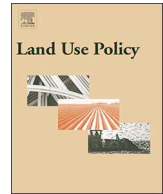




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The impacts of social-ecological system change on human-nature connectedness: A case study from Transylvania, Romania

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ABSTRACT

Contemporary Romania has been subject to several major social and institutional shifts that have had implications for the connectedness of humans with their environment. Four major governance eras have influenced human-nature connections: (1) formal and informal institutional governance after the World Wars and before socialism (before 1947), (2) top-down governance during socialism (1947–1989) and (3) during sovereign state governance and transition to European Union (1990–2006), and (4) multilevel governance since European Union accession (after 2007). We analyzed two cultural landscapes in Transylvania with respect to changes in human-nature connectedness. The two systems were similar at the beginning of the 20th century, but developed differently in their intensity of landscape management in the 21st century. Drawing on 41 semi-structured interviews, we examined changes that influenced landscape management and human-nature connectedness, considering five dimensions of connectedness: material, experiential, emotional, cognitive and philosophical. Material connections have weakened as a result of changes in food production and rising consumerism. Experiential and emotional connections were influenced by socio-economic and landscape management changes. Cognitive connections reflected changes in the knowledge system on the environment. Philosophical connection was influenced by changes in ideologies and globalization. Our findings highlight the central influence of social and institutional change on perceived human-nature connectedness. Understanding this influence provides important pointers for how to reconnect humanity to nature in the coming decades.

1. Introduction

The global ecological crisis has sparked critical reflection of humanity's roles and responsibilities for the natural environment. There is increasing recognition of human dependence on natural systems, although uncertainty exists about how to achieve a balance between human well-being and ecosystem integrity (Fischer et al., 2015). Both research and policy communities have addressed problems such as habitat loss (Millennium Ecosystem Assessment, 2005), the transgression of biophysical limits of the globe (Rockström, 2009; Steffen et al., 2015) and anthropocentric climate change (IPCC, 2014). While scientists and policy-makers are aware of environmental problems and their complexity, there is a knowledge-action gap between science, policy and practice (O'Brien, 2013), which hampers transformational change (Fischer et al., 2007).

Human-nature connectedness (HNC) has recently been re-

emphasized as a key concept for leveraging sustainability changes in social-ecological systems (SES) (Abson et al., 2017; Kopnina, 2017; Ives et al., 2018). In particular, it is recognized that there are multiple dimensions of HNC: material, experiential, emotional, cognitive and philosophical (Ives et al., 2017, 2018). While several studies have addressed the multi-dimensional complexity of HNC (Mayer and Frantz, 2004; Hofstra and Huisingh, 2014; Ives et al., 2018), fewer have emphasized its implications for sustainable landscape management (Bauer et al., 2009; Gonzalez et al., 2009). Cultural landscapes, are interesting and relevant from SES perspective (sensu Ostrom, 2009; McGinnis and Ostrom, 2014) because they are rich in culture as well as biodiversity; with connections between humans and nature playing critical roles (Hartel et al., 2014; Elands et al., 2019). Scholars argue, for example, that an emotional and experiential connection with nature has many positive outcomes for human well-being (Capaldi et al., 2014) and pro-environmental behavior (Hedlund-de Witt et al., 2014; Klaniecki et al.,

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2018), and may promote conservation initiatives of natural and cultural heritage within landscapes (Miller, 2005).

In this paper, we examine how perceived changes in the social-ecological system have influenced perceived HNC in two cultural landscapes in Transylvania (Romania). Both study areas have been subject to multiple complex and rapid changes triggered by shifts in governance and political paradigms over the past century (Câmpeanu and Fazey, 2014; Hanspach et al., 2014; Hartel et al., 2016). Notably, there were four distinct periods of socio-political and institutional changes in Romania which influenced the rural communities and land use: (1) pre-socialism (before 1947), (2) socialism (1947–1989), (3) sovereign state government and transition to EU (1990–2006), and (4) EU membership (2007–present). To the best of our knowledge, there is no available information about how the above changes have influenced HNC in the rural landscapes of Romania.

Understanding the richness of HNC and how they are influenced by institutional and social changes in the Romanian rural landscapes is important because these landscapes have exceptional socio-cultural and natural values (Horcea-Milcu et al., 2018; Molnör and Berkes, 2018). Further the farming practices still sustain species rich ecosystems, including landscape elements and species which have severely declined or are protected in Western Europe (Dahlström et al., 2013; Biró et al., 2014; Loos and Wehrden, 2018). However, changing socio-economic aspirations (Hartel et al., 2018), often linked with weak social capital (Hartel et al., 2014) and poor institutional performance (Mikulcak et al., 2015), pose several challenges in adopting and implementing sustainable landscape stewardship. Exploring the richness of HNC and how they change under various socio-political contexts can guide researchers and decision makers in governing these rural landscapes.

