Urban Protected Areas

Profiles and best practice guidelines

Ted Trzyna, in collaboration with Joseph T. Edmiston, Glen Hyman,
Jeffrey A. McNeely, Pedro da Cunha e Menezes, Brett Myrdal, Adrian Phillips
and other members of the IUCN WCPA Urban Specialist Group
Craig Groves, Series Editor; Adrian Phillips, Volume Editor

Developing capacity for a protected planet

Best Practice Protected Area Guidelines Series No. 22

IUCN WCPA's BEST PRACTICE PROTECTED AREA GUIDELINES SERIES

IUCN-WCPA's Best Practice Protected Area Guidelines are the world's authoritative resource for protected area managers. Involving collaboration among specialist practitioners dedicated to supporting better implementation in the field, they distil learning and advice drawn from across IUCN. Applied in the field, they are building institutional and individual capacity to manage protected area systems effectively, equitably and sustainably, and to cope with the myriad of challenges faced in practice. They also assist national governments, protected area agencies, non-governmental organisations, communities and private sector partners to meet their commitments and goals, and especially the Convention on Biological Diversity's Programme of Work on Protected Areas.

A full set of guidelines is available at: www.iucn.org/pa_guidelines
Complementary resources are available at: www.cbd.int/protected/tools/
Contribute to developing capacity for a Protected Planet at: www.protectedplanet.net/

IUCN PROTECTED AREA DEFINITION, MANAGEMENT CATEGORIES AND GOVERNANCE TYPES

IUCN defines a protected area as:
A clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.

The definition is expanded by six management categories (one with a sub-division), summarized below.
Ia Strict nature reserve: Strictly protected for biodiversity and also possibly geological/ geomorphological features, where human visitation, use and impacts are controlled and limited to ensure protection of the conservation values
Ib Wilderness area: Usually large unmodified or slightly modified areas, retaining their natural character and influence, without permanent or significant human habitation, protected and managed to preserve their natural condition
II National park: Large natural or near-natural areas protecting large-scale ecological processes with characteristic species and ecosystems, which also have environmentally and culturally compatible spiritual, scientific, educational, recreational and visitor opportunities
III Natural monument or feature: Areas set aside to protect a specific natural monument, which can be a landform, sea mount, marine cavern, geological feature such as a cave, or a living feature such as an ancient grove
IV Habitat/species management area: Areas to protect particular species or habitats, where management reflects this priority. Many will need regular, active interventions to meet the needs of particular species or habitats, but this is not a requirement of the category
V Protected landscape or seascape: Where the interaction of people and nature over time has produced a distinct character with significant ecological, biological, cultural and scenic value: and where safeguarding the integrity of this interaction is vital to protecting and sustaining the area and its associated nature conservation and other values
VI Protected areas with sustainable use of natural resources: Areas which conserve ecosystems, together with associated cultural values and traditional natural resource management systems. Generally large, mainly in a natural condition, with a proportion under sustainable natural resource management and where low-level non-industrial natural resource use compatible with nature conservation is seen as one of the main aims

The category should be based around the primary management objective(s), which should apply to at least three-quarters of the protected area – the 75 per cent rule.

The management categories are applied with a typology of governance types – a description of who holds authority and responsibility for the protected area. IUCN defines four governance types.
Governance by government: Federal or national ministry/agency in charge; sub-national ministry/agency in charge; government-delegated management (e.g. to NGO)
Shared governance: Collaborative management (various degrees of influence); joint management (pluralist management board; transboundary management (various levels across international borders)
Private governance: By individual owner; by non-profit organisations (NGOs, universities, cooperatives); by for-profit organsations (individuals or corporate)
Governance by indigenous peoples and local communities: Indigenous peoples' conserved areas and territories; community conserved areas – declared and run by local communities

For more information on the IUCN definition, categories and governance type see the 2008 *Guidelines for applying protected area management categories* which can be downloaded at: www.iucn.org/pa_categories

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IUCN (International Union for Conservation of Nature)
IUCN helps the world find pragmatic solutions to our most pressing environment and development challenges. IUCN works on biodiversity, climate change, energy, human livelihoods and greening the world economy by supporting scientific research, managing field projects all over the world, and bringing governments, NGOs, the UN and companies together to develop policy, laws and best practice. IUCN is the world's oldest and largest global environmental organization, with more than 1,200 government and NGO members and almost 11,000 volunteer experts in some 160 countries. IUCN's work is supported by over 1,000 staff in 45 offices and hundreds of partners in public, NGO and private sectors around the world.
www.iucn.org

Convention on Biological Diversity
The Convention on Biological Diversity (CBD), which entered into force in December 1993, is an international treaty for the conservation of biodiversity, the sustainable use of the components of biodiversity and the equitable sharing of the benefits derived from the use of genetic resources. With 193 Parties, the Convention has near universal participation among countries. The Convention seeks to address all threats to biodiversity and ecosystem services through scientific assessments, the development of tools, incentives and processes, the transfer of technologies and good practices, and the full and active involvement of relevant stakeholders including indigenous and local communities, youth, NGOs, women and the business community. The tenth meeting of the Conference of the Parties to the CBD, held in 2010, adopted a revised and updated Strategic Plan for Biodiversity for 2011-2020, comprising five strategic goals and 20 Aichi Biodiversity Targets. The Plan is the overarching framework on biodiversity, not only for the biodiversity-related conventions, but for the entire United Nations system.
www.cbd.int

Korea National Park Service
The Korea National Park Service (KNPS), established in 1987, manages 20 of the 21 national parks of the Republic of Korea, which together cover 6.6 per cent of its territory. The first protected area to be so designated, in 1967, was Jirisan National Park in the south-central part of the Korean Peninsula. Two others are described in this volume: Bukhansan National Park at the edge of Seoul, the country's capital, and Mudeungsan National Park in its fifth largest city, Gwangju. In 2012, KNPS, which is responsible to the Ministry of Environment, began implementing a ten-year master plan aimed at ensuring a high level of professional and scientific management and high-quality tourist services.
http://english.knps.or.kr/

Instituto Chico Mendes de Conservação da Bioversidade
Instituto Chico Mendes de Conservação da Biodiversidade (ICMBio, Chico Mendes Institute for Biodiversity Conservation) manages a system of 313 federally protected areas in Brazil that cover an area of 75 million hectares of land. National parks, of which there are 70, are one of twelve categories of such protected areas and include Tijuca National Park in Rio de Janeiro, which is profiled in this volume. ICMBio was created in 2007 out of Brazil's main environmental agency to form an entity specifically dedicated to the management of federal protected areas. Its tasks include law enforcement, fire control, ecotourism, research, species reintroduction, and interaction with traditional populations living in and at the edges of Brazilian protected areas.
www.ICMBio.gov.br

InterEnvironment Institute
InterEnvironment Institute, based in California, is an independent public policy center affiliated with Claremont Graduate University. Since its founding in 1969, it has specialized in making connections that otherwise would be unlikely to happen. Internationally, it has done this by: convening and promoting high-level policy dialogues; producing resource guides that 'map' organizations; and defining the concept of sustainability, which cuts across political, social, cultural and economic, as well as ecological concerns. Thus, the 'Inter' in InterEnvironment stands for interconnections, as well as international. Much of the Institute's work is done with or through IUCN, of which it has been a member since 1980. It provides the secretariat for the IUCN WCPA Urban Specialist Group.
www.InterEnvironment.org

Santa Monica Mountains Conservancy
The Santa Monica Mountains Conservancy is an agency of the State of California. Through direct action, alliances and partnerships, the Conservancy's mission is to strategically buy back, preserve, protect, restore and enhance treasured pieces of Southern California to form an interlinking system of urban, rural and river parks, open space, trails and wildlife habitats that are easily accessible to the general public in the second largest metropolitan area in the United States. An internationally recognized model of state government, the Conservancy has helped to create some 28,000 hectares of public parkland, improved hundreds of recreational facilities, and granted funds for educational and interpretation programs that serve hundreds of thousands of people each year..
www.smmc.ca.gov

South African National Parks
South African National Parks (SANParks) manages a system of 20 national parks in the Republic of South Africa covering over 3.7 million hectares of protected land representing the indigenous fauna, flora, landscapes and associated cultural heritage of the country in arid, coastal, mountain and bushveld habitats. With the independence of South Africa in 1994, the focus for SANParks, supported by the government through the Department of Environmental Affairs, has been to make national parks more accessible to tourists in order to ensure that conservation remains a viable contributor to social and economic development in rural areas. It has continued high research and management standards, has expand the land under its protection and generates 75 per cent of its operating revenue.
www.sanparks.org

IUCN World Commission on Protected Areas (WCPA)
IUCN WCPA is the world's premier network of protected area expertise. It is administered by IUCN's Programme on Protected Areas and has over 1,400 members, spanning 140 countries. IUCN WCPA works by helping governments and others plan protected areas and integrate them into all sectors; by providing strategic advice to policy makers; by strengthening capacity and investment in protected areas; and by convening the diverse constituency of protected area stakeholders to address challenging issues. For more than 50 years, IUCN and WCPA have been at the forefront of global action on protected areas.
www.iucn.org/wcpa

IUCN WCPA Urban Specialist Group
The Urban Specialist Group aims to strengthen the ability of the protected areas community to serve urban people, urban places and urban institutions, and promotes urban protected areas as a distinctive type of protected area.
www.iucn-urban.org

This publication has been made possible in part by funding from the Korea National Park Service. InterEnvironment Institute, the Instituto Chico Mendes de Conservação da Bioversidade, the Santa Monica Mountains Conservancy and South African National Parks provided significant in-kind contributions.

Citation: Trzyna, T. (2014). *Urban Protected Areas: Profiles and best practice guidelines.* Best Practice Protected Area Guidelines Series No. 22, Gland, Switzerland: IUCN. xiv + 110pp.

ISBN: 978-2-8317-1652-7

Designed by: Rick Caughman, Art@5th Alley, www.art@5thalley.com
Printed by: RDS Printing, Ontario, California

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Foreword

On a recent day in crowded Seoul, Korea, an elderly couple stepped out of their apartment, took a short ride on a city bus, and went on a long walk in Bukhansan National Park, as they often do. They joined many other Seoul residents who were hiking, climbing, picnicking and visiting ancient shrines along the park's granite mountain slopes and wooded valleys. They returned home well-exercised and refreshed from spending a few hours in nature.

On that same day in Nairobi, Kenya, a busload of local schoolchildren watched a group of black rhino browsing in the middle of Nairobi National Park, just a few kilometres from the city centre. The park, at the edge of a large region of free-ranging wildlife, protects about 60 of these powerful animals, listed by IUCN as Critically Endangered.

In London, a cabinet minister deliberately arrived early for a press conference at the London Wetland Centre along the River Thames. He took a few minutes to collect his thoughts as he strolled along a boardwalk through a 're-creation' of natural reed marsh. The NGO that designed and manages the site encourages use of its well-appointed visitor centre for such high-level meetings.

In Rio de Janeiro, Brazil, a university professor led a group of her students along a trail in Tijuca National Park. Stopping to survey the densely forested mountains, she explained that everything in their sight was a restoration. After the original forests were destroyed for coffee plantations, the mountains eroded, endangering the city's water supply. When they were reforested, recreational use was encouraged so that citizens would appreciate the forest and the reasons for its protection.

And in Los Angeles, a young boy and his parents stepped off a bus after a short, free ride to a rugged section of the Santa Monica Mountains National Recreation Area. They are immigrants who live in a rundown neighbourhood and lack the means to travel to more remote national parks. For them, this was their first experience of wild nature in their California home.

These places are emblematic of urban protected areas, and the people are typical of those who use them. Although they are important for all the reasons why any protected area is important, urban protected areas are distinctive in two fundamental ways: they offer experiences in nature to the large numbers of people who live near them; and they build urban constituencies for nature conservation. As the author points out, 'the wildest and remotest places on Earth, the most imperilled species on Earth will be protected only if urban people care about nature where they live.' Until recently, urban protected areas have been neglected by the international conservation community. That they are being given more attention is mainly due to the efforts of the Urban Specialist Group of the IUCN World Commission on Protected Areas.

It is this group that has prepared this volume in WCPA's Best Practice Protected Area Guidelines Series. It is written primarily for managers of urban protected areas and those responsible for protected area systems; however it should also be useful to city officials, urban planners and others working to infuse nature into the built environment. And it will be increasingly relevant to the managers of more remote protected areas, as many of these areas are now affected by urbanization in some way.

As our cities continue to grow, we must not abandon the protection of natural areas to the pressures of urbanization, but should instead defend such places, and indeed try to create new space for nature within the urban fabric—even within the centres of cities. We also need to make nature more accessible to people, providing interpretation and education wherever possible. Connecting people to nature should be an imperative for the whole conservation movement, and urban protected areas are well placed to do this.

Thus urban protected areas are vital to fulfilling both parts of IUCN's nature-focused and people-oriented mission: to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable. 'Societies throughout the world' must of course include the greater part of humanity that now lives in towns and cities; and a concern for equity must of course include a view about the needs of urban people. We believe that urban protected areas, as described here, can help bridge the gap between the compelling requirement of conservation and the social and economic imperatives of our times.

Ernesto Enkerlin Hoeflich
Chair
IUCN World Commission on Protected Areas

Braulio Ferreira de Souza Dias
Executive Secretary
Convention on Biological Diversity

Park Bo Hwan
Chairman
Korea National Park Service

Preface

This book is in three parts:

- Part 1, Urban protected areas – context and concept, provides a brief context to the growing interest in urban protected areas and then explains what urban protected areas are, why they matter and how they are distinctive.

- Part 2, Profiles of urban protected areas, describes protected areas in 15 metropolitan areas around the world.

- Part 3, Best practice guidelines, is organized into four sections: protected areas and people; protected areas and places; protected areas and institutions; and the creation, promotion and improvement of urban protected areas. The guidelines are illustrated by references to examples taken from the 15 profiles, as well as from other locations. As far as possible, a global perspective has been taken but inevitably some countries figure more in the range of examples than others.

Urban Protected Areas is in the well-established Best Practice Guidelines series of the IUCN World Commission on Protected Areas. As is the case with other publications in the series, it aims to consolidate current best practice—and, like them, it will need updating over time in the light of new experience. When this happens it will include more from the experience of other countries not yet covered here.

It is designed primarily for managers of urban protected areas and those responsible for protected area systems, but it has been written in non-technical language with a broader readership in mind.

Little has yet been published about the subject of urban protected areas, so this text will introduce a number of ideas that may be new to protected area managers. However, many of the methods used to manage protected areas in urban environments are the same as those required elsewhere. This volume emphasizes management approaches that are especially relevant to urban protected areas. Since these areas, and the political and social contexts in which they reside, vary greatly, it does not provide detailed recommendations, but instead it: sets out general guidelines; offers examples of problems, opportunities and solutions; and lists sources of further information and assistance.

This publication originated in a meeting of the IUCN WCPA Urban Specialist Group, which was convened following a workshop on urban protected areas at the Fifth IUCN World Parks Congress held in Durban, South Africa, in September 2003. The proceedings of that workshop, *The Urban Imperative*, were published in 2005. Over the past decade, the Urban Specialist Group has held, and participated in, numerous meetings around the world to discuss urban protected areas. The group's leaders have visited many such areas and met with those concerned with their management.

Production was authorized in early 2012. An advisory group was appointed to guide the project, and workshops were held in Los Angeles, Rio de Janeiro and Cape Town to develop a detailed outline. A workshop and informal consultations at the IUCN World Conservation Congress, held in Jeju, Republic of Korea, November 2012, helped to refine the outline and identify additional sites and sources of information. Many members of the Urban Specialist Group have contributed to the project, as have numerous others. They are listed in the Acknowledgements section.

As indicated above, the author recognizes that there will be a need to update this publication from time to time. A major objective of updating would be to get a wider range of examples from around the world than has been possible to date. Suggestions for improving it, as well as accounts of experiences in using it, are welcome and may be sent to the author, Ted Trzyna, Ted_Trzyna@InterEnvironment.org.

Acknowledgements

Many people and organizations contributed to the project that produced this volume. I am grateful for their help.

The project would not have been possible without a generous grant from the Korea National Park Service (KNPS). When KNPS offered to fund activities of IUCN's WCPA, Nik Lopoukhine, then WCPA Chair, and Trevor Sandwith, Director of the IUCN Secretariat's Global Protected Areas Programme, suggested that this long-planned project be included. Dongwon Shin, then KNPS Executive Director, agreed.

Several other organizations provided substantial in-kind support: the Instituto Chico Mendes de Conservação da Bioversidade, Brazil's protected areas agency; the Santa Monica Mountains Conservancy; South African National Parks; and my own organization, InterEnvironment Institute.

The advisory group for the project quickly became a team of collaborators. It consisted of: Joseph T. Edmiston, Executive Director, Santa Monica Mountains Conservancy; Jeffrey A. McNeely, Senior Science Advisor, IUCN; Pedro da Cunha e Menezes, a Brazilian diplomat who has served as Manager of Tijuca National Park in Rio de Janeiro and as a Director in the Instituto Chico Mendes de Conservação da Bioversidade; Brett Myrdal, General Manager, Environmental Planning, South African National Parks, and a former Manager of Table Mountain National Park; and Adrian Phillips, a British conservationist who has served as a WCPA Chair, IUCN Programme Director, and Director General of the Countryside Commission for England and Wales. John Davidson, cofounder and former Chief Executive of Groundwork, a British environmental regeneration organization, who also founded InterClimate Network, was actively involved in planning the project until his untimely death in May 2012.

Glen Hyman of the Institut d'Études Politiques de Paris helped shape the overall concept. He led two of the workshops held in early 2012 to plan the book (in Rio de Janeiro and Cape Town); he made presentations and consulted with delegates at the IUCN WCC (Jeju, Korea); and he drafted the parts of the book relating to Mumbai, Nairobi, São Paulo, human-wildlife interaction and several other themes.

Rick Caughman of Art@5th Alley in Ontario, California, served as graphic designer.

The project manager for the IUCN Secretariat was Pedro Rosabal, Deputy Director of the Global Protected Areas Programme, who was patient and understanding as unavoidable circumstances delayed progress.

To gather information and ideas, I have visited protected areas in many cities around the world, including eight of those profiled in Part 2. Listed with my main contacts in each city, these were:

- Cape Town: Brett Myrdal, South African National Parks, and George Davis and Tanya Layne, South African National Biodiversity Institute;
- Hong Kong: Fook Yee Wong, Friends of Hong Kong Country Parks, and Edmund Yui-fong Lam, Hong Kong Country Parks Authority;
- London: David Goode, formerly of the Greater London Authority, and Kevin Peberdy, Wildlife and Wetlands Trust;
- Los Angeles: Joseph T. Edmiston, Santa Monica Mountains Conservancy;
- Nairobi: Gideon Amboga, formerly of the Kenya Wildlife Service;
- Rio de Janeiro: Pedro da Cunha e Menezes, Brazilian Ministry of External Relations;
- San Francisco: Greg Moore, Golden Gate National Parks Conservancy; and
- Taipei: Shin Wang, National Taiwan University, Taiwan, Province of China.

Glen Hyman's visits to three cities resulted in profiles of protected areas. Listed with his main contacts, these were:

- Mumbai: Sunil Limaye, Sanjay Gandhi National Park;
- Nairobi: Michael Wanjau, Kenya Wildlife Service (as well as Gideon Amboga, listed above); and
- São Paulo: Rodrigo Victor, Forest Institute, State of São Paulo.

For the profiles of protected areas in the other five cities, my main contacts were:

- Gwangju: Bong-ho Han, Seoul University;
- Kingston: Susan Otuokon, Jamaica Conservation and Development Trust;
- Marseille: Louise Lézy-Bruno, Université de Paris Ouest Nanterre La Défense;
- Seoul: Jonghoon Ki, Myongji University; and
- Sydney: Mike Patrick, New South Wales Parks and Wildlife Service.

In addition to those listed above, the following people provided information, advice, contacts and comments on drafts: Susan M. Allen, Grahal Benatti, Alfred Bernhard, Fabiana Bicudo, Ernesto Castro, Emily Caughman, Tim Caughman, Nicholas Conner, Lisa Duarte, Penelope Figgis, Maria de Lourdes Figueira, Peter Frost, Paul Gaithitu, Russell Galt, Lloyd Gardner, Karl Heinz Gaudry, Gary Geller, Paolo Giuntarelli, Paddy Gordon, Craig Groves, Lucy Hutcherson, Bernardo Issa, Peter Jacobs, Anne W. Kahihia, Tania Katzschner, Wanja Kimani, Julius Kipng'etich, Wilson Korir, Mark Lellouch, Amy Lethbridge, Nora Liang, Hann Sheng Linn, Emma Lynch, Lisa McDonald, Antonio Machado, Geoffroy Mauvais, Chad Moore, Leigh-Ann Mossop, Amauri de Sena Motta, Gregg Oelofse, Michael Paparian, Alexandre M. Pedroso, Zwai Peter, George Rabb, Debra Roberts, Bittu Sahgal, Richard Saunier, Marinez Scherer, John Senior, Rorie Skei, Michael Slayen, Chris Spence, Daniel Toffoli, Branca Tressoldi, Karen Treviño, Ray Victurine, John Waugh, David Welch, Judy Ling Wong and Henrique Zaluar.

I apologize if I have left anyone out. All errors of fact, faults of judgement and omissions are my responsibility.

T.T.

Contents

Executive Summary

Urban protected areas: a matter of crucial concern

Ours has become a planet of urban dwellers in a very short time. Already, over half of humanity lives in urban areas. Two thirds will do so in the lifetimes of most people now living on Earth.

This trend is already having profound consequences, for the environment and for people. Everywhere nature is being squeezed and people are losing contact with it. The implications are many and diverse, but they make the conservation of nature ever more urgent and often more difficult to deliver. It is this that makes urban protected areas a matter of crucial concern.

What they are

Urban protected areas are protected areas situated in or at the edge of larger population centres. They meet IUCN's definition of a protected area and can be in any of its six Management Categories. In governance terms, most of them are the responsibility of national, state or provincial, or local governments; others are managed by NGOs or businesses; and some are collaborative or community efforts. They do not include conventional urban parks with lawns, flowerbeds and sports fields.

How they are distinctive

Urban protected areas are distinctive in several ways. They:

- Receive large numbers of visitors, including many who visit frequently, even daily. Many of these visitors lack experience of wilder forms of nature. They tend to be much more diverse ethnically and economically than visitors to more remote protected areas;
- Relate to numerous actors in the urban arena, including government decision-makers, communications media, opinion leaders, and key educational and cultural institutions;
- Are threatened by urban sprawl and intensification of urban development;
- Are disproportionately affected by crime, vandalism, littering, dumping, and light and noise pollution; and
- Are subject to such urban edge effects as more frequent and more severe fires, air and water pollution, and the introduction of invasive alien species.

Why they have a crucial role

Urban protected areas are important for all the reasons any protected area is important, such as providing ecosystem services, protecting species and supporting the local economy with income from tourism. However, they have a crucial role that sets them apart from other protected areas. They provide opportunities for large numbers of urban people to experience nature, including many people who may not be able to visit more remote protected areas. This is important for two reasons:

- Regular contact with nature is good for people. Aside from the benefits of outdoor exercise, there is growing scientific evidence to support the idea that spending time in nature improves physical and mental health.
- Urban people are crucial for nature conservation, nationally and globally. Towns and cities are where most people live, where wealth is concentrated, and where communications and the media are based. Political leaders are under ever greater pressure to listen to what their electorate tells them is important. Conservation depends on support from urban voters, donors and communicators. Yet people living in cities have less and less contact with nature. Reconnecting them with nature is important, if they are to tell their leaders that nature conservation is a priority.

Profiles of urban protected areas

Urban protected areas in 15 metropolitan areas are profiled in Part 2 of this volume. They represent different world regions, socioeconomic situations and natural environments, and they vary greatly in terms of size and management styles:

1. Australia: Sydney: Royal National Park has roads and facilities that make it feel 'safe' to urban people disinclined to visit a more rugged, less developed park.

2. Brazil: Rio de Janeiro: Tijuca National Park, covered by almost entirely restored tropical rainforest, is managed jointly by the national and municipal governments.

3. Brazil: São Paulo: The Cantareira Range complex of protected areas is a key part of a 2.3-million-hectare greenbelt.

4. China: Hong Kong Special Administrative Region: The Hong Kong Country Parks cover 40 per cent of Hong Kong's otherwise developed territory.

5. China: Taipei, Taiwan, Province of China: Yangmingshan National Park is notable for its uniformed and highly motivated volunteer corps.

6. France: Marseille: Calanques National Park includes islands and areas of sea, as well as forests, shrublands, vineyards and a cave with 27,000-year-old paintings.

7. India: Mumbai: Sanjay Gandhi National Park contains several sacred sites and is home to a sizeable population of leopards.

8. Jamaica: Kingston: Blue and John Crow Mountains National Park is managed by an NGO under contract with the national government.

9. Kenya: Nairobi: Nairobi National Park, the protected corner of a large savanna ecosystem, has an impressive array of wildlife species.

10. Republic of Korea: Seoul: Bukhansan National Park's granite mountain slopes and wooded valleys can receive over 10 million visits a year.

11. Republic of Korea: Gwangju: Mudeungsan National Park has buffer zones enforced by the city government that protect it from advancing urban development.

12. South Africa: Cape Town: Table Mountain National Park, part of a natural World Heritage site, protects unparalleled floral diversity.

13. United Kingdom: London: Near the heart of the city, the London Wetland Centre is a 're-creation' of wetlands, created and managed by an NGO.

14. USA: Los Angeles, California: The Santa Monica Mountains National Recreation Area is a cooperative effort of the national and California state governments.

15. USA: San Francisco, California: Golden Gate National Recreation Area, created in response to a citizens' movement, includes major historic as well as natural sites.

Best practice guidelines

In Part 3, 30 guidelines are set out in four groups, with examples. These guidelines are relevant to any protected area, but especially those in or adjoining large population centres:

Guidelines 1-11: Urban protected areas and people

1. Provide access for all; reach out to diverse ethnic groups and the underprivileged. For example, accommodate disabled people and choose words and symbols for compliance signs carefully.

2. Engender a local sense of ownership. Engage writers, artists and other creative people and draw on their works and ideas. Promote appreciation of cultural, as well as natural assets.

3. Take advantage of volunteers and support groups. Tap into the large numbers of urban volunteers who can include many highly motivated and well-educated people.

4. Communicate carefully and use a range of communication technologies. In engaging with different kinds of audiences, listen carefully and tailor messages to each. Consider the benefits of using websites, blogs, social media and mobile apps, as well as print publications.

5. Demonstrate, facilitate and promote good environmental behaviour. Provide information about the causes and consequences of climate change. Encourage energy efficiency, energy and water conservation, and the reduction, reuse and recycling of materials.

6. Demonstrate, facilitate and promote the health benefits of contact with nature and of good eating habits. Help people understand that spending time in nature improves physical and mental health. Make available nutritious, local and sustainable fresh food.

7. Prevent littering. Draw on the results of local research on littering behaviour. Clean up litter frequently and provide plenty of containers.

8. Prevent and prosecute crime against people and

property. Work closely with local law-enforcement agencies. Dispute the attitude that destruction of habitat is a 'victimless crime'. Combat vandalism, including graffiti.

9. Reduce human-wildlife interaction and conflict; keep aware of emerging infectious diseases. Help people protect themselves from predators and seek to maintain a balance between predators and their wild prey. Encourage a respectful attitude toward wildlife. Help people understand that degraded habitats encourage the transmission of diseases between other animals and humans.

10. Control poaching. Enforce laws, participate in interagency anti-poaching efforts and understand the role of organized crime. Provide alternative sources of edible and medicinal plants where possible.

11. Control invasive species of animals and plants. Realize that the main pathways by which invasive alien species invade new territory are urban. Survey lands and waters regularly to detect new invasions. Participate in local and national partnerships for prevention, early detection, eradication and control.

Guidelines 12-17: Urban protected areas and places

12. Promote connections to other natural areas. Cooperate with other public agencies and NGOs to contain or guide urban sprawl and create and maintain buffer zones and corridors that connect to other natural areas and rural lands.

13. Help infuse nature into the built environment and break down the cultural barriers between the 'natural' and the 'urban'. Participate in: region-wide nature conservation coalitions; projects to develop comprehensive local biodiversity strategies; and efforts to protect, restore and introduce natural elements in the built environment.

14. Control encroachment. Keep vigilant, enforce the law, seek help from local authorities and enlist the cooperation of local people.

15. Monitor and manage water. Keep aware of water quantity and quality trends and projections due to climate change, and work closely with those who share responsibility for water management.

16. Manage wildfires. Act aggressively to contain fires that threaten human life and property, control fires that threaten natural species and ecosystems, work closely with those responsible for fire prevention and control in neighbouring urban areas, and keep aware of wildfire trends and projections due to climate change.

17. Reduce impacts of noise and artificial nighttime light; keep aware of research on electromagnetic radiation. Promote appreciation of natural sounds and the night sky.

Guidelines 18-22: Urban protected areas and institutions

18. Cooperate with agencies that have shared or adjoining jurisdictions. Consider setting up formal or informal structures to facilitate coordination, and making written agreements on managing specific problems.

19. Cooperate with institutions that have complementary missions. Encourage and help natural history museums, zoos, aquaria and botanic gardens to provide information and exhibits about nature and conservation challenges in their regions.

20. Cast a wide net for advocates and allies. Engage with neighbours, support them whenever possible and seek allies from new sectors.

21. Cooperate with universities in training managers for urban protected areas; facilitate use of these areas for academic research and advanced learning. Help disseminate and archive research results.

22. Learn from others' experience with collaboration; pay careful attention to structure and process, as well as substance. Take advantage of people with entrepreneurial skills and experts in convening and negotiation.

Guidelines 23-30: Promoting, creating and improving urban protected areas

23. Promote and defend urban protected areas. Understand their importance for conservation nationally and globally, as well as locally. Tailor and convey this message to different constituencies.

24. Work to make urban protected areas national and global conservation priorities. Include them in conservation strategies and protected area system plans.

25. Create and expand urban protected areas. Examine possible locations and work with land-use planning authorities to include protected areas as part of projected urbanization.

26. Promote rules and organizational cultures that respect the differences between urban and more remote protected areas. Educate conservation colleagues about these differences.

27. Recognize that political skills are critical to success, strengthen them and build political capital. Improve staff political skills through training and mentoring. Organize visits and events for local leaders.

28. Seek funding from a wide range of sources. Draw from the full range of funding sources available to support protected areas generally, as well as sources unique to a metropolitan area.

29. Take advantage of international organizations and exchanges. Participate in them and draw on their resources as appropriate.

30. Improve urban protected areas through research and evaluation. Develop research agendas and help scholars to understand that urban protected areas are every bit as much proper protected areas as are more remote national parks and reserves.

Urban protected areas and the future of protected areas

As urbanization continues apace, taking many different forms and spreading ever further outwards into lands that were previously unaffected by towns and cities, more and more protected areas become subject to its influence. So the experience that has hitherto been gained in long-established urban protected areas, and the corresponding concepts that have been developed there, will be increasingly important elsewhere. Every one of these lessons is therefore growing in importance in the management of protected areas generally, and urban protected areas may be ahead in the development of solutions.

Part 1
Urban protected areas – context and concept

1. Context

Ours has become a planet of urban dwellers in a very short time. Already, over half of humanity live in urban areas. Two thirds will do so in the lifetimes of most people now living on Earth.

This trend is already having profound consequences, for the environment and for people. Everywhere nature is being squeezed and people are losing contact with it. The implications are many and diverse, but they make the conservation of nature ever more urgent and often more difficult to deliver. It is this that makes urban protected areas a matter of crucial concern.

The United Nations estimate that only 30 per cent of people lived in towns and cities in 1950. This rose to 50 per cent by 2007. Between 2010 and 2030, the world's urban population is projected to increase from 3.6 billion to 5 billion, raising the proportion of urban dwellers to 60 per cent; it will be 67 per cent by 2050. Almost all this increase will take place in developing regions. Based on current trends, most of these new urban dwellers will live in overcrowded slums, often situated on marginal and dangerous land, without sanitation or easy access to clean water. According to the Cities Alliance (2001), a World Bank-based partnership of official development agencies and global associations of local authorities, 'ignoring this policy challenge risks condemning hundreds of millions of people to an urban future of misery, insecurity, and environmental degradation on a truly awesome scale.'

Contrary to a commonly held belief, 'megacities' (urban agglomerations of 10 million inhabitants or more) account for less than four per cent of the world's population. Most urban dwellers live in settlements with fewer than half a million inhabitants. Some of the world's fastest growing cities have between one and five million people or are much smaller.

The reasons for this growing urbanization are complex. Rural-to-urban migration and international migration account for most of it, but migration from cities to rural areas that then become urbanized also occurs. Wars can drive people into cities, but they can also have the opposite effect, depending on where people feel safer. Natural disasters can cause people to move out of cities, but these people may then contribute to urban growth elsewhere.

Box 1

KINDS OF HUMAN SETTLEMENTS RANKED BY SIZE

Terms used to describe the size or character of human settlements are rarely precise. The following are some widely used English-language terms with generally accepted definitions. They relate to space and people, rather than to governmental jurisdictions.

- Hamlet: a settlement smaller than a village
- Village or commune: a rural community smaller than a town
- Town: a compactly settled area, larger than a village but smaller than a city
- City: a large or important populated place larger than a town
- Micropolis: a growing smaller city
- Metropolis: an important city and the densely populated surrounding areas that are socially and economically integrated with it
- Urban agglomeration or conurbation: includes a central city and neighbouring cities linked to it, e.g. by continuous built-up areas, or by patterns of commuting
- Megacity: an urban agglomeration of 10 million or more
- Megapolis or mega-region: an integrated network of metropolitan and micropolitan areas.
- Megalopolis: a large and highly connected urban region.

Tokyo, with 34.8 million people, is the most populous urban region in the world. Although nature is highly valued in Japanese culture, Tokyo has few natural areas (see the photo of one of these areas on page 101). Lukas Kurtz/Creative Commons BY-2.0.

As the world urbanizes, the distinction between urban and rural becomes less meaningful. For centuries, city and countryside have been seen as opposites. Now, in much of the world, differences between urban and rural communities are becoming blurred as advanced technologies and the global economy penetrate areas formerly considered remote, as farming becomes ever more industrialized, and as urban and rural areas become more linked and interdependent. One feature of this trend is that urban settlements now take many diverse forms (see Box 1).

These global trends may be clear, but such aggregated data provides only crude measures. Moreover, these figures are based on national definitions of 'urban' that use different criteria, and on numbers that sometimes derive from outdated or questionable census data.

They also hide wide regional and national variations in the degree of urbanization and the speed at which it is growing. According to the United Nations Population Division (2011), the proportion of people living in urban areas in the Americas, Europe and Oceania already exceeds 70 per cent. Although the figures for Africa and Asia are currently much lower, 39 per cent and 44 per cent respectively, many cities in those regions will double their populations in the next 10 to 15 years.

There are pronounced differences among countries within regions. In Asia, the urbanization figure is 17 per cent in Nepal and 18 per cent in Sri Lanka, rising to 91 per cent in Japan and nearly 100 per cent in several Gulf countries. Rapidly urbanizing China has just passed the half-way mark, at 51 per cent.

In Africa, the degree of urbanization ranges from 11 per cent in Burundi and 15 per cent in Malawi, to over 70 per cent in Algeria, Gabon, Libya and Tunisia. In the Americas, it is less than 45 per cent in Belize and 49 per cent in Guatemala, but more than 85 per cent in Argentina, Chile, Uruguay and Venezuela.

Almost all protected areas are affected by urbanization, whether they are in urban or more remote settings. In turn, protected areas can be used as a tool to limit or shape the growth of towns and cities.

The pressures that urban areas exert on the natural world in general and protected areas in particular are exacerbated by the effects of climate change, especially more frequent and more intense weather events, and rising sea levels.

More intense weather events demonstrate the value of protected areas to cities. For example, the unprecedented monsoon rainstorm that dumped almost a metre of rain on Mumbai, India, in 2005, caused severe flooding and loss of life, but it could have been much worse had it not been for Sanjay Gandhi National Park (see pages 26-27).

Rising sea levels, combined with storm surges, will force migration to higher ground. Roughly a billion people live at sea level or just a few metres above it, and many of the world's cities are situated in coastal lowlands. As conditions worsen, where will these people go? How will their resettlement, guided or unguided, affect protected areas?

Rising seas will also submerge low-lying coastal protected areas in and near cities, making nature less accessible to urban residents and putting pressure instead on inland protected areas. As such coastal protected areas are destroyed, the buffering role that they can play in offsetting the effects of storm surges, for example, will be eroded, leaving urban populations more at risk.

The cities most immediately vulnerable to sea-level rise are Asian megacities sitting on subsiding river delta land. However, many other coastal cities throughout the world are vulnerable to flooding from storm surges, and will become uninhabitable well before they disappear underwater because of waterlogging and saltwater intrusion. More than words can tell, an interactive map posted by geology.com (2014) shows in graphic detail the inundations that would occur with quite small level global sea rises.

This is the context in which we have focused on urban protected areas. Geographically, politically and socially they are at the front line of the tensions between the natural world that humankind inherited from the past and the increasingly urban-dominated one, affected by a changing climate, that we are making for the future.

Box 2

KEY DEFINITIONS

'Nature' in the context of protected areas, as defined by IUCN, always refers to biodiversity, at genetic, species and ecosystem level, and often also refers to geodiversity, landform and broader natural values (Dudley 2008).

'Natural' is generally used to describe anything that has not been made or significantly changed by humans—see also Box 3.

'Biodiversity', a contraction of biological diversity, is defined by Article 2 of the Convention on Biological Diversity (1992): 'the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems'. Article 2 defines 'ecosystem' as 'a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit'.

While meanings of 'nature' and 'biodiversity' overlap, there are important differences. 'Nature' includes geological and geomorphological features and processes (sometimes called 'geodiversity'); it also includes aesthetic, spiritual and other cultural elements not usually associated with 'biodiversity'. Among these cultural elements are landscapes and wild plants and animals appreciated for their beauty, as well as the history and legends associated with them. 'Biodiversity' includes cultivated plants and domesticated animals.

In the context of nature conservation, the words **'native'** or **'indigenous'** refer to organisms that occur naturally in a particular ecosystem or habitat without direct or indirect human actions—see also Box 3. (This is discussed further in Guideline 11, *Control invasive alien species of animals and plants*, along with explanations of such words as 'alien' and 'naturalised').

The words **'wild'** and **'wilderness'** are commonly used to describe areas that are uncultivated or uninhabited. In some countries, 'wilderness' has a statutory definition, as in the Wilderness Act of 1964 in the United States: 'A wilderness ... is 'an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain.'

Box 3

DEGREES OF NATURALNESS

In the context of urban protected areas, it may be useful to think of degrees of naturalness, from the most natural to the least:

10 Natural virgin system (only natural elements and processes are present)

9 Natural system (few exotic species are present)

8 Sub-natural system (there is possibly an extended presence of wild exotic species, but with low impact)

7 Quasi-natural system (extensive human activities, but with low physical impact)

6 Semi-natural system (human infrastructure is scarce or concentrated; wild exotic species are possibly dominant, with native species considerably reduced)

5 Cultural self-maintained system (processes are conditioned by extensive human activities, with native species altered and occasionally managed)

4 Cultural assisted system (there are important infrastructures and/or conditioning of the physical environment, with forced biological production and moderate addition of matter, usually with pollution added)

3 Highly intervened system (still includes areas with natural, cultivated, or breeding biological production, mixed in a mosaic with buildings and other infrastructure)

2 Semi-transformed system (biological production is not dominant; human elements predominate)

1 Transformed system (human processes govern, with clear dominance of artificial elements)

0 Artificial system (there is no self-maintained macroscopic life; microscopic life is absent or in containers) (adapted from Machado, 2004).

When presenting this index at conferences, its author, the Spanish biologist and conservationist Antonio Machado, sometimes uses an orchestral metaphor: above 5, nature holds the baton; below 5, man holds it.

The urban protected areas described or mentioned in this book generally fall between 8 and 6 on this scale. Parts of them may fall in 9 or 5.

By contrast, most urban parks are likely to fall into point 3 on the scale. While they may contain quite varied plant and animal life, this is often made up mainly of plant species that are not native to the area, as well as non-native animals. For example, New York City's Central Park is sometimes cited for its high biodiversity as it has some 479 species (Explorers Club, 2008), but most of these are not native to the region or even to North America. Nevertheless, non-native species can play a significant role in giving urban people some experience of nature.

Urban protected areas are at the heart of the struggle to create more sustainable prospects for both nature and people. Their importance cannot be over-stated.

2. Urban protected areas: What they are

We use the term 'urban protected areas' to mean protected areas in or at the edge of larger population centres. Each phrase or word needs further explanation:

A 'protected area' is defined by IUCN as 'a clearly defined geographical space, recognised, dedicated, and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values (Dudley, 2008).'

'Edge' is difficult to define exactly, because local situations vary. In this context, suburban areas are considered urban (the terms 'peri-urban', 'urban fringe', and 'rural fringe' are also used to describe the zone immediately surrounding an urban area; where an urban area abuts wildlands, the term 'wildland-urban interface' is sometimes used).

A 'larger population centre' for this purpose can be anything from a town to a 'megacity' (see Box 1). The words 'city' and 'town' are used to describe urban areas, rather than local government arrangements or their geographic jurisdictions.

The IUCN definition of a protected area refers to the long-term conservation of nature. 'Nature' and 'natural' are terms that can have various meanings in urban contexts. (See Box 2 for a discussion of these concepts.)

Many urban protected areas were originally at the outer edge of a city but were gradually surrounded by expanding urban development. This was the case with 10,400-hectare Sanjay Gandhi National Park in Mumbai, India—the large green space at the center of the photo. NASA.

Box 4

Forms of international recognition of urban protected areas

IUCN Protected Area Management Categories

The following are examples of urban protected areas taken mainly from Parts 2 and 3 of this book:

Category Ia, Strict nature reserve. Examples: Los Angeles area, Fern Canyon Research Natural Area (page 45); Taipei, Danshuei River Mangrove Nature Reserve (page 23).

Category Ib, Wilderness area. Example: Los Angeles area, Wilderness Areas in Angeles National Forest (page 45).

Category II, National park. Examples: Nine of the protected areas profiled in Part 2 of the book are in this category. (Note that categories are independent of the names of units.)

Category III, Natural monument or feature. Example: Los Angeles area, California Coastal National Monument (page 44).

Category IV, Habitat/species management area. Examples: Los Angeles, El Segundo Blue Butterfly Habitat Restoration Area (page 43); Cape Town, Edith Stephens Nature Reserve (page 38).

Category V, Protected landscape/seascape. Examples: Seoul: Bukhansan National Park (page 32); Hong Kong, Hong Kong Country Parks (page 20).

Category VI, Protected area with sustainable use of natural resources. Example: San Juan, Puerto Rico, Bosque Estatal de Piñones.

For detailed descriptions of IUCN's protected area categories, see Dudley, 2008.

Marine Protected Areas

This is an umbrella term for protected areas in any IUCN category that include areas of terrain submerged by salt or brackish water, together with the overlying water and associated flora, fauna and historical and cultural features. Among the urban protected areas profiled in Part 2, those in Cape Town, Hong Kong, Los Angeles, Marseille, San Francisco and Sydney include marine components. Others are mentioned in Part 3. For comprehensive listings, visit MPA Global, the Marine Protected Areas Database, www.mpaglobal.org.

World Heritage sites

These are designated by UNESCO's World Heritage Committee (whc.unesco.org). Two of the protected areas profiled in this book are World Heritage sites. In Rio de Janeiro, Tijuca National Park is within the Rio de Janeiro Carioca Landscapes between the Mountain and the Sea World Heritage Site (a cultural property). In Cape Town, Table Mountain National Park is part of the Cape Floral Region Protected Areas World Heritage Site (a natural property).

Global Geoparks

Designated by UNESCO (www.unesco.org). Example: Hong Kong, Hong Kong Global Geopark (page 21).

Ramsar sites

Designated under the Ramsar Convention on Wetlands of International Importance (www.ramsar.org). Examples: Hong Kong, Mai Po Marshes and Inner Deep Bay (page 21); San Francisco: San Francisco Bay and Estuary (page 46).

Biosphere reserves

Designated under UNESCO's Man and the Biosphere Programme (www.unesco.org/mab). Examples: The sites in São Paulo and Rio de Janeiro are parts of the Mata Atlântica (Atlantic Forest) Biosphere Reserve. Golden Gate National Park in the San Francisco area is within the Golden Gate Biosphere Reserve. The San Dimas Experimental Forest, mentioned in the Los Angeles profile, is a biosphere reserve.

Conventional urban parks, with lawns, flowerbeds, playgrounds and sports fields, are not considered to be urban protected areas, although such places can be very useful in sustaining native animal species and connecting natural areas. (See also Box 3 and Guideline 12, *Promote connections to other natural areas*.)

Urban protected areas have no formal recognition internationally, nor is there a global inventory of urban protected areas. The World Database of Protected Areas (WDPA—managed by the United Nations Environment Programme's World Conservation Monitoring Centre) includes many such areas, but does not identify them separately (although maps on WDPA's interactive website, www.protectedplanet.net, are helpful in identifying protected areas in and near urbanized places). However, a few national governments do identify urban protected areas: in Finland, for example, the Land Use and Building Act as amended in 2000 specifically authorizes designation of national urban parks that include 'natural areas important for the preservation of urban biodiversity'.

In terms of IUCN's Protected Area Management Categories, most urban protected areas are recognized either as Category II (national park) or Category V (protected landscape or seascape). However, there are urban protected areas in all six IUCN categories. In terms of other forms of international recognition, urban protected areas include marine protected areas, World Heritage sites, UNESCO Geoparks, Ramsar sites and biosphere reserves. Examples of all of these are listed in Box 4.

Urban protected areas are managed by various kinds of organizations:

- National governments. Most of the protected areas profiled in Part 2 are administered by national protected area agencies.

- State or provincial governments in federal systems. Examples are the São Paulo Green Belt, managed by the Forest Institute of the State of São Paulo, Brazil (see page 18); and Royal National Park near Sydney, managed by an agency of the Australian State of New South Wales (page 14).

- Local governments: Examples are the Claremont Hills Wilderness Park in the Los Angeles area (page 45), and the Edith Stephens Nature Reserve in Cape Town (page 38).

- Non-governmental organizations and local community groups: Examples are the London Wetland Centre, a project of the Wetlands and Wildlife Trust (page 40); and the Blue and John Crow Mountains National Park next to Kingston, Jamaica, which is managed for the national government by the Jamaica Conservation and Development Trust (page 28).

- Businesses: An example is the Irving Nature Park in Saint John, New Brunswick, Canada, which is owned and managed by J.D. Irving Limited, a large forestry and industrial firm (page 84).

3. Impacts of urbanization on protected areas

Urbanization can have both positive and negative effects on protected areas and natural resources generally. On the positive side, concentrations of human population in cities can relieve pressure on more remote rural and natural areas, and result in economies of scale in such areas as energy, housing, transportation and solid waste reuse and recycling.

But the negative side is usually much more evident. Urbanization leads to the depletion of water and forests, whilst generating solid, liquid and gaseous wastes. Such a combination of consumption and pollution can impose burdens on distant ecosystems, as well as those nearby. Other impacts of urbanization on protected areas include: fragmentation of habitat, edge effects, noise, light, human-wildlife conflicts, introduction of invasive alien species, fire along the wildland-urban interface, crime and littering. These impacts, and how to avoid or minimize them, are discussed in Parts 2 and 3.

Different forms of urbanization have different kinds of impact on protected areas, for example:

- Urban sprawl involves building on unprotected rural land between a city and a protected area, sometimes growing to the extent that it surrounds the protected area.

- Ribbon development involves building along roads radiating from a city, and is often a precursor of urban sprawl and thus accelerates the impacts on protected areas.

- Urban intensification and infill make it more difficult to preserve or restore small natural areas that remain in the city.

- Coalescing 'megapolitan' regions occur when large-scale polycentric networks of metropolitan and smaller urban areas combine, often encompassing protected areas, and disrupting habitat connections and wildlife corridors.

- Tourism developments are usually enclaves, such as beaches or mountain resorts, but are commonly found near protected areas (indeed these areas are often promoted as attractions for tourists).

- Second-home and retirement developments are often located near or even within protected areas.

- Gateway communities are urban settlements that spring up at the access point to protected areas; some grow to become ugly, congested places that make it hard to appreciate the protected area next to them.

