Traditional ecological knowledge as a concept and data source for historical ecology, vegetation science and conservation biology: A Hungarian perspective

Zsolt Molnár, Sándor Bartha & Dániel Babai

Abstract

Historical data are crucial in understanding landscape dynamics and in planning nature conservation management. The present knowledge of botanists, ecologists, nature conservationists, farmers and foresters, however, seems to be insufficient for reliable planning and realization of nature conservation management in Europe. One reason for this is that we know little about the traditional relationship between nature and humans. In the past, knowledge of people working in nature was ample for sustainability, since they managed their environment in order to sustain their communities for the long run. Although this knowledge is decaying rapidly with modernization, it still exists in Central-Europe. It exists in such a quantity that there will not likely be enough (historical) ecologists and botanists in our countries to collect, "sustain" and use the related scientific ecological, botanical knowledge, which is commensurable in quantity to traditional ecological local knowledge.

It is generally accepted, that traditional ecological knowledge completes scientific ecological knowledge efficiently in the solution of nature conservation issues. Traditional knowledge seems to be more relevant at local scales, while science has a larger contribution at the global to regional scale.

Although a portion of the traditional ecological knowledge has been collected by ethnographers, anthropologists and geographers interested in ecological issues, it is not documented and published sufficiently due to the obligate limits of theoretical and personal field ecological knowledge and, also, due to the varying range of scientific interests. We would like to argue in this paper that only an ecologist can accomplish an effective collection of traditional ecological knowledge. If we do not undertake this job we will have to rely upon the collection and publications of social scientists and probably would not notice accidental false data, misconceptions and, particularly, thematic and lexical gaps in the collection.

Keywords: adaptive management, land-use history, nature conservation, rural vegetational knowledge

Knowledge gaps in conservation biology

In recent years, several conferences have been held in Hungary where the main topic was the scientific foundation and implementation of nature conservation management (e.g. 3rd and 4th Hungarian Conservation Biological Conference, Eger, 2005 and Tokaj, 2007; Conservation management of plant species and plant communities in Hungary, Túrkeve, 2006). These conferences concluded that effective nature conservation management is limited considerably in Hungary due to limits of practical, local, expert knowledge. The present knowledge of peasants and modern, intensive agriculture and forestry, combined with the scientific knowledge of botanists, zoologists, ecologists (also foresters, landscape designers and water engineers working toward sustainability) is insufficient to produce reliable principles and practical recipes (management plans) for nature conservation management. We know little about recent and historical landscape changes, about the medium- and long-term effects of agricultural methods or just about the effects of abandonment. We know also little about the traditional historical relationship between nature and humans (e.g. what knowledge they used in land-use decision-making). In the last few years, remarkable

interdisciplinary research programs have been started to temper this shortage in local, often historical, knowledge (in Hungary: Science based conservation management of grasslands, NKFP6-00059/2005, Habitat Management on the Pannonian Grasslands in Hungary, LIFE05NAT/HU/000117). [Hereinafter we will refer to nature as the rural (semi-) natural environment of humans (i.e. forests, grasslands, marshes, including arable fields and fishponds). However, we do not use this term for urban, industrial and ruderal areas where ecosystem services have mostly collapsed.]

On the one hand, nature conservationists and botanists have limited opportunities to obtain deep enough personal knowledge of nature since most of them live in towns or citified villages (without gardens: they do not perform agricultural management), rarely have holistic knowledge of the landscape they work in (e.g. rarely read local historical and ethnographical papers and, while performing fieldwork, they rarely talk to local people), and, most importantly, rarely possess decades-long, personal experience with landscape changes (for an exception see Kovács & Baróti 2007). On the other hand, vegetation science focuses, traditionally, on description and classification, rarely performing field experiments, which is why e.g. Hungarian vegetation scientists have minimal experience with the effects of management types. This could also be a reason for imperfections in the development of management plans (see e.g. Bartha 2003, 2004, 2007).