Our paper therefore has two objectives: 1) to identify perceptions of changes in the social-ecological system over time, including in governance, land use, and socioeconomic conditions; and 2) to highlight the effects of these changes on material, experiential, cognitive, emotional and philosophical dimensions of HNC. In order to meet these objectives in the studied landscapes we used an interdisciplinary heuristic interpretation that recognizes material, experiential, emotional, cognitive and philosophical dimensions of connectedness to nature (Ives et al., 2017, 2018). Our methodology, including background information on the case study landscapes, our interview data collection method, and our coding analysis, is presented in the following section. We follow with results, structured according to the two objectives. We continue with a discussion that emphasizes that the landscapes we analyzed were subject to dynamic social, political and economic transitions in recent decades. We highlight that the SES changes had several similar effects on the two landscapes, but we also identified context specific effects. We conclude by stressing the importance of understanding various dimensions of HNC, both for understanding past changes and for the future management of cultural landscapes.

2. Methods

2.1. Selection of sample areas

We focused on two rural landscapes in the southeast and northwest of Transylvania, Romania. These landscapes belong to distinct regions with similar historical and cultural backgrounds, namely Erdővidék (in Covasna County) and Aranyosszék (in Cluj and Alba Counties). The two areas had similar development trajectories at the beginning of the 20th century, but developed differently in their intensity of landscape management in the 21st century. Now, the two areas (Fig. 1) represent the two extremes in the development of Romanian rural landscapes: Erdővidék is a smallholder-dominated cultural landscape, dominated by forests and grasslands, and geographically isolated, while Aranyosszék currently consists mostly of intensive arable land with smallholdings in remote areas, and overall stronger urban influences (for more

information see Appendix A in Supplementary material).

2.2. Data collection

In order to collect data on HNC over time in a changing social-ecological system, we conducted in depth interviews with a range of stakeholders in each landscape (Erdővidék, $n = 20$, Aranyosszék, $n = 21$). We wanted to achieve rich data, where we collected a broad range of opinions and themes. We therefore aimed for diversity in the types of stakeholders that we interviewed. To achieve a broad coverage of perceptions and opinions on SES changes and HNC dimensions, we aimed to identify the most relevant stakeholders and interest groups from both study areas, including foresters, farmers, wildlife rangers, long-term residents, local leaders, teachers, nature lovers, priests, artists and students. Interviewees were approached using snowball sampling (Bryman, 2012), where we started with a small group of easily accessible participants, and asked them to recommend knowledgeable people to talk to on our subject (landscape changes and HNC). We conducted $n = 41$ interviews in Romanian and Hungarian languages with an average length of 66 min. The average age of interviewees varied from 47 years in Erdővidék (26–79 years old) to 60 years in Aranyosszék (43–90 years old). The gender ratio was 33 men and 8 women, which is explained by the snowball sampling approach; the social patterns in Transylvania mean men's occupations are more connected to landscape management than women's, leading participants to be more likely to recommend male interviewees. The education level of the interviewees varied from elementary classes (4 years) up to university. We covered ethnic variety (Romanians, Hungarians, Roma) respecting the recommendations of locals for the selection of interviewee.

In order to generate deep reflection during our interviews, we generated a semi-structured interview guideline for problem-centered interviews, which was refined during a round of pilot interviews (see full guideline in Appendix B in Supplementary material). The questions referred to perceptions on SES changes and HNC dimensions, and were grouped on general topics such as: habits of visiting nature, perception of beauty, connection to the landscape or homeland, changes in the landscape, perceptions on nature conservation and renewable energies. We included elements of participatory mapping (on a printed map of the study areas) and photo elicitation (preselected pictures). We often asked participants to show on a map where they were talking about, or to explain what something looked like referring to pictures. These techniques were not intended to produce spatial or visual data, but were used as tools to facilitate discussion and to keep the interviews grounded within the study landscape. Interviews were transcribed verbatim, in the original language.

2.3. Data analysis

We analysed the transcripts using NVivo 11 Pro (QSR international) software. Coding was done in the original language. Translation was done only at the point of write-up when selecting original, illustrative quotes. We used qualitative content analysis (Mayring, 2008) with inductive and deductive coding. The deductive coding derived from recent literature on SES changes (Hanspach et al., 2014; Hartel et al., 2016) and on HNC (Ives et al., 2017, 2018). The inductive coding derived from adjusting the coding tree iteratively and consistently as new (relevant) topics emerged. We increased the level of abstraction of the content by merging similar codes successively into subcategories, then similar subcategories into categories, and finally organizing the categories on topics, then themes.

Discussions on SES changes resulted in categories of codes including agriculture, society, forest management, environmental protection and nature conservation, wildlife management and hunting, local to national economy, formal and informal institutions, urbanization and infrastructural development. Between them, our respondents provided