- Informal settlements, which are areas where groups of housing units have been constructed on land that the occupants have no legal claim to, sometimes encroach into protected areas.

A final comment: as urbanization continues apace, taking many different forms and spreading ever further outwards into lands that were previously unaffected by towns and cities, more and more protected areas become subject to its influence. So the number of urban protected areas as defined above is growing.

4. How urban protected areas are distinctive

Urban protected areas have problems and opportunities that are often different in kind or in scale from those affecting protected areas elsewhere. Thus they:

- Receive large numbers of visitors, including many who visit frequently, even daily;

- Receive many visitors who have not had experience of more remote protected areas or wilder forms of nature;

- Relate to urban populations that are typically much more diverse ethnically and economically than the rural or indigenous populations that usually live near or in other protected areas;

- Relate to numerous actors in the urban arena, such as: national, regional and local government agencies and elected officials; land-use planning authorities; and educational and cultural institutions;

- Are close to communications media and opinion leaders;

- Are threatened by urban sprawl and intensification of urban development, and often targeted for such urban infrastructure as roads, government buildings, garbage dumps and broadcasting antennae;

- Are disproportionately affected by crime, vandalism, littering, dumping and light and noise pollution that originate in adjacent urban areas; and

- Are subject to such urban edge effects as more frequent and severe fires, the creation and use of undesignated trails, water pollution, the introduction of invasive alien plants and animals, loss of foraging habitat for wildlife, conflicts between humans and wild animals, and invasion by, and abandonment of, domestic cats and dogs.

5. Why urban protected areas matter

All protected areas—including urban protected areas—make a vital contribution to the planet's health and to human well-being, by protecting endangered habitats and species, storing carbon and so forth. But, in a rapidly urbanizing world, urban protected areas are important in ways that set them apart from other protected areas. This is either because they perform functions that protected areas far from centres of population cannot perform; or because they do so to a far greater degree than is possible in other protected areas.

In summary, urban protected areas are important because they:

- Promote human health and well-being. Recreation in nature is good for people physically and emotionally. Nature is essential to people's well-being. Most significantly, children need direct experience of nature for healthy physical, intellectual and emotional development. Urban protected areas are especially well placed to help people in this way. They can also be useful as communal spaces for social interaction, promoting community cohesion.

- Help give urban people a sense of place. Urban protected areas connect urban people to their immediate surroundings, to their region, and to the Earth. They often define a city's identity.

- Build urban constituencies for nature conservation. Most people now live in urban areas and conservation increasingly depends on their support, as urban voters and urban donors. But urban people tend to have less and less contact with nature. People will value nature only if they know it. The wildest and remotest places on Earth, the most imperiled species on Earth will be protected only if urban people care about nature where they live.

- Offer opportunities to learn about nature and sustainability. Urban protected areas are often heavily used for nature study by schools, youth groups and adult groups, such as bird-watchers. Local universities use them for instruction and research. They offer excellent, accessible opportunities to demonstrate and promote good environmental behaviour.

- Provide ecosystem services. Urban protected areas commonly provide a range of ecosystem services. These include: supplying and storing clean water; conserving marine and freshwater fisheries; reducing air pollution; and moderating the urban heat island effect, which causes urban areas to be significantly warmer than their surroundings.

- Bolster resilience to climate change. Resilience in this context refers to the ability of an ecosystem to maintain its functions—biological, chemical and physical—in the face of disturbance. Protecting and restoring natural areas in and around cities can enhance resilience to storms, flooding, sea rise, ocean storm surges and mudslides, thus protecting millions of people. In addition, there is much evidence that biodiversity itself enhances resilience of ecosystems.

- Contribute to green infrastructure within cities. Nowadays, many urban plans provide for a network of green spaces to improve the quality of urban living. Urban protected areas can be essential 'anchor points' in such networks, key parts of a green infrastructure that threads through the hard spaces and surfaces of the urban fabric.

- Support the local economy with income from tourism. Many urban protected areas attract substantial numbers of national and international tourists. They are not only attractive places to visit in their own right but they add to the tourist appeal of the nearby town or city.

These benefits of urban protected areas are discussed in Part 3.

Although urban protected areas are important for many reasons, providing opportunities for recreation in nature is especially important. Here residents of San Francisco enjoy Crissy Field, a restored grassland and marsh habitat in Golden Gate National Recreation Area. USNPS.

Many urban protected areas supply fresh water to cities. The Aqueduct of El Zegri in a protected area near Madrid, Spain. Calima/Creative Commons BY-3.0.

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Some urban protected areas are rich in endemic species (species with restricted natural ranges). The Table Mountain tree pincushion (Leucospermum conocarpodendron *subsp.* conocarpodendron) *is found only in and around Table Mountain National Park in Cape Town, South Africa. Abu Shawka/Creative Commons, public domain.*

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Part 2
Profiles of urban protected areas

Note: The 15 profiles

The 15 profiles of urban protected areas in Part 2, which are organised by country alphabetically, represent metropolitan areas in different world regions, climates and socio-economic situations. They include: four of the world's fifteen largest urban agglomerations: Seoul, São Paulo, Mumbai and Los Angeles; and six of the twenty 'most globally engaged cities' in the Global Cities Index: London, Hong Kong, Los Angeles, San Francisco, Seoul and Sydney.

The urban protected areas profiled have a range of management regimes (see *Urban protected areas: What they are*, *above*). They include one with 17 million visits a year (Golden Gate National Recreation Area in the San Francisco area) and another that is closed off to the public entirely (Fern Canyon Research Natural Area in metropolitan Los Angeles). They range in size from 42 hectares (the London Wetland Centre) to 62,300 hectares (Santa Monica Mountains National Recreation Area in Los Angeles). Some have natural systems that are relatively intact, while one is a restored habitat (Tijuca National Park in Rio de Janeiro) and another is a 're-creation' of nature (the London Wetland Centre). Most include historic, prehistoric or cultural sites.

Two metropolitan areas, Cape Town and Los Angeles, are given more detailed treatment, both in their profiles and in the guidelines in Part 3, because they are particularly suitable for in-depth descriptions of the many challenges and opportunities faced by urban protected areas, as well as offering a range of innovative approaches.

Each profile contains a map and a summary of the main characteristics of the area; each ends with a list of a few key lessons that can be drawn from the site in question.

[Satellite image: NASA]

1. **Sydney, Australia:** Royal National Park
2. **Rio de Janeiro, Brazil:** Tijuca National Park
3. **São Paulo, Brazil:** Cantareira Range Complex of Protected Areas
4. **Hong Kong Special Administrative Region, China:** Hong Kong Country Parks
5. **Taipei, Taiwan, Province of China:** Yangmingshan National Park
6. **Marseille, France:** Calanques National Park
7. **Mumbai, India:** Sanjay Gandhi National Park
8. **Kingston, Jamaica:** Blue and John Crow Mountains National Park
9. **Nairobi, Kenya:** Nairobi National Park
10. **Seoul, Republic of Korea:** Bukhansan National Park
11. **Gwangju, Republic of Korea:** Mudeungsan National Park
12. **Cape Town, South Africa:** Table Mountain National Park and a municipal nature reserve
13. **London, United Kingdom:** London Wetland Centre
14. **Los Angeles, California, USA:** Santa Monica Mountains National Recreation Area and protected areas in the San Gabriel Mountains
15. **San Francisco, California, USA:** Golden Gate National Recreation Area

Sydney, Australia

Royal National Park

A popular park copes with visitor numbers, fire and pollution

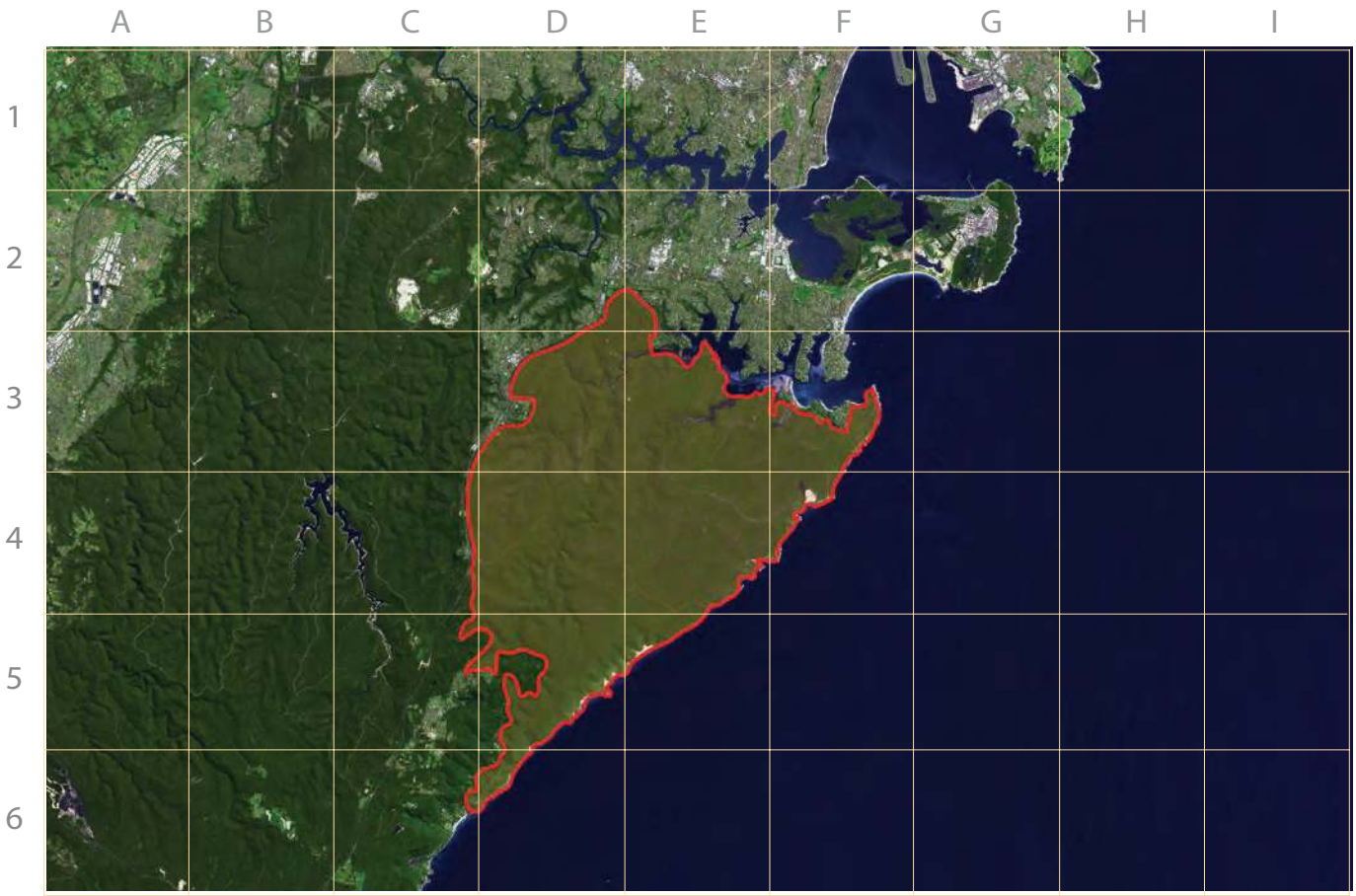
Royal National Park (IUCN Category II) is on the southern fringe of metropolitan Sydney, which has a population of 4.7 million. The park is bounded by the open Pacific Ocean, a bay called Port Hacking, suburbs and a major transportation corridor. It has 16,000 hectares of heathland, open woodland, wet and dry hard-leaved forest, warm temperate and subtropical rainforest, freshwater swamps, estuarine wetlands and small marine elements. The first national park to be designated in Australia, in 1879, it is managed by the National Parks and Wildlife Service of the State of New South Wales. (In Australia, apart from a few important exceptions, national parks and other protected areas are the responsibility of state or territorial governments, rather than the Australian authorities.)

Use 'at capacity or beyond'

This park has an estimated 4 million visits a year. Although public transportation is available, almost all visitors come by car on day trips for recreation and live within an hour's drive. Most come at least monthly. There is a vehicle entry fee equivalent to about US$ 10.

According to the state park service, an extensive road network and numerous facilities make Royal National Park 'attractive and 'safe' to large numbers of people who would either be disinclined or too inexperienced to visit a more rugged, less developed park. The most popular activities are car touring, picnicking at developed sites, short walks, and swimming and sunbathing at the beaches.

Sydney has many immigrants from Europe, Asia and the Middle East, and in the park there is high ethnic diversity among recreational users. Because many of these visitors have limited facility in English, signs with words have been replaced by ones with symbols. Rangers have expressed a need for training in cross-cultural communication.



Royal National Park (boundaries in red) covers 16,000 hectares at the southern edge of metropolitan Sydney. Terralook map: USGS/Eros and NASA; Rick Caughman.

Among visitors who come for reasons other than recreation are some 70,000 schoolchildren who come for field studies every year and Aboriginal people who come to visit prehistoric Aboriginal sites, particularly rock engravings, for cultural revival and educational purposes.

According to the park management plan, the numbers of visitors to developed parts of the park 'are already high enough at times to endanger the very quality of experience which visitors seek by coming to a natural environment'. Moreover, the park is operating 'either at capacity or beyond' in terms of the resilience of its natural assets to human impact. The plan calls for recreation planning on a regional scale to spread recreational demand more equitably.

Rowboats and canoes are available for hire at the Audley boatshed on the Hacking River, built in 1893. Adam J.W.C./Creative Commons BY-SA-3.0.

Controlling fire and water pollution

Royal National Park is at high risk from wildfire, which is often caused by arson. In 1994, over 90 per cent of its area burned, although not all lands were affected to the same degree. This followed a fire in 1988 in which over half the park burned. Fire risk is predicted to increase due to climate change. Although the state park service regards fire as 'a natural phenomenon, one of the established physical factors of the Australian environment to which native plant and animal communities have become adapted', park managers are actively involved in fire control. This is to protect human life and property in and adjacent to the park, but also because unnaturally frequent and extensive fires reduce the diversity of habitats and species. Regeneration depends on re-colonization from areas surrounding a burned area, but the park is increasingly cut off from other natural lands by urban development.

Park managers work closely with local authorities on fire protection. On the park's perimeter are fire radiation zones in which combustible vegetation is reduced at regular intervals. In any new development near the park, the state government requires 'fuel reduction zones'. On the other hand, recognizing that many plant and animal species depend on a mix of fire regimes for their survival, park officials have adopted science-based fire frequency and intensity goals for different types of plant communities. Results are monitored using geographic information systems.

Another threat to the park is water pollution. Its main freshwater habitat, the Hacking River, rises outside its boundary and flows through it to the sea. The river is polluted by urban runoff from several towns in the upper watershed, as well as such point sources as a coal mine and a landfill. The runoff also spreads weeds. The park participates in a catchment management committee that coordinates efforts to cope with these problems, and seeks to have waste treatment and sediment control requirements included in development permits.

In the park's marine areas, division of responsibility among units of government makes it difficult to keep jet-skiers and boaters from damaging habitat. While the park has jurisdiction over submerged and intertidal lands in these areas, three separate agencies are responsible for fisheries, watercraft and pollution control.

Bicyling is popular in the park. A guide to suitable trails is posted online. Brian Giesen/Creative Commons BY-SA-3.0.

Key lessons

- Urban protected areas near cities with multi-ethnic populations need to offer forms of information and interpretation that work in a variety of cultural situations.
- Urban protected areas are well placed to introduce nature to people who are not confident about it.
- Addressing pollution threats to urban protected areas often requires action elsewhere, for example upstream within the catchment.

Selected resources and notes: See page 48.

Rio de Janeiro, Brazil

Tijuca National Park

In the 'Marvellous City', a national park managed jointly with the municipality

Tijuca National Park (IUCN Category II) covers some 4,000 hectares of mountains within Rio de Janeiro, Brazil's cultural capital and second largest metropolis. Rio is nicknamed the *Cidade Maravilhosa* (Marvellous City), mainly because of its stunning natural setting between an almost landlocked harbour, renowned beaches such as Copacabana and Ipanema, and Tijuca's mountains. On Corcovado Mountain within the park is another symbol of Rio, the imposing statue of Christ the Redeemer.

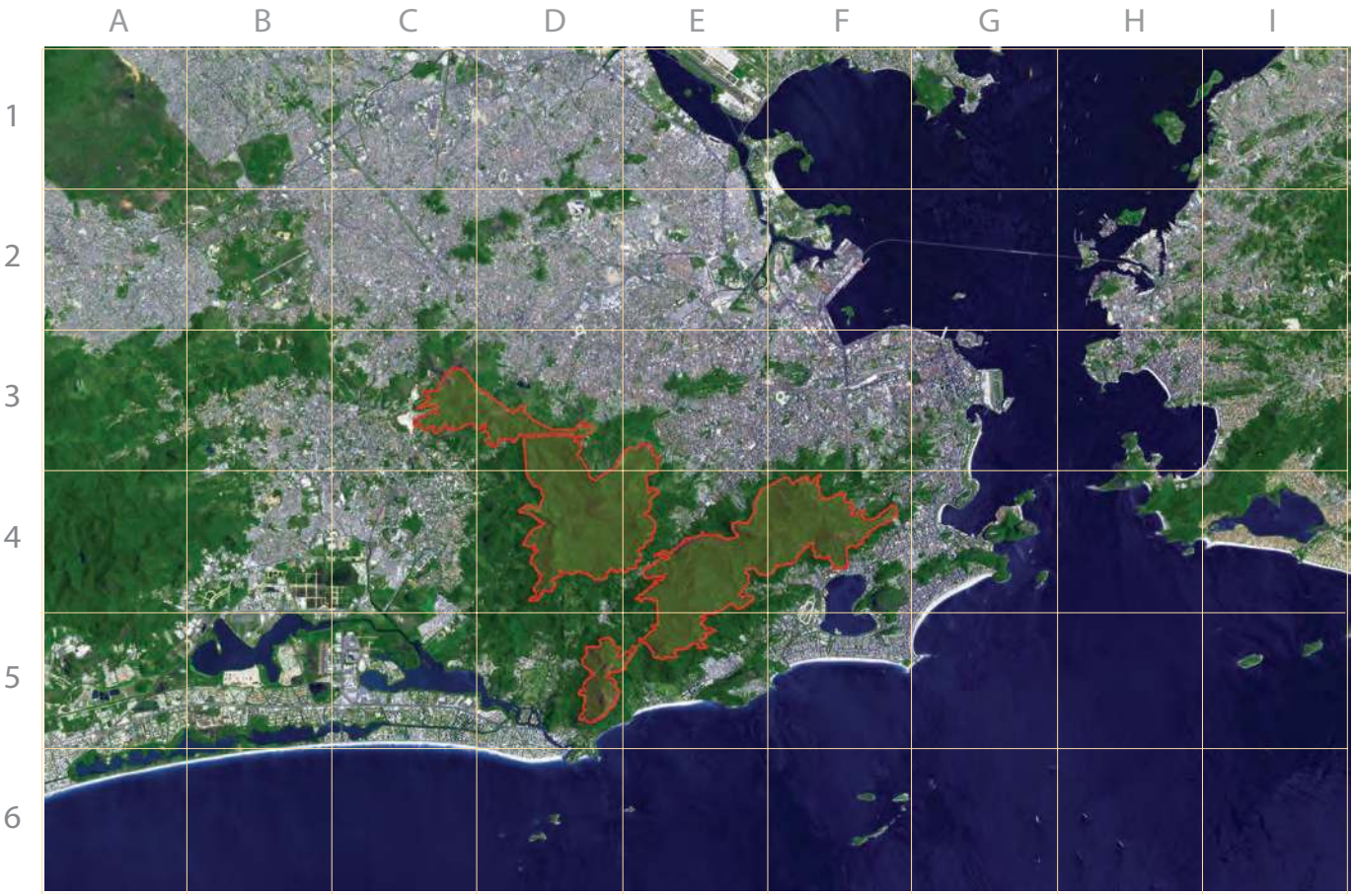
The park is managed jointly by the municipality and the national government. It has about 2.5 million visits a year. There is no visitor fee, except at Corcovado Mountain. The park is easily accessible by public transportation. There are some 1,000 kilometres of trails, of which 75 kilometres are managed and signposted.

Origins and setting

The park's origins are to be found in the establishment of the Forest of Tijuca in 1861 by the Brazilian Imperial Government in what was then the country's capital. Enlarged over the years, it was declared a national park in 1961. It is covered by largely restored Atlantic Forest (*Mata Atlântica* in Portuguese), a biome characterised by high species diversity and endemism. Once dominating the entire south-east facing slopes of Brazil, less than 10 per cent of this forest remains.

The park is within the UNESCO Carioca Landscapes between the Mountain and the Sea World Heritage Site (designated as a World Heritage cultural landscape in 2012). It is also within the much larger UNESCO Mata Atlântica Biosphere Reserve, which has core areas and buffer zones totaling 16,600,000 hectares.

The Municipality of Rio de Janeiro has a population of 6.3 million; the Rio metropolis 12.8 million; and the State of Rio de Janeiro, one of the 26 states of Brazil, 16 million. Both the municipal and state governments manage protected areas within the municipal boundaries.



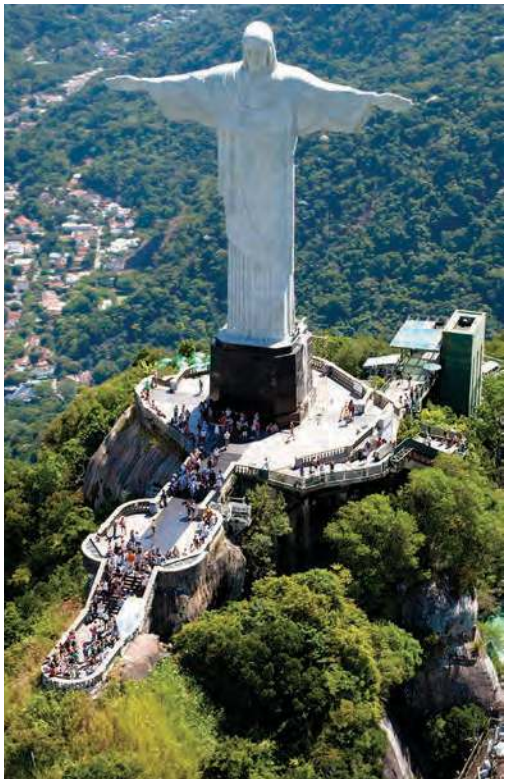
Tijuca National Park (boundaries in red) covers 4,000 mountainous hectares at the centre of metropolitan Rio de Janeiro. Terralook map: USGS/Eros and NASA; Rick Caughman.

Forest restoration and species reintroduction

In the early 19th century, the original forests on Rio's mountains were cut down to make room for coffee plantations. The result was erosion and a much-degraded watershed on which Rio depended for its drinking-water supply. To correct this, the government expropriated and reforested the mountain lands. In thinking that was unusual and far-sighted for its time, leaders provided infrastructure for recreational use of the forest to encourage Rio's citizens to become familiar with it and understand the reasons for its protection. Also unusual at a time when monocultural forest plantations were prevalent, reforestation was mainly with trees native to the region. As a result, an environment conducive to natural forest regeneration emerged.

Some fauna native to the forest disappeared over the years, including toucans and boa constrictors. Non-native species were introduced, sometimes with serious consequences. For example, a marmoset brought in from the Brazilian Northeast reproduced quickly and threatened bird populations.

In the late 1960s, local scientists began a fauna restoration project in Tijuca. Its aims were to: recover mammal, bird and reptile populations; cultivate plant species on which these animals depend; and control hunters and animal predators. From specimens captured in nearby forests, the group reintroduced boa constrictors, seven mammal species, and 25 bird species, including toucans. Although not all reintroductions have succeeded, the project contributed to a process in which Tijuca's forest is becoming a mature forest ecosystem, and one which superficially resembles a pristine forest.



Within the park, 40-metre-high Cristo Redentor (Christ the Redeemer) stands on the top of Corcovado Mountain. Gustavo Flacci/Creative Commons BY-SA-2

Joint management by the city and national governments

As the population of metropolitan Rio nearly doubled from 1960 to 1990, urban pressures on the park mounted, especially from neighbouring *favelas* (shantytowns). At the same time, the national government neglected its urban national parks, considering them less important from the standpoint of nature conservation than the country's remote protected areas. In Tijuca, trails were abandoned, most entrance gates and guard houses went unstaffed, and anti-poaching patrols were suspended. Wildfires were set, feral cats and dogs invaded, and tons of garbage were left uncollected. In the meantime, two national parks on the edge of the metropolis gained new visitor centres and acquired new 4x4 vehicles. Unfortunately, this sent the message to the millions of people living near Tijuca that caring for urban protected areas was not a national priority.

In 1999, pressed by public opinion, Rio's Mayor and the national Minister for the Environment signed an agreement for Tijuca's joint management. Its rationale was that intensive public use, watershed protection and national policy on protected areas were all important objectives and could be reconciled—and that the area should therefore be managed to achieve a variety of complementary aims.

The park continues to be managed jointly by the Municipality of Rio de Janeiro and the national Ministry of Environment, represented by the Instituto Chico Mendes de Conservação da Bioversidade (ICMBio, the Chico Mendes Institute for Conservation of Biodiversity), the entity responsible for all Brazil's national protected areas. In 2011, this cooperative effort evolved further, into the Carioca Protected Areas Mosaic, which encompasses all 28 national, state, and local protected areas situated within the municipality's boundaries. The Mosaic has an executive secretary and works to harmonize management of these protected lands. So far, it has arranged for joint law enforcement, joint training, and exchanges of equipment. Its main projects now are creating a 250-kilometre trail initially linking eight of the areas, and raising public awareness of the need for connectivity among protected areas and other green spaces.

Once extirpated in the park, toucans were successfully reintroduced in the 1960s. Common toucan (Ramphastos toco). *Jorge Andrade/Creative Commons BY-2.0.*

Key lessons

- Urban protected areas often require major, long-term programmes of ecosystem restoration.
- Support from public institutions must be maintained at all times as such areas are always vulnerable to outside pressures if neglected.
- What often begins as a small, local initiative can develop into a major urban protected area of strategic significance.

Selected resources and notes: See page 48.

São Paulo, Brazil

Cantareira Range Complex of Protected Areas

Expanding protected areas within a metropolitan green belt

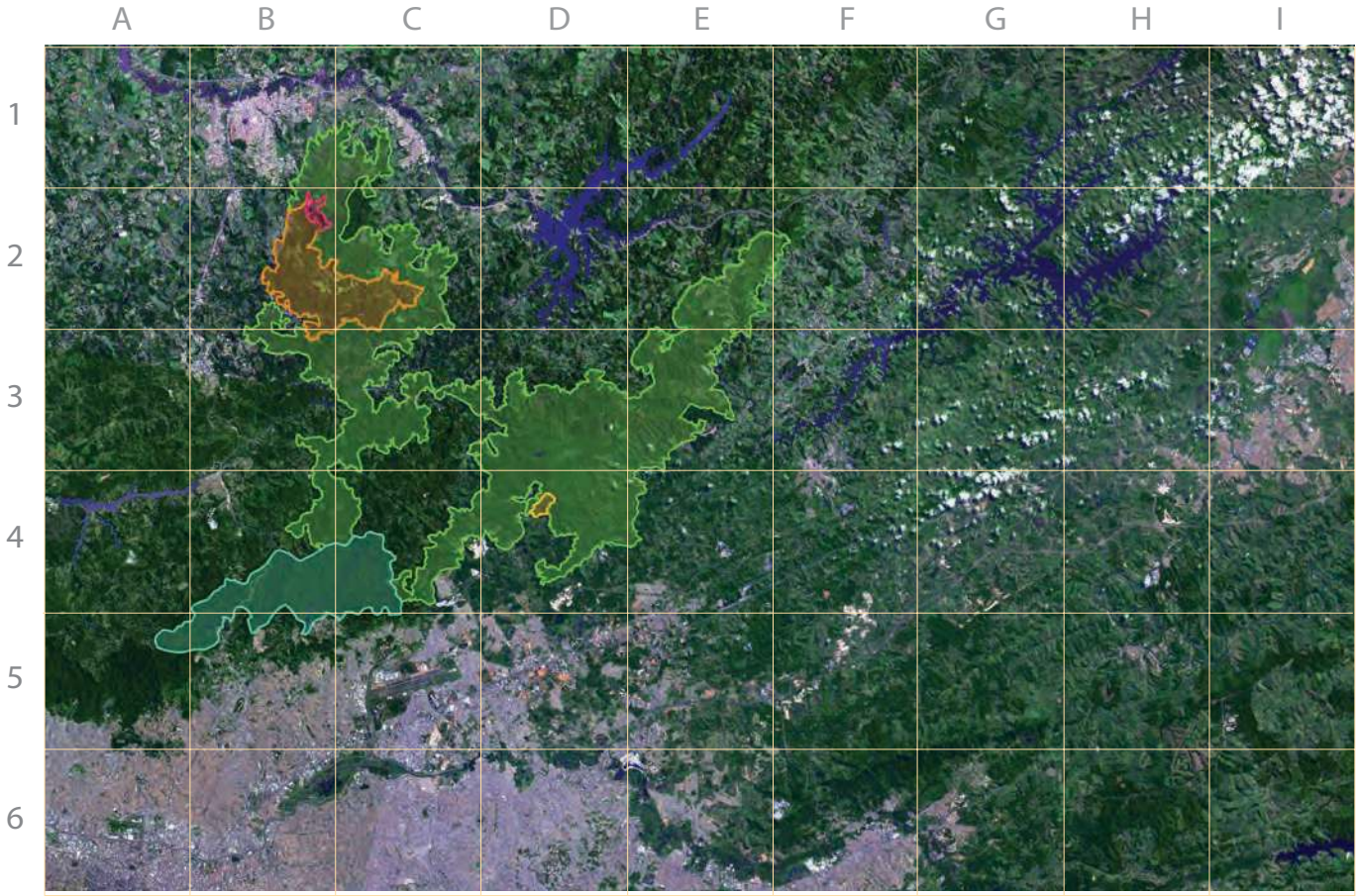
São Paulo, Brazil's commercial centre, is South America's largest metropolitan area, with a population of 20 million. The Municipality of São Paulo is also the capital of the State of São Paulo, the most populous of Brazil's 26 states. The Cantareira Mountains north of the city are covered by an important remnant of the species-rich *Mata Atlântica* (Atlantic Forest)—see page 16. In the late 19th century, about a third of this mountain range was designated as a forest reserve to protect the growing city's water supply. The reserve was later made a state park and continues to provide almost half the urban area's water, as well as numerous recreational and educational opportunities.

Brazil's most visited state parks, urban gateways to nature

Partly inside the city limits and managed by the Forest Foundation of the state government, 79-square-kilometre Cantareira State Park (IUCN Category II) contains over 850 wildlife species and nearly 700 plant species. There are some 90,000 visits each year to the park's interpretive trails, picnic sites and environmental education programmes. The small adjacent Alberto Löfgren State Park (174 hectares) receives a further 720,000 visits a year, making this the most visited state park complex in Brazil. (See the map *below* for locaions.)

The São Paulo City Green Belt Biosphere Reserve

Cantareira State Park is a major core area of the São Paulo City Green Belt Biosphere Reserve, which includes 2,331,700 hectares in 78 municipalities—an area considerably larger than the official São Paulo Metropolitan Region, which is composed of 39 of these local governments. The Green Belt Biosphere Reserve was established in the early 1990s on the recommendation of the São Paulo State Forest Institute after a citizens' movement succeeded in stopping construction of a ring road through São Paulo's peripheral forests. Although it retains a separate identity, in 1993 UNESCO made it an integral part of the much larger Mata Atlântica Biosphere Reserve.



Older and newly created protected areas in the Cantareira Range north of São Paulo. The older ones, Cantareira and Alberto Löfgren state parks, are shaded in blue-green. The newly created ones are: Itapetinga and Itaberapa state parks, shaded in light green; Guarulhos State Forest, shaded in yellow; and Pedra Grande Natural Monument, which is in two sections—the area shaded in orange is for mixed use, while the area shaded in red is more strictly protected. Terralook map: USGS/Eros and NASA; Rick Caughman.

The biosphere reserve is guided by a management council drawn from the entire region that provides a framework for regular exchange among planners, politicians and civil society. The reserve operates ten job training centres that provide nature-related skills to urban youth.

The parks are a short distance from São Paulo, South America's most populous metropolitan area. Glen Hyman.

A major expansion of protected areas

Although the Cantareira mountain range has included several protected areas for many years, much of the forested catchment outside these has been vulnerable to urban sprawl. To remedy this, the State of São Paulo in 2009 began an ambitious process to designate an additional 28,600 hectares for state protection, almost quadrupling the size of this protected area complex.

The first public step in creating these new protected areas (*see map*) was a decree placing a seven-month moratorium on land transformation within the target area. Only a short time was allowed by this law to complete the designation process, so extensive preparation preceding the decree was crucial to the expansion's eventual success.

The creation of new state parks requires purchase, transfer or expropriation of private and municipally controlled land. Attempting this at so large a scale would obviously have been impossible without strong political support from the highest levels. The state governor was briefed frequently about progress, and as the expansion included seven different municipalities, regular meetings with each of them also helped build support for the process.

Given the stakes for individual landowners, drawing the new park boundaries was a delicate and especially participative process. After the provisional area was decreed, state officials cooperated closely with local authorities and landowners. Together they surveyed the entire perimeter of the proposed parks, tailoring the precise boundary to ecological, economic and political realities on the ground. Although this cooperative approach was time-consuming, it helped to bring the participants together.

The final boundaries of the new protected areas were set out in 2010. Despite being contiguous with Cantareira State Park, the newly created Itaberaba and Itapetinga state parks retained their local names so as to promote a sense of local identity. For Pedra Grande Natural Monument and Guarulhos State Forest, different kinds of protected status were applied to allow compatible land uses to continue. Although precise land cost surveys are still incomplete, local real-estate values suggest an acquisition cost of more than US$ 1 billion. This demonstrates a strong commitment to protecting nature in and around one of the world's biggest and most dynamic cities.

Many cities benefit from clean water stored and supplied by urban protected areas. Cabaçu Reservoir in Cantareira State Park. Silvio Emanuel Fernandes/ Creative Commons BY-SA-3.0.

Key lessons

- What may begin as protection for, say, water supply can become the foundation for the creation of an urban protected area that is much-visited, protects endangered species and functions as a strategic component in city planning.
- Citizens' groups can drive some initiatives from below but strong political leadership is also vital for success.
- Visions for urban protected areas cannot be realised by a single public body alone: it needs to work with other public bodies, the private sector and local communities.

Selected resources and notes: See page 48.

Hong Kong Special Administrative Region, China

Hong Kong Country Parks

Strong citizen support builds on early decisive action

In Hong Kong, where more than 7 million people live in an area of little more than 110,000 hectares, a remarkable 40 per cent of the land is protected in a system of country parks. Located on the South China Sea, Hong Kong comprises two main islands, over 260 smaller islands, and areas of mainland, harbour and ocean. The terrain is mountainous; the climate is tropical and monsoonal. In the face of a growing population and pressure to build, key ingredients for success have been early action and strong citizen support.

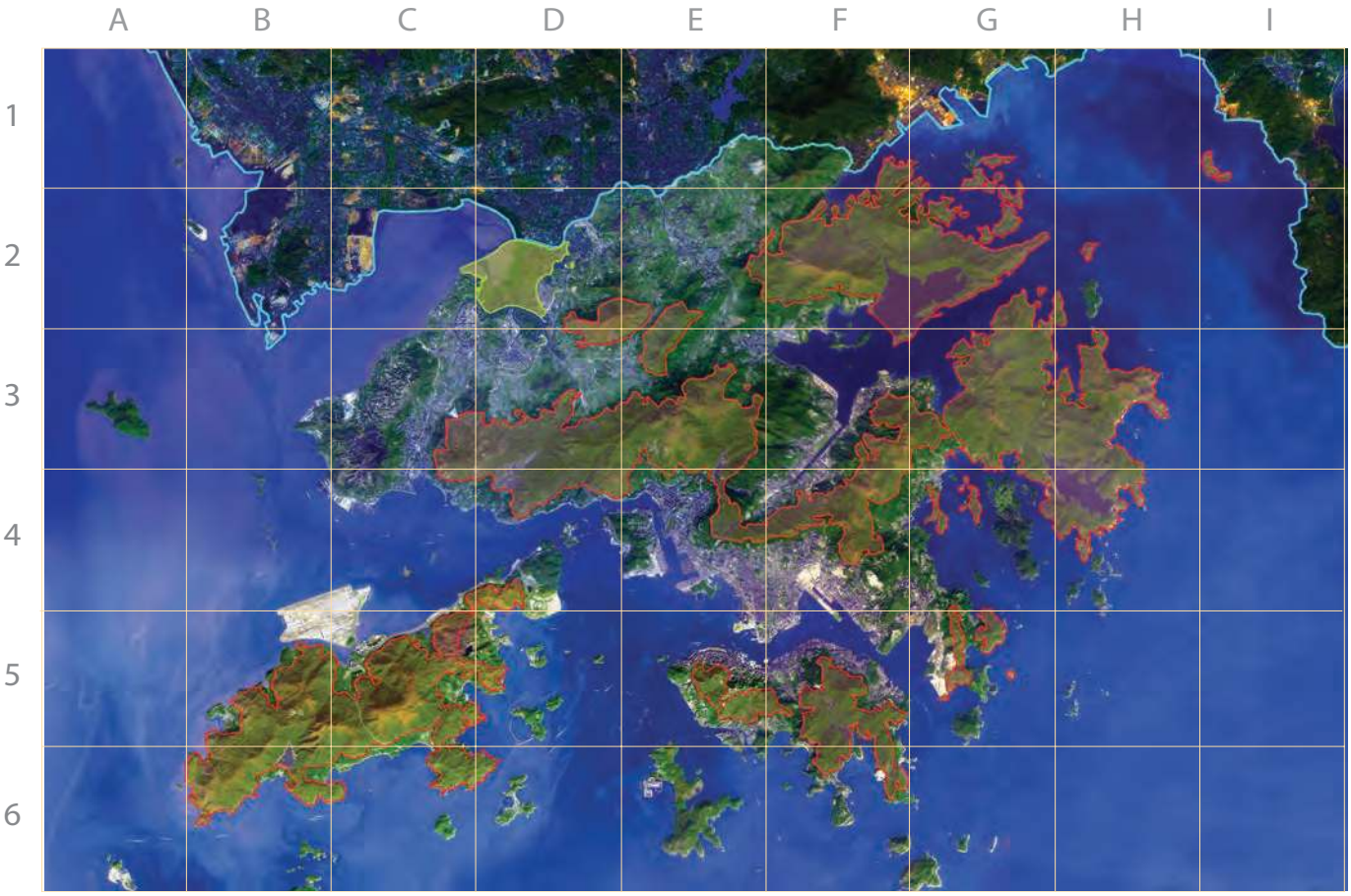
A richly endowed and heavily used park system

The richness of Hong Kong's natural assets is remarkable for such a small place. It has some 3,300 species of vascular plants, 57 mammals, 502 birds, 80 reptiles, 23 amphibians, 240 butterflies, 116 dragonflies and 185 freshwater fish.

The Hong Kong Country Parks (IUCN Category V) are administered by the Agriculture, Fisheries, and Conservation Department (AFCD) of the Government of Hong Kong. The system includes 24 terrestrial country parks and special areas totaling 44,239 hectares, as well as four marine parks and one marine reserve totaling 2,430 hectares.

The country parks are an important recreational outlet for Hong Kong's residents. Visits now average 13 million a year. People come for hiking, barbecuing, picnicking, exercise, camping, diving, boating, fishing and nature study. There are nature education centres and morning walkers' gardens. An extensive trail network includes facilities for handicapped people, as well as four long-distance trails, one of which extends over 100 kilometres.

The value of the parks was underscored in April and May of 2003, when residents were prohibited from leaving Hong Kong because of an outbreak of severe acute respiratory syndrome (SARS). They flooded into the parks seeking fresh air, natural scenery and escape from urban congestion.



The Country Parks system (approximate boundaries in red) covers 40 per cent of Hong Kong's territory. Terralook map: USGS/Eros and NASA; Rick Caughman.

Ingredients of protection: Early decisive action, strong public support

Hong Kong was a British colony from 1841 until 1997, when China resumed sovereignty. The colonial government was slow to take conservation measures until the 1960s, when it engaged IUCN to conduct a feasibility study for a park system. The study was carried out by Lee Talbot, later IUCN Director General, and his wife Martha. Their report, published in 1965, was the key first step in developing the country park system. Rather than making further studies, the colonial government in 1971 acted decisively to protect lands under its jurisdiction. Conservation leaders believe this quick action, before urban sprawl had a chance to advance, was the key to success.

Natural areas and intensive development co-exist on Hong Kong Island. A view from Lung Fu Shan Country Park across Victoria Harbour to Kowloon. Fook Yee Wong.

Hong Kong's population has doubled since the Talbot Report was issued, and it has become a global financial capital with one of the world's highest per-capita incomes. Pressure to intrude into parklands has increased accordingly. Public involvement and support have been essential in stemming this pressure. AFCD has encouraged formation of citizens' groups such as the Friends of the Country Parks, and works closely with them, as well as with local branches of such international NGOs as the World Wide Fund for Nature. To appeal to a sophisticated citizenry, AFCD produces high-quality interpretive materials, maintains several websites and has published over 100 books on various aspects of the parks.

Thwarting threats and relieving pressures

Conservationists have generally succeeded in fending off threats to the parks. In 2011, a decision by the executive branch of the Hong Kong Government to extend a solid waste landfill into five hectares of the Clear Water Bay Country Park (map: F-5) resulted in such a public outcry that the legislative branch overwhelmingly passed a motion repealing the order, an action so rare that it created a minor constitutional crisis.

Living in one of the world's most densely populated cities, Hong Kong's residents are fortunate to have easily accessible country parks. Ted Trzyna.

Relieving pressures on parks can also be a useful strategy. AFCD is responsible for the Mai Po Marshes and Inner Deep Bay (IUCN Category IV; map: D-2), a 1,540-hectare reserve of intertidal mudflats and mangroves outside the Country Parks system. Mai Po is designated as a Wetland of International Importance under the Ramsar Convention. It is critical habitat for waterfowl, including threatened species, and for that reason public access is restricted.

A separate Hong Kong Wetland Park was established in 2005 to promote wetland conservation and nature education, and also to cut down on visitor demand at Mai Po. Along with a 60-hectare wetland reserve, the park has exhibit galleries and play areas. Like the London Wetland Centre, with which it is paired (see page 41), this reserve is a re-creation of natural habitat.

The country park system includes the Hong Kong Global Geopark, a 50-square-kilometre area of geological features, including hexagonal rock columns, designated by UNESCO as part of its Global Geoparks Network.

Hong Kong Wetland Park, on a 60-hectare site next to high-rise buildings, is a 're-creation' of natural habitat that serves to educate the public and reduce visitor demand at sensitive natural marshes. AFCD.

Key lessons

- Early action before urban sprawl advances is the key to protecting large natural areas.
- Urban protected areas can benefit greatly from the presence of powerful citizens' groups, so it is worth investing in their support.
- By making some parts of urban protected areas readily accessible to large numbers of visitors, protection can more easily be given to other, more vulnerable areas.

Selected resources and notes: See page 48.

Taipei, Taiwan, Province of China

Yangmingshan National Park

Volunteers make the difference

Yangmingshan National Park (IUCN Category II) protects a mountainous area of some 11,500 hectares just outside Taipei, which has a metropolitan population of 8.9 million. The park's elevation ranges from 200 to 1,120 metres. Its vegetation is grassland, arrow bamboo forest and subtropical broadleaved forest. Its attractions include hot springs and fumarole zones with clouds of geothermal steam. There are scattered houses and small farms in its lower elevations. The park, which is especially notable for its extensive volunteer programme, was created in 1985 and is administered by the Ministry of the Interior of Taiwan, Province of China.

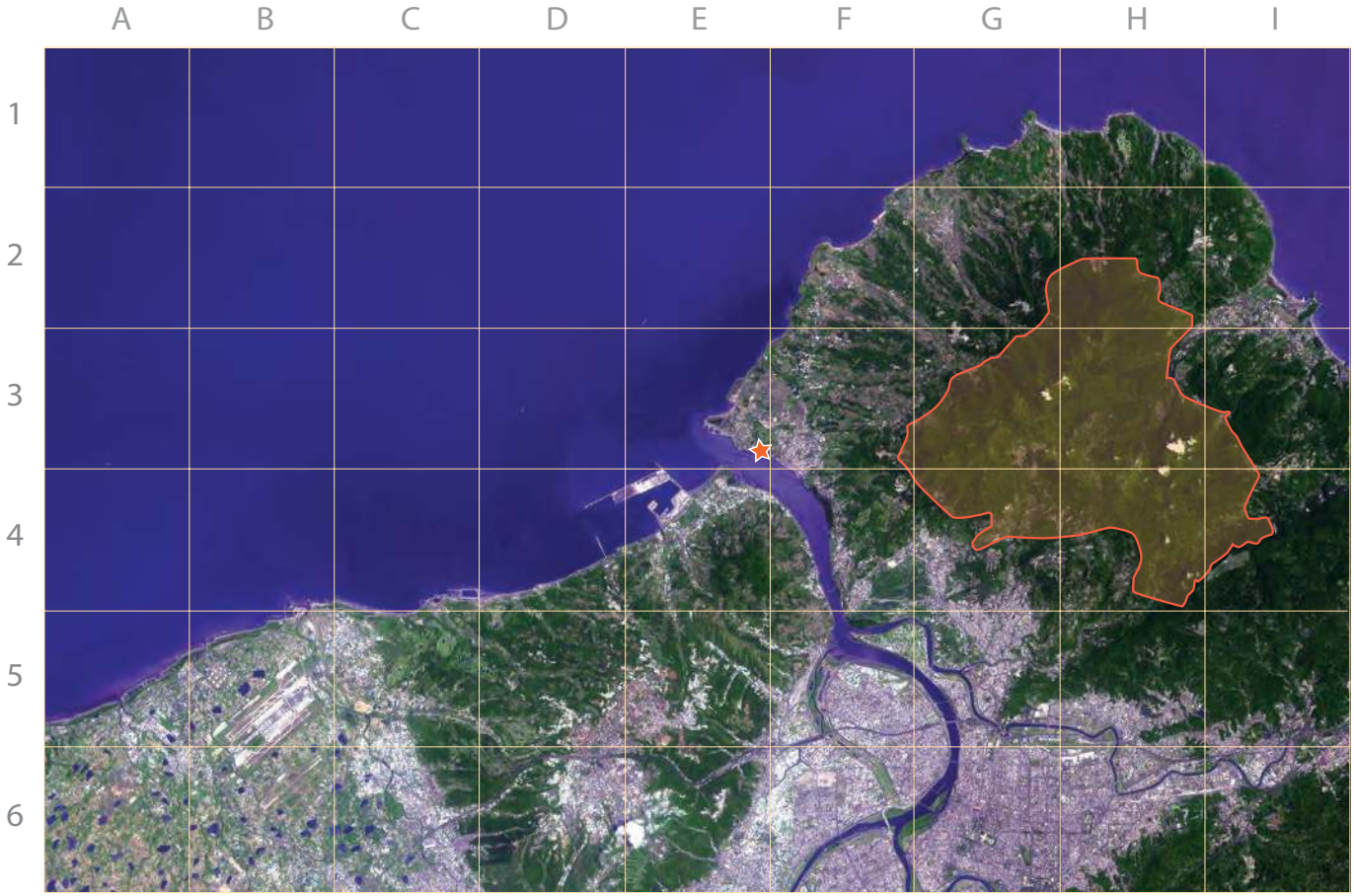
Many visitors—and much attention to them

A short drive or bus ride from the city, Yangmingshan National Park has some 4 million visits a year, many of them from people who go there after a day's work to watch birds or the setting sun. Once in the park, visitors can ride frequent park buses along a circular route with eight stops.

There are six visitor centres, including a central one that has museum displays and a theatre. The park provides intensive interpretation, both at these centres and elsewhere in the park, as well as through outreach to schools and neighbourhood organizations. Demand for interpretation is high, especially from well-educated visitors who ask for detailed information about nature, history and park management. Visitor behaviour is monitored, for example, to keep people from flying kites or setting off firecrackers, two traditional Chinese outdoor activities that can disturb wildlife. There are facilities for handicapped persons, including trails accessible by wheelchair. The park is protected by a detachment of the National Parks Police Corps, which reports to the National Police Agency rather than the park administration.

