropical rainforest ecosystem with hilly topography and narrow valleys.

According to Rapapport, the slaughter of these pig sacrifices has a physically adjusting effect, although the person who does so may not be aware. When pigs are slaughtered inside a Kaiko party or sacrificed to ancestors to treat someone's illness, that involved obtaining pork as a high-protein food that means a lot in physical tension (wars between groups). However, this Kaiko party and pig sacrifice turned out to be the regulator that controlled the number of pig livestock populations. When these cattle are already breeding, the burden of feeding requires the expansion of the garden and a huge investment of energy (ahead of the feast Kaiko Rapapport noted that pig herds consume 54% of the sweet potatoes harvested and 82% of the cassava, and their gardens are 36% wider than after the party is over). The insistence on revoking the rumbin as a sign of the start of the Kaiko party came from women who must feed the constantly breeding livestock or by quarrels caused by pigs damaging the garden.

Meanwhile, intergroup warfare (usually between nearby groups) has served as a regulator that controls the population of Tsembaga Maring. Rapapport believes that the rite cycles of the above-mentioned Tsembaga tribes have maintained the balance of ecosystems, preserved neat relationships between local groups, re-divided sources, including trading in rare items and much-needed animal proteins (Keesing, 1989).

Rapapport's view in this approach that views the human being in his environment as a very complex network of networks traversed by information, a network that includes cultural beliefs and their various impacts, and ecological events is very innovative, although initially difficult to understand. This view provides broader analysis opportunities than other relatively simpler approaches, including the cultural ecology approach that limits human ecology to only the cultural core, thus providing no broader analysis opportunities.

4.2. Slowness or Disadvantages of Ecosystem Models

In introducing this approach, based on his research on the Tsembaga group, Rapapport stated that proteins obtained at Kaiko party customs can last until the next Kaiko cycle. In fact, according to the nutritionist McArthur (Keesing, 1989) the protein will disappear, it cannot be stored until 5 – 10 years, which is the cycle of organizing a Kaiko party.

Similarly, to Steward, in determining which environmental factors cause the emergence of certain cultural cores in his cultural ecology approach, the ecosystem picture by Rapapport introduced based on the study of the Tsembaga group also seems so smooth, that it suggests the existence of engineering, in the sense that the conclusion is adjusted to the "wishful thinking" that was already in his mind before he was appointed to conduct the study.

The placement of humans as components of ecosystems, both as biological beings and as cultured social beings (animal rational or Homo sapiens), in addition to being a advantage of this approach, is also one of its weaknesses. History shows that as an animal rational, human reason turns out to be very dominant in interacting with its natural environment. This means that more attention must be paid to humans in their position as a sensible component of the ecosystem. In this context, Rambo's systems approach that incorporates humans into social systems seems more appropriate. But the non-inclusion of humans as biological components of the ecosystem is Rambo's weakness. According to Bennet and Chorly, the system of social government cannot be fully integrated into the ecosystem.

If it is true that, in the case of the Tsembaga people the ritual cycle of kaiko parties and wars between groups acted as regulators or "homeostat" for the ecosystem in which they live, then Rapapport views the Tsembaga people as mere biotic components, invariably other biotic components (animals and plants). This agrees with his statement that the act as a regulator or homeostat was not realized by them. As has been explained above, in addition to being biological beings, humans are also Homo sapiens, whose intellect dominates, including in interacting with their environment. All human actions have usually realized their purpose. So, seen from the human side as a component of a sensible ecosystem and a social being, the actions of the Tsembaga people can only be called the homeostat of their ecosystem if done consciously. If that does mean that the concept of ecosystem equilibrium they already have, something that is impossible in such a primitive society. Even if there is, the nature they have is not to waste resources because their desires are not much; they are just meeting their basic needs.

The consequence of this approach is that the concepts of ecology can be applied, including to explaining the evolution of culture. In fact, the concept of biological evolution should not be used to explain cultural evolution. The use of analogies to address this issue also raises the issue of interpretation. The analogy used in the past may not be reliable because if the thinking of the present and past societies is the same in some aspects, it does not mean that other aspects will be the same anyway.