In fact, traditional farmers had the most thorough practical knowledge of nature as they bred animals, grew plants, hunted, and fished – they "managed" nature. Györffy (1942) addressed this issue: *"Traditional rural culture is expanding to every aspect of rural life. It has got not only 8-10 subjects like in school, but hundreds and hundreds... The peasant knows his animals, soil types, weather to the tiniest details, can make tools, build houses, fish, hunt, breed domestic animals, cultivate soil, and heal man and animal. He knows grasses, trees, birds and bugs, their nature, benefits and disadvantages. He can tell the time by the position of the sun and the route of stars. He can tell tales, sing, dance, play, plate, spin, sew, cook etc."* We should realize: modern people have similarly diverse knowledge, understanding their human-made (artificial) environment very well, but build this new specialized knowledge at the expense of their previous holistic knowledge of nature. However, the biggest difference is that the subsistence of the modern people does not depend directly on nature any longer, resulting in a holistic knowledge of nature becoming less important.

The role of the anthropological approach in reducing knowledge gaps

Global changes, with frightening devastation to biodiversity, motivate scientists of various subjects to study the relationship between nature and people. Botanists, ecologists, geographers and ethnographers study the effects of land-use on nature (e.g. Hegyi 1978; Kósa 1982; Somogyi 1984; Viga 1989; Frisnyák 1990; Ikvai 1991; Molnár 1998); historians, ethnographers and geographers study the effects of the environment(al changes) on the history of human society (e.g. Györffy 1922; Andrásfalvy 1973; Rácz 1993; Sümegi et al. 1998; Várkonyi 1998; Bellon 2003); ecological anthropologists (they are called human ecologists in German speaking areas) study the effects of natural and environmental factors on culture and their role in the development of a certain culture or cultural phenomenon (e.g. Rappaport 1967; Lányi 1999; Borsos 2000, 2004). Everybody wants to contribute to the management of global problems, resulting in many groups studying different aspects of the same phenomenon (the relationship between nature and humans) from different points of view. Meanwhile, science, split into many disciplines, searches increasingly for linkages, creating inter-, multi- and transdisciplinary research teams (e.g. Holling 2001). Although the knowledge systems we understand under the terms science, art and religion can form a "unified knowledge system" at the indigenous tribe level living in close relation with nature

(Deloria 1992; Berkes 1999), in modern science it seems difficult to find any connections between the scientific disciplines. Human sociology, cultural anthropology and phytosociology, together with ecology, have exchanged paradigms and methods, for example, ecological anthropology has been trying for decades to develop an operational connection between the methods of social science and ecology (Borsos 2004).

Vegetation scientists are principally interested in the effects of land-use, e.g. on what knowledge is land-use based? How does it affect vegetation and how do these changes affect land-use? For example, when, how and why were tussock sedge beds grazed in the past? What quantity of trees are worth allowing to grow large on a wooded pasture (to have enough grass but also enough shade for animals)? Which (and why that type of) land-use was successful to maintain species richness?

To collect related knowledge, we need ethnoecological and cognitive anthropological approaches in addition to botanical approaches, as botanical methods are insufficient for this. According to anthropologists, ethnoecology studies the local knowledge of biotic and abiotic factors and makes intercultural, comparative surveys of systems of knowledge, practice and beliefs (Fowler 1977; Folke et al. 1998; Berkes 1999; Borsos 2004; Nazarea 2006). Cognitive anthropology, in turn, studies how members of the human community develop knowledge of their environment for themselves and their attitude toward the changes of their environment (D'Andrade 1995; Ellen 1996). Several publications explain anthropological methods, such as semi-directive interviews, questionnaires, analytical workshops and collaborative field research (besides those above, see Ohmagari & Berkes 1997; Medin & Atran 1999; Huntingdon 2000; Davis & Wagner 2003; Oudwater & Martin 2003; Vogl et al. 2004). In our article we would like to point out the necessity for conducting ethnoecological studies by (historical) ecologists and botanists, and to collect traditional ecological knowledge to understand present and past landscape changes.