A corps of dedicated volunteers

The national parks of Taiwan, Province of China have a well-developed Volunteer Service Corps. Yangmingshan's component is by far the largest, with some



Yangmingshan National Park (boundaries in red) protects some 11,500 hectares in the mountains north of Taipei. The star indicates the Danshuei River Mangrove Nature Reserve. Terralook map: USGS/Eros and NASA; Rick Caughman.

500 members. This is a uniformed corps with separate interpretation and conservation elements. Interpreters work as tour guides, at visitor centres or in administrative support. Conservation volunteers work in monitoring, protection and maintenance. The age of volunteers at Yangmingshan currently ranges from 18 to 81, with the average around 45. There are more women than men: 54 per cent to 46 per cent. Drawn from a sophisticated urban population, they are highly educated and strongly motivated. While most members have regular jobs, many are retired, often from high-level positions in business, government or education, or from professions such as law or medicine. Fluency in English or Japanese is common and is useful in assisting foreign visitors.

The park's Volunteer Service Corps attracts highly educated residents of Taipei, including many retired professionals. Hann Sheng Linn (left) is a retired senior military officer; Nora Liang is a retired banker. Ted Trzyna.

Requirements to become and remain a member of the volunteer corps are strenuous. Each year, out of 500-600 applicants whose résumés are accepted, only 85 or so pass an oral interview. These candidates are required to attend six months of part-time classes and field trips. If they then pass an evaluation, they are appointed for a three-month probationary period. Not all make it through. Once they receive their uniforms, volunteers must serve a minimum of 80 days a year; this is reduced to 48 days after many years of service.

Membership in the park Volunteer Service Corps has high social status in Taipei and is considered an honour. Other motivations for joining the corps include love of nature, the opportunity to do something useful, meeting new people and working in a pleasant environment. Formal recognition is given for long or exceptional service. Volunteers' uniforms, meals and transportation to the park are subsidised, and they are insured in case of accident.

In 2011, Yangmingshan's volunteers served 700,000 hours. When asked if they can attach a monetary figure to this, park officials respond that they cannot do so because it is 'priceless'.

Although the volunteers have an association, it avoids getting involved in political issues facing the park. However, individual volunteers can and do use their influence in their own ways. Since many of them are well-connected, this influence can be considerable.

There are nearly 200 species of ferns in the park, which has forests characteristic of both tropical and temperate zones. Ted Trzyna.

A strict nature reserve nearby

On the other side of Taipei is 76-hectare Danshuei River Mangrove Nature Reserve (map, E-3), an example of a strict nature reserve (IUCN Category Ia) within a metropolitan area. It was created in 1985 to protect a stand of the mangrove *Kandelia obovata* which colonized deserted farmland and has become a prime stopover site for migratory birds. The reserve is bordered by a Taipei metro passenger rail line and is affected by water pollution, trash and trespassing, including for illegal fishing and bird-hunting. There is no guard station. The Forest Bureau of the Council of Agriculture, which is responsible for the reserve, plans to give more attention to law enforcement and public education.

Key lessons

- Many urban protected areas play a vital role in providing a place for millions of people to escape to from the pressures of urban living.
- Urban protected areas are particularly well suited to the development of a volunteer corps, which may sometimes be run to a very high professional standard and offer an invaluable resource to help park management.

Looking toward the mountainous park from Xinyi District in central Taipei. Lord Koxinga/Creative Commons BY-SA-3.0.

Selected resources and notes: See page 48.

Marseille, France

Calanques National Park

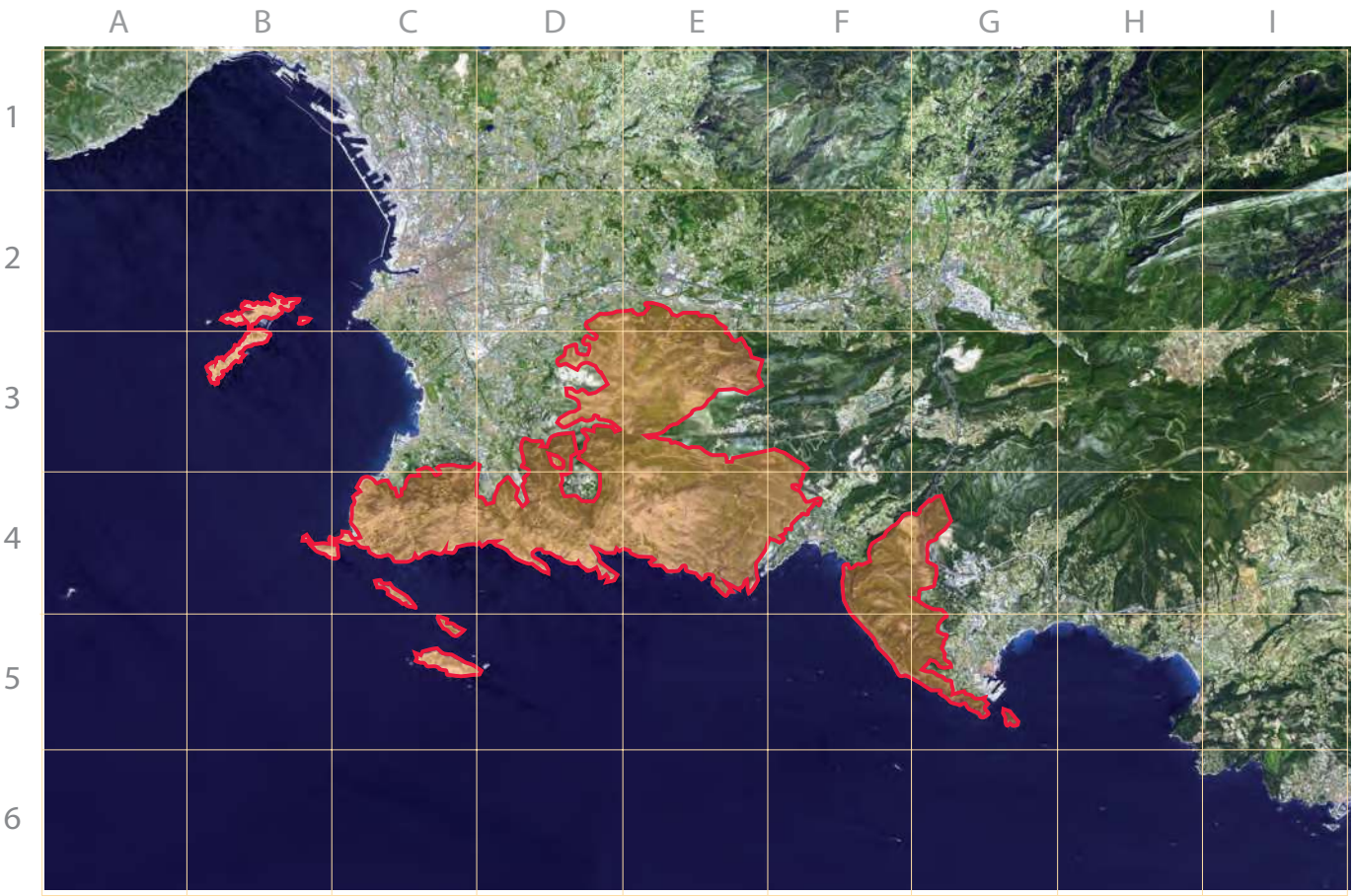
A new urban protected area on France's Mediterranean coast

Planned for more than 40 years, Calanques National Park (IUCN Category II) was created in 2012 as France's tenth national park. It is located on the outskirts of Marseille, the country's second largest city, which has a metropolitan population of 1.5 million. It is named for the many *calanques* (rocky inlets) along the coast. Its core is made up of 8,500 hectares of land and 43,500 hectares of the Mediterranean Sea; buffer zones cover another 2,630 hectares of land, including vineyards, and 97,800 hectares of sea. Within the offshore areas are many islands, including the archipelagos of Riou and Frioul. The park includes private and public land, and there are about 500 summer and full-time residents. There is easy access via bus or car, and admission is free.

An unusual meeting of urban, terrestrial and marine in a European national park

Calanques may be the only national park in Europe that adjoins a city and is both terrestrial and marine. It has a typical Mediterranean climate of hot, dry summers and mild, rainy winters. Its landscape, heavily influenced by human activity for millennia, is a mosaic of low shrubs and grassland, with forests of Aleppo pine (*Pinus halapensis*) and coppiced oak on higher ground. Its marine segments include large underwater meadows of neptune grass (*Posidonia oceanica*), as well as areas of red coral (*Corallium rubrum*). These marine habitats are rich with biodiversity and include such threatened species as sperm whale (*Physeter macrocephalus*, Endangered); and dusky grouper, a fish (*Epinephelus marginatus*, Endangered).

This park also has a rich cultural heritage. Among the most important tangible artifacts are paintings dating from as long as 27,000 years ago in Cosquer Cave, accessible only through a natural undersea tunnel. There are numerous shipwrecks, including Roman ones. Examples of intangible cultural heritage associated with the park are: local lifestyles; traditional hunting, fishing and gathering practices; and legends of the founding of Marseille.



Calanques National Park (boundaries in red) and its buffer zones extend from Marseille's city streets to shrublands and forests, as well as areas of the Mediterranean Sea that include two groups of islands. Terralook map: USGS/Eros and NASA; Rick Caughman.

A complex administrative structure

Although it is a national park created and supported financially by the national government, Calanques has an unusually complex administrative structure. Its Administrative Council consists of: nine representatives of national and regional agencies; twelve representatives of local governments; twenty-nine individuals representing various interest groups such as environmental protection associations, hunters, fishers and residents of the park; and a representative of park staff. A Scientific Council is made up of fifteen life and earth scientists and eleven experts in such fields as economics, law, urban planning, archaeology and history. It advises on applications for construction permits in the core area, as well as projects that involve balancing 'biological and human' interests and protecting the park's cultural assets and its distinctive character; it is also responsible for developing a multi-year research agenda for the park. Finally there is an advisory Economic, Social and Cultural Council, composed of agencies, associations and individuals involved in such activities in and near the park.

One of the calanques *(rocky inlets) after which the park is named. © 2013 George Trevigg.*

Pressures on the park

The park's land and sea areas receive an estimated 2 million visits a year. Onshore, the main pressures on the park are overuse by visitors in some areas, air pollution, industrial waste, and real-estate developments near park boundaries. The buffer zone between the park's core and urban parts of Marseille is very narrow and in places non-existent. In summer, wildfire is a constant concern, as it is anywhere that has Mediterranean or similar climates. Fires are caused by arson, as well as by lightning or accident. A corps of seasonal 'ecoguards', made up mainly of recent university graduates in environmental disciplines, patrols the park and gives special attention to informing visitors of the risk of fire. Offshore, the main threats are from illegal fishing and taking of coral, invasive alien species, urban wastewater, and waste and oil from ships. In addition, there is intrusive noise from tour boats and jet skis.

The park protects many cultural artifacts, including 27,000-year-old paintings in Cosquer cave. SiefkinDR/ Creative Commons BY-SA-3.0.

Key lessons

- Where relevant, the marine environment should be considered for inclusion in an urban protected area.
- Arrangements should be made to secure high quality scientific and other advice.
- A major investment will be needed to deal with the threat of fire in some urban protected areas.

Selected resources and notes: See page 48.

Mumbai, India

Sanjay Gandhi National Park

Balancing extremes in a contested urban forest

Sanjay Gandhi National Park (IUCN Category II) is located in the fast-growing northern suburbs of Mumbai (formerly Bombay), India's second largest city. Urban pressures are acute. Of the 20.8 million people inhabiting this metropolitan area, over 2 million live within two kilometres of the park boundaries. The park has some 61,000 illegal residences. It is home to a sizeable population of leopards, and human-wildlife conflict is a persistent management issue. The park is managed by the Forest Department of Maharashtra State.

An urban refuge for nature; a natural attraction for people

The national park was designated in 1950 with an initial area of 2,000 hectares. It has been expanded gradually to nearly 10,400 hectares. The park is covered mainly with mixed-deciduous tropical forest and also includes remnant mangrove scrubs. It provides habitat for around 1,000 species of flowering plants, nearly 300 species of birds, and at least 59 mammal species, including one of the world's highest densities of leopard. It also contains several sacred sites, including the Kanheri Buddhist caves.

Reservoirs in the park supply around 10 per cent of Mumbai's drinking water. The park also protects the city from floods. In July 2005, Mumbai experienced a rainstorm of unprecedented proportions—994 mm of rain fell in the first 24 hours alone—that resulted in extensive flooding. As the largest permeable surface remaining in the metropolitan area, the park helped to prevent an even worse situation. In view of the more extreme weather events predicted to occur with climate change, this function will become even more important in the future.

With over 1.2 million annual visits, this easily accessible park is one of the most visited protected areas in South Asia. Users range from early-morning joggers to schoolchildren on organized visits. Entry to the core of the park is limited, and most visits are to two public areas for which a nominal entrance fee is charged. Park

In the northern suburbs of Mumbai, 10,400-hectare Sanjay Gandhi National Park (boundaries in red) plays a vital role in protecting the city's residents from floods. Terralook map: USGS/Eros and NASA; Rick Caughman.

visits peak at certain times during the year, for example, the Kanheri caves attract nearly a quarter of a million visitors during the annual Hindu festival of Mahashivratri, straining the park's capacity.

Managing the park's sizeable leopard population is a major challenge. Srikaanth Sekar/Creative Commons BY-SA-2.0.

Persistent encroachment, even after court intervention

In recent years, Sanjay Gandhi National Park has been home to over 300,000 residents. Some are indigenous people whose traditional hamlets were subsumed over time into the expanding protected area. Most, however, are squatters living in extensive settlements they have built just inside the park boundary. This encroachment and the problems it causes—habitat degradation, wood poaching, increased fire risk, dumping and large numbers of stray dogs—are a major challenge for park managers.

Human encroachment in the park reached its peak in the mid-1990s. Those who benefitted from the presence of the squatters were rent collectors operating outside the law and politicians who depended on them for their votes. Responding to a public-interest lawsuit brought by a local NGO against the Maharashtra state government, the state High Court reaffirmed the park's protected status and ordered the Forest Department to remove all illegal human settlements and build a wall to prevent them from re-occupying the area. Many thousands of illegal structures have been demolished and around 11,000 households have been provided with alternative accommodation elsewhere. Nonetheless, the pressures for encroachment remain, and portions of the recently constructed boundary wall have been breached by people living on the edges of the park.

The Kanheri Caves attract nearly a quarter of a million visitors to the park during an annual religious festival. Sreejithsh/Creative Commons BY-SA-3.0.

A human-wildlife balance difficult to maintain

When such large informal settlements compete for space with one of the world's densest populations of leopards, conflict is an unsurprising consequence. As a species, leopards normally prey mainly on ungulates, but scat analysis of those in the park shows that their diet mainly consists of stray domestic dogs. Since these dogs thrive mainly on discarded waste from human settlements, reducing settlements inside the park cuts the number of dogs available to leopards. When leopards seek new food sources in adjacent urban areas, deadly human-wildlife conflict ensues. Between 2002 and 2006, 93 leopard attacks were recorded, resulting in 55 human deaths. Park managers have taken a two-pronged approach to this. They release alternate prey, such as deer, and they capture and relocate leopards. In addition, in cooperation with local NGOs, they conduct public education campaigns, both inside and outside the park, to teach people how to peacefully co-exist with these urban carnivores. This includes addressing people's fears.

Key lessons

- Some urban protected areas play a vital part in protecting urban populations from floods.
- Severe pressures for encroachment into urban protected areas can only be resisted if there strong political support for the measures needed; and entrenched interests will need to be overcome.
- Wildlife-human conflicts can be very severe in urban protected areas and must be addressed to secure public support for protection.

Mumbai's skyline from the park. Rudolph Furtado/Creative Commons, public domain.

Selected resources and notes: See page 48.

Kingston, Jamaica

Blue and John Crow Mountains National Park

At the edge of an island capital, a national park managed by an NGO

Blue and John Crow Mountains National Park (IUCN Category II) is at the edge of Kingston, the capital and main city of Jamaica (metropolitan population 580,000). The park protects an area of 48,600 hectares, including the largest contiguous block of natural forest in this island country. It is the source of drinking water for 40 per cent of Jamaica's 3 million people, as well as water for agriculture and industry. Residential and commercial development are prohibited. Although there is no public transportation, much of the park is easily accessible by car and a system of trails.

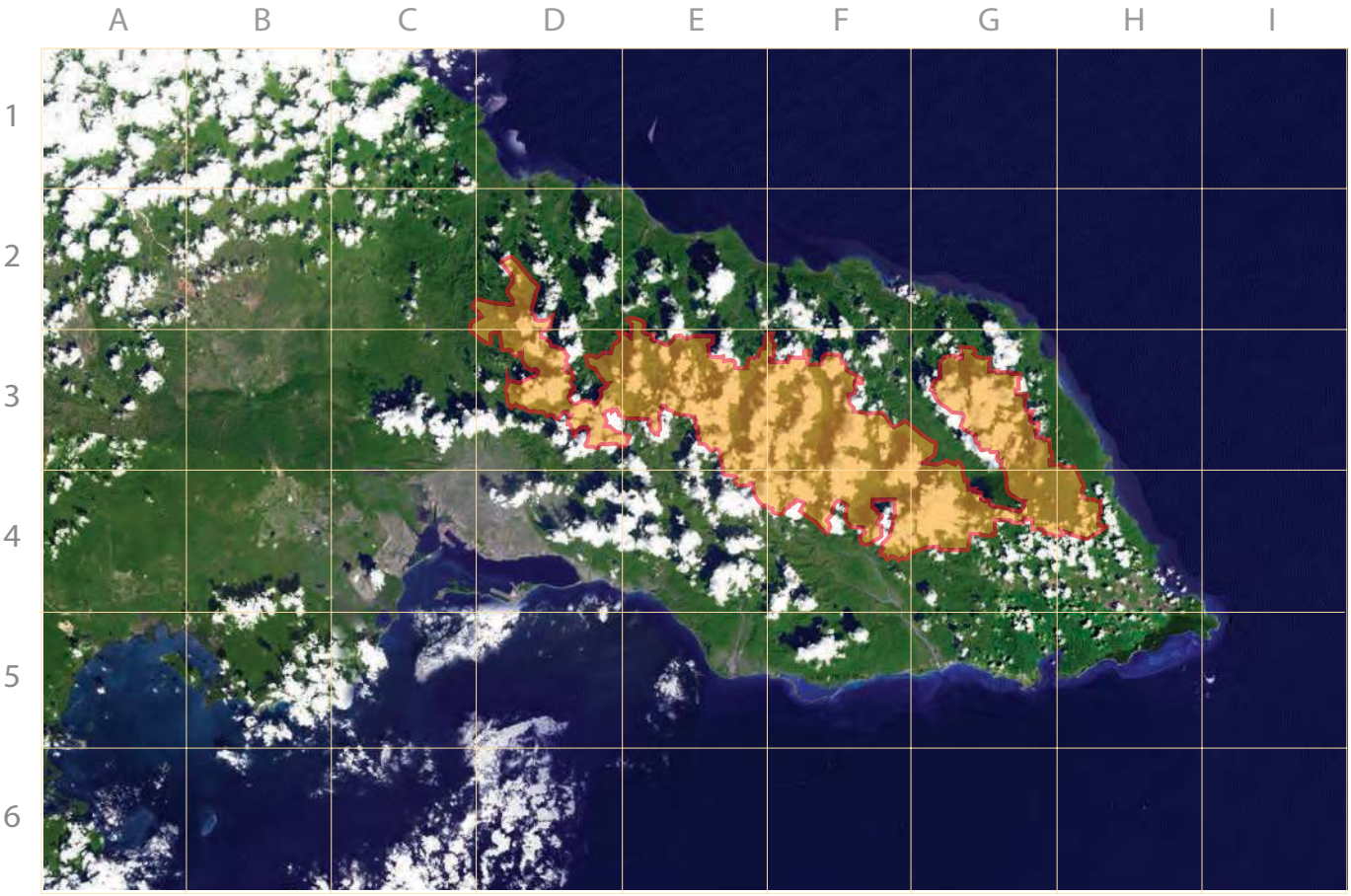
Natural heritage: Rich tropical biodiversity

Within the park are a variety of tropical forest types, including very wet, cloud and elfin forests, as well as summit savanna. Rainfall ranges from 2,600 mm to 4,300 mm per year. Large numbers of plant species are endemic to these mountains, including ferns and flowering plants, such as orchids and bromeliads. Among 200 species of resident and migratory birds are some found only here, as well as several on the IUCN Red List of Threatened Species, including the Jamaican blackbird (*Nesopsar nigerrimus*, Endangered). There are also locally endemic species of frogs, lizards and snakes.

The park is the last known major habitat of the Homerus or Jamaican giant swallowtail butterfly (*Papilio homerus*, Endangered), the largest butterfly in the Western Hemisphere. Black with yellow bands and red and blue spots, it is a national symbol. Although there is illegal collecting, habitat loss has been the major threat to its survival. The butterfly caterpillars eat only the leaves of water mahoe (*Hernandia catalpifolia*). A local farmers' association grows seedlings of this tree for the park, which plants them in degraded areas. Park managers believe this has contributed to increasing numbers of the butterflies seen in the area.

Cultural heritage: The Windward Maroons

On the opposite side of the park from Kingston are small, semi-autonomous



Blue and John Crow Mountains National Park (boundaries in red) extends over 48,600 hectares outside Kingston and its environs (the grey area at C/D-3/4). Terralook map: USGS/Eros and NASA; Rick Caughman.

communities of Windward Maroons, people who originated centuries ago when Africans who escaped slavery intermixed with native Amerindians. They formed viable settlements in remote areas, and maintained their freedom by fighting off colonial efforts to re-enslave them. The Windward Maroons had a close relationship with their natural surroundings. A distinct Maroon culture still exists, especially in food, music, dance, language and sacred natural sites, many of which relate to Maroons' fights for freedom, but there is limited transmission of traditional knowledge to younger generations.

Pesticide runoff from coffee plantations can pollute the park's streams. Here park staff monitor water quality. © Susan Otuokon 2013.

The Windward Maroons were one of the 'frontline stakeholders' involved in negotiations to establish the park, and the park works with Maroon communities to preserve and promote their heritage. For example, it helps community-based organizations in three Maroon communities with training and project planning, fundraising and implementation. It has been a financial sponsor of a conference and festival devoted to Maroon culture. A recent paper co-authored by conservationists and a Maroon leader (John et al., 2010) proposed compiling information about sacred natural sites and stories about them, incorporating these sites and stories in the park's education programmes (including promoting Maroon heritage among Maroons) and protecting sacred natural sites in the park. Although Maroon settlements and sacred sites are relatively remote culturally and geographically from Kingston, urban visitors to the park would be able to learn about this vital part of Jamaica's heritage.

Collaborative management

Blue and John Crow Mountains National Park is a collaborative effort among three organizations. The park was designated in 1993 and is within the boundaries of the larger Blue Mountains Forest Reserve, established in 1950, for which the Forestry Department has responsibilities. National parks in Jamaica are under the purview of the Protected Areas Branch of the National Environment and Planning Agency. Since 1996, the agency has designated an NGO, the Jamaica Conservation and Development Trust (JCDT), as the park's manager. JCDT was founded in 1987 and was heavily involved in the establishment of the park. It prepares a management plan and implements it with funds from the government, donors and the private sector. A Co-Management Committee meets at least twice a year to ensure coordination.

The 1.2-kilometre Oatley Mountain Trail rises from the Holywell recreational area through primary forest to a 1,400-metre peak. © Susan Otuokon 2013.

The main recreational area is Holywell, located on the edge of the park less than an hour's drive from the city. It has picnic areas, campsites, cabins and a visitor centre, and receives some 10,000 visits a year, of which about 90 per cent are from residents of Jamaica, mainly Kingston. The Blue Mountain Peak Trail has about 4,000 visits a year, many of them by students at universities in Kingston. Apart from an entry fee at Holywell and some trail fees, admission to the park is free.

The main pressures on the park are deforestation caused by rural communities for farming, and encroachment and pollution from use of pesticides by large-scale coffee farmers. Rangers patrol the park, particularly at the boundaries susceptible to encroachment. The park's Education and Public Involvement staff works with local communities to raise awareness and promote sustainable livelihoods.

Densely forested peaks of the Blue Mountains. © Susan Otuokon 2013.

Key lessons

- The success of an urban protected area often depends as much on genuine engagement with locally resident communities as with the urban populations nearby.
- Support for nature conservation may be helped by demonstrating respect for the cultural heritage of people living in or near the urban protected area.

Selected resources and notes: See page 48.

Nairobi, Kenya

Nairobi National Park

An urban protected area under siege: 'Time to draw the line'

Within the city limits of Nairobi, Kenya's capital, 117-square-kilometre Nairobi National Park (IUCN Category II) is in the African savanna biome at an altitude of around 1,600 metres. It has an impressive array of wildlife species, including black rhinoceros (*Diceros bicornis*, IUCN Critically Endangered), lion, leopard, hyena, cheetah, buffalo, eland, wildebeest, zebra, hippopotamus, giraffe and diverse birdlife.

The protected corner of a larger natural system

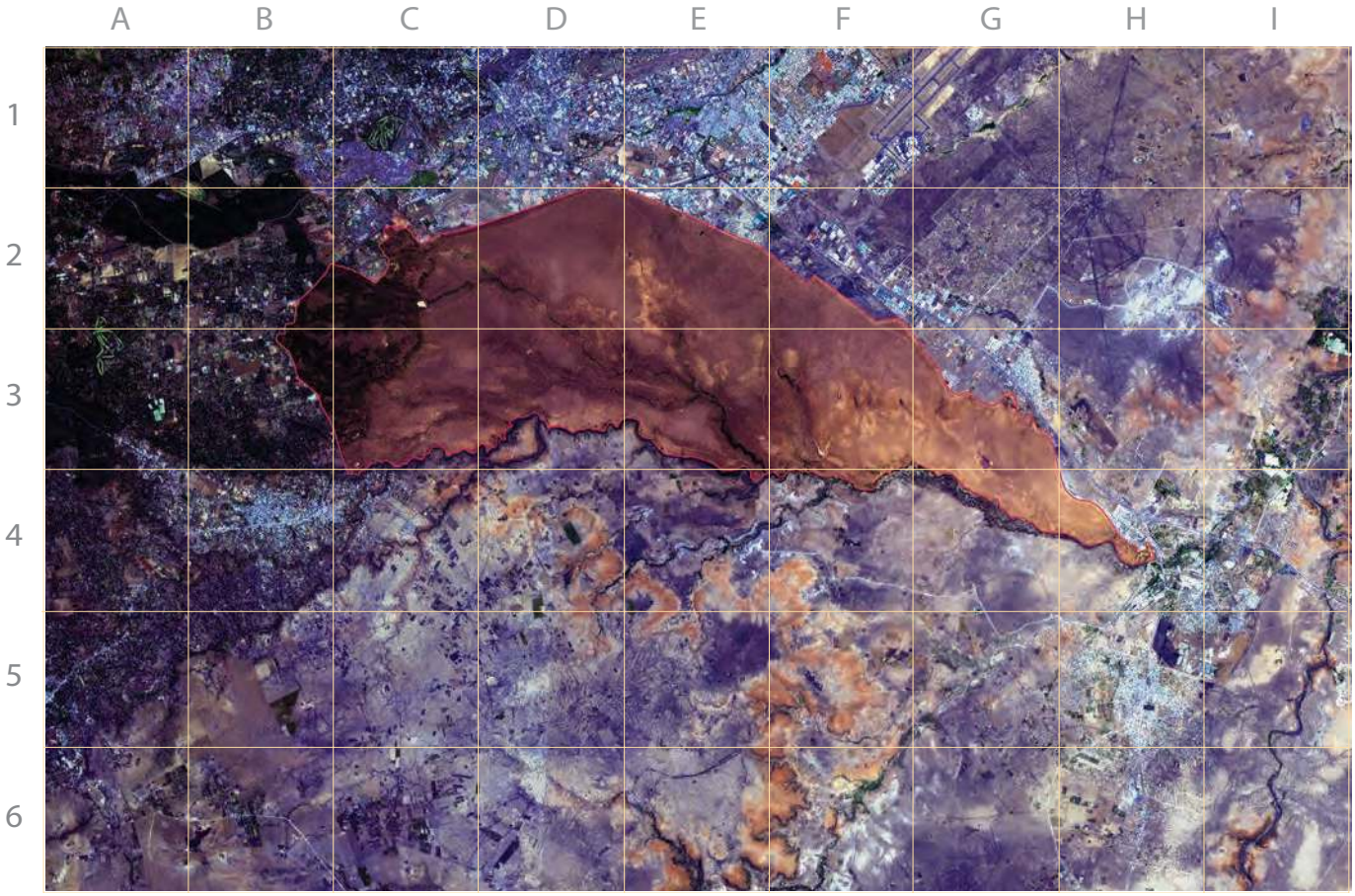
The park marks the northern limit of seasonal wildlife migration from over 200,000 hectares of semi-arid savanna. Electric fences along the park's northern, western and eastern boundaries separate it from urban and industrial activity. In the south, the park is unfenced to allow free movement of wildlife as part of the broader ecosystem. During the dry months, herbivores—such as wildebeest—take refuge in the park, which is well-watered. During the rainy season they return to the plains, where food is normally plentiful and predators are more easily avoided.

In the main park area, only visits by motor vehicle are allowed. In 2011, the park had some 121,000 visits. Next to the main gate, exhibits provide pedestrian-accessible conservation education; these received 691,000 visits in 2011.

A fast-changing urban landscape

When it was established in 1946 as Kenya's first national park, Nairobi National Park was on the outskirts of what was then a city of some 120,000 people. Now Nairobi has a population of over 3 million, and urban pressures on the park have increased greatly.

There is little open space now left in Nairobi's urban fabric, and the land around—and sometimes within—Nairobi National Park is increasingly coveted for purposes other than conservation. Buffer zones have gradually been converted to such urban uses as informal housing and factories. Decades of ad hoc development have severely degraded land along the park's eastern boundary. Access to its southeast corner has been closed because of toxic air pollution. Inside the park, infrastructure



Nairobi National Park (boundaries in red), which covers 117 square kilometres, is protected from urban activity by electric fences along its northern, western and eastern sides. Along its south side, the park is unfenced to allow free movement of wildlife. Terralook map: USGS/Eros and NASA; Rick Caughman.

projects are increasingly proposed and sometimes built: an underground oil pipeline was recently constructed just inside the park fence. A motorway is planned along a similar route.

Giraffes, as well as lions, rhinoceros, buffalo and other large mammals roam within sight of the city centre. Wikipedia/Creative Commons BY-SA-3.0.

Urban impact on the park and the larger ecosystem

With more and more urban development occurring near the park, Nairobi municipal planning and law-enforcement issues are now regularly on the agenda of park managers. These include issues related to squatters, industrial effluent and emissions, and poaching of wildlife and firewood.

Although such pressures were at first concentrated on the park's urban-facing boundaries, recent years have also seen increased activity on the southern plains, well beyond Nairobi's current city limits. Here, where the protected area is open to seasonal wildlife migration, traditional pastoral practices have maintained the open space necessary for viable animal movements. But over time, incremental changes to land use have become an obstacle to this migration: the built-up areas of Ongata Rongai and Kitengela are expanding, and another proposed highway would connect them. This kind of development is progressively cutting off the park from the plains upon which its wildlife depends.

Relating beyond the protected area

Nairobi National Park is managed by the Kenya Wildlife Service (KWS), a parastatal organization responsible for all nationally protected areas in Kenya. Most land adjoining and near the park is subject to local government land-use regulation. Although no standing mechanism exists for consulting with planning authorities, KWS does comment regularly on individual proposals that could affect the park, and it proactively encourages planning initiatives that are aligned with its conservation aims. An example is the community-developed Kitengela-Isinya-Kipeto Land Use Management Plan, which calls for minimum plots of 24 hectares in much of the southern wildlife dispersal zone.

KWS is assisted by several partner organizations. For example, to discourage fence construction in the broad wildlife dispersal area south of the park, The Wildlife Foundation, a local NGO, pays pastoral landholders a nominal rent in exchange for their agreement not to subdivide parcels or otherwise impede the occasional passage of migrating wildlife.

A business organization sponsors Nairobi GreenLine, a project to plant trees along 30 kilometres of the park's urban edge. © Wanja Kimani 2013. Used by permission.

Nairobi GreenLine, a partnership between KWS and the Kenya Association of Manufacturers, works to strengthen the park boundary and raise public awareness in order to 'shield' the park from 'land grabbers and polluters'. In 2010, it began planting a 50-metre-wide 'forest' of indigenous trees along 30 kilometres of the park's urban edge; eloquently capturing the challenges facing this urban protected area, the billboards of this initiative boldly proclaim: 'The Nairobi National Park is under siege … it's time to draw the line.'

Key lessons

- As urban protected areas are under constant pressure from urban development, consistent, high level support is needed for their protection.
- Parts of an urban protected area often adjoin rural lands; this land must be managed to support conservation within the park.
- The educational opportunities offered by urban protected areas are potentially immense.

Selected resources and notes: See page 48.

Seoul, Republic of Korea

Bukhansan National Park

Coping with millions of visitors; buffering effects of intense urban development

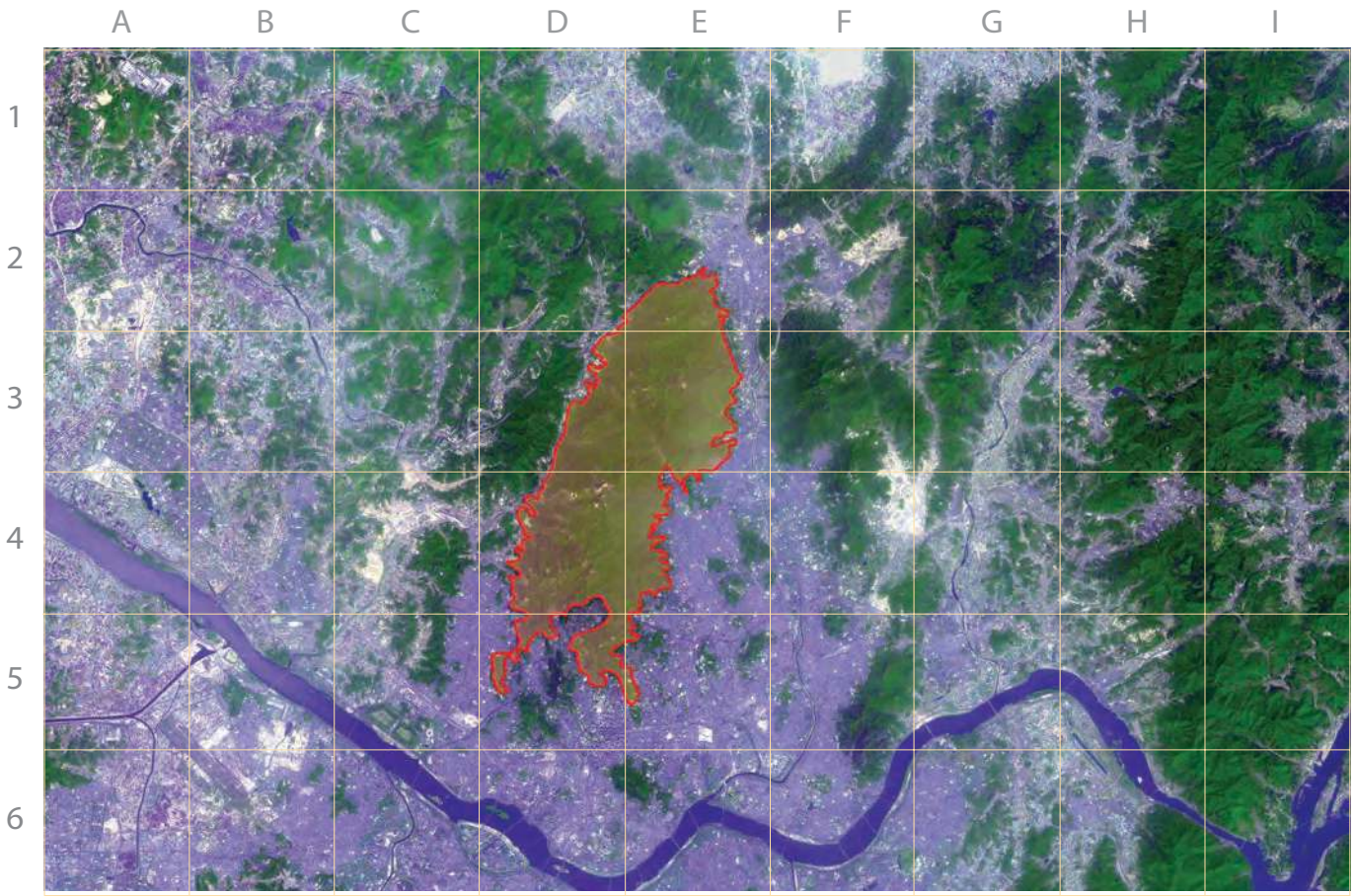
With over 25 million people, Seoul, capital of the Republic of Korea, is one of the world's largest metropolitan areas. At its northern edge is the heavily visited Bukhansan National Park (IUCN Category V), which covers some 8,000 hectares of temperate forests and granite peaks rising to 836 metres. The park includes historic Buddhist temples and an old fortress and has some 1,300 species of plants and animals. It was established in 1983 and is administered by the Korea National Park Service.

Managing large numbers of visitors and their impacts

Bukhansan National Park is easily accessible by city bus or car and receives very large numbers of visitors, almost entirely from the Seoul metropolitan area. Managing these visitors and their impacts is this park's major challenge.

In the course of one year, 2007, the number of annual visits to Bukhansan doubled, from an estimated 5 million to 10 million. This was the result of a high-level political decision by the national government to eliminate entrance fees at all the country's national and provincial parks. Although the fee was the equivalent of only US$ 1.50 (and this in a country classified as high-income by the World Bank), its removal was nonetheless important symbolically. The Park Service provided additional funding to park management to offset the loss of revenue. It also helped that Bukhansan has a well-developed system for engaging, supervising and thanking park volunteers. By 2011, visitor numbers had stabilized at around 8 million as the novelty of free entrance had worn off.

People visit the park for many reasons, including religious pilgrimage and mountain climbing. However, most come to hike, especially on weekends. Impacts on the natural environment have been considerable. A major problem is informal pathways made by hikers wanting to avoid busy formal trails. These pathways are estimated to extend over more than 70 kilometres. They affect native plants and animals through the edge effect, and help to introduce alien species.



Bukhansan National Park (boundaries in red) protects 8,000 hectares of granite peaks and wooded valleys on the northern edge of Seoul. Terralook map: USGS/ Eros and NASA; Rick Caughman.

Hikers have created some 70 kilometres of informal trails in the park, damaging natural habitat; the park has taken measures to remedy this. Craig Nagy/Creative Commons BY-SA-2.0.

To allow for recovery of such areas and prevent further damage, park managers prohibit entry into selected places called Special Protection Zones. These range from less than a hectare to 180 hectares and are designed to protect native plant habitat, prevent ravine erosion and allow for restoration of damaged trails. They are put in place for periods varying from a year to two decades. This programme, started in 2007, came out of a 'rest-year sabbatical system' adopted in 1991. It is used throughout the Korean National Park System. Violations can result in fines equivalent to US$ 425.

A buffer zone for 'eco-friendly urban planning'

Urban development, including high-rise apartment buildings, has marched right up to the boundary of Bukhansan National Park. As a result, both park managers and Seoul city planning officials promote 'eco-friendly urban planning' in the park's buffer zone. There are three aspects to this:

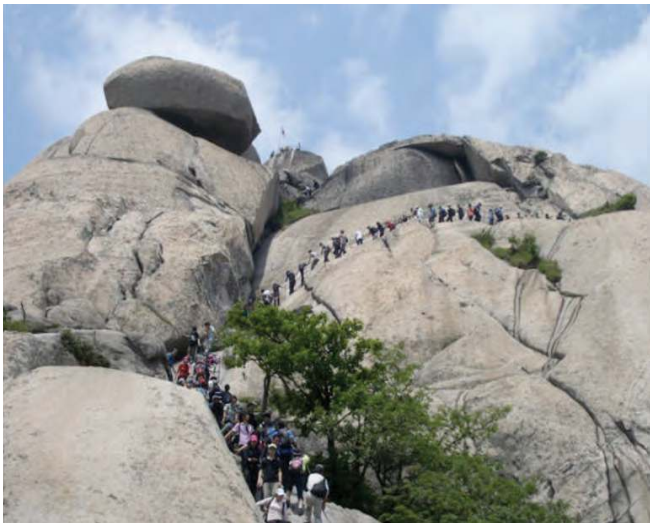
First, a spatial database for landscape planning has been created, based on biotope mapping of natural resources on both sides of the boundary. This is used to: identify opportunities to connect the park with remaining green spaces in Seoul; restore river ecosystems; protect wildlife habitat; develop facilities for outdoor recreation; and establish wind corridors between high-rise buildings to disperse air pollutants and bring in fresh air.

Second, a formal buffer zone is being developed, consisting of six districts. These districts will have responsibility for guiding the height and arrangement of buildings, as well as protecting viewsheds.

Third, participation of local communities and residents is being encouraged through their collaboration in policy-making, volunteer activities, and nature and cultural festivals.

Key lessons

- Sophisticated zoning and other management techniques are essential where urban protected areas have to cater to large numbers of visitors.
- The planning of the urban areas adjoining the protected area should be undertaken with the needs of the park in mind and may need to be executed as a joint programme to help protect the park from urban pressures.



The park had 10 million visits in one recent year. Bong-ho Han.

Seoul is one of the most densely populated cities in the world. The city's centre seen across the Han River. Charles Lam/Creative Commons BY-SA-2.0.

Selected resources and notes: See page 48.

Gwangju, Republic of Korea

Mudeungsan National Park

South Korea's newest national park could more than double in size

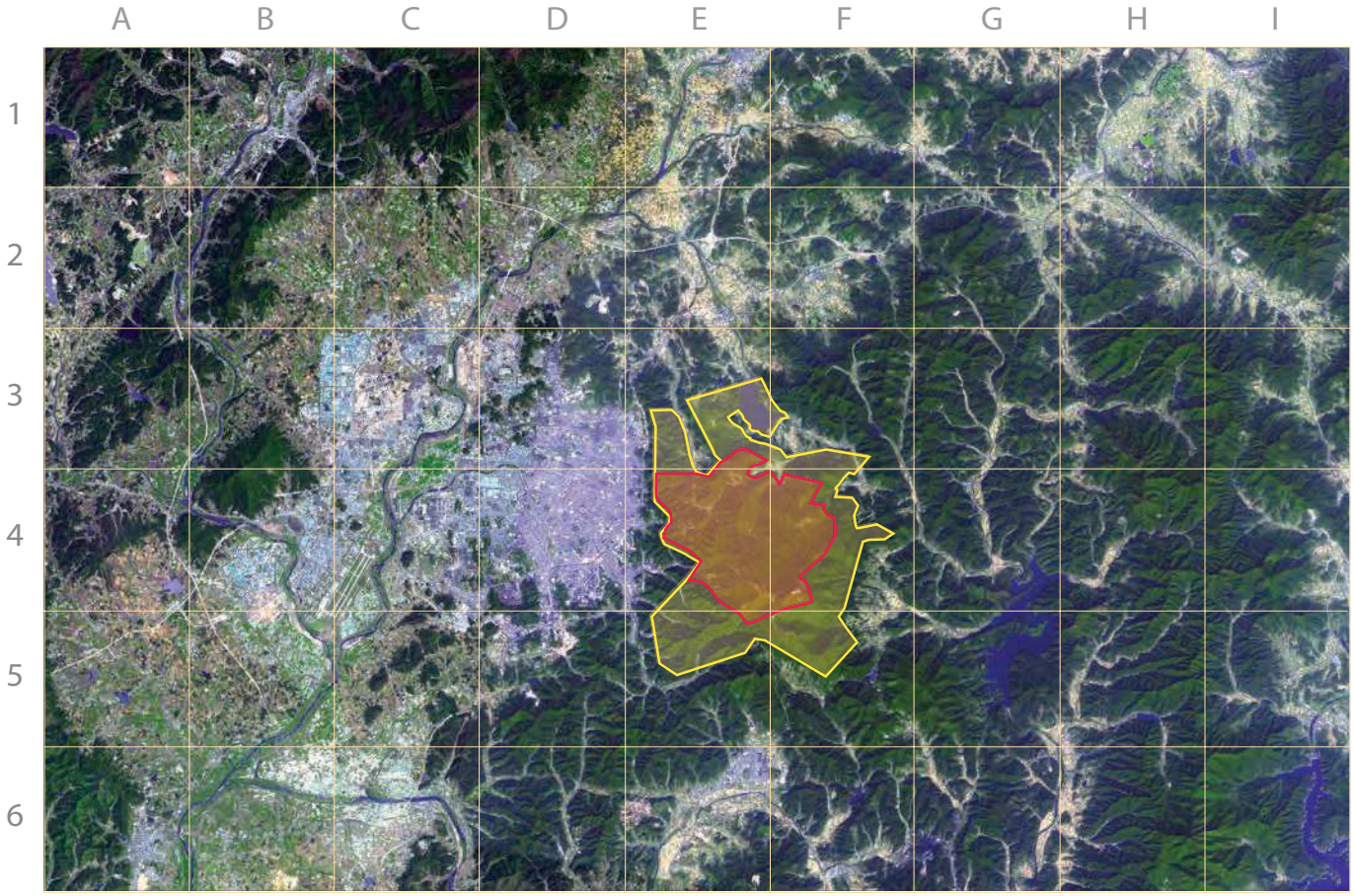
Within the boundaries of Gwangju, South Korea's fifth largest city, the 3,000-hectare Mudeungsan National Park (IUCN Category IV) features a 1,200-metre-high forested mountain. A network of well-signed trails is heavily used by local residents. There are several Buddhist temples, as well as a museum of cultural artifacts from the region, which is in the southwestern part of the Korean peninsula. About 57 per cent of the park is in private ownership but subject to strict development controls.

A vigorous response to urbanization

Mudeungsan was established in 1972 as a provincial park of Jeollanamdo Province. When Gwangju Metropolitan City was created in 1986 with a status equivalent to that of a province, the park became the responsibility of the city. In 1972, Gwangju had a population of 620,000. This has grown to over 1.4 million. Urban pressures on the park have increased accordingly, both in terms of visitors and land-use changes.

There were over 7.2 million visits in 2011, mainly by residents of Gwangju. The park is easily accessible by city bus or car. There is no admission charge except for parking. The mountainous area of the park is accessible only by walking and climbing.

When it was established, the park was on the outskirts of the city, but residential, commercial and industrial development have advanced closer and closer. The city government has responded vigorously with land-use planning and regulation centred on several buffer zones. These consist of a Green Area for Conservation, which has the strictest standards for protection of open space—only farming and low-density housing are allowed—and Scenery Zones in residential areas, where viewsheds and landscapes are protected from high-density construction. In addition, the city's second ring road serves as a buffer between urbanized areas and the park. Taken together, these measures not only protect the park, but work to contain urban sprawl.



Mudeungsan National Park (park boundaries in red; buffer zone boundaries in yellow) protects 3,000 hectares of a forested mountain at the eastern edge of South Korea's fifth largest city. Terralook map: USGS/Eros and NASA; Rick Caughman.

Over half of the park is in private ownership but subject to strict development controls. Auteurkims/ Creative Commons BY-SA-3.0.

Inappropriate development is also addressed within the park. A military camp, a transmission tower and commercial shops have been removed in an effort to preserve and restore natural habitats.

Proposed expansion and national park status

In 2010, the city proposed to the Korea Ministry of Environment that Mudeungsan be expanded from 3,000 to 8,000 hectares and made a national park. The motivations for expansion were protection of environmentally sensitive lands and creation of more opportunities for outdoor recreation, especially hiking and mountain-climbing.

The ministry asked the Korea Environment Institute, a research centre under the Office of the Prime Minister, to undertake a feasibility study. The institute made positive findings, as did the Korea National Park Service, and Mudeungsan was declared South Korea's twenty-first national park in March 2013.

Local non-governmental organizations have provided political support for national park status and expansion, as well as help with securing the agreement of private landowners who would be affected by the expansion. These landowners would retain ownership but be compensated by the city and the national government for loss of development rights.

