Comparing Ecosystem Service Preferences between Urban and Rural Dwellers

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Urbanization can profoundly alter socioecological relationships, but its influence on how people perceive and value ecosystem services (ES) is poorly understood. We reviewed an emerging literature in which sociocultural valuation of ES is compared among urban and rural dwellers. This research suggests that, although regulating and cultural ES were highly valued by both rural and urban dwellers, urban dwellers tended to value provisioning ES less than rural dwellers did. Differences in ES valuation could result from different experiences, uses, and needs for ES of urban and rural dwellers. We also identified two key gaps in the literature that relate to understanding how diverse ES contribute differently to the well-being of rural and urban populations (and the relevance of these differences for environmental education and policy) and the changing roles of ES in developing countries and vulnerable ecosystems, such as small islands, that face pressing environmental, social, and economic challenges.

Keywords: sociocultural valuation, perceptions, urbanization, socioecological system

Urban and rural populations ultimately depend both directly and indirectly on ecosystems for their well-being. However, the environmental, economic, and social changes associated with urbanization can alter people's relationship with nature and the well-being benefits people obtain from ecosystems—that is, ecosystem services (ES; MA 2005). Cities have the potential to affect global sustainability (Seto et al. 2017). Projections indicate that by 2050, the urban population will have grown from 3.5 to 6 billion people, accounting for two-thirds of the global population (United Nations 2014). In this context, it is important to understand the differences in how people in urban and rural areas respectively benefit from and value nature, because it seems likely that future impacts on ecosystems will increasingly be dictated by urban dwellers.

Current conceptual models of the relationships between biophysical environments and human well-being regard ES provision as a sequence, or cascade, in which ecosystems create potential ES that are realized through benefits and use values to influence human well-being (Spangenberg et al. 2014). Quantifying and modeling this cascade requires that the connections between different elements are understood and, ideally, connected empirically through statistical relationships and equations (Cumming and Maciejewski 2017). Although the step from the biophysical elements of an ecosystem to potential ES is relatively well documented (Naeem et al. 2009), the more human-focused, value-related elements of the cascade are poorly understood, and little information is available from which to model or simulate them for management, scenario planning, or vulnerability analyses (Rieb et al. 2017). To explore the current state of knowledge in this area and to highlight areas in which understanding the human elements of ES provision will be critical as society navigates the transition to a dominantly urban world, we reviewed the literature comparing people's perceptions and preferences for ES in urban and rural areas.

The valuation of ES using people's perceptions or preferences is called *sociocultural valuation* or *nonmonetary valuation* (Scholte et al. 2015). Valuing ES with a sociocultural approach has three major advantages for managing ES sustainably and equitably. First, perceptions are essential to understand actual ES contributions to individual well-being (e.g., using the Millennium Ecosystem Assessment, MA 2005, well-being constituents: security, basic material for a good life, health, and good social relations) that account for a person's own circumstances, needs, and preferences toward the environment (Daw et al. 2011). This is why recent reviews on urban ES (Haase et al. 2014, Luederitz et al. 2015) and in the general ES literature (Daw et al. 2011) identify a strong need for individual-level data. Furthermore, heterogeneity between social subgroups in perceptions, preferences, and well-being contributions from ecosystems can provide insights into how they might be affected

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differently by environmental change and how trade-offs can emerge between groups. Second, values and perceptions also influence motivation and, ultimately, behavior toward the environment (Braito et al. 2017, Muhar et al. 2017). Third, sociocultural valuation permits direct comparisons among all categories of ES (provisioning, regulating, and cultural). Direct comparisons among ES can point to potential trade-offs between them (e.g., land clearing for food provisioning may reduce cultural values, such as aesthetic benefits or medicinal plants, provided by forests). Economic valuation methods, in contrast, are less suited to measuring ES that are intangible (Scholte et al. 2015) or not traded on the market (Granek et al. 2010). However, intangible cultural ES, such as a sense of place or heritage values, may be harder to replace or substitute than provisioning and regulating ES (Plieninger et al. 2013). Therefore, sociocultural valuation of ES can contribute to informed environmental management decisions by clarifying the potential trade-offs between ES and social subgroups.