The role of traditional ecological knowledge

The main question for the survival of human societies is how can they adapt to a permanently, sometimes abruptly, changing environment (Folke et al. 1998; Holling 2001; Berkes & Folke 2002). One of the primary tasks and responsibility of botanists and ecologists is to produce, maintain, transmit and adopt the related knowledge to practice land management which we need for this adaptation. To do this, we must understand the spatio-temporal state transformations in our landscapes, together with mechanistic explanations, namely we must understand the "behaviour" of nature (Bartha 2003, 2004).

Static landscape descriptions (which are still predominant in Hungarian vegetation science) are not sufficient to achieve this type of knowledge. Observations and experiments performed at too small spatial and temporal scales are often irrelevant (though they are also important sources of information); we need long-term (and large area) observations and experiments, studying landscape changes for decades and across many square kilometers. We also need to understand historical processes (looking back across decades, centuries and millennia), and we have to build models and run scenario analyses. Moreover, we must learn the social driving forces behind the observed landscape changes (Juhász-Nagy 1993; Haberl et al. 2006; Bartha 2007).

A significant part of botanical knowledge (though definitely not all) relies upon visible patterns (principally, the occurrence and cover data of species, e.g. flora lists, micro- and macro-phytosociological releves and vegetation maps). By collecting these data in one or many landscape(s), once or repeatedly, we develop our knowledge of nature. Not only botanists gather knowledge in this way. Those laymen who spend most of their lives farming

or living in a certain landscape know an astonishing number of plant species, even as many as a third to half of the local flora. Moreover, they know almost all of the habitat types, recognized by botanists, by their name and, also, know the habitat requirements of species and vegetation types and their changes over time. Their knowledge is remarkable even when compared to a botanist's. Consider the richness in the names of marshes in the Hungarian Great Plain (Györffy 1922) or the fine-tuned traditional flood-plain management along the Danube (Andrásfalvy 1973). The similarity of the local traditional botanical knowledge and the scientific knowledge suggests that botanists could use this local botanical knowledge to complete and/or improve their local scientific botanical knowledge.

The principal problem with modern scientific knowledge is that it has not been tested for a sufficient amount of time before being widely applied (Orr 1996). We cannot predict the medium- and long-term effects of our modernization activities (e.g. chemical medicines, world wide web) as we could for those which slowly develop and have been tested for centuries (e.g. grazing, mowing, peasant forestry). This is why people return, in these uncertain times – sometimes, in an idealized, romanticized and naive way – to the knowledge of our predecessors.

It is now evident that past land-use contributed to present day biodiversity to a great extent. Without the partial restoration of this extensive, spatially fine-scaled management system, a significant part of our natural heritage will perish within a few decades. We must replace our modern (intensive) land-use types with 'post'modern land-use types (e.g. agro-environmental schemes, nature conservation management, and sustainable forest, grassland and water management). This 'throwback' seems to be in a similar situation as other current issues, such as infant nutrition being returned to breastfeeding, or intensively produced, chemically treated foods being replaced by organic foods. We often revert to premodern knowledge and habits, although slightly altered (cf. Agócs 2003).

Based on our experience in Hungary, there are approximately ten to thirty people per village who still possess this traditional knowledge. This results in nearly ten thousands of people with traditional knowledge in the country. We estimate that there will never be enough botanists in Hungary able to handle a comparable amount of botanical knowledge. This is one reason why we must collect this local, long-term, persistent and now rapidly decaying knowledge.

We argue that only a small portion of the landscape-scale knowledge needed for nature conservation management is known by nature conservation managers at the moment, and even less of it has been published. Accordingly, participatory nature conservation management planning (i.e. including members of the local community in the planning process) is very important, as it is already routinely used in several parts of the world. This is also considered an effective way of collecting local traditional knowledge (Gadgil et al. 2000; Campbell & Vainio-Mattila 2003; Mihók et al. 2006). In North China, for example, the grazing habits of the Mongol nomadic culture, old laws of Khans and even the morals of folk tales have been used to design science-based ecological restoration of landscapes undergoing desertification (MunkhDalai et al. 2007).