High-rise buildings such as these have been built close to the park's western edge. CD/Creative Commons BY-SA-3.0.

National park designation will result in increased funding. It also carries with it considerable prestige. However, even with an expanded park and national park status, the challenges of urbanization and accommodating large numbers of visitors will remain. To cope with these challenges, park staff and their advisers believe it will be essential to bring park management and urban planning together in a comprehensive 'sustainable ecological design', an approach that combines land-use and building-density regulations, zoning and other environmental guidelines.

Key lessons

- Land use planning outside the urban protected area, and management and zoning within it, benefit from being integrated; so park and city planning staff need to work together in shaping policy and implementation.
- The status associated with becoming a 'national park' can persuade city authorities to support urban protected areas.

Street merchants near the entrance to the park. Tecking/Creative Commons SA-2.0.

Selected resources and notes: See page 48.

Cape Town, South Africa

Table Mountain National Park and a municipal nature reserve

Protecting extraordinary biodiversity; contributing to an urban social agenda

Table Mountain National Park (IUCN Category II) covers some 25,000 hectares of land and 100,000 hectares of sea around the Cape Peninsula of South Africa. It is within the City of Cape Town, which has a population of 3.9 million. The park includes Cape Town's iconic Table Mountain, which rises 1,100 metres above the ocean. It is administered by South African National Parks, part of the Department of Environmental Affairs.

The park was established in 1998 out of a mosaic of lands owned by various public authorities. It started with 16,000 hectares of land and expects to expand to about 29,000 hectares. Fragmented by privately owned parcels, it is bordered by some of the wealthiest residential areas of the city as well as seven shantytowns. It is an 'open-access park', with only four managed pay points. Visits are estimated to be 4 million annually, with one million of these made by paying visitors.

Protecting an unparalleled flora

Table Mountain National Park is one of eight sites that comprise the Cape Floral Region Protected Areas World Heritage Site, inscribed by the UNESCO World Heritage Committee in 2004. The Cape Floral Region, which covers some 90,000 square kilometres, is the smallest of the world's six floral kingdoms. The region has some 8,500 plant species, of which just under 70 per cent are endemic, as are 193 of its plant genera and six plant families. Nowhere else in the world is there such a profusion of endemism and concentration of plant species, with a density of 1,300 in 10,000 square kilometres (compared to 400 in a similar area of tropical rain forest in the Amazon).

On the Cape Peninsula, most of which is within Table Mountain National Park, there are some 2,300 species of flowering plants, at least 90 of which are endemic to the peninsula. Some of these plants have minute natural ranges, for example one orchid is known only from two cliff ledges in the park. Many are listed as facing a high risk of extinction.

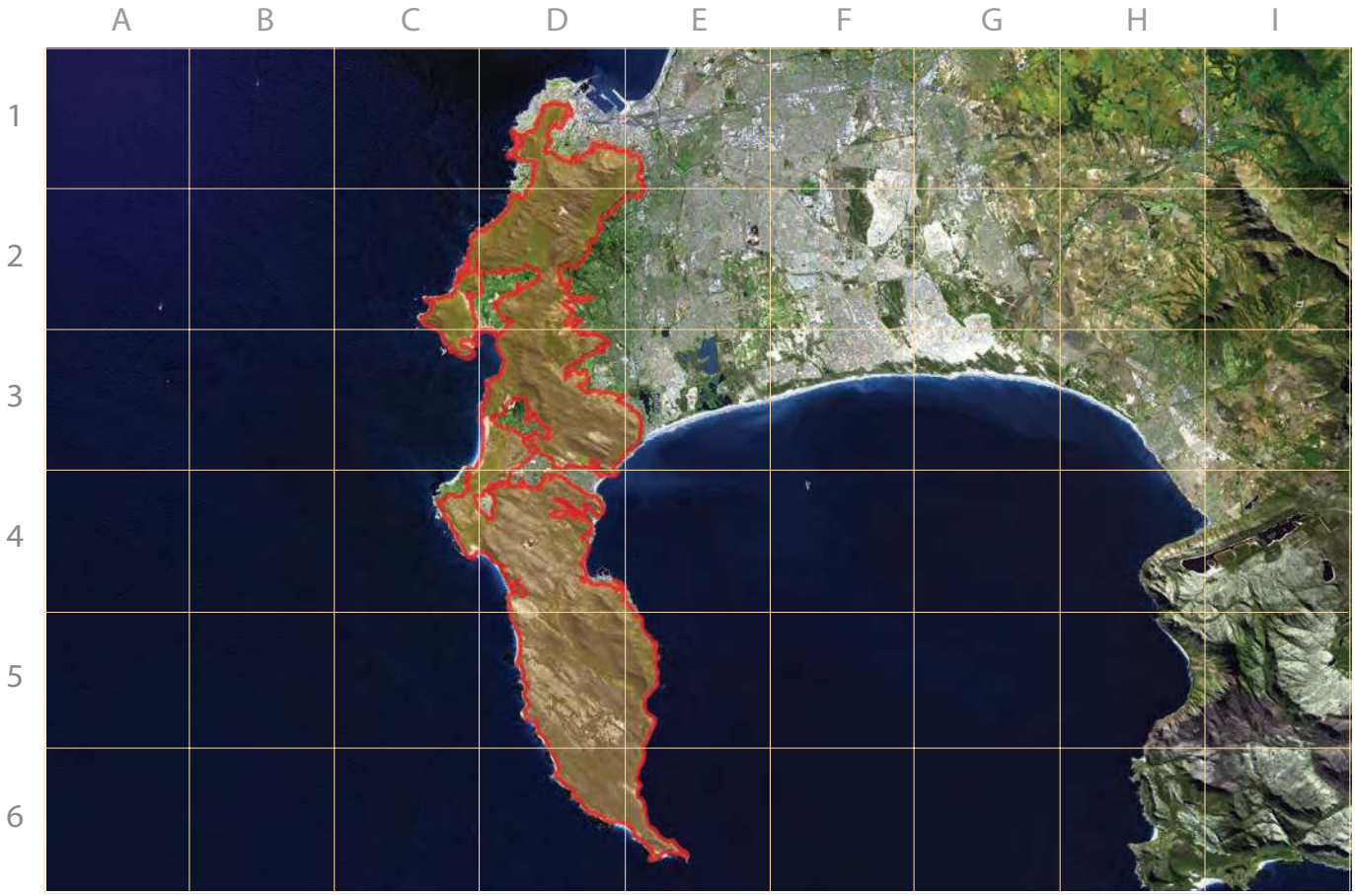


Table Mountain National Park (approximate terrestrial boundaries in red) covers some 25,000 hectares of land and 100,000 hectares of the South Atlantic Ocean. Terralook map: USGS/Eros and NASA; Rick Caughman.

There is a rich diversity of fauna as well. The most visible species are such widely distributed mammals as zebra and several kinds of antelope. Among smaller animals, however, are at least 112 that are endemic to the Cape Peninsula. These are almost all invertebrates, but include the rarely seen Table Mountain ghost frog (*Heleophryne rosei*, IUCN Critically Endangered), which is found only in seven mountain streams.

Climate change is causing warmer and drier conditions in the Cape region, increasing already significant water stress and resulting in more frequent fires. The ranges of many native plants are shifting, shrinking or becoming disrupted. At the same time, invasive plants that are less sensitive to climate change are spreading, further reducing the supply of water and contributing to increased fire frequency. Consequently, a UNESCO study found that many protected areas in the region may lose species through rapidly cascading extinctions and migrations. Conservation organizations in the Cape region are therefore giving serious attention to protecting and expanding migration corridors (see page 75).

The 700 kilometres of hiking trails in the park include popular routes to the top of Table Mountain. TMNP.

Providing jobs and training to the poor

The urban context for protected area management in Cape Town is one of extreme inequality, reinforced by spatial separation of races as a legacy of apartheid. The average unemployment rate is 24 per cent, although this varies greatly from one part of the urbanized area to another.

The park's management has a strong commitment to social justice. Its former Manager, Brett Myrdal, has written, 'Because South Africa is a developing nation with a long history of inequality, the park's duty is to conserve the Cape Peninsula's rich biodiversity while at the same time making a meaningful contribution to the socioeconomic development of citizens living on and around its borders.'

Poverty relief in the form of jobs and training is a priority. Using funds provided by the South African Government's Expanded Public Works Programme, a key initiative that provides poverty and income relief through temporary work for the unemployed to carry out socially useful activities, the park has provided jobs and training to thousands of unemployed people living in the adjoining townships. Projects have included upgrading 250 kilometres of trails to exacting standards, erecting signs, improving picnic sites, building tented campgrounds and removing invasive alien plant species. Some of these workers have been trained as visitor safety officers and marine recreational monitors. In line with government policy, half of them have been women, with disabled people and youth also well represented. All begin at the lowest wage and can advance up the ranks. Those who excel often find regular employment in the park.

On the Cape Peninsula, most of which is in the park, there are some 2,300 species of flowering plants, at least 90 of which are endemic to the peninsula; these include members of the genus Erica, *one of which is shown here. TMNP.*

Contributing to the tourism sector and benefiting from it

Cape Town is the main international tourist destination in all of Africa, and tourism is one of the lead sectors of its economy. The park is on most itineraries. A study by the Graduate School of Business of the University of Cape Town found that visits to it had a 'significant macroeconomic effect on Cape Town, the Western Cape and South Africa'.

Revenue from a percentage of sales at tourism facilities is a major source of income for the park. The most important concessions are an aerial cableway that takes some 800,000 people a year up Table Mountain, and an equally popular complex of restaurants, shops and a funicular railway at Cape

Table Mountain, rising 1,100 metres above the ocean, is a symbol of Cape Town's identity. © Janvdb95/ shutterStock.

Point on the Cape of Good Hope, a narrow finger of land at the southwesterly point of the African continent.

Edith Stephens Nature Reserve

Edith Stephens Nature Reserve is one of 31 nature reserves and natural areas managed by the City of Cape Town (the city's *Biodiversity Strategy* is described on page 78). Several of these are on the lowlands known as the Cape Flats. This mosaic of dunes and marshes became the dumping ground for thousands of black families relocated in the 1960s under the apartheid system's Group Areas Act, so as to create whites-only suburbs on the mountainside. The Cape Flats are now fragmented by industry, farming and high-density working-class townships. These include shantytowns without proper supplies of water, electricity or sanitation, where unemployment rates exceed 40 per cent and up to three quarters of residents live below South Africa's poverty line.

In spite of the urbanization of the flats, there remain some 1,800 indigenous plant species, 76 of them endemic to the area. The Edith Stephens Nature Reserve, now 39 hectares in extent, was created in 1955 by what became the South African National Biodiversity Institute (SANBI) to protect wetland habitat of an aquatic fern, *Isoetes capensis* (IUCN Endangered) that occurs only at this site, as well as several other threatened plants. The reserve became surrounded by poor townships and was used as a dumpsite. Land-hungry residents broke down a fence protecting the wetland and used rubble from the illegal dump to build shacks on its edges. The city government in 1999 budgeted for an expensive stronger steel fence, but before it was built the Table Mountain Fund (part of WWF South Africa) brokered a deal between the surrounding townships, SANBI and the City of Cape Town to spend the fencing budget on badly needed jobs instead. Unemployed people were hired to clear the wetland of alien plants, sculpt rubble into a grassy public amphitheatre for concerts and rebuild a burned-out farmhouse for offices. The sense of community

Zebras and several kinds of antelope are the most visible animals in the park, but over a hundred smaller species are endemic to the Cape Peninsula. TMNP.

ownership that resulted set the tone for the Table Mountain Fund-supported Cape Flats Nature project (*described below* on page 90). Edith Stephens Nature Reserve is no longer neglected, but managed by the City of Cape Town in cooperation with local communities.

Behind the scenes in Cape Town there are sharp differences of view about the value of places like the Edith Stephens Nature Reserve. The critics call such places 'postage-stamp' or 'flowerpot' reserves. They argue for concentrating on protecting large-scale landscapes, where natural ecosystems demonstrably have a better chance of surviving global change, pointing out that plant species endemic to small areas of the Cape Flats could easily be wiped out by drought or by winter floods that have become more intense as natural areas and agricultural lands have been converted to urban uses.

Others in the conservation movement who support investing money to save highly endemic species consider that such places are incredibly valuable because they not only help to protect species in situ but can also reconnect people to nature—and there are indeed many reasons for reconnecting people to their natural heritage, especially where this brings benefits to local people, as it has done in the Cape Flats. There are political arguments too in support of this approach: while Table Mountain National Park is clearly visible from the Cape Flats, most people living on the flats never go there, but they do vote for members of parliament who make vital decisions about all of South Africa's protected areas.

Key lessons

- Some urban protected areas contain globally important and endangered habitats and species and must be managed with their protection as a top priority.
- Urban protected areas can be an important part of a city's tourism 'offer'.
- Urban protected areas can be used to help heal social and economic divisions, create jobs, improve the quality of life and build community pride.

Selected resources and notes: See page 49.

London, United Kingdom

London Wetland Centre

A re-creation; a non-governmental effort

Near the heart of London (metropolitan population 8.1 million), the 42-hectare London Wetland Centre (LWC) is unusual in two respects: it is a re-creation of an historic wetland; and it is a project of a non-governmental organization, the Wildfowl and Wetlands Trust (WWT), working with business partners. It has not yet been included in international lists of protected areas, but (as is the case with many smaller urban nature reserves), it meets IUCN's definition of them (see Part 1.2) and will therefore be included in future lists, probably as Category IV. It opened in 2000.

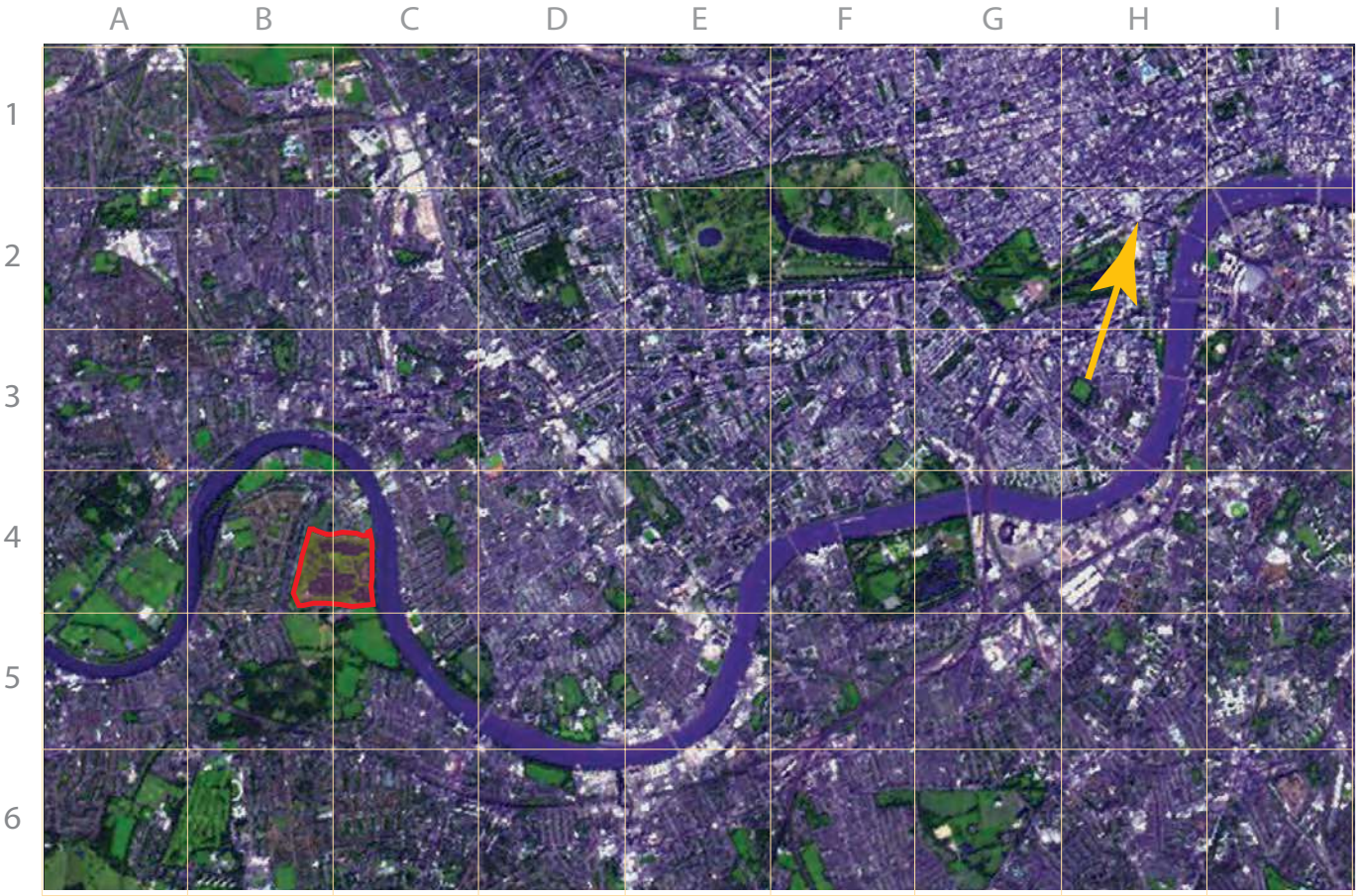
An 'urban pocket of countryside'

This urban wetland was re-created on the site of a redundant 19th century reservoir beside the River Thames. The artificially created habitats include floodplains, open-water lakes, reed beds and seasonally flooded grasslands, each planted with appropriate species from the region.

The wildlife value of the site is now of national importance in terms of wintering wildfowl and a mix of breeding birds which includes species of conservation concern, particularly ground-nesting wading birds and birds of reed bed habitats. It has also become home to a remarkable bat population.

Although it is sometimes called a restoration, the LWC does not strictly fit the definition of that term as adopted by the Society for Ecological Restoration International: 'ecological restoration is the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed.' It is more accurately called a 're-creation'.

Reflecting perhaps a British attachment to rural heritage, visitors have called it an 'urban pocket of countryside'. London has other such pockets, but not on the same scale.



The 42-hectare London Wetland Centre (B/C-4) is situated beside the River Thames. The yellow arrow points to London's centre at Charing Cross, a straight-line distance from the LWC of about seven kilometres. Terralook map: USGS/Eros and NASA; Rick Caughman.

A non-governmental initiative with business partners

The Wetland Centre is a "re-creation" of nature on the site of a redundant reservoir on the River Thames. WWT.

The LWC was designed and is managed by the WWT, a conservation NGO set up by the naturalist and painter Sir Peter Scott (1909-1989). WWT maintains eight other reserves in the United Kingdom and has long been active in wetland protection globally. It links its London reserve in cooperative efforts with similar sites in Ghana, Hong Kong and South Korea.

The project was achieved through an unusual three-way partnership between WWT, the water utility company which owned the reservoir, and a housing developer. Under this arrangement, around 10 hectares of the original site were developed for housing, with proceeds used to create the wetlands and build related infrastructure. The water utility leased the remainder of the site to WWT, initially for 125 years for a nominal rent. The utility realised the value of the asset by its deal with the housing developer, and also benefits from the 'green' credentials through its association with the project. The WWT raised funds separately for visitor facilities. This 'enabling development' was a pioneering concept perfected at the centre and showed that housing associated with an urban wildlife reserve could be sold at a premium.

'Bringing people and wildlife together for the benefit of both'

Following Peter Scott's philosophy of 'bringing people and wildlife together for the benefit of both', the LWC places great emphasis on encouraging people to visit, making it easy to do so, making a visit worthwhile and engaging volunteers.

The LWC has several kilometres of footpaths and boardwalks. Hides and observatories provide close-up views of wildlife. The visitor centre includes interactive displays on wildlife and wetland conservation. Ramps and elevators are provided for people with limited mobility. Some 150 volunteers help to run the site.

There are about 220,000 visits a year, including up to 20,000 formal education visits, many from disadvantaged parts of London. Such experiential learning is seen by WWT to be 'important in an urban environment and with an audience increasingly divorced from real-world learning'.

The LWC has become a popular meeting-place for business corporations developing environmental initiatives, as well as a backdrop for government announcements on environmental policy. A city bus makes frequent stops at the gate, making the site easily accessible to anyone in greater London.

The London Wetland Centre has re-created a piece of nature in the core of one of the world's greatest cities.

Each year the centre hosts some 20,000 schoolchildren on formal education visits. WWT

Key lessons

- There is a place in the planning of urban protected areas for the re-creation of nature as well as for its restoration.
- Creative approaches to funding partnerships may be needed to secure sustainable funding for urban protected areas.

Selected resources and notes: See page 49.

Los Angeles, California, USA

Santa Monica Mountains National Recreation Area and protected areas in the San Gabriel Mountains

A successful multi-agency effort in one mountain range, unrealized potential in another

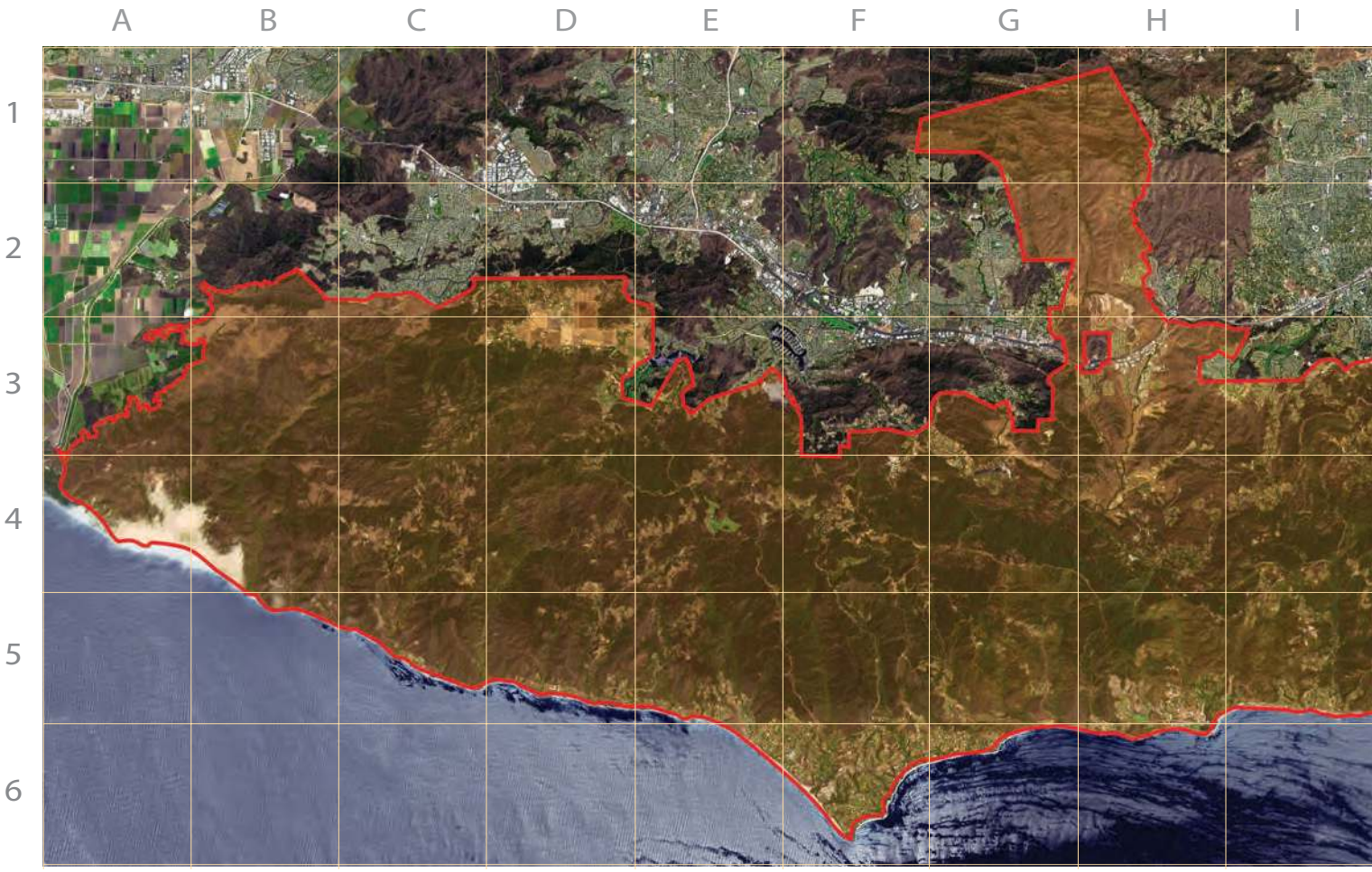
In greater Los Angeles, the Santa Monica Mountains National Recreation Area (IUCN Category V) protects 62,300 hectares of a mountain range that extends from the heart of the city to the Pacific Ocean. The park is operated as a cooperative effort of several protected area agencies within a framework administered by the United States National Park Service.

To the north and east in this metropolis is a separate range, the San Gabriel Mountains, most of which is in a national forest; there, concerns about resource protection and inadequate public services have led to proposals for a new unit of the National Park System.

The urban and natural context: Unparalleled growth

Greater Los Angeles ranks ninth among the world's urban agglomerations and second in the United States, after New York. The speed and size of its population growth, and the extent of its spatial growth, are unparalleled in the industrialized world. Population grew from 250,000 in 1900 to 11 million in 1980, and 18 million in 2012. People born elsewhere are in the majority: those born outside the US make up 31 per cent of the population; those born in other US states make up another 20 per cent. The urbanized area stretches 200 kilometres along the Pacific Ocean and up to 100 kilometres inland. Those who live here are highly dependent on automobiles for transport, and none of the protected areas described is easily accessible by public transportation.

Los Angeles is located in the California Floristic Province (as is the San Francisco Bay Area, discussed in the following profile), one of five areas of the world with Mediterranean-type climates characterized by mild, rainy winters and hot, dry summers (the others are the Mediterranean Basin itself—see pages 24-25—the Cape region of South Africa—pages 36-39—and parts of Australia and Chile).



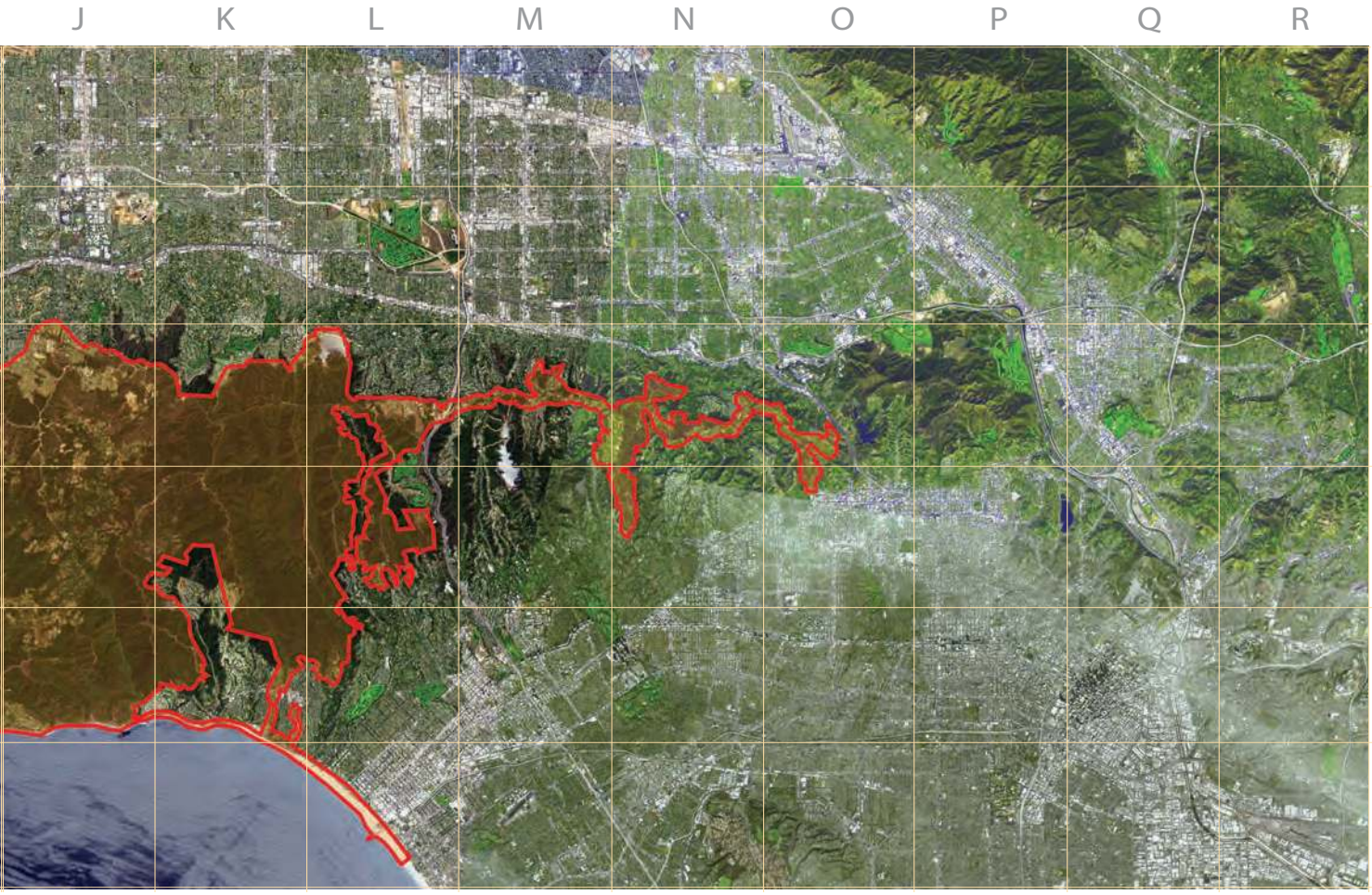
The Santa Monica Mountains National Recreation Area (boundaries in red) protects 62,300 hectares of a mountain range that stretches 74 kilometres from the centre of Los Angeles to the Pacific Ocean. Terralook map: USGS/Eros and NASA; Rick Caughman.

Within the California Floristic Province, a scientific designation that covers most of the state of California and small adjoining areas, 40 per cent of the 5,500 native plant species and subspecies are endemic to the region, i.e. they occur naturally nowhere else in the world. There are also many endemic animals. As with other Mediterranean-type ecosystems, California's are especially vulnerable to the effects of fire and invasive alien species (see Guideline 11, *Control invasive species of animals and plants*).

The predominant vegetation is chaparral, a dense growth of various species of evergreen, hard-leaved shrubs. Chaparral has a natural fire regime of infrequent crown fires. However, fires set by people along the wildland-urban interface, whether accidental or deliberate, can be very destructive of human life and property. Climate change is causing hotter, drier and windier weather in this region, and more frequent and more intense fires are expected. Native animals and plants that are unable to adapt to the effects of climate change will require migration corridors to survive (see page 75).

Although its urban core contains relatively few conventional or natural parks, greater Los Angeles is framed by protected areas. In addition to those described here, there are other mountainous national forests, as well as parklands along the coast. Along a beach, the 80-hectare El Segundo Blue Butterfly Habitat Restoration Area protects a subspecies (*Euphilotes battoides allyni*, US Endangered) found only in a small dune ecosystem next to Los Angeles International

SMMNRA is a cooperative effort of national, state and local government entities. This ranger is from the Mountains Recreation and Conservation Authority, an operating arm of the California state government's Santa Monica Mountains Conservancy. MRCA.



Downtown Los Angeles with the San Gabriel Mountains in the distance. Urbanization extends into the foothills. Todd Jones/Creative Commons 2.0-generic.

*Nelson bighorn sheep (*Ovis canadensis cremnobates*, US Endangered; California Threatened) are found in the San Gabriel Mountains. US Fish and Wildlife Service.*

*Blue-flowered hairy ceanothus (*Ceanothus oliganthus*) is typical of California's chaparral, a dense growth of various species of evergreen, hard-leaved and highly flammable shrubs. USNPS.*

Airport. In the ocean, the California Coastal National Monument protects thousands of islands, rocks and exposed reefs.

In the Santa Monica Mountains: A cooperative effort of protected area agencies

The Santa Monica Mountains National Recreation Area (SMMNRA) was established in 1978 as the result of a grassroots movement catalyzed by the then Congressman Anthony Beilenson. Covering 63,000 hectares, it is a patchwork of national, California state and local government lands, intermingled with privately owned parcels covering about 47 per cent of the area. The largest public landowner is California State Parks, followed by the National Park Service and the Santa Monica Mountains Conservancy. The Conservancy's board, which includes representatives of all the agencies involved, serves as an informal coordinating mechanism.

The Santa Monica Mountains include expensive residential areas, as well as ranches, vineyards and relatively wild tracts rising to 950 metres. Their parklands are covered mainly by chaparral, oak woodland and canyon riparian forest. They are home for some two dozen threatened animal and plant species. Mountain lions move throughout the range (see page 66). Over 800 kilometres of trails include the nearly complete Backbone Trail along the main ridgeline. Some components of SMMNRA charge visitor or user fees.

The Santa Monica Mountains Conservancy

The Conservancy is an unusual agency of the California state government, which was set up in 1979 with special acquisition powers out of concern that the national government was acting too slowly to acquire private lands for the national recreation area in a fast-rising real estate market. It has become highly skilled and proactive at acquiring land and making it accessible by combining funds from different sources and forming partnerships with other agencies and NGOs.

Having accomplished much that it set out to do in the Santa Monica Mountains, it has been reaching out to some of the poorest areas of the city. For example, it offers residents free bus trips to the mountains and supports a sports league composed of recent immigrants. It created the 3.5-hectare Augustus F. Hawkins Natural Park, described on page 89, which has become a social centre for the neighbourhood.

Although it receives funding from the California state government, the Conservancy has been creative in raising additional money. It benefits in particular from being in a movie capital. For example, the actress Barbra Streisand deeded her former home in a wooded canyon to the Conservancy for its headquarters, and the estate of the entertainer Bob Hope donated 3,100 hectares. It also collects fees for filming, weddings and other events held on its lands.

The Rim of the Valley Corridor

The Santa Monica Mountains Conservancy Zone, as defined by state legislation, includes not only the SMMNRA but another 140,000 hectares of mountainous land surrounding five urbanized valleys bordering Angeles and Los Padres national forests.

In 2008, the US Congress requested the National Park Service to study the area, called the Rim of the Valley Corridor, to determine whether portions of it would be suitable for inclusion in the SMMNRA. A draft report is expected in 2014.

Weekend bathers enjoy the East Fork of the San Gabriel River, a short drive from the urban edge of Angeles National Forest. Charles White/Creative Commons BY-SA-2.5.

In the San Gabriel Mountains: Proposals for National Park Service involvement

North and east of the Santa Monicas, the higher and much steeper San Gabriel Mountains rise to over 3,000 metres. Their lower slopes are covered with chaparral; higher elevations have mixed conifer forest and alpine vegetation. Among their varied flora and fauna are some 150 threatened species, including Nelson's bighorn sheep (*Ovis canadensis nelsoni*, US Endangered). Almost all the range is within the 285,000-hectare Angeles National Forest, created in 1892 to protect the watershed and managed by the US Forest Service. Because they are so rugged and were protected before the region became urbanized, the San Gabriels have a relatively high degree of ecological integrity for an area adjacent to a large city. Most of the national forest has multiple-use management in which, for example, hunting and mining are allowed, but it also includes: three wilderness areas (IUCN Category Ib) covering 32,000 hectares; the 7,000-hectare San Dimas Experimental Forest, a UNESCO biosphere reserve managed for long-term environmental monitoring; and two small, strictly protected natural research areas, Fern Canyon and Falls Canyon (Category Ia).

Angeles National Forest receives an estimated 3 million visits a year. Although the forest is well-equipped to deal with wildfires, it has inadequate funds for law enforcement and public safety, let alone education and interpretation. Although most visitors are law-abiding hikers and picnickers, tons of trash are left behind each weekend, stream waters are polluted and roadside rocks are covered with graffiti. Under current laws and regulations governing US national forests, it is not possible to make special funding provisions for urban ones. In any case, the Forest Service's culture is less oriented to serving visitors than to managing resources.

Along the foothills of the San Gabriels adjoining metropolitan Los Angeles, several local governments have established their own natural parks. For example, in the university city of Claremont (population 35,000), the Claremont Hills Wilderness Park protects 650 hectares of chaparral and wooded canyons. Its nine-kilometre loop trail attracts increasing numbers of visits, now over 300,000 a year. More than three-quarters of those who visit the park live outside Claremont, placing a burden on parking, policing and other municipal services. Along with many other indicators, this demonstrates an unmet need for outdoor recreation resources in the region.

The ski lifts on 3,069-metre Mount Baldy in Angeles National Forest are a popular winter destination when there is enough snow on the ground, something that happens less and less frequently at this latitude (34°N). Eric T. Gunther/Creative Commons BY-SA-1.0

Responding to public concern, the US Congress in 2003 requested the National Park Service to determine whether any of the San Gabriel Mountains and adjoining hills and rivers would be suitable for inclusion in the National Park System. Its recommendations, along with alternative proposals, are being discussed by local leaders. One scenario has Angeles National Forest continuing to be managed by the Forest Service, with the Park Service working with the Forest Service, local governments and others to protect and restore natural areas, improve recreational opportunities, and offer new educational and interpretive services. Any action would require a vote by Congress.

Key lessons

- Urban protected areas for megacities need to be planned at a large scale and as part of the planning of the city region as a whole.
- A multi-agency approach to the management of a large, complex urban protected area is essential, and will need periodic review.

Selected resources and notes: See page 49.

San Francisco, California, USA

Golden Gate National Recreation Area

A striking mix of built and natural, with strong partners

In the San Francisco Bay Area (population 7.2 million), the Golden Gate National Recreation Area (GGNRA; IUCN Category V) consists of lands on both sides of the Golden Gate, the dramatic strait that connects San Francisco Bay to the Pacific Ocean and is spanned by the Golden Gate Bridge, a symbol of the city and of California.

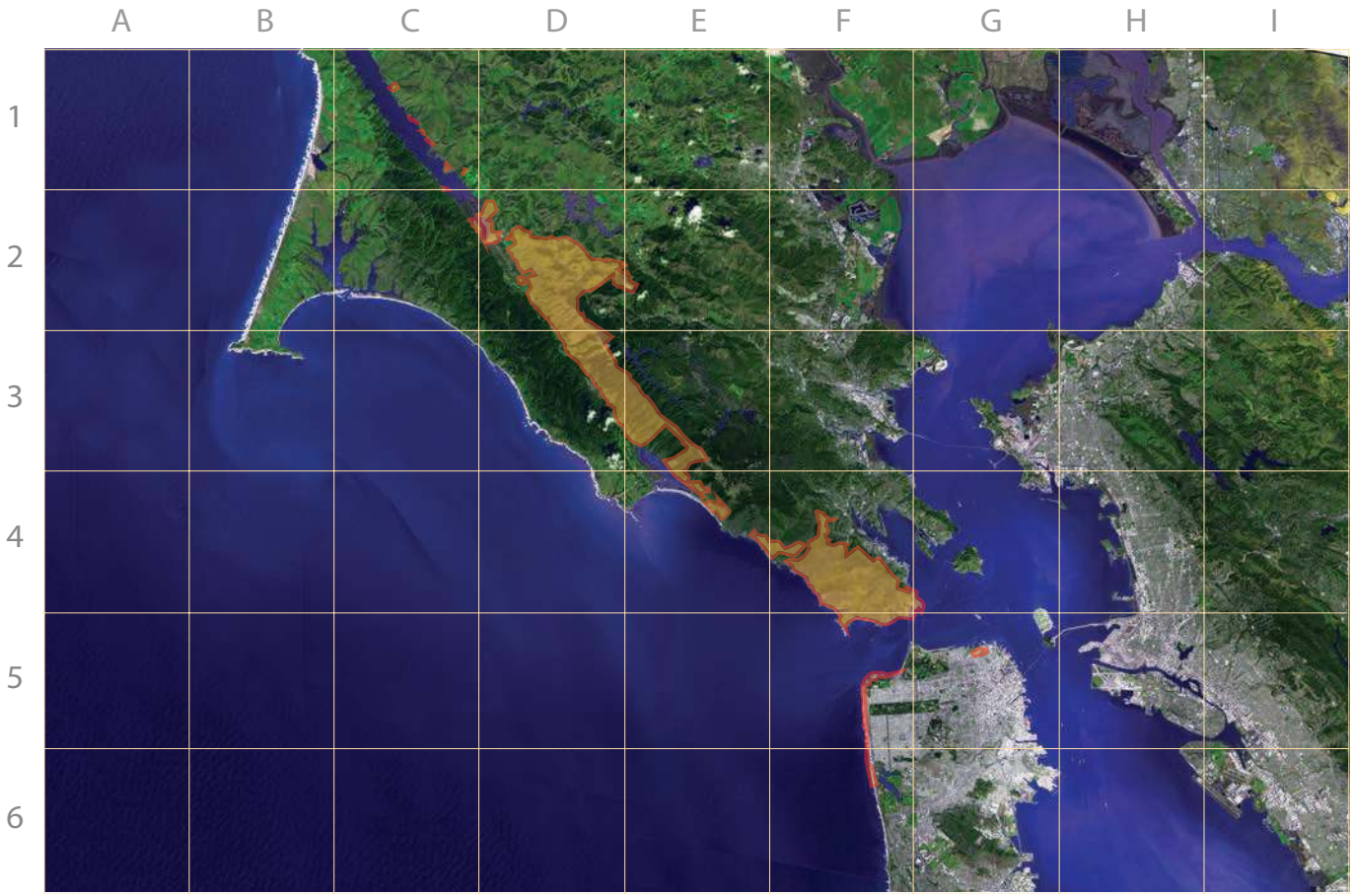
GGNRA is administered by the United States National Park Service. It covers 33,500 hectares. About half of this is owned by the Park Service; the rest is managed by local and California state agencies or is protected under scenic, conservation and recreation easements over San Francisco municipal watershed lands. Park Service jurisdiction extends one-quarter mile (about 0.4 kilometres) offshore along 95 kilometres of ocean and bay shoreline.

Adjacent are several other protected areas: San Francisco Bay and Estuary, which is a Ramsar site; Point Reyes National Seashore; state parks; and extensive national and state marine sanctuaries. All these areas, and others, are within the UNESCO Golden Gate Biosphere Reserve.

'Parks for people, where the people are'

GGNRA was established in 1972 in response to a citizens' movement sparked by threats to develop open space lands owned by the military that were being declared surplus, as well as private lands threatened by development. The movement's slogan was 'Parks for people, where the people are'. What resulted is a mix of historic sites, natural areas and farmlands. These include: the Presidio of San Francisco (*see below*); several other former military bases closed in the late 20th century; Fort Point National Historic Site, which preserves a mid-19th century coastal fortification; and Alcatraz Island, the location until 1964 of an 'escape-proof' prison.

The more natural areas comprise ecosystems ranging from open ocean and bay waters, intertidal zones, sand dunes, estuaries and tidal marshes, to scrublands,



GGNRA includes 33,500 hectares of lands on both sides of the Golden Gate; other protected areas are adjacent. Approximate GGNRA boundaries are shown in red; south of the area covered by the map are several outliers in the mountains of the San Francisco Peninsula. Terralook map: USGS/Eros and NASA; Rick Caughman.

grasslands, oak woodlands and forest. The terrestrial ecosystems support some 1,300 plant and animal species, including three dozen threatened species (among which are three butterflies with highly restricted ranges).

Included in GGNRA is the 225-hectare Muir Woods National Monument, a prime remnant of ancient coast redwood forest that receives nearly a million visits a year; it was protected in 1908 through a gift of the land by William and Elizabeth Kent, private citizens who feared that the trees would be cut down and the canyon dammed.

Taken together, all parts of GGNRA receive almost 17 million visits a year. Most areas are accessible by public transport; some are served by a shuttle system. There is no general visitor fee, but admission or user fees are charged at certain sites.

A view across the Golden Gate from one part of GGNRA, a former military base in San Francisco, toward another part, the Marin Headlands. USNPS.

The Presidio Trust: Fulfilling a mandate to be financially self-supporting

One part of GGNRA, the 600-hectare Presidio of San Francisco, is managed by the Presidio Trust. The Presidio was a military reservation from its establishment as a Spanish colonial outpost in 1776 until the US Army turned it over to the National Park Service in 1994. It has some 700 buildings, of which over 400 are historic; among these are prime examples of 19th century military architecture. The Presidio Trust was set up as an independent US Government agency to preserve the Presidio and convert it into a national park. The costs of doing so were substantial, and the Trust was charged by the US Congress with ensuring that the Presidio became financially self-sustaining. This goal was accomplished in 2013, mainly by renting space in the buildings to some 225 businesses and NGOs and residents of 1,200 housing units. Most of the Presidio is available for public use, including beaches, trails, a golf course, athletic fields and a campground. Shoreline portions are managed by the National Park Service.

The Golden Gate National Parks Conservancy: Non-profit partner

Established in 1981, the Golden Gate National Parks Conservancy is the non-profit cooperating association of GGNRA, which is sometimes referred to informally as the 'Golden Gate National Parks'. (GGNRA does not include Golden Gate Park, a separate 400-hectare municipal park with which it is often confused.)

The Conservancy has raised over US$ 300 million to support park programmes and projects. These have included: restoring historic sites and natural areas; building trails, visitor centres and a raptor observatory; and operating park bookstores and an extensive volunteer programme.

Muir Woods, a remnant of ancient redwood forest, was donated to the US National Park Service in 1908 by private citizens. Ted Trzyna.

The Conservancy's signature project is the restoration of 40-hectare Crissy Field. Originally a salt marsh along San Francisco Bay, it was filled in for a track for car racing and then used as a military airfield. After it became part of the GGNRA, the Conservancy raised US$ 34.5 million from foundation grants and private donations to clean up hazardous material, remove asphalt and concrete, restore grassland and marsh habitats, and build a promenade and an environmental education centre. Much of the planting was done by 3,000 volunteers, including inserting 130,000 plugs of salt grass by hand. The project started in 1997 and was completed in 2001. A weekly drop-in volunteer programme continues to help maintain the area and nurture the sense of connection to Crissy Field that many of the volunteers acquired while they were involved in the restoration.

The Institute at the Golden Gate, a programme of the Conservancy, 'positions parks as part of solutions to wider social challenges by pilot testing new ideas locally and influencing national policy and practice'. It currently works in four policy areas: climate change education in parks; parks in urban areas; health benefits of spending time in nature (see page 61); and healthy food in parks (see page 62).

Key lessons

- The trigger for the establishment of an urban protected area is often a threat to a much-loved area of land near a city.
- Conserving the built heritage is a key component of many urban protected areas.
- Many urban protected areas call for collaboration between numerous public agencies and non-profit bodies: to be successful, they have to share a vision and develop effective ways of cooperating.

Selected resources and notes: see page 49.

References, selected resources and notes on the profiled areas

The 15 profiles are based primarily on interviews, personal communications and visits as listed under each city in the Acknowledgements, as well as the materials and websites *listed below*.

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6. Marseille, France: Calanques National Park

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7. Mumbai, India: Sanjay Gandhi National Park

Mumbaikars for Sanjay Gandhi National Park: www.mumbaikarsforsgnp.com.

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8. Kingston, Jamaica: Blue and John Crow Mountains National Park

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Presidio Trust: www.presidio.gov.

Part 3
Best practice guidelines

Note: The 30 guidelines

The 30 guidelines in Part 3 include examples from the 15 profiled protected areas, as well as other locations. They are organized into four sections:

- urban protected areas and people
- urban protected areas and places
- urban protected areas and institutions
- promoting, creating and improving urban protected areas.

Unless otherwise indicated, references in these guidelines to the protected areas profiled in Part 2 *above* draw on the sources of information listed in the *References, selected resources and notes* in Part 2.

There are no guidelines that deal exclusively and specifically with biodiversity conservation. This is because the topic is threaded through many of the individual guidelines as explained in Box 5.

GUIDELINES 1-11: URBAN PROTECTED AREAS AND PEOPLE

Guideline 1. Provide access for all; reach out to diverse ethnic groups and the underprivileged.

Managers of urban protected areas and their allies should:

- Accommodate disabled people;
- Reach out to diverse ethnic groups and the underprivileged;
- Consider allowing free entry or charging lower entrance fees to local residents, especially in parks visited by large numbers of foreign tourists;
- Choose words and symbols for compliance signs carefully;
- Consider using a range of languages in signs and publications;
- Encourage direct public transportation services;
- Supply transportation to the protected area if necessary;
- Provide well-mapped and clearly marked walking trails;
- Provide bicycle routes and rentals where appropriate; and
- Supply easily accessible information about transportation services available.

