

Indicators of Cultural Ecosystem Services for urban planning

A review

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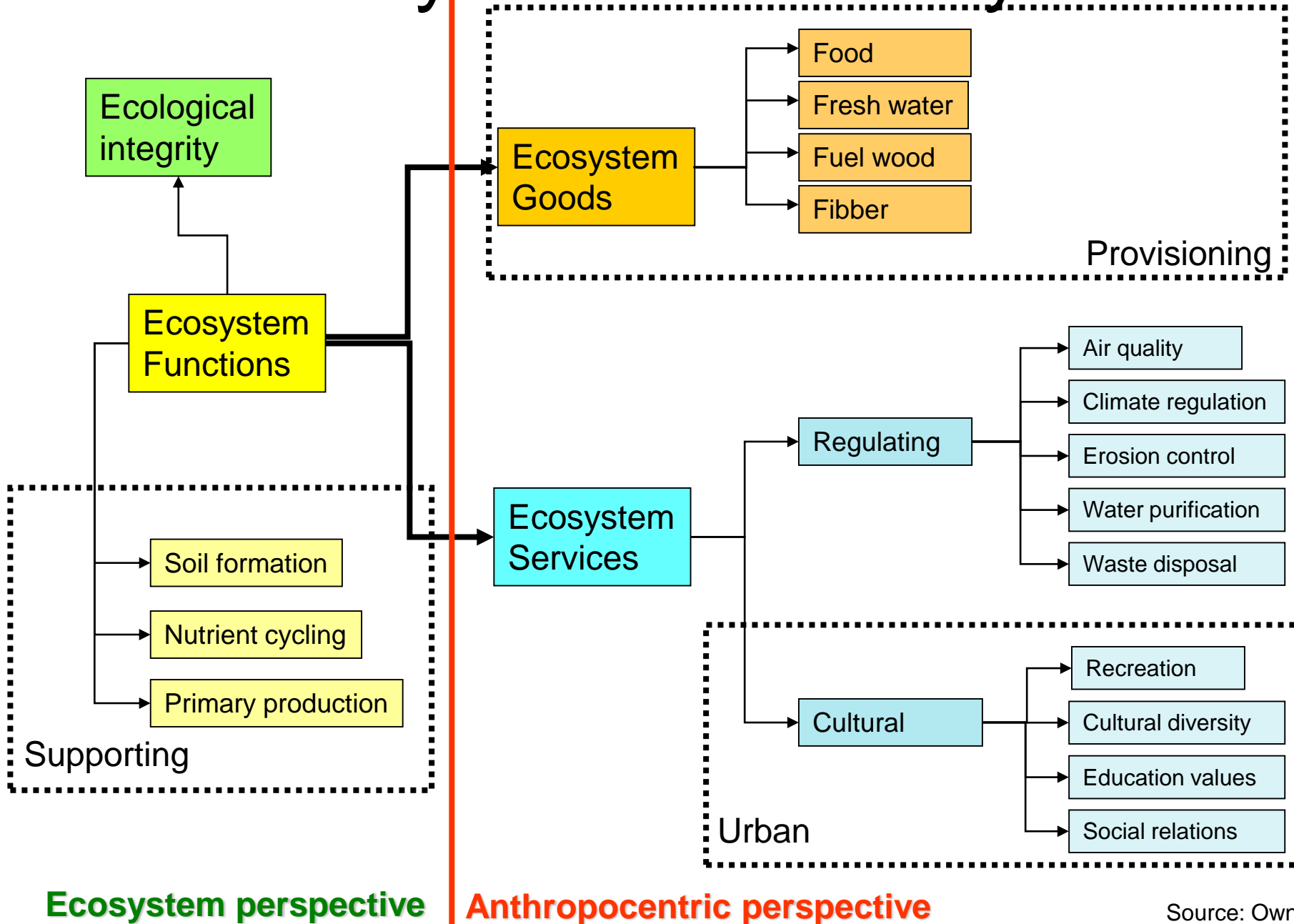
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Scope

- This research investigates which are CES **indicators** that can be used for planning purposes and especially for urban planning

Ecosystem taxonomy



Introduction – CES issue

- **Cultural Ecosystem Service (CES)** - non-material and/or socio-ecological benefits people obtain from a contact with ecosystems through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experiences (MEA 2005; TEEB 2011).
- CES are directly experienced and appreciated by people through ecosystems, thus, unlike other services, CES cannot be replaced if degraded.
- Limited attention has been given to (CES) – particularly in urban contexts (Hernández-Morcillo et al. 2013; Tengberg et al. 2012).

