

# Integrated assessment and valuation of urban ecosystem services

Erik Gómez-Baggethun

Norwegian Institute for Nature Research, Norway (erik.gomez@nina.no)

Institute of Environmental Science & Technology, Autonomous University of Barcelona, Spain

## Summary:

Conserving and restoring ecosystem services in urban areas can reduce the ecological debts of cities while enhancing resilience, health, and quality of life for their inhabitants. In this paper we synthesize knowledge and methods to classify and value ecosystem services for urban planning based on the experience of the URBES project and empirical data from a case study in Barcelona city, Spain. First, we categorize ecosystem services and disservices in urban areas. Second, we describe valuation languages (health, resilience, economic benefits) to capture the importance of urban ecosystems. Last, we provide practical examples of biophysical accounting and integrated valuation of ecosystem services provided by urban ecosystems in Barcelona.

## Extended abstract

Demand on ecosystem services keep increasing steadily in our urbanized planet. Decoupling of cities from ecological systems can only occur locally and partially, thanks to the appropriation of vast areas of ecosystem services provision beyond the city boundaries. Conserving and restoring ecosystem services in urban areas can reduce the ecological footprints and the ecological debts of cities while enhancing resilience, health, and quality of life for their inhabitants. In this paper we synthesize knowledge and methods to classify and value ecosystem services for urban planning based on the experience of the URBES project and empirical data from a case study in Barcelona city, Spain. First, we categorize ecosystem services and disservices in urban areas. Second, we describe values (health, resilience, economic benefits) to capture the importance of urban

ecosystems. Last, we provide practical examples of biophysical accounting and integrated valuation of ecosystem services provided by urban ecosystems in Barcelona.

The presentation discusses ways through which the ecosystems services framework can inform urban planners, practitioners and activists to enhance quality of life in cities. Three main insights are highlighted. First, there is growing evidence on the positive impacts of urban ecosystem services on quality of life in cities. Regulating and cultural services, including air purification, noise reduction, urban cooling, runoff mitigation, recreation, and contributions to mental and physical health, showed to be of special importance in urban contexts. Even if urban ecosystems provide only a fraction of the total ecosystem services used in cities, high density of users relative to existing levels of green infrastructure implies that the social value of services provided locally by urban ecosystems can be surprisingly high. Impacts on environmental quality and human well-being varies greatly across ecosystem services. Our data shows that the contribution of regulating services to air purification and carbon sequestration is very low relative to city emissions suggesting the need to address these issues at larger spatial scales. Cultural ecosystem services however, prove to have high impacts on human well-being even in smaller green areas.

Second, loss of ecosystems in cities involve high economic costs and severe impacts on social, cultural, and insurance values associated to ecosystem services. Economic costs from the loss of urban ecosystems derive from the need to restore and maintain public services and supplies through built infrastructure as similar services provided by urban green infrastructure are lost. Further negative impacts derive from the effects in social and cultural values, including sense of place, identity and community, social cohesion, and local ecological knowledge. Loss of green infrastructure can also lead to decreases in insurance values, increasing the vulnerability of cities to shocks such as heat waves, flooding events, storms, landslides, and even food crises. However, urban ecosystems do not only provide ecosystem services but also disservices such as pollen causing allergies and breakup of pavements. Rigorous valuation exercises should not only take into account benefits from ecosystem services, but also costs from ecosystem disservices.

Finally, although evidence of the multiple values and benefits sustained by urban ecosystems is expanding rapidly, it also reveals knowledge asymmetries in our capacity to understand and capture specific types of values. A relative abundance of biophysical and economic studies contrasts with the scarcity of studies addressing including social, cultural, and insurance values. Although increasingly recognized in the ecosystem services literature, these values are rarely addressed at the operational level and little has been said on how the ecosystem services approach may contribute to better incorporate non-economic values in urban planning. Research on urban ecosystem services should broaden its present focus on biophysical and economic measurement so as to better capture and articulate non-economic values in decision making and planning. A further challenge for the research and policy agenda concerns the way different and often irreducible values of urban ecosystem services can be combined and consistently integrated to support decision-making processes at municipality and metropolitan levels.