SOCIAL INNOVATION: URGENT NEEDS FOR SYNERGIC ACTIONS AMONG BIODIVERSITY CONSERVATION, CIRCULAR ECONOMY AND BIOECONOMY POLICIES IN RURAL AREAS FOR SOUTHEASTERN EUROPEAN COUNTRIES

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Abstract. Social innovation is a must for implementing new economic policies such as circular economy and bioeconomy. However, the need to preserve our biodiversity in the quest to new and better resources impose us to take synergic actions among different economic policies and biodiversity conservation at the national, regional and global levels. The scope of this study was to reveal that social innovation may act down to the most remote rural communities in Southeastern European countries for four case studies such as following: Bulgaria (e.g. The Valley of Roses), Hungary (e.g. Hungarian Grey Cattle), North Macedonia (e.g. Honeyland film "Half for me and half for you") and Romania (e.g. village' cowherds). All these case studies are related to villages positioned inside or in the border of protected areas and for all of them biodiversity conservation should be a must. In order to assess the needs for communication social innovation inside these communities a simplified Galbraith's approach was proposed and acting at four levels: (1) local communication with authorities and science, (2) organizational engagements of authorities and relevant stakeholders, (3) existing strategies on circular economy and bioeconomy that should act based on integrative approaches and synergic actions with the strategy on biodiversity conservation and (4) accessing community support for social innovation implementation. Each of the case studies revealed specific peculiarities for communication needs and each of them may have the potential to be replicated at the regional level. Our study results revealed that it is a must to become engaged in developing synergic activities for all these three policies: biodiversity conservation, circular economy and bioeconomy at the country level as well as at the region level due to fast scientific and technological achievements at the global level. We need not only to live in harmony with nature but also we need to learn to share with nature.

Keywords: biodiversity conservation; bioeconomy; circular economy; Galbraith's approach of communication assessment needs; social innovation; Southeastern European countries.

INTRODUCTION

Social – innovation is a relatively new concept for the European Union (EU) that needs to be adopted in supporting the synergic implementation of new political developments for all domains, new technologies and by considering the today environmental challenges mostly taken for the European Union (EU) countries under the Green Deal [50, 57, 83]. The concept has a long history starting with the Austrian economist Joseph Alois Schumpeter, after he released before the very first World War in 1912 [106] the book *The theory of economic development* [30, 49, 84]. It was a historical momentum when it was considered as compulsory that all new achievements in science and technology, in all domains, should be supported further by social acceptance [35]. Thus, the tremendous need to develop a critical mass of stakeholders supporting social acceptance to implement new products and services placed on the market due to new technologies as well as new scientific achievements was of highly importance [125]. It is well established that after 1912 we witnessed un unforeseen rate of discoveries and inventions in all classic scientific domains that pave the way for new emerging scientific domains as well as new technologies that further contributed to the unprecedent scientific achievements of the last century [65, 101].

By taking into consideration the scientific domain of biotechnology that started with the discovery of diastases (Anselme Payenne in 1833), followed by another relevant discovery some 30 years later by which enzymes are the masters of chemical bioconversion, as a new identified biological process [19], we will consider some further landmarks for biotechnology achievements during the last century. In this regard we also need to underline that it is a small but essential step between lab research, and the placing on the market of products and services based on patenting [78]. The very first step in technology transfer as a key procedure triggered a complex capacity building process related to developing precise administrative procedures for patents' official registration and intellectual property rights (IPR) protection [81]. This has a long history in terms of capacity building starting with the XIXth century that mostly increased during the XXth century [65].

After the Second World War, in 1948, the IPR as a concept is globally recognized in the text of the Universal Declaration of Human Rights, giving a strong impetus to science and research, private or public, for patenting and further patents' recognition for trade before entering global market [22].

In case of bioeconomy as well as biotechnology development, one of the first relevant landmarks is related to patenting the very first genetic transformation in 1974 [10]. In close connectivity we are witnessing the development of new administrative procedures or innovative capacities development at the authorities' level as well as other stakeholders such as organizational bodies related to patenting for research. It can be considered a complex process that paved the way for social innovation development after 1920 [67].

This was due to the need to transform political and administrative organizations for accepting during the XXth century new technologies by using innovative tools in communicating science to society [41] that further paved the way for economic and societal changes [93, 140]. The scientific community realized for the very first time that certain techniques and tools need careful considerations from administrative point of view and for the first time biosafety measures are defined in relationship with the work inside the laboratory as well as with the environmental connectivity when working with DNA molecules [134]. However, without the support of market demands for new products and services it is not possible to consider successful patenting actions and technology transfer to industry and, placing on the global market [63].