2^o PART - Method

Bibliographic review

Scopus (<http://scopus.com>) and all ISI Web of Knowledge (WoK) databases (<https://webofknowledge.com>) were used to perform a search for peer-reviewed papers or book chapters on Cultural Ecosystem Services in urban contexts

Searched terms

Q1: "ecosystem services" and "indicators"

Q2: "cultural ecosystem services"

Q3: "cultural ecosystem services" and "indicators"

Q4: **"cultural ecosystem services" and "indicators" and "urban"**

In deep review of selected papers

Communicability	Relevance of urban contexts	Possibility of use in urban planning
Y	A	It can be used with major adjustments
Y	B	It can be used with minor adjustments
Y	C	It can be used as it is
N	A	It can be used with major adjustments
N	B	It can be used with major adjustments
N	C	It can be used with minor adjustments

System of double evaluation based on two sets of criteria:

Communicability the ability to transfer the results from indicators to policymaking. Sub-criteria:

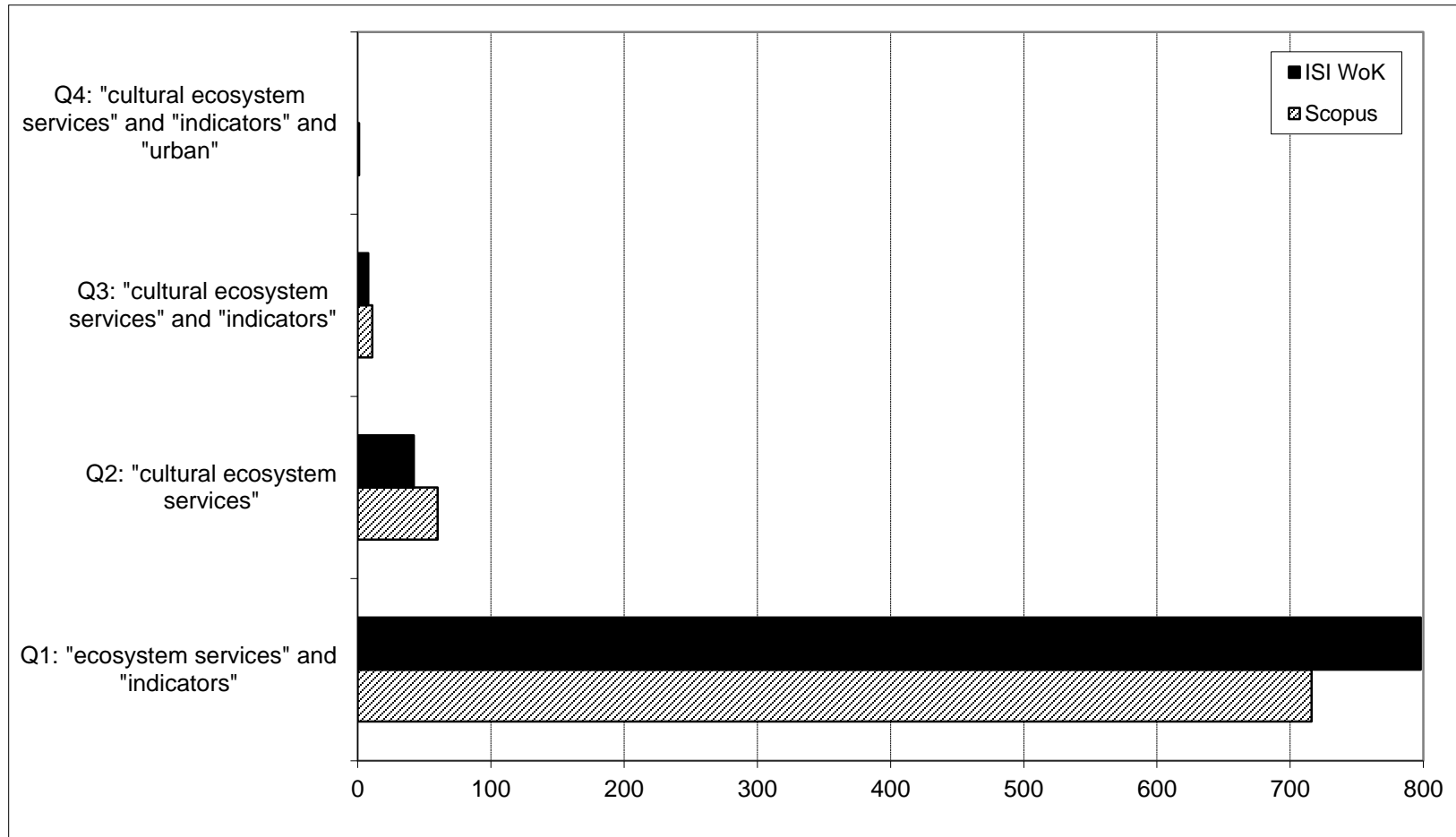
- (i) use of clear, theoretical framework for CES assessment,
- (ii) (ii) presence of the spatially explicit results of the study area (i.e. maps, tables, charts, etc.),
- (iii) reproducibility of the assessment method.

