

Ecological Concepts and Categories in Ecological Anthropology

Balázs Borsos

Institute of Ethnology, RCH, Hungarian Academy of Sciences, Budapest

Abstract: Borrowing concepts, principles and categories of other disciplines unavoidably raise problems of their correct use in the host discipline. In this article, the author intends to analyze the use of ecological categories and concepts in ecological anthropology. First the definition of ecology and its related and sub-disciplines in natural sciences are investigated. The main body of the article deals with some basic ecological categories, such as ecosystem, population and niche, comparing the potentials of using their concepts both in ecology and anthropology, relying on the works and ideas of different anthropologists who introduced them in their analyses and explanations about the character of specific cultures (e. g. Barth, Rappaport, Singh et al.). Finally, the author comes to the conclusion that the theoretical definitions of all these categories are wide enough to use them in ecological anthropology as well, but the practice of ecology interprets them in a narrower sense and the different levels of ecological investigation are based on this narrow sense. The summary of the article claims that there are several ways of applying ecological methods in human sciences, but they will give way either to disciplines yet to be developed or to a scientific practice not without contradictions.

Keywords: ecology, ecosystem, population, niche, paradigm shift

Borrowing concepts, principles and categories of other disciplines is not a feature restricted to anthropology, as it is “an old and important source of scholarly advancement and authority in nearly all disciplines” (DOVE 2001:96). But this practice unavoidably arise problems of correct use in the borrowing discipline, which are to be solved. In this article I intend to analyze some of them.

ECOLOGY OR ECOLOGICAL ANTHROPOLOGY

The problem of using ecological categories in ecological anthropology can not be explained merely by the differences of human and natural sciences. Ecological categories are not without contradictions in biology, either. The first problem appears at the very beginning, when we come to the definition of the original biological *ecology*, as it is

not without confusion. The term *ökológia* has different meaning in Central European countries like Hungary than the term *ecology* has in Anglo-Saxon countries. “*Ecology* is the scientific study of the interactions that determine the distribution and abundance of organisms” (KREBS 2001:2). It means that the investigation of feature and its background is not separated, while in Hungary, regarding a certain definition, *ökológia* means the examination of the background only. In this context the Anglo-Saxon *ecology* is the same as the Hungarian szünbiológia (*synbiology*) (LÁNG 2000a:24)¹. However, some Hungarian ecologists define *ökológia* more closely to *synbiology*, which means more closely to the Anglo-Saxon *ecology* as well (JUHÁSZ – NAGY 1987:195–198; LÁNG 1977/3:297–298; STRAUB F. 2002/2:178). In Hungarian science the term *ökológia* has at least three different definitions, although two of them are close to each other. The first definition of *ökológia* is connected to the definition of *synbiology*.

1. The definition of *synbiology (ecology)* derives from its two basic areas of observation. It examines, first, the measure of regularity of the behaviour of populations in time and space, that is the so called *synfenobiology*, and secondly the environmental conditions that influence the regular distribution of populations, which is the field of *ökológia* used in the strict sense (LÁNG 2000a:23). So we can see that *synbiology* is not really the same as Anglo-Saxon *ecology*, because *synbiology* still makes a difference between an influencing factor and a factor under influence, while *ecology* does not emphasize this hierarchy of factors when it uses the more neutral phrase of interaction between organism and environment.

2. The dividing tendency mentioned above can be found in a bit broader definition of *ökológia* as well. According to this *ökológia* investigates the interrelationship of living organisms and their environment, but makes a clear distinction between the influencing, thus more thoroughly examined, factor, that is the environment (the object of *ökológia* in the strict sense), and the organism that is influenced by the given environmental conditions (the object of *synfenobiology*) (DICTIONARY OF BIOLOGY 1977/3:297–298). The level of integration of the investigated organisms can be different: from sub-individual to super-individual ones. It varies from the levels of molecules (or cells, ODUM–BARRETT 2005:5) through individual organisms to the levels of populations, biological communities (biocoenosis), ecosystems etc (KREBS 2001:10).²

3. From this point we can arrive at a broader (and recently more accepted) definition of *ökológia*, which is closer to that of *ecology* as well. It defines the subject of *ökológia* as the investigation of the causes and the process of the creation and change of the so-called “*coexistential structures*” that consist of organism and environment, and come into being under the influence of given environmental conditions (JUHÁSZ–NAGY 1987:195–198).

So we can see that although the second and the third definition of *ökológia* define it in a bit wider sense than the first one, they still refer to the hierarchical connection between

¹ In this case Láng also cites the first edition of KREBS (1972:4). The term *synbiology* is not used in Anglo-Saxon countries.

² Anglo-Saxon ecologists use the word *community* for groups of population of plants and animals in a given place (KREBS 2001:619), a term frequently used in human sciences as well. European and Russian ecologists use the word *biocoenosis* instead (ODUM–BARRETT 2005:5–6), a term introduced by Karl Möbius in 1877 investigating an oyster-bed community (ODUM – OVERBECK 1999:7). To avoid misunderstandings I always use the term *biological communities* in reference to *biocoenosis*.

organism and environment, while the definition of *ecology* does not. However, since it is the nearest definition to that of *ecology*, in this paper I always refer to this definition when I use the word ecology.

