Interpretation of sustainability as the social adaptation of resiliency

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Abstract

The paper briefly overviews different types of diversity; not only ecological ones but also its various socio, economical as well as local, regional and global technological appearances, like the importance of retaining irreplaceable cultural diversity and the diverse ways of thinking and behaviour. The first part of the study analyses these different types of diversity which are preserved. The discussion of the mutual connections of the bio-cultural diversity is the content of the next section. Sustainable development is in great need of adequate competencies and expertise, both in the planning and implementation phase of promoting programmes and projects, including the long-term and complicated effects of them. The fundamental condition of sustainability – and therefore any plan which intends to produce a sustainable socio, economical, moreover ecological system (SES), is that it should express the need for resilient improvement of institutions, and, in particular, the suitable institutionalisation of the decision making process. The research and assessment methodology of this study has been the gathering of a broad spectrum of social, economical, technological and ecological publications on this topic, evaluation of the scientific literature and also the combination of their results. The end of the paper consists of conclusions and furthermore, suggestions for scientists, experts and politicians on how to apply a holistic, multidisciplinary approach and methodology both in proposal and decision making processes.

Keywords: socio-economical systems (SES), ecological and cultural diversity, institutionalisation of the resiliency into the sustainable development's planning.

1   Introduction

First of all, there are to be introduced and defined some existing terms which have become increasingly popular in the international discussion of scientists seeking and creating sustainability programmes.

- The robustness of Socio-Ecological Systems (SES) refers to a property whereby these systems can maintain, even strengthen, their ability to withstand the influence of disturbances without changing structure or complex dynamics (Young *et al*. [1]).
- "Resilience" is another form of resistance, adaptability and/even the capacity of a system to absorb, utilise or even benefit from perturbations and changes that it meets, and so to persist without a qualitative change in the system's structure (Gallopin *et al*. [2], Young *et al*. [1]).
- Cultural resilience means the ability of a community to keep its identity, whilst applying new, practical skills and knowledge (Bulla [3], UNESCO [4]).

These terms are known in the operation of process control and ecological systems. The novelty lies (or may lie) in the fact that they are associated with the social-economic sphere, in short: civilisation.

2   Diversity to be sustained :
why is diversity so important for sustainability?

In this paper, diversity will be interpreted in a wide and diverse sense, the latter being not just word play. We will thus extend our understanding beyond ecological diversity and discuss the importance of preserving the diversity of micro-regional, local systems, technologies and, not least, approaches and scales of values as well as policies aimed at/striving for expressing and implementing those.

Diversity is an indispensable chance to sustain the global ecosystem (and, in turn, the viability of our civilisation) for a reasonable time. It helps avoid vulnerability, when neither "robustness" nor "resilience" works after the tipping point.

In the 21st century or, simply put, in the decades to come and yet more simply, in the life of the next two generations, the "SES" will have to find, or at least try to find, answers to increasingly hard questions.

The main difference between sustainability policies in developed countries today is to what extent, and mainly how, the political and business elite, as well as the supporting civil society, perceives the concept of sustainable development.

The concept of sustainable development has global ecological roots (UNESCO and UNEP [5]). Humankind has interfered in the global bio-chemical cycles to such an extent that the integrity of the billion-year old natural balance is threatened and, in turn, the existence of any life on Earth. "The demand for natural resources grows rapidly, far beyond what the Earth is able to sustain in the long run… biodiversity declines, and main eco-systems are threatened more

than ever" (World Resources Institute [6]). If we are not able to change the habits of human society (e.g. their consumption patterns) and the way of production, then life conditions will become seriously endangered. In this sense, nature is the source and, at the same time, the limit of social welfare and economic development. The development concept, subject to ecological constraints, is the so called "strong" sustainability; transformation of society and economy which enables adherence to ecological constraints. In another (more indulgent) understanding, sustainable development is the equal (potential) development of society, the economy and the environment. Many different definitions and approaches exist, but almost all of the related strategies refer to the need for a balanced management of the "three pillars", namely the environmental, social, and economic components. However, this requirement is already met in the texts of "policy papers" whose authors promise all.