A second landmark for biotechnology is the history of producing Humulin®, the commercial form of insulin, by applying recombinant DNA technology starting with 1978 [21, 58]. It took more than four years to communicate, challenge and transform scientific societies and relevant stakeholders dealing with genetics [96]. Thus, new official medical boards emerged as responsible for placing on the market of new products. Moreover, for the first time Humulin's positive potential for placing on the market is transferred to politicians and authorities including the US Senate and dealing with new scientific achievements relevant for bioeconomy and facing the need to accordingly change policy and regulatory frameworks in the US and later in the UK. We may add also the acceptance for the first-time of strict biosafety measures for industrial monitoring system – as an innovative administrative procedure by following the advice of Paul Berg from Asilomar Conference that took place in 1975 [11]. The transformation and development of science's communication to the public is continuously changing since.

The analysis of these two landmarks for bioeconomy and biotechnology developments revealed that the communication of science to society is essential when placing on the market of new products and services it becomes a must [1, 40].

But how can we best communicate a new technology for different stakeholders belonging to two major groups: biodiversity conservation and economy? And what techniques or tools should be used to understand first that it should be possible to optimize communication? For this article we mention as relevant to remind the studies' results on emerging information technology (IT) published by Jay R. Galbraith's (1977) according to which at least six communication techniques should be used if we want to develop the communication between two separate IT units and these are as following: (1) *direct communication* using different tools and methods; (2) *contact person* nomination and working as liaison persons; (3) *task force* organizing and working for a specific period of time and clear tasks and schedule (4) *steering committee* organizing and evaluating the progress of the process; (5) *integrative actions* by nominating a person from one unit to work in another unit and (6) *synergistic actions* identification at the managerial level [99]. Such a complex approach in developing communication tools can be adopted and adapted for any new emerging scientific domain or new emerging technology when the subject will be integrated at an appropriate level and using the best tools for all stakeholders to discuss social innovation too [13, 109].

The complexity of nowadays biotechnology development as science and as new emerging technologies has accessed similar above-mentioned approaches: (1) direct science communication to the general public by using different new approaches, methods and tools for [53, 135]; (2) liaison services [98]; (3) task forces [27]; (4) steering committees [28]; (5) integrative approaches [107] and (6) synergic actions [122].

If up to the last century social innovation was under the development perspectives of certain groups of stakeholders such as private research units and industry however, due to the fulminant progress of science well established at the end of the last century we are witnessing that social innovation became part of the strategic vision of states, governments and regional level's policies at the global level [6]. If during 2009 social innovation touched mainly economic and new technologies subjects [47], later social innovation included social, economic, political and environmental challenges [51].

In terms of policy at the global level, the year 1992 is a landmark year for being adopted at the global level three United Nations conventions: UN Convention on Biological Diversity (CBD), UN Framework Convention on Climate Change (UNFCCC), and UN Convention to Combat Desertification (UNCCD) [56]. Today's economic needs to find more and access best quality resources are facing today the need to support global actions such as to halt biodiversity loss, to fight against climate change and to stop land degradation [110]. It is long time since the direct connectivity between biodiversity conservation and biodiversity development based on science was established [42]. Therefore, we consider that a balance between biotechnology products and services for the future and biodiversity conservation and further economic development should exist. Also, in this case we should access similar approaches for science communication to the public: (1) direct science communication to the public by using different new approaches, methods and tools for [23, 89] (2); liaison services [73]; (3) task forces [141]; (4) steering committees [88]; (5) integrative approaches [141] and (6) synergic actions [95].

A complex analysis of the roots of social innovation during the past century showed that it seems to rest mainly at the higher policy levels that should apply first top-down as well as bottom-up approaches [39], being easily adopted but not with the promised effects

at the community levels [85]. In 2012, Howaldt and collaborators considered that the roots of social innovation rest in the quest ways for unexploited potential for future social developments, also considering remote communities. Thus, we need to embrace the principle "Leave no one behind" that stays at the heart of sustainable development goals [36, 76]. Furthermore, the above mentioned authors considered that there is a need for people's empowerment and users' high involvement at the community level that should act as driving forces for supporting transformative change towards social innovation [136]. What is more difficult is to understand ways and means for social innovation implementation as well as to adopt bottom-up approaches for very specific and diverse new scientific subjects or new technologies for implementing social-innovation [85, 123].