Analogies and differences between western science and traditional knowledge

According to Andrásfalvy (1973), "co-operation with nature is the oldest heritage of humans". Knowledge of nature is really the most ancient knowledge. Knowing this, it is astonishing that vegetation science rarely mentions traditional knowledge as a potential information source.

Both western science and traditional knowledge aim to understand the surrounding world. Both are rational, empirical and produce permanently verified descriptions, explanations and predictions through the observation of patterns. Both types of knowledge can be most effectively communicated in their own language and both are culture-based (see in detail: Aikenhead & Ogawa 2007).

Traditional knowledge assumes (believes) a personal and moral connection between the observer and the observed. Its approach is often monistic, the observation is holistic, the content is spiritual and its statements are value-based, generally qualitative, locally relevant, and based on centuries of experience. Predictions aim to assure the long-term survival of the society (e.g. if we cut the forest, our crop will be taken away by flood, thus we will starve at the end of winter). In contrast, western science demands the observer's objectivity, endeavors toward value neutrality in results and excludes mysticism. Its aim is personal, scientific efficiency, economic profit, or knowledge for its own sake etc. Methods are (especially in natural sciences) reductionistic with quantitative results and a tendency to be universal. Most of the scientific disciplines aim to exploit nature as effectively as possible (e.g. the same land can produce more food by using herbicides, chemical fertilizers and GMOs).

Traditional knowledge in Europe

Traditional knowledge has usually been studied by anthropologists in indigenous, tribal, mainly colonized societies, for example in Central and South America, Africa, New Guinea and in premodern cultures in North America (e.g. Rappaport 1967; Knudston & Suzuki 1992; Ohmagari & Berkes 1997; Inglis 1993; Ellen 1996, 2003; Battiste & Henderson 2000; Medin & Atran 1999; Folke 2004; Blackstock & McAllister 2004). There is no existing knowledge of this type in Europe. Aikenhead & Ogawa (2007), however, point out that another type of traditional knowledge exists, which they call neo-indigenous knowledge. This is characteristic of cultures which were not colonized, but were not influenced by western science, either (e.g. Japan, China and Islamic countries).

The approach called as "western science" is the product of European urban culture. It is also worth mentioning that there is another independent culture which has long been coexisting in Europe, the rural culture. A significant part of people's present knowledge living in villages, on farms and close to nature is a knowledge that is empirical and very similar to traditional ecological knowledge (e.g. Andrásfalvy 1973; Stocklund 1976; Netting 1981; Agócs 1997; Tengö & Belfrage 2004; Vogl et al. 2004).

Since, in Europe, this knowledge differs in its characteristics from the traditional knowledge observed in tribal societies (e.g. as a result of trade, the community does not depend on the local landscape so much), we have developed the following definiton: European rural traditional ecological knowledge is knowledge based upon decades of personal experience with the surrounding landscape, acquired through hands-on management of the landscape, containing centuries-old, communally stored experiences which is mostly independent of western science and connected to rituals of social life.

Prospects and limits in using traditional, rural ecological knowledge

The advantage of integrating rural knowledge into science has been proved all over the world, most notably in the medical sciences, but also in conservation biology, and especially in the process of adaptive management (Colorado 1988; Agrawal 1995; Folke 2004; Folke et al. 1998; Berkes, Colding & Folke 2000; Huntingdon 2000; Becker & Ghimire 2003; Rist & Dahdouh-Guebas 2006; Drew & Henne 2006; MunkhDalai 2007). Traditional ecological knowledge is often spatially more detailed, sometimes even thematically more detailed (e.g. for landscape historical studies, Molnár 2007; the farmer knows the historical changes which