Recent data collected by Hide (1980) among the Chimbu tribes of the Irian plateau, and Salisbury among the Siane tribe showed something contrary to that

discovered by Rapapport among the Tsembaga tribe, who Rapapport said were unable to carefully control and plan the number of his pig herds. The latter two societies turned out to be able to carefully control and plan the number of their pig herds. Even if the number of their pig herds increases, this is not because of a "natural" process beyond human capabilities, but through a systematic maintenance strategy, with the aim of forming a herd of cattle, so that various exchange parties (barter) can be carried out (Hide, 1980). The dynamics of the pig population, which, Rapapport says, is "natural" beyond the ability of society or is the nature of pigs and to which the Tsembaga community conforms, is the result of deliberate planning by its maintainers. The view of a society that passively adapts belief institutions or systems of exchange to the demands of nature, as suggested by Rapapport, is no longer tenable, except (perhaps) in the most primitive groups of societies. (Modern) humans generally organize their productive efforts around the goals they have set out in a way, not the other way around.

To state that a socio-cultural system brings a population into a stable balance within an ecosystem requires detailed ecological data and proving ecological connections over a long span. Looking at a population over a period of two – three or even 10 years, concluding that what they did was for the sake of maintaining balance as Rapapport did would never be adequate. Such short-term studies cannot show us how the ancestors of the Tsembaga people used to live in an environment as observed by Rapapport later, in which the custom of planting rumbins or patterns of warfare and ritual prevailed, unless Rapapport immediately discovered that they were done for the first time by the Tsembaga people, and they clearly stated their purpose, namely to maintain the balance of the ecosystem. In this context, the Comparative History method used by Stewards is relatively better. However, because this method is used to find the existence of a cause-and-effect relationship, it finally seems that the weakness is.

Excessive simplification and the notion that the habits of ecologically tribal societies are adaptive as natural selection and to maintain equilibrium relations with ecosystems are quite dangerous. The ecosystem approach to human populations might be more beneficial if it doesn't just think about how a particular local group or community adjusts to its environment (as Rapapport did with the Tsembaga tribe), but rather observes the various sets of human populations close to each other (and perhaps affecting each other) within a broader ecosystem.

4.3. Practicality of the Ecosystem Model

Judging from the number of parameters that must be observed as the Report Card has done to the Institutional Group, this approach is still relatively more practical than Rambo's system approach, but it is slightly more complex than the cultural ecology approach. Just as the cultural ecology approach only pays attention to the cultural core because of adaptation to the environment, this approach also pays more attention to the way a community group adjusts to its environment, so that a balance (homeostasis) is achieved. This approach involves few parameters and is practically applied in the field by development planners and implementers. However, as explained in the previous section, this approach should be more useful if used to observe various sets of populations close to each other within a broader ecosystem. If so, more accurate information will be obtained, closer to the truth about the interrelationships of the populations in question on a broader scope.

4.4. The Conformity of the Ecosystem Model with Indonesia's Conditions

When applied to most groups of people in Indonesia, this approach seems more appropriate compared to cultural ecology. Indonesian society has been (and until recently) famous for "maintaining balance" or "stability." In the government system, for example, the government elite has always been able to "defend themselves" for a relatively long time in their positions. Here, the lower class also seeks to help "secure" the position of the elite circles it supports, in the hope of enjoying the result of the "balance" achieved, namely entering the network of the governing elite at least as a link in the "material" cycle or accepting the "trickle" from above. The older generation group in Indonesia likes "stability" the most, and the most anti-change. Soekarno's regime managed to maintain its "balance" for 20 years (1945 – 1965). Even more spectacular was the Soeharto regime, which could maintain its "establishment" for 32 years (1966 – 1998).

In the Pancasila democratic system adopted in Indonesia, the principle of "deliberation for consensus" is known. The purpose of this principle is none other than to create a "balance." The use of this principle indicates that there is no problem that cannot be solved, so that "balance" is still guaranteed. This principle is always prioritized in every resolution of a problem, especially among the government, especially in the legislature, so voting is rarely used, and there is no veto power.

This approach is also in line with the conditions of few other Indonesian community groups, namely people whose lives are still traditional, such as many tribal groups in Papua. The tribes there, in their adaptation to the harsh natural environment (hilly, steep-lipped, and densely wooded), apparently also caused a war between them, the regulators that governed the balance of their ecosystems. As the cause of wars between groups are usually women and pigs as the most valuable goods for them and must be protected and maintained. For groups living in narrow valleys because the hunting area of wild animals is limited, they make sago caterpillars an additional source of protein. The harsh natural conditions caused them to be capitalistic. All objects were rewarded with pigs. Solidarity within the group is also high, but they are very aggressive toward outside interference that is

expected to threaten their survival. The Amungme tribe's case with the Mining Company Freeport and some of the frequent kidnappings of "foreigners" are examples.

