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Policy interpretations and manifestation of biocultural diversity in urbanized Europe: conservation of lived biodiversity

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Abstract Biocultural diversity, which refers to the inextricable link between biodiversity and cultural diversity, has been predominantly associated with the traditional ways in which indigenous people in tropical countries interact with the natural environment. But it does not have to be restricted to these circumstances. Biocultural diversity may also be regarded as an interesting concept for understanding how people in industrialized and globalized societies deal with nature. This paper explores biocultural diversity in 20 European cities by considering (i) how biocultural diversity is interpreted in urban planning and governance, and (ii) what actual manifestations of biocultural diversity are present in these cities. Despite the fact that the concept of biocultural diversity was hardly recognized by city authorities, interviewees gave many examples of how biodiversity and cultural diversity are taken into account in (in) formal city policies. The research revealed two main manifestations of biocultural diversity within urban Europe: biocultural diversity grounded in ecological features, and cultural values as a basic foundation for biocultural diversity. Consequently, urban biocultural diversity was found to have two spatial levels: the city level and the site level. The former is the domain of governmental policy makers who discuss biocultural diversity in 'green space networks' in a rather static way. The latter is the domain where citizens participate in decisionmaking and the management of green spaces; it is here that cultural dynamics are most acknowledged.

Keywords Biocultural diversity · Biocultural manifestations · Europe · Cities · Cultural values

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Introduction

Biocultural diversity: origins and discussion

The 1992 *Convention on Biological Diversity* states that biodiversity conservation pro-
grammes should recognize the knowledge, innovations and practices of indigenous peoples
and local communities regarding biodiversity. This notion was further elaborated in 1999,
when the *United Nations Environment Programme* published an overview of the cultural
and spiritual values of biodiversity as a contribution to the *Global Biodiversity Assessment*
(Posey 1999). This publication identified the concept of *biocultural diversity* (BCD) to
highlight the 'inextricable link' between biodiversity and cultural diversity (Posey 1999).
Subsequently, the concept was specified as involving the diversity of life in all its mani-
festations—biological, cultural, and linguistic- all of which are interrelated (and are likely
to have co-evolved) within a complex socio-ecological system (Persic and Martin 2008).

   This link between nature and culture has especially been explored in tropical countries
(Maffi 2005; Maffi and Woodley 2010). The existence of a convergence of biological and
cultural diversity was observed in regions inhabited by indigenous people and traditional
communities (Pilgrim et al. 2008; Pretty et al. 2009), as illustrated by a positive correlation
between the number of different taxa (birds, mammals, vascular plants) and the number of
different types of human cultural and linguistic groups (Stepp et al. 2004; Loh and Harmon
2005). It was also noted that in these regions, there is a frequent occurrence of 'sacred
nature areas', in which the original biodiversity was maintained; such areas were subse-
quently characterized as exhibiting 'the oldest form of conservation' (Wild and McLeod
2008). Several studies also identified modern life styles and urbanization as common
threats to both biodiversity and cultural diversity (Pilgrim et al. 2008; Pretty et al. 2009).
As illustrated by the *Convention on Biological Diversity,* the conservation of values and
practices in traditional societies is considered as a means to prevent the loss of biodiversity.
Consequently, the concept of biocultural diversity has often been discussed within a
dichotomizing model that contrasts the retention of biocultural diversity amongst indige-
nous people with its loss due to socioeconomic modernization (Rapport and Maffi 2010).

   The exclusive focus on indigenous and traditional people living in close harmony with
their natural surroundings often invokes the idea of 'ecological noble savages'; this
however, has several drawbacks (Hames 2007; Elands and Van Koppen 2012). Certainly,
BCD is critical for indigenous communities that live in forests and natural areas, both in
terms of their material as well as their cultural needs (Posey 1999). However, while it is
clear that many indigenous peoples have developed sustainable ways of dealing with
nature, the idea that they have always acted as nature conservationists, has been disputed
(Hames 2007; Cocks and Wiersum 2014). This is because by no means are all cultural
practices beneficial for nature, with for instance the cultural uses of ivory and rhino horn
constituting the main reason for the endangered status of these species.

   Secondly, the notion of noble savages implies a static interpretation of culture, which
does not allow for modernization. The concept of BCD, however, applies as much to
indigenous communities as it does to rural and urban communities living in more or less
modernized conditions. Many studies in rural areas highlight how local people have
developed new constellations of biodiversity in the form of agrobiodiversity (Wood and
Lenné 1997; Kareiva et al. 2007; Pilgrim and Pretty 2010). Cocks and Wiersum (2014)
documented the endurance of traditional biocultural values and practices in South Africa's
(peri-)urban areas. Its relevance goes beyond poor households, with wealthy households in

South Africa also extensively using wild plants for cultural and material reasons (Cocks et al. 2008). Moreover, it was noted that new constellations of BCD have been developed in modernized urban settings in the Netherlands. Consequently, the concept of 'biocultural creativity' has been introduced, which focuses on the creation, rather than the conservation of biological diversity (Elands and Van Koppen 2012).

Thirdly, the notion seems to limit itself to non-Western societies, as if biocultural diversity values and practices were absent in the rest of the world. In a recent book detailing 45 biocultural projects worldwide, the majority were characterized by terms such as indigenous, aboriginal, ethnic minority or traditional; however, it also included examples from more modernized rural areas in Europe (Maffi and Woodley 2010). Possibly the most authoritative work describing BCD interactions in the last two and a half centuries of 'Western' history is Schama's (1996) monumental volume on 'Landscape and Memory'. This book illustrates how cultural values and practices in respect to nature range from a desire to rediscover or even redesign a natural arcadia, to the development of acculturalized forests reflecting either royal grandeur, or peasant livelihoods and memories. Moreover, this recent recognition of the relevance of biocultural diversity in Europe is illustrated by the various papers in this *Special Issue on Biocultural Diversity in Europe*. Notably as a result of the UNESCO programmes on cultural heritage sites and cultural landscapes (Rössler 2006), there is a growing awareness that in Europe and other economically advanced countries biocultural diversity exists in a variety of manifestations (e.g. Puppim de Oliveira et al. 2011; Moreno-Penaranda 2013). *The Florence Declaration* (2014) explicitly stresses the need to recognize "*the vital importance of cultural and biological diversity for present and future generations and the well-being of contemporary societies in urban and rural settings*".