occurred on his land better than they can be reconstructed from written historical sources). This knowledge source could be used to enhance our management plans (e.g. introduction of cattle grazing on orchid-rich fen meadows, A. Máté verb. comm.); in other cases, it may resolve contradictions (e.g. why weren't willow shrubs a component of tussock sedge beds formerly, if we, currently, observe shrub encroachment to be a fast process? Because shepherds burned the shrubs). It can also help replace a positivist and amoral ideology with a more holistic and ethical one (Huntingdon 2000). Collecting traditional knowledge does not only enrich the lexical knowledge of botanists, but, according to our experience, it enriches our entire scientific approach and also our conception of nature conservation management.

Although there are problems which arise with the application of traditional knowledge [e.g. interpretation errors, reliability, quantitative errors and adaptability (especially in our ever-changing natural and social environments)], these can be handled well, in most cases (see references above). We must also be aware that "experiments" of present day rural management are less-tested than former ones (e.g. the impact of new varieties of domestic animals on pastures have not been tested for a long enough time). Another problem emerges when modern agriculture affects the conceptual and lexical knowledge of present day farmers; thus, the collection of traditional local knowledge in a modernized rural community is unreliable and needs thorough criticism. But exeptions exist here as well. We have experienced this with a pensioner co-op agronomist who did not repeat the slogens of socialist agriculture as a pensioner, but as his personal local knowledge of the landscape, (e.g. explaining that forced grassland improvements were not successful and original grasslands returned soon after). In Europe, our aim during the collection of traditional, rural knowledge cannot be to gather "ancient" knowledge but to obtain knowledge that has been tested for a proper length of time. This knowledge might only be a few decades old. (Some of the ethnographical data from the 19th century might also not have been tested for long enough, e.g. the grassland management of areas immediately following river regulation.)

An ecologist's biggest responsibility is to sustain (restore) the adaptive ability of society, helping to integrate postmodern technologies through adaptive management. This is one reason why local, long-tested kowledge is increasingly appreciated. Local, traditional knowledge seems to be more relevant at smaller scales, while science has a larger share in nature conservation programs at the global to regional scale (Fig. 1).

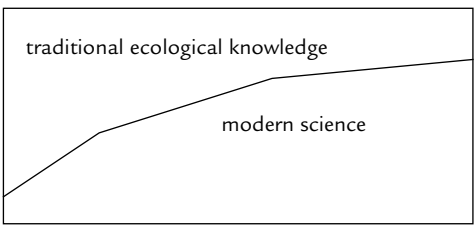

Fig. 1 Relevance of traditional ecological knowledge and western science varies with scale. [We emphasize that a part of an ecologists' or botanists' knowledge is equivalent to traditional knowledge in its character (experiental, naturalist knowledge) thus the boundary line can be interpreted as a wider zone.]

Pecularities of the Hungarian situation

Traditional ecological knowledge is part of the local culture. Hungarian culture is rich, as it is generally known, in both western and eastern cultural components. The landscape itself, where Hungarian people live, is diverse as well (with vegetation influenced by atlantic, mediterranean and continental connections), which also helps to enrich the culture (Andrásfalvy 1973; Hamvas 1988). Consequently, Hungarian traditional ecological

knowledge is also rich. This hypothesis is verified by the richness of folk music, folk tales and folk symbols studied in inter-cultural, comparative surveys (e.g. in the case of folk music Juhász 2006a, 2006b).
Traditional ecological knowledge is decaying all over the world (Benz et al. 2000; Wolff & Medin 2001). Fortunately, in Hungary ethnographic studies have documented a large portion of it (see ethnographic references). We have more of this long-tested, local knowledge in archives than in Western European countries, where knowledge loss was significant by the 19th century (Hofer 1975), and traditional knowledge has nearly disappeared by now (see e.g. Rotherham 2007).
A further research advantage is that significant numbers (cca. 2,5 million) of Hungarian people live outside Hungary as a result of the Treaty of Trianon and, in these regions, modernization processes are often slower, hence the premodern land-use type and style of living has been preserved. Hungarian botanists can therefore collect local traditional knowledge in their mother tongue.

