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# ECOSYSTEM SERVICES AND POVERTY ALLEVIATION IN URBANISING CONTEXTS

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## Introduction

The world's urban population is expected to rise from 3.9 to 6.4 billion people between 2014 and 2050, with 90% of this increase in Asia and Africa (UN, 2014). While the impacts of urbanisation on ecosystems and the dependence of urban populations on ecosystem services are acknowledged (Gómez-Baggethun et al., 2013), the complex nature of the interactions involved and the diverse implications for human wellbeing are poorly understood, risking missed opportunities for managing urban ecosystems more sustainably. As direct and visible dependence on ecosystems for livelihoods declines, so urban development policies have tended to neglect ecosystem management, and communication strategies to raise awareness among urban publics become challenging. This dissociation of urban development from ecosystems makes it difficult for urban communities to understand and manage urbanisation sustainably, at the same time as they remain highly dependent on their ecological hinterlands (Seto et al., 2013).

Academic and policy interest in urban ecosystems and ecosystem services has grown rapidly since the late 1990s (Bolund and Hunhammar, 1999; Botkin and Beveridge, 1997). A body of urban ecosystem services literature (see Andersson et al., 2014; Baró et al., 2017; Elmqvist et al., 2013; Gaston et al., 2013; Gómez-Baggethun and Barton, 2013; Haase et al., 2014a,b; Kremer et al., 2016) has emerged amidst rising concerns about the environmental impacts of urbanisation (largely in North America and Europe), as cities appropriated ecosystem services from near and distant ecosystems (Folke et al., 1997; Rees and Wackernagel, 1996). Scholars also recognised that there was an important role for ecosystems within urban areas to contribute to biodiversity and human wellbeing (Bolund and Hunhammar, 1999) and potentially even reduce impacts of urbanisation on distant ecosystems (Gaston et al., 2013).

Nevertheless, urban ecosystem services research remains a relatively new field. A recent review of urban assessments found that most were concerned with Europe, North America and China, and focused on ecosystem services generated in urban areas by forested areas, mixed land use and urban green infrastructure such as parks (Haase et al., 2014b). This is consistent with Bolund and Hunhammar's (1999: 294) definition of urban ecosystems as 'all natural green and blue areas in the city, including in this definition street trees and ponds'. However, following the Millennium Ecosystem Assessment (MA, 2005), a wider range of services has been shown to be provided by urban ecosystems, including 'supporting (e.g. soil formation and nutrient cycling), provisioning (e.g. urban food production), regulating (e.g. local climate and flood regulation) and cultural (e.g. aesthetic, sense of place and health benefits of green space and wildlife' (Davies et al., 2011 as quoted in Gaston et al., 2013).

The focus of urban ecosystem services research has widened to incorporate a multi-scale social–ecological systems approach going beyond 'ecology *in* cities' to examine 'the ecology *of* cities' (Gómez-Baggethun et al., 2013: 177; see also Seitzinger et al., 2012). This brings a greater emphasis onto the close linkages between urbanisation processes and ecosystems which span or interact across the traditional boundaries between urban and rural. This highlights ecosystem services produced across the rural–urban continuum within city-regions – particularly those associated with peri-urban agricultural ecosystems (e.g. Deutsch et al., 2013; Lin et al., 2015) – and the dynamic rural–urban linkages emerging around urbanising places from small towns to megacities and urban corridors (Elmqvist et al., 2013; Gómez-Baggethun and Barton, 2013). The ecosystem services framework can, however, provide a useful common language for co-management of ecosystems across urban areas and their hinterlands (Kremer et al., 2016).

However, there has been little attention in urban ecosystem literature to equity in needs and demands for, and access to, ecosystem service benefits, including those that directly support food and water security (Haase et al., 2014b). In contrast, the literature on ecosystem services and poverty alleviation, which has emerged in parallel to the urban ecosystems literature, focuses attention on the Global South and the role of ecosystem services in poverty alleviation and social justice. However, until recently, this literature has dealt mainly with rural systems and their interaction with a narrow range of poverty indicators such as income and assets (Suich et al., 2015).