Considering all this, we can conclude that on the one hand the object under influence, that is the object of ecological investigations, can be a certain human community sharing a certain culture as it is also a complex level of integration. On the other hand, the environment that creates the conditions that have an influence on the object can represent a natural environment as well as social and cultural ones. Consequently, biological ecology can be used for investigations in human sciences. But in order to apply it correctly, we have to define the parts of a *coexistential structure* as well: the natural-social-cultural environment and the factor under the influence of it, that is a certain human community sharing the same culture. But these definitions have not been made up yet at all. Not even a rough definition of the social-cultural environment has been made successfully by anyone yet.

This, however, does not necessarily exclude the non-natural environment as the subject of observation. There is a 'world view' in social sciences – calling itself human ecology – which, although assigning a major role to the natural determinations of human life, maintains that the primary environment of man is the world of language. This concept, thus, deviates from the biological concept of ecology not only because it does not consider the natural environment as the primary environment, but also because it regards environmental conditions as consciously shaped conditions rather than forced ones.³

As we have seen there is some confusion about both the subject and the name of that branch of anthropology that we call in this paper *ecological anthropology*. Yet, a 'mutual agreement' can be discovered among scholars dealing with this discipline on investigating those features of a culture that are influenced by the natural environment, and the way natural conditions influence the birth and character of a certain cultural phenomenon. As ecological anthropology has its roots in the Anglo-Saxon definition of *ecology*, the strict hierarchy of *ökológia* (namely, that between the two factors of a *coexistential structure* the environment is the influencing one and the object is under its influence) is not taken into consideration. It means that ecological anthropology often reverses the hierarchy of the factors and investigates the impact of a culture on the natural environment. Although by doing so, ecological anthropology can draw more phenomena into its field of survey; it also loses its tight bounds to biological ecology and makes it more difficult to determine its own subject and the application of ecological concepts and terms. The correct determination of the subject of ecological anthropology is not easy even if we insist on the strict hierarchy of the factors of a *coexistential structure*, as only one of them, namely, the natural environment, can be easily defined with the help of biological ecology. To define the object under influence, i.e. a certain human community sharing the same culture, is more problematic. If ecological anthropology wants to take advantage of the concepts and terms of biological ecology, it has to define the object, the certain human community so that it can be used in parallel with the objects of ecology (first of all, population).

³ For more details see LÁNYI 1995:76 and LÁNYI 1999:51–58, whose line of thoughts concluding to this point were based mainly on MEAD 1934 and BERTALANFFY 1967.

POPULATION OR CULTURE

The relationship of living organisms with their natural environment can be investigated at different levels. Thus traditionally there are two branches of ecology: *autecology* that deals with the interactions between single organisms and the environment, and *synecology* that investigates these interactions at a higher organic level, namely, at the level of populations, a biological community (biocoenosis), and the biosphere (LÁNG 2000b:271).⁴ Some Anglo-Saxon ecologists do not really agree with this: Krebs, for example, pointed out that “this subdivision of ecology has the bad feature of suggesting that the environmental factors relevant to individuals are somehow different from the environmental factors relevant to groups of organisms. Much of what is traditionally considered autecology is really environmental physiology” (KREBS 1985:12).⁵ Nevertheless, ecological anthropology is indeed connected to *synecology* as investigations about culture take place at a higher organic level, which are human communities.⁶ As the highest organic level, the biosphere includes every living creature, among them the whole mankind, the concepts of *population* or *biological community* (*biocoenosis*) can be used for an analogy in *synecology* to the subject of anthropological investigation, namely, a *certain human community sharing the same culture*. The most important difference between these two categories is that *population* refers to the coexistence of individuals of the same species, while *biological community* refers to that of different species (KREBS 2001:9). *Population* can be determined by a common quality of individuals. In ecology it means in most cases that they interbreed (*genetic population*) (ODUM–OVERBECK 1999:192; ENVIRONMENTAL DICTIONARY 2002/2:224). Some authors name groups of interbreeding organisms *demes* or *local populations* and regard them as only a subdivision of *population* (KREBS 2001:116). But any of these definitions show

⁴ The effects of tendencies to unify methods of investigations on different branches of science in different countries are weakened by the fact that despite this logical distribution of subjects under investigation, some Anglo-Saxon authors use a more confusing definition. For example Hardesty in his work based mainly on biological ecology defines *synecology* as something that deals with “broad interrelationships” among organisms, while according to him *autecology* investigates “interactions that explain the abundance, distribution, and composition of specific populations” (HARDESTY 1977:123).

