Making the most of peri-urban ecosystem services

Ecosystem services are vital for peri-urban and urbanising areas, and the people who live within them. In contexts of rapid urbanisation, these services are under threat from redevelopment, pollution and overconsumption, and there are gaps in the policies and structures that should protect them. Despite these challenges, there are opportunities for local authorities and citizens to work together and join up policy with action on the ground.

Key messages

- Peri-urban ecosystems can provide vital support for functions such as disaster risk management, flood control, reduction of urban heat island effects, air and water purification, food and water security, and waste management.

- Supporting them is essential in order to meet national government policies and commitments on multiple issues linked to environment, health and poverty reduction, the Sustainable Development Goals and the resilient cities agenda.

- There are important governance challenges involved in safeguarding and harnessing peri-urban ecosystem services. These include rapid change, ambiguity over boundaries, and gaps in policies and regulations.

- Involving communities in appraisal and decision-making is crucial to the success of initiatives to protect peri-urban ecosystem services. Taking account of local cultures and histories is important. In many cases, the process will also provide crucial missing data and insights, build trust and avoid misunderstandings.

- There is a need to share good practice, cases and opportunities between municipalities; and to provide opportunities for decision-makers at national level to learn from them.

Introduction

This briefing summarises evidence on how to harness peri-urban[1] ecosystem services to create more resilient and sustainable cities in ways that are pro-poor and inclusive.

Ecosystem services have a vital role to play in plans and policies to address poverty and vulnerability, support local economies, protect against shocks and stresses, promote food security and safeguard health and wellbeing. Despite policy challenges and rapid, complex change, there are opportunities for local authorities and citizens to work together more to spread good practice and join up policy with ground-level action.

Peri-urban change and ecosystems

Ecosystems and the services they provide are vital for peri-urban and urbanising areas, and the people who live in them. Healthy soils, animal and plant life are crucial for land uses and practices that contribute to urban food and water security, air and water purification, and even flood control.

Ecosystem services are also central to many people's cultural and religious practices. They can support livelihoods through activities such as farming, which is an important part of peri-urban economies and a vital source of jobs and income for many, including for poor, vulnerable and disadvantaged people.[2]

Box 1: Peri-urban agriculture and ecosystem services

Ecosystem services are crucial for urban economies in a number of important ways. Peri-urban agriculture is both strongly dependent on them, and can help to safeguard and manage them productively.

Local food: Peri-urban farming is an important source of affordable, local fresh produce for urban populations, saving the costs and pollution of transporting food.

Environmental management: Depending on how it is practised, peri-urban agriculture can also contribute to other environmental services such as nutrient cycling, air and water purification and flood control.[3-8] It can even help to recycle urban waste, with appropriate support.

Livelihoods: Peri-urban agriculture supplies long-term livelihoods and casual labour for many, including poor and vulnerable groups (see Box 3).

Flood mitigation: Some farming methods can help to create more resilient landscapes alongside rivers, which can take in water and reduce the risk of flooding (see Box 4).

Heat islands: Temperatures are often higher in and around urban areas. Crops, including trees, and agricultural land can have a cooling effect by providing shade, and through water evaporation from soil or transpiration from plants in agriculture.[7]

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As jobs and livelihoods change, peri-urban citizens feel more and more disconnected from ecosystems, even though they may depend on the services they provide.

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Women from the Ratu River community share their experiences of flash floods

Photo credit: Jitendra Raj Bajracharya/ International Centre for Integrated Mountain Development (ICIMOD)

In contexts of rapid urbanisation, however, these ecosystem services are under threat from redevelopment, pollution and overconsumption by industry. There are important gaps in the policies and structures that should protect them.

Where cities are expanding their reach into rural areas, and people and materials flow more intensively between rural and urban spaces, it is often unclear who is responsible for environmental regulation, or which rules apply. As jobs and livelihoods change, peri-urban citizens feel more and more disconnected from ecosystems, even though they may depend on the services they provide.