Research by the Ecosystem Services for Poverty Alleviation (ESPA) programme has bridged the gap between the northern-focused urban ecosystems literature and its emergent interest in the rural–urban continuum, and the rural-centric ecosystem services and poverty alleviation literatures. In this chapter we review relevant research in urbanising contexts, which is still relatively sparse, arguing that the expanding peri-urban interface is a critical frontier for learning about interconnected ecosystems and livelihood transitions and merits more attention (Marshall, 2016). We examine how an enhanced understanding of peri-urban dynamics, coupled with alliance building and multi-stakeholder dialogue concerning cross-scale implications

of current development interventions, can reveal possibilities for creating synergies across the rural–urban continuum in support of integrated urban environmental, human wellbeing and economic development goals.

## Peri-urban ecosystem transformations

Rural-urban linkages in the Global South are increasingly shaped and transformed by processes of peri-urbanisation (Seto et al., 2013). Global, national, regional and urban political economies drive peri-urban transformations through their influence on patterns of investment, consumption, employment, migration, urban planning priorities and environmental legislation, and implementation of regulations. These transformations are characterised by a range of land use and livelihood changes and socio-economic and institutional dynamics. For these reasons, we define the peri-urban interface not simply by location in relation to urban centres, but in terms of the juxtaposition of rural and urban activities, institutions and/or land uses (Marshall et al., 2009).

Peri-urban places on the margins of large metropolitan areas are often character-ised by a mosaic of land uses, including agriculture, common land and forest, alongside industry, urban infrastructure, informal settlements, exclusive gated communities, urban parks and golf courses (Box 7.1). There are also typically flows of urban waste from the city's core to the peripheries in the form of landfill sites and waste treatment facilities; air pollution, illegal extraction of groundwater by industries and disposal of untreated industrial and domestic waste in open space, under the ground and in rivers or other water bodies (Marshall et al., 2009; STEPS Centre and Sarai, 2010). At the other end of the peri-urban spectrum are rural villages. Here the peri-urban context is a juxtaposition of urban and rural

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### BOX 7.1 PERI-URBAN AGRICULTURE, ECOSYSTEM SERVICES AND HUMAN WELLBEING IN INDIA

Building on a longer programme of transdisciplinary research in peri-urban India (Marshall et al., 1999, 2003, 2005; Singh et al., 2010; te Lintelo et al., 2002), fieldwork activities were conducted in the village of Karhera as part of the 'risks and responses to urban futures' project in 2014–2015. Karhera lies between Delhi and Ghaziabad in the National Capital Region in India, and many of its inhabitants still depend on agriculture for their livelihoods.

Driven by the broader trajectory of urban development, land-use change in Karhera has been substantial and rapid. Nearby areas have become informal industrial clusters, the government has acquired land for infrastructure construction and for setting up a City Forest park, and land has been sold informally to private builders for informal settlements (Bisht et al., 2016).

Economic opportunities for peri-urban residents have changed as local factory work and other jobs have become available, attracting migrants and resulting in an increasingly heterogeneous population.

Upstream industries have depleted and polluted the water flow along the Hindon River, which runs through Karhera, and provided a source of drinking, bathing and irrigation water to the community in the past. Lack of regulation due to the area's ambiguous administrative status as neither rural nor urban has allowed local industries relocated from urban areas to pollute local groundwater and soils. The City Forest park project, initiated by the Ghaziabad City development authority, has enclosed former common land used by local farmers. This has resulted in a sought-after cultural ecosystem service being available to paying urbanites, but has increased pressure on depleted groundwater resources and reduced access to agricultural land and other forest ecosystem services.