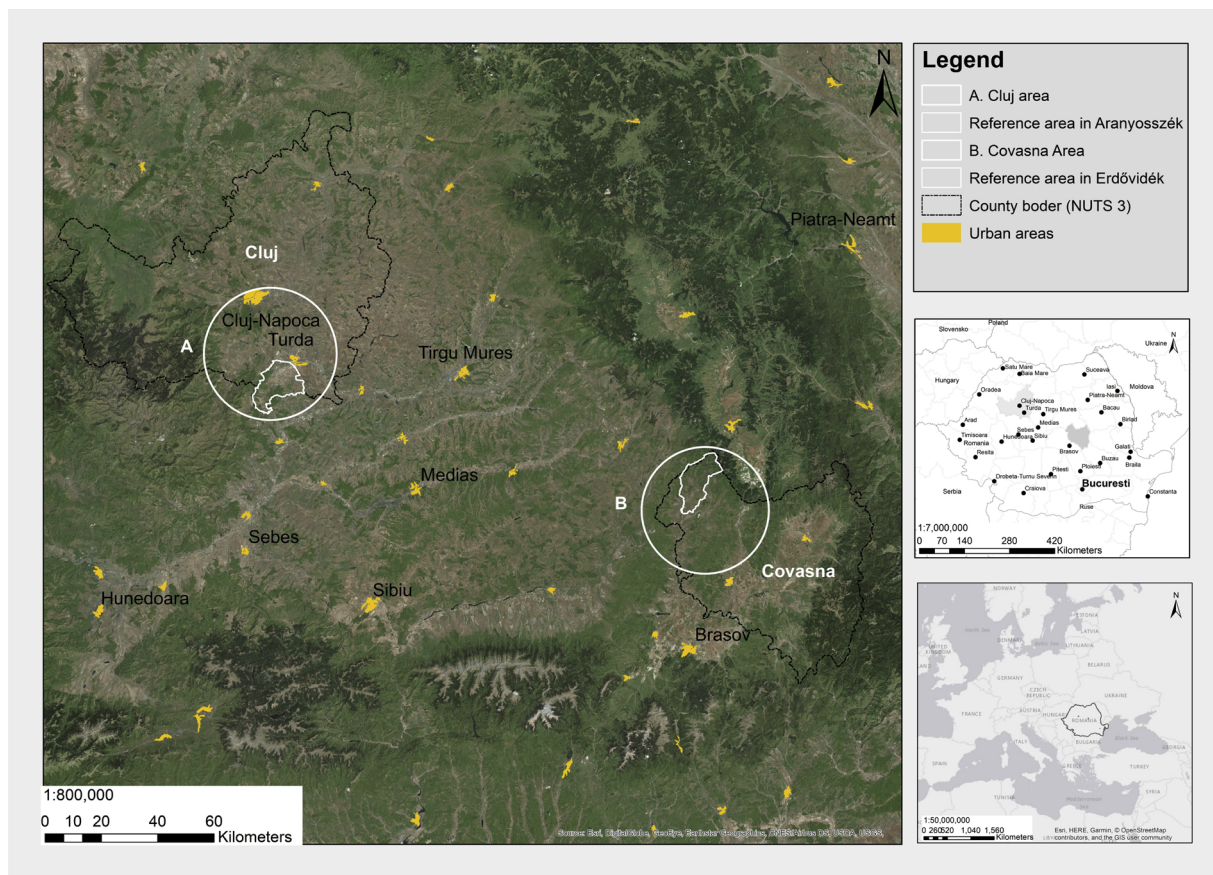


Fig. 1. Study area indicating the locations of the reference areas. The inset shows the location of the study areas within Romania and Europe. (Map author: Balázs Á., Source: Esri, HERE, Garmin, OpenStreetMap.

narratives that covered approximately the past century (since World War II) and followed almost the same division as described by some scholars (Câmpeanu and Fazey, 2014; Hartel et al., 2016): the pre-socialist (before 1947), the socialist (1948–1989), the sovereign state & EU transition (1990–2006), the after EU accession to present (after 2007). We recognize that not all participants were adults during the era about which they reflected, and that memory is often fallible. However, we use these narratives as representations of the way in which our respondents perceive that 1) landscape has changed; and 2) how that change affects their relationship with nature. We do not therefore seek to challenge or fact-check these narratives, but rather explore within them how people frame and represent these changes.

The HNC theme was split into the five dimensions of HNC: material (e.g. provision from nature for livelihood & land management), experiential (e.g. social relationships linked to land use & culture; activities in nature/landscape), emotional (e.g. bond with landscape & nature; sense of home), cognitive (e.g. knowledge in resource management; nature awareness) and philosophical (e.g. meanings of nature for human life). Each dimension covered subcategories of codes about personal or collective, internal or external connectedness. Where evidence existed we coded paragraphs on HNC to eras.

To find out whether and how SES changes influenced HNC dimensions, we performed the following analysis. First, we linked the SES changes to HNC dimensions running a matrix query using NVivo software. For this we used as common variables the eras, or the pieces of paragraphs that were coded for both themes to find out causal links between SES changes and HNC dimensions. Thus, we obtained three matrixes: (i) combining SES changes with eras; (ii) combining HNC dimension with eras and (iii) combining SES changes with HNC dimensions. Then we analyzed the texts (i.e. the matrix enabled access to original text that was coded in both variables) to see if any causality

existed between coding categories (e.g. material connection & 1990–2006, cognitive dimension & institutional changes). The causalities between SES changes and eras and HNC dimensions and eras, are described in Table 1 and Appendix C. The major, and the most evident influences of SES changes on HNC dimensions that emerged from the interviews were described in the Section 3.2 Changes in human-nature connectedness.