Based on different opinions the development of strategies related to bioeconomy and/or circular economy need a bottom-up approach too and this will become a main driving force in supporting social-innovation for remote rural communities [16, 137]. The driving forces for further developments rest in the continuous societal transformation that is fueled by external factors such communication tools and methods mentioned above as well as different external commitments in terms of capacity building. We may add the relevance of appropriate political decisions, close communication between policy and local communities, and the need of public acceptance to support bioeconomy implementation down to most remoted communities [71].

Integrating social innovation for green circular bioeconomy in rural communities will become more challenging for the transition of countries towards this type of economy [103]. In this regard national strategies for biodiversity conservation, bioeconomy and circular economy should synergically integrate different actions for different scientific domains and should provide tools and methods to be applied on a case-by-case basis down to community level to concrete engagement and stimulate social innovation for bioeconomy [114].

The scope of this article is to apply a simplified Galbraith's approach to investigate the needs for communication on the potential social innovation related to green bioeconomy and circular economy policies implementation in synergy with biodiversity conservation policy for four different European communities. The selected case studies belong to South Easter European countries and considering the needs to synergically act between biodiversity conservation circular and green bioeconomy policies at the community level. These specific case studies are placed in Bulgaria, Hungary, North Macedonia and Romania, in rural areas in close connectivity with or inside protected areas. We are investigating the level of synergies working between these three policies (i.e. biodiversity conservation, circular economy and bioeconomy) to identify existing social services in rural communities and best approaches for best practices.

MATERIAL AND METHOD

The main principles applied for this study are as follows: the investigated case studies should be placed in rural areas and in close connectivity with protected areas and should be from South Easter European countries.

The simplified Galbraith's approach is equally applied for all four case studies by following the four levels of communications such as following: (1) the existence of communication between authorities and local community for direct communication of science; (2) the organizational engagements of authorities and relevant stakeholders such as liaison groups, steering committees and taskforces; (3) existing strategies on circular economy and bioeconomy that should act based on integrative approaches and synergic actions with the strategy on biodiversity conservation and (4) to access community support for the implementation of social innovation [99] (Fig. 1).

On desk study based on the review of scientific articles related to the four case studies for Bulgaria, Hungary, North Macedonia and Romania.

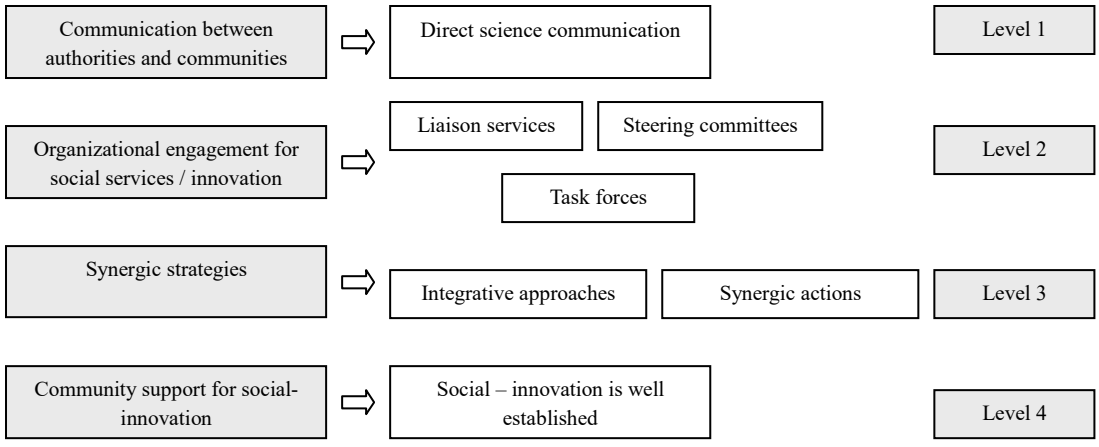

Figure 1. Proposed framework for social innovation potential analysis based on the simplified Galbraith's approach

Interviews with locals in Romania, with cowherd's shepherds and authorities was realized by respecting the privacy from Vlădeni village, Brașov County (45°46′9″N 25°22′0″E) and Alțâna commune, Sibiu County (45°55′34″N 24°27′55″E).

Place of studies. For all case studies the GPS coordinates are provided with the support of Google Maps [155].