Urban and rural environments differ in people's lifestyle, economic activities, and ES supply. These differences may influence the human-nature relationship and the perceptions of ES. First, an urban lifestyle may be associated with particular sets of needs or preferences. For example, a study in Italy showed that people tend to value urban non-ecosystem services (e.g., communications technology, waste disposal, transport) over ES for their contributions to their quality of life (Antognelli and Vizzari 2017). Second, the specialized economies of cities imply that fewer people are involved in their own food production than are people in traditional rural societies. Instead, urbanized societies meet their needs by substituting some ES with infrastructure and manufactured goods, which have complex and obscure relationships with ecosystems (Cumming et al. 2014). Affluent societies transfer many of the environmental impacts of their consumption to less affluent nations through trade and pollution (Weinzettel et al. 2013). Third, ES supply has been shown to decrease in urban areas (e.g., Su et al. 2012, Qiu and Turner 2013, Radford and James 2013, Long et al. 2014). The most heavily affected ES are often those that have a close relationship to land cover, including regulating ES (e.g., water filtration and regulation, soil retention, and climate regulation) and provisioning ES (e.g., food and material production). Rural areas are also affected by urban areas and urbanization. Urban areas often expand into natural areas and agricultural land (Bren d'Amour et al. 2017). Furthermore, to meet the needs of urban populations for food and materials, the production of provisioning ES (e.g., food, fiber, and fuel) may increase in rural areas. Increases in provisioning ES can lead to a decrease in regulating ES related to the functioning of ecosystems, potentially causing environmental degradation (MA 2005, Lee and Lautenbach 2016). For example, the shift to high-intensity agriculture in Europe has caused declines in rural pollinators and natural pest regulators (Power 2010). Therefore, because of their physical environment and socioeconomic context, people in urban areas experience nature and depend on it differently from the way people in rural areas do; in turn, this could affect perceptions and preferences of nature and the ES it provides.

Understanding how and why ES preferences differ among populations and social groups has important consequences for environmental management, notably in identifying conflicting values and the winners and losers under different outcomes. In addition, as the main consumers of ES worldwide, the consumption choices of urban dwellers can have important impacts on local and distant rural ecosystems (Kareiva et al. 2007, Seto et al. 2012). For example, current pressure from urban dwellers in Europe and North America to end the big game trophy hunting industry in southern Africa has potentially negative implications for biodiversity (Di Minin et al. 2016) and rural dwellers in countries, such as Botswana and Zimbabwe, where local communities may depend on revenue from hunting quotas as a source of income and may restrict their own farming and hunting activities to maintain ecosystem functionality (Lindsey et al. 2007).

In this review, we ask whether general trends in urban versus rural ES preferences emerge and what the main explanations are for these trends. We synthesized the findings of case studies that contrasted urban and rural ES sociocultural valuation. This topic has not been previously addressed by either the literature on urban ES (e.g., Haase et al. 2014, Luederitz et al. 2015, Kremer et al. 2016a) or that on ES sociocultural valuation (e.g., Scholte et al. 2015). A rigorous understanding of the urban–rural divide depends on comparative case studies in which ES valuation has been done using the same approach in both urban and rural areas of the same region or country, thus controlling, to some extent, the influences of culture and methodology. We sought to identify similarities and differences in ES valuation between the urban and rural populations, the main factors that might explain differences in ES valuation, and whether the authors considered well-being benefits associated with ES. Our review highlights several important, emerging research priorities.

Urban and rural dwellers' ecosystem service preferences: Collating the evidence

We collected data from peer-reviewed journal articles obtained from searches in the Thomson Reuters Web of Science conducted between August and October 2017 and updated in August 2018. We used the following topic search terms: *(ecosystem service* OR landscape service*) AND urban* AND rural AND (perception* OR preference* OR stakeholder* OR user* OR beneficiar* OR cultural valuation OR soc* valuation OR demand OR use)* for all years. We considered sociocultural valuation in a broad sense, including research on ES preferences, as well as ES use and willingness to pay, given that they provided information on ES use or preferences. The included papers were focused on ES beneficiaries and their perceptions or use of ES. *Landscape services*

Table 1. Frequency of methods followed in the paper reviewed (N = 17).