⁵ According to Krebs “synecology may then be further subdivided into population, community and ecosystem ecology” (KREBS 1985:12.). In the fifth edition of his work he does not deal with autecology and synecology any more, although at the end of the volume he gives their definitions (KREBS 2001:619, 622) He also extends the list of investigated levels of integration to populations, species, communities, ecosystems and landscapes (KREBS 2001:10). However, he discusses in detail only the above mentioned three levels: populations, communities and ecosystems. In each edition of his book Krebs improves his original concept and restructures his book according to the new results in ecology. Consequently, he sometimes leaves out previously well-formed sentences that, however, have not lost their relevance. In these cases I refer to the former editions.

⁶ Not only loose, but strict definitions are sometimes problematic to conciliate. Ellen claims that “the replacement of autecology by synecology would logically require the end of anthropology, if we define anthropology as a research focusing on the interrelationships between *Homo sapiens* in particular and the environment, while synecology as an examination of ecosystems as such within which populations of *Homo sapiens* happen to dwell” (ELLEN 1982:93). [He refers to ANDERSON, J. N.: *Ecological Anthropology and Anthropological Ecology*. In HONIGMANN, J. J. (ed) *Handbook of Social and Cultural Anthropology*, 1973. Chicago: Rand McNally.]

that (*local*) *population* cannot be a correct analogy to *human community sharing the same culture*, as a special culture does not mean unavoidably endogamy as well. But if we take the broader definition of *population* into consideration, we can conclude that scientific investigation can determine other common qualities than the one used by ecology. Consequently, *a human community sharing the same culture* can be regarded as *population (cultural population)*.

The problem again lies in the application of further ecological analogies in ecological anthropology. As in ecology *population* means *genetic population*, further investigations cannot be made by the simple use of ecological analogies. After all – if they are not divided by geographical barriers – every single individual of a certain species forms potentially only one *genetic (local) population* and different *genetic (local) populations* of the same species can be joined without troubles. Contrary to this, many *cultural populations* can form – *ad absurdum* – only one *genetic (local) population*, but the union of *cultural populations* call forth nearly unavoidably the change of the character of the individual *cultural populations*. Consequently, species and culture have too different a character to be used as analogies. Ecological anthropology has to find its special tools and methods to describe the coexistential structure of cultural population and natural environment, and has to give up the direct use of ecological categories.

However, ecological anthropology still has the possibility of investigating *genetic population*. The trouble of this solution is that by using it, the possibility to explain culture is lost and culture can be regarded only as a special character of a *genetic population*, a most effective strategy for adaptation (RAPPAPORT 1990:55–57). But the essential contradiction, that the borders of *genetic population* are not identical with the borders of *cultural population*, remains unsolved. We can only disregard this contradiction and investigate either *culture* or *genetic population* (BARGATZKY 1986:160; VAYDA – RAPPAPORT 1968:497).

Regarding the results of the paragraph above, the next level of integration in ecology, that is *biological community (biocoenosis)*, can also be used in two different ways. If we investigate *genetic populations*, a *biological community (biocoenosis)* means all, (or, for the sake of investigations, some chosen) *genetic populations* of different species and the structure of their given interrelations (LÁNG 2002/1:138).⁷ To study these *biological communities (biocoenoses)* we can use biological laws and apply characteristics and phenomena that have no meaning with reference to the population level of integration (trophic structure, relative abundance, biodiversity etc.) (KREBS 2001:392). But if we investigate *cultural populations*, *community* does not mean the coexistence of populations of different species, but the *community* of different cultures that all are from the same species (*'culture-coenosis'*). A special examination has to be accomplished to determine whether categories of ecology can be used at this level or not. There are questions about the nature of methods that can be used for describing the interrelations in a *'culture-coenosis'* (community of cultures) and about the possibility of regarding *'culture-coenosis'* as part of a certain *biological community (biocoenosis)*. Naturally, it would be easier to use ecological analogies if this *'culture-coenosis'* was only one *genetic (local) population*. But this precondition is more than questionable,

⁷ If interrelationships have a structure, it means that “the species tend to be associated in a non-random manner” (KREBS 1978:375).

since marriage is only one and not unavoidably a constant factor among the interactions of different *cultural populations*.

ECOSYSTEM OR CULTURAL SYSTEM

Sometimes anthropologists investigate certain cultural elements, but their isolation from the other parts of the culture is only a tool to get acquainted with them in details. To find their place in the structure of the whole culture and their connection to other elements, is highly necessary for their correct interpretation.

The main aim of anthropological investigations on a certain culture is usually the explanation of it in a holistic way: with all of its phenomena and interactions. It means that not only ecological anthropology but all the other branches of cultural anthropology regard the object of investigation as a system. Ecological anthropology only multiplies the elements of the system and regards *cultural population* or *genetic population sharing the same culture* together with the natural environment as one entity. Investigating this entity, a term from biological ecology is called forth, namely *ecosystem*. Ecosystem means that we regard *biological community (biocoenosis)* and the natural conditions surrounding it as parts of one system. More correctly, *biological community (biocoenosis)* can be regarded as an *ecosystem*, if we choose one dynamic aspect from among the interrelations of environment and the organism under its influence, and interpret these as a cybernetic (self-regulating) system (ENVIRONMENTAL DICTIONARY 2002/2:184). In most ecological investigations “these relationships are often concerned with the circulation of energy and material (water, nutrients, carbon), but relationships could be defined on the basis of time and space as well” (KREBS 1972:556).