Investigated data bases. In all cases protected areas were identified by using in parallel the protected planet web site https://www.protectedplanet.net/en [158] and Natura 2000 viewer, https://natura2000.eea.europa.eu/ [159]. The strategies related to biodiversity conservation, circular economy and bioeconomy were investigated based on official portals and presented in the following section.

RESULTS AND DISCUSSIONS

Nowadays it is increasingly discussed in different political levels about the social innovation potential within rural communities for European countries [37, 131]. Based on former investigations results, different factors can negatively influence the acceptance of social innovation such as the increase in emigration/ immigration rates [60], demographic change towards the increase of elderly population [14], infrastructure needs related to public transport and different current social services (i.e. medical care, internet, television) [105].

The first most detrimental factor in catalyzing social innovation in remote rural areas is communication. This should be developed first based on the understanding of local needs and beliefs to update, adapt and improve tools and methods for potential further developments [66].

The second relevant factor is related to capacity building needs at the authorities and other organization levels including business when different structures may further support communication for social innovation implementation [5].

The third successful factor is related to the synergic actions' needs of more relevant strategies at the national or regional level, namely for this study: biodiversity conservation, circular economy and bioeconomy strategy. By considering this an integrative and holistic approach for social innovation is highly supported at the European Union level since 2015 for the aim of circular economy [77] and bioeconomy [17]. Considering that biodiversity is the main provider for raw materials for both economic strategies, and most affected by climate change and anthropic pressure it should be relevant to identify the connectivity between above mentioned strategies and further developments of synergic actions under the biodiversity conservation strategy at the national levels [141] and furthermore for climate crisis adaptation and mitigation [104]. A short analysis related to the official web sites where the three policies' pillars can be studied is presented in Table no. 1.

We underline that the science communication to local communities and relevant stakeholders including business for all three strategies needs to improve based on the results of different scientific articles and further they should include some targets for the national strategy on education and research for Bulgaria [29], Hungary [24], North Macedonia [72] and Romania [20].

Case study Valley of Roses Bulgaria [87]. *Rosa damascena* Mill., a rose species is cultivated for more than 400 years for its scent, that started during the Ottoman imperium in central Bulgaria, in the so-called *Valley of Roses* recognized today as a heritage site for Bulgaria [18, 74]. Due to a long history of specific agricultural activity, we are witnessing today the presence of an amazing traditional agricultural landscape shared between roses and vineyards that proved to be valuable for the future of the species and local communities. However, some recent studies claim that these communities will be under threat due to the decline of essential rose-oil productivity due to climate change effects [38]. Also, relevant studies point out that there still exists traditional knowledge related to the cultivation of roses and the extraction of the essential oils it is presented as a good practice of integrating into the national economy the entire rural activity from the Valley of Roses [52, 138]. Nowadays, scientists underline the relevance of this area for the conservation of wild pollinators as well as for traditional agricultural practices in place [130]. It can be considered as a complex situation.

Table 1. The analysis of synergic actions taken under strategies and action plans for biodiversity, circular economy and bioeconomt for Bulgaria, Hungary and Romania

Countries	***Biodiversity conservation strategy and action plan***	***Circular economy strategy and action plan***	***Bioeconomy strategy and action plan***
Bulgaria	Biodiversity strategy and action plan in force [145]. Not coupled with other strategies [129].	Circular economy – strategy and action plan in force for the period 2022-2027 [43, 150].	Bioeconomy strategy in force. BioEast Initiative for bioeconomy [142].
Hungary	Biodiversity strategy and action plan in force [9]. The strategy is taking action against pesticides and fertilizers over-use in agriculture [146].	Circular economy – strategy and action plan in force [92, 151].	Bioeconomy strategy and action plan. BioEast Initiative for bioeconomy [143].
North Macedonia	Biodiversity strategy and action plan in force [147].	Circular economy – strategy [152]	Bioeconomy strategy (EEA, 2025).
Romania	Biodiversity strategy and action plan in force. Not coupled with other strategies [127, 148].	Strategy on circular economy -2022 [153]. Not coupled with biodiversity strategy [120].	Bioeconomy strategy 2022. BioEast Initiative for bioeconomy [144].

From biodiversity conservation point of view, this amazing landscape is in close connectivity with some protected areas such as Tsentralen Balkan buffer (Natura 2000 - BG0002128 - protected under the Birds Directive) and Reka Tundzha 1 (Natura 2000 - BG0000192- protected under the Habitats Directive). The last protected area is designated for 31 protected species and 14 habitats. Among the habitats, relevant for the Rose valley are the semi-natural dry grasslands and scrubland facies on calcareous substrates, the same structures on which the Valley of Roses is developed [108]. Some investigations related to natural pollinators are also conducted in the region and providing concerns for their future conservation [102].