5. System Approach

5.1. Advantages of a System Approach

This approach puts humans into a social system separate from the ecosystem. This placement, in addition to facilitating analysis, is also a revision to Rapapport's ecosystem model approach, which places humans as components of ecosystems, as biological and social beings.

It has been explained in the previous section that a human as a social being with their intellect indeed needs to be separated from the ecosystem because humans affect their natural environment more than is influenced by it. White (Rambo, 1983) states that humans are unique creatures, only humans can determine, only humans allow the occurrence of culture and cause him to be different from other creatures. Unlike other living beings, human behavior is not limited by their biological form, genetic traits, or body structure; although their behavior is individually influenced by their biological form, it is not a decisive factor (Rambo, 1983). According to White (Rambo, 1983), with their culture, humans secure their lives. But in its development to date, human culture has apparently also damaged the planet earth, so White filed a lawsuit against himself – then what is the function of that culture (Rambo, 1983)?

The relationship between ecosystems and social systems according to this approach is reciprocal, not causal, as is the case in Steward's cultural ecology approach. Such is the reality, more so in modern society today. The interaction of a human with their environment is not at the level of social institutions or their elements, but at the level of the totality of the social system as a system.

A classic example of the successful application of this approach (especially seen in the context of human placement into social systems) is Rambo's study in Vietnam that found a way in which metagnoid communities living in the highlands of the country managed to avoid the attack of the Anopheles Minimus mosquito as a vector of malaria. Any comer who tried to open the ground in that place must have died from the attack of this disease. The Metagnoids managed to survive because they made fireplaces under and next to the house to repel mosquitoes, and they built a house two meters above the ground. This approach pays attention to all components, both from the ecosystem and the social system, which means that its scope is wider, as well as the opportunities for its analysis. The scientific study of this approach is also more holistic, so that the resulting solution or conclusion, theoretically, is also more accurate.

5.2. Weaknesses of the System Approach

Although Rambo stated that the interaction between humans and their environment occurs at the level of the totality of social systems seems logical, in practice, it often causes frustration. At the level of totality of interaction between social systems and ecosystems that can be easily seen are only the flow of matter, the current of energy, and the flow of information, as well as the input of the outer system and the output to other external systems. Meanwhile, other interactions should occur and be viewed at a lower component level. But, if this principle is to be used, it can have the consequence that every component of the two systems must be sought for a form of interaction, though not necessarily all of them interact. Human language, for example, as a component of a social system, may not interact with any component of the ecosystem.

Field research using this approach often becomes directionless. Each member of the research team collects data according to their respective areas of expertise, then analyzed. But after that, they don't know which aspects of the two systems to look for a connection to – "what is connected to?" Therefore, the weakness of this approach is the same as Bacon's failure to understand the significance of the hypothesis in a study, because of which the data must be collected as much and as possible because it is not known which data are relevant. This weakness can be overcome by providing adequate theoretical knowledge and understanding of the relationship between the various components of the two ecological systems by each member of the research team. Therefore, they do not just know their area of expertise, because as explained above, this approach is multidisciplinary. Based on this provision, the research team can then only pay attention to aspects or components that are theoretically expected to be important. Conversely, less important components may be ignored first or numbered.

In practice, there are often difficulties in determining the boundaries of the social system. Should it be based on the existence or enactment of all existing social components, or is it sufficiently based on one of them alone? If it is to be based on the existence of all components in full brings the consequences of a group of people who have only part of the components it is not covered. However, if it is based on only one component, for example, the component that has the widest scope will have the consequences of incompleteness. In this construction, the first basis should be used. Then, as already mentioned above, it is enough to pay attention to some key components first.

This approach involves too many parameters or aspects that must be researched. However, in practice, as mentioned above, it is possible to first identify several key or main components, as long as each member of the research team has the provision to look at it. This approach also only sees the human being as a social being placed within the social system. When in reality humans are at the same time also biological

beings.