"The European Union is firmly committed to sustainable development, based on balanced economic growth and price stability, a competitive social market economy, a top level of education and social progress, and an advanced protection and improvement of the environment." And continued, elsewhere:

"Revised in 2006, the EU's sustainable development strategy provides a long-term framework for sustainability, where economic growth, social cohesion and protection of the environment go hand in hand and support each other." (EU [7], EC [8]).

Globalisation, society and its economy should, however, fit into the environment. This paper does not discuss sustainable development (nor the slightly different term "sustainability") in more detail as there is a vast amount of literature on it.

However, guiding principles are somewhat simpler to overview. The picture may intentionally be unclear at most, such as the Brundtland definition, which was a general political promise (Láng [9]), or the exchangeable capital types, which are just limited by ecology itself.

"Based on the capital approach, sustainable development can be understood as property per capita that does not decrease in time" (UNICEF [10]).

Σ capital (natural, technical, monetary, social, and human): = const., meaning that the sum of all kinds of capital should be constant or, if possible, increase.

$$T_i \qquad : \leq T_{i+1} \ldots \leq T_{i+n} \tag{1}$$

Consequently, the "solution" might be to control the relationship between the biosphere and the system of civilisation (Csányi and Lovelock [11]). However, there is a critical level beyond what natural capital cannot fall! This is the strong criterion of sustainability (Ayres [12]).

"Capital … consists of elements that are able to provide a future service having some value" (Schultz [13]). However, "… we fail to differentiate capital from revenue where this distinction should be of key importance: in the case of indispensable capital that is not produced but only found by the human and what is absolutely necessary… Far larger is the capital provided by nature and not by

man – and we do not even recognise it as such. This larger part is now being depleted at an alarming rate (Schumacher [14]).

The concept (and mainly, contents) of sustainability has been formulated several times, whether in a more stringent or indulgent way, but yet it would seem that people are reluctant to give the only true definition of this term. Concepts and criteria, however, can be formulated, yet there have been several theoretical debates, interpretations and substantial efforts, focusing primarily on how principles, criteria and sustainability indexes can be applied and brought closer to local, regional and national decision-makers or at least decision supporting teams. Definition issues are thus not just syntactical but largely semantic, as well: they refer to the contents of the term, and the attainment thereof. Debates circulate around the following main questions:

- Is there (can there be) any feasible way of finding a sustainable co-existence, production and consumption sample that opens perspectives for a community or at least some generations?
- What is the size of a sustainable community; village, a town, a region, a country; an association of regions, a cooperation of countries, or the entire globe?
- Could be talked about sustainability in one (sized) group, if other groups are not sustainable?

The above are the real questions relating to the definition of the concepts of sustainability. However, there is considerable uncertainty for the future. We cannot foresee future events and can only set up some scenarios in several options (Bulla and Tamás [15]). One of these factors is climate change, with its all ecological, social, economic, security, vulnerability and adaptability consequences.

In addition, to preserve diversity and to survey future options and available stocks, a systematic, scientifically demanding, analytical work is required. Diversity can be found in rich and extensive, often shockingly amazing forms on our planet, the Earth. As is well known, local communities, languages, cultures are imminently tied to biological diversity and to the pattern, the opportunities and supporting capacity of their "native area" and its landscape, provided that it survives in the globalised world. It is exactly globalisation that gives a special meaning to the preservation of ecological, cultural and language diversity as a stock.

- Cultural diversity: cultural diversity includes: (1) habits, rituals, good production practices, knowledge transformation systems; (2) co-existence methods, social systems; legislation and its institutions, the public authority system including the period of mandates and authorisations; (3) religions, beliefs, spiritual and philosophical views; (4) knowledge, (technological) procedures, skills; (5) languages; (6) fields, genres of artistic expressions; the (fine) arts, architecture, literature and music (UNESCO [16]).
- Biocultural diversity: all distinctness in the world, without regard to the origins thereof. This includes biological diversity with all its levels, and all forms of cultural diversity ranging from the individual to the collective as well as any interactions among these (Loh and Harmon [17]).