In most of the investigations in ecological anthropology, similarly to those in ecology, the relationship observed is the circulation of material and energy (HARDESTY 1977:47–74). This is a practice used from the time of neo-functionalists⁸ up to the 21st century. An example by Singh et al. (2001) deals with Trinket, a member of the Nicobar Islands stretching out in the Bay of Bengal. Their thorough investigation on the metabolism of the island and its inhabitants led to the conclusion that Trinket entered the 21st century with more or less self-sufficient and balanced economy, but its ecological and economical equilibrium is threatened by the external pressure due to demand for copra on the world market to replace rainforests with coconut plantations and self-sufficiency by monoculture market economy.⁹

Nevertheless, it is not compulsory to follow the routine of measuring material and energy flow, as any *dynamic aspect* of the interrelation can be used (e.g. the change of land use, circulation of goods and services etc.) (BORSOS 1995:134). Ecological analogies are highly adequate when anthropology regards the flow of material and energy as a *dynamic aspect*, since in this sense man is viewed only as a consumer, as the last link in

⁸ See for example RAPPAPORT 1967: Appendix 9.

⁹ This “natural laboratory” does not exist any longer. Trinket was devastated by tsunamis generated by the 2004 Indian Ocean Earthquake, lost 7 km² of its territory and 91 people. The entire remaining population of the island was evacuated to neighbouring islands. http://en.wikipedia.org/wiki/Trinket_Island (Accessed June 13, 2017.)

the food chain, and so (s)he becomes similar to the subject of ecological investigation. But the system of *cultural population and natural environment* can be regarded as an *ecosystem* only if it regulates itself. Those *ecosystems* that do not regulate themselves are only a simplified part of a greater system, and consist of only one producer and one consumer (i.e.: arable land: grain and man) and are regulated by human beings. This is the reason why ecological anthropologists, called also neo-functionalists (Vayda, Rappaport and others), were fond of cybernetics as it is the science of self-regulating systems, and they investigated entities that could be considered as natural cybernetic systems. Consequently, they were looking for cultural phenomena that could act as feed-back in the process of self-regulation and so ensured the *dynamic balance (homeostasis)* of the system and they paid less attention to processes that could cause the change of the system (APPLEBAUM 1987:204–205). Rituals, for instance, were considered by them as factors keeping the balance (RAPPAPORT 1967:6). Their theories were criticised, however, since they stated that balancing factors were unconscious ones (BENNETT 1975:286–287). To refine his theories, Rappaport invented the term of *maladaptation* as well, for those human generated processes that act against the homeostasis of a system (RAPPAPORT 1977:58).

NICHE OR REGIONAL GROUPS

The use of the term *niche* as an analogy for *regional group* can attract our interest, since it was the first ecological term used in anthropology. It was introduced by Fredrik Barth during his research in Pakistan because he found that the concept of cultural area was insufficient for the description of the mosaic like co-existing cultures of the Swat-valley. Three ethnic groups live in this valley which developed – according to Barth – different political and economic systems built on each other (a symbiotic model as it was) in the process of cultural adaptation. Each of the co-existing peoples live in their own respective niche, occupied in the course of the competition carried out with each other (BARTH 1969:374–375). The strongest group, the Pathan, farm the fertile bottom of the valley, the weaker Kohistani till less and poorer soils, but are additionally transhumance livestock keepers, while the weakest, the Gudjar people are primarily agile pastoralists besides engaged in some farming as well (BARTH 1969:363).

Regarding international ecological anthropology, some scientists advised to use it as the basic category in investigations, since culture, a virtual entity is also investigated in cultural anthropology through a regional group that is a real entity (BARGATZKY 1986:162).

Barth's critics emphasise that his use of the term *niche* is problematic, as he considers it as a cultural term that represents also a definite type of self-subsistence (agriculture and animal husbandry). They argue that *niche* in ecology means a certain mood of utilisation of the natural environment by a certain species, and while the latter is a result of a *genetic selection*, the former is not (BENNETT 1975:273–274). This is true but we have to emphasise that certain problems originate from the fact that the term *niche* in ecology used to have two different meanings. The view of *niche* as a subdivision of habitat and the other one as a "role" of the species in the biological community were incorporated into a redefinition by Hutchinson only in 1958, two years after Barth's proposal. Following Hutchinson, ecologists view *niche* as a virtual space of *n* dimensions that equal with the *n* environmental variables, where each interval of each value determines a range that

allows the species to survive and to multiply (KREBS 2001:190). In this way in modern ecology *niche* has no topographical meaning. It must not be considered as a territory where the individuals of a certain species live together with other species. This territory is the *biota* (KREBS 2001:619). Yet, some authors still use the former meanings of *niche* but in this sense the term *niche* has an adjective. So phrases like “spatial niche”, “trophic niche” and “multidimensional or hypervolume niche” have been coined. The last one is widely used as *THE niche* (ODUM – BARRETT 2005:312–313).