Tools	Type of method	Number of papers
Data collection	Interview, surveys, or self-administered surveys	16
	Focus groups	3
	Other (use of ES)	2
	Multiple methods	5
Other tools used in data collection	Used pictures to illustrate ES or ecosystems	7
	Collected spatial data	1
Sampling of the population	Random	15
	Purposive (specific stakeholder group, e.g., landowners or experts)	6
	Combination of random and purposive	4
ES valuation method	Perceptions	16
	Use	10
	Rating	9
	Ranking	3
	Willingness to pay or to give time	6
ES classification method	Millennium Ecosystem Assessment	4
	Common International Classification of Ecosystem Services	1
	Ad hoc classification	12

were also included in the search, because this term is sometimes used similarly to *ecosystem services* (e.g., Fagerholm et al. 2012, Willemen et al. 2012). We did not consider the gray literature and may have overlooked papers in which the rural–urban contrast was considered as a sociodemographic indicator (i.e., residential type) or was not mentioned in the title or abstract.

Our approach initially identified a pool of 107 potential papers, from which we selected according to the following three criteria: The search terms appeared in the title or the abstract, and the papers explicitly contained the words *ecosystem service* or *landscape service*, as well as *urban* and *rural*; the findings were drawn from field-based case studies; and the studies compared urban and rural dwellers' ES uses and preferences (the latter could be elicited using various methods). Focusing the review in this way identified a total of 17 focal papers (listed in supplemental appendix A). For each focal paper, we considered a set of variables relating to understanding differences in ES preferences between urban and rural areas and the current breadth of the field (table 1, in supplemental table S1): country of origin, context of the study, type of methodology, stakeholders involved, ES assessed, findings and interpretation of the urban–rural ES valuation, influence of sociodemographic indicators, differences between developed and developing countries, link between ES and well-being.

In order to make valid ES comparisons across studies, we translated assessed ES into the Common International Classification of Ecosystem Services (CICES) at the class level (Haines-Young and Potschin 2018; see supplemental appendix B for the definitions of ES classes). CICES was developed for the System of Environmental-Economic Accounting, led by the United Nations Statistical Division for ES accounting and assessing. It provides a means to translate other ES classifications (e.g., MA, The Economics of Ecosystems and Biodiversity, or the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services) into a common language. Supporting ES are not considered a separate ES category but, rather, the underlying ecosystem functions that generate ES (e.g., primary productivity). Some supporting ES from the MA are included in the regulation and maintenance category (e.g., soil formation).

The translation of ES into CICES version 5.1 (Haines-Young and Potschin 2018) sometimes proved challenging, because different definitions and classifications of ES were used. In general, we tried to respect the intent of the study when converting ES and, therefore, keep a similar number of ES. When several interpretations were possible, we made a few simplifications to ensure classification consistency. First, when two ES classes were assessed together (e.g., recreation and tourism), only the one most frequently mentioned or otherwise the first in order of appearance was recorded. Second, we classified nontimber forest products as wild plants for nutrition if no additional information was provided. Third, if recreation was mentioned without being specified as an active or passive interaction with the environment, it was placed in the active category.

Portrait of the field

Countries and context in which the studies were conducted. All of the reviewed papers were published after 2006, more than 80% since 2012, in a diversity of journals. Only three journals had two articles each: *Ecosystem Services*, *Forest Policy and Economics*, and the *Journal of Environmental Management*. Ten studies were conducted in developed countries and five in developing countries (figure 1). Two studies compared a developing with a developed country (China with Switzerland and Jordan with Israel).

The papers' authors either adopted an ecological (e.g., watershed, river basin, forest) or political boundary (e.g., municipality, region), or no boundary was specified. In the latter case, for example, one paper was focused on archetypal forests from China and Switzerland (Lindemann-Matthies et al. 2013). Most papers used a combination of ecological and political boundaries, prioritizing one or the other. For example, Shi and colleagues (2016) selected municipalities within the boundaries of a watershed. Sometimes, studies