Biocultural diversity in an urban context

One specific environment that poignantly illustrates the dynamic nature of BCD is the urban area. In the past, cities were often conceived of as the ultimate expression of socio-cultural development, and as typical exemplars of the nature–culture dichotomy. At present, however, it is acknowledged that green spaces in urban settings can be biologically rich and provide diverse habitats for many species (Elmqvist et al. 2013; Aronson et al. 2014). Many studies have been undertaken to assess the importance of biodiversity conservation in urban areas (McKinney 2008; Gaston 2010; Niemelä et al. 2011; Elmqvist et al. 2013). However, biodiversity in urban areas is threatened due to several anthropogenic pressures such as habitat destruction, pollution, introduced alien species, overexploitation and changing environmental conditions (Puppim de Oliveira et al. 2011). These pressures do not leave much space for biodiversity conservation. Therefore, measures and analytical tools have been developed for identifying and valuing biodiversity in cities (e.g. City Biodiversity Index and Ecosystem Services). The results of these measurements are of limited importance for biodiversity conservation and maintenance, as these indices and valuations cannot be simply translated into cultural values that can then direct decisions on conservation. At the same time, the presence of various types of 'green spaces' in cities, such as for example designed parks in estates of former nobility and allotment gardens of urban citizens, attest to the emergence of specific types of urban biocultural diversity. Urban environments therefore offer salient opportunities to assess the multiple expressions of biocultural diversity under modernized conditions.

This article seeks to contribute to the on-going scientific discussion about not only the relevance of the concept of biocultural diversity, but also the varied manifestations of biodiversity and cultural diversity. As it is based on research conducted in 20 European

cities within the framework of the EU-FP7 GREEN SURGE research project (www.greensurge.eu), it focuses specifically on highly modernized European urban areas. The article is structured as follows: (i) first, it provides a conceptual framework for studying biocultural diversity in an urban context, (ii) secondly, it presents the chosen research methodology, followed by (iii) the main results which highlight the principal interpretations and manifestations of BCD that emerged from survey of 20 cities, and (iv) finally, a discussion presenting the conclusions reached.

Biocultural diversity: a conceptual approach

BCD as concept takes the dynamic linkages between humans and nature as a starting point. It focuses on the interrelationships and interdependencies between people and nature, and, as expressed in terms like 'humans-in-nature', considers humans as agents of ecosystem change (Folke 2006). BCD presumes that nature and culture are not in opposition to each other, but are interlinked. There are increasing suggestions that in order to successfully protect and enhance biodiversity, the focus should not only be on biodiversity as an ecological or biophysical concept, but also on the social processes that determine success and failure of biodiversity conservation and management efforts, as well as on the relationship with the social and institutional context in which biological diversity develops. Consequently, more interdisciplinary approaches were conceived (e.g. Folke 2006; Young et al. 2006; Ostrom 2007).

The socio-ecological systems (SES) approach, which is being referred to in the BCD definition (see introduction) is one of the dominant approaches with an explicitly interdisciplinary focus. Within SES, like BCD, the social and ecological systems are seen as coupled system, closely interrelated at various scales and evolved through time. A central focus of SES is the concept of ecological resilience, which is the ability of SES to absorb disturbance without flipping into another state or phase (Gunderson 2000; Folke 2006). This is related to the adaptive capacity of society (Folke et al. 2005), and particularly the adaptive capacity of institutions (Olsson et al. 2004). This adaptive capacity is predominantly applied at the macro level of institutions. Some researchers argue that as a consequence, interactions at the meso- and micro level may be underrepresented in the SES approach (Binder et al. 2013). These authors argue that in the SES approach, too much emphasis is put on the structures and functions of institutions, without proper notice of political and cultural meanings (Cote and Nightingale 2012). Moreover, limited attention is given to the diversity and complexity of the values, as well as to the power relations eminent in adaptive institutions and practices. Indeed, "some system regimes may be considered desirable by one segment of society and undesirable by another" (Walker et al. 2006, p. 3). As SES research is concerned with the governance of linked social-ecological systems, and good governance includes all relevant actors and their diverging values, views and interests, SES research also needs to capture the socio-cultural diversity manifest in current society. The argument that diversity in social-ecological systems is a key determinant for maintenance and adaptation capacity (Folke et al. 2005; Maffi and Woodley 2010) can also be applied to biocultural diversity: the diversity in the ways people live with biodiversity supports the adaption capacity of biocultural systems to site-specific environmental conditions and changes (Maffi 2005).

Next to the SES-approach, the ecosystem services (ES) approach has been given attention amongst scientists and policy-makers to stress not only the importance of biodiversity for human beings, but also for biodiversity-inclusive decision-making (Peterson

et al. 2009; Brett et al. 2010; Schröter et al. 2012). Within this approach, four specific types of ES are commonly recognized: provisioning, regulating, supporting and cultural services. The latter is defined as "the nonmaterial benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation and aesthetic experiences" (MA 2005). Culture is often conceptualized as a system of values, beliefs and ideas that social groups make use of when experiencing the world in mutually meaningful ways (Cocks 2006). These values, and their related practices, do not only apply to cultural services alone but also to provisioning, regulating, and supporting these services. People utilize biodiversity in many ways, and especially value those components of biodiversity that they consider most useful. The focus is then shifted to 'living with' biodiversity and the daily practices through which various social and cultural groups enjoy, understand and protect biodiversity (Turnhout et al. 2013). The notion of 'living with' implies a second drawback of the ES approach, which, due to its focus on standardized classification and quantification of 'deliverables of nature' (e.g. MA 2005), does not allow for integrating cultural dynamics. Culture often acts as a selective force, with people deliberately choosing from the cultural assemblages they have at their disposal. These assemblages reflect ancient values and practices that are conceived of as manifestations of heritage, new values and practices that evolve as a result of cultural modernization, as well as trans-cultural exchange and intercultural hybridization (Cocks 2006). From the above we can conclude that the concept of BCD provides options to incorporate both 'living with' biodiversity, and the cultural dynamics in and between societies in SES.