1.1 Disabled people

Many urban protected areas make arrangements to help visitors who need wheelchair access or who are visually or hearing impaired. Table Mountain National Park in Cape Town, South Africa, profiled on pages 36-39, is a good example. The park's website gives detailed guidance for disabled visitors. Access to the top of Table Mountain is through a lift and a revolving cable car system. On the western mountaintop, the shop, restaurant and toilets all have ramped access and pathways that can be manoeuvered by wheelchair.

1.2 Diverse ethnic groups

Many of the world's cities have ethnically diverse populations. It is important for managers of urban protected areas to understand that people of different ethnic groups often approach and use natural areas in ways that differ from those coming from the nationally or locally dominant ethnic groups. The vocabulary of ethnicity varies among and even within countries, and is often a sensitive matter. For example, although people of Spanish-speaking heritage (called 'Latinos' or 'Hispanics') are a minority nationally in the United States, they represent a majority of the population in Los Angeles. Referring to them as an ethnic minority in the local context is therefore inappropriate and increasingly resented.
Social science research can be helpful in reaching out to

Accommodating disabled people should be a priority for urban protected areas. Shown here: visitors to Yangmingshan National Park near Taipei, Taiwan, Province of China. Ted Trzyna.

diverse ethnic groups. In Sydney, for example, Denis Byrne and Heather Goodall made an in-depth study of the ways Arab and Vietnamese immigrants engage with Georges River National Park (IUCN Category V). This park extends along both sides of a river some 18 kilometres southwest of the city centre. Steep bush-covered slopes run down to alluvial flats, some of which were extended by filling in mangrove wetlands to form lawns for picnic grounds long before the park was established in 1992. The picnics held there by both ethnic groups not only help them to maintain and expand social ties but also serve to acquaint them with Australia's natural environment. The lesson for park managers is that it is not enough to welcome people of all ethnic backgrounds to a park; they have to be sensitive to this kind of 'placemaking', activity by which people construct cultural habitats for themselves.

A successful effort to reach out to immigrants is the United Kingdom's Mosaic Partnership. It aims to build 'sustainable links' between minority ethnic communities, England's ten national parks and the Youth Hostels Association. It was organized in response to evidence that although about ten per cent of the country's population is from ethnic minorities only one per cent of visitors to national parks are from such groups. It works by organizing group visits to parks and training influential leaders from minority groups to become 'Community Champions' promoting the national parks in their communities. Although none of England's national parks can be considered as urban protected areas, all of them are suitable for day trips.

Depending on the local culture, friendly compliance signs may be more effective than stark prohibitions. A sign at Claremont Hills Wilderness Park in California (left); a different kind of message posted at Dong Ba Country Park in Beijing. Ted Trzyna.

A humourous approach to compliance signs can be effective. A sign at Muir Woods near San Francisco warns that a fictional disease called "chipmunkiosis" appears when humans offer food to chipmunks, which are friendly and attractive wild rodents. The dog latrine sign is in a park in Hong Kong. Ted Trzyna.

The Mosaic Partnership originated in the Mosaic Project, started in 2001 by the Campaign for National Parks (then the Council for National Parks) and the Black Environment Network (BEN). Led for many years by Judy Ling Wong, BEN has carried out numerous practical and research projects on various dimensions of 'ethnic environmental participation'. Reports of this work, including a series of 'good practice' case studies, are posted on its website. (BEN uses the word 'black' symbolically, recognizing that black communities are the most visible of all ethnic communities. It works with all ethnic groups.)

Newcomers from other parts of the same country are often unfamiliar with the natural environments of their new homes, as these can differ radically from their places of origin. For instance, many people moving to Los Angeles from more humid climates elsewhere in the United States find its Mediterranean-type chaparral scrubland ecosystem unattractive—just 'brush'. Park managers and NGOs such as the California Chaparral Institute work to educate the public.

1.3 Entrance fees

There is free entry to many urban protected areas, or at least parts of them. Among park professionals, there are differences of opinion about charging entrance fees (as opposed to fees for camp sites, bus rides, etc.). On the one hand, parks need the money from entrance fees, and visitors are more likely to appreciate their visit if they pay for the experience; on the other, urban protected areas provide access to nature for urban people unable to visit more remote parks, and therefore help to build a broader constituency for conservation.

Tiered entrance fees are especially appropriate in parks in developing countries where parks are visited by large numbers of foreign tourists. Here are two examples from urban protected areas:

- At Table Mountain National Park, residents of Cape Town are able to buy a My Green Card for 90 Rand (about US$ 10) that permits 12 free entries to any of the park's pay points and picnic areas; regular admission costs 90 Rand at each place. In addition, citizens and residents of the 15 member countries of the Southern African Development Community are able to buy a Wild Card that permits free admission to many parks throughout the region, including Table Mountain, for about a quarter of the price paid by others.

- At Nairobi National Park in Kenya, profiled on pages 30-31, citizens of Kenya and other East African countries pay an admission fee of around US$ 3, while non-citizen residents pay three times that figure and non-residents pay about ten times as much.

1.4 Wording and symbols in compliance signs

Compliance signs, i.e. those prohibiting various activities in a park, are always needed. In some cases, stern warnings are in order, for example to stop people setting fires, swimming above waterfalls or entering prohibited zones. In many other cases, however, a more welcoming, even humourous, approach may be more effective. As with everything else in these guidelines, local practice and local culture will determine the best course of action (see the photos for examples.)

1.5 Transportation to the protected area

In many cities, regularly scheduled buses provide direct service to urban protected areas. For example, among the parks profiled in Part 2: Several of Hong Kong's country parks are easily accessible by city bus. In London, a city bus runs every few minutes to and from the gate of the WWT London Wetland Centre. Parts of Table Mountain National Park in Cape Town, Tijuca National Park in Rio de Janeiro, Yangmingshan National Park in Taipei and the two Korean parks are served by city bus lines. In Mumbai, there are weekend and holiday bus services to Sanjay Gandhi National Park.

In other places, special arrangements are made. For example, on weekends and public holidays, the Kenya Wildlife Service runs shuttle buses from the centre of Nairobi to, and around Nairobi National Park. The main section of the park, with its free-ranging lions and other predators, is otherwise accessible only by car.

Well-marked trails like this one in a country park on Lantau Island in Hong Kong enable visitors to guide themselves safely. Ted Trzyna.

Some urban protected areas provide transportation to and within their lands. A busload of schoolchildren visit Nairobi National Park. Glen Hyman.

In the San Francisco Bay Area, there is an interactive website called Transit & Trails, which gives information on parks, campgrounds and over 100 trailheads and how to get to them via public transportation. The website is a project of an NGO, the Open Space Council.

In the more car-oriented Los Angeles metropolitan area, public transportation to protected areas is very limited. An NGO called The City Project, in cooperation with the Mountains Recreation and Conservation Authority, an operating arm of the Santa Monica Mountains Conservancy (see page 44), takes inner-city youth and their families on day trips to parks in the mountains and on the beach.

1.6 Trails

Well-marked and clearly mapped access trails enable visitors to guide themselves safely in exploring urban protected areas. A well-planned and well-communicated trail network allows managers to channel visitor flow according to 'use zones', for example, areas zoned for intensive use, for quieter use, for a more remote experience and as wilderness zones. Access into the protected area can be through 'gateways' that provide an easy way onto the trail network, preventing the erosion that accompanies random path-making.

Some urban protected areas are transected by long-distance trails. In Angeles National Forest near Los Angeles, hikers set out on a section of the 4,300-kilometre-long Pacific Crest Trail. Ted Trzyna.

For example, when it upgraded its 700-kilometre trail network, Table Mountain National Park produced maps showing all of the park's gateways and trails in Cape Town's three local languages, English, Afrikaans and isiXhosa. The GIS data were made available to commercial map companies, with the result that detailed, accurate maps are easily available.

(See also *Trails between natural areas: Physical and psychological connectors*, on page 76.)

1.7 Bicycles

Many urban protected areas allow bicycling, at least in certain areas, and some make special provisions for cyclists. For example, Royal National Park in Sydney, Australia, profiled on pages 14-15, is a popular destination for cyclists due to its relatively flat to undulating terrain. Bicycles may be brought in, or rented in the park. A guide to park trails suitable for bicycle access is available online and as a PDF that can be viewed on mobile devices. The park has a 'no sign-no ride' policy: this means that cycling is permitted on public roads, management trails and single tracks only where a sign indicates this. Fines can be imposed for cycling elsewhere.

Bicycling is popular on the well-maintained fire roads in Santa Monica Mountains National Recreation Area in Los Angeles. © CBI62 at en.wikipedia.

Guideline 2. Engender a local sense of ownership.

To promote appreciation of their protected area and engender a sense of 'ownership' among local residents, managers of urban protected areas and their allies should:

- Draw on writers, artists and other creative people and their works and ideas;
- Promote appreciation of the cultural, as well as natural, assets of the protected area; and
- Make facilities available for events of governmental agencies, NGOs, local communities and businesses.

2.1 Writers, artists, and other creative people and their works and ideas

Writers, painters, photographers and other creative people have an important role in forming and reinforcing a sense of place in urban and urbanizing areas. Writers are particularly important. In his book *Cities in the Wilderness* (2005), Bruce Babbitt, a former Secretary of the United States Department of the Interior, the country's principal natural resource agency, says that one of the key ingredients of success in protecting natural places from urbanization is writers 'giving voice to a strong regional identity'. He gives the example of the writer John McPhee and the Pine Barrens of the state of New Jersey.

Writers can play a key role in shaping and reinforcing a sense of place. In the United States, John McPhee's book about the New Jersey Pine Barrens, a mosaic of forests and cranberry bogs such as those shown here, was crucial in protecting them from advancing urbanization. Famartin/Creative Commons SA-3.0.

In the 1960s, the Pine Barrens, an area of oak-pine forests, berry farms, wetlands and historic towns situated between the expanding metropolitan areas of New York and Philadelphia, were threatened by urbanization and a proposed intercontinental airport. In magazine articles that became a best-selling book, *The Pine Barrens* (1968), McPhee portrayed the history and legends of this landscape, which to him seemed 'to be slowly headed to extinction'. McPhee's writings awakened public sentiment, and 10 years later the US Congress created the 4,500-square-kilometre New Jersey Pinelands National Reserve (IUCN Category V), which is administered by New Jersey authorities in partnership with the National Park Service. His book is still used in New Jersey schools.

Box 5

Conserving biodiversity in urban protected areas[1]

Numerous means of achieving conservation of biodiversity in urban environments are discussed in the best practice guidelines in Part 3. Some of these, such as public education, promote conservation indirectly. Others have a more direct impact, for example:

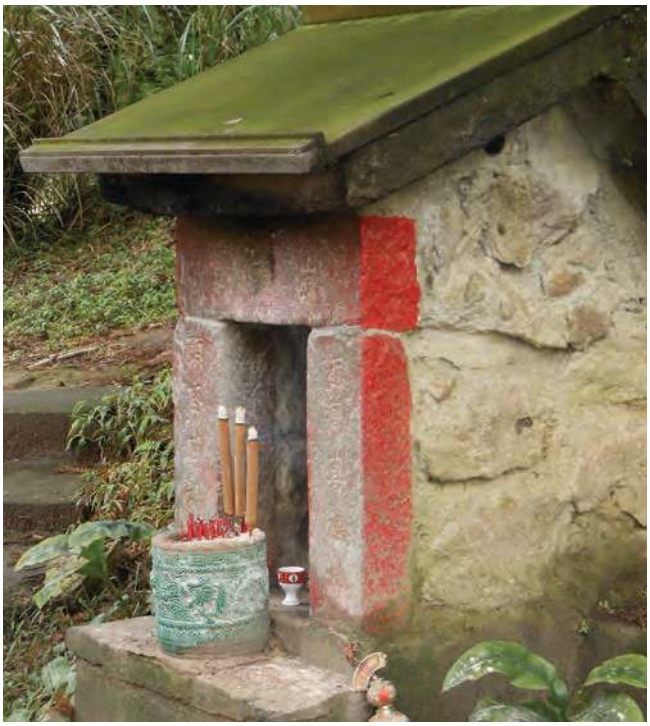
- Discouraging random path-making that causes erosion and destroys habitat (Guideline 1.6);
- Taking advantage of volunteers to remove invasive alien plant species (Guideline 3.2);
- Preventing littering that harms or kills wildlife (Guideline 7.3);
- Avoiding human-wildlife conflict (Guideline 9.1);
- Controlling poaching (Guideline 10);
- Controlling invasive species of animals and plants that destroy natural habitat and native species (Guideline 11);
- Maintaining connectivity with other natural areas in the face of habitat fragmentation caused by urbanization (Guideline 12);
- Looking at cities and their surroundings as ecological systems that include biodiversity along with built, social and other elements (Guideline 13.1);
- Incorporating "green infrastructure" into the built urban environment (Guideline 13.2);
- Monitoring and managing water quality and quantity to protect biodiversity from pollution and extremes of drought and flooding (Guideline 15);
- Managing wildfires in ways that protect native species and ecosystems (Guideline 16);
- Reducing the effects of noise and artificial nighttime light on wildlife (Guideline 17);
- Facilitating research on biodiversity and helping to disseminate and archive research results (Guideline 21.2);
- Creating and expanding urban protected areas, keeping in mind priorities for biodiversity conservation (Guideline 25); and
- Developing research agendas that include studies aimed at protecting biodiversity (Guideline 30.2).

1. The definitions of biodiversity and nature (page 3), and the index of naturalness (page 4) provide background to the contents of this box.

2.2 Connecting culture and nature

People often have a sense of belonging to a natural area because of its cultural assets. In fact, John McPhee's portrait of the Pine Barrens is as much about its history and the distinctive way of life of its people, called 'Pineys', as it is of nature.

Many urban protected areas contain religious sites that connect their visitors to their natural surroundings. Among the protected areas profiled in Part 2, for instance, Mumbai's Sanjay Gandhi National Park receives large numbers of people who come to visit the Kanheri Caves, sacred to both Buddhists and Hindus. In Taipei, Yangmingshan National Park includes both Taoist and Buddhist temples. The Korean parks have many Buddhist temples. In Tijuca National Park in Rio de Janeiro, the huge statue of Christ the Redeemer atop Corcovado Mountain is the most visited man-made monument in South America. Cape Town's Table Mountain National Park includes three of a ring of five sacred Muslim burial sites known as *kramats*.



Religious sites in urban protected areas connect those visiting them to their natural surroundings. Yangmingshan National Park near Taipei has both Buddhist and Taoist temples. Ted Trzyna.

Along with their natural areas and numerous historic structures, Rome's 15 nature parks, managed by the provincial agency RomaNatura, include meadows grazed by flocks of sheep, groves of cork oaks, and farms that produce foods such as olive oil and pecorino cheese that are sold directly to the public. Former RomaNatura Director Paolo Giuntarelli (2005) writes that an important task of the agency is to preserve Rome's 'Memory, the ancient peasant and rural traditions of the city of Rome'.

Landscape features themselves can have strong cultural meaning. A good example is Table Mountain, one of the world's most striking natural landmarks. Rising over a thousand metres above the Atlantic Ocean, it is a symbol of Cape Town's identity and the subject of legends of all the city's various ethnic groups. When what is now Table

Preserving rural culture can be an important goal of urban protected areas. In Italy, Rome's nature parks include small farms that use traditional methods to produce foods such as bread and cheese. Pecorino romano cheese. Jon Sullivan/Creative Commons, public domain.

Mountain National Park was created in 1998, it was originally called Cape Peninsula National Park, rather than named after the mountain. There were many objections. Based on a telephone poll of thousands of Capetonians in which more than two-thirds of those who phoned in voted for the name 'Table Mountain National Park', the name was changed in 2004. 'We know that Table Mountain has a special place in the hearts of everyone in Cape Town', said the then Park Manager Brett Myrdal. 'It gives us all a sense of place, and the new name will reinforce this association.'

Much has been written about sense of place, also called spirit of place, or genius loci. In 2008, ICOMOS, the International Council on Monuments and Sites, which advises UNESCO on World Heritage cultural sites, adopted the Québec Declaration on the Preservation of the Spirit of Place. The principles and recommendations of the Québec Declaration apply broadly to natural areas, as well as to cultural sites: spirit of place is made up of intangible elements such as memories, narratives, rituals, and festivals, as well as tangible elements such as mountains, rocks, or trees. A place can have several spirits and be shared by different groups, as in the case of Table Mountain. Spirits of place need to be safeguarded and promoted, for example, through public education.

Visitor centres can help in this regard. In a paper written for an ICOMOS conference, Simon Woodward of Leeds Metropolitan University points out that visitor centres in natural areas and cultural sites can help audiences create and support a sense of place, 'that elusive quality that often gives rise to the "golden memory"'.

2.3 Hosting events of governmental agencies, NGOs, local communities and businesses

To build good relations with organizations in the region—governmental agencies, citizens' groups, businesses—it can be very helpful to make facilities available for their meetings. The WWT London Wetland Centre has rooms designed for this purpose, including one that seats 150; they are well-appointed and suitable for high-level events, including government press conferences. The Wetland Centre cooperates with a company called Events Matter to offer team-building events for business corporations that encourage participants to take climate change seriously and consider how they can contribute to its mitigation. These events are called Sense and Sustainability, a take-off on Jane Austen's 1811 novel, *Sense and Sensibility*.

Although volunteers can contribute in many ways, cleaning up litter is a common and very welcome activity. Along the beach in Table Mountain National Park in Cape Town. TMNP.

Guideline 3. Take advantage of volunteers and support groups.

Managers of urban protected areas should:

- Tap into the potentially large number of urban volunteers available in their regions, who will include many highly motivated, well-educated and talented people; and
- Draw on the park support group (if it is absent, organize one), work to strengthen it, and consider whether its purposes and activities could be expanded.

3.1 Volunteers

Protected areas in metropolitan regions have the advantage of being able to draw on large populations for volunteers, which will include many highly educated, talented and well-connected people. A good example is Yangmingshan National Park in Taipei, whose volunteer corps is described in the profile of the park on pages 22-23.

Some urban protected areas take advantage of commitments by groups of employees of business corporations to contribute time and energy to hands-on projects for the public good. For example, the WWT London Wetland Centre has corporate volunteering days when staff from local companies help with planting and weeding.

Park managers get an important side-benefit from taking advantage of well-connected and corporate volunteers, especially if they take time to engage with these volunteers and keep them informed of issues facing their park: the volunteers become a network of political supporters. Another source of volunteers is schools with formal programmes to give students work experience. However, supervising students can absorb a lot of staff time and the London Wetland Centre, for example, accepts only five of them each year for this reason.

Volunteers can be organized as friends of a particular part of an urban protected area, thereby promoting a sense of local ownership. For example, in Table Mountain National Park, the Friends of Lion's Head and the Friends of Cape Point, among others, are self-organized and park-supported groups which undertake tasks such as removing litter and pulling weed seedlings. Their work is coordinated by local section rangers.

3.2 Support groups

Most urban protected areas have nonprofit support groups, often called 'friends', 'partner' groups or 'cooperating associations'. Their purposes and activities differ widely.

In Rio de Janeiro, Amigos do Parque Nacional da Tijuca (Friends of Tijuca National Park) run a programme of volunteers who assist the park by patrolling and maintaining trails and eradicating invasive alien plant species.

In Hong Kong, Friends of Hong Kong Country Parks produce and sell publications and are advocates for the park system with governmental officials.

In Los Angeles, the Santa Monica Mountains Fund raises funds in support of the Santa Monica Mountains National Recreation Area, for example, to buy radios for volunteers who patrol park trails.

In Nairobi, Friends of Nairobi National Park work to build partnerships between the park and neighbouring urban and

rural communities. They also aim to 'influence opinions and decisions' that may have detrimental effects on the park.

In the Chicago metropolitan area, the Dunes National Park Association supports Indiana Dunes National Lakeshore by raising and administering funds for projects the park is unable to pay for, selling park-related merchandise, encouraging public support for park goals, representing the park to public officials and hosting special events. Recognising that many other organizations are active in nature conservation in the region, its purposes specifically exclude purchasing or owning land for conservation, acting as an environmental advocate or conducting public workshops or seminars.

In the San Francisco area, the Golden Gate National Parks Conservancy has raised substantial amounts of money for major projects and a range of activities; it is described on page 47.

Guideline 4. Communicate carefully and use a range of communication technologies.

In communicating with different kinds of audiences, managers of urban protected areas should:

- Listen carefully to what they are saying and asking;
- Tailor messages to each audience;
- Be careful to use the right words;
- Use a range of communication technologies, including print publications, websites, blogs, apps and social media; and
- Consider preparing a communication strategy and getting help from people skilled in communication.

4.1 Core principles of effective communication

It may seem obvious that listening is an important part of any kind of communication, but in cities where it is often the case that many voices are seldom heard, a capacity for listening is one of the most fundamental skills an urban protected area manager can cultivate.

It is important to identify key audiences and address their specific needs. For urban protected areas, these are: the general public (4.2); policy-makers, opinion leaders and the media (4.3); and affected property owners (4.4). See also Guideline 23.2, *Tailoring messages for specific constituencies*.

The techniques that are used should be appropriate to the circumstances. They include traditional means like print (4.5); websites, blogs and social media (4.6); and mobile apps (4.7).

Communicating with the public is not, of course, confined to places like visitor centres, but should permeate all aspects of the management of an urban protected area, and is central to developing a positive relationship with the citizenry living around it.

Because communication is such a complex challenge and so central to the success of an urban protected area, each protected area should consider preparing a communication strategy, usually put together with professional advice.

4.2 Communicating with the general public

Based on a decade of discussions in the IUCN WCPA Urban Specialist Group, here are some approaches that have worked well for managers of urban protected areas in communicating with the general public:

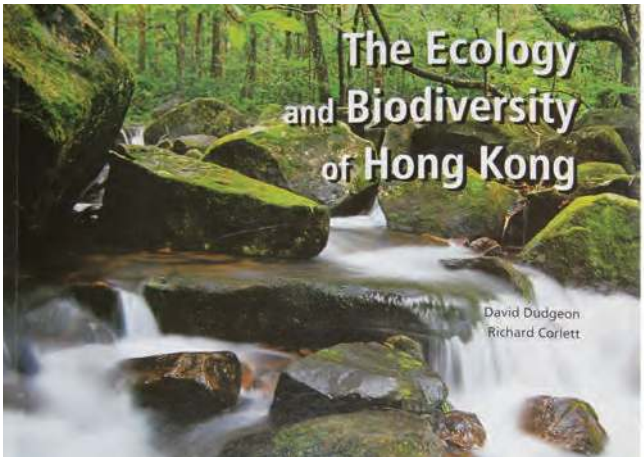
- Keep messages simple, for example: 'This is where your household water comes from' or 'Foreigners visiting this park bring money to our local economy.'
- When parks or lands proposed for parks are threatened by development, appeal to their concerns about the loss of local history, culture and identity, as well as the loss of nature.
- Don't be afraid of appealing to emotion. People are motivated more by what they believe and feel than by what they know.
- Help people understand the environment as a whole and how the specific natural place being protected is an important part of it. Help them understand that people still depend on nature now as much as ever.
- Work closely with NGOs and firms sophisticated in communication.

4.3 Communicating with policy-makers, opinion leaders and the media

In engaging with policy-makers and opinion leaders, including representatives of print and electronic media, choosing the right words is critical. In urban settings, terms such as 'protected area', 'park', and 'biodiversity' can be misunderstood. 'Protected' against what or whom? Doesn't a park have lawns? Why use a fancy word like 'biodiversity'?

In one city council, a policy document that used the words 'biodiversity' and 'nature' was not well received, but once the term 'ecological services' was substituted, the council approved the otherwise identical policy. Others might prefer to refer to 'nature-based solutions' rather than ecosystem services.

Decision-makers respond to evidence supported by numbers. The more benefits can be quantified, the better: numbers of visitors, numbers of students served, money generated from tourism that stays in the local and national economies, quantities of water generated and so forth.



Print publications remain important to promote public understanding and support. Hong Kong's Friends of the Country Parks has published over a hundred books, including this detailed and copiously illustrated volume. Rick Caughman.

Visitor centres often sell field guides and other publications related to nature, culture and history in their regions. This well-stocked bookstore in Golden Gate National Recreation Area in San Francisco is operated by its cooperating association, the Golden Gate National Parks Conservancy. Ted Trzyna.

More and more visitors to urban protected areas depend on mobile apps for information. At a trail junction, Tim Caughman checks a map on his tablet computer to decide which path to take. Rick Caughman.

4.4 Communicating with property owners affected by park decisions

Special strategies are needed to communicate with property owners affected by park management decisions, including expansion of park boundaries. For example, to create new protected areas adjacent to Cantareira State Park in São Paulo, Brazil (profiled on pages 18-19), the state government needed to expropriate property from a large number of private landowners. There was no painless way to do this, and for the landowners a poorly handled process would have made an already difficult procedure quite intolerable. The state Forest Institute went to great lengths to explain the reasons for these new protected areas, listen to concerns and fears, and involve landowners in the process of determining the parks' precise boundaries. The Institute wanted to make sure the process was fair, transparent and respectful, so the end result, even if very uncomfortable for some, would be seen as legitimate and defensible.

4.5 Print publications

Producing and distributing print publications about their urban protected areas can be effective ways for managers and allied organizations to promote public understanding and support. For example, Hong Kong's Friends of the Country Parks has published over a hundred books in Chinese and English on various aspects of the parks, including field guides to places, plants and animals. The Lions Nature Education Foundation, a service project of the local Lions Clubs, has sponsored the publication of a generously illustrated, 344-page volume, *The Ecology and Biodiversity of Hong Kong,* produced by faculty members of the University of Hong Kong. It focuses on the country parks system, but expresses concern about threats to the 'diminishing remnants of the natural environment that lie outside the boundaries' of that system.

4.6 Websites, blogs and social media

By now, virtually all urban protected areas have a presence on the World Wide Web. Their websites range from basic to elaborate. An agency that is among those leading in this field is the Hong Kong Country Parks Authority, whose websites include checklists of animals, maps, current trail conditions and other in-depth information. In Taipei, Yangmingshan National Park's website provides similar coverage in both Chinese and English, as well as real-time videos from eight locations. In Los Angeles, the Santa Monica Mountains Conservancy hosts LAMountains.com, an interactive search site covering hundreds of locations managed by various jurisdictions in a large part of the region. In London, the WWT London Wetland Centre's website posts daily reports of bird sightings, as well as such other occurrences as when plants first come into flower.

Support groups often have their own websites and are not as limited by government rules, or political constraints, in the kinds of information they can post. For example, the website of the Friends of Hong Kong Country Parks alerts its supporters to threats of encroachment on the parks by urban development.

Both official and support group websites are being used in many different ways, for example:

- Adding blogs. A blog (short for weblog) is a web page on which the sponsoring organization or individuals post news items, opinions and links to other websites on a regular basis; the most recent post appears first with previous ones below it or archived. A good example is the blog on the website of the Bracciano-Martignano Regional Natural Park at the edge of Rome, Italy, which includes announcements of forthcoming events and news related to park management;
- Linking to websites of organizations that share the same objectives;
- Linking to multimedia presentations, including videos posted on the video-sharing website You Tube;
- Offering users the opportunity to sign up for e-mail newsletters; and
- Providing links to social media.

Social media, particularly Facebook and Twitter, are being used increasingly by urban protected areas and their support groups. Facebook is an online social networking service that has over a billion accounts. Registered users may create a personal profile, add other users as 'friends', and exchange messages. They may also form or join invitation-only common-interest user groups. Several of the protected areas profiled in Part 2 have official Facebook pages; these include Tijuca, Blue and John Crow Mountains, and Table Mountain national parks, as well as the WWT London Wetland Centre.

Twitter is an online social networking and 'microblogging' service that enables registered users to send and receive

'tweets', text messages limited to 140 characters. It has over 650 million users. For urban protected areas, Twitter is especially useful for sending out urgent messages about hazards such as wildfire, predicted storms and flooding. There are other kinds of social media and other uses for this technology, and the field is evolving rapidly. Expert advice can help in deciding on which ones to use and how.

4.7 Mobile apps

In much of the world, people depend for information more and more on smartphones, tablet computers and other mobile devices. Mobile application software ('apps') designed to run on these devices can be an effective way of providing information to visitors to urban protected areas. Currently, these apps emphasize logistics. For example, in the United Kingdom, Cymru Forest Xplorer is a guide to publicly accessible state-owned forests in South Wales, including the urban-fringe sites of Cwmcarn and Fforest Fawr. Each site has a page with links to directions, trails and facilities, and is available in either English or Welsh. Commercial firms sell similar apps for such urban protected areas as Table Mountain National Park in Cape Town and Santa Monica Mountains National Recreation Area in Los Angeles. However, mobile apps have more potential than just as logistical aids: they can include in-depth interpretive and educational information. For example, the Hong Kong Country Parks' apps explain features of the Hong Kong Geopark by means of audio, video and text in several languages. Publishers of such software should be encouraged to include urban protected areas in their plans as they design more sophisticated generations of their products.

Guideline 5. Demonstrate, facilitate and promote good environmental behaviour.

Managers of urban protected areas should take advantage of the large numbers of people who visit their parks, who include many repeat visitors and visitors unable to go to remote parks, to demonstrate, facilitate and promote good behaviour toward the environment, including behaviour that reduces emissions of greenhouse gases, by:

- Looking systematically at the opportunities available and acting strategically;
- Informing and engaging visitors in discussions about the causes and consequences of climate change;
- Demonstrating energy-efficient facilities;
- Demonstrating and encouraging energy and water conservation; and
- Demonstrating and facilitating reduction, reuse and recycling of materials.

5.1 A systematic, strategic approach to environmental performance

The *Green Parks Plan* of the United States National Park Service, issued in 2012, articulates an overarching vision that calls for the agency to:

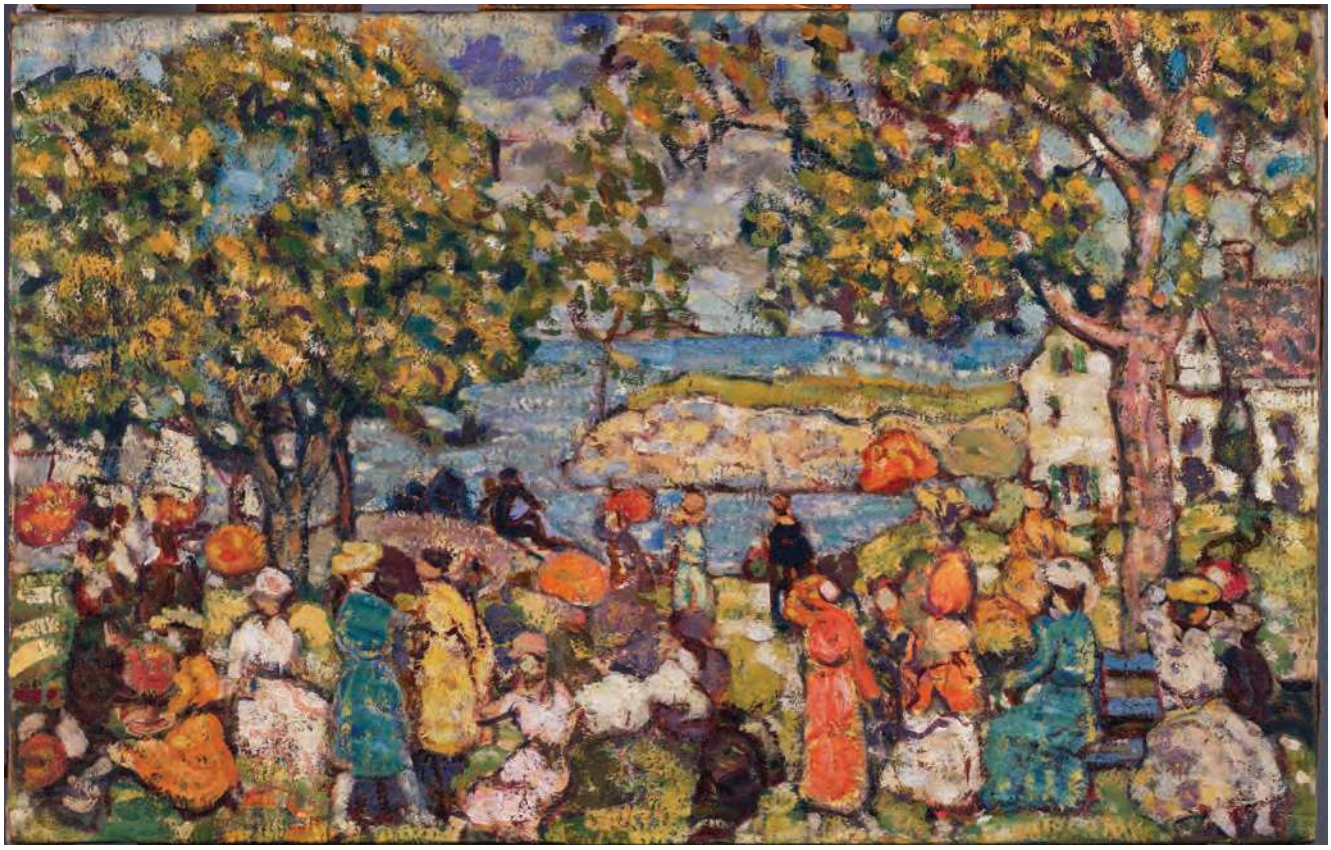
- Continuously improve its environmental performance;
- Reduce greenhouse gas emissions;
- Improve energy performance at its facilities and increase reliance on renewable energy;
- Improve water use efficiency at its facilities;
- Adopt 'greener' transportation methods;
- Purchase environmentally friendly products and increase waste diversion and recycling;
- Minimize the impact of its facilities outside park boundaries. This includes reducing light and noise from park facilities to preserve dark night skies and natural sounds; and
- Adopt sustainable best practices in all facility operations.

Finally, the Green Parks Plan calls for engaging visitors about sustainability and inviting their participation. This includes informing park visitors and park gateway communities about the actions that the Park Service is taking to reduce its impact on the environment. The agency will 'encourage everyone to take a step toward including sustainable actions in their own homes, workplaces, and communities'. It will 'explain the science of climate change and the impact it is having on parks to visitors, partners, and surrounding communities', and describe what the agency is doing to reduce its own greenhouse gas emissions.

5.2 Energy-efficient buildings

In the Santa Monica Mountains National Recreation Area in Los Angeles, profiled on pages 42-45, the Anthony C. Beilenson Interagency Visitor Center is the US National Park Service's first LEED Platinum certified visitor centre. (LEED, which stands for Leadership in Energy and Environmental Design, is a programme sponsored by the US Green Building Council; Platinum is the highest of its four ratings of environmental stewardship and social responsibility.) However, the centre goes beyond LEED Platinum requirements and is a 'net-zero' building that produces as much energy as it uses on an annual basis, a remarkable achievement as the original structure was a horse stable on an estate whose buildings were designed in the 1920s by the prominent pioneer architect of the California-style, Wallace Neff. The design of the visitor centre was aimed both at preserving the appearance of the stable and demonstrating energy efficiency.

Good behaviour toward the environment can be promoted in many ways. The 'net-zero' visitor centre at Santa Monica Mountains National Recreation Area produces as much energy as it uses, and its design preserves the appearance of a cultural landmark. Ted Trzyna.



Excursions to natural places near the city have a long history. Picnic*, circa 1913-1916, oil on canvas, Maurice Prendergast (American, 1861-1924).*

Guideline 6. Demonstrate, facilitate and promote the health benefits of contact with nature and of good eating habits.

Managers of urban protected areas should take advantage of the large numbers of people who visit their parks to:

- Demonstrate, facilitate and promote the many benefits of contact with nature; and
- Make healthy food available and encourage good eating habits.

6.1 Health benefits of contact with nature

Urban protected areas, along with conventional city parks, have an important role in promoting and facilitating physical exercise and contact with nature for urban populations. Aside from the benefits of exercise, there is growing scientific evidence to support the idea that spending time in nature improves physical and mental health, an idea long held by many conservationists and health professionals. In his influential 2005 book *Last Child in the Woods*, Richard Louv used the term 'nature-deficit disorder' to describe a complex of conditions resulting from children spending less time outdoors than they did in previous generations, such as obesity, depression, hyperactivity, boredom and loneliness. While 'nature-deficit disorder' is not a recognized medical diagnosis, it is a powerful metaphor. Citizens groups in several countries have been organized to act on this problem; they are brought together in the Children and Nature Network. A movement called Healthy Parks Healthy People started in 2000 in Australia as an initiative of Parks Victoria, the agency responsible for national and state parks and reserves in the state of Victoria, along with major urban parks and regional open space in and around Melbourne (metropolitan population 4.2 million).

Parks Victoria commissioned Deakin University to do a literature review (Maller et al., 2008) which analysed more than 200 journal articles on research into the human health benefits of contact with nature. Evidence in the review, which was updated in 2008, came from fields as diverse as ecology, biology, environmental psychology and psychiatry, and showed that access to nature plays a vital role in human health, well-being and development. The research indicated that humans depend on nature for psychological, emotional and spiritual needs that are difficult to satisfy by any other means.

In Victoria, the Healthy Parks Healthy People initiative brings together organizations in the parks, environmental, healthcare, public health, tourism and education sectors to promote parks and the use of parks as a means to improve physical and mental health. It works through media campaigns and sponsorship of such events as The World's Greatest Pram Stroll, which encourages young mothers to 'meet and mix' in a pleasant environment.

In 2010 Parks Victoria hosted the first International Healthy Parks Healthy People Congress, which brought together 1,200 participants from 37 countries. Subsequently, an entity called Healthy Parks Healthy People Global was created to advocate the benefits of contact with nature worldwide. Several park agencies in Australia and New Zealand have adopted the theme.

The United States National Park Service has an initiative called Healthy Parks Healthy People US, which was inspired by the Parks Victoria programme and has the broader objective of 'reintegrating human, environmental, and ecological health into the mission of public parks and public lands'. Although it is based in the Park Service, it works with other national land-management agencies, as well as state and local parks organizations and the healthcare and public-health sectors.

Richard Louv's book had a big impact in Britain. In response, the National Trust, a charity with 4 million members that protects natural and built heritage, started an initiative to encourage all children to do 50 outdoor things by the age of 11¾, ranging from going star gazing to cooking on a campfire. Working with another national NGO, the Royal Society for the Protection of Birds—RSPB—the Trust has also backed a powerful film about the need to reconnect children with nature, *Project Wild Thing*, which has received enthusiastic reviews.

6.2 Healthy food and good eating habits

In the San Francisco Bay Area, the 225-hectare Muir Woods National Monument (IUCN Category V) protects a remnant of ancient coast redwood forest. It receives almost a million visits a year and has become the site of several projects aimed at demonstrating good environmental and healthy behaviour (see also Guideline 17 regarding natural sounds). Muir Woods is administered as part of Golden Gate National Recreation Area, GGNNRA, profiled on pages 46-47.

One of these initiatives is Food for the Parks, a programme aimed at expanding the availability of nutritious, local and sustainable fresh food to park visitors. In the United States, as in many other countries, poor eating habits have led to an increase in obesity, type 2 diabetes and other health problems. The programme also aims to leverage the food purchasing power of the US National Park Service and its supply chain to influence systems of food production, processing and transportation in the US and beyond.

At Muir Woods, a small café operated by a concessionaire used to serve conventional fast-food items. Now, it offers organically produced, locally sourced and healthy food, including vegan, vegetarian, gluten-free, low-fat and low-sodium items. The menu does not include food with refined sugars, trans-fats, high fructose corn syrup or processed white flour. The snacks sold do not include candy or fried chips.

Food for the Parks is an initiative of the Institute at the Golden Gate, a programme of the Golden Gate National Parks Conservancy, the nonprofit partner of GGNRA. Its experiences at Muir Woods and other parks have been distilled in two publications listed on page 103.

Guideline 7. Prevent littering.

Managers of urban protected areas and their allies should prevent littering by:

- Drawing on the results of research on littering behaviour;
- Conducting research on such behaviour locally, since specifics vary by location and culture;
- Cleaning up litter frequently and consistently;
- Providing plenty of easily identifiable containers for trash and cigarette butts;
- Providing containers for recyclable items;
- Informing visitors of the importance of, and reasons for not, littering;
- Making a special effort to reach younger visitors with this message;
- Avoiding counterproductive references to a high rate of littering, or to threats of punishment;
- Targeting special problems such as cigarette filters, plastic bags and beverage containers; and
- Working with allied groups to prevent and clean up litter and push for stronger regulation.

Littering behaviour varies greatly by country and culture. In a national park in southeastern Europe, a box thrown into winter snow reappears with the first spring flowers. Ted Trzyna.

7.1 The problem

Littering is a perennial problem in many urban protected areas, with their large numbers of visitors, many of whom are local and regard these parks as extensions of the built environment. Litter is unsightly and encourages more littering and other irresponsible behaviour. Wildlife dies from getting trapped in trash, mistaking it for food or eating discarded food. Litter can remain in the environment for a long time before it degrades, and it can find its way over long distances to lakes and the sea. Marine animals are especially vulnerable to plastic items in which they get entangled or mistake for food.

7.2 The value of research: Why people litter and what can be done about it

There is much research available on littering behaviour. Although some research findings are relevant to many situations, studies point to the need to base action on a good understanding of local conditions.

One major study, conducted by the environmental psychologist Wesley Schultz (2009) and his colleagues in the United States, found that a strong contributor to littering is the presence of litter ('litter begets litter'), demonstrating the importance of consistent and repeated removal of litter. The study found that most littering happens at a considerable distance from litter bins, so proper disposal should be easily identifiable, convenient and accessible. Another finding was that people under 30 were more likely to litter than those who were older, highlighting the need to focus messages on younger people. Any anti-littering messages should be consistent and ongoing about the importance of not littering; messages that refer to a high rate of littering can make it acceptable and actually increase littering rates. Although threats of fines and other sanctions are common, in the case of litter there is evidence they can be counterproductive.

On the other hand, enforcement of anti-litter laws can be a deterrent. Intense and well-publicized enforcement for short periods is especially effective.

Littering behaviour varies greatly by country and culture. In fact, the research project found considerable regional and local differences even within the United States. It recommends tailoring anti-litter efforts to specific localities.

If littering is tolerated, it can create the conditions in which more serious offences may occur. An idea known as the 'Broken Windows Theory' applies to litter as well as to broken windows. Thus James Q. Wilson and George L. Kelling's article of 1982, 'Broken Windows', that eventually led to a 'broken windows policing strategy' being adopted in New York City and many other cities, also used litter as an example. They wrote: 'Consider a building with a few broken windows. If the windows are not repaired, the tendency is for vandals to break a few more windows. Eventually, they may even break into the building, and if it's unoccupied, perhaps become squatters or light fires inside. Or consider a sidewalk. Some litter accumulates. Soon, more litter accumulates. Eventually, people even start leaving bags of trash from take-out restaurants there or even break into cars.'

7.3 Special problems: Cigarettes, plastic bags, beverage containers

Littering statistics can be staggering. Worldwide, cigarette filters are the most common form of litter; it is estimated that 4.5 trillion of them end up as litter each year, amounting to 350,000 metric tons. Smokers outdoors commonly throw their cigarette butts to the ground, not thinking of it as littering (or indeed of the dangers of causing fire). Cigarette filters are made of cellulose acetate, which is not biodegradable. Chemicals in tobacco and used filters are toxic to marine and freshwater fish (Smith & Novotny, 2011). In urban protected areas where smoking bans are not feasible, signs and admonitions may discourage people from such behaviour. Providing plenty of ash receptacles can also help: the study by Schultz et al. mentioned *above* found that their availability, as well as the number of cigarette butts already on the ground, affected the littering rate.

Plastic bag litter has become a nuisance and an eyesore throughout the world, including in many urban protected areas, where winds carry them from the city. National governments have started to act on this 'white pollution'. In 2002, Bangladesh was the first country to ban use of these bags. Several African countries prohibit use of all plastic bags,

Providing separate containers encourages recycling of bottles and cans. A bin in the Hong Kong Country Parks. Ted Trzyna.

Globally, cigarette butts are the most common form of litter. A juvenile red billed gull examines one in New Zealand (the photographer assures us the bird didn't swallow it). Tony Wills/Creative Commons BY-SA-3.0.

while others ban ultra-thin bags. China has also banned ultra-thin bags, which are more likely than thicker bags to be used once and then discarded. Some countries require stores to charge customers a fee for taking a plastic bag; in Ireland, for example, a small 'bag levy' has resulted in bag use falling by 95 per cent. Local authorities have acted in countries without national laws, including in India, Mexico, Pakistan and the United States (France24, 2013).

Discarded beverage containers are another common problem in urban protected areas. Container deposit laws are a proven method of capturing beverage bottles and cans for recycling. Some two dozen countries have such laws, although in some cases they apply only in certain of their states or provinces. California's programme, in place since 1986, is one of the largest; more than 16 billion containers a year are returned, achieving an 82 per cent recycling rate.

7.4 Working with allied groups; pushing for stronger regulation

Volunteers from NGOs allied to urban protected areas can help prevent littering as well as clean it up. For example, each year on Mahashivratri, a Hindu holy day, large numbers of people visit Mumbai's Sanjay Gandhi National Park, profiled on pages 26-27. In one recent year, 150 volunteers from the Bombay Environmental Action Group, Conservation Action Trust and the Bombay Natural History Society maintained a vigil to ensure that there was no litter trail left behind. They were armed with whistles and posters in regional languages to spread awareness (Choksi, 2009). (See also Guideline 3, *Take advantage of volunteers and support groups*.)

Managers of urban protected areas can encourage governmental authorities to enact and enforce laws regulating such disposable items as plastic bags and beverage containers, pointing to the steps already taken in many places around the world.

Guideline 8. Prevent and prosecute crime against people and property.

Managers of urban protected areas should:

- Work closely with local law-enforcement agencies to prevent and prosecute crime against visitors, staff and park property;
- Take the initiative when others fail to act;
- Work to counter the attitude that destruction of park habitat is a 'victimless crime'; and
- Combat vandalism, including graffiti.

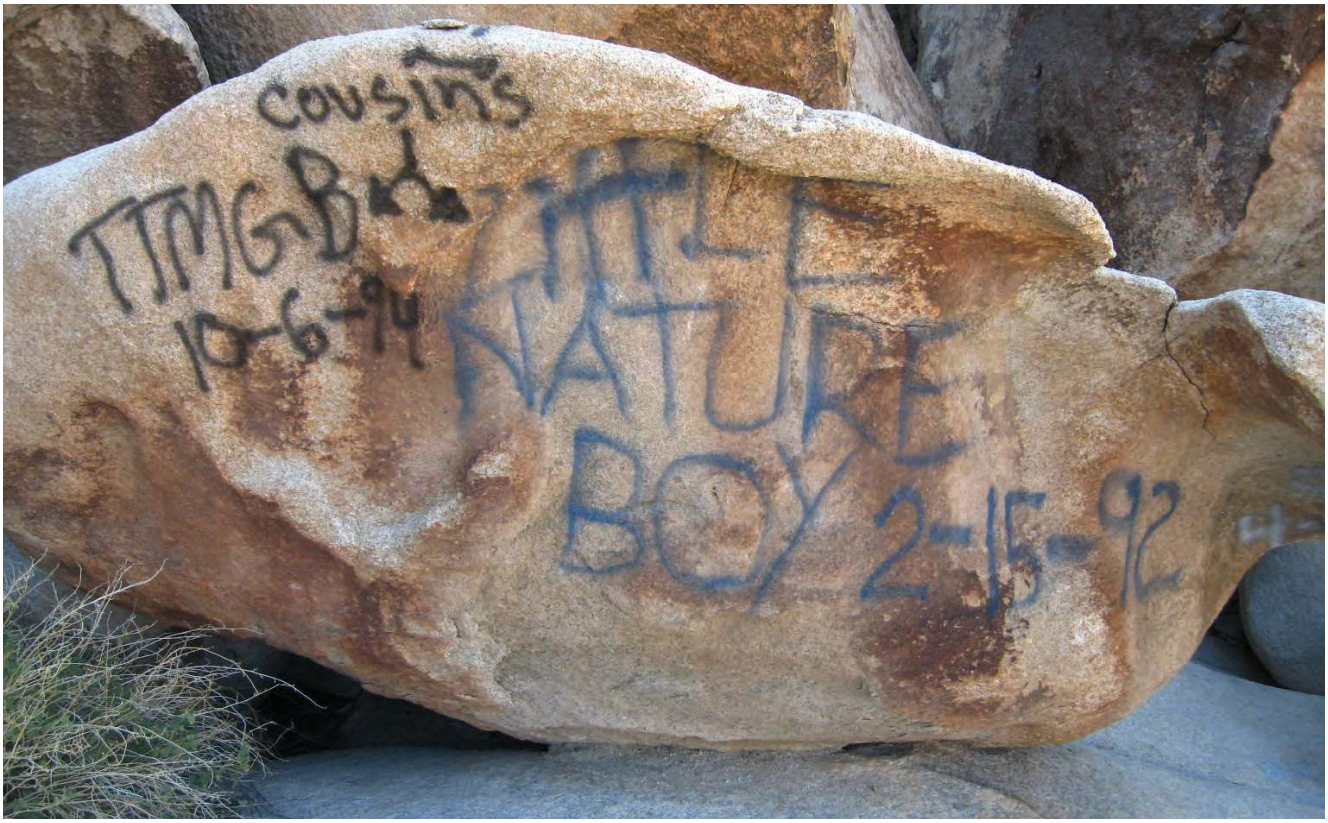
See also Guideline 10, *Control poaching*.