Relevance of the urban context - evaluating the predominance of the urban context within the study area:

- A: null or low relevance
- B: medium relevance: urban areas prevalent but not predominant
- C: high relevance: urban areas were predominant

3^o PART - Results

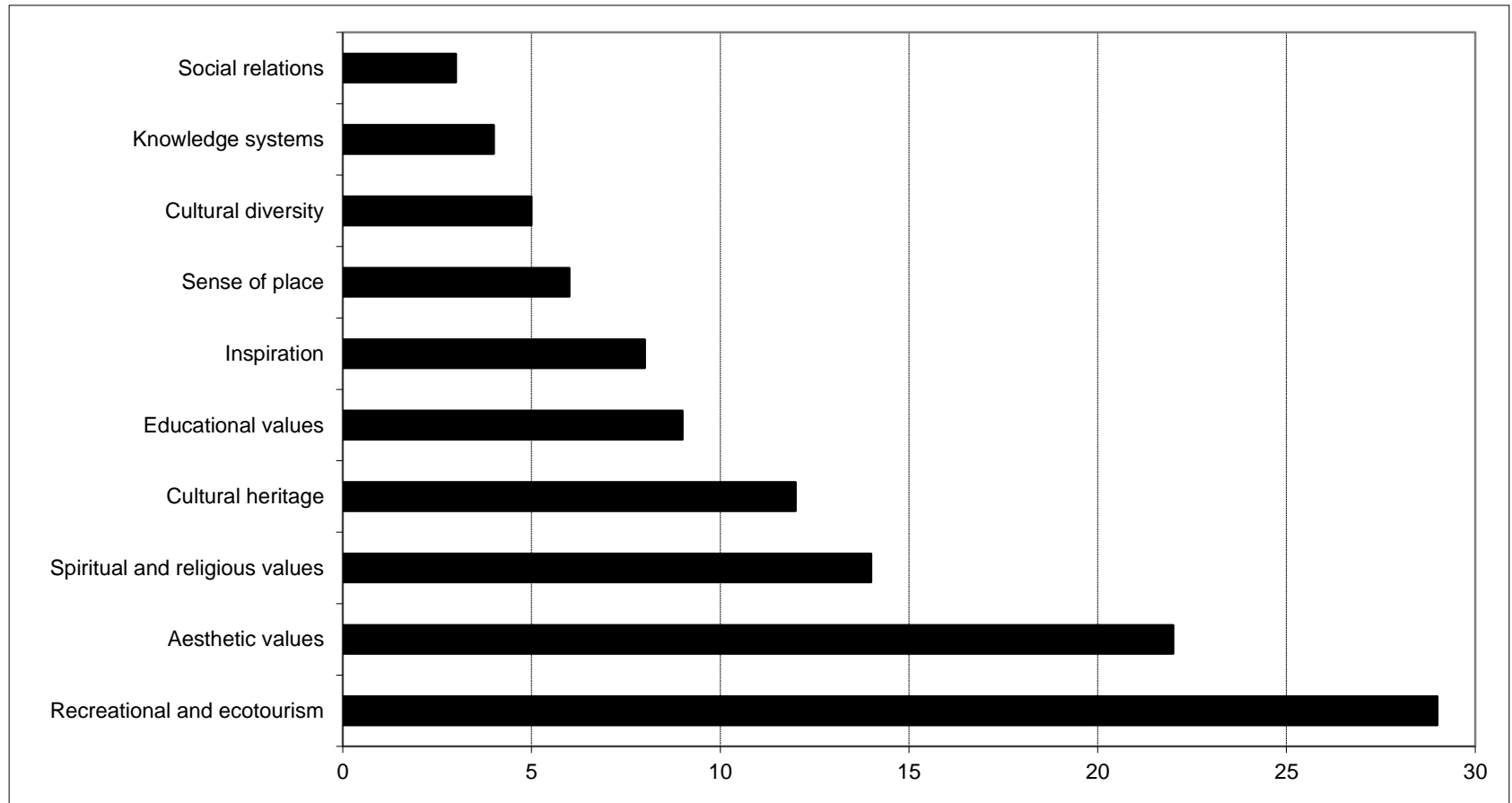
Results from queries to SCOPUS and ISI Web of Knowledge



These results clearly indicate how the real application of indicators for Cultural Ecosystem Services in urban contexts is still unexplored, even if urban contexts are places with an high density of CES