Current research tasks in Hungary

In Hungary, a large part of the traditional ecological knowledge has already been collected by ethnographers, anthropologists, historians and geographers (e.g. Györffy 1922, 1942; Andrásfalvy 1973; Paládi-Kovács 1979; Imreh 1993; Borsos 2000; Ilyés 2000; botanical studies, see below).
However, we would like to stress that according to our experiences, ethnographers, anthropologists and geographers collecting traditional ecological knowledge – even if they are interested in vegetation issues and educate themselves about it – usually do not document vegetation-related connections between people and nature at a sufficient level, probably due to limits of lexical and personal vegetational knowledge.
This alone would not be a problem, since their knowledge of nature is sufficient for the social science and geography issues they study, but for botanical studies and for detailed plans of nature conservation management it is not sufficient. These details can only be studied by botanists – usually examining natural scientific questions. These botanists not only must have botanical knowledge, but also must know ecological anthopological and cognitive anthropological methodologies and methods. If we do not undertake this job, we will have to rely upon the collection and publications of social scientists and probably would not notice accidental false data, misconceptions and, particularly, thematic and lexical gaps in the collection. As a result, only a small part of traditional ecological knowledge could be used in our research and nature conservation management.
Ethnobotanical and ethnoecological data collection has a long tradition in Hungary. We can rely on detailed studies of folk plants' names, the way herbs were used and, also folk vegetation names as well as recent and historical studies of vegetation-based geographical names (e.g. Tikos 1950, 1951; Szabó & Péntek 1976; Péntek & Szabó 1985; Kóczián 1985; Pálfalvi 1994; Gub 1996; Babulka 1994; Gryneaus & Grynaeus n.d.; Szabó 1997; Rab 2001). Our task is to continue this research, to repeat it in as many landscapes as possible (e.g. Hungarian Mountains, Hungarian Plain), and to implement the methodologies of anthropology. Questions to be asked are: What types of vegetation can people, living in the landscape, name? What knowledge is it based upon? What do they know about each vegetation type? What knowledge do they have and how do they use it in land-use decisions? This type of research has become explicit and regular in recent years world-wide (Fleck & Farder 2000; Shepard et al. 2001; Toledo 2003; Torre-Cuadros et al. 2003; Casagrande 2004; Delang 2006; Hernandez-Stefanoni et al. 2006; Naidoo & Hill 2006; Halme & Bodmer 2007).

Ethnotaxonomical studies revealed that local "plant taxonomies" use similar taxons as scientific plant taxonomy, i.e. 70-80% of the used "species" names are at the species rank in scientific taxonomy (Berlin 1992). These people use these names without even understanding evolution, but know the names and create groups by only morphological features and possible use (Berlin 1992). We can presume a larger analogy between traditional knowledge and science in the case of vegetation types, as the scientific classification of vegetation types is based similarly on species composition, site-conditions and physiognomy, as in traditional knowledge.

One might ask whether we are in the 24th hour in collecting traditional ecological knowledge in Hungary. In our country, collecting folk songs has been going on for a hundred years; more than two hundred thousand archived records are kept and several syntheses have been written (e.g. Kodály & Vargyas 1971), however, some specific collections have little to no archived records (e.g. verbal description of singing styles by native singers), thus the collection of this information has just begun (see e.g. Berecz 1997; Agócs 1997; Juhász 2006b). In the case of decaying traditional ecological knowledge, we must collect the knowledge that still exists. It is not the 24th hour: traditional ecological knowledge has survived for a long time and will be perpetuated.