8.1 Dimensions of the problem

Urban protected areas are often full of visitors, they are readily accessible from built-up areas of the city, and it is easy to hide in them. This provides opportunities for crimes against visitors and staff, as well as park property.

Crimes against people and their property are usually limited to pick-pocketing, mugging or breaking into cars, but there are sometimes violent assaults and even murders. Such incidents are tragic in themselves, but even one well-publicized attack can create apprehension among park users. Once established, the perception that a place is dangerous is hard to eradicate, and visitor numbers can consequently decline.

Among countries and individual urban protected areas, the extent and nature of such crimes vary greatly and depend



Vandals using social media pose a new threat to protected areas. In Joshua Tree National Park in California, a popular trail was closed after spray-painting of boulders attracted copycat vandals to the site through social media. JTNP.

Some urban protected areas find it necessary to invest substantial resources into improving visitor safety. In Table Mountain National Park, trained staff patrol with dogs, cooperating closely with other law-enforcement agencies. TMNP.

mainly on crime rates in the cities where they are located. Division of responsibility between park staff and law-enforcement authorities also varies greatly. For example, Yangmingshan National Park in Taipei is protected by a detachment of the National Parks Police Corps, which reports to the National Police Agency rather than to the park administration. At the other end of the spectrum, responsibility for law enforcement in the Santa Monica Mountains National Recreation Area is divided among four separate park agencies, several local police departments, and specialized California state and US federal agencies.

Park managers sometimes express frustration over weak support from municipal police but are reluctant to talk about it for the record. Failure to prosecute violations can also be a concern. In one case, a developer bulldozed a half-hectare of primary forest within a park boundary, but prosecutors declined to act because they regarded it as a 'victimless crime'.

8.2 Vandalism and theft of park property

As with littering, much research has been done on vandalism and what to do about it. Groups of young people are most likely to commit vandalism. Motivations can be boredom, anger, resentment, revenge, defiance or peer pressure.

A new threat has appeared: vandals' use of social media. In Joshua Tree National Park in the California desert, one popular trail was closed when there was a surge in spray-painting and scratching boulders. Park officials found that the vandals used social media to brag about their actions, which in turn attracted more copycat vandals to the site (Cart, 2013). Although it is not an urban protected area, many of Joshua Tree's visitors come on day trips day from metropolitan Los Angeles.

Theft of park property is a serious problem in some urban protected areas. In Table Mountain National Park, a microwave tower was taken apart during the night, apparently to be sold as scrap metal. Fencing has been taken down in Nairobi National Park. Copper wire and bronze plaques have been stolen in the Santa Monica Mountains National Recreation Area.

If these crimes occur in an urban protected area, they will also be happening in the adjoining city, and local police will be able to help or provide advice on how to cope with them.

In the case of graffiti, prompt removal is the best deterrent. On buildings and signs that are frequent targets, anti-graffiti coating can be used to make cleaning easier. Some cities have adopted a different approach: graffiti artists are given places to paint murals, which are then opened for public view. This has deterred them from working in the wrong places.

8.3 Taking the initiative

Among the urban protected areas profiled in Part 2, Table Mountain National Park is one of those most challenged by criminal activity. It lies in the heart of Cape Town, a city which has great disparity between rich and poor, a high rate of unemployment, large shantytowns and many street gangs. In the first years of the 21st century, there was a surge in the number of crimes, mainly muggings and petty thefts, but also several violent assaults on hikers, both local residents and foreign tourists. Park managers were of course concerned about the victims of these attacks, but also worried about how this would be reported in the international press, since such negative publicity could have serious consequences for Cape Town's economy, of which foreign tourism forms a large part.

The park decided to put substantial resources into improving visitor safety. Previously, according to Park Manager Paddy Gordon, Table Mountain's crime problem was regarded as the 'police's work'. However, the park management came to realize that it had to take responsibility itself, since the park could not meet the international standards the managers aspired to unless visitors' safety could be guaranteed. Since 2005, the park has deployed teams of trained staff who patrol the park equipped with dogs, vehicles and radios, cooperating closely with other law-enforcement agencies. In addition, visitor information centres have been set up in parking areas, a security hut has been placed in a vulnerable site at the bottom of a gorge, volunteers have been organized to help and closed-circuit television has been installed in high-use areas.

Guideline 9. Reduce human-wildlife interaction and conflict; keep aware of emerging infectious diseases.

To reduce hazards resulting from the interaction between wildlife and people in and near their parks, managers of urban protected areas should:

- Understand that fences are an incomplete solution;
- Help people protect themselves from predators;
- Seek to maintain a balance between predators and their wild prey;
- Educate the public about wildlife behaviour and encourage a respectful attitude toward wildlife;
- Enforce wildlife laws to protect people and wildlife;
- Be aware of the potential danger to people of emerging infectious diseases in wildlife and the natural environment; and
- Educate decision-makers about the value of keeping habitat as natural as possible to control such emerging infectious diseases.

See also Guideline 10, *Control poaching*.

Visitors feeding wildlife can lead to serious problems. In the Hong Kong Country Parks, food handouts resulted in a huge increase in the monkey population; sterilization was used to control it. Monkeys in Kam Shan, Hong Kong. Creative Commons BY-SA-3.0.

Large predators are a concern in and around some urban protected areas. In Los Angeles, this mountain lion found its way to a toilet in a city park well beyond the boundaries of Santa Monica Mountains National Recreation Area. SMMNRA.

9.1 Human-wildlife conflict

Although conflict between people and wildlife can occur almost anywhere, dense human populations near urban protected areas increase the likelihood of such encounters. Animals often venture unnoticed beyond porous park boundaries. Unwelcome confrontations occur when they raid garbage, destroy gardens, intrude into homes, cause highway accidents or injure or even kill people. Many animal species are involved, including mammals (both carnivores and large herbivores) and poisonous reptiles, amphibians, insects, spiders, birds and fish. Animals carrying dangerous diseases that are transmittable to humans, such as rabies and bubonic plague, are of special concern.

Whether these conflicts occur within protected areas or are the result of wild animals moving from them into nearby built-up areas, their prevention or mitigation should be a matter of great importance to park managers.

9.2 Fences: An incomplete solution

Controlling wildlife movements by building fences and other physical barriers may seem to be the straightforward solution to reduce conflict. In some places and for some species this will suffice, for example, to prevent ungulates such as deer or zebra from straying onto roadways. However, in most cases barriers are of limited value. For one thing, fences are often removed or vandalized. But even a perfectly maintained fence cannot alone reduce human-wildlife conflict. Managers must understand what drives wildlife movement beyond park boundaries. This involves factors within the protected area, such as excessive wildlife density or insufficient food, as well as enticements from outside the park, such as handouts from irresponsible neighbours.

For example, in and around the Hong Kong Country Parks, profiled on pages 20-21, food provided by local residents led to a huge increase in monkey populations and a wave of complaints about the nuisance they caused. With local predators long since extinct, an extensive sterilization programme was needed to control the number of monkeys.

9.3 Predators

Predators are of particular concern. A fundamental task for urban protected area managers is maintaining ecologically appropriate conditions for resident wildlife. As urban activity can dramatically influence the systems on which wildlife depends, changing circumstances often require action. With predators, this requires specific attention to predator-prey balance. With too many predators or insufficient prey inside the protected area, hungry individuals will often stray outside.

In Sanjay Gandhi National Park in Mumbai, conflict between people and leopards (*Panthera pardus*) occurs frequently. Some incidents occur inside the park, but many others take place just outside it, with sometimes fatal results for humans. Intense media coverage given to these dramatic events can increase fear. For revenge or self-protection, fearful mobs sometimes corner and kill the big cats. This puts additional pressure on park staff to reduce such incidents and they have been working to restore a viable predator-prey balance. Between 2002 and 2005, they captured 64 leopards within and around the park, relocating many of them outside the metropolitan area. Efforts to reinforce a sustainable prey base include reintroduction of native deer and cultivation of additional grasslands for grazing.

Even with sufficient numbers of prey, natural or artificially supported, some predator species still roam beyond park boundaries. In some countries, protecting them is part of urban protected area management. Elaborate measures may be required to do so.

For example, mountain lions (*Puma concolor*) live in and around the Santa Monica Mountains National Recreation Area in Los Angeles. These impressive animals—adult males weigh 70-120 kilograms—feed mainly on deer and small mammals and very rarely attack humans. They have been protected since 1990 by California state law.

Since 2002, biologists from the United States National Park Service have been monitoring the movement and behaviour of mountain lions in the Santa Monica Mountains, using radio collars and GPS devices, in order to better understand how urbanization is impacting them. They have found that the main threats to these mountain lions are loss and fragmentation of habitat, as well as poisoning from feeding on poisoned rodents or other animals that have consumed poisoned rodents. Another finding is that there is not much difference between the home ranges of these territorial animals in urban as opposed to non-urban regions; in both environments an

Degradation of wildlife around human settlements is a major driver of emerging infectious diseases. Deer ticks of the genus Ixodes *transmit the bacterium that causes lyme disease. US Department of Agriculture.*

The mosquito Aedes aegypti*, which can transmit dengue, yellow fever and other tropical diseases, is spreading in many countries due in part to warmer temperatures resulting from climate change. US Department of Agriculture.*

adult male needs about 50,000 hectares. The long-term survival of the mountain lion population in the Santa Monica Mountains depends on their ability to move between regions. Thus, priority is being given to identifying and protecting corridors that link this region to other large natural areas (see Guideline 12, *Promote connections to other natural areas*).

9.4 Educating the public

Some human-wildlife interaction is unavoidable. Educating the public about wildlife behaviour helps to shape their reactions towards it. Setting healthy expectations and encouraging respectful attitudes towards wildlife can help prevent naturally occurring contact from deteriorating into human-wildlife conflict.

Such education, undertaken by park staff or partners, can take many forms, including printed publications, television and radio spots, and classroom instruction for young people. Given the often-high turnover of urban populations, this is necessarily a process that needs to be repeated often.

9.5 Enforcement

Education can be supplemented, but never fully replaced, by enforcement of laws and regulations. But laws are often necessary and should be enforced, for example: animal feeding bans, reduced speed-limits at known animal crossings ('Deer crossing' signs, etc.), and requiring compatible fencing and landscaping in adjoining areas. Writing and enforcing such regulations necessarily involves working closely with neighbouring authorities.

9.6 Emerging infectious diseases

Infectious diseases that have newly appeared in a human population or have been known for some time but are rapidly increasing in incidence or geographic range, are called 'emerging infectious diseases'. Most of them are zoonotic, that is, they are transmitted between other animals and humans. Examples are malaria, dengue, yellow fever, plague and leishmaniasis.

Degradation of wildlife habitat, increased edge effect and increased human-wildlife interaction are all major drivers of zoonotic diseases, as is human interaction with domestic and farm animals. The key factor is disturbance of the equilibrium between certain hosts and parasites. A good illustration is Lyme disease, first described in 1977 in the northeastern United States, which has since been found in other parts of North America, as well as parts of Europe, Asia and Australia. Lyme disease is caused by a bacterium, *Borrelia burgdorferi*, which is transmitted to humans by bites from ticks. If it is treated early, the infection is eliminated by antibiotics. If untreated, it can lead to meningitis, heart disorders and severe arthritis. In eastern North America, the white-footed mouse (*Peromyscys leucopus*) is an important reservoir of the Lyme disease pathogen. In intact habitats, mouse populations are controlled by owls, hawks, snakes, foxes, weasels and other species. In fragmented or degraded habitats, such predators are fewer in number or may not exist.

Globally, the generally warmer and wetter conditions resulting from climate change, combined with habitat changes, are expected to encourage the conditions in which the spread of infectious diseases (including entirely new diseases) occurs, thus increasing the danger of transmission to humans.

Urban protected areas have a dual role here. When they protect natural ecosystems that are more or less intact, they tend to keep the ecology of microorganisms in balance. But when they are degraded, such as around roads, along boundaries and in heavily visited locations, they may facilitate the interaction among pathogens, vectors and hosts, and thus create the conditions in which disease is spread. These are good reasons for maintaining urban protected areas in as natural a state as possible.

The links between loss of wildlife habitat and emerging infectious diseases are receiving increased attention from scientific researchers and public health professionals. Managers of protected areas should keep abreast of what is happening in their regions and cooperate with those involved. They should also educate governmental decision-makers about the value of keeping wildlife habitat as natural as possible so as to control emerging infectious diseases—in addition to many other reasons.

Guideline 10. Control poaching.

Managers of urban protected areas should:

- Enforce laws against poaching in protected areas;
- Participate in interagency efforts to combat poaching;
- Encourage police to take poaching seriously;
- Provide alternative sources of edible and medicinal plants where appropriate; and
- Understand the role of organized crime, and act accordingly.

See also Guideline 8, *Prevent and prosecute crime against people and property*; Guideline 9, *Reduce human-wildlife interaction and conflict; keep aware of emerging infectious diseases.*

10.1 The problem

Poaching can be a problem in any urban protected area, given their proximity to large urban populations.

In developing countries, certain wild plants and animals found in urban protected areas, and their products, find a ready market in the city. These include medicinal and edible plants, firewood, timber, animals, animal products and even fresh water. This is especially the case where formerly rural people have recently moved to urban places. Furthermore, in newly created urban protected areas, formerly permitted uses can become prohibited practice, with serious implications for local livelihoods. Examples of poaching in developing countries are wood cutting in Sanjay Gandhi National Park in Mumbai (see page 27) and harvesting of medicinal plants in Table Mountain National Park (see below).

Organized crime is behind much of the poaching that generates high profits. An example is illegal taking in Table Mountain National Park of beige abalone, valued in Asia for its supposed aphrodisiac qualities. These specimens were confiscated by park staff. TMNP.

Urban protected areas in industrialized countries can also be vulnerable. For example, in the Golden Gate National Recreation Area in the San Francisco region, collectors poach the mission blue butterfly (*Aricia icariodes missionensis*, US Endangered), which is found only in a small area in and around the park. In Blue Mountains National Park next to Sydney, orchids, tree ferns and slabs of sandstone are taken for gardens or for sale to the landscaping industry.

10.2 Enforcing the law

Enforcing laws against poaching is a challenge for managers of urban protected areas. This is because they have limited staff, only some of whom are trained in law enforcement, and local police departments do not give poaching a high priority. Separate wildlife agencies can help, but they are usually spread thin.

Many countries suffer from poor coordination between the various police and specialized agencies responsible for combating environmental crime. In 2012, INTERPOL, the International Criminal Police Organization, launched an initiative to encourage its 190 member countries to set up National Environmental Security Task Forces, which bring together law enforcement, customs, environmental agencies, prosecutors and other units of government.

10.3 Providing alternatives

In some cases, in addition to enforcing the law, providing alternatives for poached items can help to undermine poaching.

When Table Mountain National Park was established in 1998, one of the most serious resource management problems it faced was bark-stripping and illegal plant collecting for the traditional medicine trade. By 2003, the Newlands Forest section of the park was being heavily targeted by bark-strippers, who had damaged some 800 mature indigenous trees to the point of no return. These trees included black stinkwood (*Ocotea bullata*), a protected species under South African law. Bulbs and herbs were illegally harvested throughout the park.

Park staff first responded with stricter law enforcement and fencing. However, environmental crimes did not rank high on the police's list of priorities. The staff decided to talk with users of traditional medicines and came up with a solution. An abandoned terraced garden in the park was converted to a site where traditional healers can grow their medicinal plants instead of collecting them in the wild. The national Department of Labour recognized and provided funding for the programme as a formal learning facility where participants are taught propagation techniques, soil preparation and other skills. In addition, healers are encouraged to use the leaves, rather than the bark, of medicinal plants, since the active ingredient is found in both. However, this site will not meet a growing demand for traditional medicinal plants, and not all required species will grow in its physical conditions, so new nurseries are being established elsewhere in the city.

10.4 Understanding the role of organized crime and acting accordingly

There is poaching of a different sort in protected ocean waters in and near Table Mountain National Park. Here beige abalone *(Haliotis midae*), a shellfish locally called *perlemoen*, are being poached. Although some commercial harvesting of this species of abalone is permitted, most of it is taken illegally, frozen or dried, and exported, almost entirely to China,

Collectors seek specimens of rare species of animals and plants for pleasure or profit. In Golden Gate National Recreation Area in the San Francisco region, the mission blue butterfly is such a target. GGNRA.

where it commands high prices for its supposed aphrodisiac qualities. Although local divers harvest the abalone, this lucrative trade is controlled by a crime syndicate believed to be based in China which is also involved in selling illegal drugs in South Africa. The urban location makes both illegal activities harder to detect. Park and other government officials try to control abalone poaching and confiscate hundreds of thousands of specimens each year. Since 2007, the species has been listed under Appendix III of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), thereby allowing South Africa to restrict the exports of illegally obtained specimens.

INTERPOL has an Environmental Crime Programme, which includes working groups on wildlife and pollution crime. According to this intergovernmental organization, 'Environmental crime is a serious and growing international problem, and one which takes many different forms. ... Broadly speaking, wildlife crime is the illegal exploitation of the world's wild flora and fauna, while pollution crime is the trading and disposal of hazardous wastes or resources in contravention of national and international laws. ... A significant proportion of both wildlife and pollution crime is carried out by organized criminal networks, drawn by the low risk and high profit nature of these types of crime. The same routes used to smuggle wildlife across countries and continents are often used to smuggle weapons, drugs and people. Indeed, environmental crime often occurs hand in hand with other offences such as passport fraud, corruption, money laundering and murder.'

Guideline 11. Control invasive alien species of animals and plants.

Managers of urban protected areas should:

- Survey their lands and waters regularly to detect new invasions;
- Act aggressively to remove or control invasive species within their areas;
- Work with local authorities, for example, to discourage use of potentially invasive landscaping plants along streets and highways;
- Participate in broader local and national partnerships for prevention, early detection, eradication and control; Educate visitors, as well as public officials, the media and the general public, about the invasive species threat;
- Enlist the cooperation of other urban nature-education institutions, such as zoos, botanic gardens and natural history museums; and
- Make use of the toolkits and other information resources available.

11.1 The problem

Invasive alien species are a major global challenge for nature conservation and cause extensive economic damage to farms, grazing lands, commercial forests and fisheries. Some species such as mosquitoes are vectors for human diseases. The main pathways by which these species invade new territory are urban: seaports, river ports, airports, rail and truck yards, plant nurseries and gardens. Globalization of trade is accelerating their introduction. There is a huge number of potentially invasive species.

Urban protected areas can be both facilitators and victims of such traffic. They can facilitate establishment of invasive species by serving as refuges and breeding grounds, but also suffer from invasive species that destroy natural habitat and native species, deplete water, and increase the risk and severity of fire.

Descriptions follow of several kinds of invasive animals and plants, along with specific examples and responses. As several of the examples show, what is acceptable in terms of invasive species can be determined by culture as well as science and conservation priorities.

11.2 Defining terms

In discussing invasive alien species, clarity about the meaning of terms is important:

- 'Native' (or 'indigenous') species are organisms that occur naturally in a particular ecosystem or habitat without direct or indirect human actions. However, using the word 'native' to describe species found in a broad region or particular political jurisdiction can be misleading. For example, although Monterey pine (*Pinus radiata*) may be considered a 'California native', it is in fact native to only three small parts of the California coast and should be therefore properly regarded as invasive in other parts of California. The term 'native here' is sometimes used to make the distinction. Climate change presents a new need for clarification of terms. Where native species are expanding into new habitats as part of a natural process of adapting to climate change, they should probably not be called 'invasive'.

- 'Alien' species occur in a place as a result of direct or indirect, deliberate or accidental, actions by humans. Synonyms are 'exotic', 'introduced', 'non-native' and 'non-indigenous'.

- 'Naturalized' species are non-native organisms capable of surviving and reproducing without human intervention for an indefinite period. Naturalized plants that do not spread away from where they were introduced are not generally a significant problem. However, naturalized species that do spread and survive in new areas can be considered to be 'invasive'.

- 'Invasive' species are those species that spread or intrude aggressively into natural habitat in a harmful manner. Native species can behave invasively, but the term usually describes non-native species that cause ecological disruption to natural ecosystems. The severity of the impact varies considerably, depending on the species and the area being invaded. The worst invasive species cause substantial changes to the character, condition and form of the invaded habitat. In scientific literature, these species are sometimes referred to as 'landscape transformers'.

- 'Weeds' are plants considered undesirable where they are growing. They are not necessarily alien, but usually are. The terms 'noxious weed' and 'exotic pest plant' are legal terms in some countries for species that cause major economic damage.

Only a small proportion of alien species transported to new places become established, and an even smaller fraction of those established become invasive.

11.3 Domesticated cats and dogs

In protected areas in and near cities, domesticated cats and dogs that are allowed to range freely, escape or are abandoned, and their wilder descendants, can cause serious damage. Although the term 'feral' is often used to describe all such animals, it more accurately refers to free-ranging animals that have minimal or no reliance on humans and survive in self-reproducing populations. On the other hand, 'domestic' cats and dogs are pets or house animals whose requirements are intentionally met by humans, and 'stray' cats and dogs rely only partly on humans. All such animals can present problems.

Recent research suggests that the number of wild animals killed by free-ranging cats (*Felis silvestris catus*) is far greater than previously thought. For wild birds alone, the estimate for the United States is 1.4 to 3.7 billion birds annually (Loss, 2013). In Australia, many urban protected areas are severely damaged by domestic, stray and feral cats (Dickman, 1996). An example is Dandenong Ranges National Park (IUCN Category II) in the suburbs of Melbourne, where cats commonly prey on wildlife, including ground-dwelling birds. In response, local governments adjacent to the park have enacted strict regulations controlling pet cats, including registration and night curfews. The Shire of Yarra Ranges, for example, started acting on the problem in 1991 and now has an 8 pm to 9 am curfew during which pet cats must be confined. Its website points out that 'even well-fed cats will hunt.' Fines apply (Yarra Ranges, 2014).

Domestic, stray and feral cats kill huge numbers of wildlife. A feral cat in Brisbane, Australia. Brisbane City Council.

Free-ranging dogs (*Canis familiaris*) are a nuisance and can be dangerous to park staff and visitors. They disturb and sometimes kill wild animals, and they can carry pathogens that threaten wildlife. In Yangmingshan National Park near Taipei, there are hundreds of dogs that have been abandoned in the park by people who no longer want them. Groups of these dogs sit in the park's roadways waiting for visitors to hand them food. Efforts to discourage dog abandonment and control the dog population have been stymied by popular sentiment. This is sometimes attributed to the influence of Buddhism, but researcher Yuying Hsu (2003) and her colleagues believe it may have more to do with an 'animist folk belief in the persistence of animal spirits capable of exacting revenge on those who either killed them or were responsible for their deaths'. They think efforts to overcome this problem should focus on: increasing the value of pet dogs by enforcing registration fees, especially for unsterilized animals; making neutering available at low cost; and public education.

11.4 Exotic pets

Exotic pets that find their way into protected areas can present serious problems. (See also *Home aquarium plants and animals, below*.) One of the worst cases relates to Burmese python in Everglades National Park (IUCN Category II; a World Heritage Site, Ramsar Site and biosphere reserve). This 600,000-hectare park is adjacent to metropolitan Miami (population 5.8 million) in the US state of Florida. It protects a semi tropic wetland, a 'River of Grass' that is important habitat for wildlife, including several endangered or threatened animal species.

The Burmese python (*Python bivittatus*) is one of the largest snakes in the world and a favourite of the pet trade. Native to Southeast Asia, it has been introduced to Everglades. Intentional releases are made when people wish to rid themselves of their over-sized pets—not surprising, as they grow fast, from a centimetre at birth to over a metre and a half within a year, and to two to three metres when mature (by which time they weigh 90 kilograms and have a big appetite for small mammals). Also some pythons have escaped from confinement (Dorcas, 2012).

Exotic pets that find their way into protected areas can pose serious problems. In Everglades National Park in Florida, invasive Burmese pythons are voracious feeders on native wildlife. USNPS.

In 2006 park staff found conclusive evidence that escaped Burmese pythons were reproducing, a cause for real concern (USNPS, 2008). Large pythons can be dangerous to people, and are voracious feeders on wildlife, causing drastic reductions in the numbers of mid-sized mammals and disruption of the natural food chain. By 2012, staff had captured or killed over 1,800 Burmese pythons, but government biologists fear that there may be hundreds of pythons for each one found. Efforts to control numbers will fail if pythons continue to be released. There is also the threat of other exotic pet reptile species being established (Lineback, 2012).

Everglades National Park managers have worked with national and Florida state wildlife officials to strengthen regulation of exotic reptiles, and to inform the public of the dangers of releasing exotic pets into natural areas. Buyers must now purchase a license, show that they know how to care for such animals and ensure that every snake is implanted with a computer chip with information about the owner. Park staff have mounted educational exhibits in local nature reserves and offer a primary school curriculum to encourage responsible pet ownership which provides educators with background on invasive species in the Everglades and a suite of classroom activities (Florida, 2014). The Invasive Species Program of the US Geological Survey has published detailed guidance on monitoring and eradication methods, including trapping, bounties and detector dogs (Reed & Rodda, 2009). In 2012, the US Government banned imports and interstate trade of Burmese pythons and three other invasive snakes (USFWS, 2012).

11.5 Ballast water

The ballast tanks of ships are the main pathways for invasions of marine organisms. One of the worst examples of such invasions is the San Francisco Bay and Estuary, which was designated in 2013 as a Wetland of International Importance under the Ramsar Convention on Wetlands, and includes several national and state wildlife refuges (IUCN Categories IV and V).

More than a hundred species of exotic aquatic invertebrates, including clams, oysters and worms, are now found in the bay and new bottom-dwelling animals continue to be unintentionally introduced at the rate of about one species a year, mainly in ship ballast water. An Asian clam, *Corbula amurensis*, formerly known as *Potamocorbula amurensis*, first noticed in the bay in 1986, has altered the food web to the detriment of native salmon, among other species; in one section there are up to 25,000 clams per square metre. The

Ships' ballast water in urban ports is the main pathway for invasions of alien marine organisms. The Chinese mitten crab arrived in San Francisco Bay this way in 1992, spread quickly and now numbers in the millions. Christian Fischer/Creative Commons SA-3.0.

Chinese mitten crab (*Eriocheir sinensis*), first seen in San Francisco Bay in 1992, spread rapidly throughout the estuary and there are now millions of them (SFEI, 2014).

The US Coast Guard is implementing stringent regulations adopted in 2012 that require ballast water exchanges to be carried out in mid-ocean rather than in the harbour. The California state government is also working on the problem (SERC, 2014).

11.6 Home aquarium plants and animals

Home aquaria are another source of invasive exotic marine species, both animals and plants, especially in urban areas. Aquarium owners will sometimes empty their contents into local waterways or toilet bowls. Thirteen such species have been introduced to California marine waters, presumably after being released from aquaria. These include the seaweed *Caulerpa taxifolia*, which infested two protected coastal lagoons in urban areas in 2000 and cost the California state government more than US$ 6 million to eradicate. Native to tropical seas where it grows in small patches, in cooler waters it can form a dense smothering blanket on any surface and is capable of rapid growth. It becomes the dominant plant life in areas where it becomes established, crowding out native plant and animal species. In the Mediterranean Sea, where it is believed to have escaped from the Oceanographic Museum of Monaco in 1984, it now covers many thousands of hectares of seabed.

In the California incident, the press dubbed *Caulerpa taxifolia* the 'killer' alga after officials warned that it could have devastating ecological and economic consequences. Using the word 'killer' was perhaps hyperbole, but it caught the public's attention. A recent report to the state government by the University of California concluded that public education is the most effective means of preventing aquarium dumping. Nine *Caulerpa* species have since been prohibited in California and in US interstate trade. However, for aquarium animals such as fish and snails, regulatory authority is fragmented and there is no central source of information on the species, regulations or permits involved (Williams, 2012, SCCAT, 2003).

11.7 Invasive terrestrial plants

Invasive terrestrial plants are a problem in most, if not all, urban protected areas. The following are examples from two regions that are especially vulnerable but of course the problem arises in most parts of the world.

The California Floristic Province and the Cape Floristic Region in South Africa are two of five regions in the world that have Mediterranean-type climates. Both are exceptionally rich in endemic plant species, and both are undergoing rapid urbanization. Per unit of area, their native floras face greater immediate threats than those in any other species-rich regions on earth (Rundel, 2002).

With more than a thousand naturalized non-native plants, the very term 'natural' is a relative one in California, especially in protected areas at lower elevations around cities. Some of these plants are only a nuisance, but 75 of them are aggressive invaders that displace natives and disrupt natural systems (SIPM 2007). One of the worst is giant reed (*Arundo donax*), an Asian plant introduced for erosion control in the early 19th century, which chokes riparian systems, forming dense stands up to eight metres tall and crowding out native plants that shade streams, resulting in warmer water that harms aquatic life. It also uses more water than native plants, lowering groundwater tables, and is highly flammable. Control

Invasive terrestrial plants are a problem in most, if not all, urban protected areas. In California and elsewhere, one of the worst is giant reed, Arundo donax. *US Geological Survey.*

Removing alien plant species can be controversial. In Table Mountain National Park, a compromise resulted in removal of exotic pines and regeneration of indigenous silvertree (Leucadendron argenteum)*, shown here on the slopes of Table Mountain. Abu Shawka/Creative Commons, public domain.*

is an expensive process that involves cutting plants to the ground and brushing on herbicide manually to avoid harming native species. Another dangerous invasive is the cape ivy (*Delairea odorata*), an ornamental vine native to southern Africa, which has become a significant threat to riparian habitats in California, covering native vegetation with toxic leaves that are inedible for birds and other wildlife. Eradication is difficult and expensive.

Many of California's invasive plants were introduced intentionally as ornamental landscape species but only a few of these are controlled as 'noxious weeds'. Plant nurseries continue to sell many others, including the big periwinkle *(Vinca major*) and Scotch broom (*Cytisus scoparius*), both ranked as high-impact invasives by the California Invasive Species Advisory Committee (CISAC, 2010).

Early detection and removal of potentially harmful introduced species is essential to prevent new species becoming established or spreading. The United States National Park Service has been a pioneer in this field: its six national parks in the San Francisco Bay Area suffer from many invasive species in critical areas. Eradication needs not only scientific knowledge and major investment, but also requires the mobilization of communities in support of monitoring and eradication programmes. The Park Service has set up groups of volunteer 'Weed Watchers', under the guidance of vegetation ecologists, who are trained to identify plants and report the presence of invasives (USNPS, 2009).

The Cape Region of South Africa is also threatened by numerous invasive alien species, notably *Acacia* and *Hakea* species native to Australia, as well as pines (*Pinus* spp.). Table Mountain National Park in Cape Town has dealt with the problem aggressively.

Removing alien plant species can be controversial. Table Mountain park staff wanted to remove plantations of stone pine (*Pinus pinea*) and maritime or cluster pine (*P. pinaster*), both native to the Mediterranean region, which were first planted in the late 19th century for timber. In recent years, they have served as shady recreation areas for those living in wealthy neighbourhoods close to the park. Although they cover only two per cent of the park, these plantations threatened the seedbeds of two highly endangered types of *fynbos*, the extremely diverse, endemic-rich natural shrubland found only in the Cape Region.

On one side were park officials, determined to restore the *fynbos* to ensure its long-term sustainability; on the other were residents who wanted to preserve the pine plantations for recreational purposes, as well as cultural landscapes that they saw as emblematic of Cape Town's history and identity. Most of those involved agreed to participate in a facilitated consultation process held in 2006-2007 that widened the middle ground of public opinion. A compromise resulted that called for harvesting of the existing pines, a prescribed burn to regenerate the hundred-year-old seedbed, an eight-year period of *fynbos* recovery to set new seed and replenish the seed bed, and planting in limited areas of the non-invasive slash pine (*Pinus ellioti*), which is native to the southeastern United States. After about 30 years, these pines will be harvested, the areas burned, and another cycle of *fynbos* regrowth will occur. The compromise included an undertaking to expand picnic facilities within the park, and a request to the City of Cape Town to provide shaded recreational areas throughout the city (TMNP, 2008, Myrdal, 2013).

11.8 Enlisting the support of the public and other urban institutions

Public education and engagement are key to controlling invasive alien species, as the examples of cats in Australia, dogs in Taipei, snakes in the Everglades, pines in Cape Town and the 'killer' alga and Weed Watchers in California all show.

Urban protected areas have a significant role to play here through exhibits and interpretive activities such as those sponsored by Everglades National Park. So do other urban institutions such as zoos, botanic gardens and natural history museums. (See Guideline 19, *Cooperate with institutions that have complementary missions*.)

GUIDELINES 12-17: URBAN PROTECTED AREAS AND PLACES

Guideline 12. Promote connections to other natural areas.

Managers of urban protected areas and their allies should cooperate with other public agencies and NGOs to prevent their areas from becoming green islands by:

- Keeping aware of and sharing research findings on the effects of fragmentation, aggravated by climate change;
- Containing or guiding urban sprawl, including through protection of farmland;
- Maintaining and creating corridors to other natural areas and rural lands;
- Creating and maintaining buffer zones; and
- Building trails linking natural areas.

12.1 Fragmentation, aggravated by climate change

Most urban protected areas are affected by loss, fragmentation and degradation of natural habitat caused by urban sprawl. When first delineated, the boundaries of such areas were rarely drawn based on science, but rather on what was politically and financially possible. So these parks were already established on shaky foundations even before they had to face the pressures of urban sprawl, combined with the effects of climate change and the many other factors described here.

In their edited volume *Nature in Fragments: The Legacy of Sprawl* (2005), Elizabeth Johnson and Michael Klemens describe the causes and effects of urban sprawl on species and ecosystems. While urban development often destroys habitat outright, habitat fragmentation 'occurs when natural or human processes break large, contiguous areas into smaller, isolated patches'. Degradation reduces the ability of habitat to meet species' needs because it reduces the amount of habitat available, alters conditions within remaining habitat patches and shifts patches of habitat around. From the standpoint of ecosystem integrity, habitat loss, fragmentation and degradation interfere with basic biogeochemical and life cycles, as well as with such critical processes as pollination.

Global climate change is aggravating this situation. It is causing warmer temperatures, rising sea levels, different rainfall patterns, declining water balances and an increase in the number and severity of extreme weather events, although specific impacts vary by location. Some species and ecosystems adapt to the new conditions, others migrate to areas with more favourable conditions, and still others will perish. However, fragmentation of habitats and the presence of disruptive features such as roads all make it more difficult for species to respond to changes in climate by migration.

In urban areas especially, habitat fragmentation disrupts migration pathways, especially of species and habitats with restricted distribution. Of particular concern is the effect sea rise has on coastal wetlands and estuaries and the species that depend on them. In most urbanized areas, tidal wetlands are not able to move inland, becoming squeezed between a rising sea and dense development along the coast.

Reflecting widespread concern in the conservation community, Johnson and Klemens (2005, 42-43) write that 'our existing system of parks and other protected areas may no longer serve to protect plants and animals whose ranges shift in response to climate change. As species move, their ranges will likely shift outside the boundaries of these protected areas into less hospitable, human-altered landscapes, ultimately leading to the demise of individuals and populations. For this reason, it is vital that our human-dominated environments remain as natural as possible.'

12.2 Containing or guiding urban sprawl

An obvious solution is to contain or guide urban sprawl. The means available and the political will to do so vary greatly among and within countries. The following are three examples that illustrate these differences.

Most Western European cities have sharp edges to their built-up areas that are enforced through land-use planning and regulation. However, these cities are rarely faced with the kind

Much attention has been given to maintaining wildlife corridors through the Santa Cruz Mountains south of the urban areas surrounding San Francisco Bay. Terraprints from US Government satellite imagery/Creative Commons SA-3.0.

Corridors linking natural areas can include tunnels and bridges designed to enable wildlife movement. This "toad tunnel" under a German highway was built to be used by migrating amphibians. Christian Fischer/Creative Commons SA-3.0.

of rapid population growth and urban development pressures found elsewhere in the world.

In Melbourne, Australia, which is expected to grow from 4.2 million people in 2013 to 7 million by 2030, an independent agency of the state of Victoria, the Metropolitan Planning Authority, formulates plans to guide development along four growth corridors. As explained in Guideline 25, *Create and expand urban protected areas*, a biodiversity conservation strategy has been prepared, calling for protected areas to be set up within and adjoining these corridors.

In California, metropolitan areas are under great pressure to expand; the state's population, well over 90 per cent of which is urban, is projected to increase from 38 million in 2013 to 60 million in 2060. The state Sustainable Communities and Climate Protection Act of 2008 (also known as Senate Bill 375 or SB 375), requires regional associations of local governments to plan for compact growth. Although the political and legal rationales behind SB 375 are to reduce greenhouse gas emissions, it has the effect of protecting farmland and natural habitat from development (Adams et al., 2009).

Preserving agricultural land in the urban fringe is one way of containing sprawl that also contributes to connectivity. There is a widespread movement to protect farmland in and near cities for local production of food. In many cases, this also promotes conservation of native species—in riparian forests, windbreaks and hedgerows, for example—as well as open space and regional character.

12.3 Maintaining and creating corridors

Much attention has been given to the use of corridors to mitigate the effects of habitat fragmentation, including two guidance documents by IUCN—*Linkages in the Landscape* (Bennett,1999) and *Linkages in Practice* (Bennett, 2004). More recently, connectivity is receiving considerable attention as a climate adaptation strategy. In their exhaustive review of adaptation strategies, Heller and Zavaleta (2009) observed that increasing connectivity between or among conservation or protected areas was the most frequently cited response to climate adaptation. Over the last decade, there has been a rapid expansion in scientific thinking and literature on corridors and connectivity. For example, Jodi Hilty and colleagues (2006) provided scientists, managers and practitioners alike with a highly useful in-depth treatment on the science and conservation practice of connectivity for biodiversity conservation at landscape scales.

Sanjayan and Crooks (2005) note that 'much is still unknown about wildlife corridors and connectivity, particularly in areas with pronounced human use where the potential for human-wildlife conflict is high.' Although plantings of trees along roads are commonly promoted as wildlife corridors, they caution that 'To best protect biodiversity, corridors should be specifically designed for the purposes of facilitating movement of focal species and ensuring the continuation of ecological processes. Corridors designed for alternative or even competing functions can be ineffective at best and detrimental at worst.' Examples are greenways or roadside corridors designed for human safety or aesthetic reasons, which may act as 'mortality sinks' for wildlife. The actual design of the corridor is the key to success.

Whether in urban, ex-urban or more natural landscapes, Beier and colleagues (2008) have articulated 16 key questions to consider in the design of linkages. Some of these are more technical in nature and require the involvement of those with expertise in geographic information systems (GIS) and landscape ecology while others are less technical but still critically important to consider. Fortunately, Beier et al. also provide some recommended answers or at least choices for approaching each question. Some questions that may be particularly important to urban protected area managers include:

- How wide should the linkage design be?
- How should focal species (species for which the linkage will be designed) be identified?
- How should habitat patches be delineated?
- How should the linkage design address barriers and management practices?

Finally, for urban protected area managers desiring to connect their protected area with adjacent lands or waters, Aune and colleagues (2011) have produced a helpful, practical guide for going from the visioning and planning stages of thinking about connectivity to the implementation and monitoring phases. Managers and scientists may find the principles which they outline at the beginning of this guidance document to be particularly helpful as they initially contemplate how best to consider connectivity and corridors within the context of designing and managing urban protected areas.

Kenya and California offer good examples of well-studied corridors in urbanizing landscapes. The Kenyan example, the Kitengela Wildlife Corridor, is described in the profile of Nairobi National Park on page 31. One California example, of corridors designed to facilitate movement of mountain lions (*Puma concolor*) in and around the Santa Monica Mountains National Recreation Area, is mentioned in Guideline 9, *Reduce human-wildlife interaction and conflict*.

Another California example is the Tenaja Corridor, on the edge of the Santa Ana Mountains, 85 kilometres southeast of the centre of Los Angeles. The Nature Conservancy, an NGO, worked with partners to establish the 3,200-hectare Santa Rosa Plateau Ecological Reserve (IUCN Category V), one of the richest and most diverse natural landscapes remaining in the state. Unfortunately, the area immediately surrounding it was privately owned land threatened by rapid urban and agricultural development. To prevent the reserve from becoming isolated, the Conservancy cooperated over many years with numerous stakeholders to create the six-kilometre-long Tenaja Corridor linking it with the 59,000-hectare Cleveland National Forest (not classified by IUCN, but including the 15,500-hectare San Mateo Canyon Wilderness, Category Ib, near the ecological reserve). The

Protecting wildlife corridors requires the support of local communities. Residents of the Kitingela Plain, south of Nairobi National Park, celebrate the launch of a local land use plan designed to enable migrating wildlife to coexist with villages and livestock owners. Glen Hyman.

corridor includes 700 hectares of land protected by a mix of property acquisition, planned development and conservation easements. The easements limit the size and location of buildings, prohibit outdoor pets and certain exotic species, and specify the kinds of fencing and outdoor lighting that may be used. A public education campaign is aimed at minimizing human-wildlife conflict. The mammals that move through the corridor include mountain lion, bobcat (*Lynx rufus*), coyote (*Canis latrans*) and mule deer (*Odocoileus hemionus*).

Sanjayan and Crooks conclude that the most important lesson learned from this project may be that 'securing a wildlife corridor in a rapidly urbanizing environment is far more difficult than is usually anticipated. Indeed, the socioeconomic landscape, not the biological landscape, is most likely to prove a hindrance to the corridor's long-term viability and to its replication as a concept elsewhere.'

Among the protected areas profiled in Part 2, those in Sydney, Rio de Janeiro, São Paulo, Nairobi, Los Angeles and San Francisco are especially concerned with protecting wildlife corridors.

12.4 Creating and maintaining buffer zones

A commonly used definition of buffer zones is that they are areas peripheral to a protected area 'where restrictions are placed upon resource use or special development measures are undertaken to enhance the conservation values of the area' (Sayer, 1991). While there are two perspectives on buffer zones (as extensions of protected areas or as a means of integrating protected areas and people), there is no inherent conflict between them.

In many urban protected areas, it is too late to think about a formal buffer zone: houses, shops, and even factories and apartment buildings have been built right up to the boundaries. Where opportunities do exist to create a buffer zone, it requires regulating the use of privately owned land, buying or trading such land or the development rights to it, or restricting development on land already controlled by a public agency. What can be accomplished depends on the local culture and legal system, and ultimately on political will.

Several of the urban protected areas profiled in Part 2 have formal buffer zones. These include: Tijuca National Park and the Cantareira Complex of Protected Areas in Brazil, Calanques National Park in France, and Bukhansan and Mudeungsan National Parks in South Korea.

12.5 Trails linking urban natural areas: Physical and psychological connectors

Trail systems connecting natural areas in and around cities are built for recreational purposes and sometimes to allow access for fire and other emergencies. However, they can also serve another purpose.

How urban people understand their surroundings depends on their mental pictures of their city and its surroundings. In his classic work *The Image of the City* (1960), Kevin Lynch argues

Securing a wildlife corridor in a rapidly urbanizing environment can be far more difficult than anticipated. Connecting these vernal pools in California's Santa Rosa Plateau Ecological Reserve to the nearest neighboring protected area required years of negotiations. US Fish and Wildlife Service.

that paths of all kinds—streets, highways, trails—are 'the most potent means by which the whole can be ordered'. It follows that well-marked and well-publicized trails connecting urban to natural areas, and between natural areas in and around cities, can be strong psychological connectors to the natural environment. Lynch points out that the best urban paths give those walking on them a sense of progression toward a destination. However, even if people never walk on them, just knowing they are there has a value. (Armchair hikers regularly make books about adventures on long-distance trails such as the Pennine Way in England and the Pacific Crest Trail in the US best sellers.)

There are good examples of trails linking urban natural areas. In Rio de Janeiro, the 250-kilometre Transcarioca Trail, connecting a number of national, state and municipal natural parks within the city, is under construction. The trail is designed to be a legacy of the 2016 Summer Olympics to be held in that city.

The Hong Kong Country Parks have several long trails connecting individual country parks. These include the 100-kilometre MacLehose Trail, linking eight parks in the New Territories; and the 50-kilometre Hong Kong Trail, connecting five parks on Hong Kong Island.

In California, the 800-kilometre San Francisco Bay Trail is two-thirds completed. It will eventually encircle San Francisco and San Pablo Bays, connecting numerous local, state and national parks and reserves. The project is coordinated by the Association of Bay Area Governments.

Guideline 13. Help to infuse nature into the built environment and break down the cultural barriers between the 'natural' and the 'urban'.

Managers of urban protected areas and their allies should:

- Consider the larger picture of nature in the city;
- Help to infuse nature into the built urban environment; and
- Work to break down the cultural barriers between the 'natural' and the 'urban'.

13.1 Looking at nature as part of the larger urban picture

There are three rather different ways of incorporating nature into the larger urban picture.

It can be done through comprehensive, interdisciplinary scientific studies. Prominent examples are two urban projects included in the US National Science Foundation's Long-Term Ecological Research Network, one in Baltimore, Maryland (sub-metropolitan population 2.6 million, part of the Washington-Baltimore metropolitan area, population 8 million), the other in Phoenix, Arizona (4.3 million). These projects look at cities and their surroundings as ecological systems, integrating biological, physical and social sciences. They work to understand interactions between wild and domestic organisms, people and their organizations, and the natural and built environment.

Although they are not protected areas as IUCN defines them, conventional city parks bring a degree of nature into the built environment. Planty, a tree-lined park surrounding the Old Town of Kraków, Poland's second-largest city, was created in the early 19th century. Ferdziu/Creative Commons SA-3.0.

Another increasingly popular approach is through comprehensive local biodiversity strategies, within which protected areas, as they are defined by IUCN, are only one aspect of urban nature. They are typically carried out or led by local governments. Two good examples are:

- *Connecting with London's Nature: The Mayor's Biodiversity Strategy*. Published in 2002, this document describes wildlife habitats, protected sites and rare species in Greater London, an area of 1,572 square kilometres with a population of 8.1 million. It sets out policies and proposals for protecting biodiversity, and links them to those for health, equal opportunities, transportation, energy, economic development, culture and pollution control.

- The Cape Town *Biodiversity Strategy*. Published in 2001, this is one of six strategies in the Integrated Metropolitan Environmental Policy of the City of Cape Town, which has a population of 3.9 million and an area of 2,445 square kilometres. Less descriptive than the London strategy, its seven objectives cover: 'primary biodiversity' (conservation areas and 'biodiversity nodes' managed for the specific purpose of protecting biodiversity); 'secondary biodiversity' (corridors, links and mixed areas); invasive alien species; legislation and enforcement; information and monitoring; and education.

The Cities Biodiversity Center of ICLEI – Local Governments for Sustainability has online resources on conducting local biodiversity strategy projects.

Finally, region-wide coalitions exist to promote nature conservation. Two examples of such coalitions, Chicago Wilderness and the London Biodiversity Partnership, are described in Guideline 19. Chicago Wilderness has produced an *Atlas of Biodiversity* (CW, 2011) for the Chicago metropolitan area and surrounding countryside. The *Atlas* covers: geology; habitats such as prairies, woods, wetlands, lakes, streams and dunes; climate change; water resources; and the history of urbanization and conservation in the region. Some 60,000 copies have been distributed, and it is also available online.

Urban protected areas can be, and usually are, active participants in each of these three kinds of approaches.