- Cultural land(scape): illustrative of the evolution of human society and settlement over time, under the influence of the physical constraints and/or opportunities presented by their natural environment and of successive social, economic and cultural forces, both external and internal (Balée and Ericson [18], UNESCO [19]).

In societies/communities where it is believed that conservation of biodiversity is the basis of life in terms of material, cultural and spiritual aspects alike, nature and culture in their widest interpretation (according to a proposed terminology, jointly: civilization) cannot be separated; humans and other creatures are all integral parts of the ecosystem. In this context, landscape is the highest guiding force and framework of all organizations, processes and events (Agnelitti [20]).

Globalisation opens borders, not only between countries, but regions and micro-regions, as well. It reorganises or even recreates the relationship between governments and the market. It gives birth to new forms of dependence by ensuring the global (and real-time) flow of capital and information.

Globalisation increases the number and speed of interactions between social, economic systems and the supporting environmental systems (Berkes *et al.* [21]). Consequently (or, as a price of the aforementioned), it suppresses the "low series" relationships (knowledge, services, goods) of small communities. It homogenises production and consumption habits by introducing a uniform, standard, often simpler, thinking and behaviour pattern.

It terminates or limits diversity – not only ecological diversity, but institutional and cultural (ethnic and lingual) diversity (Daveluy [22]), as well. One of the most severe impacts is that globalisation invalidates the value of knowing how to use applied, understood and acquired ("familiarised") techniques.

3   Mutual interaction of biological and cultural diversity

Would be allowed to highlight some of the mutual relations of biological and cultural diversity and fields of bio cultural diversity, based on UNESCO-UNEP, World Summit on SD Round Table, 2007 (UNESCO and UNEP [5]).

3.1 Knowledge and technology

- technologies, techniques, processes, procedures (also) for using natural materials;
- traditional and local knowledge, knowledge of local resources, ecological relations, early identification of dangers, management of risks, ability to cope with natural disaster, traditional medicine;
- passing and transmission of knowledge and skills to generations, formal and informal, traditional education, raising;
- procedures, habits, mechanisms for reviving traditional knowledge, and
- procedures, habits, mechanisms for applying new knowledge and technologies, adaptation.

Technological development is not simply a rearrangement of new technical and economic procedures, but involves the process whereby society learns how to use these.

It includes a learning process about how to apply these, as well as the social confidence resulting from the mass distribution of this "familiarized" knowledge. It also involves the extension of its application in the fields of consumption, culture creation, value forming, decision-supporting (joint decision-making) and participation in its implementation (for instance, the use of the Internet, selective waste collection, e-government, etc.).

In this wide(r) context, innovation is not only a part of the technical sphere or the economy; it also makes proposals for social organisations and institutions, expanding on the set solutions available.

It is, however, to be feared that as soon as SESs adapt to globalising system(s), they lose their "resilience" (i.e. their ability to utilise external impacts) in whole or in part, whilst acquiring new abilities in the meantime. Hence, the conservation of diversity along with the stimulation of the rhythm of potential interactions can reduce the vulnerability of the operation of our ecological system, including our civilisation. This is why "resilience" needs to be maintained. This is the point which, in my opinion, requires us to give a new interpretation to the term, and go beyond the ecological definition.

From an ecological point of view, "resilience is the ability of an ecosystem to resist disturbance without changing its qualitative status. The ecosystem uses its control and repair mechanisms to rebuild itself" (Cazorla-Clarisó *et al*. [23]).

However, when viewed from the operational aspects of a social and economic system, this term means the ability to foresee; the ability for preparing integral plans and scenarios for improving the cooperation between the natural environment and society (=civilisation) and the analysis of interactions and (in turn) minimising threats as well as making potential consequences more beneficial. Thus, such a system does not need to preserve its ability for rebuilding its original structure, but it should be able to "learn" how to adapt to the changes. The system needs to be able to establish operational rule and controlling and feedback organisations that reduce the consequences of drawbacks and support the identification and application of benefits (Bulla [3]).