We have to begin our research in landscapes where Hungarian traditional knowledge is the richest (e.g. in Gyimes, in the Eastern Carpathians, along the river Tatros) and from there we will go to areas where these experiences are poorer (András Berecz pers. comm.). We began our research in Gyimes eight years ago and have conducted similar studies for two years in Hortobágy (Molnár & Babai unpubl.). According to our experience, local people have extensive knowledge of plant species and not only understand how to use them, but they know their distribution and habitat preferences as well. They know vegetation types described by botanists at the plant community and alliance levels, and also know a lot about their dynamics. Edaphic plant communities are named after their bed rock or soil conditions (similarly to scientific Hungarian names), while the ones growing on deeper soils – similarly, again, to scientific names – are named after the dominant species and/or land-use type. This knowledge can be collected systematically and quantitatively. As traditional knowledge is local, we must collect it from place to place.

A significant part of this knowledge can be collected only with great difficulty. Some elements of it can hardly or not at all be verbalized – they can only be experienced personally (e.g. lifestyle, beliefs and spiritual elements) (Rowe 1993). In cases like this, participatory collection – for months – cannot be substituted with the use of questionnaires. Moreover, it is not enough to collect only vegetation or ecological knowledge. This knowledge is embedded in culture, therefore we must come to understand it along cultural lines (cf. e.g. Agócs 1997; Aikenhead & Ogawa 2007).

Besides collecting knowledge in the field, botanists have to systematically reinterpret former ethnographic collections (this is the only way to obtain lost knowledge which cannot be collected or experienced any longer).

We think that a portion of the collected traditional ecological knowledge is worth integrating into science (see Huntingdon 2000; MunkhDalai 2007). In other cases, for example during the planning process of nature management plans – supposing we have already collected the local traditional knowledge – it is sufficient to select the relevant knowledge, whether it is scientific or traditional (see e.g. the old-new grassland management methods in the Hortobágy, Ecsedi et al. 2006).

Future prospects

Traditional ecological knowledge has a wider applicability locally than historical ecology, vegetation science or conservation biology. It can be of great use in answering social questions related to the management of environmental crises (Folke et al. 1998; Folke 2004; Borsos 2004). It is also presumed that for local school curricula we should collect traditional knowledge in each landscape rather than simplify scientific knowledge to develop local curricula. Watching films of nature and of far continents or visiting zoos result in a different type of knowledge of nature than having an excursion around the home town, and obtaining personal experience of the history of the local landscape. People who know their environment can be involved more effectively into participatory local/regional decision-making. If the terms used by and the knowledge of researcher-designers and local people are more similar and overlap, the planning process might be more effective. Academic-style commentaries by researcher-designers and the arguments of local people coded by geographic names, influenced by local, historical/cultural factors, are often at odds with each other (see the numerous conflicts of present nature conservation).

Studying traditional ecological knowledge can be an important tool in the elaboration of a new scientific paradigm. Pál Juhász-Nagy (1993) wrote about it as follows: *"Indeed: why can we not undertake more courageously, the whole arsenal of human faculty, but in a more competent and wiser way – into our emotions, as well as our fragmentary, but useful knowledge? Why should we repeat all of the mistakes we have had so far in this undertaking regarding e.g. green movement, art and science in foolish sub- and superordering. It is evident that this undertaking is almost obligated by Noah's "sinking" Ark, with so many problems of the Earth and the frightening decay of the biosphere. In this undertaking we need, and will need more and more, the aesthetical, moral and metaphysical enrichment of our present image of nature; especially in a wiser and more tolerant, but radical reinterpretation of the relationship between humans and nature. Since modern people desecrated nature, the resecration of Nature (in a more modern interpretation of Saint Francis' "existence democracy") is an unavoidable program."*

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Authors' affiliation

Zsolt Molnár (corresponding author) ❙ Institute of Ecology and Botany of the Hungarian Academy of Sciences ❙ H-2163 Vácrátót ❙ Alkotmány utca 2–4 ❙ e-mail: molnar@botanika.hu

Sándor Bartha ❙ Institute of Ecology and Botany of the Hungarian Academy of Sciences

Dániel Babai ❙ Department of Ethnography and Cultural Anthropology, University of Pécs