Access to expanding urban markets for fresh vegetables (especially spinach) has improved livelihoods for many farmers, who have changed from mixed farming of staple crops and livestock to intensive spinach farming (see STEPS Centre, 2016). This has significantly reduced material poverty for many landed and tenant farming households, providing incomes higher than are available in informal factory work. This comes with trade-offs, however. Industrial air and water pollution contaminate crops, posing food safety threats to both peri-urban and urban consumers. Village *johads* (traditional communal ponds) and innovative waste water reuse practices for irrigation largely disappeared when a new supply of piped water was temporarily supplied, but the new water infrastructure soon became inadequate due to competing demands, lack of maintenance and a growing population. When traditional practices were reinstated, new problems of faecal contamination arose due to inadequate sewage and waste disposal services. The increased intensity and duration of work is physically demanding, and women often bear the heaviest burden as they work in fields while the men sell the produce at markets (Waldman et al., 2017). This exposes them to health risks from the polluted water, as they apply it to their crops, and also poses a threat to food safety for urban consumers. The poorest urban consumers are likely to be most at risk as they are unable to afford expensive certified organic produce or foreign imported foods to replace the nutritional value of locally grown leafy vegetables (Marshall and Randhawa, 2017). Finally, the move away from mixed farming to intensive vegetable production also has implications for the feedbacks to peri-urban ecosystems, as crop yields are supported by higher use of chemical inputs and intensive year-round cultivation, with the likelihood of declining soil fertility and structure. There is little support for small-scale farmers in peri-urban areas, despite the critical role they play in multiple dimensions of food security (Marshall and Randhawa, 2017).

## BOX 7.2  A RURAL-URBAN RECIPROCAL WATER AGREEMENT IN INDIA

*Kovacs et al. (2016) report on a case study of a 'reciprocal water agreement' (RWA) between urban and rural communities in Himachal Pradesh, India.*

An increasingly unreliable water supply due to changing rainfall and snowfall patterns had put pressure on water quality and cost, which prompted the Palampur town Municipal Council (MC) to place greater value on the high quality and more reliable water supply from the neighbouring upstream Bohal spring. The recharge zone for this spring lies within a forest area used by three villages to support their livelihoods. In response to increasing flash floods and declines in firewood availability, these upstream villages had developed informal management arrangements to protect local forest ecosystems in order to preserve the ecosystem services supporting firewood, leaf fodder, flash flood prevention and spring water recharge.

Development of the RWA was facilitated by the German Development Agency, GIZ, and the State Government of Himachal Pradesh in order to create a decentralised formal arrangement for management of water supply to the town. Negotiations between the town and upstream villages led to the creation of a formal rural organisation for forest management (Village Forest Development Society – VFDS). The RWA was set up between the VFDS and the MC, which was required to pay an annual fee to the VFDS for protecting the forest in order to maintain the spring water supply. The MC had the right to monitor this activity and end the RWA if the forest was not properly protected in accordance with the agreed plan.

Despite initial signs of success, the changes in governance have negatively impacted the rural communities' ability to manage access to and use of the forest over the long term. After the facilitators of the RWA stepped back from direct involvement the RWA continued to work well from the perspective of the MC, maintaining the quantity and quality of water supply to the town from the spring. The rural communities upstream, however, faced internal conflicts over differing perceptions of the RWA, competing agendas of different households and villages, increasing pressure from outside commercial actors with their own agenda for hydropower and infrastructure development, and the VFDS became increasingly dysfunctional. In addition, the RWA payments didn't contribute significantly to the livelihoods of the majority of villagers, and the contribution of forest ecosystem services to poverty alleviation was no different than before the formalisation of forest protection measures.

institutions, often created to service the increasing demands of urban consumers. For example, shared ecosystems such as water catchments may provide direct eco-system services to rural communities whose activities also have impacts on the indirect flow of ecosystem services to the town (see Box 7.2). Here, the juxta-position of urban and rural institutions and activities is seen in the extension of municipal governance arrangements into ecological hinterlands, in attempts to manage the trade-offs and synergies between rural livelihoods and urban demand for ecosystem services, such as water security.

## Institutional challenges for managing peri-urban ecosystems

Institutionally and legally, the peri-urban interface is often governed by complex administrative arrangements and may fall outside the purview of both rural and urban governments (Marshall et al., 2009). Often emergent formal urban-style governance structures co-exist alongside partially dismantled yet persistent formal and informal rural arrangements, coupled with institutional ambiguity concerning which agencies are responsible for regulation of pollution, provision of public services and infrastructure and the management of agricultural support programmes. Bureaucratic oversight of the peri-urban area can be non-existent for activities that do not fall into strictly urban or rural activities and jurisdictions. Simultaneously, however, it can result in legal pluralism as both urban and rural laws and institutions are applied *ad hoc* (Dupont, 2007; Narain and Nischal, 2007). These complex and overlapping jurisdictional arrangements can lead to 'organised irresponsibility', where environmental regulations are lax and can be readily flouted. This is compounded by the fact that traditional environmental management structures tend to decline in the transition from 'rural' to 'urban' status. New formal urban institutions are slow to evolve, often siloed, and involve a shift in decision making to distant authorities. This often leaves an institutional vacuum and neglect of ecosystem service-based livelihoods. At the same time, the growth of new informal, market-based arrangements lacks the structures for ecosystem management (Moench and Gyawali, 2008), and has little or no incentive to consider ecosystem services for the poor.