Source	Indicator name	Measurement Unit	Calculation / Resolution
	Landscape aesthetics	Spatial proxy	unknown resolution grid
Brandt et al. (2014)	Park visitation	Spatial proxy	Unknown resolution grid
Casalegno et al. (2013)	Density of photographs	# photographs per 1 km ²	1 km grid
	Monetary value of marine ES	Spatial proxy of the preference value of some ES	500 m resolution grid
Klain et al. (2012)	Number of threats to marine ES	Spatial proxy of perceived threats to some ecosystem services	500 m resolution grid
Nahuelhual et al. (2014)	Agriculture Heritage	Spatial proxy of different dimensions that are spatially estimated with kernel density	100 resolution grid
	Recreation potential	Spatial proxy of different aggregated variables	Different spatial resolutions
Nahuelhual et al. (2013)	EcoTourism potential	Spatial proxy of different aggregated variables	Different spatial resolutions
	Tourist attractions	Number of tourist attractions in certain area (Tourist attractions/km ²)	Municipality
	Rare species	Number of observations of rare species in certain area (Observations of rare species/km ²)	Municipality
	Tax value of cottages	Tax value of cottages (Tax value of cottages/km ²)	Municipality
Raudsepp-Hearnea et al. (2010)	Forested land	Percent of land that is forested	Municipality
	Mean percent tree cover on the home's parcel	Mean percent of home's parcel that is forested	County
	Mean percent tree cover in neighborhood land cover measured in home's viewshed	Mean percent of land that is forested in neighborhood limited by home's viewshed	County
	Impervious land cover	Area of land that is covered with impervious surface (m ²)	County
	Lawn area of short grass	Area of land that is covered with short grass (m ²)	County
	Area of maintained tall grassland cover	Area of land that is covered with maintained tall grass (m ²)	County
	Area of forest	Area of land that is forested (m ²)	County
	Area of shrub	Area of land that is covered with shrub (m ²)	County
	Area of unmaintained grassland	Area of land that is covered with unmaintained grassland (m ²)	County
	Area of emergent vegetation	Area of land that is covered with emergent vegetation (m ²)	County
	Area of open water	Area of land that is covered with open water (m ²)	County
	Area of woody wetland	Area of land that is covered with woody wetland (m ²)	County
Sander et al. (2012)	Area of agricultural land	Area of land that is used for agriculture purposes (m ²)	County
	Respondents' willingness to pay (WTP) for landscape maintenance	Estimation of the monetary value of environmental and cultural services (€)	Vector Landscape features (unknown resolution)
van Berkel & Verburg (2014)	Travel time-cost estimate	Calculation of estimated respondents' travel costs (€/km)	Vector Landscape features (unknown resolution)
	Surface water availability	Length/area of waterbodies	
	Game-fish species richness	Number of species found	
	Water quality	Length/area impaired for aquatic life	
	Forested riparian areas	Forested riparian area	
	Boating access sites	Number of boat access sites	
	Publicly accessible areas	Waterbody shoreline and length within public use area	
	Fishing spots	Number of fishing spots	
	Fish stocking	Number of stocked fish	
	Fishing licenses	Number of licenses	
Villamagna et al. (2014)	Licensed anglers within 16.09 km of fishable waterbody	Number of licenses	Hydrologic units
	Campsite density with landscape metrics	Campsite density explained by landscape metrics (variables):	32 km resolution grid
Weyland & Laterra (2014)			

Categories of CES



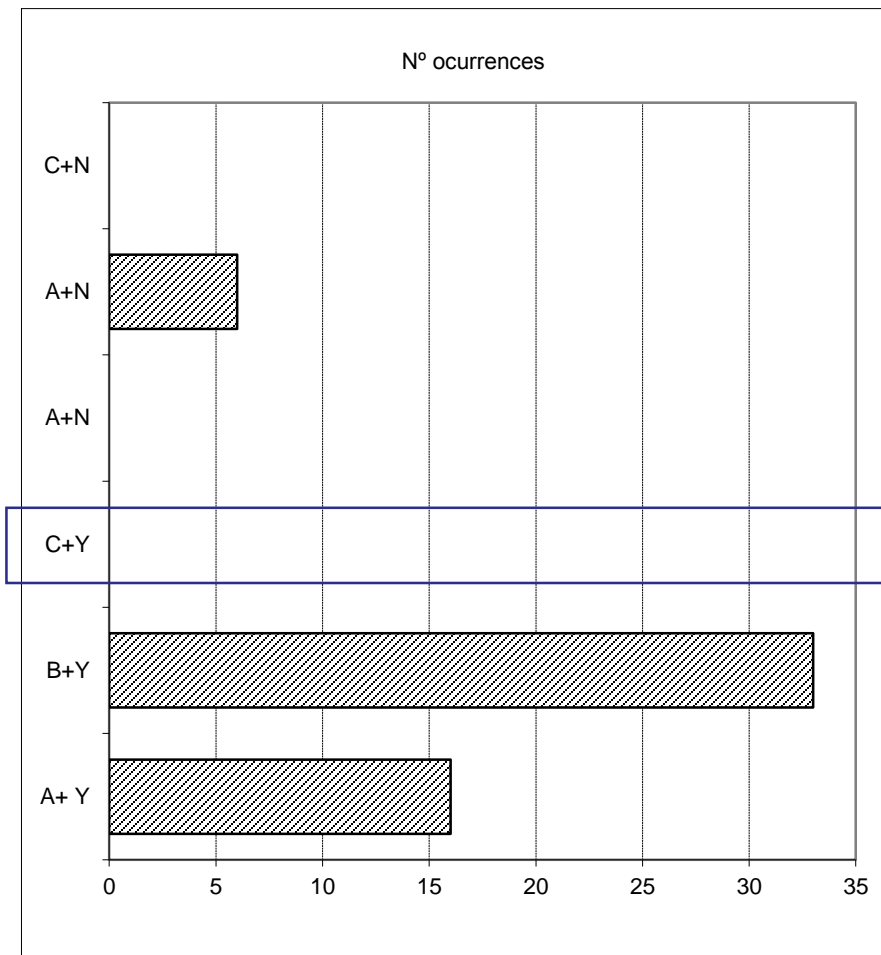
Some of the CES categories are described in very general way as “social values” (Sherrouse et al. 2014), “constituents of wellbeing” (Russell et al. 2013), “public goods” (Swallow 2013) or “contribution of peri-urban woodlands to wellbeing” (O’Brien et al. 2014).