It follows that the concept of biocultural diversity offers three major additions to the study of human-nature interaction, especially in urban settings. In the first place, it switches the point of departure from looking at a limited set of cultural services provided by ecosystems to human values and practices in respect to living with biodiversity. We argue that the nature of SES is not exclusively dependent upon natural environmental conditions, but also on the nature of the diversity in cultural values and practices. Secondly, this makes it possible to move beyond the protection of biodiversity from negative impacts in the social realm to also include the study of opportunities for biodiversity conservation that stem from cultural diversity in societies. These opportunities are expressed in specific manifestations of biocultural diversity. Finally, as cultural values and practices are fusions of ancient traditions and new developments within society, and consequently adhere to their own unique dynamics, BCD manifestations are always evolving, but anchored in existing socio-physical contexts.

These three emergent properties act as points of departure for our research into 'biocultural expressions'. Biocultural expressions refer to the physical objects, rules and institutions, or the conceptual manifestations of dominant ways of looking at human-nature relationships (Vierikko et al. 2015). Physical examples in an urban environment are public parks used for relaxation and outdoor recreation, communal gardens providing local food and ornamental plants, as well as innovative green architectural buildings. Conceptual expressions are the contents of policy or management plans for urban green. It also includes the concept of 'ecosystem services', which amongst others expresses that biodiversity conservation is increasingly discussed in economic terms. Both physical objects and conceptual manifestations are biocultural expressions because they are telling of how, as humans, we look at nature from a cultural perspective, and how we should value it (Vierikko et al. 2015). Although urban areas are traditionally considered as antipodes of nature, from a dynamic perspectives of 'living with biodiversity', it can be argued that in urban areas specific expressions of biocultural diversity will evolve (Wood and Landry 2008; Leikkilä et al. 2013). These expressions can be identified as historical layers of

biocultural diversity, but also as continuously developing novel expressions of BCD. The objectives of our research are to explore the different expressions in 20 European cities. We analyze these expressions at two levels by considering, i) how biocultural diversity is interpreted in urban planning and governance, as well as ii) what actual manifestations of biocultural diversity are present in the cities.

Methods

Green surge project

The research took place within the 'The Green Infrastructure and Urban Biodiversity for Sustainable Urban Development and the Green Economy (GREEN SURGE)' project. This research project is funded under the EU's 7th Framework Programme for research, and involves 24 partners (including SMEs and city municipalities) from 11 countries. These urban environment green spaces, ranging from forests and parks to community gardens and green roofs, provide a variety of benefits that contribute to healthier and more attractive cities. The project will elaborate on the concept of Urban Green Infrastructure, and examine whether it can serve as a planning concept for integrating biodiversity, urban residents and the green economy. The contribution of both strategic planning and participatory governance for establishing this integration forms an important part of the research activities within GREEN SURGE. In order to do so, a biocultural diversity perspective is being employed as the theoretical focus. The research is organized in three phases. In the first phase, an explorative survey was carried out to assess to what extent biocultural diversity is recognized and applied in urban planning and governance in twenty European cities. In the second phase, innovative BCD practices will be analyzed in more detail to ascertain to what extent they contribute to the planning of Urban Green Infrastructure. In phase three, the results will be incorporated into action research programmes in five Urban Learning Labs. This paper reports the results of the explorative survey.

Selection of cases

The selection of the 20 case studies for the explorative survey was based on four considerations. Firstly, the chosen cities should be part of the European Urban Atlas datasets (Urban Atlas 2014), allowing access to comparable data on land use, socio-demographics and economic development. Secondly, considering the objective of the GREEN SURGE project, cities should represent the various European planning traditions, i.e. a Nordic, a British, a Mediterranean, a Central European and a New Member States planning tradition (Davies et al. 2015). Cities were selected as representations of these various planning traditions. Thirdly, the selection included the cities in which the five *Urban Learning Labs* are scheduled to take place, i.e. Bari (Italy), Berlin (Germany), Edinburg (UK), Malmö (Sweden) and Ljubljana (Slovenia). Finally, pragmatic factors, such as project partner networks with relevant stakeholders that can enable fieldwork, also played an important role for case selection. Table 1 presents the 20 selected cities with their key characteristics.

Table 1 The 20 selected cities with their key characteristics (*Source* Davies et al. 2015)

City	Country	Population (core city, 2012 or latest)	Annual population change rate core city 1990–2012	Public recreational green space per capita (core city, m²/inhabitant) 2006[a]
Århus	Denmark	319,094	0.99***	31.34
Malmö	Sweden	307,758	1.46	35.01
Helsinki	Finland	595,384	0.95	25.51
Edinburgh	United Kingdom	482,640	0.48	32.69
Bristol	United Kingdom	432,451	0.49***	27.30
Lódz	Poland	718,960	−0.75***	11.81
Poznan	Poland	550,742	−0.30***	36.39
Ljubljana	Slovenia	280,607	0.14***	9.29
Szeged	Hungary	162,183	−0.34	33.38
Oradea	Romania	196,367*	−0.74***	4.46
Berlin	Germany	3,501,872	0.05****	16.82
Halle (Saale)	Germany	233,705	−1.10****	25.16
Linz	Austria	191,501**	−0.38***	27.14
Amsterdam	The Netherlands	790,110	0.62	17.62
Utrecht	The Netherlands	316,275	1.70	21.04
Bari	Italy	313,213	−0.40***	5.57
Milan	Italy	1,262,101	−0.37***	8.98
Barcelona	Spain	1,621,537	−0.23	2.96
Lisbon	Portugal	696,488	−0.24***	23.36
Almada	Portugal	174,030	No data	No data

[a] Urban Atlas defines urban green space as "public green areas for predominantly recreational use". Peri-urban natural areas, such as forests and agricultural land, are mapped as green urban areas only in certain cases. In general, peri-urban green areas are not counted. Private green and blue areas are also not included. Further, green spaces with less than 250 m² are not mapped as well. This leads to deviation with per capita green space values used by city officials

* Data from 2011, ** Data from 2013, *** Data from 1991, **** Data from 1992

Data collection

The main aim of the phase 1 analysis was to explore the state of green space planning and governance in Europe, as well as the extent to which biocultural diversity was dealt with. Data was collected through analysis of major policy documents on urban green space, and at least one interview in each city with experienced, high profile urban planners. Each interview took place in the native language and lasted about one to two hours. The interview included specific questions on (i) knowledge of the concept of biocultural diversity, (ii) how biodiversity and cultural diversity are addressed in policy, and (iii) bioculturally significant practices and/or places. The interview data reflect the ideas and opinions of the urban planners, and do not necessarily reflect the official city perspective and urban green conditions. However, they do provide a good overview of the diversity of existing interpretations on what the concept of biocultural means, and how it is expressed in European cities. Copies of the materials used for data collection can be found in Buizer et al. (2015, pp. 71–92).