Another set of challenges emerges from the fact that, in comparison with many traditional rural settings, peri-urban ecosystems are disconnected from people who receive ecosystem service benefits. When there is also less interdependence between community members who are accessing and utilising them, many of the established mechanisms for community-based management are ineffective (Moench and Gyawali, 2008). As new diversified livelihood and market opportunities open, it is no longer a requirement to contribute to ecosystem management to benefit from these. The traditional direct links to ecosystems will remain for some, but additional demands on ecosystems emerge from local and non-local users to meet formal and informal market demands.

## Peri-urban ecosystem services and poverty linkages

Peri-urban ecosystems and the services they provide support peri-urban livelihoods, and can contribute to urban food and water security, air and water purification, flood control, urban heat island reduction and cultural and religious practices (Dubbeling, 2013; Marshall et al., 2009, 2017; Moench and Gyawali, 2008). The multiple and changing pressures on peri-urban ecosystems are reflected in shifting relationships between ecosystem services and poverty, with new issues emerging which are neither urban nor rural. In urbanising contexts, the pressures on eco-systems will change along with the nature of the ecosystem services. While direct access to provisioning ecosystem services (arguably a core focus in rural contexts) remains important, the pressures on peri-urban ecosystems that affect regulating services (such as water purification or flood control) are of growing concern, because of increasing and widespread implications for human health (through, for example, poor air and water quality and food safety).

Urban development and redevelopment bring new pressures on ecosystems, and peri-urban communities themselves are also transformed through migration, land-use change and changing employment opportunities. A complex set of new opportunities and exclusions emerge which drive changes in ecosystem services-based livelihoods and have implications for the degradation and maintenance of peri-urban ecosystems. As highlighted by Adger and Fortnam (this volume), migration and urban expansion is a critical area for ecosystem services research.

The case study of Karhera (Box 7.1) illustrates some of the complex flows of benefits, risks and feedbacks which link ecosystem services and multiple aspects of human wellbeing in a rapidly urbanising peri-urban context. For those peri-urban residents who depend directly on ecosystem services for their livelihoods, the rela-tionships with poverty alleviation can also be quite distinct from rural contexts. Peri-urban ecosystems may not only act as a safety net for the poorest, but also provide potential pathways out of poverty. An increasing proportion of households operate with livelihood strategies that depend on a mixed economy between the urban and rural, and often formal and informal sectors (Moench and Gyawali, 2008). Within the livelihood mix of a peri-urban community (or even a single household), agriculture and temporary urban employment may both be important. But as the Karhera example demonstrates, direct dependence on peri-urban ecosystem services can provide pathways out of poverty for some. In rapidly urbanising peri-urban contexts, the potential contribution of agriculture to peri-urban livelihoods often increases significantly as farmers adjust and intensify agricultural practices, respond-ing to growing urban markets for fresh perishable produce. This increases the potential contribution of agriculture to peri-urban livelihoods and opens a path-way out of material poverty for many who would otherwise find themselves trapped in low-wage factory work under poor conditions. There are many potential direct interventions that could help to maintain peri-urban ecosystem services, such as promotion of decentralised technologies; revival of communal water resources; and increased rainwater harvesting and support for safe and appropriate

waste water re-use (Amerasinghe et al., 2013; Nanninga et al., 2012). However, rapid depletion and degradation of peri–urban ecosystems by mainstream development interventions, ambiguous governance arrangements and the limited power and agency of local communities to manage their local ecosystems, has resulted in trade-offs between reducing material poverty and other aspects of wellbeing, with longer-term adverse implications for middle-class and wealthy urban residents too.