Based on these studies it can be considered that the mentioned protected areas surrounding the Valley of Roses should have the support of traditional agricultural practices for ensuring open connectivity between agricultural land and wild nature. Today's constraints are related to the climatic crises, that impact on the need to grow the essential oil productivity, and the community further development needs closer attention to further support the maintenance of traditional practices as well as of these traditional services in direct connectivity with nature.

Moreover, a combination of nature base solutions (i.e. for landscape restorations) [111] and green bio-based solutions (i.e. supporting circular economy and bioeconomy) can support local community's further development [133].

Based on the simplified Galbraith's approach the existing social services may be further accessed to integrate new tools and methods for improving communication in supporting social innovation for circular economy and bioeconomy as well as for biodiversity conservation. The community is already aware of the benefits of rose oil and acknowledge already the risks of not acting. The major value at the social level of this case study is the full involvement of authorities for supporting the preservation and promotion of Valley of Roses into the national economy. The first 3 levels of communication according to simplified Galbraith's approach, are already in place and it will be a small challenge to develop further the need of local communities' full support. In this case a task force and a standing committee is compulsory to be developed based on different expertise and answering to all these policies as well as for the up-dated monitoring system that should be in place. This capacity building can be easily developed based on existing regulatory frameworks developments only considering the economic needs for the Valley of Rose.

The Bulgarian Valley of Roses can be considered one of the best practices for Easter European countries, where a traditional landscape of rose and vineyard is used for essential oils and wine industries as well as for tourism as a national brand. However, there is a need to continue the development of communication at taskforces levels (level 3 and 4) that should include all stakeholders (i.e. including scientific community) for ensuring that climate change does not affect the productivity of essential oils on one hand and on the other to develop innovation at the industrial level for ensuring the continuation of this Bulgarian brand. This traditional landscape may become valuable for the study of pollinators, especially for areas close to protected areas where the loop for the three strategies (i.e. biodiversity conservation, circular economy and bioeconomy) can close. Nature based solutions and green bio-based solutions can pave the way for social innovation implementation in the region.

Case study the Hungarian Gray (grey) cows [7]. The need and appreciations for preserving the Hungarian Gray cows have been well established since 1966 (Bartosiewicz, 1997). After the Second World War only around 200 specimens were identified and before 1970 this breed was considered as threatened with extinction [79]. According to Bartosiewicz (1997) [7] due to the national breeding program in place after 1966 the number of specimens rose from 460 in 1966 to 1600 in 1996 and reached 4065 specimens in 2022 based on the latest data from FAO [154]. The breed was officially defined as a heritage value for the country, for local communities and for the country's future (Bartosiewicz, 1997) and it is considered at risk of extinction at the FAO. During that time, scientific achievements were used to prove the origin and uniqueness of this breed. Thus, recently the MtDNA analysis proved the historical breeding isolation of this Hungarian breed belonging to the Podolian cattle group as well as its importance for future conservation and breeding perspectives (Maróti-Agóts et al., 2025). In mean time, the official recognition of the breed developed further in Hungarian local communities as well as and the recognition of products derived thereof are of national importance [68, 160]. By closely analyzing this evidence, the direct connectivity of this ancient breed with science and education system can be considered as most relevant and innovative for the region (University of Debrecen, University of Szeged). Other scientific articles are proving the positive long-term effect on environment due to traditional knowledge related to grazing of Hungarian Gray cows [46, 94, 118]. Moreover, a strong promotion of these cattle breeds as valuable traditional products of local heritage relevant for local identity [7] tourism [132] and consumers education [68] are well established. Some relevant farms are positioned inside protected areas such as Hortobágy National Park where safari is used as a tourism service [7].

It can be considered that this is one of the best practices identified in the region of Southern Eastern European countries where traditional knowledge related to agriculture (i.e. Hungarian Grey Cattle) is a central subject for: a) capacity building at the official level to ensure for long term its conservation and sustainable use; b) research and education for further developments; c) environment supported by traditional agricultural practices; d) heritage and local identity

officially recognized at the national level for preservation and further developments; e) tourism industry that includes also traditional rural areas and f) consumers education based on traditional and innovative products and services. All these identified values at the national level are protected for future generations by law due to their heritage, scientific, educational, economic and ecological proven values as well as the need for the preservation of local communities' identity [8]. In this case authorities succeed in becoming part of the stakeholders working directly inside these communities and gaining their trust for long term.