Listening to and involving communities

There is a growing awareness of ecosystem degradation and its causes among local communities, but they often do not feel empowered to address it. Our research has found that local civil society activism on the issues, though sometimes weak, limited or fragmented, is present in various forms.[9] There are good reasons for including civil society in research, assessments, policy-making and implementation.

- To make urban policy and action pro-poor and ecosystem-friendly, civil society can provide ideas and insights to urban planning that have been ignored or neglected. Long-term engagement by research embedded in these communities can help.

- Local civil society and advocacy in peri-urban settings can provide deeper and more detailed insights into the diversity of views, needs and opportunities, than purely urban viewpoints. Listening and responding to them is an important task of state agencies and planners.

Box 2: Relevant policies and policy challenges

A number of policies, from global to local level, are designed to support more sustainable urbanisation. These include the **Sustainable Development Goals (SDGs)**, which call for cities to be made 'inclusive, safe, resilient and sustainable' (SDG11).

Target 2 of India's **National Biodiversity Action Plan**[10] calls for biodiversity to be valued and integrated into national and state planning processes, development programmes and poverty alleviation strategies. Target 3, on 'reducing the rate of degradation, fragmentation and loss of all natural habitats', includes an indicator on water quality which recognises the need to address agricultural run-off, toxic wastes and industrial effluents that affect water quality – all important for peri-urban ecosystems. The Ministry of Urban Development's **Urban and Regional Development Plan Formulation and Implementation Guidelines (URDPFI)** stresses the need to protect land which provides ecosystem services, protect land for agriculture and use the available land 'in the best interest of the community'.[11] The **Smart Cities Mission**[12] has 'preserving and developing open spaces' to 'promote eco-balance' as the fourth of its eight 'Smart City Features'.

However, there are policy challenges for supporting ecosystem services on the ground, especially where the boundaries between urban and rural are blurred. Urban governance structures clash with partially dismantled, yet persistent, formal and informal rural arrangements.[13] Development in peri-urban areas is governed by multiple agencies including *Panchayat* (Village Council), Municipality, Town and Country Planning and other development authorities.

These areas generally lie beyond or between the legal and administrative boundaries of cities, so government authorities have less capacity to regulate economic activities. It can be unclear which agencies are responsible for regulation of pollution, providing public services and infrastructure, and agricultural support programmes.

Change can be rapid and unpredictable, leaving policy behind. This can leave the way open to companies and individuals to flout environmental laws and regulations. It cannot be assumed that protection can be achieved only with the right policies and plans in place.

As single, technical solutions are rarely effective, citizens and local authorities need to work together to monitor and respond to change – requiring flexible and inclusive modes of engagement. Those responsible for designing and implementing policy should especially consider the impacts of new interventions on vulnerable and disadvantaged people.

• Working with and listening to local communities and civil society is also crucial in gaining public acceptance for policies designed to protect and enhance ecosystems. It is important to understand local cultures, behaviours and histories that may affect the success of plans (see Box 5).

• Participatory research with urban communities can reveal neglected links between environment, poverty and health – which may have implications for local action as well as wider relevance.

• Flexible, resilient responses to urban change need citizens who are involved as active participants in monitoring and action.

> **Working with and listening to local communities and civil society is crucial in gaining public acceptance for policies designed to protect and enhance ecosystems.**

Box 3: Farming in the midst of change in Karhera

The village of Karhera lies between Delhi and Ghaziabad in the National Capital Region of India. Many of its inhabitants still depend on agriculture for their livelihoods. Building on a long history of research in the area, researchers from the Ecosystem Services for Poverty Alleviation (ESPA) funded *Risks and responses to urban futures* project conducted fieldwork in 2014-2015.

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.[14] Economic prospects for peri-urban residents have changed as local factory work and other jobs have become available, attracting migrants and resulting in an increasingly varied population.

Upstream industries have depleted and polluted the Hindon river that runs through Karhera, which in the past was a major source of water for drinking, bathing and irrigation. 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 experience to paying urbanites, but puts pressure on groundwater and access to agricultural land and forest ecosystem services for locals.