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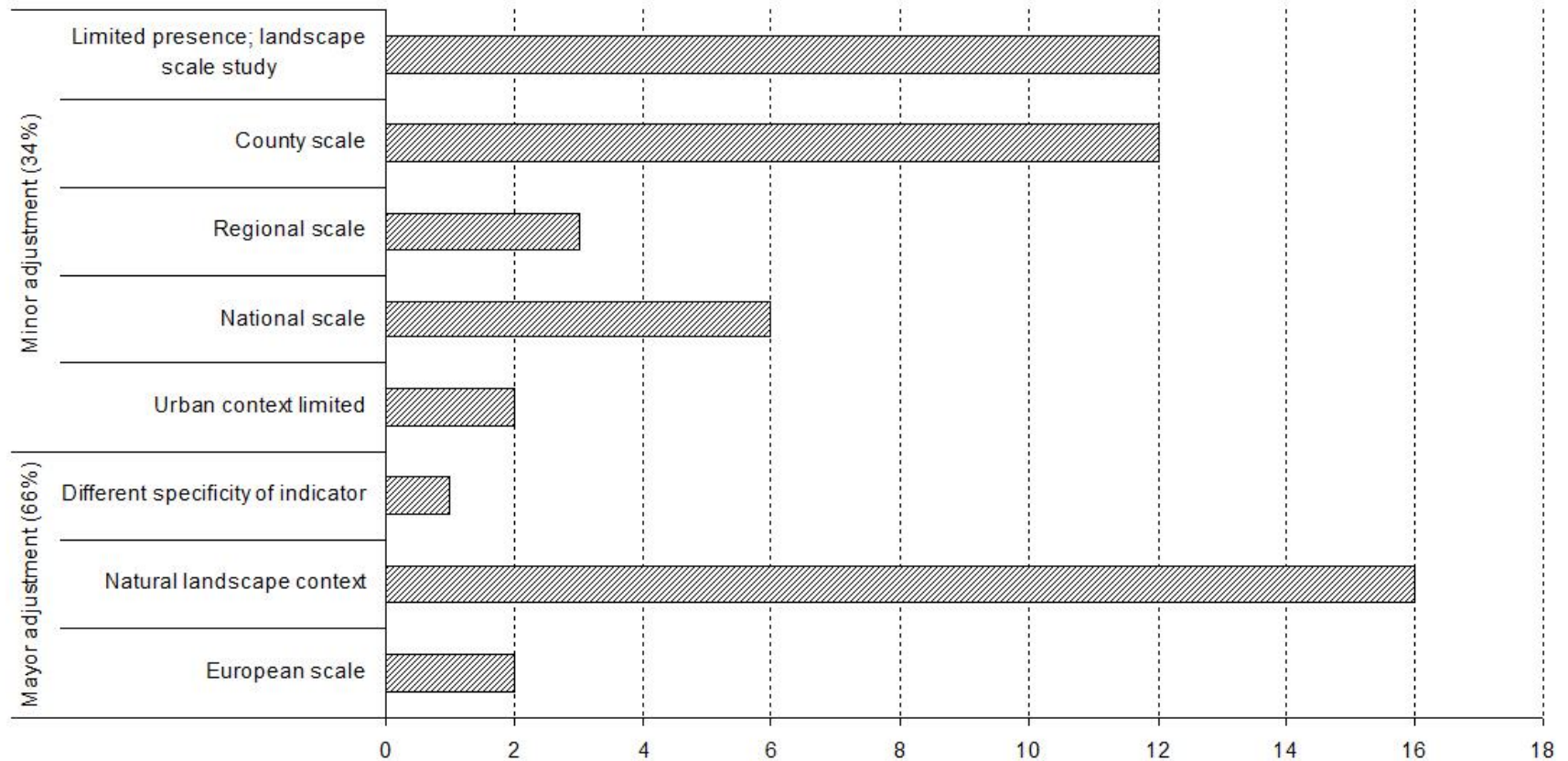
System of double evaluation based on two sets of criteria

