

Issue Brief -2

Key points

- ◆ Peri urban ecosystems are increasingly at risk of degradation and loss as natural resource consumption and waste in peri urban areas increase due to rapid urbanisation and increasing human activities.
- ◆ Loss of peri urban ecosystems and the associated negative outcomes for the poor are exacerbated by political processes that haphazardly regulate land use and land markets not reflecting ecosystem services values.
- ◆ Cities do not operate in isolation but within a 'sphere of dependence' on surrounding areas and their ecosystems. Thus, the degradation of these ecosystems results in loss of ecosystem services that support urban and peri urban populations.

Peri-Urban Ecosystems

Rapid degradation of peri-urban ecosystems lead to declining ecosystem services. Water and food provisioning, storm and wastewater regulation and protection from natural disasters and soil erosion are impaired, affecting the poor and the vulnerable. A major reason for this deterioration is the lack of political will to regulate and implement land-use policies as well as limited alternatives for livelihoods, housing or basic services. Often the loss of the ecosystem is irreversible. Replacement of the associated services, where possible, are prohibitively expensive.

Introduction

India's rapid urbanization process accompanied by significant structural changes in the economy and an agrarian crisis typified by falling agricultural growth rates and share of agriculture in the GDP, as well as a de-peasantisation and increasing feminisation of agriculture, has enhanced urban expansion in the latest decade. Not adhering to certain basic principles of an ecosystem approach to development, including in the understanding of the 'urban, the peri-urban and the rural' can be detrimental for both populations and the eco-system itself. This includes an understanding of the very notion of an eco-system and how urban transformations, unless carefully planned and implemented, can impact such ecosystems adversely. For instance, the process of urban sprawl in the core and at the peri-urban

interface, conserved areas such as greenbelts, open spaces and floodplains are threatened and rendered fragile, all the more so in a situation of climate change.

Conversely then, it is critical to maintain these spaces and in general the ecosystem as such, to build human resilience to climate change. Overall, such urbanisation processes transforms, sometimes unalterably, agrarian eco-systems, threatening the very existence of the urban space by lowering its resilience to natural and human made disasters. Understanding the role of ecosystem services, the hierarchy of ecosystems and how they relate to the lives and livelihoods of small-marginal-landless and women farmers is crucial to such analyses. Critically, such services help small and women farmers build resilience to climate change and their decline



Gorakhpur city

In the Gorakhpur, the major driver of change has been changing land-use patterns. As the city expands, a speculative land market has emerged and agricultural land is being lost to housing. The shrinkage in agricultural production impacts the redundancy of food production that plays a critical role in augmenting Gorakhpur's food supplies. Water bodies are being increasingly encroached on or polluted, impacting on the lives and livelihoods of many. Provisioning services are critically affected as the poor become more dependent on non-cultivated foods obtained from the commons and domestic animal stocks are declining. Water pollution and soil contamination are increasing as Gorakhpur's solid wastes and sewage are dumped in the peri-urban areas while infrastructure measures to reduce urban flooding are creating water-logging. Taken together, all these factors impact on the well-being of the people. Major efforts by policy makers, administrators and residents are required to tackle the crisis. This requires an explicit recognition that an ecosystems approach and realising the importance of ecosystem services is needed if both urban and peri-urban areas are to be developed sustainably and inclusively. Current practices pose a tremendous threat to both the ecosystem and vulnerable populations and are exacerbated by climate change (Mitra et al 2015).

accentuates not only the people's vulnerability but also of the city itself. The problem begins with the prevalent conceptualisations of human habitats into dichotomous categories of rural and urban that do not recognise the 'peri-urban' beyond its spatial connotations, leave alone considering them as eco-systems.

Land-tenures in peri-urban areas are uncertain. The infrastructure is poor, incomes low and there is no formal recognition of these areas (Prakash, 2012). Typified by mixed agricultural and non-agricultural land uses and flows of goods, services and resources between villages and urban centres and a perpetually changing heterogeneous social population that lead to specific environmental and natural resource problems beyond the scope of urban or rural governments individually, peri-urban areas need innovative approaches (Prakash, 2012, Narain, 2010; Allen, 2003). The people and the landscape interact dynamically with the associated land uses and livelihoods based on flows of agricultural goods and ecological services both within peri-urban zones and between them and urban core areas (Prakash, 2012; Lerner and Eakin, 2011). The 'rural is not only defined relative to its urban counterpart, but also relative to the specific political-economic, ecological and social-cultural context in which such spaces emerge,' (Prakash, 2012:2).