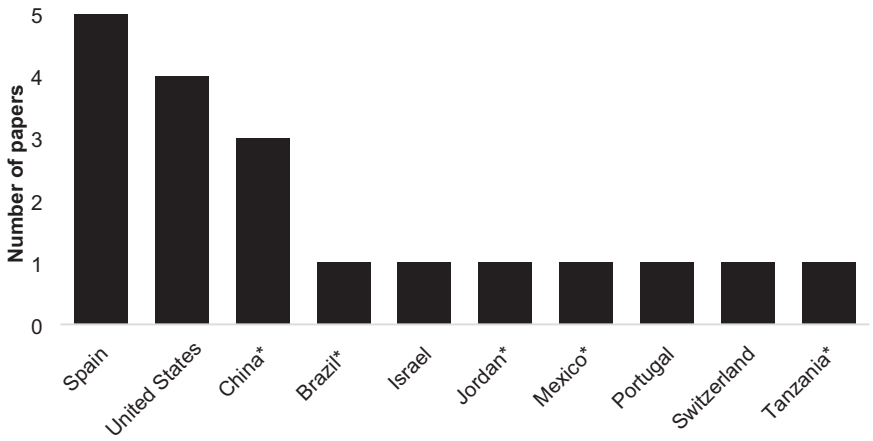

Figure 1. Frequency of publications considered in the review per country in which the studies were conducted (N = 17, two papers included two countries each). The asterisk (*) indicates a developing country.

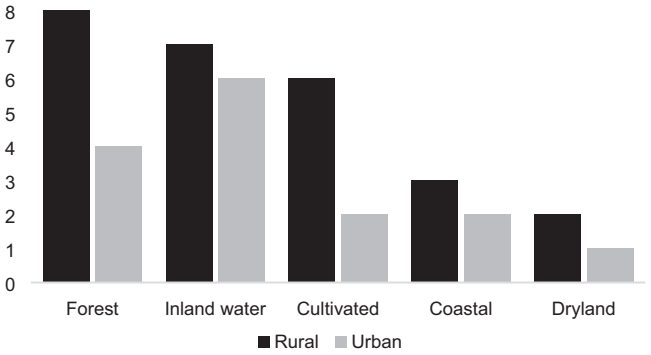

Figure 2. Frequency of main ecosystem type studied in the papers reviewed (N = 17) classified according the Millennium Ecosystem Assessment systems and the context in which they are located: urban (i.e., close to or in an urban or periurban area or directly provides ES to an urban area) or rural (i.e., in a rural or a natural area). A same ecosystem type in a paper can be considered both urban and rural if it covers the two contexts.

were at the extent of a protected area (e.g., Williams et al. 2017). The areas covered by the studies ranged from dozens to thousands of square kilometers.

To define urban and rural, the authors used population size (five papers), population densities (one paper), percentage of built areas (one paper), or referred to a national definition or a previous publication (four papers). In seven papers, no definition was provided.

The ecosystems studied most frequently (as classified in MA 2005) were forests, inland water (especially rivers), and cultivated land (figure 2). In no study were marine or island ecosystems assessed, and one addressed a mountain ecosystem. In only one paper, in which multiple ecosystems were surveyed, an 'urban' type was identified (i.e., the Bilbao greenbelt, Spain) (Martín-López et al. 2012). Nine out of 17 papers also considered ES that were delivered or obtained in urban or periurban areas. The other papers addressed ES outside of urban areas—that is, in natural or rural areas—that were visited by urban dwellers.

Data collection and valuation method. The papers in which participants' perceptions of ES were examined included a diversity of methods, including ES presence (e.g., capacity of an ecosystem to generate ES), ES importance, and relative preference for ES (table 1).

ES assessed. On average, studies evaluated 9.5 ES from 32 classes (table 2 and figure 3). Ecosystem disservices were examined in 3 of the 17 papers reviewed; these included the impacts of deer browsing on forest plants, affecting tree regeneration and songbird populations (Racevskis and Lupi 2006); a dislike of bugs and weeds (Kenwick et al. 2009); forest plagues and wildfires (Caro-Borrero et al. 2015); and negative landscape characteristics (e.g., dust and aridity; Orenstein and Groner 2014).