3. Results

3.1. Objective 1: perceived social-ecological changes

3.1.1. Governance changes

Interviewees described changes in Romania’s governance system as a transition of mainly informal institutional governance (before socialism) toward a formal, top-down government during socialism, and after its fall, aspirations toward multilevel governance (Fig. 2, Appendix C - Major system changes in Romania over time and influences of those on the local landscapes). Before socialism, widespread respect of locally agreed rules (e.g. use of natural resources) was highlighted. Later, socialist propaganda suppressed local rules of resource management and those who refused to obey (e.g. collectivization of land, losing ownership of forests) were punished or intimidated. Despite this, several interviewees noted that many had preferred the period of socialism, because it created a sense of socio-economic stability. The post-socialist period was associated with “revolution”, “freedom” and “high hopes”. Yet, interviewees were disappointed about this period, because real democracy remained elusive. In the 1990s “everything remained a bit without law” (Erdővidék, wildlife manager) and corruption increased. Today, interviewees felt that the top-down system strongly limits local leaders to proactively govern local resources.

Table 1 General changes in human-nature connectedness in relation to higher-level social-ecological change. This table combines information about changes in historical periods of Romania that influenced the five dimension of HNC we addressed. The table reflects the perception of the interviewees from both study areas.

HNC	Before 1947	Socialism 1947–1989	Sovereign state & EU transition 1990–2006	EU membership 2007–present
Material Provisions for livelihoods & land management	Peasant farming & provisions for subsistence	Abolition of traditional land use & provisions from gardens (allowed 0.3 ha/family)	Restitution of land and property rights & extensive management for livelihoods	Technologisation, market economy, agribusinesses & partial livelihood
Experiential Social relationships linked to land use & culture	Shared community work	Compulsory work in collectives	Less community work & technology weakened social relationships	Interest for events environment & culture
Activities in nature	Focus on work	Technologisation of agriculture, leisure & recreation encouraged	Decreasing work, increasing leisure & recreation	Decrease in activities & children spend less time in nature
Emotional Bond with landscape & nature	Farming connected people & nature	Disturbance by expropriation & devaluation of heritage	Elders attached to land & heritage, decreased bond for youth	Connection weakened & youth increasingly disconnected
Sense of home	Preservation of natural & cultural heritage of homeland/landscape	Emigration for better life & strong emotional connection	Environmental quality of homeland appreciated	Community belonging weakened & preservation of local values
Cognitive Knowledge in resource management	Traditional knowledge and informal rules	Professional knowledge and formal rules & traditions less practiced	Land management for economic reasons	Aspirations for western styles of management
Nature awareness	Life close to nature & awareness of ecological processes & collective care	Disconnection due to industrialization & no environmental education	Low environmental awareness & limited access to information	Environmental education & community engagement & access to information
Philosophical Framing of the value/ role of nature	Urge to maintain the heritage for coming generations & subsistence	Nature as principal provider of goods & services in the visions of socialism	Capitalistic ideologies, limited access to resources & unsustainable management	Rising environmentalism, tendency to protect traditions and heritage

3.1.2. Changes in landscape management

According to interviewees, landscape changes manifested as shifts in land use, land management and ownership (Fig. 2, Appendix C in Supplementary material). Before socialism, the landscapes were managed for the subsistence of family farms in private and common ownership forms. Interviewees often described this period as a reference for proper landscape management, when production, needs of community and ecological processes were much more in balance than today. During socialism, the farming was taken over by the government (i.e. ‘state’) and the land was managed for industrial production, often unsustainably. Private ownership was suppressed either by expropriation (in the case of forests), or collectivization (in the case of arable land). Collective farms served state interests, while local people were executors of the national production plans on their former land. With the end of socialism, state production ceased in both landscapes and locals turned back to former ownership forms and managed the land traditionally, mainly for subsistence or family profit (Erdővidék from animal husbandry, Aranyosszék from vegetable production). Forest management suffered from unsustainable management and sometimes illegal activities (e.g. logging, property shifts) as interviewees described.

Major differences in landscape trajectories between the two study areas were described after 2000. In Erdővidék farm sizes increased (from less than 5 ha to avg. 50 ha) since 2007, when EU subsidies became accessible. The Common Agricultural Policy of the EU, while being economically important for farmers, created a phenomenon of cultivating crops and keeping animals primarily for subsidies instead of to meet local needs. Forest management became more professional because of EU environmental regulations, and access to certification schemes (e.g. quality certification - FSC). In Aranyosszék traditional vegetable production fell when supermarkets opened international competition in the early 2000s. Stringent conditions and national bureaucracy made it almost impossible for farmers to sell local products in the supermarkets. Most recently, the landscape has become dominated by industrial crop production, whereas small-scale farming has survived only in remote areas. Since 2007, EU subsidies have improved conditions for agribusiness (avg. size of a farm 200–600 ha), following western production standards. The quality of forest management has not improved much and was strongly criticized by interviewees.

3.1.3. Socio-economic changes

Before socialism, people were less dependent on the monetary economy than on benefits and goods offered by nature locally for livelihood (Fig. 2, Appendix C in Supplementary material). Strong social cohesion existed due to social networks and shared activities related to landscape management, such as haymaking, pasture cleaning or wood extraction. During socialism, people felt that the land served the interests of the state instead of locals. While rural emigration was common in both areas, Aranyosszék also experienced some influx from other regions. Erdővidék was more economically affected than Aranyosszék after the collapse of industry and state companies in the 1990s. EU accession (2007) and globalization further amplified socio-economic instability (e.g. intra-EU migration, lack of labor force locally, weak economic competitiveness). However, EU membership facilitated access to new funds (e.g. agricultural subsidies), and living standards generally increased.