The interview data was translated into English by the local researchers. This data was analyzed in two ways: by means of an analysis of the raw data, and by means of analysis of the city portraits. The raw data was put in a spread sheet and analyzed systematically. The city portraits are a narrative summary of the major research results. An initial description according to a standardized format was compiled by local researchers. These initial descriptions were then checked for consistency and comparability by the coordinating research team, and further adapted by the local researchers if necessary. The analysis of both the raw data and city portraits was conducted in a reiterative way. The objective of the final comparative analysis was to identify the multiple existing interpretations of the BCD concept. In view of the research's explorative nature, the results should not be interpreted as comparative city-specific representations of how these deal with biocultural diversity, but rather as indicative data about the diversity in interpretations of the nature and significance of urban biocultural diversity.

Limitations

We would like to emphasize that the evidence used in our analyses is limited to data that was obtained from interviews held with one or more single- city official(s) in each of the selected cities, as well as through summaries of a limited number of urban green infrastructure and related planning documents. This provides only a partial view of the activity that may be occurring in a city, an urban region, or the wider region that cities are situated in. To some extent, we may also judge the view of city officials and the planning to represent the current discourse or 'official' view supported by government institutions. The data gathered should therefore be seen as a first important step towards obtaining an overview of how policy makers recognize and apply biocultural diversity in urban planning and governance, including which manifestations of BCD are recognized by them.

Results

The interview results indicated a wide variety of interpretations on the nature of green urban spaces, and how they relate to biocultural diversity. In most cases, the concept BCD was not recognized by interviewees. Rather, in almost all interviews, interpretations of biodiversity and cultural diversity were discussed separately. Nonetheless, in all interviews several manifestations of biocultural diversity were mentioned. The results on policy interpretations of biocultural diversity, as well the recalled manifestations of biocultural diversity will be described subsequently.

Policy interpretations of biodiversity

The interviews with the policy makers were introduced by presenting them with three different options regarding the biodiversity focus for urban green space policies in their city (Table 2). The majority of policy makers indicated that the establishment of a green space network was most important. Many cities have a policy to establish a green space network that would benefit biodiversity, accessibility and recreational use of green spaces. The aim of the green network is to link spatially and functionally specific green areas, such as parks, forests and wilderness areas, within linear structures often composed of waterways and green corridors. Connectivity is an important ecological argument to substantiate

Table 2 The focus of the policies for urban green space in city/urban region (multiple answers possible, N = 20)

Focus	N
On the establishment of a green space network	15
On species rich or well-preserved individual sites that are, or are not, part of a network	5
On a diversity of species	4
Other	1

the establishment of a green network at the city level. In some cities, the network was also considered from a regional perspective, linking the city to its immediate agricultural or rural surroundings in order to allow species migration between urban and nonurban areas.

Although biodiversity conservation was an important aim for the urban green space network, most interviewees were of the opinion that this was not the only objective, but that the green network would also support equal accessibility to green areas for citizens and enable recreational use of green areas. From a planning perspective, the idea of urban green infrastructure was perceived as an object of strategic planning, implying that it is expert-based and hierarchical government steering would be needed.

Interviewees also acknowledged an interest in biodiversity conservation at the site or species level, not only as a major focus in urban green space policies (Table 2), but also as a policy concern within the establishment of a green space network. As one interviewee expressed:

> in our city, on the establishment of the green structure and network, we are not only focusing on the connectivity, but also focusing and contributing to the diversity of species and on promoting the preservation and rehabilitation of individual sites, especially in our historical green spaces, like exotic gardens, botanical gardens, palaces and the castles, for example.

However, it was also stated that, although conserving species diversity was an important policy objective, its implementation depended on the urban context as manifested in citizens' values:

> biodiversity in itself is not an imperative and it is accepted that there can be diversity in the amount of biodiversity.

The interest in biodiversity at the species level was expressed in varied ways. City authorities were asked to consider if biodiversity conservation should incorporate both native and non-native species. Nine interviewees agreed that protection of species should incorporate both, while the others were neutral in their opinion or disagreed. The latter group favoured native species above non-native species. Conservation of native species was an important policy goal in all cities, and native species were commonly preferred over non-natives. Very frequently, conservation of native species was positioned within specific sites such as wildlife corridors, natural habitats, protected sites or wilderness parks. Natural habitats with native species were seen as an important element of biodiversity. In several cities, interviewees indicated the need for native plant species in order to avoid diseases and uncontrolled expansion of (non-native) invasive plant species. Sometimes 'high species richness' was not only pursued for reasons of biodiversity protection, but also driven by financial motives, as the management of the original vegetation was very

laborious. Despite the fact that non-native species were often considered a threat for native species, many interviewees thought non-native species to be beneficial for urban parks as they contribute to aesthetics, give spaces a particular identity, as well as allow different cultural groups to identify with them. Botanical and community gardens were commonly considered as 'species richness places', where both native and non-native species were incorporated. Nonetheless, all interviewees were of the opinion that invasive non-native species should be combatted actively. In some cases, species diversity was not prompted by origin, but by either resistance to urban conditions, such as air pollution and urban extremes with respect to water availability and being able to adapt to changing climate conditions, or by allowing species to distribute spontaneously without human involvement.

Biodiversity was also considered as something that can be created. Many cities were confronted with former industrial sites and infrastructure, such as factories and railways, which were in need of redevelopment. Quite often, these sites were restored ecologically, but without taking into consideration their particular cultural heritage.

