the URBES project

The Cities and Biodiversity Outlook

The world is increasingly urban and if current trends continue by 2050 the global urban population is estimated to nearly double to around 6.5 billions. This presents unprecedented challenges for both halting biodiversity loss and fostering sustainable urban development, but it also offers opportunities. Nature-based solutions present novel ways to employ biodiversity and ecosystems to address some of the most pressing challenges, such as climate change, water and food security.

At the request of the parties of the United Nations Convention on Biological Diversity, and with strong support from the URBES partners, an international team of scientists has produced the *Cities and Biodiversity Outlook*. This is the first scientific assessment of how global urbanization trends affect biodiversity and ecosystem dynamics. It explains how biodiversity and ecosystem services can be managed and restored in innovative ways to reduce the vulnerability of cities to climate change and other disturbances. It also provides decision-makers, urban planners and experts with practical guidelines, highlighting the complementary roles of authorities on national, sub-national and local levels in preserving biodiversity in cities as well as in distant places.

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Key messages of the Cities and Biodiversity Outlook

While there is growing awareness that cities affect almost every ecosystem on earth, significantly contribute to biodiversity loss, and are increasingly vulnerable to environmental changes, a global analysis of the environmental impacts of urbanization has until now been lacking. While past studies have focused either on urban development or on ecosystem functioning, few attempts have been made to connect the two and assess the prospects for supporting ecosystem services on an urbanizing planet. This is the knowledge gap that the *Cities and Biodiversity Outlook* aims to bridge. The project has resulted in two main publications: the shorter report *Action and Policy* presenting ten key messages from the *Cities and Biodiversity Outlook*, and the more extensive scientific foundation *Urbanization, Biodiversity and Ecosystem Services - Challenges and Opportunities*.

The *Cities and Biodiversity Outlook* has 10 key messages:

1. Urbanization is both a challenge and an opportunity to manage ecosystem services globally.
The great urban expansion we are going to face in the next decades will heavily draw on natural resources on a global scale, and will consume prime agricultural land, with severe effects on biodiversity and ecosystem services elsewhere. Urban regions must take responsibility for motivating and implementing solutions that take into account their deep connections with and impacts on the rest of the planet.

2. Rich biodiversity can exist in cities.
Many urban areas host great species richness and some are even located within globally recognized "biodiversity hotspots". Many cities also contain protected areas within or just outside their borders that provide an important contribution to biodiversity. With proper planning and management, cities can retain substantial components of native biodiversity, increase ecological functionality and maximize the ecosystem services offered.

3. Biodiversity and ecosystem services are critical natural capital.
Valuing ecosystems in both monetary and non-monetary terms is an important tool for mainstreaming ecological considerations into the management of a city. By illustrating that natural capital contributes to job creation, that it is a cost effective alternative, and it complements services already provided by municipalities such as disaster-risk management and food security, municipal leaders can be encouraged to make decisions that favour the environment rather than harm it.

4. Maintaining functioning urban ecosystems can significantly enhance human health and well-being.
The health benefits that we derive from direct contact with ecosystems range from improving the immune function, mood, and concentration to reducing stress and enhancing the benefits of physical exercise. Ecosystems also indirectly support human well-being by providing, for example, air and water purification, pest control, and climate regulation. Developing urban spaces that improve air quality, promote active living, and facilitate good nutrition and dietary diversity can enhance human health and biodiversity.

5. Urban ecosystem services and biodiversity can help contribute to climate change mitigation and adaptation.
Cities contribute to 60-70% of global greenhouse gas emissions. Investing in urban biodiversity and ecosystem services, can play an important role in mitigating and adapting to climate change. Urban green spaces, such as parks, agriculture, residential lawns and roof gardens can increase carbon storage and uptake, as well as significantly contribute to cooling the city. Blue spaces, such as functional watersheds, provide access to safe water for drinking and irrigation.

6. Increasing the biodiversity of urban food systems can enhance food and nutrition security.
The capacity of urban, peri-urban, and rural areas for developing greater food self-reliance needs to be considered within a local biodiversity context, and investments are needed to protect local plant and animal species. Local alternatives can reduce vulnerability to global shocks and counterbalance price and supply volatility as well as reduce the ecological footprint of cities.

7. Ecosystem services must be integrated in urban policy and planning.
Urban policy and planning provide opportunities to integrate biodiversity conservation into the design, building codes, zoning schemes, spatial plans, strategic choices, and enforcement of city management. The practice of urban planning, which can range from green infrastructures to promotion of organic and environmentally friendly products and services, is widely recognized as a vehicle for securing the long-term public good at the city scale.