The Karhera case exemplifies the rather chaotic evolution and neglect of ecosystem service and poverty interactions in many rapidly urbanising contexts. By way of contrast, our second example (Box 7.2) illustrates that unintended consequences can result from deliberate interventions made by municipal authorities who recognise the dependence on distant ecosystems to meet increasing urban demand for resources. Here a municipal corporation has recognised the need for enhanced ecosystem management to secure urban water supplies, and has attempted to bring together environmental concerns and livelihoods of forest communities. In this case, formalising a reciprocal arrangement to manage this rural–urban linkage did not simplify the complex local negotiations. Nor did it protect rural communities from outside pressures. Instead it gave rise to 'multifaceted difficulties for the upstream hamlets, which has impeded the functionality of their forest management committee' (Kovacs et al., 2016: 1). This highlights the importance of understanding local politics and their histories, and in particular recognising and being adaptive to changes in local governance arrangements that result from interactions with urban institutions.

## Enhancing pro-poor peri-urban ecosystem management and building synergies across the rural–urban continuum

Our case studies demonstrate the need to better understand the processes through which policy and institutional challenges, and political dynamics across scales, interact to influence environmental management in transitional places, and create barriers and opportunities for creating synergies with poverty alleviation goals. They also illustrate the need to work with local and state governments to explore possibilities for integrated urban planning that extend beyond city limits. This type of re-visioning of city regions to incorporate environment, health and development perspectives also raises more fundamental issues about consumption patterns, carrying capacity of cities and the extent to which urban development should impose on rural ecosystems.

To be effective, environmental management and resource-sharing initiatives across the rural–urban continuum must include sustained engagement with communities, with local contexts and with local social, cultural, economic and political drivers and dynamics. Complex interactions between environment, poverty and health will rapidly evolve in these uncharted development trajectories, and interventions based on singular prescriptive solutions are rarely effective (Marshall et al., 2015; Randhawa and Marshall, 2014).

In settings with such complex social structure and conflicts of interest, differential impacts across social segments are bound to occur, most often to the disadvantage of the more marginalised and powerless. Increasingly heterogeneous peri-urban communities and a lack of social cohesion can add to the challenges of addressing these exclusionary processes, through difficulties in mobilising people in response to environmental and poverty issues (Waldman et al., 2017). In addition, where local citizen activism is present, initiatives with a focus on environmental, health and livelihood issues of the poor tend to be isolated from each other. Recent research (Priya et al., 2017) has explored possibilities for building alliances to enhance the agency of the peri-urban poor, and revealed the emergence of a distinctive peri-urban civil society activism in Delhi. This is distinct from the 'environmentalism of the poor' practiced by rural and forest dwelling groups; from the dominant elite urban 'green development' practices and discourses of 'bourgeois environmentalism'; as well as from the urban politics of the poor' (Priya et al., 2017). It thus reflects the possibility of creating bridges across sectional interests – rural and urban, red and green ideological streams – and across classes.

## A framework for analysing ecosystem service and poverty alleviation interactions in urbanising contexts

Critical to developing policy and planning, which can realise synergies between peri-urban ecosystem management and other urban development goals, will be a re-conceptualisation 'of cities and their hinterlands as interconnected ecosystem service landscapes' (Kremer et al., 2016). As discussed above, urban contexts have some distinctive features which must be central to this re-conceptualisation.

Our framework places poor and marginalised communities, whose livelihoods are directly dependent on ecosystem services, at the centre of our analysis. This approach provides a means of analysing social differentiation in the contribution of ecosystem services to wellbeing within communities and across scales (see Fisher et al., 2014). However, we propose three additional lines of enquiry.

First, an explicit focus on how the transition of governance systems and institutional structures mediate ecosystem services interactions for the poor. This includes attention to the impact of the wider *political economy* and of *peri-urban transformations* (including changing governance arrangements, increasingly heterogeneous populations, the juxtaposition of informal and formal institutions) on how ecosystem services are both accessed and utilised by diverse urban and peri-urban stakeholders.

Second, a focus on how ecosystem services can impact the health and wellbeing of diverse urban and peri-urban communities in both positive and negative ways. For example, our Karhera case study clearly illustrates how in polluted peri-urban ecosystems there may be benefits to material aspects of wellbeing through food provisioning, but adverse impacts on health (Waldman et al., 2017).