To conclude, it became clear that biodiversity is interpreted as an ecological network at the landscape level, and as protecting the habitats of (non-) native species. Biodiversity is to some extent also interpreted from a cultural perspective as citizens' values and cultural heritage, and urban living conditions were often referred to, yet rarely integrally considered in city planning.

Policy interpretation of cultural diversity

Policy makers were asked whether their city had formal urban green policies, which explicitly recognized and accommodated the uses, needs and values of different cultural groups. Only five interviewees confirmed this, three indicated 'somewhat', and the others did not confirm the existence of such a policy. Only when policy makers were asked if cultural diversity was addressed in an alternative manner from formal policies, a majority of them asserted it was somewhat addressed. The ways in which cultural diversity took shape in these policies varied. We identified seven different interpretations (Fig. 1).

First and foremost, policy makers discussed the role of green spaces in regards to the recreational needs of different socio-cultural groups. These groups were demographic groups, user groups, immigrants or ethnic (minority) groups. Most often, interviewees referred to activities that people carried out in public greens, such as hiking, running, dog-
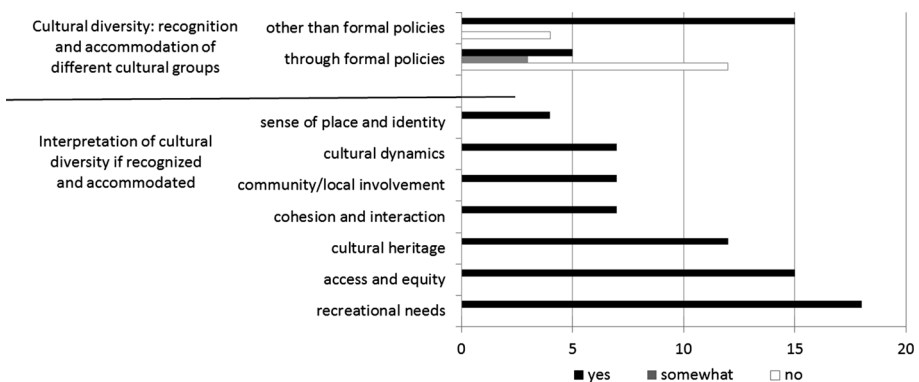

Fig. 1 Interpretations of cultural diversity in European cities (N = 20)

walking, roller-skating, barbecuing and partying. They considered the provision of facilities for user groups important. A different interpretation was related to groups of people who experience mobility constraints, such as the elderly and disabled. Moreover, immigrant groups were distinguished as their recreational needs might differ from those of native groups. The latter aspect is not always considered to be relevant as one interviewee clearly expresses:

> I don't think that different ethnic groups and their needs are thought separately when making urban green area planning. It does not matter what her/his nationality or background is. We look at it more from different user group point of view, and what their needs are. Dog walkers, bikers, runners, fishers have their own demands and needs, despite what is individual's nationality.

For all these groups, it was deemed important for recreational infrastructure to be available, and that urban green spaces were used by as many different groups as possible.

Secondly, some interviewees did not differentiate amongst citizens. They considered the principles of equal access to urban green space, as well as equal distribution of both the quantity and quality of green spaces across the city of major importance. If these conditions were being fulfilled, interviewees were of the opinion that there was no need for acknowledging cultural diversity.

A third interpretation highlights the importance of urban green spaces as cultural heritage landscapes in the form of either historic parks and estates, traditional farmlands or city fortification areas. The incorporation of cultural heritage objects (statues, landmarks, stately homes, etc.) often contributes towards such heritage values. This view assumes that cultural heritage accommodates modern citizens' needs regarding green spaces.

Fourthly, green spaces accommodate cultural diversity as they might increase or support multicultural interaction, which subsequently might lead to social cohesion or community bonding. This thought is clearly expressed by one interviewee:

> The administrative authorities consider urban parks as ethnic 'melting pots' and places for stimulating social cohesion (…) A park serves as a hub for encounters, public forums, recreation, resting, and seasonal handicraft fairs for locals and ethnic groups alike.

The fifth interpretation of cultural diversity comprised community or local involvement in decision-making and the management of urban green. Local involvement varied from authority-guided management practices to spontaneous activities by citizens. The former represented 'adopt a park'—type of activities where locals had a strong responsibility to take care of their neighbourhoods, while the local authorities decided which management practices or what kind of biodiversity e.g. species assemblage needed to be cultivated. The latter represented 'free activism', even though values and ideas of different citizen groups were not always necessarily known in advance by authorities as these were articulated by people themselves. Additionally, in several cases policy makers saw this as 'win–win' situations, which engaged locals to take care of the environment while at the same time saving management costs.

In the sixth interpretation of cultural diversity, reference was made to the present dynamics of society. Urban green spaces were considered as important places for different cultural events, urban green facilities such as outdoor theaters, cafes or recreational facilities as reflecting cultural dynamics, and urban green was commonly used for innovations at city level.

Finally, the role of urban green spaces that provide (cultural) identity or a sense of place was mentioned by several interviewees. It was emphasized that urban green spaces play a role in shaping cultural identity, not only referring to the past, but also with regards to new societal developments.

To sum up, culture is predominantly interpreted as a service that green spaces provide, and only secondly as a human value. Additionally, addressing diversity of cultures within urban green planning and management is not self-evident. Finally, culture is considered to be dynamic, but merely in a retrospective way.

Manifestations of biocultural diversity

So far we have discussed policy interpretations of biodiversity and cultural diversity separately. Despite the fact that city authorities hardly recognized BCD in the policy domain, they were asked which bioculturally significant places came to mind when considering biocultural diversity in their city. These places had to be physically manifested in their cities. We refer to them as biocultural manifestations, or biocultural significant places. During the interviews, it became clear that scale mattered for biocultural diversity manifestations. Two scales were mentioned particularly, the scale of the city or urban region as expressed in the strategic planning within municipal policy, and the scale of the locality or site. These scales were different in their place characteristics and the activities involved (Figs. 2 and 3). Figure 2 depicts the city level, Fig. 3 the site level. The biocultural significant places are articulated with respect to the characteristics (x-axis) and the kind of activities involved (y-axis).