13.2 Infusing nature into the built urban environment

The *Cities and Biodiversity Outlook* produced by the Secretariat of the Convention on Biological Diversity (SCBD, 2012, 19) asserts that preserving biodiversity in rapidly growing cities 'requires going well beyond the traditional conservation approaches of protecting and restoring what we think of as "natural ecosystems," and trying to infuse or mimic such elements in the design of urban spaces'.

Many organizations, publications and websites are devoted to incorporating natural elements into the built urban environment, creating what is sometimes called 'green infrastructure'. To mention a few examples: in May 2013, the European Commission announced a strategy to promote green infrastructure in both urban and rural areas throughout the European Union (EU, 2014). In the United Kingdom, CABE, the Commission for Architecture and the Built Environment, which was merged with the Design Council in 2011, has been a leader in promoting a 'grey to green' strategy in that country; its work is being taken forward by Natural England. Chicago Wilderness, mentioned *above*, issued a *Green Infrastructure Vision* in 2004 that identifies a quarter of the metropolitan area as potential 'resource protected areas'.

Among many recent books on urban nature, *Biophilic Cities: Integrating Nature into Urban Design and Planning* (2011), by Timothy Beatley, professor of sustainable communities at the University of Virginia, stands out as authoritative, practical and concise. ('Biophilic' refers to the term 'biophilia' that was invented by E.O. Wilson to describe the extent to which humans are 'hardwired' to need connection with nature.) Beatley has a useful typology of biophilic urban design elements across scales, which serves to illustrate the huge

Very small protected areas are commonly included in comprehensive local biodiversity strategies. The 0.8-hectare Camley Street Natural Park, seen from across Regent's Canal, is one of many such areas described in the London Mayor's Biodiversity Strategy. © Pierre Terre/Creative Commons BY-SA-2.0.

possibilities that exist to create greener cities:

- Building scale: Green rooftops, sky gardens and green atriums, rooftop gardens, green walls, daylit inner spaces;
- Block scale: Green courtyards, clustered housing around green areas, native species yards and spaces;
- Street scale: Green streets, sidewalk gardens, urban trees, low-impact development, vegetated swales (marshy depressions) and skinny streets, edible landscaping, high degree of permeability;
- Neighbourhood scale: Opening up streams to daylight, stream restoration, urban forests, ecology parks, community gardens, neighbourhood parks and pocket parks, greening greyfields and brownfields;
- Community scale: Urban creeks and riparian areas, urban ecological networks, green schools, city tree canopy, community forest and community orchards, greening utility corridors; and
- Region scale: River systems and floodplains, riparian systems, regional greenspace systems, greening major transportation corridors (Beatley, 84).

There are many opportunities for urban protected areas to work with other urban actors to encourage such efforts and provide technical advice. Thus they can be partners with others in building nature into cities, as well as protecting it on the urban edge.

While the 'greening' of cities to protect, restore and infuse natural elements into the built environment should not be confused with 'green city' or 'eco-city' initiatives (which relate more to alternative energy and transportation), both can be seen as essential components in the design of more sustainable cities and the promotion of healthy and environmentally friendly life-styles.

13.3 Breaking down the cultural barriers between the 'natural' and the 'urban'

Conservationists working in urban environments invariably mention the difficulty of communicating with urban planners, others trained in the design and engineering professions, and many of the scholars who study urban places and activists concerned with urban people. These difficulties reflect some quite profound cultural barriers between different philosophical positions, reinforced by differences in professional training.

Thus, at a philosophical level, conservationists often draw for their arguments on such writings as Aldo Leopold's *A Sand County Almanac* (1949), in which a land ethic is espoused where the rightness of actions is based on whether they promote the 'integrity, stability, and beauty of the biotic community'. From the perspective of the built environment, urban scholars and activists draw more on theories of social justice. They argue for equal access to the benefits of urban life by people from all walks of life, and not relegating marginalized people to the most vulnerable urban places.

As Steward Pickett (an ecologist who directs the Baltimore Ecosystem Study) writes (2013): 'the chasm between the land ethic and urban social ethics is both large and damaging. It assumes there is no nature in the city ... If environmental ethics stops at the city line, and social ethics is blind to the environmental foundations of human and nonhuman life on Earth, there is a risk that moral, but segregated, behavioral guidelines for the natural and the urban will be ill equipped to avert both human and environmental crisis in the twenty-first century.'

One might add that an approach to nature conservation that ignores questions of social justice will be politically unsustainable as well as morally unacceptable. Many of the case studies cited in this publication describe initiatives that are driven by social concerns as well as ecological ones. This balance is reflected too in IUCN's vision—a just world that values and conserves nature—and its mission—to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable.

So breaking down the cultural barriers between the 'natural' and the 'urban' is a challenge that managers of urban protected areas, and their allies, need to keep firmly in their sights.

Green infrastructure can be introduced even in the very center of a city. A park in busy Connaught Road, Central, Hong Kong. Ted Trzyna.

Guideline 14. Control encroachment.

Managers of urban protected areas and their allies should prevent and control encroachment on their lands by:

- Keeping vigilant;
- Enforcing the law;
- Seeking help from local authorities; and
- Enlisting the cooperation of local people.

14.1 Encroachment by the rich and well-connected

Encroachment on urban protected areas is often thought of as being driven by the urban poor, but in many urban protected areas wealthy and politically well-connected people may be more responsible. For example, in affluent neighbourhoods bordering Table Mountain National Park in Cape Town, homeowners have on occasion extended their fences into the park, attempted to privatize mountain springs and even built swimming pools on park property. At Nairobi National Park in Kenya, industrial plants have been built in what was intended to be a low-intensity buffer zone between the park and urbanized areas; toxic air pollution from one factory has required a corner of the park to be closed to the public. In another part of the park, a section of the boundary fence was moved during the night and parcels of land were put up for sale; fortunately, officials learned of this in time to stop it.

14.2 Encroachment by the poor

A persistent case of squatting by tens of thousands of poor people in an urban protected area, Sanjay Gandhi National Park in Mumbai, India, is described on page 27. At Tijuca National Park in Rio de Janeiro, Brazil, profiled on pages 16-17, park managers use satellite imagery, helicopter flights and geographic information systems to monitor nearby *favelas*, or shantytowns, to detect and stop building within the park.

Guideline 15. Monitor and manage water.

Managers of urban protected areas and their allies should:

- Keep aware of water quantity and quality trends and projections due to climate change;
- Work closely with those who share responsibility for water management;
- Participate in integrated watershed planning and management; and
- Propose integrated management if it does not yet exist.

15.1 Water, urban protected areas and climate change

There are complex relationships between urban protected areas and freshwater resources, whether the protected areas are in mountains, along lakes or rivers, or in wetlands:

- Water supply. Many urban protected areas provide clean water to the cities near them. A study by Nigel Dudley and Sue Stolton (2005) found that about a third of the world's largest cities draw some or all of their drinking water from protected areas. In some cases they own or manage forests specifically for drinking water supply.

- Pollution. Surface and ground water in urban protected areas can be polluted from urban runoff and point sources such as dumps and factories. The case of Lake Nakuru National Park in Kenya is *described below*. Several other examples are mentioned in this volume, including in the parks in Sydney, Marseille and Nairobi.

Vigilance is required to prevent encroachment on urban protected areas. A cement plant was built right on the boundary of Nairobi National Park in what was intended to be a low-intensity buffer zone. Glen Hyman.

- Flood protection. With their large impermeable surfaces, cities can quickly accumulate large volumes of storm water runoff. Urban protected areas can disperse or divert these floodwaters. The case of Sanjay Gandhi National Park in India, which helped to protect the city of Mumbai during flooding from a rainstorm of unprecedented magnitude, is mentioned on page 26.

- Flooding. Urban protected areas are sometimes the source of floodwaters. This requires their managers to work with planners and landowners to discourage inappropriate construction in flood zones. This can be difficult in places like Los Angeles, where rivers may be virtually dry for many years and then become torrents.

Climate change can exacerbate the challenge of managing shared hydrological regimes, although the effects will vary by location. These effects can include more frequent and more extreme floods and droughts, altered runoff and water availability. In some places, less freshwater will be available for humans and ecosystems; semi-arid and arid regions are particularly exposed to the impacts of climate change on freshwater. Warming of lakes and rivers affects water quality, while sea-level rise allows salt water to encroach into groundwater and further up estuaries.

15.2 Integrated watershed management

Integrated watershed management takes into account everything that occurs in a watershed (also called a catchment area or drainage basin), including human as well as naturally occurring activities. It is typically coordinated by a watershed organization composed of representatives of stakeholders.

Integrated watershed management has been used to resolve conflicts among urban, rural and conservation uses in an effort to control pollution and maintain the water level in Lake Nakuru, in Kenya's 18,800-hectare Lake Nakuru National Park (IUCN Category II). The lake is renowned for huge numbers of pink lesser flamingo (*Phoeniconaias minor*). The area was first established as a bird sanctuary in 1960, became a national park in 1968, and was inscribed on UNESCO's World Heritage List in 2011 as part of the Kenya Lake System in the Great Rift Valley World Heritage Site. The lake itself is on the Ramsar List of Wetlands of International Importance. The park receives about 300,000 visitors a year, about half of whom are Kenyans, including 100,000 students.

Lake Nakuru has no outlet. It sits at the lowest point of a watershed of 180,000 hectares, fed by rivers as well as rainfall and springs along its shore. The lake's inflow is balanced by evaporation. Its food chain is based on populations of algae and fish that can survive only under very specific conditions. Changes in water level or composition have drastic impacts on this ecosystem.

The park lies within the municipality of Nakuru, the country's fourth largest city, whose population grew from 47,000 in 1969 to an estimated 500,000 today. In recent decades, the lake became a sump for silt and waste. It was receiving raw sewage and urban runoff, as well as treated water from an overburdened city sewage works. This urban pollution has been exacerbated by sediment and agricultural chemicals flowing into the rivers from outlying areas of the watershed.

The plight of Lake Nakuru has received much attention from Kenyan and international conservation organizations and development agencies. After several false starts, the Kenyan Government, led by the Kenya Wildlife Service, adopted and is implementing an integrated ecosystem management plan for the lake and its watershed. Participants in its 'interdisciplinary implementation committee' are: the Wildlife Service, which is responsible for the park; the Nakuru Municipal Council; and various national and regional governmental agencies, NGOs and community groups. The scope of the effort is broad: as well

Integrated watershed management is an effective means of ensuring water quantity and quality in protected areas at the edge of cities, as in Kenya's Lake Nakuru National Park, renowned for its flamingos. BIT 1982/Creative Commons SA-3.0.

Protecting human life and property from wildfire while trying to preserve the character of natural ecosystems is a challenge for urban protected areas. Fires occur frequently along the wildland-urban interface of Santa Monica Mountains National Recreation Area. 'Malibu on Fire, August 2007', Ron Reiring/Creative Commons SA-2.0.

as park management and control of urban sewage, runoff and solid waste, it covers forests, agriculture, livestock grazing, land tenure, human-wildlife conflict, environmental education, tourism, and research and monitoring.

Substantial progress has been made in carrying out the management plan, including construction of an expanded sewage treatment plant and moving the municipal landfill away from the lake. The key has been involving all relevant stakeholders. These efforts have been helped by Kenya's adoption of a new Water Act, which permits more participative management of water resources than had been possible and has led to formation of associations of local water users (Trzyna, 2006, Mauvais, 2013).

Guideline 16. Manage wildfires.

Managers of urban protected areas should:

- Act aggressively to contain fires that threaten human life and property;
- Control fires that threaten natural species and ecosystems;
- Use prescribed fire cautiously and based on science;
- Prevent and prosecute arson and fires caused by careless behaviour;
- Keep aware of wildfire trends and projections due to climate change;
- Work closely with those responsible for fire prevention and control in neighbouring urban areas; and
- Encourage local authorities to limit development in nearby fire-prone areas, require fire-safe landscaping and adopt wildland hazard building codes.

16.1 Fire, urban protected areas and climate change

Because they have many visitors and are near densely populated places, urban protected areas have always been vulnerable to human-ignited wildfires, both accidental and intentional. However, in many parts of the world, the scale, frequency and intensity of wildfires are increasing, due mainly to drought and high temperatures resulting from climate change (Handmer, 2012). Unusually extensive wildfires have occurred in recent years in: Australia's state of Victoria (430,000 hectares burned, 2009); around Sydney (2013); in California (300,000 hectares, 2030; and in France, Greece, Italy, Spain and Turkey (2009). All these fires caused tragic loss of human life—and protected areas, including urban ones, were affected in every case.

16.2 Fires, species and natural ecosystems

In some urban protected areas, species and ecosystems are adapted to particular fire regimes, and humans disturb natural processes by reducing fire frequency or intensity. For this reason, wildfires may be allowed to burn in carefully controlled situations. This is the case in Royal National Park near Sydney, as described on page 15. Intentional burning, known as 'prescribed fire', may also be carried out, either to reduce fuel in the potential paths of destructive wildfires or to maintain natural processes. However, prescribed fires are usually ignited at times when they are least likely to get out of control, which often coincide with periods when fires cause more damage to soil, seeds and reproducing animals.

This is the case in California's chaparral shrublands, which have the mild, wet winters and hot, dry summers that characterize Mediterranean-type ecosystems. In chaparral, prescribed fires are typically ignited in late spring, after plants have dried out enough to burn, but before this leads to intense

Unusually extensive wildfires have occurred in recent years, especially in Mediterranean-type climates. A fire crew in California. Andrea Booher, US Federal Emergency Management Agency.

fires that may be difficult to control. However, according to Ronald D. Quinn and Sterling C. Keeley (2006), spring fires cause different and more severe changes in many biological processes than do fires in the dry summer months: 'Spring burning can disrupt or terminate reproduction of birds at the peak of the breeding season,' for example. 'Populations of chaparral plants can lose an entire year's reproductive effort if flowers or fruits are present on the plant when it is burned.'

The *fynbos*—the shrubland community of the Cape region of South Africa—is another Mediterranean-type fire-adapted and fire-dependent vegetation. Table Mountain National Park in Cape Town protects large stands of *fynbos*, which needs regular burning to survive and flourish. However, the park borders high-density urban areas that need to be totally protected from fire. National law requires landowners, including public agencies, to extinguish fires on their property and prevent them from spreading to their neighbours, so the park puts them out. However, it has found ways of conducting prescribed burning to maintain some ecological balance, using guidelines developed by the country's Council for Scientific and Industrial Research.

Wildfire can be a problem in humid tropical areas as well as in drier regions. A sign in one of the Hong Kong Country Parks warns visitors of extreme fire danger. Ted Trzyna.

These examples demonstrate the complexity of protecting human life and property from wildfire while attempting to preserve the character of natural ecosystems. Research results can be helpful in making well-informed decisions.

Guideline 17. Reduce impacts of noise and artificial nighttime light; keep aware of research on electromagnetic fields.

Managers of urban protected areas should:

- Reduce noise and promote appreciation of natural sounds;
- Reduce artificial nighttime light and promote appreciation of the night sky; and
- Keep aware of research on electromagnetic fields.

17.1 Noise

Noise, defined as unwanted sound, can be a problem in any protected area, but those in urban settings are especially vulnerable. Humans and wildlife are both stressed by noise from many sources: park visitors, road and rail traffic, aircraft, park facilities, industrial activity and all kinds of construction in adjacent areas.

Sound plays a critical role in natural ecosystems. Wildlife depend on their ability to hear natural sounds for many aspects of survival, such as finding desirable mates, avoiding predators, finding prey, establishing territory and protecting young. Animals are forced to adapt to increased human-caused noise. For example, bats avoid hunting in areas with road noise; female frogs cannot hear male frogs' signals in such areas; and urban noise can interfere with the songs birds use to repel intruders. So unwanted sound can have important implications for the health and vitality of wildlife populations.

The United States National Park Service has been a leader in protecting natural soundscapes and mitigating noise in protected areas. It first addressed the topic of noise in 1978 and adopted detailed policies to protect the acoustical environment in 2001. Its Natural Sounds Program conducts research, monitors sounds in parks to establish ambient acoustic baselines, formulates policy recommendations and

Noise is often a problem in urban protected areas. This sign is in Muir Woods National Monument near San Francisco, where a pilot project is looking into ways of reducing noise and promoting appreciation of natural sounds. Ted Trzyna.

helps parks incorporate soundscape management in their planning documents. Above all, it promotes understanding and appreciation of the importance of natural sounds.

Muir Woods National Monument in California's San Francisco Bay Area has been a focus of this programme. People visit this park to experience the peace and natural sounds of an old-growth redwood forest. To study the effects of human-caused noise on visitors, volunteers at Muir Woods catalogued all the sounds they heard, day and night, for a year. It was rarely quiet. A survey of visitors found levels of human-caused sounds to be unacceptable and annoying. Loud talking, music and mobile phones were found to detract substantially from the quality of visitors' experiences. The Park Service has partnered with social scientists at Colorado State University to develop noise indicators and standards for the park.

17.2 Light

In all protected areas, but especially urban ones, artificial nighttime light interferes with organism and ecosystem function. It impedes visitors' enjoyment of the nighttime sky, as well as astronomy, both professional and amateur. It can intrude on appreciation of cultural heritage sites in their authentic state. In many places, cultural traditions, mythology and ceremony draw on night-sky phenomena. Artificial light can also have significant effects on wildlife: nocturnal species are directly affected, and diurnal species suffer from disturbed sleep.

Efforts to reduce the effects of artificial nighttime light in protected areas have focused mainly on parks remote from cities. However, urban protected areas can provide relatively dark oases for people to appreciate the night sky. They can also be used as venues to promote appreciation of the nighttime sky and educate visitors about the benefits of reducing excessive lighting, which include energy conservation.

In 2008, the Royal Astronomical Society of Canada adopted a Dark-Sky Program that designates Urban Star Parks and Dark-Sky Preserves based on consistence with specified standards. From the Society's astronomical perspective, Urban Star Parks reflect the benefit for outreach programmes of readily accessible sky-viewing sites within or adjacent to urban areas; Dark-Sky Preserves are more distant, yet still easily reached, sites for observing the pristine sky. The Society has issued guidelines for each category that have been adopted by Parks Canada, the country's national parks agency, as 'best practice' for all its facilities.

The Society defines an 'Urban Star Park' as 'an area in which artificial lighting is strictly controlled and active measures are in place to educate and promote the reduction of light pollution to the public and nearby municipalities. Sky glow from beyond the borders of the reserve may be visible to observers within the area.' The guidelines for Urban Star Parks cover such matters as accessibility after dark, conformity with a detailed lighting protocol, buffer zones and supportive municipal policies (RASC, 2014).

The first Urban Star Park designated under the Society's programme, in 2011, was not a national park, but a privately owned protected area, the Irving Nature Park in Saint John, the largest city in the Canadian province of New Brunswick. The park is owned by J.D. Irving, Limited, a large forestry and industrial firm. It covers 243 hectares of volcanic rock and temperate forest along the Bay of Fundy, a few minutes' drive from the centre of Saint John (metropolitan population 130,000).

The Irving Nature Park receives some 220,000 visits a year. Since 1995, it has hosted star-gazing events in cooperation with local and national astronomical organizations that have attracted from 100 to over 500 people. These and other events and visitor services are provided free of charge. The park has no light fixtures and no vehicle traffic after sundown, making it an ideal natural setting to view the night sky within an urban environment. In addition, the local electric utility is replacing conventional street lights in the city with low-glare ones, further improving views of the night sky (Welch, 2013).

In 2012, IUCN adopted a formal Recommendation, 'Dark Skies and Nature Conservation,' calling on environmental and natural resource management agencies to 'recognize that outdoor artificial light should be subject to effective standards in order to help restore and/or maintain the ecological integrity of natural areas and the commemorative integrity of cultural sites, to respect traditional beliefs related to the night sky, and to protect species and ecosystems everywhere.'

Amateur astronomers like this one in Hong Kong are among the strongest supporters of reducing artificial nighttime light in protected areas. Memes/ Creative Commons SA-3.0.

In Canada, the Royal Astronomical Society of Canada designates Urban Star Parks based on consistence with standards such as strict control of artificial lighting. © 2013 RASC. Used by permission.

The Recommendation encourages natural area managers and non-governmental organizations to 'promote awareness of dark sky values and the need for and methods of reducing outdoor artificial light', and urges 'protected area management authorities to develop visitor activities that lead to public appreciation and understanding of nocturnal ecology and the night sky'.

17.3 Electromagnetic fields

Since urban protected areas commonly include the highest natural points in urban areas, they are often home to microwave transmission towers of radio and television stations, mobile telephone services and governmental agencies. These towers can broadcast strong electromagnetic fields (EMF). Research on the effects of EMF on humans and wild fauna is ongoing. In terms of effects on humans, the World Health Organization states that 'Electromagnetic fields of all frequencies represent one of the most common and fastest growing environmental influences, about which anxiety and speculation are spreading. EMF exposure now occurs to varying degrees to all populations of the world, and the levels will continue to increase with advancing technology. Thus, even a small health consequence from EMF exposure could have a major public health impact' (WHO, 2014).

Tijuca National Park in Rio de Janeiro hosts numerous transmission towers. A study commissioned by the park of EMF originating in the towers recommended in 2011 that it apply both the precautionary principle (use caution in the face of uncertainty) and the polluter pays principle (the party responsible for producing pollution is responsible for the damage done).

Regardless of whether EMF is taken into account, officials of urban protected areas can, and often do, charge substantial rents for transmission towers, just as owners of tall buildings are able to do.

In urban protected areas such as these in Rio de Janeiro, sky glow as well as glare from outdoor lighting interferes with organism and ecosystem function, as well as visitors' enjoyment of the nighttime sky and natural darkness. Mark Goble/Creative Commons BY-SA-2.0.

GUIDELINES 18-22: URBAN PROTECTED AREAS AND INSTITUTIONS

Guideline 18. Cooperate with agencies that have shared or adjoining jurisdictions.

Managers of urban protected areas should:

- Form and maintain cooperative relationships with agencies sharing jurisdiction over their protected areas;
- Do the same with agencies which have jurisdiction over adjoining lands;
- Set up formal or informal structures to facilitate coordination, as required; and
- Make written agreements on managing specific problems, as necessary.

18.1 Shared and adjoining jurisdictions

It is important for managers of urban protected areas to maintain cooperative relationships with agencies that have shared or adjoining jurisdictions.

Shared jurisdictions. Urban protected areas always share jurisdiction over their lands and resources with other governmental agencies, although the extent of this shared jurisdiction varies from place to place. The agencies involved typically include those responsible for the enforcement of criminal laws, and may include others, such as those concerned with wildlife and water resources. Sometimes local authorities have a range of powers that can affect urban protected areas, e.g. aspects of land use planning or pollution control.

Adjoining jurisdictions. A separate set of governmental units has jurisdiction over lands and resources adjoining urban protected areas. These commonly include local authorities, which are usually responsible for land-use regulation on privately owned lands, as well as agencies responsible for controlling air and water pollution and managing solid waste. Along interfaces with wildlands, farmlands or range lands, they can also include forestry and/or agriculture departments. Often, the management of wildlife outside the park is the responsibility of a separate body from that which manages the urban protected area.

Formal structures can facilitate coordination among neighboring jurisdictions. A meeting of the Carioca Protected Area Mosaic, made up of national, state and local protected areas in Rio de Janeiro, Brazil. Pedro da Cunha e Menezes.

18.2 Informal coordination

In some cases, a formal structure has not been found necessary to facilitate cooperation. For example, in the case of Nairobi National Park in Kenya, urbanization south of the park disrupts migration of large wild mammals and also interferes with livestock grazing. Park managers and county councils both support policies designed to cope with this situation. These policies include the Kitengela-Isinya-Kipeto Local Land Use Master Plan, which was designed in cooperation with local communities. Launched in 2011, the plan promotes larger plots and fewer fences, measures that help movement of wildlife as well as the traditional practices of pastoralists. Although Nairobi National Park benefits directly from the plan, and park managers provided advice, it is being implemented by other agencies and there is no coordinating structure between them and the park.

18.3 Formal structures

A good example of successful formal structures is from Table Mountain National Park in Cape Town. Just after the park was created in 1998, in large part due to an agreement to transfer land and staff from the City of Cape Town to South African National Parks, two partnership structures were set up. One, the 'Bilateral', was composed of the park management team and City of Cape Town senior staff. The other, the 'Park Forum', gave citizens an advisory voice and made recommendations on fee increases at the four pay points while ensuring that existing open access areas remained in place.

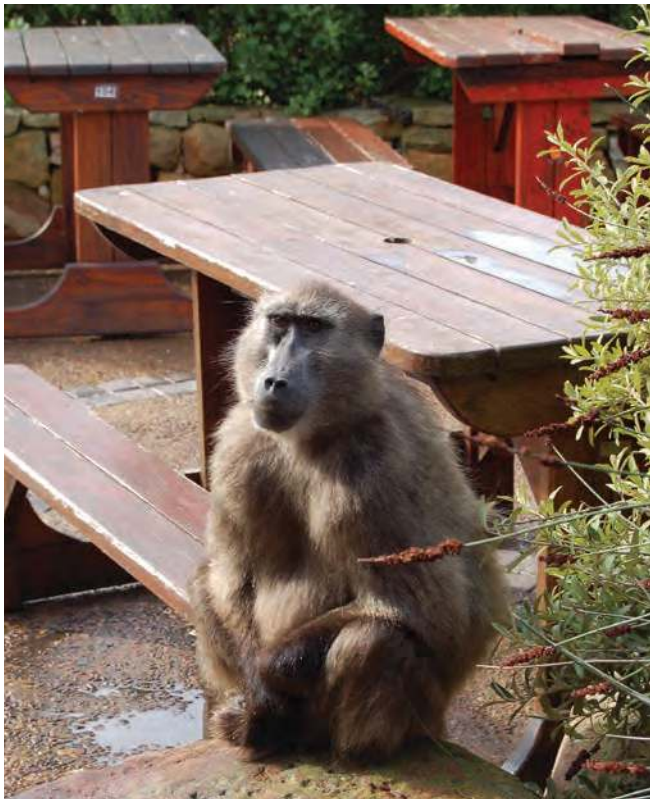
When both structures became inactive, five executive city councilors were added to the Bilateral in 2003 order to achieve city-wide representation, and the Park Forum was renewed after city-wide nominations and open elections. The Bilateral and the Forum now meet quarterly and have several working groups, including Education, Visitor Safety, Housing, Fire and Spatial Planning. This regular contact has led to numerous joint projects, as well as to familiarity among peers.

Stephen Granger, the city's principal liaison with the park, has described the experience: 'It's taken ten years for South African National Parks to get used to the idea that this is an unusual park, an urban park with its own unique challenges, and it's also taken ten years for the city to get used to the fact that this is a national park, not a local government competency. So, we've been learning from each other and growing together' (TMNP, 2008, 11).

Another good example of a formal structure is the Carioca Protected Area Mosaic, described in the profile of Tijuca National Park in Rio de Janeiro on page 17.

18.4 Written agreements on specific problems

Table Mountain National Park also provides a good example of a written agreement on managing a specific problem that involves two or more agencies. Chacma baboons (*Papio*



Written agreements can help with managing specific wildlife problems that involve several jurisdictions. Dealing with aggressive baboons in and around Table Mountain National Park was facilitated by a written agreement among national, provincial and local authorities. TMNP.

ursinus) that live in the mainly unfenced park raid adjoining neighbourhoods for food. They are often quite aggressive. Although residents can call for help on a special hotline and wildlife officers occasionally euthanize problem animals, residents have sometimes illegally killed baboons in retribution for their raids.

Managing the baboons involves three tiers of government, each of which has its own legal obligations and limitations. Table Mountain National Park, while it is responsible for protecting wildlife within its boundaries, has no authority to control free-ranging baboons beyond those boundaries. The City of Cape Town has a duty to provide a safe environment for residents, but in this case its options are limited. CapeNature, the conservation agency of Western Cape Province, has broad authority to manage baboons as a provincially protected species, but coping with human-wildlife conflict is the responsibility of landowners.

To overcome this division of responsibility, NGOs and scientific experts joined with the three governmental authorities to form a Baboon Management Team. One outcome of this has been deployment of Baboon Chasers, trained groups that patrol the affected areas and chase baboons away from human settlements. These are generally effective at reducing raids. However, it has been difficult for the partners to agree on how to deal with individual baboons that are persistently troublesome. As a consequence, the three responsible authorities in 2011 adopted a 'protocol' on the matter that gives clear instructions based on a scientifically informed consensus of the interested parties. The protocol provides for independent oversight, so that the future of any specific baboon will be decided by experienced managers who are not directly affected, and this helps to insulate them from too much local pressure (City of Cape Town et al., 2011).

Guideline 19. Cooperate with institutions that have complementary missions.

Managers of urban protected areas should:

- Encourage and participate in region-wide nature conservation coalitions;
- Encourage natural history museums, zoos, aquaria, botanic gardens and similar institutions in neighbouring cities to provide information and exhibits about nature and conservation challenges in their regions;
- Cooperate with other urban actors to deliver nature experiences and education;
- Train primary and secondary school teachers in nature education;
- Consider creating local 'natural parks' as outliers of their protected areas; and
- Consider creating conservation centres designed to house organizations that work to protect the natural environment.

19.1 Region-wide nature conservation coalitions

In many metropolitan areas there are coalitions of organizations concerned with nature conservation, including governmental agencies and NGOs responsible for urban protected areas. Here are two good examples:

Chicago Wilderness grew out of efforts that started in the 1960s and was officially launched in 1996. Its region covers parts of four states—Illinois, Indiana, Michigan and Wisconsin—in which there are more than 10 million people and over 150,000 hectares of protected lands and waters. Its members are over 300 local, state and federal agencies, large and small conservation NGOs, cultural and educational institutions, volunteer groups, municipalities, religious organizations and business corporations. Among these members are such protected areas or protected area agencies as: the 60,000-hectare Indiana Dunes National Lakeshore, part of the US National Park System; the Illinois Department of Natural Resources, which manages several state parks and recreation areas in the region; local forest preserve districts; and nonprofit organizations such as the Coffee Creek Watershed Conservancy, which manages a 68-hectare nature preserve. Chicago Wilderness works to protect and restore natural areas, mitigate climate change and connect children with nature. It currently chairs the Metropolitan Greenspaces Alliance, a national network of urban conservation coalitions that work to promote this collaborative approach.

London Biodiversity Partnership. The Partnership was established in 1996 to develop action plans for important habitats and species in Greater London, an area of 1,572 square kilometres that has a population of 8.1 million. Among the Partnership's members are a range of organizations responsible for protected areas within Greater London. Examples are London's boroughs, which have numerous local nature reserves, and NGOs such as the London Wildlife Trust which is responsible for over 40 nature reserves in London, and the Wildlife and Wetlands Trust, which manages the London Wetland Centre. Although it is independent of government, the Partnership works closely with the Greater London Authority in implementing the London Biodiversity Strategy, described on page 78.

19.2 Working with others to deliver nature experiences and education

Educating people about nature, especially young people, is a core mission of almost all urban protected areas. This is usually accomplished through visits of school and other youth groups and at visitor centres. However, given the sheer volume of young people in urban places, virtually no protected area will have sufficient internal capacity to deliver nature education to even a small proportion of them. To overcome this, managers of urban protected areas often form partnerships with other actors in the urban arena. Several examples follow.

19.3 Encouraging museums and similar institutions to provide information and exhibits about nature and conservation challenges in their regions

Typically there are several kinds of museums and similar institutions in metropolitan areas that educate and sensitize people to the natural world, but these institutions rarely work together toward that purpose. They include natural history museums, science centres, zoos, aquaria and botanic gardens, as well as urban protected areas.

The simplest and easiest means for such institutions to cooperate is what could be called cross-promotion. Thus, a natural history museum can provide visitors with information about natural places to visit in its region, and visitor centres or exhibits in protected areas can direct visitors to museums.

Chicago's Field Museum is a good example of what can be done. In its Abbott Hall of Conservation, visitors are able to use an interactive map table to locate a forest preserve or other natural area to explore in the Chicago area. An exhibit nearby (*see photo*) showcases conservation efforts of protected area agencies in the region, including restoration projects and efforts to eradicate invasive species. The exhibit also features Chicago Wilderness, the regional conservation coalition *described above*, of which the museum and several forest preserve districts are members. Another good example is the Brookfield Zoo in suburban Chicago, which has posted signs throughout its grounds that mention Chicago Wilderness in order to encourage zoo visitors to gain a regional perspective and a sense of place (Rabb, 2012).

Temporary museum exhibits are also an effective means of cooperation. In Hong Kong, the Hong Kong Country Parks, along with the Kadoorie Farm and Botanic Garden and WWF-Hong Hong, jointly sponsored a temporary exhibit at the Hong Kong Science Museum in 2010. The museum's 'Biodiversity in Hong Kong' exhibit was aimed at demonstrating the richness of Hong Kong's indigenous animal life and the importance of preserving it. Unlike typical museum displays of preserved specimens, the exhibit featured live specimens of frogs, snakes, insects and other species collected from the wild. In contrast, another institution, the Hong Kong Museum of History, devotes one of its eight permanent exhibit halls to Hong Kong's natural environment, but does not include information on opportunities for excursions or a conservation message.

Protected area agencies can work much more intensively with such institutions. Since 2010, Parks Canada, the country's national parks agency, and the Calgary Zoo in Calgary, Alberta (metropolitan population 1.9 million) have cooperated to make interactive presentations for zoo visitors about Canada's national parks and their research on bears, whooping cranes, bison and fire. Staff are hired, trained and supervised cooperatively by both organizations (McDonald, 2012).This programme allows Parks Canada to reach urban audiences which are often described as 'hard to reach'.

Natural history museums can work with urban protected areas to encourage people to visit natural areas and inform them about local conservation efforts. At this map table, visitors to Chicago's Field Museum can learn about fragmentation and restoration in the Chicago region. © 2013 Field Museum of Natural History. Used by permission.

The Wildlife Garden at London's Natural History Museum features plants and animals native to the region. Many natural history museums lack exhibits on their local natural environments. Ted Trzyna.

Sometimes cooperation is built into administration. For example, in Tokyo, the National Museum of Nature and Science is responsible for the Institute for Nature Study, a 20-hectare nature reserve which protects a well-visited remnant of ancient evergreen oak and pine forest, marsh and ponds in the heart of the city (see photo on page 101). In Australia, the Botanic Gardens and Parks Authority of the state of Western Australia manages a 437-hectare bushland reserve called Bold Park, as well as the State Botanic Garden, which is 'committed to the conservation of the state's flora'. Both are located in Perth, the state's capital and major city.

Juxtaposition can also lead to cooperation. In Cape Town, Kirstenbosch Botanic Garden, administered by the South African National Biodiversity Institute (SANBI), is adjacent to Table Mountain National Park, managed by South African National Parks. The garden serves as a gateway to the park and several park trails start in it. The garden's entry kiosk provides maps and other information about the park, and its visitor centre has exhibits of flora and fauna indigenous to the area.

Kirtstenbosch itself has natural as well as cultivated aspects. The garden was established in 1913 to promote, conserve and display the rich flora of southern Africa. It devotes 36 of its 528 hectares to horticulture; the remainder is preserved as natural forest and shrubland.

Although some urban natural history museums, zoos and botanic gardens have exhibits on their local or regional natural environments, many do not. For too many managers of urban protected areas, this is a lost opportunity.

19.4 Training teachers

Many urban protected areas work with school systems to train primary and secondary teachers as nature educators, both in classroom teaching and in field studies in the protected area. For example, Gateway National Recreation Area in metropolitan New York City has a Teacher/Ranger/Teacher Program in which teachers serve as park rangers for a summer. During the following school year, the teachers share their experiences with students and produce lesson plans related to the park. Another Gateway programme, called A Park for Every Classroom, brings together educators, scientists and park staff to train teachers in how to engage students in place-based learning in the national parks in ways that meet state curriculum standards. This is done through field experiences, workshops and online media.

Royal National Park in Sydney offers professional training for teachers, including an introduction to field work for secondary teachers and workshops on climate change and sustainability education. Table Mountain National Park in Cape Town has a curriculum and teacher-training programme endorsed by the provincial education department. Teachers who pass a course qualify to conduct environmental education in the park. In the United Kingdom, the Wildlife and Wetlands Trust, whose reserves include the London Wetland Centre, received funding from a bank for Inspiring Generations, a programme started in mid-2013 that includes training 300 teachers in nature education.

19.5 Creating 'natural park' outliers

A few urban protected area systems have reached out to urban populations by working with other organizations to create 'natural park' outliers. One example is the 60-hectare Hong Kong Wetland Park (see page 21), that is a simulated wetland environment among high-rise buildings designed to promote nature education, as well as reduce visitor demand in more rural wetland areas of Hong Kong.

Another example is in Los Angeles, where in some of the poorest and most run-down areas of the city the Santa Monica Mountains Conservancy has created outliers such as the Augustus F. Hawkins Natural Park, built on a 3.5-hectare parcel of land owned by the City of Los Angeles that was formerly used to store discarded water pipes. The park, which opened in 2001, was designed by landscape architects in consultation with the people who live in the area. It is not a restoration, but rather a 'reflection', of the natural ecosystems of the region, including riparian forest, oak woodland and freshwater marsh. It has a visitor centre with nature exhibits that conforms to the high design standards the Conservancy applies to all its projects. The park has become the centrepiece of the neighbourhood, and local residents are highly protective of it. The City of Los Angeles has since taken over management. More recently, the Conservancy worked with school authorities to create the four-hectare Vista Hermosa Natural Park in a disused oil field next to a primary school in the very centre of the city. A newspaper reporter wrote that 'it even smells like the Santa Monica Mountains' (Holland, 2012).

'Natural park' outliers are an effective way for protected area agencies to reach out to urban residents. Planted with species native to the region, Vista Hermosa Natural Park, next to a primary school near the centre of Los Angeles, was developed by the Santa Monica Mountains Conservancy in cooperation with school authorities. Ted Trzyna.

The Centre for Biodiversity Conservation in Cape Town. SANBI.

19.6 Creating conservation centres

Conservation centres designed to house organizations that work to protect the natural environment are an effective way of stimulating cooperation among urban conservation actors. Perhaps the best example is at the South African National Biodiversity Institute's Kirstenbosch Botanic Garden in Cape Town, *described above*. At the edge of the garden, SANBI has built the 1,200-square-metre Centre for Biodiversity Conservation, which houses offices of South African and international conservation groups, as well as meeting rooms. The idea is that proximity promotes communication and synergy.

Guideline 20. Cast a wide net for advocates and allies.

Managers of urban protected areas should:

- Engage with their neighbours and support them whenever possible;
- Work to enlarge the community of the concerned; and
- Go beyond the obvious in recruiting allies.

See also Guideline 3, *Take advantage of volunteers and support groups*; and Guideline 27, *Recognize that political skills are critical to success, strengthen them, and build political capital.*

20.1 Engaging with neighbours

Urban neighbours are much more likely to help protected areas if protected areas help their urban neighbours. For example, Kenya's Lake Nakuru National Park (described under Guideline 15, *Monitor and manage water*) is giving direct support to local schools and assisting the municipality of Nakuru with water and sewerage facilities. In South Africa, Table Mountain National Park provides employment and life-skills training to people from neighbouring shantytowns. In California, the Santa Monica Mountains Conservancy works with city and school officials to provide poorer areas of Los Angeles with access to nature.

A South African project called Cape Flats Nature supported the City of Cape Town to engage much more deeply with the neighbours of several small nature reserves in the Cape Flats, an area of dwindling farmlands, low-cost housing, shantytowns, street gangs and violent crime. (The locations include the Edith Stephens Nature Reserve, described on page 38). This cooperative effort of SANBI, the City of Cape Town, Table Mountain National Park, the Western Cape Province's conservation authority CapeNature, the Table Mountain Fund of the World Wide Fund for Nature (WWF) and the Botanical Society of South Africa worked from 2002 to 2010 to develop and learn from an 'alternative social nature conservation practice in impoverished areas'. Its founding project manager, Tanya Layne (2013), writes that nature conservation historically focused on 'protecting nature from people, seeing them as separate from natural systems'. Cape Flats Nature 'was instead interested in building a constituency for conservation among citizens who understand themselves to be living as part of natural systems'. It started by mapping the social systems around each of the sites and listening to the stories of people who lived there. Community champions were then identified from each area to engage in developing locally meaningful action that integrated community development and conservation. What resulted is described in detail in a 156-page handbook produced by Cape Flats Nature in 2010, *Growing Together: Thinking and Practice of Urban Nature Conservators* (Pitt & Boulle, 2010).

Some conservation professionals wonder where to draw the line in serving disadvantaged populations. 'We can't become social service agencies,' one protected area manager complained at The Urban Imperative workshop at the 2003 IUCN World Parks Congress. Joe Edmiston, Executive Director of the Santa Monica Mountains Conservancy, responded: 'Environmentalists often write off urban ecosystems, but you can't write off people (Trzyna, 2005a).'

Those responsible for urban protected areas should think in terms of engagement with neighbours, rather than 'outreach', which can seem patronizing. Sherry Arnstein's (1996) widely used Ladder of Citizen Participation is useful in discussing local community involvement:

Rung 8: Citizen control
Rung 7: Delegated power
Rung 6: Partnership
Rung 5: Placation
Rung 4: Consultation
Rung 3: Informing
Rung 2: Therapy
Rung 1: Manipulation

Ideally, citizen involvement should push upward toward at least Rung 6. In some locations, going to Rung 7 or even Rung 8 might be desirable and possible, but in most countries there would be statutory and other barriers that get in the way of this ambition.

In Cape Town, one of the places where Cape Flats Nature engaged with neighbours of nature reserves was Wolfgat, which protects dune vegetation along False Bay next to Khayeltsha and Mitchell's Plain townships. Abu Shawka/Creative Commons, public domain.

20.2 Enlarging the community of the concerned

Some potential allies are obvious, like other conservation organizations and groups of recreational users. Others may be less so. This is examined in detail in an IUCN publication edited by Jeffrey A. McNeely, *Friends for Life: New Partners in Support of Protected Areas* (2005).

Here are a few examples of urban protected area alliances that are out of the ordinary:

Business leaders. Business leaders are usually thought of as prospects for donations, but they can be helpful in other ways. Nairobi National Park in Kenya offers a good example of how a local business community can become a powerful park ally. As part of its response to land-grabbing and pollution along the park's urban edge, the Kenya Wildlife Service entered into a partnership with the Kenya Association of Manufacturers to grow a 30-kilometre-long forest of native trees to mark the park boundary with what is called the 'Nairobi GreenLine'. More than just providing an opportunity for companies to meet their corporate social responsibility objectives, this initiative also exposes their employees and clients to nature and the problems faced daily by the park.

Resource users. In Mombasa, Kenya's major port and second largest city, the commercial marine fishing industry cooperates closely with the Mombasa Marine National Park and Reserve (IUCN Categories II and VI, respectively) to enforce regulations against overfishing.

Medical and public health organizations. These include public agencies and professional societies that are members of the Healthy Parks and Healthy People and similar coalitions described in Guideline 6, *Demonstrate, facilitate and promote health benefits of contact with nature and good eating habits*.

The military. In Thailand, the Royal Thai Army, WWF-Thailand and businesses cooperated in developing an urban nature conservation centre within one of the last remaining patches of mangrove near the country's capital, Bangkok. The centre is situated in the Army Recreation and Convalescent Centre at Bang Pu, 37 kilometres from Bangkok (Parr, 2012).

Guideline 21. Cooperate with universities in training managers for urban protected areas; facilitate use of these areas for academic research and advanced learning.

Managers of urban protected areas should:

- Encourage university protected area research and training programmes to give specific attention to urban protected areas;
- Encourage universities, research institutes and individual scholars to use their protected areas for research projects and advanced education;
- Identify problems that could benefit from academic research; and
- Assist in disseminating research results and maintain archives of completed research projects.

21.1 University protected area programmes

A number of universities have programmes that conduct research and training on protected areas. In general, they have not given much attention to the particular problems and opportunities of urban protected areas. They should be encouraged to do so.

Several such programmes are international in scope, and while they may include elements related to urban protected areas, their focus is wider. Notable examples are: the National Parks Institute of the University of California, Merced, which conducts an annual 12-day Executive Leadership Seminar in cooperation with the US National Park Service that is attended by protected area managers from around the world; the Center for Protected Area Management and Training at Colorado State University which conducts research and holds training seminars for protected area staff, primarily from Latin America; and Klagenfurt University in Austria and the Esculea Latinoamericana de Áreas Protegidas of the Universidad para la Cooperación Internacional (Latin American School of Protected Areas of the University for International Cooperation) in Costa Rica, which both run degree programmes in management of protected areas designed for participants from many countries.

One programme that does focus on protected areas in an urban context is that on Urban National Parks in Emerging Countries and Cities, which is associated with the University of Paris Ouest Nanterre La Défense; its initial research projects and conferences have focused on Cape Town, Mumbai, Nairobi and Rio de Janeiro.

21.2 Helping scholars to help urban protected areas

Individual faculty members and students commonly do field studies in urban protected areas close to their institutions. Identifying problems that could benefit from research helps both the managers of these areas and the scholars. Managers can also help if they assist in disseminating research results and maintain archives of completed research projects.

An example of a more structured approach to linking learning to management is the United States National Park Service's system of Research Learning Centers (RLCs), launched in

2001. Designed to help researchers work in US national parks and to integrate research into visitor experience, park resource management and educational outreach, it promotes collaboration with universities, professional societies, primary and secondary schools, and other research and educational groups. Some of these centres are at physical locations and provide opportunities for park and educational institutions to cooperate in a range of research-oriented activities; others are virtual centres that operate as web portals giving access to research databases and online resources. Five RLCs are based at urban protected areas, in New York, Washington, Los Angeles, San Francisco and Chicago. They focus variously on mitigating human impacts on habitats, the effects of urbanization on species and habitats, urban ecology and social science, climate change and invasive plant species.

Guideline 22. Learn from others' experience with collaboration; pay careful attention to structure and process, as well as to substance.

Managers of urban protected areas should:

- Learn from research on what works in collaborative problem-solving;
- Pay careful attention to structure and process, as well as substance; and
- Take advantage of intermediaries and entrepreneurs.

22.1 Learning from research on what works

Julia Wondolleck and Stephen Yaffee of the University of Michigan, who have studied collaboration on natural resource management for many years, distilled their lessons learned in *Making Collaboration Work*, published in 2000. Although their book is based on experience in the United States, their findings and recommendations are useful for managers of any urban protected area in collaborating with other stakeholders. They found that collaboration in managing natural resources in specific localities works best when:

- There is strong leadership aimed at fostering a sense of shared ownership of a resource or problem;

- A strong sense of place is present. 'Places can be powerful symbols that encourage people to reframe their identity and interact with individuals or groups that historically have been viewed "outside" their geographic, interest-based, or perceptual boundaries.' This can be fostered by field trips and public events. (Sense of place is discussed in Guideline 2, *Engender a local sense of ownership*);

- There is a sense of crisis, for example, from impending legal or legislative action, or a sense of uncertainty about the future. (Although it is not mentioned by the authors, the effects of climate change provide both a sense of crisis and a sense of uncertainty in almost all protected areas);

- Goals or interests are shared. Examples are improving water quality, controlling crime and coping with invasive alien species and hosts of emerging infectious diseases;

- Interests are compatible. Even though participants' interests may be different, collaboration can work if they are compatible, for example, protecting endangered species and promoting ecotourism;

- There are good lines of two-way communication, e.g. mechanisms for easy, periodic interaction, and opportunities for informal social interaction, for example, over meals and meeting breaks, and in field trips to conservation sites;

- Agencies have staff positions dedicated to engaging with adjacent communities, landowners and interest groups, as well as other agencies that have shared or adjoining jurisdictions. Formal advisory committees are often useful;

- Attention is given to new issues as soon as they emerge, and there is frequent and ongoing communication about them;

- Managers imagine the possibilities of collaboration in carrying out important work and making better decisions; they encourage and enable staff to use collaborative methods and experiment with them; and they are committed to the process and follow through with the agreements that result; and

- The focus is on individuals, rather than organizations, and it is understood that it takes time and energy to develop and nurture relationships based in trust and respect. *Patience pays off*.

22.2 Taking advantage of intermediaries and social entrepreneurs

Intermediaries such as NGOs and consultants who are expert in convening different interest groups and bringing about negotiations can be useful in creating and maintaining alliances. Such organizations exist in most cities, focussing on conflict resolution or collaboration and partnership-building.