Access to expanding urban markets for fresh vegetables (especially spinach) has made agriculture more profitable for many farmers, who have changed from mixed farming of staple crops and livestock to intensive spinach farming.[15] This has significantly reduced material poverty for many landed and tenant farming households, providing higher incomes 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*[16] and the re-use of waste water for irrigation largely disappeared when a new supply of piped water was temporarily supplied, but 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.[17] This exposes them to health risks from the polluted water as they apply it to their crops; it also threatens food safety for urban consumers. The poorest urban consumers are likely to be most at risk from this as they are unable to afford organic or imported vegetables.[18] Finally, the move away from mixed farming to intensive vegetable production also has implications for the feedbacks to peri-urban ecosystems, as farmers use more chemical inputs and intensive year-round cultivation to get higher crop yields, 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.

For more information see steps-centre.org/project/urban-futures

Activities at ICIMOD's Knowledge Park in Godavari, Nepal to mark World Environment Day 2017
Photo credit: Jitendra Raj Bajracharya/ICIMOD

Box 4: Enhancing climate resilience in Gorakhpur

One of the 'learning lab' projects of the Asian Cities Climate Change Resilience Network (ACCCRN) in the city of Gorakhpur, India, was implemented by the Gorakhpur Environmental Action Group (GEAG) in less developed parts of the city.[19] The project supported peri-urban agriculture as a flood buffer, an important measure given changing rainfall patterns and rising flood-risk potential resulting from climate change and urban development.

Four types of intervention were carried out:

1. Farm models with low external input and sustainable agriculture (LEISA) and climate-resilient practices.
2. Local institutions that were formed, such as farmer clubs, farmer field schools, and *laghu seemant krishak morcha* (LSKMs) (farmers' unions that are part of a national LSKM network).
3. The weather and agro-services provided by SMS messaging.
4. Established linkages with government line departments and GEAG.

The average agricultural income of model farmers has more than doubled due to reduced input costs, crop diversification, crop intensification, expansion of agricultural land under cultivation, and reduced crop loss due to natural hazards such as floods.

Given the limited size of the study, more research is needed to establish the full impacts that such practices could have on overall flood mitigation in Gorakhpur. However, the pilot suggests some tangible ways that action to protect ecosystems, with coordination and information-sharing between farmers, experts and policy-makers, can have positive impacts for agriculturalists and the communities they support.

For more information, see: http://e-lib.iclei.org/wp-content/uploads/2017/03/enhancing-climate-resilience-of-Gorakhpur-by-buffering-floods-through-peri-urban-agriculture.pdf

Box 5: Reciprocal water access in the Himalayas

The ESPA-funded project *Political economy of water security, ecosystem services and livelihoods in the Western Himalayas* conducted a case study of a reciprocal water access (RWA) agreement between urban and rural communities in Himachal Pradesh, India.[20]

Changing rainfall and snowfall patterns had made water supplies increasingly unreliable, putting pressure on water quality and cost. In response, the town Municipal Council (MC) decided to draw more on the high-quality and more reliable spring water supply from the neighbouring upstream Bohal Spring. The recharge zone for this spring fell within a forest area used by three villages to support their livelihoods.

These upstream villages depended on the forest for firewood and leaf fodder and also recognised its role in reducing flash flooding, which severely damaged their crops. They had responded to increasing flash floods and declining firewood by developing informal management arrangements to protect local forest ecosystems.

Development of the RWA agreement was facilitated by the German Development Agency GIZ and the state Government of Himachal Pradesh in order to create a decentralised formal Payment for Ecosystem Services-like arrangement for management of water supply to the town. Negotiations between the town and upstream villages led to creation of a formal rural organisation for forest management (Village Forest Development Society – VFDS).

The agreement required the MC 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 agreement if the forest was not properly protected in accordance with the agreed plan.