At city level, manifestations that were mentioned varied between areas with a primary focus on either natural capital or cultural capital. Of course, the cultural capital focus was always accompanied with a focus on the natural capital (x-axis of Fig. 2). Next to this, the management of these areas varied depending on whether activities involved focussing predominantly on conservation activities, or on recreation activities. Very often these two focuses were considered complementary (y-axis of Fig. 2). Cities, of course, varied in their
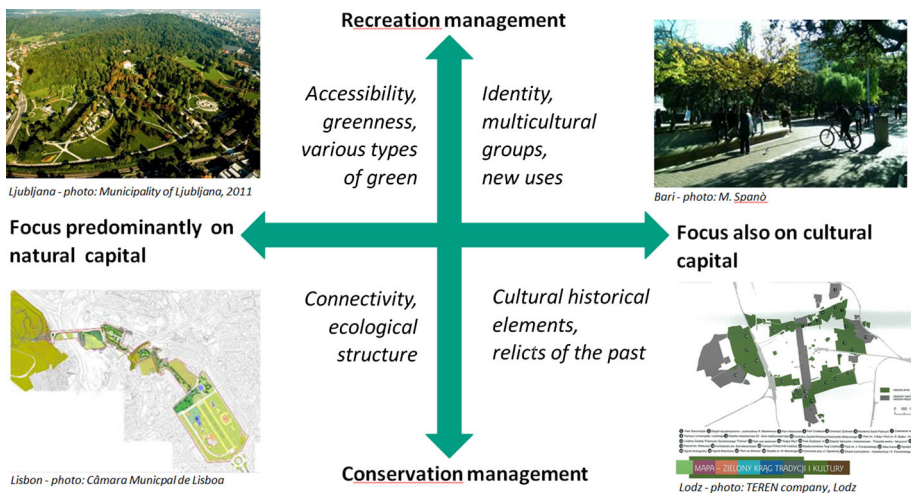

Recreation management

Accessibility, greenness, various types of green

Identity, multicultural groups, new uses

Ljubljana - photo: Municipality of Ljubljana, 2011

Focus predominantly on natural capital

Focus also on cultural capital

Connectivity, ecological structure

Cultural historical elements, relics of the past

Lisbon - photo: Câmara Municpal de Lisboa

Bari - photo: M. Spanò

Lodz - photo: TEREN company, Lodz

Conservation management

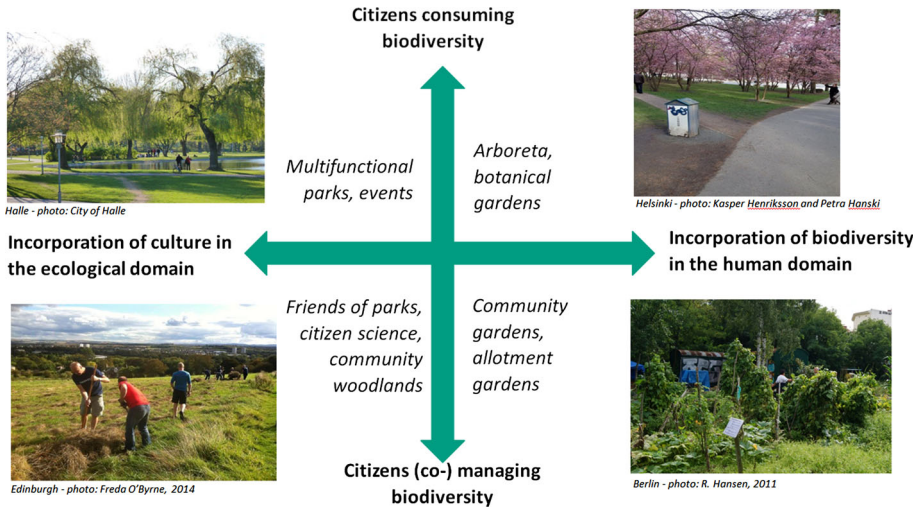**Fig. 2** Biocultural manifestations at city level

Fig. 3 Biocultural manifestations at site level

focus. We will subsequently deal with the four types of bioculturally significant places that arise from the two axes.

Often, while referring to bioculturally significant places, policy makers mentioned either the ecological network in its entirety, or public spaces that were part of this larger ecological network, such as novel or restored urban habitats. This relates to a combined focus on *conservation* and *natural capital*. These places were mostly well secured in biodiversity or ecological municipal plans. Good examples were the ecological corridor in Lisbon linking Monsanto and Educardo VII Park, but also the the Almada's Master Development Plan:

> The plan gives specific attention to the development of an ecological structure linking urban green spaces and the surrounding natural environment and to promote native species.(It also focuses) on the city's ecological vulnerabilities and resilience and the various ecosystem functions and services provided by green spaces in an urban environment.

These places were considered beneficial for people as well, providing diverse green spaces, different ES, and possibilities for nature experiences and environmental education.

This people-centered approach becomes even more significant within the combined focus on *recreation* and *natural capital*. The interviewees mentioned many manifestations of BCD that emphasize recreational use within nature areas. The Edinburgh policy maker argues:

> green networks are not just seen as wildlife corridors but also as opportunities to increase accessibility to green space and other parts of town for cyclists and pedestrians. The Union Canal is an example where a waterway formally used for carrying coal and passengers between Edinburgh and Glasgow was given a new purpose as a green corridor for wildlife and recreation.

Many examples of rivers were given, especially in Oradea (Crişul Repede) and Szeged (Tisza), the rivers provide both natural habitats and recreational areas. Adjacent to the river banks, recreational infrastructure for cycling and walking is being offered, and often city parks are linked with the river system. Another example is the 'Landscape Park Tivoli, Rožnik and Šišenski hrib', which is the oldest urban park and forest in Ljubljana. It is a natural reserve with a plethora of threatened species. At the same time however, and due to its location close to the city centre and the variety of recreational facilities it offers, this park receives more than 1.7 million visitors each year (Hansen et al. 2015, p. 111).