Ecology makes a difference between *fundamental niche* and *real niche*. The former one is an interval of environmental conditions where a genetic population can exist at all, while a *real niche* is a much smaller one, as it is filled in by the competition of different populations requiring the same conditions. An important part of investigations in ecology is segregation and overlapping, and the struggle for a larger *real niche* among various populations (FEKETE 2000:275–280; ODUM–BARRETT 2005:313).

The definition of *niche* in ecology can be used in ecological anthropology, too, as we can determine the *fundamental niche* of *cultural populations* or *genetic (local) populations sharing the same culture*. The use of this ecological term can also be applied to the conditions of the cultural and natural environment of a certain community of cultures (*‘culture-coenosis’*) as well as to investigating the conditions of the natural environment of a certain *genetic (local) population sharing the same culture*. In the last case the definition of the *fundamental niches* of different cultures could help us to explain some overlapping and segregation among them, and we could give reasons for the existing topographical pattern of cultures related to the patterns of their virtually required conditions. Perhaps the most evident analogy between *cultural* and *genetic populations* is again offered by the use of *niche*. Fur and pine are expelled from their *biota* with optimal conditions by the more competitive oak and beech. But as fur and pine can live among worse conditions as well (their *fundamental niche* is wider), they flourish in *biota* where oak and beech can not live (FEKETE 2000:275). The analogy is obvious: hunter and gatherer societies are expelled from their optimal conditions by people practising animal husbandry, just as well as the latter ones are expelled by the most competitive agricultural people. So hunters and gatherers exist among conditions not tolerable for pastoral tribes, and animal-keepers exist among conditions that cannot support agriculture. Another tempting analogy is the case of the close relative beech (*Fagus*) and southern beech (*Notofagus*) that have similar niche, but their *biota* is topographically far away from each other, on a different hemisphere. We can easily draw a parallel between tribes hunting and gathering among the same conditions of tropical forests, although they are very far from each other, if either their homeland or physical anthropological features are taken into account (e.g. Indians in Amazonia and Bambutis in the Congo Basin). Despite these examples a careless analogous use of *niche* can easily result in simplification and misuse. And the main problem emphasised by Bennett still remains: *genetic selection* and *genetic adaptation* cannot be an analogy for *cultural selection* and *cultural adaptation*, as the former ones take place among species and during a long period of time, while the latter ones occur among different groups of the same species and sometimes in a very short period of time.

The use of some ecological categories in ecological anthropology, namely *population*, *ecosystem* and *niche*, always arises the same problem. The theoretical definitions of all these categories are wide enough to use them in ecological anthropology as well, but the practice of ecology interprets them in a narrower sense and the different levels of ecological investigation are based upon this narrow sense. It has become a constant problem as the work on the theory and methodology of ecological anthropology was inspired mainly by the aim to interpret culture and nature within one system (RAPPAPORT 1979:62–63).

If ecological anthropology chooses the other way and applies the categories of ecology (population, ecosystem, niche etc.), and uses its investigating methods (it means that ecological anthropology defines itself as “ecology rather than cultural ecology” (VAYDA–RAPPAPORT 1968:492), then this discipline will face some other serious problems. First of all typical cultural features that do not occur in a natural environment (for example conscious human acts to keep the balance) remain uninterpretable, and only those people can be investigated that are still very close to natural environment.

In the last 30–40 years ecological anthropology has been facing the contradictions and their consequences mentioned above. This has fuelled the scientific debates around its applicability ever since. We still may find consoling the optimist view of Cohen (1994:65), that misinterpretations (and misuses) of concepts or principles of other disciplines can lead to fruitful results. And it is true: using ecological categories even in a criticised way has led to unavoidable issues in ecological anthropology.

SUMMARY IN A BROADER VIEW

In this paper we have tried to summarize the problems of applying ecological methods in anthropology. Ecological concepts, methods and terms are widely used in anthropology, but because of their sometimes inconsequent, contradictory and problematic application this practice gives rise to criticism from both human and natural sciences. Presently we have aimed to investigate the relevance and usability of the terms and concepts of ecology in anthropological research through the comparison of their definition and use in ecology as well as in ecological anthropology. We can conclude that there are several ways of introducing ecological methods into human sciences, but they will give way either to disciplines yet to be evolved or to a scientific practice not without contradictions.

As we have seen, difficulties already begin with the definition of ecology itself, as ecology and synbiology are not clearly separated and although a definition of ecology (namely, “the investigations of interactions that determine the quantitative relations among and the distribution of living organisms”) is commonly accepted, various researchers emphasize the importance of the interacting factors (object and environment that together create a certain coexistential structure) in a different way. Having studied the different views, we can conclude that the commonly accepted definition of ecology allows us to accept an understanding of the environment not only as a natural one but also as social-cultural environment, hence the object can not only be viewed as a different level of living organisms (organism, population, biocoenosis, biosphere), but also as a human community with a special culture (cultural population).