3.2. Objective 2: changes in human nature connectedness

Changes in the SES affected HNC in both landscapes. Changes in both study sites were broadly similar, as summarized in Table 1 (see also Fig. 2, Appendix C - Major system changes in Romania over time and influences of those on the local landscapes). However, differences existed in the degree of change in HNC, as described in more detail in this section.

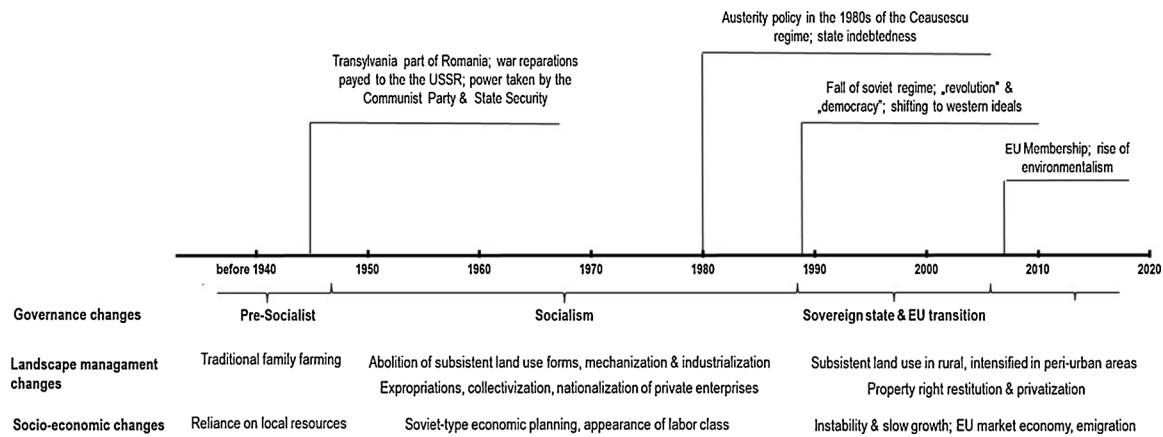


Fig. 2. Timeline of social-ecological system changes as described by local interviewees. The figure shows big events in Romanian history above the timeline. Below, we outline the four eras that our respondents talk about, and summarise the perceived broad changes in social-ecological systems.

3.2.1. Material connections to nature

Material HNC was perceived as declining in both landscapes in comparison with the past, but was still present in the sense that some local materials continued to be important. All types of SES changes described in the previous section were perceived to have influenced material connections. *“There is no one left who will work the land with two horses, two cows and three pigs. This will be disappearing (...). At one or two houses, you still can buy milk, but in former times, every household had milk. (...) Many of them grow crops for their own use...eggs, ducks, geese are not a problem. But there are many that buy pork from others [i.e. locally], or go to the supermarket to buy the meat they need”* (Aranyosszék, hunter). Socio-economic changes pushed the material needs of society from a landscape-dependent context toward a global one.

3.2.2. Experiential connections to nature

Major changes that influenced experiential connection were: (1) giving up farming and transformation of rural lifestyle, (2) less time spent in nature, especially for young people, (3) interest of the urban population in the natural values of rural areas. Interviewees spent time in nature because they had a traditional household or worked in professions related to nature (e.g. farmers, foresters, wildlife managers) and/or liked to spend time in nature for a wide range of reasons (e.g. hobbies, artistic activities, participation in public events). Experiences from being outside, collection of goods from nature (e.g. mushrooms, wild fruits, and medicinal plants), leisure and recreation were the most prevalent. Childhood experiences in particular emerged in almost all of the discussions related to nature. *“I always wondered, I was curious, and hoped to discover something new tomorrow”* (Aranyosszék, farmer). Interviewees mentioned that childhood experiences had changed. Due to technology and other distractions, children spent considerably less time in nature: *“In former times, it was natural that you spent time outside [at the summer settlement near the mountain meadows], sitting in the evenings beside the fire, while the parents went home to bring food, or wood from the forest. Today we are afraid, children are afraid [of nature]”* (Erdővidék, forest and wildlife manager).

Changes that occurred within the landscape, in combination with socio-economic changes, determined the way interviewees related experientially with nature. Erdővidék kept its rural appearance, as small farms remained a functional part of the landscape. Due to a lack of urban influences, the area remained rural. *“People from here are in contact with nature almost every day”* (Erdővidék, carpenter). Aranyosszék has changed more substantially, with some villages primarily inhabited by weekend residents, and others becoming attractive for urban migrants, offering *“better living conditions than in the city”* (Aranyosszék, teacher) and access to new leisure experiences in nature (e.g. running, cycling, hiking).

