Avoiding urban social-ecological system traps by accounting for both ecosystem services and disservices

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Abstract

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Ecosystem services are inherently social-ecological with ecosystem-derived benefits accruing to individuals, populations, and institutions. Urban ecological infrastructure has been championed for providing a wide range of important ecosystem services to urban residents with expected positive impacts on resilience of urban systems. Ecosystem disservices, however, have been poorly studied and largely overlooked in urban planning, governance, and management. This oversight is problematic because urban greening initiatives, fast becoming a standard component of urban planning and development, may be inadvertently locking in the accumulation of disservices, leading to social-ecological traps that decrease the adaptive capacity of the system. A social-ecological trap is one where social and ecological feedbacks mutually reinforce each other and maintain or push a social-ecological system towards an undesirable state. Social-ecological traps are difficult to escape. However, they can be avoided. This paper will examine cases from multiple cities to suggest that urban greening initiatives to improve ecosystem services and adaptive capacity must also understand how planning, management, and governance decisions affect the generation of ecosystem disservices. Ecosystem disservices are common and include negative health effects, safety issues, accidents, and infrastructure damage. For example, urban trees generate pollen, which can lead to increased allergy sensitivity and asthma rates among affected urban residents. During rainstorms wetlands, rivers, and streams can flood causing social, ecological, and technological infrastructure damage. Real trade-offs exist between the services and disservices provided by urban ecological infrastructure. Evaluation of trade-offs and synergies of services and disservices is important for planning more resilient urban social-ecological systems. Human actions, such as the establishment of popular tree planting programs, affect feedbacks and drivers in social-ecological systems, which may push systems toward tipping points or lead to regime shifts. Such changes alter ecosystem capacity to generate services on which human wellbeing depends. Further research is needed to better map the landscape of ecosystem services and disservices in cities and urbanized regions in order to provide more comprehensive accounting for services and disservices, to improve decision support tools, and to avoid social-ecological traps.

Keywords: Social, ecological systems, traps, ecosystem services, disservices, adaptive capacity

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