Then we can make further investigations of the different ways of defining social-cultural environment and cultural population and of the possibilities of the use of ecological concepts

and terms in their research. We compared the definition and use of some ecological terms both in ecology and in ecological anthropology. The terms population, ecosystem and niche are the most commonly used ones in ecological anthropology. We can point out the fact that although the definition of the three terms in ecology is wide enough to use them in anthropological research as well, there are two problems that can not be solved and both of them lead to a contradiction when applying ecological terms in anthropology. These problems have been at the heart of the disputes around ecological anthropology since the 1960s and are many times emphasized by its critics. The first one is that in ecology the terms of population, ecosystem and niche are worked out to investigate different species, while ecological anthropology uses them to study different cultures of the same species. This contradiction leads to the fact that in ecological anthropology investigations of the objects of different levels (population, biocoenosis etc.) can not be compared, although in ecology they are comparable. The second problem is that the distribution and quantity of the populations of different species in the biosphere are always determined by genetic selection, while those of different cultures are not. The ecological concepts and terms were worked out on the basis of genetic selection, therefore their use in anthropology remains always problematic.

Summarizing the investigations and the critical views about the use of ecological terms in anthropology, we can line up three different and sometimes further dividing ways for a science that is engaged in the investigation of the interrelationship of man and his environment. The first cross-road is at the question about the primary environment of man. Is it the social-cultural environment or the natural one?

Route 1. The answer that the symbolic (social-cultural) environment is regarded as the primary one leads to a totally separate science (sometimes called human ecology), in which the terms and concepts of ecology can not be used, as they have been worked out to study the natural environment.

Route 2. The answer that the social-cultural environment has the same importance as the natural environment leads to two possibilities:

2.a. The social-cultural and the natural environment are analytically distinguished, so route 1. or route 3. can be followed.

2.b. This distinction is not made and a separate science has to be evolved with special concepts, terms and a definition for social-cultural-natural environment, for its environmental factors, for the cultural population etc. The terms of ecology can be applied only as distant analogies, while the system consisting of natural environment and man is regarded only as a subsystem. Thus this route can not be followed by ecological anthropology, since one of the main aims of founding ecological anthropology as a special discipline of anthropology was to create a frame of reference in which man and natural environment can be investigated as one system.

Route 3. If we consider nature as the primary environment for man, and want to apply ecological categories, we definitely need to make a paradigm shift in social sciences, including anthropology, and a new scientific model must be developed. This would be the model of ecological anthropology, trying to use ecological methodologies and considering the man and nature environmental system as the primary target of research instead of culture per se. However, by raising the new paradigm we are again on another horns of dilemma when trying to define the subject.

3.a. If we take the specific properties of culture into account, we have to create the notion of cultural population or cultural coenosis, and the co-existential structure, which is subject

of the research, will be the *cultural population – natural environment system*. Here, however, the contradiction emerges that although a wider interpretation of ecological categories allows the use of them in cultural studies, since ecology adopts a narrower interpretation, the notion of cultural population or cultural coenosis defined can not be reconciled with other categories of ecology. An additional problem is that cultural changes are caused by cultural adaptation, while in nature genetic adaptation prevails and these two are incompatible.

3.b. If we do not take into account the specifics of culture and use the scientific ecological methodology, we still have to carry out a paradigm shift and the co-existing structure to be studied would be the *human population as a genetic population – natural environment system*. This approach also has a number of problems. On the one hand, culture would lose its autonomy and appear merely as a useful adaptation strategy, while on the other hand any phenomena which do not occur in a natural eco-system are uninterpretable (such as conscious acts aiming at the maintenance of equilibrium), and, eventually, the research would be inevitably narrowed down to a few native peoples. The contradiction between cultural adaptation and genetic adaptation also remains unresolved.

3.c. If we don't want to make a paradigm shift, but, rather, to search for the answers to certain partial problems in the relation between man and the natural environment, the point in ecological studies (system-type interpretation and research of man-environment relations) would be lost and we are not a bit closer to understand this connection.

It can be seen that none of these routes offers a system without contradictions or a task that is easily accomplished. Due to this reason ecological anthropology (and, in a broader sense, any social research with ecological approach) can have the task to continue developing the characteristic features of man-nature relationship in a manner as detailed as possible, while keeping an eye on the problems discussed above, and to try to interpret the whole as a system not only in the course of studying native peoples, but also when dealing with any issue related to the connections between culture and natural environment. Ecological methodologies and terms can be definitely used because by doing so we can stumble upon such connections and relationships that could not be revealed when using only the conventional tools of cultural research.