3.2.3. Emotional connections to nature

Interviewees associated nature with positive emotions describing relaxation (e.g. sense of calm, stress release), attachment (e.g. love for nature), happiness (e.g. joy, pleasure), and freedom. Negative emotions were associated with situations where humans impacted nature (e.g. anger, frustration, hurt, rejection). Childhood experiences with nature showed positive effects on emotional connectedness. *“My father took me in the forest for the first time, which deeply touched me and it still does”* (Aranyosszék, decision maker). Interviewees discussed emotions linked to values of nature or landscape features that conserved memories and feelings and included experiential connections as well. The most highlighted were seasonal and other changes in nature, wild and domestic animals, forests, gorges, agricultural land, streams, sounds, flowers, mountains and views. *“Once I saw a scene, I rarely cry, but then my eyes became wet. (...) It was summer with red sky. The grandfather was spreading manure from the cart while his little grandchild was dancing on the horizon with her blond, floating hair. It was such a nice view”* (Erdővidék, forest and wildlife manager). Interviewees linked the landscape to their personal roots and sense of responsibility, and expressed a deep emotional bond and a sense of home, composed of landscape, nature and community belonging.

3.2.4. Cognitive connections to nature

Cognitive connections changed with system ideologies (e.g. socialism, communism, capitalism, environmentalism) and their associated knowledge systems – that is, differential relative importance of formal (e.g. professional, disciplinary based) and informal (e.g. traditional, inherited, observation based) knowledge about nature and the surrounding landscape. Interviewees were concerned about the loss of informal knowledge that had implications for emotional connections and attitudes toward nature. *“With inherited knowledge, the relationship is inherited. Implicitly, it includes the names of trees, things (...) but there is an emotional bond that is missing in the acquired knowledge”* (Aranyosszék, priest). Even if informal, traditional knowledge survived in the memory of the community, young people were less interested to apply it. Socio-economic changes during and after socialism amplified governmental changes, and created conditions for many to lose their sense of responsibility for the landscape. Young people were increasingly less interested to work the land and expectations about life changed. Environmental awareness has generally increased since 2000, but remains poor for some issues (e.g. littering, human-wildlife conflicts).

3.2.5. Philosophical connections to nature

Philosophical connections covered physical, moral and spiritual values for humanity, which ought to be conserved to assure a future for humanity. This dimension included people’s value systems, and was influenced by experiences, emotional and cognitive connectedness to

nature. It was revealed in stories about: (1) nature and its role in human life; (2) human attitudes and the need to conserve nature beyond cognitive statements; and (3) cultural heritage preservation and sustainability. Nature was considered many times as a living being and part of life, and represented a deep meaning, associated with God, totality, absolute freedom or psychological well-being. “*I see nature as yet undestroyed reality of God in our lives, even though we tried it hard [to destroy it]*” (Aranyosszék, priest). “*We live close to nature and closeness determines that our inner and upper world, our spirit and soul is connected to nature.*” (Erdővidék, teacher). “*Today, society and globalization suggest that every person is valuable but in fact, we are just dust. (...) Nature tolerates us for a while. After a time, [nature] will get bored of [us], switch something and humanity will come to its end*” (Erdővidék, student). More discussions addressed the human self and nature from philosophical perspectives in Erdővidék than in Aranyosszék. Interviewees often revealed the responsibility of humans for protecting nature: “*Nature can exist without me, but I cannot exist without nature*” (Erdővidék, forester and wildlife manager), “*it is a functional part of our society*” (Erdővidék, decision maker). Sustainability (the idea, not the term) emerged in stories about the care for family heritage (the farmland), which played a central role for landscape connections. “*Society has changed. Less and less people do farming and those who have kept farming mainly do it on large areas and rather for more and more profit [monetary], than doing it from heart. [Investigator: What does farming from the heart mean to you?]. It used to be a general way of life for livelihood. My grandfather got the land from his father and nourished it [managed] as if it would be a piece of his soul. He tried to maintain the meadows and the arable to be able to leave it to his child. He knew, that his child would live from the land, and the child’s descendants too. Today, many [farmers] work on rented land and it matters less how the condition [of land] it will last, because next year maybe someone else will rent it*” (Erdővidék, student).

Interviewees talked about changes in general over the last 100 years, and explained that the value system shifted, which made them to think pessimistically about the future of their landscapes: “*We became very selfish*” (Aranyosszék, teacher).

4. Discussion

4.1. Social-ecological change and its implications for human-nature connectedness

After World War II both landscapes were intensified in response to changing political and economic paradigms (e.g. socialism, capitalism). Against the context of these changes, there was also a pattern of generally weakened connections between communities and their landscapes, which also had various social consequences (e.g. individualism, emigration). A major difference between the study areas was that Erdővidék, because of its relatively higher level of isolation, kept its rural character and extensive management. Aranyosszék, in contrast, changed towards a more urbanized, intensively cropped landscape that followed western aspirations. In Romania extensively managed landscapes (e.g. in Transylvania, Moldova, Maramureş, Bucovina) generally experienced a revival coinciding with the time after the fall of communism, and are widely seen as important hotspots of biocultural diversity (Babai and Molnár, 2013; Barthel et al., 2013; Dorresteyn et al., 2013). Thus, Romania is privileged compared to other post-communist countries of Central and Eastern Europe such as the Czech Republic (Bičík et al., 2001), Hungary (Mihók et al., 2017) or Slovakia (Lieskovský et al., 2015), where the loss of extensive landscapes was more prevalent. However, the survival of extensive landscapes in Romania happened primarily due to economic constraints rather than being a conscious governance choice (Öllerer, 2013; Mikulcak et al., 2015).