Overcoming our antipathy, this aspect reveals that globalisation may also create some favourable conditions for very different processes and the treatment thereof. It is almost sure that sustainability will be attained through the separation of local regional system, strengthening these individual systems and integration into a global network ("glocalization") (Daly [24], Gyulai [25], O'Riordan [26]). I believe that the key level of reorganisation will be the (micro) region. (See: Cultural landscape.)

The conscious/reasonable management of the widest range of resources, including social, cultural and institutional resources in addition to the environmental ones (in short, sustainable development, more briefly, sustainability) thus requires us to reveal, maintain, strengthen, develop and use the (hopefully) existing, but often hidden abilities of economic and social (sub)systems.

Hence, sustainability is both a restraint and an opportunity to specify the borders of the economy established and managed in order to make society, if not happier, then at least to improve its welfare. It may and should also be the driving force of innovation.

It is increasingly clear that biodiversity improves the resilience of ecosystems; however, it is also claimed that cultural diversity (including social interactions) plays a vital role in establishing innovation mechanisms (Puia and Ofori-Dankwa [27], Oths [28]).

Thanks to the innovation based on and shaped by cultural diversity, new ways are generated for a creative application of existing traditional knowledge, and new institutions are established in response to threatening challenges, whilst utilising, at the same time, the opportunities raised by the changes.

4   Sustainability and professionality: the quality of being scientific

Ecological and other natural sciences, as well as economic, social and technical disciplines, seem to be controlled by individual disciplinal rules. An exploratory analysis does require a thorough analysis, but processes and especially potential consequences can only be understood with a synthesis that considers interactions as well.

This is a key rule in scientific thinking. The rules that control the universe are not disciplinary but universal, even if we do not identify these.

The implementation (or even the formulation) of a sustainability programme can/should not be started without the availability of professional-social knowledge, establishing different areas of expertise, special policies (such as, environmental protection and its subsystems) and public policies (such as, social care, minimisation of social risks, with special regard to the shortening/threat of the future generation, a working health care system, education/higher education providing a good/usable knowledge).

Simple, relevant examples are (can be) regional development policies, which are (should be) a complex web of "eo ipso" integrated programmes. When managing these policies and implementing programmes, very good or very bad synergies are generated, depending on whether the knowledge mentioned above is available or not (Bulla [29]).

Different policies (based on sectoral knowledge only) may have various consequences with varying impact. Interactions are often clear (e.g. agricultural sector/biodiversity, land use/transportation development, quality of rural life, etc.), but sometimes are not apparent, especially when strong groups are interested in keeping them hidden and/or their exploration requires larger-than-average analytical, synthesising skills and diligence. In any case, it is clear (or more tolerantly, hard to deny) that economic, social and cultural interactions and even interdependencies increase upon having access to environmental resources, especially during the controlled use thereof.

Public institutions can only slightly (in other words, hardly) cover this demand through developing their operations. This emphasises the need for

institutional development. Any social, political, economic institutional development steps pointing towards this aim might be the start of the change, the beginning of a long process, which may (perhaps) lead us to sustainability before its conditions cease to exist. No structural problems can be solved in a system where the given problem was created (Bulla [3], Bulla *et al.* [30]).

5 Resilient institutional development

Institutional reform should be an integral part of the agenda of natural-scientific, technological, economic and cultural discussion about diversity (UNESCO [4]). It is feared that it will be easier to find the technical/technological solutions for the tasks of development challenges than to adapt these solutions into behaviour patterns, approaches and values. This mass social action may be the reason why people tend to accept the simple belief that technical progress is the only way of defence and is above all else. Nevertheless, serious changes have to happen in terms of the practices applied and transmitted by decision-supporting and program management institutions. This is imminently and deeply connected to the success or failure of scientific, technical, technological, economic and social developments and the improvement of capability for resiliency.

The real question is whether the decision-supporter and, later, the executive (nowadays called: controlling) institution will be able to learn fast, i.e., pick up, adapt, apply and develop fresh knowledge, scientific analyses or management skills, as it is done by intelligent systems.