Urban–rural ES contrasts. The ES categories that were found to be the most important in the papers reviewed (without contrasting urban and rural dwellers) were, in order, regulating, cultural, and provisioning services (table 3). However, for urban dwellers, provisioning ES were the most important type only in one study (da Cunha Ávila and colleagues 2017, on home gardens in Brazil), whereas preferences were more equally divided across ES categories for rural dwellers. Relative differences between urban and rural dwellers' ES preferences were found in 16 of the 17 papers reviewed. In only one paper from the United States were differences not found between suburban and rural ES preferences for riparian buffer types (Kenwick et al. 2009). About half of the studies showed that provisioning ES (e.g., food production, timber) were relatively more important for rural than urban people (table 3). Regulating (in particular, air filtration and microclimate regulation) and cultural ES (e.g., recreation and aesthetic experience) were found to be most important to urban dwellers more often than to rural people. Direct contrasts between developing and developed countries in urban–rural comparisons of ES valuation cannot be undertaken, because only three papers on studies conducted solely in developing countries showed comparisions of the three ES categories directly.

Explanation of the urban–rural differences in ES valuation. To explain differences in ES valuation, the authors often hypothesized or measured associations between ES valuation with sociodemographic characteristics (figure 4). Education, sex, and age were most frequently found to have an influence.

Table 2. Average number of ES assessed per category and in total per paper.

Category of ES	Average number of ES per study (*N* = 17)	Average number of ES per study in developing country (*N* = 5)	Average number of ES per study in developed country (*N* = 10)
Provisioning	2.5	3.0	2.4
Regulating	3.1	2.4	3.4
Cultural	3.8	2.4	4.5
Total	9.5 (ranging from 4 to 15)	7.8	10.3

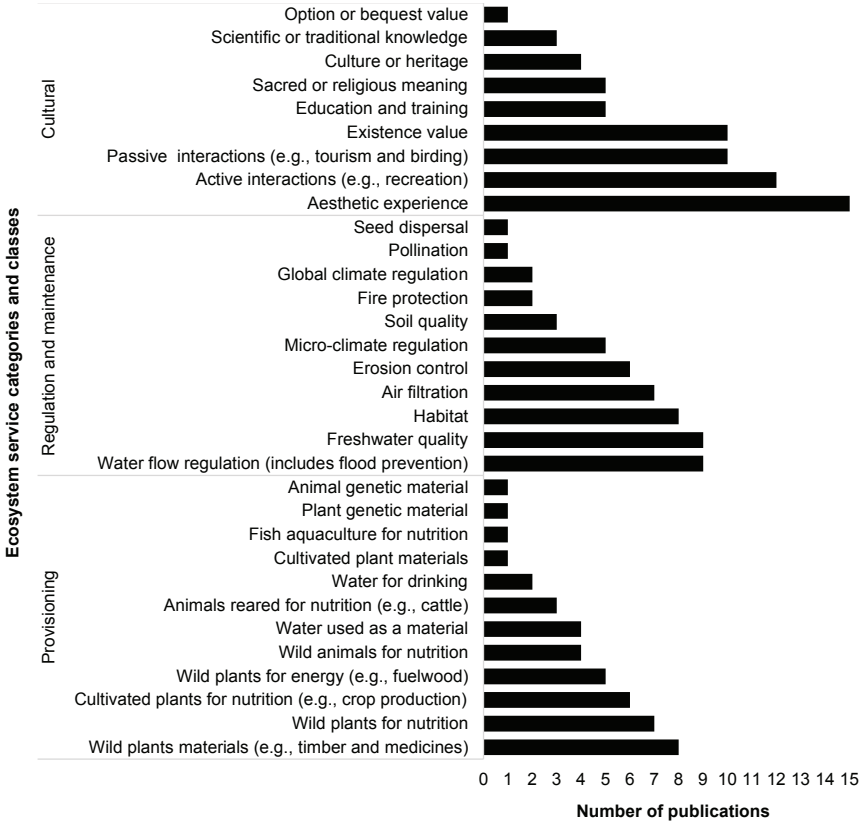

Figure 3. The ES categories: Provisioning, Regulating and Cultural have disappeared from the Y axis.

Income, ethnicity, and occupation were also thought to be influential, but in fewer papers (in six, three, and one papers, respectively). The other factors were classified into seven categories (described in supplemental appendix B) derived from two frameworks: determinants of sociocultural values of ES (Scholte et al. 2015) and elasticity in ecosystem services (Daw et al. 2016).