Thus the peri-urban forms a rapidly changing, semi-natural ecosystem which provides natural resources for growing cities while depending on the urban markets for sales and employment. This two-way interaction changes even the lifestyles and mentalities of peri-urban inhabitants. The 'extractive' nature of urbanisation places a low premium on preserving the ecosystem, affecting not only the livelihoods of those directly dependent on it but also the city itself. Peri-urbanisation leads to usurpation of ecologically sensitive lands for housing and other construction activities. These change the face of agriculture, reduce open spaces and enhance pressure on natural resources like water. These areas are marked by a lack of hygiene and sanitation infrastructure, industrial effluence, air pollution and inadequate provision of basic services. Often, the solid waste of a city is dumped in peri-urban areas (Marshall et al., 2009:7).

Changing peri-urban boundaries due to rapid urban growth leads to multiple transformations physical, morphological, socio-demographic, cultural, economic and functional in the city periphery (Dupont, 2004; Brook and Davila, 2000). The high spatial uncertainty necessitates the protection of land-use patterns and reclamation of common property resources for other purposes (Narain, 2009; Narain and Nischal, 2007). These transformations sometimes irreversibly change ecosystems and the services they provide. Environmental management of peri-urban areas is critical to the sustainability of urban and rural development as the ecological, economic and social functions performed by and in them impact on both the city and the countryside (Dutta, 2012: 4; Narain, 2009; Allen, 2003). Contemporary land acquisition policies in developing cities disregard social equity and environmental integrity, undermining a city's capacity to adapt to climate change and rendering the peri-urban areas and poorer populations very vulnerable. Environmental degradation, natural resource conflicts, health concerns and social injustice are particularly acute in the peri-urban areas that are excluded in formal planning processes (Prakash, 2012; Marshall et al., 2009). The lack of basic knowledge and timely information of the urbanisation process and its long-term ecological impacts constrains development planning authorities in analysing, managing and restoring peri-urban ecosystems (Dutta, 2012; Narain, 2007). Left unaddressed, the process leads to rural-urban synergies breaking down, environmental degradation and rising urban inequities and poverty (Prakash, 2012) which could be worsened by the impact of climate change (Mitra and Singh, 2011).

The Ecosystems Approach to Resilient Urbanisation

Maintaining the health of the eco-system is crucial to developing the resilience of urban spaces, a



Ecosystem for Resilience

process that not only would contribute to the 'smartness' of the city, but also because of the criticality of the ecosystem services that further build resilience. These ecosystem services include:

- **Supporting services:** ecosystem services 'that are necessary for the production of all other ecosystem services' (MEA, 2005:40) such as nutrient dispersal and cycling, seed dispersal, primary production.
- **Provisioning services:** products obtained from the ecosystems such as food, fuel and water, fodder, fibres, genetic resources, medicines, energy or ornamental products.
- **Regulating services:** 'benefits obtained from the regulation of ecosystem processes' (ibid) such as carbon sequestration and climate regulation, waste decomposition and detoxification, water and air purification, natural hazard mitigation, pest and disease control or erosion control.
- **Cultural services:** 'non-material benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experiences' (ibid).

Overall, the different ecosystem services enhance the redundancy and flexibility of urban systems, and can help ensure that any failures are 'safe failures' so as to minimise damages (Figure 1).

The Role of Ecosystem Services

Ecosystem services ensure the well-being of the people and also play a role in regulating migration of people to urban areas as 'footloose' labour (Bremen, 1996). This is because ecosystem services can play a role in influencing the various components of human well-being which include providing the basic materials for a good life, health, good social relations, security and freedom of choice and actions (MEA, 2005: v). People are

integral parts of ecosystems. A dynamic interaction exists between humans and ecosystems, with the changing human condition driving, both directly and indirectly, changes in ecosystems and thereby causing changes in human wellbeing (MEA, 2005: vii.) At the same time, social, economic and cultural factors unrelated to ecosystems alter the human condition, and many natural forces influence ecosystems (ibid).