Initially the project showed signs of success, but in the longer term the changes in governance made the rural communities less able to use the forest ecosystem services. After the facilitators stepped back, the agreement continued to work well for the town, which continued to receive reliable, clean water. The rural communities upstream, however, faced conflicts in their different views about the RWA, competing agendas of different households and villages, and increasing pressure from outside commercial actors with their own agenda for hydropower and infrastructure development. The VFDS became increasingly dysfunctional. In addition, the RWA payments did not contribute significantly to the livelihoods of the majority of villagers, and the contribution of forest ecosystem services to poverty alleviation was no different to what it was before the forest protection measures were formalised.

International Conference on Resilient Hindu Kush Himalaya, developing solutions towards a sustainable future for Asia
Photo credit: Jitendra Raj Bajracharya/ICIMOD

Box 6: Future-proofing Madurai

Madurai, the second-largest city in Tamil Nadu, faces a range of climate-related hazards, particularly flooding from the nearby Vaigai river. Storm drains are blocked, and informal settlements are encroaching onto water bodies; slum communities are also worst hit by flooding.

The *Future Proofing Cities* project was delivered in Madurai by the Development of Humane Action (DHAN) Foundation, working with the Madurai City Corporation.[21] This involved drawing up the Madurai Action Plan for 'blue-green infrastructure' – the combination of water systems and land-based natural habitats and ecosystems. The Action Plan was based on an integrated assessment framework linking climate risks, resource and ecosystem risks, and carbon/energy. The Action Plan aimed to identify priority issues, actions to strengthen blue-green infrastructure, and secure funding.

The process for developing the Action Plan, over a period of 18 months, harnessed DHAN's experience with working at grassroots level. It also involved engagement with the municipal corporation, the municipality and the city council, district and state government, academia, the private sector and communities.

Fourteen projects were identified, many of which had the potential to cut carbon as well as address climate risks – for example, improving sewers to allow effluent to be conveyed by gravity, and fixing leaks in water pipes, which both reduced the need for energy-consuming pumping. A lack of urban green space would be addressed by creating green spaces near the river, which could also temporarily absorb flood waters when needed.

Lessons from the process included:

- The usefulness of participatory cross-sectoral forms of decision-making, instead of top-down, expert-driven processes. This helped to build a shared vision and elicit new ideas. An example is 'water walks' (*Nathivalam*) by the river involving different stakeholders.

- Comprehensive, broad consultations helped to break through silos and broaden out the diagnosis of the problems facing the city, and address gaps in existing data and information.

- Social capital was an important outcome: a 'Zonal Council' was formed with a mandate to restore the rivers, and the water walks continue to be held every two weeks. These harness local knowledge and build trust between the city authorities and communities. Events such as the Vaigai River Pageant have also raised the cultural profile of the river.

For more details, see the Climate and Development Knowledge Network (CDKN) case story https://cdkn.org/resource/inside-story-future-proofing-madurai/

Drinking water being delivered to Karhera, where local ponds have been filled for road building

Photo credit: Risks and Responses to Urban Futures project/ STEPS Centre

Drainage channels in Karhera

Photo credit: Risks and Responses to Urban Futures project/ STEPS Centre

Endnotes

1. In this briefing, 'peri-urban' refers not just to physical locations, but to settings or systems where there is a juxtaposition of rural and urban activities, institutions or land-uses, often with flows and interactions between them. See Marshall, F., Waldman, L., MacGregor, H., Mehta, L. and Randhawa, P. (2009) *On the edge of sustainability: perspective on peri-urban dynamics*. STEPS Working Paper 35. Brighton: STEPS Centre.

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About the ESPA Programme

ESPA is a global development research programme established in 2009 with funding from the Department for International Development (DFID), the Natural Environment Research Council (NERC) and the Economic and Social Research Council (ESRC). ESPA is one of the most comprehensive research programmes exploring the linkages between ecosystem services and human wellbeing. ESPA aims to provide new worldclass research evidence demonstrating how ecosystem services can reduce poverty and enhance wellbeing for the world's poor.

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Endnotes continued

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