An explanation for the rural–urban contrast in ES valuation based on the factors mentioned above was provided in 13 of the 17 papers reviewed. Differing needs and use or experience were the main explanations for differences between populations (figure 5). The main sociodemographic characteristics that explained differences in urban and rural ES valuation were education, income, and affluence; they were all generally higher in urban areas (Martín-López et al. 2012, García-Llorente et al. 2016). Education was positively correlated with the perception of a larger range of ES and environmental knowledge (Martín-López et al. 2012, Pan et al. 2016, Soy-Massoni et al. 2016) and regulating ES (Caro-Borrero et al. 2015) and negatively correlated with the importance of ES for rural areas (Martín-López et al. 2012, García-Llorente et al. 2016). Income and affluence appeared to positively correlate with ES valuation (Orenstein and Groner 2014), with the willingness to pay for ES (Shi et al. 2016), and with the positive perception of payments for ES (Caro-Borrero et al. 2015). Older people were associated with rural perceptions (or younger people with urban areas) in three papers, and women were associated with urban perceptions (or men with rural ones) in two papers.

The link between ES and well-being. Well-being was mentioned in 13 of the 17 papers, most often when defining ES. However, fewer studies (seven) made actual links between ES and the constituents of well-being (as classified in MA 2005): security, basic material for a good life, health, and good social relations). Links between ES and well-being were made more frequently with the basic material for a good life constituent of the MA well-being definition, with income and occupation being most common, especially for rural inhabitants (e.g., Orenstein and Groner 2014). Health was mentioned as an ES in one paper (Soy-Massoni et al. 2016). Finally, Pan and colleagues (2016) mentioned the importance of social interactions for rural dwellers using a river.

Ecosystem service preferences among urban and rural dwellers: Insights and future directions

Our review showed that urban and rural dwellers present similarities in their valuation of ES but also important differences. The main difference in ES valuation between urban and rural dwellers was that the importance of provisioning ES was rarely perceived by urban dwellers. Urban and rural populations highly valued regulating and cultural

Table 3. Comparative valuation of ecosystem service categories by rural and urban dwellers.

	ES preferences: Most valued by population (*N* = 13)		Differences in valuation between populations: Valued more by one population than the other (*N* = 16)	
Ecosystem service category	Rural	Urban	Rural	Urban
Provisioning	4	1	8	0
Regulating	6	7	3	5
Cultural	3	5	2	7

Note: Thirteen of the 17 papers reviewed specified the most important ES category for rural and urban dwellers, whereas 16 pointed to differences between rural and urban dwellers (but not all ES categories were compared in every study and sometimes differences were found in only one ES category). All of the 17 papers appear in one or both of the comparisons.

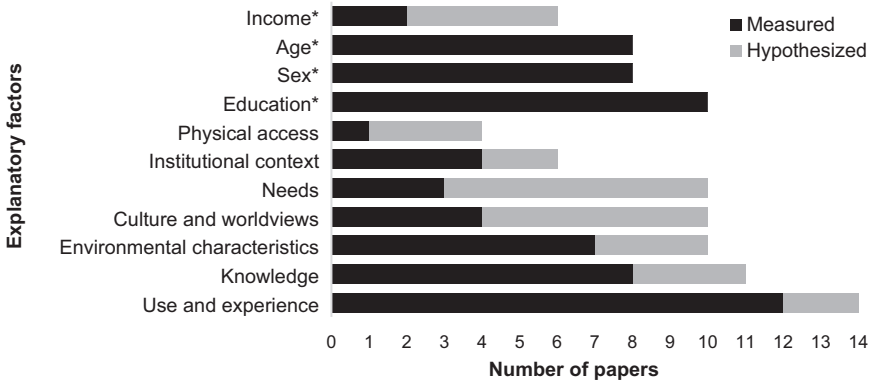

Figure 4. Frequency of the main explanatory factors measured or hypothesized to influence people's ES valuation cited in the papers reviewed (N = 17, (*) indicate sociodemographic characteristics).