Several dimensions of HNC in our study were reported by our participants as being affected by social-ecological changes. Two types of material connectedness existed, namely of (i) those who still *directly use*

nature (using products for their own consumption or selling them in local markets), versus (ii) those who *indirectly use* nature (acquiring local products for consumption, e.g. from local markets). Emotional and experiential connections were highly prevalent in both landscapes, and many emotional and experiential connections were linked to cognitive and philosophical dimensions of human-nature connectedness (e.g. childhood experiences, connection to homeland), as also shown by other studies (Salmon, 2000; Bourdeau, 2004; Frantz et al., 2005). Our results underline the strong emotional bond to local landscapes as “home”, suggesting that landscape and nature were overlapping concepts to many interviewees. Many scholars have highlighted that rural areas typically experience stronger levels of nature connectedness than urban ones (Hinds and Sparks, 2008; Martin and Czellar, 2017), because both culture and traditional knowledge about nature play a more important role in rural areas (Bennett et al., 2016; van Zanten et al., 2016; Díaz et al., 2018).

Changes in paradigms and ideologies strongly influenced HNC. While changes were not always immediately apparent after a given social-ecological change (Fig. 1), following time lags, shifting values and practices can have major long-term consequences for HNC (Dallimer et al., 2014; Horcea-Milcu et al., 2018). As our results show, material and experiential connections were perceived as generally weakened with the onset of industrialization (in the 1950s) and modernization of rural lifestyles. Whereas extensive farming still connected many people to nature, especially in Erdővidék, the presence and function of people changed in both landscapes since the 2000s. Young people especially have become increasingly disconnected experientially and emotionally. Consequently, the loss of material connection appears to be a precursor for declines in experiential, emotional and cognitive connections, which may be an important consideration for the sustainable management of social-ecological systems (Auer et al., 2017; Ives et al., 2018; Muhar et al., 2018). Moreover, in our case studies, the ideological shifts also weakened cognitive and philosophical connectedness. Perhaps most importantly, informal knowledge systems and the attitude of the community towards nature changed. Recent work has emphasized the importance of HNC for environmental behaviors and landscape conservation (Brown et al., 2018; Klaniecki et al., 2018). Scholars highlighted that cognitive and philosophical dimensions are vulnerable when trade-offs between commodity production and value conservation are established (Mikulcak et al., 2013; Rode et al., 2015; Baccar et al., 2017). Finally, the loss of traditional knowledge may have irremediable implications for SES and HNC in Romania and all over Europe (Reif et al., 2008; Fischer et al., 2012; Bezák and Mitchley, 2014; Molnár and Berkes, 2018). We acknowledge that changes and value shifts are part of the cultural landscapes, yet the question is how conscious and sustainable the decisions are that drive the transition.

4.2. Intervening within a social-ecological systems to foster human-nature connectedness

As the results showed, HNC is an important element of Transylvanian SES and were deeply affected by its changes. Yet, transitions toward sustainability have to be consciously established by different actors to achieve measurable impacts. We see the strongest traps that slow sustainable development in the: (i) instability of SES, because of the transition of governance system from the top-down governance model of soviet socialism towards the EU multilevel governance model; (ii) exclusion of formal and informal social networks from consultation, decision making, and active management of resources; (iii) paradigm traps of disciplinary oriented resource management (e.g. forestry, agronomy, hunting, public administration) that deepen conflicts between institutions and create the avoidance of responsibility and solutions; (iv) weakening sense of responsibility of younger generations for cultural and natural heritage; (v) weakening community cohesion and connection with the landscape, due to urbanization and industrialization of rural areas and migration; (vi) poor

availability of financial resources and weak capacity to access that which does exist.

Our results suggest an accelerated erosion of natural and cultural capital over the last 5–10 years. We therefore believe that intervention to foster sustainability is highly necessary. Furthermore, our results revealed a favorable momentum for intervention in SES that could foster HNC in the future. Overall, Transylvania's SES are trapped in conflicting aspirations between development and conservation (Horcea-Milcu et al., 2018). Nieto-Romero et al. (2016) showed that information sharing and visioning in Transylvania are not enough to break through the barriers that stand against desired changes in a community, but many local leaders would actually prefer landscapes that imply rich HNC in the future. More than this, SES are sensitive to changes, because of the unsteady governance of Romania (i.e. predominantly top-down), that on one hand should be undergoing a process of decentralization in alignment with the EU, and on the other hand remains characterized by the central power of the prevailing political parties (Dragoman, 2011; Matei, 2013). This situation incentivizes rural flight and a disconnection of locals from landscapes (Favell, 2018; Sandu et al., 2018). Similar to our results, Mikulcak et al. (2015) and Hartel et al. (2016) emphasized that decision-making power is limited locally and the institutional context is the most influential barrier of development.