Second set

Communicability	Relevance of urban contexts	Possibility of use in urban planning
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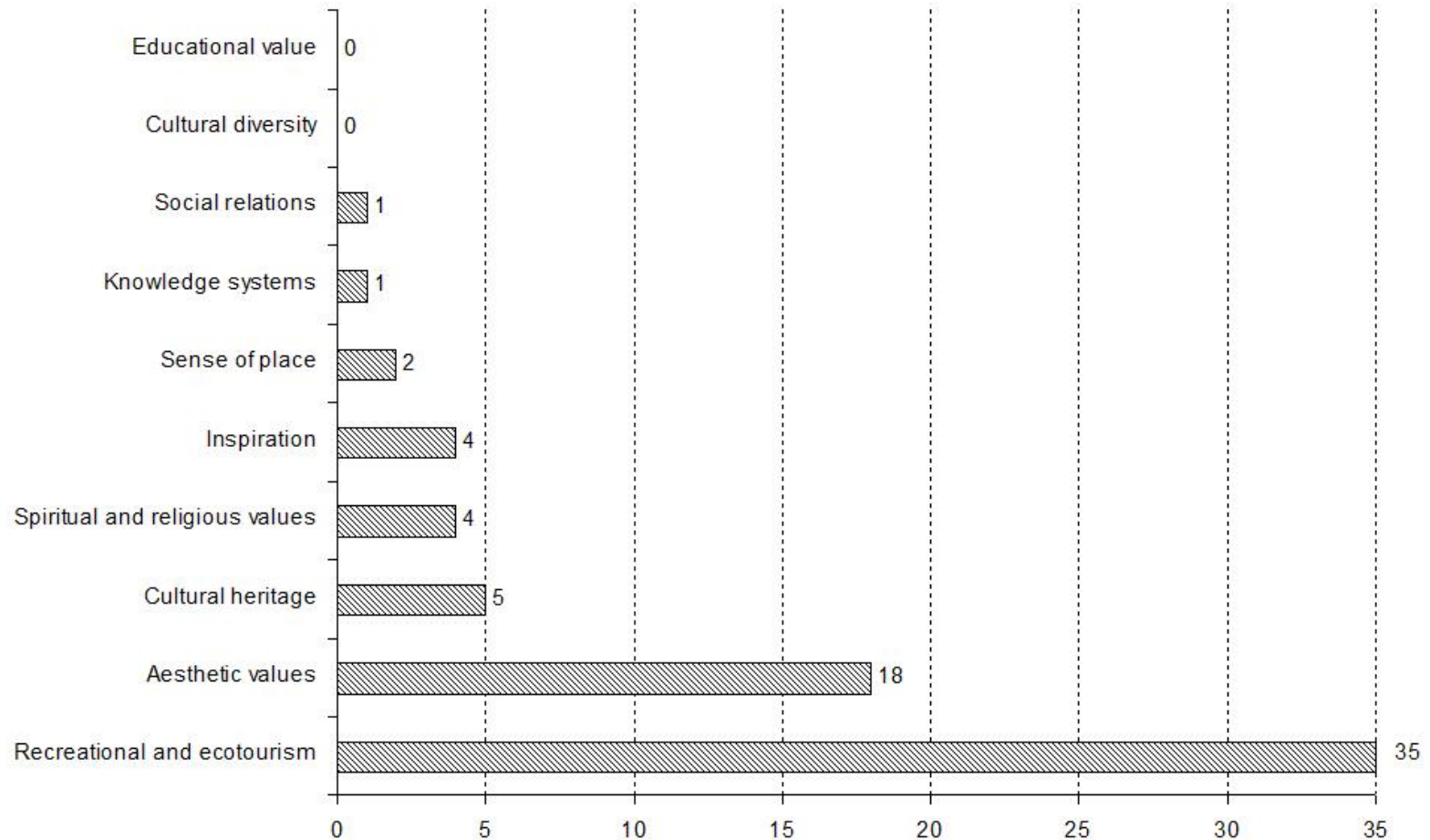


Number of indicators that can be used for urban planning



The need of an appropriate urban scale able to display spatial distribution of CES.

CUES useful indicators and relative categories



What we found...

- No CES indicator was found to be of high relevance to urban contexts:
 - Urban environments play a minor role within current ES assessments
 - non-urban nature of most indicators
- High dependence of indicators from data quality and availability
- Need for explicit considerations of urban context by CES indicators is identified:
 - Direct application of indicators for CES in urban context is still unexplored

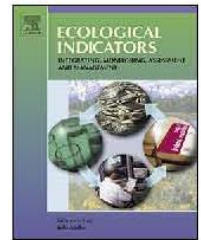


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Review

Indicators of Cultural Ecosystem Services for urban planning: A review

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ABSTRACT

The concept of Ecosystem Services has gained traction on the scientific agenda and has found its way into research on urban environments. Cities and towns, like any other ecosystem, provide specific services to their inhabitants and communities and they are benefited by surrounding ecosystems as well. Among the different categories, typical Ecosystem Services categories such as food production and erosion control usually have a lesser importance within urban contexts. However, the very diverse range of land uses and ecosystems in urban contexts provide specific Cultural Ecosystem Services including recreational, cultural and educational values.