8. Successful management of biodiversity and ecosystem services must be based on multi-scale, multi-sectoral, and multi-stakeholder involvement.
The efficiency of cities' governance efforts to address the multiple drivers of biodiversity loss strongly relies on collaboration between representatives from all levels of decision-making, from multiple jurisdictions, and with the inclusion of the general public. Good environmental governance is likely to benefit from a diversity of approaches. There is a need for generating more knowledge about governance of biodiversity as well as urban ecosystem services, and facilitating the exchange of this acquired knowledge.

9. Cities offer unique opportunities for learning and education about a resilient and sustainable future. Cities are a testing ground of our capacity to live together and create environments that are socially just, ecologically sustainable, economically productive, politically participatory, and culturally vibrant. Education is vital to the task of acquiring knowledge and capacity to manage our cities sustainably. This capacity is also generated through a wide range of informal modalities of learning like urban environmental education programs, which are growing in number.

10. Cities have a large potential to generate innovations and governance tools and therefore can—and must—take the lead in sustainable development. As centers of human innovation, and perhaps the most active frontier of human impact on the planet, cities offer enormous opportunities to reimagine and invent a different kind of future with room for humans and other species to thrive. Some cities are starting to change their ways by taxing waste, encouraging renewable energy, promoting car sharing, and optimising natural sources of light. These policies and tools are designed to be carbon neutral and to promote eco-citizenship, encouraging people to improve their own well-being by preserving the environment.

A resource for biodiversity and people

The *Cities and Biodiversity Outlook* highlights that many cities contain sites of special importance for conservation because they protect threatened species and habitats. Even backyard gardens can harbour significant biodiversity: a study of 61 gardens in the city of Sheffield (United Kingdom) found 4,000 species of invertebrates, 80 species of lichen, and more than 1,000 species of plants.

Stockholm is famous for its parks and residential areas with old, densely vegetated gardens, which complement protected areas and remnant patches of trees and grassland. The city supports a rich and diverse flora and fauna. More than 1,000 species of vascular plants have been recorded. Of the 69 species of mammals known to breed in Sweden, 43 reproduce in or near Stockholm, including wolves. This rich biodiversity can be attributed in part to the city's infrastructure, which has left several green wedges connecting Stockholm to its hinterlands, and to a history of environmental efforts that date to the late 1800s. More than 40% of the city's land area still consists of green spaces.

In many slums in India, the presence of trees and plants as traditional medicine is typically the most cost-effective, trusted, and readily available form of health care and therefore critical to people's health and well-being. In Bangalore, one of India's fastest growing cities, an estimated 30-40% of the population lives in slums, which have an average of 11 trees per hectare.

Nature-based solutions to urban challenges

Urban biodiversity and ecosystem services can play a critical role in reducing the ecological footprints of cities while enhancing resilience, health, and quality of life for their inhabitants. Investing in nature-based solutions can offer a valuable return for cities and urban areas, which is demonstrated by a diversity of examples the *Cities and Biodiversity Outlook* has compiled from different parts of the world.

Several of these examples explain that by establishing new urban parks and increasing vegetation cover, cities may effectively reduce the urban heat island effect. Additional potential for lowering urban temperatures may be realized through construction of green roofs and green walls. Data from Manchester (United Kingdom) show that a 10% increase in tree canopy cover may result in a 3-4°C decrease in ambient temperature and save large amounts of energy used in cooling buildings. In addition, there are multiple other benefits since urban green spaces can contribute to filtering dust, storing CO2, serving as windbreaks, etc.

Although the values of ecosystem functions are often not fully appreciated by society, positive examples demonstrate that the recognition is growing. The Nakivubo Swamps, adjacent to Uganda's capital city Kampala, are a positive example of how investing in natural ecosystems can be a cost-effective decision. The local government had proposed draining the swamps to make way for agriculture, but when a study revealed that this ecosystem provides a valuable service by filtering organic waste and other effluent derived from Kampala, the proposal was promptly dropped. The study indicated that a water-purification facility capable of performing the same service would cost several millions of US dollars to construct and 2 million dollars a year to maintain. In this case, the value of converting land for agriculture would be offset by the cost of losing the sewage-treatment capacity of the swamps.

To understand how the world's ecosystems are changing we need to understand cities, and to create better cities we need to understand the ecosystems they depend on. The challenges of urbanization are profound, but so are the opportunities. The *Cities and Biodiversity Outlook* shows how the well-being of the world's growing urban population is linked to biodiversity and the services produced by ecosystems, particularly in the face of climate change.

Explore the *Cities and Biodiversity Outlook* and download the publications at **www.cbobook.org**

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