"From a system theory point of view, we may say that sustainable is any society that has information, social and institutional mechanisms that continuously control the positive feedback loops that cause exponential growth of the population and capital" (Meadows *et al.* [31])

These controls are the ones that constitute and accomplish resiliency and resilient capabilities. In other words, the basic and unavoidable contradiction has become clear. The operation of our civilisation may not be sustainable due to the limited availability of resources and/or our inability to adapt to environmental challenges. Despite the fact that huge environmental and economic changes are taking place in the global space, the scale of prevention and adaptation is not in proportion to these changes, although society is focusing more and more on the future, as detailed in the public health impacts of climate change; Vulnerability and adaptability (Páldy and Bobvos [32]).

To overcome the challenges caused by these changes, some new, versatile strategies (supported by multi-disciplinary analyses) should be applied, where the importance of diversity should be recognised to ensure the survival of the social-ecological system so that the resiliency of SES can be kept.

Nonetheless, it seems that the basic operation methods cannot be changed in an institutional system where decision techniques are becoming less and less capable of solving (or at least managing) problems that were caused and extensively reproduced by the system itself (Bulla *et al.* [30]).

Several questions may arise in Europe, in the EU and, more specifically, in Hungary, about the basic relations of institutions and their capability for developing adaptability in order to reduce vulnerability.

How can institutes and decision processes be reformed, made more flexible, effective, and adaptable if the demand for this improvement is questionable due to the inability of participants to recognise this need and to cooperate?

This is not a theoretical, bureaucratic or unnecessary question. Just think about the (failure of) analysing the versatile interaction during the preparation of infrastructural system. It's like when a "business plan" precedes the concept.

In matters that create forced obligations affecting the life of generations, infrastructures (including R&D&I structures) are rigid, expensive and less prone to change, whilst they determine frames and availability of natural resources for decades. Additionally, they play a vital part in building the ability to reduce vulnerability (ESFRI [33–35]).

6   Conclusions

The improvement of adaptability of communities and their economic systems requires us to navigate in a different paradigm system, and supposes that we can deviate from our former thinking patterns. It involves our search for "different" solutions, and that we extend our toolkit beyond the traditional technical-economic formula and analytical algorhythms.

No challenging problems can be solved in the paradigm framework where the problem was created; problems can only be extensively reproduced in such systems. Hence, regional and local organisations should be maintained and supported to make sure that diversity (which is indispensable for finding real solutions to problems) is protected and several options are available time after time.

Preserving diversity, including ecological, economic, technological, cultural and ethnic diversity as well as different approaches, plus the complex dynamics of all these, significantly contribute to a sustainable development that is operable in the long run or at least for a reasonable time.

The scholastic notion of sustainable development takes away the driving force of innovation, which is the resiliency of the social, economic and cultural system, (in short: civilisation), and its ability to learn how to develop itself in order to survive.

7   Recommendations

In scientific and political circles, biological and cultural diversity are still two strictly independent disciplines. This severely hinders people from understanding how different ecological and cultural components and bio cultural diversity interact, and are expressed in the changing social-economic trends and conditions.

The lack of inter- , or rather multi-disciplinarity, the rejection of thinking in this framework, and the failure to put processes into a real space of interactions

(the cultural landscape) all hinder the establishment of a reasonable and efficient strategy.

Clear and conceptual framework programmes should thus be established to analyse ecological and social relations, which are suitable for pointing out further directions to support future research work, programmes (policies) and plans.

A holistic inter/multi-disciplinary, cooperative comparative analysis is recommended, which combines qualitative and quantitative elements, integrates existing methods and reveals new ones for learning and developing innovative systems that apply good practices.

A common "vocabulary" should be set up to translate concepts and terminology, between both the theoretical and practical as well as the sciences and the arts.

The eco-cultural diversity and the concept of using a cultural landscape should be made part of policy-forming agendas.

Environmental, social and economic information on diversity as well as its benefits supporting resilience should be integrated into the drafts of sustainability policies, strategies and action plans and also during implementation at international, national, regional and local levels alike.

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