Current and future generations are confronted with the challenge of finding sustainable solutions for environmental problems of the coming decade in Europe and the world (Folke et al., 2011; Bodin, 2017; Grier et al., 2017). Understanding how social and institutional change has influenced human-nature connectedness, in turn, provides important pointers for how to re-connect humanity to nature in the coming decades. Drawing on our results, we argue that it is important to find ways to foster and strengthen HNC in local communities, even as broader social, political and economic changes shift opportunities for interacting with the landscape. Intervening in the governance system (e.g. making governance participative, changing policies that govern natural resources) would thus appear to be the most influential way to create shifts in HNC, towards sustaining the diversity of values (ecological, social, cultural) within the cultural landscapes and reconnect people to nature (Ives et al., 2018; Fischer and Riechers, 2019). However, governance of SES is a priori difficult given the complexity and unpredictable dynamics of both natural environment and human societies (McGinnis and Ostrom, 2014). Setting up priorities and ideologies that foster an environmentally sustainable society has to be balanced with what communities consider valuable and what is valuable from sustainability perspectives (Kaltenborn and Bjerke, 2002; Hermes et al., 2018). Reconnection of people to nature is possible by meaningful interaction with nature in close proximity where people live and work (Miller, 2005).

Hence, we argue that a future dialogue and consensus for a sustainable government will be vital for the SES of Romania. Novel institutional arrangements such as the communities of practice (Wenger and Snyder, 2000) and collaborative governance (Ansell and Gash, 2007) can emerge in order to facilitate cross sectoral collaborations for landscape stewardship. Institutional collaborations can be facilitated by academia through transdisciplinary projects (Lang et al., 2012), where various institutions work together to identify key sustainability issues, understand them and co-create the solutions for addressing and solving them (Emerson et al., 2012; Hartel et al., 2019). Ansell and Gash (2007) set up variables for collaborative governance systems to foresee whether a governance system will produce successful collaboration or not. When connecting the findings of Ansell and Gash (2007) to ours to achieve collaborative governance in Romania, the following intervention points emerge: (i) offering positive examples of cooperation a conflict solving models that overwrite the present and past experiences; (ii) creation of platforms that facilitate communication and cooperation between governmental and non-governmental actors; (iii) incentives for social networks to participate in decision making and management; (iv) decreasing power and resource imbalances; (v) facilitation of leadership

models and effective institutional designs.

We recognize the complexity of interactions between SES and HNC dimensions, and the many factors that can influence their relationship. Furthermore, we acknowledge that many of the changes that occurred in SES and HNC dimensions in the last century in Transylvania, or widely in Romania, cannot be seen separately from the processes of Europeanisation, and indeed globalization that were influential across the world. However, have shown that for our two study landscapes, perceived changes in the SES over time are related to perceived changes in HNC over time, and we have been able to identify a number of conditions related to the governance system, land management and social-ecological context that have shaped HNC. In response, we believe that the most valuable cultural landscapes of Romania need a strong participative governance that would allow local values and HNC to be celebrated, preserved, and even restored. Such processes should stand to protect the natural and cultural heritage of the communities and develop economically viable, but sustainable rural policies, even in the face of broader processes of global change. This is especially important when global ecological crises require decision makers and stakeholders at every level to turn toward a sustainable future.

5. Conclusions

We found that changes of social-ecological systems weakened human-nature connectedness in two cultural landscapes in Transylvania, Romania that were similar at the beginning of the 20th century, but developed differently in their intensity of landscape management in the 21st century. In particular, the shifting political and economic paradigms (e.g. socialism, capitalism) of the last decades are perceived as being the most influential drivers of change in landscape management and human connection to nature (HNC). While multiple dimensions of HNC (material, experiential, emotional, cognitive and philosophical) remained meaningful in both landscapes, the accelerated erosion of the natural and cultural capital due to less sustainable development makes us concerned about HNC in the long run. Therefore, we argue for collaboration between multiple actors in order to strengthen the HNC and navigate the SES toward sustainability.

Building on the theoretical foundation of multidimensional HNC (Ives et al., 2018) this paper belongs to those empirical studies that firstly address all five dimensions of the HNC in SES framework at a landscape level. We find this particularly important because the theoretical literature offers quite a vague and abstract meaning of "reconnection" of humans with nature as a solution for sustainability transformation and response to global ecological crisis, without a guideline on how to achieve it. The sense/meanings of HNC dimensions in cultural landscapes can be complex and diverse, and require different solutions on horizontal (from one landscape to the other) and vertical (local to national or global level) approaches. Therefore, our first recommendation is for synergic interventions in the governance system (i.e. top down and bottom up) that could generate tangible outcomes (e.g. decisions, regulations, funding system) for sustainable management of cultural landscapes of Transylvania. Second, we also suggest mainstreaming natural resource management and the intangible landscape values into every relevant institution responsible for the management of the cultural landscapes. This could result in sustainable landscape stewardship models. Third, we recommend planning the development of SES toward sustainability and making decisions based on the scenario of a desired sustainable future. We argue that such interventions should be made through alterations to the governance system that influences decision-making within the SES.

Notwithstanding, the focus of our study in an international context is narrow, but offers a good perspective on regional/local peculiarities of HNC on a gradient of changes of cultural landscapes of Transylvania (Romania). The similar historical periods of the governmental systems of Romania and of other post-communist countries, makes the study relevant for Central and Eastern Europe. Further, our results might be

comparable with other studies elsewhere in the world, where shifting governmental paradigms, or/and landscape intensification changed HNC. Therefore, we support further empirical research on the multi-dimensional HNC concept to promote solution for reconnecting of humans with nature.

Declaration of Competing Interest

None.

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Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:<https://doi.org/10.1016/j.landusepol.2019.104232>.

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