Last, we draw on insights from Dorward's (2014) analysis, which highlights the dynamic nature of ecosystems services, linked to changing livelihoods within broader
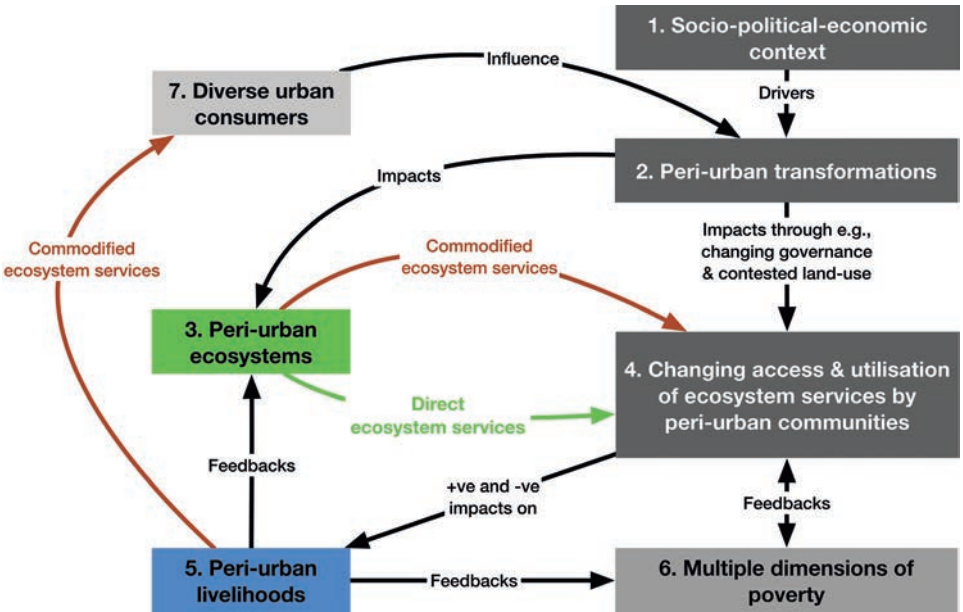
**FIGURE 7.1** Ecosystem services–poverty alleviation interactions in urbanising contexts.

structures which themselves are also changing – and illustrated in our case studies by changing threats and opportunities and livelihoods in flux, with multiple feedback implications for peri-urban ecosystems.

Figure 7.1 draws on the empirical work and related literatures discussed above, to highlight key features of ecosystem services and poverty alleviation interactions in urban development and redevelopment. It represents the changing access to and utilisation of ecosystem services by poor and marginalised peri-urban communities (4) and the multiple ways that this impacts on livelihoods (5), and relates to the health and wellbeing of peri-urban and urban residents and to environmental integrity across temporal and spatial scales. The green arrows indicate direct flows of ecosystem services where communities are 'dwelling in' or in close contact with the ecosystems providing the services. The red arrow indicates the indirect flow of services which are provided as commodities and/or transported to consumers (7) distanced from the ecosystem (e.g. food and water) or experienced through travel as destinations rather than a dwelling place (e.g. cultural). This distinction is adapted to the peri-urban context from Cumming et al.'s (2014) notion of red-loop/green-loop dynamics in agricultural transitions and urbanisation.

The diagram highlights the impact of peri-urban transformations (2) – driven by the broader socio-political-economic context of urban development (1) – on how peri-urban communities access and utilise ecosystem services (4). These impacts include, for example, changing governance arrangements and contested land use in

peri-urban areas which influence the access of peri-urban communities to ecosystem services and the ways in which these can support livelihood strategies (5). In many cases peri-urban transformations (2) also directly impact peri-urban ecosystems (3), as infrastructure developments and urban pollution degrade ecosystems and urban greening projects transform forest, scrub, wetland and agro-ecosystems for cultural uses. All these impacts have implications for multiple dimensions of poverty (6) through the contribution of ecosystem services to changing patterns of peri-urban livelihoods (5), which in turn produce feedbacks to peri-urban ecosystems (3) as, for example, agricultural practices change or households become more or less dependent upon gathering firewood from forests. Outcomes for diverse urban consumers (7), particularly the urban poor who are often unable to substitute local provisioning services for more expensive imported commodities, are also linked to the impacts of transformations on peri-urban ecosystems and livelihoods through their role in providing commodified ecosystem services such as food, water and cultural services.