The first 3 levels of communication according to simplified Galbraith's approach are already in place in Hungary as well proving that a synergy between all types of stakeholders is possible for the preservation of biodiversity and the associated products and services integration in the current economy at the national level. There are all chances to fast cover the fourth level of communication to act synergically in the quest to fully integrate biodiversity conservation, circular economy and bioeconomy policies with the support of these local communities. It is a similar with the Bulgarian case in terms of capacity building needs for social innovation. Thus, it will be very easy to further develop capacity building needs for synergic actions among the three strategies that may pave the way of new task forces and standing committees that should take this relevant task for different levels and fora.

However, the traditional knowledge related to Hungarian Gray Cattle should be further promoted at the global level also to the Intangible Cultural Heritage Convention under UNESCO [161] considering its relevance for the Podolian group especially for its evolution and domestication as well as to the traditional knowledge [26, 139]. Unfortunately, the subject of agricultural traditional practices is not so often accessed into this convention as it should be [64].

Case study Half for me and half for you North Makedonia. A very interesting case is that describing traditional ways of collecting honey from the wild in the mountain village of Bekirlija (41°40′48″N 21°56′27″E), which is a poor region depleted of any social services (i.e. tap water, electricity or gas) [61]. In 2020, a documentary film on the subject was promoted at the global level as one of the best practices to support both biodiversity and cultural heritage conservation. The film presents as a central figure an old single woman sharing her traditional knowledge with proud related to the honey collecting from the wild. Each time she collects only half of the mature size honeycombs and the rest is left for the wild bees. It is one of the most emotional interconnectivities between nature and humans [34, 45]. The need to preserve local community identity makes this case study of outmost importance Kara, S. (2022) [61]. The message is clear: we need to take care of nature first!

Today this traditional knowledge is promoted under the pollinator's initiative at the global level [97]. It is well established at the global level that there is a descendent trend for pollinators all over the globe since 1970 [59]. Real vulnerabilities and risks for pollinators are pesticides and other chemicals and there is a need for a real transformative change at the society level for accepting that the life of pollinators is highly important for the survival of our future generations [86]. This is one of the most impressive case-study for biodiversity conservation in Eastern European countries. This village is located inside the pan European network for protected areas Klisura na Bregalnica (SiteCode: MK0000031) [149] as a candidate protected area for Natura 2000.

In case of North Macedonia there are no identified synergic actions between strategies and action plans for biodiversity conservation (Table no 1), circular economy and bioeconomy [112]. We mention that in 2025 the country profiles on circular economy and bioeconomy were just published for the first time at the EU (Table 1). Further developments in creating synergies among the tree policies will be required for the future as comparing to the other two already presented case studies (i.e. Bulgaria and Hungary), the economic value is not yet well defined and integrated in the national economy. Such a case study is most important when we may consider it as a reference one for further developments. In this case the fragility of rural communities in that area impose careful attention when developing tools and methos for improving communication with local community to include social innovation based on the simplified Galbraith's approach. Such poor local communities exist in almost all southern European countries and the professional involvement of media in this case study can be used as a best practice for all countries sharing the same values.

For the example *Half for me and half for you* of North Macedonia, it can be considered one of the best practices when mass media is involved for promoting at the global level one of the most important traditional values discovered inside a remote rural community inhabiting inside a protected area and living in harmony with nature. It is an isolated case study revealed by chance due to some investigators and organizational engagement for communicating such subjects that may bring some unique innovative solutions for these communities. There is also need for further developments based on the simplified Galbraith's approach to cover all four levels in creating synergic actions among the three types of strategies such as biodiversity circular economy and bioeconomy, and further considering social-innovation for nature based and green bio-based solutions. We underline that it should be a relevant lesson for business when they intend to develop behind nature's boundaries and we need to remind all the time that we need to pay back to nature or to leave at least an intact half for nature's restoration in the buffering areas of protected areas.