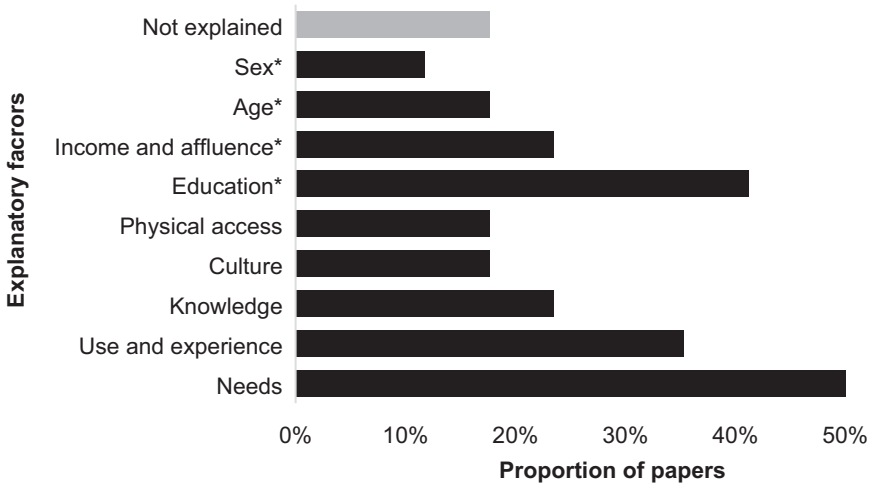

Figure 5. The main explanatory factors of the urban and rural contrast in ES valuation expressed as a proportion of the papers reviewed (N = 17). The asterisk (*) indicates a sociodemographic characteristic. The number of papers not providing an explanation is in gray.

ES, although the actual ES preferred differed. Differences between urban and rural dwellers could be mediated by differences in sociodemographic characteristics; education, income, and affluence are higher in urban areas. These characteristics, combined with different lifestyles and livelihoods, are likely to lead to differences in needs between urban and rural populations, as well as in their experience and use of nature.

The supply and demand of provisioning ES in urban areas differ from those in rural areas in three ways. First, the supply of provisioning ES (e.g., agricultural production) is usually low in urban areas and could result in a lack of direct experience with these services by urban dwellers. Second, infrastructure and manufactured goods can substitute part of the demand for provisioning ES (e.g., processed food and synthetic building materials; Cumming et al. 2014). Casado-Arzuaga and colleagues (2013), for example, found that urban dwellers knew that the food they ate tended not to come from local ecosystems. Third, the ability of people to afford alternatives to provisioning ES is likely to increase in urban areas in which incomes are generally higher than in rural areas (Henderson 2010). Conversely, the fact that rural dwellers valued provisioning ES more highly than did urban dwellers could be attributed to the higher supply of some provisioning ES in rural areas and their importance for the livelihoods of the people living in rural areas (i.e., by providing food and material either directly or through occupations that depend on these services).

Our findings point to somewhat different human-nature relationships in rural and urban areas. Some papers qualified the urban dwellers' relationship to ES and nature as indirect (Pan et al. 2016), disconnected (Martín-López et al. 2012, García-Llorente et al. 2016), more theoretical (Martín-López et al. 2012, Pan et al. 2016), or more bucolic (López-Santiago et al. 2014, Soy-Massoni et al. 2016). In contrast, rural dwellers were said to have a more direct, more connected (Racevskis and Lupi 2006, Martín-López et al. 2012), or more production-oriented relationship with

nature (López-Santiago et al. 2014, Soy-Massoni et al. 2016). This gap between nature and people in urban areas is sometimes referred to as a *nature deficit* (Louv 2005).

Sociocultural valuation of ES has practical implications for decision-makers, in at least two arenas. First, policies and management practices can use ES valuation to identify and meet the preferences and needs of different groups (e.g., Kenwick et al. 2009) and to point out shared values (e.g., Williams et al. 2017) and potential conflicts between these groups (e.g., Martín-López et al. 2012). Our review shows that these social groups might differ not only in where they live but also in sociodemographic characteristics, including education level, age, and sex. Second, environmental education programs can be targeted to specific groups to highlight the importance of underrecognized ES to their well-being (Racevskis and Lupi 2006, Carvalho-Ribeiro and Lovett 2011, Lindemann-Matthies et al. 2013, Mombo et al. 2014). In fact, Casado-Arzuaga and colleagues (2013) have shown that the information communicated can transform ES preferences. This might compensate, in part, for the knowledge traditionally gained through direct experience of nature.