The cultural aspect of bioculturally significant places played a strong role in the combined focus on *cultural capital* and *conservation*, albeit in a retrospective way. Relics of the past, for example belonging to the former fortification or industrial infrastructure of cities, have been integrated in green areas of the city. The Polish interviewee of the city of Lodz referred to the green circle of tradition and culture (GCTC):

> the areas within the ring around the centre of Lodz include the palaces and 19th century industrial factories which are surrounded by green space and often located next to rivers, cemeteries and parks. Some parks still have remnants of the old forest that grew here in pre-industrial times. These areas remind the inhabitants and visitors of the interactions between nature and culture—being a product of cultural and natural processes of the past.

Additionally, references were made to cultural heritage landscapes and historical places that are examples of traditional biocultural systems with linkages to highly valued biodiversity, such as historical species.

The fourth type of BCD manifestations at the city level was at *cultural capital* with an emphasis on *recreation*. The places mentioned are strongly related to the cultural and multicultural identity of the city, and the needs of its inhabitants. The policy maker of Bari strongly expressed this:

> In the 80s and 90 s, with the entry of immigrants from the Balkans and Southeast Asia, the role of parks and gardens changed. The introduction of immigrants has led local residents to search for their own public green space; this has caused tension among them and the immigrants. Thus, an emerging issue is the need to manage green spaces to integrate the cultural orientations of the native Italian people and the immigrants and to provide adequate facilities and allow cultural expression. The administrative authorities of Bari consider urban parks as ethnic 'melting pots' and places for stimulating social cohesion. They play an essential role in promoting social exchange and in creating 'rooms' where ethnic groups meet and find refuge.

In the same line of reasoning, the squares of Lisbon, although for the most part ecologically poor, are critical for cultural identity and constitute important meeting points that provide interaction between people from many different cultures and ethnicities (Hansen et al. 2015, p. 249).

Aside from the city level, the policy makers also gave examples of BCD at the site or local level. A first distinction of characteristics could be made between places within the natural domain that can incorporate cultural elements or dynamics, and places within the human domain that can incorporate biodiversity or nature (x-axis of Fig. 3). Secondly, while discussing places of biocultural significance, policy makers explicitly addressed different activities by specifying that citizens were either invited to enjoy urban nature or to (co-) manage urban nature (y-axis of Fig. 3). We will illustrate each interpretation.

Often, while referring to bioculturally significant places at the local level, the facilitating qualities of urban nature were highlighted, for example by providing natural space for cultural activities such as meeting other people, having a barbecue or engaging in sports, and for cultural events such as music festivals or fairs. We refer to this as the *incorporation of culture in the ecological domain,* with *citizens consuming biodiversity*. In several parks in the German city of Halle, 'multifunctional' lawn areas have been designated, which are good examples of how to embed diverse recreational uses (consuming biodiversity) within green areas that have simple ecological structures and often low species richness:

> multifunctional areas are able to support high densities of people. They are located in noise-tolerant areas so large groups can have barbeques or open-air parties and stay out late without disturbing neighbours.

Many cities stressed the importance of the supply of urban green for multiple functions or multiple user groups, not only for purposes of wellbeing, but also for a strong sense of belonging. This was the case in Sobreda Park in Almada, where the municipality deliberately asked local groups, neighbourhood associations, NGOs and scout groups to participate in the design of the multifunctional park (Hansen et al. 2015).

In the same ecological domain, important BCD manifestations were considered to be those marked by a socially-inclusive approach, i.e. *citizens (co-)managing biodiversity* of ecological spaces. The focus of such participatory conservation efforts is on restoring and conserving biodiversity or ecological values, but social values might be addressed as well. This managing role for citizens became visible in Edinburgh, were a local group manages 2.5 ha within the local green structure in order to engage in ecological habitat restoration, and to provide a high amenity recreational space for the community:

> Since signing the lease agreement in autumn 2011, the group has planted over a 1000 trees, planted a community apple orchard, a willow coppice and created walkways to improve access.

The interviewee of Berlin gave several good examples of linking cultural diversity with biodiversity through the creation of intercultural gardens in urban wilderness parks, which are the result of spontaneous rewilding of former railway areas (e.g. Park am Gleisdreieck).

The interviewees also revealed examples of biocultural manifestations within the human domain. This did not only relate to the human habitat, such as residential areas and squares, but also to cultural values, habits and traditions with respect to religion or ethnicity. We called this *incorporation of biodiversity in the human domain*. The cherry orchard in Roihuvuori (Helsinki) is an example of how to make or shape biodiversity in the human domain with a focus on recreational use (*citizens consuming biodiversity*):

> According to a local resident, Norio Tomida, the local Japanese community wished to donate cherry trees to the city as a sign of gratitude towards Helsinki as a good place to live. Inspired by Norio Tomida, Japanese residents throughout Finland joined into donate the trees. The trees were planted between 2007 and 2009. At the same time the park's lighting, paths and furniture were renewed. The orchard has become a popular attraction for Japanese tourists, local residents and other Finns.

Other examples referred to arboreta that exhibit plant species with which different cultural groups can identify, or to nature festivals that often aim at reconnecting people with local biodiversity, sustainably engaging them with nature.

There were abundant examples of biocultural manifestations with respect to the *incorporation of biodiversity in the human domain* and *citizens (co-)managing biodiversity*, most of them aimed at gardening. The urban gardening areas in the city of Malmö constituted a good example:

> Malmö has urban gardening spaces that recently have been constructed in parks or in residential areas. They supplement the traditional allotment gardens that were established already since 1895. The gardens reflect local citizen's interests in living with biodiversity.

While the interviewee of Malmö highlighted the importance of urban gardening for reconnecting citizens to edible biodiversity, the interviewee of Lisbon stressed the importance of communal gardens for self-sufficiency in vegetable production. Additionally, both interviewees argued that these gardens contributed to the city's biodiversity. Apart from gardens, interviewees also mentioned garden activities and nature management by children and elderly people as special target groups, or in certain residential areas, such as underprivileged areas or social housing estates. Social objectives, such as social cohesion, education, and health, were highlighted in these bioculturally significant places.