Case study village's cowherd South Est Transylvania, Romania. For certain villages in Southeast Transylvania (i.e. villages from Sibiu and Brașov Counties) village's cowherds have a local heritage value that are not yet recognized in Romania, and it is among the most relevant and important traditional social services developed for many centuries in the region of Transylvania, the former historical province [156]. Based on Marius Halmaghi historical investigations at the community level it was decided more centuries ago that all the cowherds should be managed by a family that should be trusted to take care of cowherd feeding at the commune level. There also exists a Court of Justice case when in 1771 a shepherd was investigated for not complying with this rule [157]. The procedure was traditionally transmitted on unwritten mutual agreed terms. By creating this traditional social service, a job for a family and free time for all community members were created as a win-win solution. Under these circumstances new services were possible to be developed at the community level such as the neighborhood practice (i.e. all people in a community used to participate in different agricultural or cultural practices from one household to another). In this case pastures' grazing was not intensive and therefore biodiversity increased and / or was maintained [80, 90, 113]. Based on this type of extensive grazing before accessing the EU, it was proved that for SE Transylvania we may have for grasslands one of the highest biodiversity at the European level, responsible for the today defined high-nature value grasslands [2]. This traditional service continuously continued during communist times and after.

However, during the past 10 years we have witnessed a continuous decrease in the livestock for cowherds. Based on data collected from families responsible with cowherds' management the number of cows decreased at least 10 times compared to 1990 for Vlădeni village from Brașov County (35 cows in 2025 compared to 350 in 1990). The main factors mentioned are as follows: the increase of elderly population and the migration to the cities (i.e. 15 km distance to Codlea and 27 km to Brașov) or other countries of young generation [116]. We mention that this commune area is surrounded by some relevant protected areas such as Dumbravita Fishpond Complex or ROSPA0037, as a protected area under the Birds Directive [55] and Perșani or ROSAC0352, as a protected area under the Habitats Directive.

A different situation was found in Alțâna, Sibiu County, where 200 cows split in two cowherds (i.e. one of 150 and one of 50) left of more than 1200 in 1990. Alțâna commune is positioned in the Natura 2000 network ROSCI0132 Oltul Mijlociu - Cibin – Hârtibaciu (45°55′34″N 24°27′55″E). The commune is in a remote distance to Mediaș (i.e. 37 km) or Sibiu (i.e. 38 km) and the preservation of the cowherd as a social service is a must.

It can be established that these traditional agricultural practices and traditional social services supported the maintenance and further development of biodiversity in the region [90].

We need to emphasize that at the Commune Hall level today exists contractual forms based on mutual agreed terms between authorities and the families involved in this community service providing advice when and where with a clear calendar for cowherd grazing during the summertime. However, this traditional based social service is unofficially accepted as part of the cultural heritage in Sibiu and Brașov Counties [44, 115]. The main lack at the Commune Halls today is the missing link between traditional and local practices and the current regulatory framework. There are at least two facets of the problem: the family in charge with the heard which is not socially integrated with a constant income, not even on voluntary basis on one hand, and due to the lack of incentives for maintaining these practices the grassland biodiversity will be under threat later such in the case of Poienile cu narcise de la Dumbrava Vadului or ROSAC0205 a protected area under the Habitats Directive where the birch trees invaded the daffodil meadows as the traditional grazing was forbidden after 2000 [128]. We emphasize that most of the pastures today are managed under N2000 and are part of high nature value farmland [119]. In these cases, mainly nature-based solutions [119] and green-biobased solutions [121] should be accepted and they will have an immense chance for further developments based on existing social-services.

By considering this case study it is more than obvious that in remote rural areas it is possible to communicate on social innovation as already in place there are different social services. They should be accessed, understood and used for further developments and accepting nature – based solutions in case of nature restoration as well as innovation at the social level for integrating new technologies and bio-based solutions where is the case.

We need to underline that based on the simplified Galbraith's approach at the commune level (level 1) there is a great need to further develop communication between authorities, scientific community, business and other relevant stakeholders for local communities' development (levels 2 and 3). Furthermore, creating synergies among the three political pillars (i.e. biodiversity conservation, circular economy and bioeconomy) will be needed for fully integrating all political commitments taken at the national levels. By developing at the county level of a standing committee to respond to all three policies should be a must. Furthermore, a task force should be in place to implement local measures for the continuity of these traditional activities that should be officially accepted as having heritage values.

We would underline that social innovation is essential for ensuring the full implementation of strategies on circular economy and bioeconomy and it

will become more important when biodiversity conservation is a relevant community's asset.

In this latest case study, we may reveal the potential erosion of one of the most relevant old traditional values for villages in the historical Southeastern Transylvania region also promoted by media. Today's lifestyle can easily erode traditional values that are of outmost importance for biodiversity conservation and yet comprising social services as basis for further developing social innovation with the support of circular economy and bioeconomy. The entire simplified Galbraith's approach should be reassessed at all four levels for ensuring the continuation of villages' cowherds as a basis for further development, trust and local pride that are needed for further developments.