5.3. Practicality of the System Approach

If this approach is applied purely, as proposed by Rambo, it will certainly become less practical since as has been explained above, it covers all components of the ecosystem and social system in full. The components are: (1) climate, (2) water, (3) soil, (4) air, (5) plants, and (6) animals (for ecosystems), and (7) technology, (8) patterns of exploitation of natural resources, (9) social organization, (10) knowledge, (11) ideology, (12) values, (13) language, (14) biophysical characteristics, (15) health, and (16) nutrition (for social systems). However, as explained above, for the purposes of application in the field, to be more practical, several components that are considered important can be identified and considered important that may differ from one place to another, or from one ecosystem to another, or from one social system to another.

5.4. Conformity of the System Approach to Indonesia's Conditions

The systems approach is essentially the same and is a revision of the ecosystem model approach. As with the ecosystem model, this approach is more in line with Indonesia's conditions. The process of selection and adaptation, as well as the flow of energy, the current of matter, and the flow of information that occurs between ecosystems and social systems in Indonesia as a developing and developing country is very interesting to observe using this approach. Interesting and important components of the social system to observe are: (1) patterns of exploitation of natural resources, (2) population, and (3) values. The components of the ecosystem that are interesting and important to observe are: (1) soil, (2) water, (3) plants (forests), and (4) air, which constitutes the majority (80%) of all ecosystem components.

The pattern of exploitation of natural resources is interesting to observe because as a country is building and rich in natural resources, this country will certainly use its natural resources to earn foreign exchange. As we observe today, the most exploited natural resources are oil and gas, forests, and coal. Judging from the context of the currents of energy and matter, during this time, there has been an imbalance between energy and matter flowing from the ecosystem to the social system, and vice versa. More energy and matter flow from ecosystems to social systems through the draining of natural resources. In contrast, the flow of energy and matter from social systems to ecosystems with the aim of maintaining the balance of ecosystems is much smaller. The output of the social system (which uses the energy and matter of the ecosystem as its input) mostly flows into other social systems: (1) rich or developed countries or capitalist countries, and (2) economic actors or capitalists. The output of the social system in Indonesia flows a lot to rich or developed countries or capitalist countries through its hegemony (globalization and free market system). There are also outputs that are deliberately rushed abroad (through money laundering) by domestic economic actors, both legal and unlawful outputs (proceeds of corruption, etc.). Part of the output in question only accumulates in a group of people: (1) economic actors or capitalists, and (2) corrupt officials.

Because of all these actions, there has been an imbalance in many ecosystems, which can be seen through the phenomenon of landslides, floods in the rainy season, and droughts in the dry season. Forests, as renewable natural resources that naturally can recover, have been exploited in such a way that they exceed their resilience and ability to recover. As a renewable natural resource, forests should be exploited by maintaining and fostering them, so that they remain in a balanced state and can flow energy and matter continuously to social (human) systems. But what has happened so far is that the output of the social system, which uses energy and matter from forest ecosystems as inputs, has nothing or very little to re-channel to maintain and foster forest ecosystems. The draining of forest resources has not only disrupted the balance of forest ecosystems or damaged forests, but can also disrupt the balance of other ecosystems through microclimate change and an increase in the earth's temperature.

The imbalance of energy and meter flows from ecosystems to social systems in the country is likely to continue. After the forest was exhausted, people switched to digging coal under the ground of the former forest area. Even though coal is a non-renewable natural resource, one day it will run out. Whatever efforts are made by humans (social systems) will not be able to restore this coal. Post-mining revegetation will also not be able to restore the balance of the forest ecosystem. Although it can create a new balance of forest ecosystems, it is definitely not as rich and complex as its natural ecosystem. The function of the forest as a habitat for certain wildlife may no longer be created because the wildlife in question is already extinct. Other forms of disturbance caused by the imbalance of forest ecosystems are: (1) disruption of water systems, (2) changes in the microclimate, (3) decreased soil fertility, (4) decreased biodiversity, (5) reduced vegetation types, and (6) increased earth temperature (because the function of forests as carbon sinks is lost).

Values in the social system are important to pay attention to because they are often concerned with the use of energy sources. Examples are: (1) the prohibition of eating pork and dogs among certain societies (social systems), (2) the prohibition of eating meat for children among rural communities, and (3) the habit of eating pork or dog meat or rat meat among certain societies. These values will affect the flow of energy and matter in all systems, which will ultimately affect the nutrition and health of the population (as a component of the social system) and can affect the balance of the ecosystem. Four of the six components of the ecosystem, namely (1) soil, (2) water, (3) air, and (4) plants (forests) are considered important because they are components that directly interact with social systems, and are therefore the components most often

affected by human activities.