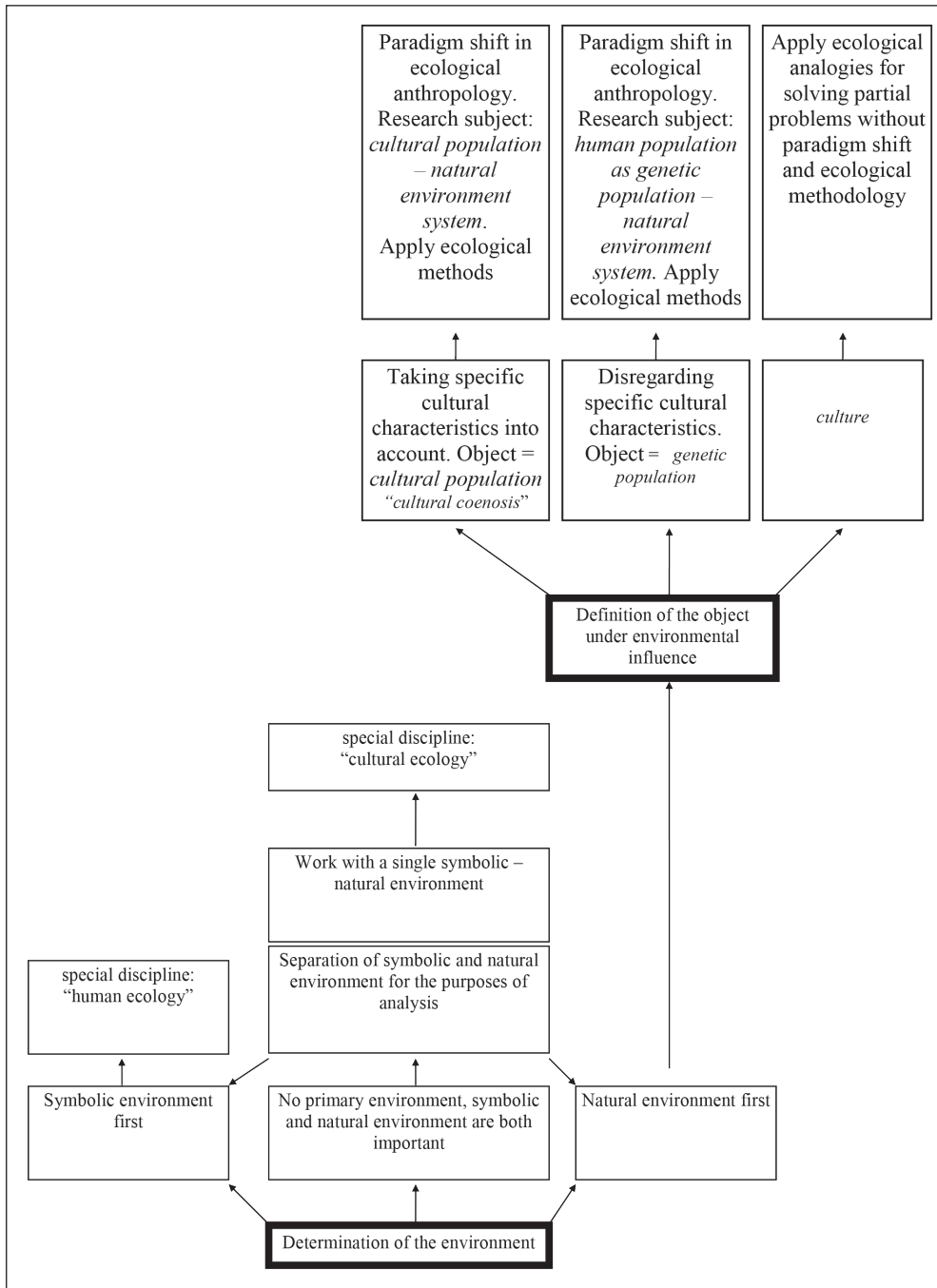


Figure 1. Possibilities of using ecological methodology in social science

REFERENCES CITED

- APPLEBAUM, Herbert
1987 20th Century Evolution and Ecological Anthropology. Introduction. In APPLEBAUM, Herbert (ed) *Perspectives in Cultural Anthropology*, 199–207. Albany: SUNY Press.
- BARGATZKY, Thomas
1986 *Einführung in die Kulturökologie*. Berlin: Dietrich Reimer.
- BARTH, Fredrik
1969 [1956] Ecological Relationships of Ethnic Groups in Swat, North Pakistan. In VAYDA, Andrew P. (ed) *Environment and Cultural Behaviour. Ecological Studies in Cultural Anthropology*, 362–376. Garden City, N.Y.: Natural History Press.
- BENNETT, John W.
1975 Ecosystem Analogies in Cultural Ecology. In POLGAR, Steven (ed) *Population, Ecology and Social Evolution*. The Hague – Paris: Mouton.
- BERTALANFFY, Ludwig von
1967 *Robots, Men and Minds. Psychology in the Modern World*. New York: Braziller.
- BERTALANFFY, Ludwig von
1968 *Organismic Psychology and Systems Theory*. Barre: Clarke University Press.
- BORSOS, Balázs
1995 Ecosystem – Geographic Area – Economic Region. A Computer Analysis of the Environmental and Economic Changes in the Bodrogeköz. NE Hungary in the Second Part of the 19th Century. *Acta Ethnographica Hungarica* 40(1–2):131–184.
- COHEN, I. Bernard
1994 *Interactions. Some Contacts between the Natural Sciences and the Social Sciences*. Cambridge: MIT Press.
- DOVE, Michael R.
2001 Interdisciplinary Borrowing in Environmental Anthropology and the Critique of Modern Science. In CRUMLEY, Carole (ed) *New Directions in Anthropology and Environment*, 90–110. Walnut Creek et al.: Altamira Press.
- ELLEN, Roy
1982 *Environment, Subsistence and System. The Ecology of Small-Scale Social Formations*. Cambridge et al.: Cambridge Univ. Press.
- FEKETE, Gábor
2000 Az ökológiai niche [The Ecological Niche]. In HORTOBÁGYI, Tibor – SIMON, Tibor (eds) *Növényföldrajz, társulástan és ökológia* [Plant Geography, Plant Communities and Ecology], 274–280. Budapest: Tankönyvkiadó.
- HARDESTY, Donald L.
1977 *Ecological Anthropology*. New York et al.: John Wiley & Sons.