This study reveals four different case studies for four different countries from Southeast Europe that are in a different process of development for ensuring biodiversity conservation as well as the implementation of policies related to circular economy and bioeconomy. All these strategies are essential for ensuring the sustainable development of each of the country in the regional context. We consider that each of the case studies can be assessed towards the simplified Galbraith's approach in order to understand where the weaknesses of the communication system are and how to further develop synergic actions to ensure that social innovation can be also implemented in remote rural areas positioned inside of protected areas or in their buffering areas.

For all four cases, the promotion of traditional knowledge related to local communities into the Intangible Heritage Convention should close the loop for ensuring the living in harmony with nature for these remote rural communities [32].

However, to ensure further sustainable development of these local communities we need to consider the integration of green-biobased solutions as well as nature – based solutions on a case-by-case bases that should be revealed as synergic actions among at least three political strategies such as biodiversity conservation, circular economy and bioeconomy.

Each of these three above-mentioned strategies access different approaches for their implementation to national level. The main framework for biodiversity conservation is adopted under the Conference of the Parties of the Convention on Biological Diversity, well known as NBSAP or National Biodiversity Strategy and Action Plan. However, both strategies for circular economy and bioeconomy follow a different approach. In case of the European Union member states both are regionally implemented and based on a unique vision at the EU level [31]. Different online platforms dedicated to communication and creating synergic actions as well as defining a specific critical mass of expertise (i.e. technical, legislative and based on projects) are among the few examples working at the EU level [25, 33].

The main quest is related to developing business innovation based on different co-creative approaches related to all involved stakeholders [3]. Moreover, in case of businesses related to circular economy and bioeconomy relevant are patents, IPR complying, lab research, piloting, knowledge transfer to industry and scaling up. A specific focus for economy is to monitor stock exchange for different companies and products on Dow Jons or Nasdaq [62, 117]. A specific innovation should be to add biodiversity conservation planning into each of these business planning [12, 54]. All the above case studies may have the chance to be successfully included in business innovation planning for circular economy and bioeconomy for the future having the potential to further ensure the full implementation of the concept living in harmony with nature [4].

The analysis of all these case studies proves that there is no link between biodiversity conservation and sustainable use and the final scope of circular economy and bioeconomy which is mostly related to the co-creation process itself [48]. Thus, the NBSAP for each of the four countries should also follow a co-creation approach in the same manner as circular economy and bioeconomy to ensure that nature is still preserved for future generations [126] and we can share the benefits also with nature in a similar way North Macedonia case study revealed. Transformative change as a mechanism should also be when all these strategies should be re-assessed to further have the supportive input coming from all potential stakeholders [124]. Different models of work are already in place and implemented based on different projects to assess their effectiveness as well as their consistency and coherency related to the final outputs [15].

The development of synergic actions among these three policy pillars will be a must in the near future and this is required by the increased dynamic of new scientific achievements [100] and new technologies entering the global market [70] as well as the need to support further sustainable development at the country's levels by effectively ensuring biodiversity conservation as well.

In a second stage we need to emphasize that synergic actions for cost-efficiency between different strategies should be relevant to be taken. Thus, among these strategies we mention the need for merging synergic actions among the action plans. Thus, only for biodiversity conservation we need to remind the need for synergic actions with the following strategies: climate change, combating desertification, the International Treaty on Plant Genetic Resources for Food and Agriculture, as well as that on education and research.

In the third stage the complexity of the above-mentioned actions should be added for co-creating cost-efficient synergic actions with circular economy, bioeconomy and sustainable development. The need for synergies is not new, but it is recently recognized and acknowledged [82, 91]. And how to do this? The simplified Galbraith's approach may be used as an excellent tool to create and investigate the

communication needs between treaties and economic policies [69]. Thus, based on this approach or starting from this conceptual modelling there is a great need to further develop communication between resourceful experts by establishing liaison groups, task forces and or steering committees where people working under different strategies should work together and understand for each other the need for country progress by taking into consideration the concept living in harmony with nature [75]. Based on this approach, a monitoring system as part of capacity building needs related to understanding the effectiveness of the process should be defined considering the need to adopt synergic actions including for social innovation.

Finally, social innovation will be relevant not only for placing on the market of new technologies as products and services but also for further appreciating nature, considering the need to preserve nature, the need to make sure that nature will continue its own evolution based on the principle living in harmony with nature and adding a new principle: sharing with nature.

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