Few traditional groups of people can also be observed using this approach in their interaction with their ecological systems, shifting cultivators on the islands of Borneo and Sulawesi, for example, often seen as part of a traditional social system that is adaptive to its ecosystem. Shifting cultivation is seen as their way of maintaining a balance of energy and matter currents. The fertility of their soil is maintained by burning forest vegetation. The soil that has been planted 2-3 times is abandoned because it is no longer fertile (the nutrients from burning forest vegetation have been exhausted). They are looking for new land that is still forested to be used as a field. Finally, they returned again to the original fields that had returned to wooding. The microclimate is maintained by opening only a small part of the forest for farming; the fields remain surrounded by forests. The soil moisture is maintained by leaving a portion of trees or planting fields with perennials. They are just to be able to live (subsistence), so that the flow of energy and matter between ecosystems and social systems is always in a balanced state. The Talun garden system among the Sundanese people in West Java and the yard land among the Javanese people are other examples of the interaction between the social system and the ecosystem that can be studied using this approach.

6. Conclusion

The systems approach is the best, as it separates social systems from ecosystems and connects them through processes of selection and adaptation and the reciprocal flow of energy, matter, and information. This action corresponds to the facts (das sein) and should (das sollen); since it is evident that a human (animal rational, social being) dominates and determines their interaction with their environment, they must be distinguished from other biotic components. Another plus of this approach: the study is holistic, paying attention to the components of social systems and ecosystems. But this is also a drawback, the application can be difficult.

The ecosystem model is the second-best approach because it pays attention to human interaction with the environment in the ecosystem. In this approach, humans (social and biological beings) are placed into an ecosystem. The relationship of physical, biological, and social components is seen reciprocally. The focus of attention is how society adjusts to its environment so that the flow of energy and matter is balanced. It doesn't involve many parameters, it's easy to apply. But its simplicity is at once its weakness. The abovementioned two approaches are in accordance with the conditions of Indonesian society: traditional people in Papua and Kalimantan, modern society in urban areas, Indonesian society as a whole.

The search found no research on the suitability of various approaches to human ecology to the conditions of Indonesian society. But the systems approach was once used by Tomlinson et al. (2011) as a complementary methodology for adaptive management of Barcelona's urban coasts; in conclusion: The systems approach is similar to the adaptive management approach, but depends on the system, stakeholders, their vision of the system-socio-ecological, and its problems; the methodology of this approach is specific, and this approach can be used as a basis for modeling (Tomlinson et al., 2011).

That the ecosystem model still has limitations, among others, corresponds to Jorgensen (Chatzinikolaou, 2013) who mentions the general limitations of the use of ecological models: (1) insufficient data for model development, (2) weaknesses in estimating parameters, and (3) improper reflection of the real properties of ecosystems.

Meanwhile, the cultural ecology approach was once used by Pranaji (without years) to research the informal sector in urban Indonesia. In conclusion: the interaction of cities - villages reflects the "integration" of two systems of society whose evolutionary levels are different. With this difference, it may be that the relationship between the city ("industry") and the village ("agriculture") contains an indication of the imbalance of two systems of society that are vertically well integrated.

An implication of these findings is that the systems approach as the most advanced one being in accordance with the conditions of Indonesian society can be used by social researchers to study Indonesian society. The reason is that human ecology research in Indonesia so far generally does not explicitly mention the approach used. A small part of them only uses the cultural ecology approach that emphasizes more on the processes and adaptability of man to the conditions of his natural environment. On the other hand, humans also can change their environment to suit their wishes – adjustment (Sarwono, 1992). This ability must be controlled to certain limits optimally so as not to harm the environment. Therefore, perspectives from other approaches are needed as a comparison.

The study strength is that it is carried out by Indonesian researchers and carried out on the Indonesians, so that its accuracy can be relied on because researchers have sufficient knowledge and experience about the object of their research. Meanwhile, the drawback is that this study is only a literature review that compares theories and approaches with the researcher's empiric knowledge and indirect experience about the condition of Indonesian society.

So, it can be concluded that, based on this study, the systems approach in human ecology is the best and most suitable for the conditions and for studying Indonesian society, the Indonesians in the past, present, and future; the Indonesians in the interior and outer islands, modern society, and Indonesian society as a whole. Research using this approach is needed to build and develop Indonesian society toward a more advanced, more modern society, more sense of justice,

more prosperous, and more prosperous in accordance with the mandate of the Preamble to the 1945 Constitution.

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