However, to date only limited attention has been given to the provision of Cultural Ecosystem Services (CES), especially considering the relevant benefits that communities and urban planning processes can derive from them. In this document we review existing approaches for the assessment of CES in urban contexts and provide a critical overview of how indicators are used to assess and measure CES. We first conduct a literature review on the indicators used for CES in urban contexts then the paper addresses some specific issues with reference to both operability and benefits of the use of CES indicators for urban planning and management.

Our results show that existing CES indicators have limited usability for urban planning and management. Moreover a lack of appropriate data use is a significant obstacle for proper CES assessment. This impacts the potential for sustainable decision-making concerning CES in urban contexts. These issues, together with fact that most identified indicators are proxy ones, identify an urgent need to develop proper assessment indicators for CES.

4^o PART

ES – some challenges

Urban life needs...



Increasing complexity of demands



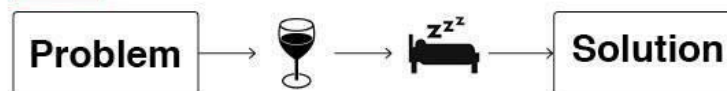
Coffee beverages in 1996



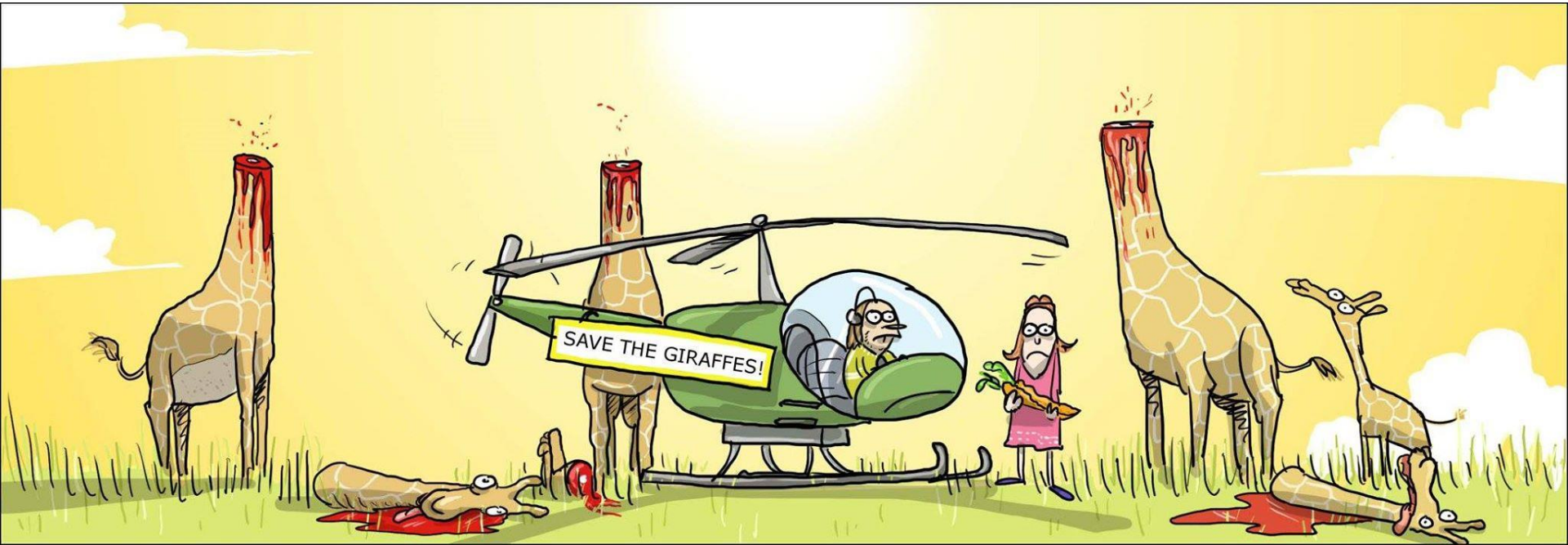
Coffee beverages in 2014

Different cultural settings

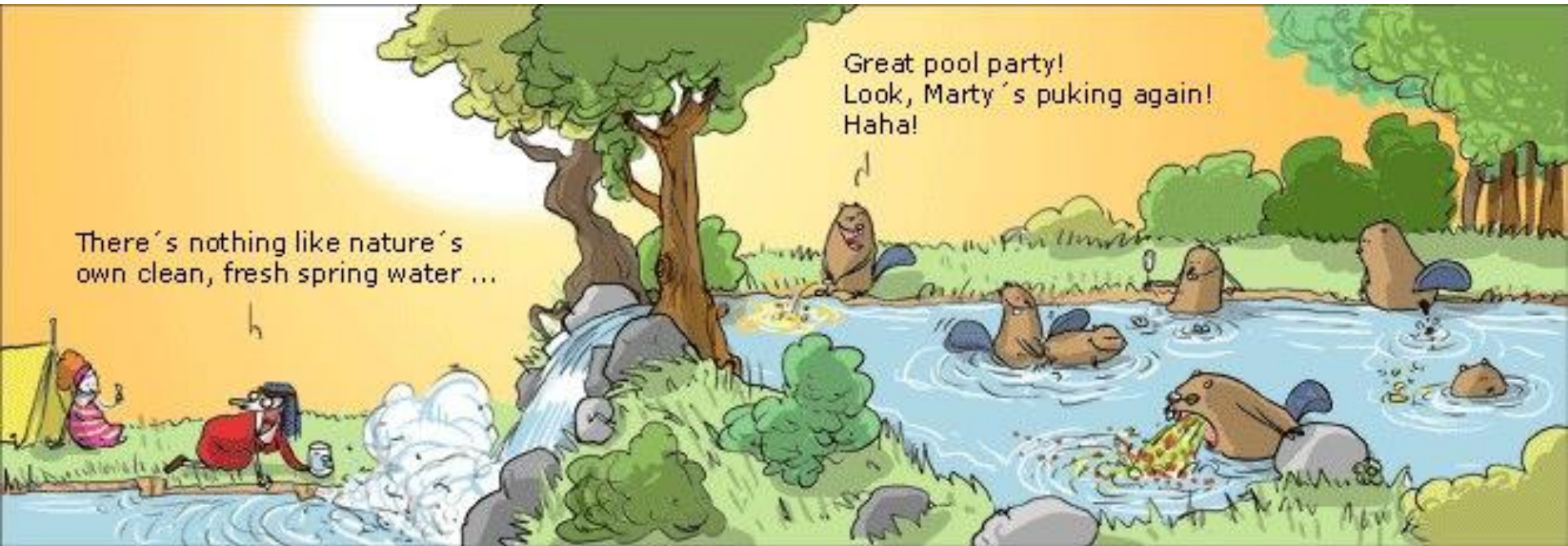
International problem solving techniques



Monitoring and implementation



Nature's fetishism



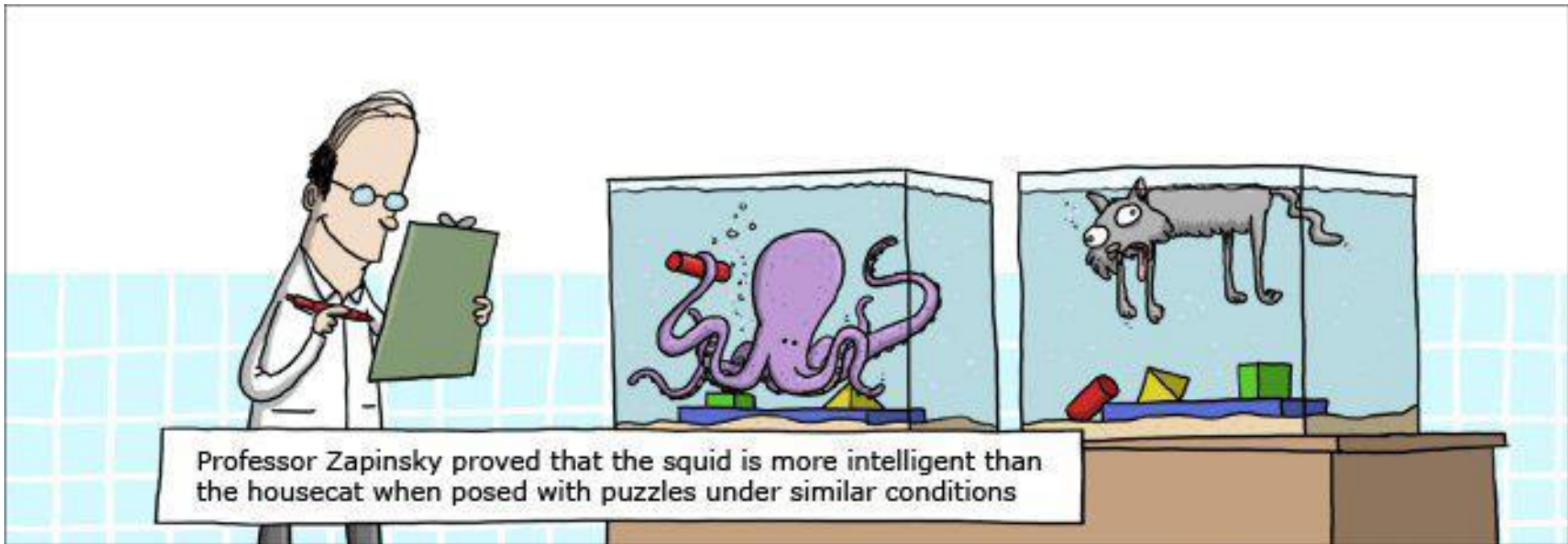
Ecosystems disservices



Specially in urban areas



Replicability of ES in urban contexts



Calculation and measurement