To conclude, the interviews revealed that cities within Europe display a large variety of BCD significant places. These places are a reflection of the ongoing co-evolutionary process between the ecological and social system. Whereas BCD manifestations at the city level were articulated in a more traditional way, focussing on cultural heritage, conservation and use of green spaces, at the local level, the diversity and dynamics of culture interacting with biodiversity were relatively stronger; this was expressed in BCD manifestations through the perspective of citizens becoming more prominent, as well as when the quality of individual green spaces was more contextualized.

Discussion and conclusion

This article presented the interpretations and manifestations of BCD in an urban context. As it became clear that this concept was not known to policy makers in twenty European cities, biodiversity and cultural diversity were discussed separately.

Interpretations of biodiversity and cultural diversity

The conservation value of native species and natural ecological processes were acknowledged in policy aims and interventions. Connections between urban green spaces were considered essential for optimal ecological functioning. As natural biodiversity is often considered to be threatened by urban processes such as habitat destruction due to construction, pollution, introduction of alien species, overexploitation and changing environmental conditions, it is quite common to give much attention to conserve the original native biodiversity (Puppim de Oliveira et al. 2011). However, our analysis also indicated that cultural values and practices such as aesthetics or gardening were often the reason for using non-native species or creating new urban habitats as a part of urban green space planning.

The research also made clear how policy makers addressed cultural diversity in urban biodiversity and green programmes. First, the provision of recreational opportunities is considered to be important as it improves people's quality of life (Elands and Van Marwijk

2012); from policy perspective, there was no need to define cultural groups specifically, as long as essential conditions such as sufficient amount of green spaces and equal accessibility at the city level were fulfilled. This is an important strategy as for example research from the UK has revealed that the social-economic status of different groups was relevant in the sense that the most income-deprived groups were also the most deprived of access to public parks (Jones et al. 2009). Secondly, a functional focus on cultural diversity was most prevalent, implying that cultural groups were defined in terms of recreational activities and limited mobility. Cultural groups delineated by religion, ethnicity and migration status were only addressed in a marginal manner. The latter, however, is needed as previous research has demonstrated that immigrants use urban green predominantly for social gatherings and food related activities, whereas native-born citizens use urban green more frequently for walking, sporting and cycling, both on an individual basis and in small groups (Peters et al. 2010). More recently, academic scholars have been arguing that an exclusive focus on ethnicity neglects intra-ethnic differences such as age, gender and religion, which also play an important role in explaining recreational behaviour. Moreover, they make a plea to use the concept of multiple identities in valuing immigrants' outdoor recreation (Kloek 2015; Gentin 2011). This relates to a third group of interpretations of cultural diversity in the studies of European cities, i.e. sense of identity, wellbeing and health, leading to social cohesion within the neighbourhood or city. Urban parks, indeed, have been found to be places where different social and ethnic groups mingle, thereby potentially stimulating interactions and enhancing social cohesion among urban inhabitants (Peters et al. 2010; Kaźmierczak 2013). Finally, culture is interpreted as a dynamic phenomenon, but merely in a retrospective way. Interviewees expressed the idea that urban green spaces are shaped by cultural practices of the past that provide them with cultural heritage values, which contribute to the present identity of cities.

Manifestations of biocultural diversity

Overall, our research findings illustrate how the concept of biocultural diversity is not only of relevance to traditional rural societies, but also to modernized urban societies. The interpretations of biodiversity and cultural diversity are reflected in the different manifestations of BCD (Figs. 2 and 3) in a selection of European cities. At the city level, the ecological functioning of urban green and the green network are considered as the basic foundation of biocultural diversity. This offers benefits and different ES to human societies, including cultural services. Daniel et al. (2012) characterized this analytical orientation as aiming at the improvement of relationships between ecological structures and functions and culturally-related human needs and values. This requires combining biodiversity conservation with the development of a green economy in which ES are further optimized (Puppim de Oliveira et al. 2011; Moreno-Penaranda 2013). This is largely in line with our research as we found that, especially at the city level, cultural diversity is predominantly interpreted as a service. This implies a functional view of human needs and values, which fundamentally ignores the basic categories of human values as distinguished by Cocks and Wiersum (2014); these are i) the value of nature with respect to spiritual and emotional wellbeing and health, ii) the value of nature in providing a sense of identity and place, and iii) the value of nature in providing cultural artefacts and livelihood products. These three categories of human values, however, were certainly recognized at the site level where, rather than biodiversity values, cultural values are considered as the basic foundation of BCD. Moreover, it also became clear that the involvement of citizens predominantly took place at the site level. This is in line with a trend across Europe to create

greater stakeholder inclusion, specifically for civil society organisations and citizens to become more prevalent (Rosol 2010). Notwithstanding this trend, in practice governments still play an important role in the management and planning of (large) green spaces (Buizer et al. 2015). Local activism can provide benefits for biodiversity and the entire society as it increases awareness of the environment, which in turn supports pro-environmental behaviour and improves self-esteem and feelings of belonging to society or a cultural groups (Ling Wong 2007; Dinnie et al. 2013).

The temporal dimension also varies on both levels. While at the city level, a long-term perspective with limited attention for cultural dynamics is being applied, cultural dynamics play a more acknowledged role at the site level. Such dynamics are closely linked to the emergence of social innovations within local communities. Constituting both an autonomous cultural phenomenon as well as a reaction to budget cuts and a decreased political focus on nature conservation in several countries (Buijs et al. 2014), local communities have developed innovative ways to contribute to urban greening on the site level (Van Dam et al. 2015). Such local practices are not only inspired by the physical characteristics of the place, but also by the cultural characteristics of the local community (Baker and Mehmood 2015). People involved in these local pioneering practices can, according to Elands and Van Koppen (2012), be called 'biocultural creatives'. This is because the types of knowledge and values relating to different cultures, as well as their relationships to nature come together to continuously invent or 'co-create' new constellations of living with biodiversity; in this way, there is no 'one size fits all' approach, and diversity and change constitute the core of such local practices. Thus, cultural diversity may also create new opportunities for biodiversity conservation. The interplay between local physical and cultural diversity may result in new assemblages of biodiversity that involve both new landscapes as well as new assemblages of species and cultivars (Pungetti 2013).

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