JUHÁSZ-NAGY, Pál

- 1987 "Kulturális ökológia". Néhány kritikai észrevétel ['Cultural Ecology.' Some Critical Remarks]. In Cs. VARGA, István (ed) *A kultúra ökológiája* [The Ecology of Culture], 189–217. Tatabánya: Komárom Megyei Tanács VB – Közművelődési Információs Intézet. (Új Forrás Füzetek 3.)

LÁNG, István (ed)

- 2002 *Környezetvédelmi lexicon* 1–2 [Environmental Dictionary 1–2]. Budapest: Akadémiai Kiadó.

KREBS, Charles J.

- 2001 *Ecology. The Experimental Analysis of Distribution and Abundance*. San Francisco et al: Benjamin Cummings.

LÁNG, Edit

- 2000a Bevezetés [Introduction]. In HORTOBÁGYI, Tibor – SIMON, Tibor (eds) *Növényföldrajz, társulástan és ökológia* [Plant Geography, Plant Communities and Ecology], 21–24. Budapest: Tankönyvkiadó.

- 2000b Bevezetés és néhány alapelv [Introduction and Some Principles]. In HORTOBÁGYI, Tibor – SIMON, Tibor (eds) *Növényföldrajz, társulástan és ökológia* [Plant Geography, Plant Communities and Ecology], 267–274. Budapest: Tankönyvkiadó.

LÁNYI, András

- 1995 Együttéléstan 1. Kísérlet a politikai filozófia néhány problémájának humánökológiai értelmezésére [Coexistenceology 1. An Attempt to Interpret Some Problems of Political Philosophy in Human Ecology]. *Liget* 8(8):72–86.

- 1999 A környezet fogalma a humánökológiában [The Concept of Environment in Human Ecology]. In LÁNYI, András *Együttéléstan. A humánökológia a politikai filozófiában*. [Coexistenceology. Human Ecology in Political Philosophy], 41–62. Budapest: Liget.

MEAD, George Herbert

- 1934 *Mind, Self, and Society from the Standpoint of a Social Behaviourist*. Chicago: University of Chicago.

ODUM, Eugene P. – Overbeck, Jürgen

- 1999 *Ökologie. Grundlagen, Standorte, Anwendung*. Stuttgart – New York: Thieme.

ODUM, Eugene P. – BARRETT, Gary W.

- 2005 *Fundamentals of Ecology*. Belmont et al: Thomson Brooks/Cole.

RAPPAPORT, Roy A.

- 1967 *Pigs for the Ancestors. Ritual in the Ecology of a New Guinea People*. New Haven – London: Yale Univ. Press.

- 1977 Maladaptation is Social Systems. In FRIEDMANN, Jonathan – ROWLANDS, Mike J. (eds) *The Evolution of Social Systems*, 49–71. London: Duckworth.

- 1979 *Ecology, Meaning and Religion*. Richmond, Calif.: North Atlantic Press.

- 1990 Ecosystems, Populations and People. In MORAN, Emilio F. (ed) *The Ecosystem Approach in Anthropology. From Concept to Practice*, 41–72. Ann Arbor: University of Michigan Press.

SINGH, Simron Jit – GRÜNBÜHEL, Clemens M. – SCHANDL, Heinz – SCHULZ, Niels

- 2001 Social Metabolism and Labour in a Local Context. Changing Environmental Relations on Trinket Island. *Population and Environment* 23(1):71–104.

STRAUB, F. Brúnó (ed)

1975–1979 *Biológiai lexikon* [Dictionary of Biology] 1–4. Budapest: Akadémiai Kiadó.

VAYDA, Andrew P. – RAPPAPORT, Roy A.

1968 Ecology, Cultural and Non-Cultural. In CLIFTON, James A. (ed) *Introduction to Cultural Anthropology*, 477–497. Boston: Houghton Mifflin.

See biography of **Balázs Borsos** at the end of guest editors' foreword: Ecological Anthropological Research in Hungary, at page 29.