## Conclusions

Processes of urbanisation are implicated in worsening environmental degradation and poverty, while at the same time cities often drive growth and innovation. Essential connections between people and the environment are often obscured in the drive for economic growth, infrastructural development and mainstream initiatives for clean and green urban centres. As in rural contexts, urban and peri-urban ecosystem services have critical roles to play in underpinning sustainable development, and will be key to building 'resilient' towns and cities. However, the commodification of ecosystem services as they move across the rural–urban continuum detracts the attention of urban residents from the multiple roles of peri-urban ecosystem services, including disaster risk management; reduction of heat island effects; air and water purification; and food and water security. As a result, the degradation of urban and peri-urban ecosystems and intense competition for land use has multiple negative impacts across temporal and spatial scales and social groups.

Neoliberal reordering of urbanising places, rising land prices, complex local governance arrangements, jurisdictional ambiguity and poor environmental regulation are among the many challenges for improved environmental manage-ment. Traditional environmental management structures, in the transition from 'rural' to 'urban' status, often leave an institutional vacuum and neglect for eco-system services-based livelihoods, and the growth of informal market-based arrangements lacks structures for ecosystem services management.

Increasingly heterogeneous communities, which can lack social cohesion, and a disconnection between peri-urban ecosystems and their multiple beneficiaries, present difficulties for establishing effective management/adaptive co-management approaches. In addition, local citizen activism on environmental, food security and health issues of the poor tend to be isolated from each other, although emergent

forms of peri–urban activism may be important for creating new alliances across interest groups, sectors and scales.

Dynamic urbanising contexts highlight the need to shift from singular techno-cratic approaches to service provision and 'clean up and control' approaches for urban environmental management, promoting instead flexible, creative approaches, engaging with communities on the ground and seeking ways of incorporating subaltern experiential knowledge into adaptive management processes. Both our case studies highlight the need to recognise and address the distinctive institutional challenges of environmental management in peri–urban contexts, understanding local politics and context-specific governance mechanisms that are appropriate for facilitating negotiations between ecosystem services and poverty alleviation trade-offs among multiple groups across the rural–urban continuum.

Ecosystem service and poverty interactions present distinctive challenges and opportunities in peri–urban contexts. For example, contrary to claims that ecosystem services function mainly as a safety net to prevent increasing poverty, we find that in some peri–urban settings they offer potential pathways out of poverty. Peri–urban agri-ecosystem services can support significant increases in income as a main or supplementary source of peri–urban livelihoods, but there are trade-offs in terms of adverse effects on health. Tackling environment, poverty and health issues together, through unpacking their links to peri–urban ecosystem services, offers the opportunity to both reduce peri–urban poverty and enhance the health and wellbeing of peri–urban and urban residents by, for example, supporting innovative ways to overcome these trade-offs.

Research to date suggests that there are some immediate opportunities to reduce trade-offs while maintaining or even improving peri–urban ecosystems, and building synergies across the rural-urban continuum (Bhatt et al., 2016; Marshall et al., 2017). For example, in the case of peri–urban farming – to consider the preservation of land most suitable for agriculture for production of crops for local markets that will be affordable for the urban poor; to recognise the adverse impacts of polluting and extracting industries on agriculture; to support the development of decentralised technologies to improve the efficiency of water resource use, its quality and access by the poor; and linking urban waste recycling to food production.

Major progress beyond this is likely to require greater formal recognition of the value of peri–urban ecosystem services, looking beyond cultural services and cosmetic improvements. Here more work is required to reframe debates, demonstrating the implications of poor ecosystem management and the potential benefits of alternative strategies across all social groups. Current local, national and international interest in 'sustainable' urbanisation, 'city regions' and urban resilience (Ernstson et al., 2010; Jennings et al., 2015; Meerow et al., 2016; Seeliger and Turok, 2013) provides opportunities to integrate such insights into current initiatives and create dialogue to reframe wider debates. A key advantage of work-ing in transitional peri–urban contexts is that they enable rapid learning, evaluation and potential scaling-up of successful initiatives.

## Acknowledgement

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