Finally, our review supports the argument that a sociocultural approach can be used to value a diversity of ES across all ES categories (Granek et al. 2010, Hicks 2011). It has been suggested that because regulating ES might be harder to perceive, their value would not be captured as effectively by sociocultural valuation as that of other ES (Asah et al. 2014, Scholte et al. 2015). Our findings indicate that this is not true for regulating ES in general. However, when regulating ES were not specifically mentioned to the research participants, they were not as readily perceived and valued (Casado-Arzuaga et al. 2013, Soy-Massoni et al. 2016). Furthermore, more than two-thirds of the papers also considered cultural ES classes other than recreation and aesthetic value, such as spiritual or existence values, which are rarely considered in ES research (Chan et al. 2012, Daniel et al. 2012, Scholte et al. 2015). Surprisingly, although the importance of cultural ES for urban dwellers of the Western world has been demonstrated (Kremer et al. 2016b), a recent literature review on urban ES showed that cultural ES are lacking in urban ES assessments (Ziter 2016). Sociocultural valuation can help bridge that gap.

Research priorities. Our review highlights the many needs for further research in this emerging field. The gaps that we have identified reflect the limited number of papers available for review rather than providing a critique of the papers themselves. Three research areas appear to be of particular importance for future research on how ES valuation differs between urban and rural dwellers: the assessment of human well-being benefits, ecosystem diversity, and research in developing countries.

The well-being benefits of ES in both rural and urban environments are poorly understood, as has been highlighted for the ES literature in general (Bennett et al. 2015, Dawson and Martin 2015, Daw et al. 2016). Of the few papers that we reviewed in which the link between ES and well-being was considered, most included examinations of links with economic benefits (Mombo et al. 2014, Orenstein and Groner 2014). However, we often encountered a conflation of ES and well-being benefits. Well-being benefits were mentioned as an ES—for example, health (Soy-Massoni et al. 2016) and occupation (Racevskis and Lupi 2006). ES well-being benefits can be examined using the MA framework or other well-being frameworks (for a review of different frameworks that can be used to study the well-being impacts of ES, see Agarwala and colleagues 2014).

Future research on sociocultural valuation of urban and rural ES would benefit from the inclusion of a greater diversity of ecosystem types. ES that were remote from urban communities were assessed in only about half of the studies. Urban–rural comparisons in ES preferences could also include ES that are located in or close to urban areas and can contribute to the well-being of urban dwellers in their everyday life. There is also a need to study marine and island ecosystems.

Finally, more research contrasting the ES preferences of rural–urban dwellers is needed in developing countries, especially because most urbanization will occur in these countries in the future (United Nations 2014). Most of the socioecological research on urbanization has been conducted in developed countries (McHale et al. 2013). However, urbanization processes may differ between developed and developing countries; for example, in developing countries, urbanization is not always linked to industrialization and an improved quality of life (Gollin et al. 2016).

Conclusions

We reviewed the literature comparing people's preferences for ES in urban and rural areas to understand the ways in which living in cities affects how people value the benefits they obtain from nature. Research on ES sociocultural valuation of rural versus urban dwellers is an emergent field, as is illustrated by the low number of peer-reviewed journal articles currently addressing this topic. Our review showed that the sociocultural valuation of ES differs between urban and rural dwellers. Although both populations highly valued regulating and cultural ES, urban dwellers rarely found provisioning ES to be important for their well-being. These differences could be due to differences in affluence and education between the populations, as well as to different needs, uses, and experiences of nature in urban and rural contexts. In our analysis, we identify two key future directions for this nascent literature. First, assessing well-being contributions derived from ES would help us better understand the importance of nature in the life of rural and urban dwellers. Second, broadening research horizons in terms of the diversity of ecosystem types and countries is also needed to better understand the potential impacts of urbanization on the most vulnerable people and ecosystems. In particular, future research on changes in ES preferences associated with urbanization is needed in developing countries facing social,

economic, and environmental challenges that may follow different development trajectories to those of Western countries (Cumming and von Cramon-Taubadel 2018).

Supplemental material

Supplemental data are available at *BIOSCI* online.

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