In the present overall Indian urbanisation scenario what is needed is an ecosystem-based approach to urban climate change adaptation and resilience, emphasising the role of that ecosystem services in peri-urban areas in core urban areas. Ecosystem-based adaptation has the potential to overcome maladaptation and the inadequate consideration of biodiversity while giving the social components of adaptation more consideration, helping to avoid social inequality and disempowerment (Mitra et al 2015). The role of ecosystem services is critical to ecosystem-based adaptation strategies. It is only when people are rooted in their original habitat, but with total access to their development rights as well as basic needs, that they are able to preserve the ecosystem, so vital to the health and also the resilience of the city.

Conclusions

Protecting ecosystems and ecosystem services in peri-urban areas is essential to the survival of the poor. These services also enhance the city's resilience. For instance, a critical ecosystem service provided by 'open spaces' like orchards and fields (where they exist) that act as buffers can enhance resilience to flooding as in the case of Gorakhpur City (See BOX). Construction that usurps these spaces reduces the resilience of the city.

Overall supporting, provisioning, regulating, and cultural ecosystem services enhance the redundancy and flexibility of urban systems. They can help ensure that any failures are 'safe failures' to minimise damage. Critical to the building of resilience is the distinction between hard and soft systems. Most administrators and policy makers focus on hard systems (infrastructure and institutions). But soft systems which enhance the capacities of social agents, including resourcefulness, responsiveness and the ability to learn, are critical to the functioning of the former.

Integral to soft systems are the understanding and use of an ecosystem approach and the systematic development and protection of ecosystem services. However, part of the problem lies in the very conceptualisation of peri-urban areas, which are often only seen as a space between urban and rural areas by policy makers and administrators. For example in Gorakhpur, in common with many other Indian contexts, peri-urban areas are conceptualised as just those villages that are included in the city's master plan, but without using the term peri-urban. In effect, this means that the social,

economic, ecological and administrative changes occurring in these villages, as distinct from those villages that are strictly rural (that is in the hinterland) or the villages just outside the master plan boundaries are ignored. Combined with a failure to understand urban and peri-urban areas as ecosystems, this has led to many changes.

Central to a systems approach is the protection of urban and peri-urban agriculture. Peri-urban areas are not 'waiting rooms' for entry to urban areas. A fundamental change in mindsets is needed, to prevent further land-use changes and unregulated construction activities. While international agencies like FAO and CGIAR articulate the need to for supporting policies and practices for peri-urban agriculture (Marshall et al., 2009; FAO 2007), they do not seem to consider agriculture as part of an integrated system within ecological settings which contributes to the overall resilience of the city. Multidisciplinary and integrated administrative land-use planning that recognises the agricultural ecosystem as a core component of the urban and peri-urban natural resources system is essential for this initiative (Marshall et al., 2009; Pothukuchi and Kaufman, 1999).

- ♦ At the core of redefining 'peri-urban' in the Indian context should be a multipronged ecosystem -based strategy that includes:
- ♦ Enforcing legislation to prevent the conversion of agricultural land and water bodies
- ♦ Recognising peri-urban agriculture as a distinct category, with support in the form of extension services, marketing facilities and institutional credit
- ♦ Increasing ecosystem support, such as enhancing soil nutrition and protecting water quality.
- ♦ Providing better transportation infrastructure
- ♦ Implementing new waste management policies and rules
- ♦ Recognising and supporting the role of women in peri-urban agriculture
- ♦ Improving education, healthcare and access to existing facilities
- ♦ Tackling issues such as chronic malnutrition and disease with better environmental management.
- ♦ Ensuring effective citizens' participation in implementing such measures through appropriately formed people's institutions
- ♦ Implementing such measures requires good governance coupled with planning 'from below'. The financial requirements for this would have to

be met primarily through state funding. Apart from higher budgetary allocations and improved efficiency in government spending, prevention of leakages has to be instituted through greater transparency and accountability to the people. The role of the private sector, through public-private partnerships also needs to be explored.

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