People with entrepreneurial skills are needed to make partnerships work and implement creative ideas. Such agents of change are not always extroverted 'leaders': they often prefer a low profile and work behind the scenes as connectors, quiet supporters and constructive critics. Social entrepreneurs of this kind need to be identified, encouraged and supported.

One point cannot be emphasized enough: talks aimed at forming alliances should begin as early as possible. Top-down bureaucracies tend to decide what they want to do and then look for partners. It works much better the other way around.

GUIDELINES 23-30: PROMOTING, CREATING AND IMPROVING URBAN PROTECTED AREAS

Guideline 23. Promote and defend urban protected areas.

Managers of urban protected areas, administrators of protected area systems and their allies should:

- Understand the importance of urban protected areas for conservation nationally and globally, as well as locally; and
- Tailor and convey this message to specific constituencies.

23.1 The importance of urban protected areas

We stress the growing importance of urban protected areas in the first part of these guidelines. Thus they promote human health and well-being, help give urban people a sense of place, offer opportunities to learn about nature and sustainability, provide ecosystem services, contribute to green infrastructure within cities, help mitigate climate change, bolster resilience to climate change, protect threatened species and habitats not protected elsewhere and support the local economy with income from tourism.

But another reason has special significance: Urban people are critical for nature conservation, nationally and globally. More than half of humanity lives in urban areas and this proportion is growing dramatically; in many countries the figure is already much higher. Wealth is concentrated in cities, as are communications and the media. Worldwide, there is a general trend toward more democratic political systems in which politicians are increasingly accountable to their electorates. Conservation depends on support from urban-based voters, donors, media and communicators. Yet urban people tend to have less and less contact with nature. People will value nature only if they care about nature where they live.

As a poster prepared by InterEnvironment Institute for IUCN's 2012 World Conservation Congress put it: 'The wildest and remotest places on Earth, the most imperiled species on Earth, the chain of life sustaining human life on Earth will be protected only if urban people care about nature ... Conservationists must take urban people and urban places much more seriously. Unless they do so, they will struggle for relevance in the years to come.'

*"The wildest and remotest places on Earth ... will be protected only if urban people care about nature." Polar bears (*Ursus maritimus*, IUCN Vulnerable) in the 78,000-square-kilometre Arctic National Wildlife Refuge in Alaska. US Fish and Wildlife Service.*

23.2 Tailoring messages for specific constituencies

In explaining the importance of urban protected areas, different messages will resonate with different constituencies. Each of these audiences has its own distinctive point of view. Some will respond to an appeal to self-interest or individual preference; others to perceptions of the public interest. Messages should be tailored to appeal to these various perspectives. For example:

- To administrators of systems of protected areas: 'Urban protected areas are essential to your success in protecting more remote landscapes.'
- To conservation biologists and wildlife specialists: 'Urban protected areas help protect species and habitats, including many range-restricted endemic species of animals and plants, and types of natural communities that are not protected elsewhere.'
- To local political leaders: 'Urban protected areas in and near your cities are important for recreation, social interaction, education, ecosystem services, resilience to climate change and the local economy—thereby creating and supporting jobs. They often provide your water supply and control flooding; and some support commercial fisheries.'
- To urban planners: 'Urban protected areas are part of the green infrastructure in your city and can be essential anchor points in networks of green spaces. They can be barriers to urban sprawl.'
- To visitors: 'Urban protected areas are places where you can picnic, hike, watch birds and other wildlife, enjoy trees and flowers, appreciate geology, take in the view and experience solitude. They can inspire you to create your own art or other creative work.'
- To medical and public health professionals: 'Urban protected areas offer natural settings for outdoor recreation that is good for people, physically and emotionally. They can help you meet targets to tackle problems like obesity, heart disease and unhealthy life styles. If their natural systems are kept intact, they can serve as barriers for vectors of emerging infectious diseases.'
- To social workers and law enforcement agencies: 'These areas can be communal spaces for social interaction which promotes community cohesion and thereby helps to undermine anti-social and even criminal behavior. Projects for environmental recovery can have social as well as ecological benefits.'
- To educators and academic researchers: 'Urban protected areas are easily accessible places to learn about nature and conduct research in the natural and social sciences.'
- To cultural heritage organizations: 'The natural assets of urban protected areas are part of your region's cultural heritage—and many of them also contain important cultural monuments that can be appreciated in attractive settings.'

Although all these constituencies can be reached through professional societies, trade associations or interest groups, it is important to engage as well with the main actors in each category, one by one. In every field of activity there are key individuals or organizations, and usually some among them are more receptive than others to fresh ideas. Identifying these leaders is an essential step in building political capital (see Guideline 27).

The economic benefits of urban protected areas will appeal to several of these constituencies. The TEEB project, The Economics of Ecosystems and Biodiversity, has produced much useful material on the broader subject of the economic benefits of biodiversity, including the *TEEB Manual for Cities: Ecosystem Services in Urban Management* (2011). On the specific benefits of urban protected areas, see the article by Nicholas Conner (2005) of the New South Wales Government in Australia.

In making the case for the importance of urban protected areas, it is essential to distinguish them from conventional city parks, with which they are frequently confused. For those familiar with IUCN's Protected Area Management Categories (see Box 3 in Part 1), it is important to understand too that urban protected areas can be in any of the six categories; it is sometimes assumed that they all fall under Category V, Protected landscape/seascape. This misunderstanding grew up because past IUCN guidance arbitrarily allocated recreational areas to this category; current advice does not repeat this error.

Guideline 24. Work to make urban protected areas national and global conservation priorities.

Managers of urban protected areas and their allies should work in national and international arenas to:

- Include urban protected areas in global, national and sub-national conservation strategies; and
- Include urban protected areas in national and state or provincial protected area system plans.

24.1 Including urban places in global conservation priorities

Very often, those who design global criteria for priority conservation targets overlook the importance of urban places and urban people. For example, IUCN World Parks Congress Recommendation 5.04, 'Building Comprehensive and Effective Protected Area Systems' (2003), gives priority to 'large intact ecosystems' and 'globally threatened species'. However, this is a rather limited view of the importance of areas for conservation: while some protected areas in urban and urbanizing settings may not fully meet all the biological criteria, their value is often much greater in terms of their potential to build and sustain public support for conservation. Urban protected areas should therefore be factored into global conservation priorities.

24.2 Including urban protected areas in protected area system plans

Plans for protected area systems, where they exist, typically do not give attention to urban places and urban people. The IUCN publication *National System Planning for Protected*

The California State Park System Plan *gives priority to acquiring urban protected areas such as the previously purchased Verdugo Mountains Open Space Preserve (in the distance) in metropolitan Los Angeles. Mike Dillon/Creative Commons SA-3.0.*

Areas (Davey, 1998) points out that national system plans should clarify objectives, identify options and their implications and identify priorities for investments. Serving urban places and populations, including with urban protected areas, could certainly be included among these objectives, options and priorities, but these are not mentioned. As with almost all the literature on system planning, the emphasis is on direct protection of biodiversity and other natural assets, whereas urban protected areas also make an indirect contribution.

An exception to this is the *California State Park System Plan*, adopted in 2002. 'Providing more park access to urban populations' is listed at the top of its Key Initiatives. The plan calls for expanding existing urban state parks and acquiring land for new parks in and near cities. This is in addition to continuing a longstanding programme of grants and technical assistance to local governments for parks and recreation. (Note that this plan is for the California State Park System, which has 279 natural and cultural units totaling nearly 650,000 hectares; it does not include units of the US National Park System within California.)

Guideline 25. Create and expand urban protected areas.

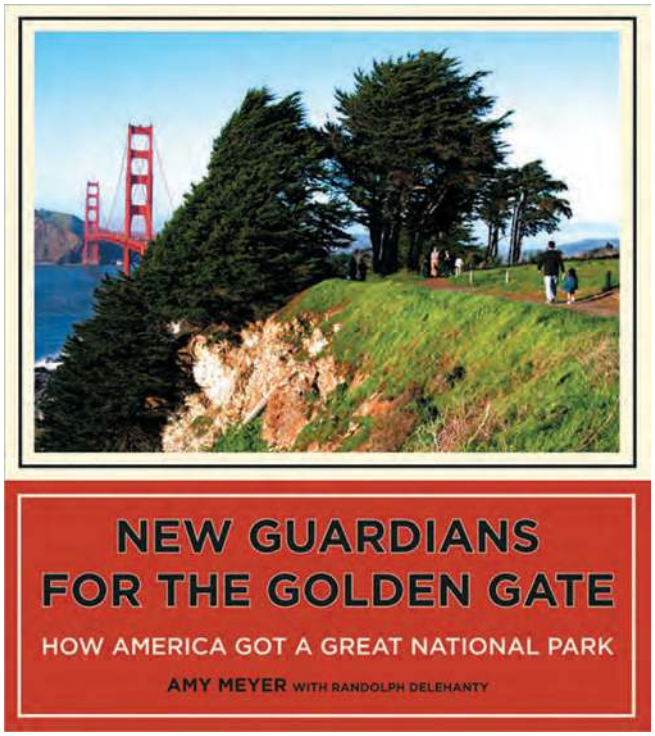
Administrators of protected area systems and NGOs and research centres concerned with protected areas should:

- Examine possibilities for new and expanded protected areas in and near cities;
- Work with land-use planning authorities to include protected areas and wildlife corridors as an integral part of projected urbanization; and
- Follow up to see that plans are implemented.

25.1 Scoping possible locations for new and expanded urban protected areas

The *Cities and Biodiversity Outlook*, published in 2012 by the Secretariat of the Convention on Biological Diversity, speculates that globally more than 60 per cent of the area projected to be urban by 2030 has yet to be built. The total urban area may triple between 2000 and 2030, while urban populations could nearly double. 'In other words, urban areas are expanding faster than urban populations. ... Most of this urban expansion will occur in places with low economic and human capacity to protect biodiversity. ... Moreover many of the world's cities are located in biodiversity-rich areas such as floodplains, estuaries, and coastlines. ... Urban expansion and habitat fragmentation are rapidly transforming critical habitats that are of value for the conservation of biodiversity across the globe—so-called biodiversity hotspots—among them the Atlantic Forest region of Brazil, the Cape of South Africa and coastal Central America (SCBD, 2012, 7-8).'

In looking at possible locations for new and expanded urban protected areas, it is hard to generalize about opportunities; each city is different. Some cities, especially in parts of Europe, are not expected to grow much, if at all, and are already bordered by well protected natural spaces and agricultural land. Other cities have government-owned land on their outskirts which include natural areas that could be protected or restored. This has happened, for example, in San Francisco, where the Golden Gate National Recreation Area in San Francisco was assembled from surplus military bases; and in Taipei, where Yangmingshan National Park was created from land in a security zone. Some cities have large private holdings on their periphery. In Los Angeles, the Santa Monica Mountains Conservancy has acquired, and continues to acquire, large estates and ranches by purchase or donation. Some cities have little natural habitat left within them or at their edges: examples are Tokyo and Beijing. In such cases, the best strategies are restoration or 're-creation' (as was done at the London Wetland Centre). In every case, however, urban expansion should be guided in ways that preserve or extend existing protected areas and wildlife corridors.



The Golden Gate National Recreation Area in and around San Francisco was created as the result of a citizens' movement. Amy Meyer tells the story in New Guardians for the Golden Gate *(University of California Press, 2006). © 2006 The Regents of the University of California. Used by permission.*

Involving local citizens is an essential step in creating, expanding or changing the status of an urban protected area. US Congresswoman Judy Chu leads a public meeting to discuss plans for a proposed national recreation area in California's San Gabriel Mountains. Ted Trzyna.

Scoping possibilities for new urban protected areas, and proposing them, is not always a government function. Often conservation NGOs and research centres will examine conservation opportunities systematically and present them to decision-makers. Also, public pressure has often played a key role in creating and enlarging protected areas in urban settings. For example, the movement called 'People for a Golden Gate National Recreation Area' was largely responsible for the creation of GGNRA in 1972; and a local grassroots effort led by a group called the Movimento Cidanania Ecológica (Ecological Citizenship Movement) helped to bring about the designation of the Serra da Tiririca State Park in metropolitan Rio de Janeiro in 1991.

25.2 Planning ahead: The Melbourne example

An independent agency of the state of Victoria, the Metropolitan Planning Authority, has been established for the region around Melbourne, Australia's second largest city (metropolitan population 4.2 million, projected to grow to 7 million by 2030). To help it plan for development along four growth corridors, the state Department of Environment and Primary Industries produced a detailed *Biodiversity Conservation Strategy* (Victoria, 2013). This proposes large new protected areas outside the corridors so as to protect native grasslands and grassy woodlands, and a network of smaller protected areas both in and outside the corridors.

The strategy was prepared according to biodiversity conservation planning principles relating to size of habitat areas, connectivity and buffer zones, and best available ecological information. It seeks to avoid or minimize negative impacts on biodiversity. Where this is not possible, loss of native vegetation is to be offset by protecting natural areas elsewhere in a way that makes a net contribution to the biodiversity of the state of Victoria.

25.3 Plans are not enough: An example from Los Angeles

Plans are worth very little unless they are carried out. Los Angeles offers a sad example of failure to implement a plan to protect nature in and around a fast-growing city. In 1927, a citizens' committee formed by the Los Angeles Chamber of Commerce commissioned nationally recognized consultants to prepare a detailed plan for a system of parks, playgrounds and beaches in Los Angeles County, which covers 10,500 square kilometres of coastal plains and valleys, mountains and desert. At that time, the county had a population of 1.9 million (it now has over 10 million). The plan, released in 1930, called for the protection of large natural areas, including buying out private inholdings in Angeles National Forest, described on page 45, and the creation of state parks in outlying areas. According to Hise and Deverell (2000), the Chamber of Commerce itself was responsible for its demise. Although the plan was never implemented, it did come to serve as a point of reference for future planning efforts. However, none of these has been as far-reaching as the 1930 report.

Guideline 26. Promote rules and organizational cultures that respect the differences between urban and more remote protected areas.

Managers of urban protected areas and their allies should:

- Educate conservation colleagues about the different challenges faced by urban as against more remote protected areas; and
- Work for changes in legislation, regulations and practices that recognize these differences.

26.1 Educating conservation colleagues

In systems of protected areas, urban ones are almost always a small minority. The organizational cultures of those that manage such systems tend to be based on their experience with more remote protected areas, and staff members often come to urban assignments from posts in non-urban protected areas, poorly equipped to deal with the problems of conservation in such stressed environments. So it is important that those who do have experience in managing urban protected areas should share this with their non-urban colleagues, through system training sessions, field trips and staff exchanges.

26.2 Changing legislation, regulations and practices

Laws, regulations and practices governing management of protected areas are typically based on protected areas remote from cities and rarely take into account the special needs and opportunities of urban protected areas. An example of the problems that this can create is given on page 32: in 2007, a high-level political decision to eliminate entrance fees at all Korean national and provincial parks caused a major increase in visits to Bukhansan National Park in Seoul, while removing the revenue stream necessary to support visitor services. (This loss of revenue was later offset by an allocation of funds by the Korea National Park Service.)

Guideline 27. Recognize that political skills are critical to success, strengthen them and build political capital.

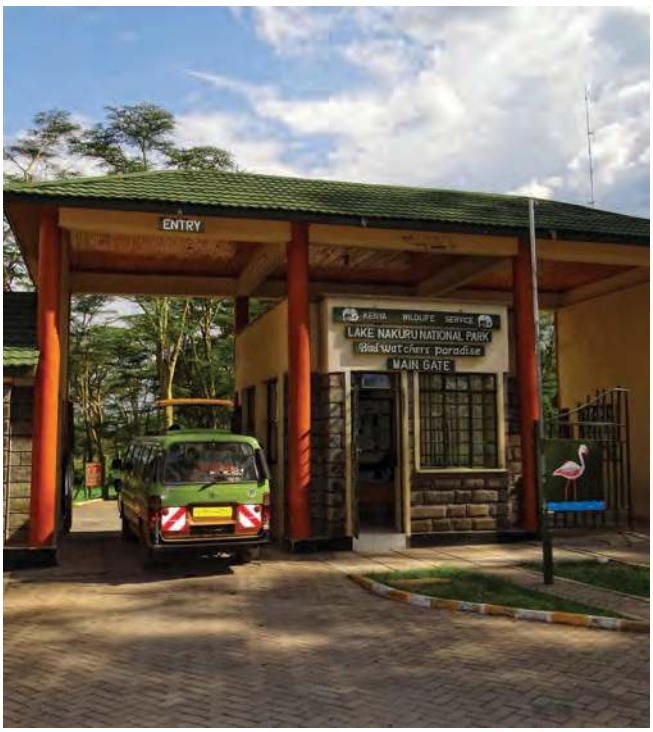
Managers of urban protected areas should:

- Recognize that managing an urban protected area requires strong political skills;
- Strengthen political skills through training and mentoring; and
- Build political capital.

27.1 Recognizing that strong political skills are critical

While the management of a protected area anywhere demands political as well as technical skills, management of urban protected areas makes particular demands in this respect. For example, managers of such areas often have to deal with city governments that control urban space, so they will need the skills to influence such powerful institutions.

Brett Myrdal, former Manager of Table Mountain National Park in Cape Town, notes that managers of urban protected areas must be 'politically astute and able to place conservation issues on the local government agenda through demonstrating their benefits to citizens and city leaders. Successful urban protected area managers are skilled ambassadors, able to represent the interests of both the local urban protected area and the national protected area network as a whole. Thus a special type of protected area manager is required, not only one with conservation and management expertise but also political ability. The value and importance of taking advantage of this opportunity is usually underestimated by senior national protected area managers.'



The main entrance to Lake Nakuru National Park in Kenya, where an annual event called Cycle with the Rhino builds political support and raises funds for the park. Bjørn Christian Tørrissen/Creative Commons BY-SA-3.0.

27.2 Strengthening political skills

Although political skills seem to come naturally to some people, to a large degree they can be defined and taught like any other skill. Staff can improve such skills by attending generalized political skills training, or the protected area or its parent agency can organize training specifically oriented to engaging with urban constituencies.

Case studies can be very useful in learning political skills, especially if they are well told, impartial and candid. More and better case studies are needed.

Often the best way of transferring political skills is by mentoring, usually defined as a formal or informal relationship between two people, a senior mentor and a protégé. A mentor is usually, but not always, outside the protégé's chain of supervision. A guide to mentoring prepared by the US Office of Personnel Management (2008) describes other forms of mentoring, including group mentoring, peer monitoring and mentoring by someone junior in status. The guide sets out the elements of effective mentoring practice and warns that mentoring programmes and relationships can fail because of the absence of leadership involvement, unrealistic expectations or fuzzy goals.

27.3 Building political capital

'Political capital' means a bank of goodwill; in this case, goodwill earned by managers of urban protected areas with the people and organizations they relate to.

Many of the activities described in these guidelines contribute to building political capital. These include providing access for all, taking advantage of volunteers and support groups, communicating carefully, cooperating with agencies that have shared or adjoining jurisdictions or complementary missions, casting a wide net for advocates and allies, and cooperating with universities.

A very effective way to reach the whole range of leaders with whom urban protected areas relate is to organize visits and special public events. Visits can be planned for groups of public officials; heads of local businesses, universities and civic associations; and opinion leaders, especially members of the press. Participants should be given the opportunity to see first-hand the natural resources of the urban protected area, as well as the opportunities offered, and the problems faced by managers working in an urban setting.

Kenya offers a good example of how special events can contribute to building political capital. In many of its national parks, including urban ones, the Kenya Wildlife Service holds 'day in the park' festivals for local leaders. The annual day at Lake Nakuru National Park, described on page 81, includes Cycle with the Rhino. This is a fund-raising event built around bicycle races, the most strenuous of which is 85 kilometres long (while in the park, the cyclists are protected from resident rhinos by armed guards). The event has included: speeches by the Member of Parliament representing the district, the park manager, the mayor, the head of a business association and other local leaders; prayers; performances by a youth choir; and food stands. The day brings together leaders to experience the park as a group, calls attention to the plight of rhinos in Kenya, and raises funds to build and maintain an electric fence around the park and support conservation education in nearby villages. Admission and racing fees are charged, and top cycle racers are sponsored by businesses.

Guideline 28. Seek funding from a wide range of sources.

Managers of urban protected areas should:

- Be aware of the full range of funding sources available to support protected areas generally;
- Explore sources of funding specific to urban protected areas, and sources that are unique to their own area; and
- Look into ways of earning revenue from such sources as concession fees and payments for ecosystem services.

28.1 Funding for protected areas generally

Protected areas managed by governmental agencies can be supported by three kinds of revenue: (1) annual budget allocations from government; (2) grants and donations from individuals, corporations, foundations and international donor agencies; and (3) earned revenue from user fees, conservation taxes, concessions, carbon sequestration payments, ecosystem services payments (such as water fees), fines and other such sources that are earmarked for protected areas. Convening stakeholders to help formulate a business plan for the protected area is an effective way of exploring means of generating revenue to supplement governmental and charitable funding. Social media are used increasingly for fund-raising; see Guideline 4. (Not all forms of funding are available or permitted in every jurisdiction.)

The publications *listed below* under *References and selected resources* provide useful background and guidance on

Fees collected for pipeline rights-of-way can be a significant source of income for urban protected areas. US Fish and Wildlife Service.

protected area funding. The Conservation Finance Alliance, which is sponsored by major conservation agencies, NGOs and donors, promotes information exchange, develops tools, conducts research on funding for conservation generally and has a Protected Areas Financing Working Group. Membership of the Alliance is open to organizations and individuals.

In developing countries, regional and country offices of IUCN and major NGOs that work internationally, such as Conservation International, The Nature Conservancy, the Wildlife Conservation Society and the World Wide Fund for Nature, are usually able to help identify sources of grants and provide or find expertise on less conventional means of funding.

28.2 Sources specific to urban protected areas

Urban protected areas are able to benefit in several ways from their proximity to urban people and urban institutions:

- Because of the number of people living in cities and towns, it is relatively easy to get support from local groups, such as those described in Guideline 3, and practical help from volunteers. Where there are large numbers of relatively affluent people, such groups are well placed to raise significant funds for the protected area. Urban professionals with entrepreneurial skills and business acumen can help find ways to increase earned revenue.

- Major business corporations with headquarters or large offices in cities are often willing to donate funds to urban protected areas as part of their corporate social responsibility, as well as to receive favourable publicity. They can also contribute equipment and expertise.

- Buildings and sites within the protected area can be rented out for meetings, weddings, parties and other events. While all such uses need to be properly planned and managed to protect the area's values, revenue from them is often a significant source of income.

- Fees can be collected from operators for the right to route pipelines under, transmission lines over, and telecommunications towers within the protected area. In Brazil, an environmental compensation fee of half a per cent of the construction cost or annual maintenance cost of any such facility is collected and used to pay for conservation of the protected area where such activity occurs.

- Fees can be charged for shooting films, TV programmes and commercials on park lands. The attraction to producers is the diversity of landscapes, settings, vistas and structures, all of which create attractive images for marketing.

Guideline 29. Take advantage of international organizations and exchanges.

Managers of urban protected areas should:

- Be aware of international organizations and what they can offer;
- Draw on the resources of such organizations and participate in them as appropriate; and
- Participate in exchanges with managers of urban protected areas in other countries.

29.1 International organizations

The following international organizations are particularly relevant to management of urban protected areas. (Other international organizations concerned with nature in urban areas more generally or from other perspectives are listed in Guideline 13.)

IUCN World Commission on Protected Areas (WCPA), Urban Specialist Group. WCPA is the world's premier network of protected area expertise. Its Urban Specialist Group works

A well-attended roundtable at an IUCN conference. © IUCN 2008. All rights reserved.

to strengthen the ability of the protected areas community to serve urban people, urban places and urban institutions. The group promotes and exchanges experience about urban protected areas as a distinctive type of protected area, exchanges information and ideas, and produces and contributes to publications. Members are drawn from many professions and academic disciplines. Membership in the Urban Specialist Group is open to individuals who have expertise in urban conservation and are willing to contribute to its work. Membership in the Commission, which requires a separate application process, is not a prerequisite for membership in the group.

Secretariat of the United Nations Convention on Biological Diversity. The CBD elements most relevant to urban protected areas are: the Programme of Work on Protected Areas (PoWPA); Major Groups: Subnational and Local Authorities; and the Global Partnership on Local and Subnational Action for Biodiversity.

Ramsar Convention on Wetlands. The intergovernmental secretariat to this convention works for conservation and wise use of wetlands and their resources. Many of the 2,100-plus sites on its List of Wetlands of International Importance are in urban areas. Urban wetlands have been receiving increased attention by Ramsar, as have urban impacts on wetlands and the biodiversity they support, often 'far beyond the peri-urban environment'. Examples of Ramsar sites mentioned in this volume are San Francisco Bay and Estuary (page 46) and Lake Nakuru (page 81).

Secretariat of the Convention on Migratory Species. The CMS (also known as the Bonn Convention) works to conserve migratory species of animals and their habitats and migration routes. Urban protected areas are relevant to its purposes, especially as stopover habitats for migratory birds.

UNESCO World Heritage Centre. This acts as the secretariat to the World Heritage Convention. Among the nearly 1,000 cultural, natural and mixed properties on the World Heritage List are several that include urban protected areas, including: the Cape Floral Region Protected Areas, a natural site in and around Cape Town; and the Carioca Landscapes between the Mountain and the Sea, a cultural site in Rio de Janeiro. The World Heritage Cities Programme assists governments in preserving their urban heritage. UNESCO's Historic Urban Landscapes initiative integrates goals of urban heritage conservation and those of social and economic development.

UNESCO Man and the Biosphere Programme (*MAB*). This is the focal point for the more than 600 biosphere reserves, 'sites of excellence where new and optimal practices to manage nature and human activities are tested and demonstrated'. Biosphere reserves share their experience and ideas within the World Network of Biosphere Reserves. A number of biosphere reserves include urban protected areas. Examples are Puszcza Kampinoska Biosphere Reserve at the edge of Warsaw, Poland, which includes Kampinos National Park; the Mornington Peninsula and Western Port Biosphere Reserve on the edge of Melbourne, Australia, which includes French Island National Park; and the vast Mata Atlântica Biosphere Reserve in Brazil, which includes several national and state parks. A MAB Urban Group was formed in 2000 and has proposed a separate category of 'Urban Biosphere Reserve', but the proposal has not been accepted. In the United Kingdom, there is an active UK MAB Urban Forum.

Organization of World Heritage Cities. An international NGO whose members are some 250 cities in which there are World Heritage sites. It assists member cities in improving their management practices with respect to the specific requirements of inscription on the World Heritage List. Its emphasis has been on cultural assets.

29.2 Exchanges

Exchanges of urban protected area managers between countries can be inspiring and productive. These can be arranged through formal exchange programmes or on an ad hoc basis. An example of a formal programme is a sister park relationship between Indiana Dunes National Lakeshore (IUCN Category V) near Chicago in the United States, and Kampinoski National Park (IUCN Category II) on the outskirts of Warsaw, capital of Poland. Examples of ad hoc exchanges are several that have been organized among Tijuca National Park in Brazil, Nairobi National Park in Kenya and Table Mountain National Park in South Africa.

Guideline 30. Improve urban protected areas through research and evaluation.

Managers of urban protected areas, administrators of protected area systems, and their allies, working with academic and other experts, should:

- Understand the value of research;
- Develop research agendas on urban protected areas; and
- Encourage scholars of urban places and natural places to look beyond their usual perspectives.

30.1 The value of research and evaluation

In general, the distinctive problems and opportunities of protected areas in and around cities have not received adequate attention from academic or other researchers. One reason for this is that the concept of urban protected areas has not been well understood in research communities. Both those working from the perspective of built environments and those with conservation perspectives need to understand that urban protected areas are every bit as much proper protected areas as are the more remote national parks and reserves.

Many of the topics discussed in this volume could benefit from research. A few examples that stand out are: getting across the message that urban protected areas are important, engaging effectively with urban neighbors and constituencies, experimenting with innovative funding sources, and collaborating with natural history museums and similar urban institutions.

Case studies are especially useful. Practitioners often favour the descriptive parts of them over the usual 'findings, conclusions and recommendations'. They want to make their own conclusions as they relate to their own work.

In any case, such results-oriented research projects should include structured discussion with key players, not only during project design and the research itself, but after the research project has been completed.

Evaluation has evolved into a separate discipline that has much to offer managers of urban protected areas. Evaluators, as practitioners of the discipline are called, can help design programmes and projects, as well as assess the results of activities.

30.2 Developing research agendas

Research and evaluation agendas are helpful to managers, administrators and NGO leaders who need policy-relevant and action-oriented studies of the problems they face, as well as the possibilities open to them. Research agendas are helpful to academic and other researchers in deciding what to study. Donors are often prepared to finance research agendas that enjoy a broad measure of support.

Such agendas can be developed for individual urban protected areas. For example, the Scientific Council of Calanques National Park in France has adopted priorities for a multi-year research programme drawing on the social and natural sciences. Research agendas can also be developed at state or provincial, national or international scales.

Research agendas are best forged through a process in which key players are invited to submit ideas and a larger group is convened to discuss them and eventually agree on a draft that is then circulated more widely. 'Key players' usually include both providers and consumers of research. Conveners at local to national levels can be heads of urban protected areas or protected area agencies, governmental research units or NGOs. The IUCN World Commission on Protected Areas is an appropriate convener to help shape research initiatives at international levels.

The 20-hectare Institute for Nature Study is a remnant of ancient pine and oak forest in the heart of Tokyo, a city that has few natural areas. Nishimura Yukiyasu/Creative Commons SA-3.0.

References and selected resources on the guidelines

GUIDELINES 1-11: URBAN PROTECTED AREAS AND PEOPLE

Guideline 1. Provide access for all; reach out to diverse ethnic groups and the underprivileged

Black Environment Network, http://www.ben-network.org.uk.

California Chaparral Institute, http://www.californiachaparral.org.

Chavez, Deborah J., et al. 2008. *Recreation visitor research: Studies of diversity*. Albany, California: Pacific Southwest Research Station, US Forest Service. [Online report accessed 13 February 2014] http://www.fs.fed.us/psw/publications/documents/psw_gtr210/psw_gtr210.pdf.

City Project, The. http://www.cityproject.org. Click 'Transit to Trails.'

Conservation Finance Alliance, http://www.conservationfinance.org. Website has links to studies on protected area entrance fees.

Mosaic Partnership, http://www.mosaicnationalparks.org

Roberts, Nina S., et al. 2009. *Serving culturally diverse visitors to forests in California: A resource guide*. Albany, California: Pacific Southwest Research Station, US Forest Service. [Online report accessed 13 February 2014] http://atfiles.org/files/pdf/Cultural-Diverse-Forest.pdf.

Royal National Park, http://www.environment.nsw.gov.au/nationalparks.

Transit & Trails, http://www.transitandtrails.org.

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Guideline 2. Engender a local sense of ownership

Babbitt, Bruce. 2005. *Cities in the wilderness: A new vision of land use in America.* Washington, DC: Island, 175-179.

Byrne, Denis, Heather Goodall and Allison Cadzow. *Place-making in national parks: Ways that Australians of Arabic and Vietnamese background perceive and use the parklands along the Georges River, NSW*. Sydney: Office of Environment and Heritage New South Wales. [Online report accessed 12 February 2014] http://www.environment.nsw.gov.au/resources/cultureheritage/OEH20120073PlaceMakingP1.pdf.

Events Matter, http://www.eventsmatter.com.

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McPhee, John. 1968. *The pine barrens*. New York: Farrar, Straus & Giroux.

Québec Declaration on the Preservation of the Spirit of Place. 2008. [Online document accessed 13 February 2014] http://whc.unesco.org/document/116778.

RomaNatura, http://romanatura.roma.it.

Verschuuren, Bas, et al., eds. 2012. *Sacred natural sites: Conserving nature & culture*. London: Earthscan.

Wild, Rob and McLeod, Christopher, eds. 2008. *Sacred natural sites: Guidelines for protected area managers.* Best Practice Protected Area Guidelines Series, No. 16. Gland, Switzerland: IUCN. Posted at http://www.iucn.org/wcpa in several languages.

Woodward, Simon C. 2008. 'Visitor centres and the spirit of place.' International Centre for Responsible Tourism, Occasional Paper 10.

Guideline 3. Take advantage of volunteers and support groups

Amigos do Parque Nacional da Tijuca, http://www.parquedatijuca.com.br.

Association of Partners for Public Lands, http://www.appl.org. Members are some 85 cooperative associations of national parks and other land-management agencies in the United States. Website includes links to sites of members.

Dunes National Park Association, http://www.dunesnationalpark.org.

Friends of Nairobi National Park, http://fonnap.wordpress.com.

Golden Gate National Parks Conservancy, http://www.parksconservancy,org.

Santa Monica Mountains Fund, http://www.samofund.org.

World Volunteer Web, http://www.worldvolunteerweb.org. Website has links to organizations, journals and research studies concerned with volunteerism in many countries.

Guideline 4. Communicate carefully and use a range of communication technologies

Cymru Forest Xplorer. [Smartphone app accessed 13 February 2014] http://www.forestry.gov.uk/forestry/INFD-8EJFYS.

Dudgeon, David and Corlett, Richard. Rev. ed. 2011. *The ecology and biodiversity of Hong Kong.* Hong Kong: Cosmos.

IUCN Commission on Education and Communication, http://www.iucn.org/cec.

LA Mountains.com, Santa Monica Mountains Conservancy, http://www.lamountains.com.

Wetlands and Wildlife Trust. 'Latest Sightings.' WWT London Wetland Centre, http://www.wwt.org.uk/visit/London/wildlife.

Yangmingshan National Park, english.ymsnp.gov.tw. To watch the real-time videos, click Multimedia.

Guideline 5. Demonstrate, facilitate and promote good environmental behaviour

United States National Park Service. 2012. *Green Parks Plan.* Washington, DC: USNPS. [Document accessed 13 February

2014] http://www.nps.gov/greenparksplan/downloads/NPS_2012_Green_Parks_Plan.pdf.

World Green Building Council, http://www.worldgbc.org. A network of national Green Building Councils in over 90 countries. These are 'member-based organizations that empower industry leaders to effect the transformation of the local building industry toward sustainability'.

Guideline 6. Demonstrate, facilitate and promote health the benefits of contact with nature and of good eating habits

Children and Nature Network, http://www.childrenandnature.org. Website includes a directory of organizations in the 'children and nature movement' in several countries.

50 Things to do before you're 11$^{3/4}$, https://www.50things.org.uk.

Golden Gate National Parks Conservancy, http://www.parksconservancy.org. Search for the page 'Food for the Parks,' which includes downloads of two print publications, *Food for the parks: Case studies of sustainable food in America's most treasured places,* and *Food for the parks: A roadmap to success.*

Golden Gate National Parks Conservancy, Institute at the Golden Gate, http://www.parkshealthguide.org. This 'Parks and Health' website describes projects at several US national parks to promote health, including 'trails with a medical purpose', healthy food and running competitions.

Healthy People Healthy Parks Central, http://www.hphpcentral.com.

IUCN World Commission on Protected Areas, Healthy Parks Healthy People Task Force, http://www.iucn.org/wcpa. The Task Force is preparing a volume in the IUCN WCPA Best Practice Protected Area Guidelines Series on the subject.

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Project Wild Thing, http://projectwildthing.com.

Townsend, Mardie and Weerasuriya, Rona. 2010. *Beyond blue to green: Benefits of contact with nature for mental health and well-being.* Melbourne: Beyond Blue Limited. [Online report accessed 13 February 2014] http://www.hphpcentral.com/wp-content/uploads/2010/09/beyondblue_togreen.pdf.

United States National Park Service. 2011. 'Healthy Parks Healthy People Strategic Action Plan.' Washington, DC: USNPS [Online document accessed 13 February 2014] http://www.nps.gov/public_health/hp/hphp/press/1012-955-WASO.pdf.

Guideline 7. Prevent littering

Californians Against Waste, http://www.cawrecycles.org. Website has detailed information about California's bottle and can recycling program, as well as plastic bags.

Choksi, Mansi. 2009. 'National park to fight litter on Mahashivratri.' *The Times of India*, 19 February. [Online article accessed 13 February 2014] http://articles.timesofindia.indiatimes.com/2009-02-19/mumbai/28057100_1_mahashivratri-forest-fires-p-n-munde.

Clean Up the World, http://www.cleanuptheworld.org. Sponsors an annual international clean-up day and other activities. Affiliated groups in many countries; a partner of the United Nations Environment Programme.

Container Recycling Institute, Bottle Bill Resource Guide, http://www.bottlebill.org. Website has information on container deposit laws worldwide.

France24. 2013. 'Could 2013 spell the end for plastic bags?' France24 International News, 1 January.

Keep America Beautiful, http://www.kab.org. Anti-litter organization for the United States. Website includes research reports.

Keep Britain Tidy, http://www.keepbritaintidy.org. Anti-litter campaign for England.

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Guideline 8. Prevent and prosecute crime against people and property

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Guideline 9. Reduce human-wildlife interaction and conflict; keep aware of emerging infectious diseases

Human-wildlife interaction and conflict

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Conover, Michael R. *Resolving human-wildlife conflicts: The science of wildlife damage management*. Boca Raton, Florida: CRC.

Urban Wildlife Institute, http://www.lpzoo.org. Part of Chicago's Lincoln Park Zoo; uses Chicago as a model for research on wildlife in urban areas.

Utah State University, Jack H. Berryman Institute, http://www.wildlifeconflicts.com. Research and teaching on resolving human-wildlife conflicts. Publishes *Human Wildlife Interactions Journal.*

Wildlife Society, The, http://www.wildlife.org. This professional society has an Urban Wildlife Working Group.

Emerging infectious diseases

EcoHealth: International Association for Ecology and Health, http://www.ecohealth.net. Publishes *EcoHealth Journal*.

EcoHealth Alliance, http://www.ecohealthalliance.org. Concerned with links between habitat encroachment and outbreaks of emerging infectious diseases.

IUCN Species Survival Commission, Wildlife Health Specialist Group, http://www.iucn-whsg.org.

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Guideline 10. Control poaching

International Consortium on Combating Wildlife Crime (ICCWC), http://www.cites.org/eng/prog/iccwc.php. The Consortium includes CITES, INTERPOL, the World Bank, the World Customs Organization and the UN Office on Drugs and Crime.

International Criminal Police Organization (INTERPOL), Environmental Crime Programme, http://www.interpol.int.

International Network for Environmental Compliance and Enforcement, http://www.inece.org.

Secretariat of the Convention on International Trafficking in Endangered Species of Wild Fauna and Flora (CITES), http://www.cites.org.

TRAFFIC: The Wildlife Trade Monitoring Network, http://www.traffic.org. Sponsored by IUCN and the World Wide Fund for Nature.

United Nations Office of Drugs and Crime, 'Wildlife and forest crime,' http://www.unodc.org/unodc/en/wildlife-and-forest-crime

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Guideline 11. Control invasive species of animals and plants

CISAC (California Invasive Species Advisory Committee). 2010. 'The California Invasive Species List.' http://www.iscc.ca.gov.

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GUIDELINES 12-17: URBAN PROTECTED AREAS AND PLACES

Guideline 12. Promote connections to other natural areas

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FEDENATUR: European Federation of Metropolitan and Periurban Natural and Rural Spaces, http://www.fedenatur.org

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Hong Kong Trails, http://www.hkwalkers.net/eng.

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Guideline 13. Help infuse nature into the built environment and break down the cultural barriers between the 'natural' and the 'urban'

Publications

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Food and Agriculture Organization of the United Nations, 'Growing Greener Cities,' http://www.fao.org/ag/agp/greenercities.

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Singapore National Parks et al. 'City Biodiversity Index' ('Singapore Index'). Documents posted at http://www.cbd.int. Developed in Singapore with advice from experts in many countries, this is a self-assessment tool for monitoring and evaluating biodiversity in cities.

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Organizations and websites

Biophilic Cities, http://www.biophiliccities.org. A Web-based network of individuals working to implement the ideas in Timothy Beatley's book *listed above*.

Ecological Society of America, Urban Ecosystem Ecology Section, http://www.esa.org/urbanecosystem.

ICLEI – Local Governments for Sustainability, Cities Biodiversity Center, http://www.iclei.org.

IUCN Commission on Ecosystem Management, http://www.iucn.org/cem.

Natural England, http://www.naturalengland.org.uk.

Society for Urban Ecology, http://www.society-urban-ecology.org.

United Nations Convention on Biological Diversity, Global Partnership on Local and Subnational Action for Biodiversity, http://www.cbd.int/en/subnational/partners-and-initiatives.

United Nations Environment Programme, Urban Environment Programme, http://www.unep.org/urban_environment.

Urban Ecosystems (online journal), http://link.springer.com/journal/11252.

Urbanization and Global Environmental Change (IGEC), http://www.ugec.org. A core project of the International Dimension Programme on Global Environmental Change (IHDP). Promotes research at the local, regional, and global scales.

URBES: Urban Biodiversity and Ecosystem Services, http://www.urbesproject.org. Research project on links between urbanization, ecosystem services, and biodiversity. Focus is on European cities.

URBIO: International Network Urban Biosphere and Design, http://www.fh-erfurt.de/urbio. Scientific initiative of the CBD 'Local Action' Major Group.

URBIS: Urban Biosphere Initiative, http://urbis.iclei.org. An open global alliance 'aspiring to reconcile urban development with the conservation of biodiversity and the sustainable use of natural resources'.

US National Science Foundation, Long Term Ecological Research Network (LTER): Baltimore Ecosystem Study, http://www.beslter.org; Central Arizona-Phoenix Long Term Ecological Research, http://www.caplter.asu.edu.

Guideline 15. Monitor and manage water

Dudley, Nigel, et al. 2010. *Natural solutions: Protected areas helping people cope with climate change.* Gland, Switzerland; New York; and Washington, DC: IUCN-WCPA, TNC, UNDP, WCS, The World Bank, and WWF. [Online document accessed 12 February 2014 in English; other languages available] https://cmsdata.iucn.org/downloads/natural_solutions.pdf. See especially the Introduction, 13-28; and 'Role of protected areas in safeguarding water,' 51-57.

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Group II: Impacts, adaptation, and vulnerability. Geneva: IPPC. [Online report accessed 13 February 2014] http://www.ipcc.ch.

International Network of Basin Organizations, http://www.inbo-news.org.

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US Environmental Protection Agency. 'Principles of Watershed Management.' A distance-learning module posted at http://www.epa.gov/watertrain.

Guideline 16. Manage wildfires

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California Native Plant Society. 2010. Special Issue: Fire Safety. *Fremontia: Journal of the California Native Plant Society* 38:2 and 3. [Online issues accessed 13 February 2014] http://www.cnps.org/cnps/publications/fremontia/Fremontia_Vol38-No2-3.pdf.

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International Association of Wildland Fire, http://www.iawfonline.org.

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State of Victoria. 2010. *2009 Victorian Bushfires Royal Commission final report*. Melbourne: Royal Commission. [Online report accessed 13 February 2014] http://www.royalcommission.vic.gov.au/commission-reports/final-report.

US Geological Survey, Western Ecological Research Center, Southern California Wildfire Risk Project, http://www.werc.usgs.gov/socalfirerisk.

Guideline 17. Reduce impacts of noise and artificial nighttime light; keep aware of research on electromagnetic radiation

Noise

IUCN WCPA Natural Sounds Advisory Group, http://www.iucn-urban.org.

United States National Park Service, Natural Sounds and Night Skies Division, http://www.nature.nps.gov/sound. Website includes information on acoustics, noise pollution, measuring and managing soundscapes, and actions individuals can take, as well as links to useful resources.

Light

Initiative for an International Association of Dark Sky Parks, http://www.darkskyparks.org.

International Dark Sky Association, http://www.darksky.org. Designates international Dark Sky Parks, Reserves and Communities based on specific criteria. Profiles of sites are on the website, along with detailed information on outdoor lighting.

Irving Nature Park, http://www.ifdn.com. Described in the text

IUCN. 2012. Recommendation, 'Dark Skies and Nature Conservation,' http://www.iucnworldconservationcongress.org. Go to 2012 Outcomes, Recommendation 183.

IUCN WCPA Dark Skies Advisory Group, http://www.iucn-urban.org.

RASC (Royal Astronomical Society of Canada, Light-Pollution Abatement Program). 2014. 'Light pollution abatement.' [Web page accessed 13 February 2014] http://www.rasc.ca/lpa.

UNESCO Starlight Initiative, http://www.starlight2007.net. Website includes information on Starlight Cities, cities in Europe that have committed to promote 'intelligent lighting, with the double function of saving energy and recovering the starry sky'.

United States National Park Service, Natural Sounds and Night Skies Division, http://www.nature.nps.gov/night. Website includes information on the science of light, light pollution, measurement and management of lightscapes, and steps individuals can take, as well as links to useful resources.

Welch, David. 2013. Personal communication.

Electromagnetic fields

WHO (World Health Organization, International EMF [Electromagnetic Fields] Project). 2014. 'What is the International EMF Project?' http://www.who.int/peh-emf/project/EMF_Project/en/index.html. Web pages at http://www.who.int/peh-emf include results of research and links to national and international resources. [Web pages accessed 13 February 2014]

GUIDELINES 18-22: URBAN PROTECTED AREAS AND INSTITUTIONS

Guideline 18. Cooperate with agencies that have shared or adjoining jurisdictions

City of Cape Town et al. 2011. 'Protocol for reducing the frequency and severity of raiding behaviour by chacma baboons on the Cape Peninsula, South Africa.' Cape Town: South African National Parks, City of Cape Town and CapeNature.

TMNP (Table Mountain National Park). 2008. *1998-2008: Celebrating milestones achieved,* 11. Cape Town: TMNP.

Guideline 19. Cooperate with institutions that have complementary missions

Chicago Wilderness, http://www.chicagowilderness.org.

Gateway National Recreation Area. 2014. 'For Teachers,' [Web page accessed 13 February 2014] http://www.nps.gov/gate/for teachers/.

Holland, Gale. 'An L.A. park like no other.' *Los Angeles Times,* 28 August 2012. [Online article accessed 13 February 2014] http://articles.latimes.com/2012/aug/28/local/la-me-adv-holland-vista-hermosa-20120828. About Vista Hermosa Natural Park.

Hutcherson, Lucy. 2005. 'Chicago Wilderness: A collaborative model for urban conservation.' In Trzyna 2005, 138-141.

McDonald, Lisa, Calgary Zoo. 2012. Personal communication.

Rabb, George. 2012. Personal communications.

Royal National Park, Environmental Education Centre, http://www.royalnatpk-e.schools.au.

Santa Monica Mountains Conservancy, http://www.smmc.ca.gov.

Table Mountain National Park, http://www.sanparks.org/parks/table_mountain.

Trzyna, Ted. 2005. 'A conservation agency creates inner-city "natural parks" In Los Angeles.' In Trzyna 2005, 107-110. About Augustus F. Hawkins Natural Park.

Wildlife and Wetlands Trust, http://www.wwt.org.uk.

Guideline 20. Cast a wide net for advocates and allies

Arnstein, Sherry. 1996. 'A ladder of citizen participation.' *Journal of the American Institute of Planners* 35:4: 216-224.

Layne, Tanya. 2013. 'Ordinary magic: The alchemy of biodiversity and development in Cape Flats Nature.' *Solutions* 4:3. [Online article accessed 13 February 2014] http://www.thesolutionsjournal.com/node/23431.

McNeely, Jeffrey A. 2005. *Friends for life: New partners in support of protected areas.* Gland, Switzerland: IUCN. https://portals.iucn.org/library/efiles/html/Friends-for-life/cover.html.

Parr, John W.K., et al. 2012. 'Bang Pu: Thailand's first urban nature education centre.' *Natural History Bulletin of the Siam Society* 58: 7-17.

Pitt, Bridget and Boulle, Therese. 2010. *Growing together: Thinking and practice of urban nature conservators*. Cape Town: SANBI Cape Flats Nature. [Online document accessed 23 February 2014] http://www.capeflatsnature.co.za/index.php?option=com_content&view=article&id=56&Itemid=66.

Trzyna, Ted. 2005a. 'A conservation agency creates inner-city "natural parks" in Los Angeles.' In Trzyna 2005, 110.

Guideline 21. Cooperate with universities in training managers for urban protected areas; facilitate use of these areas for academic research and advanced learning

Colorado State University, Center for Protected Area Management and Training, http://warnercnr.colostate.edu.

Klagenfurt University, Management of Protected Areas, http://mpa.e-c-o.at.

Universidad para la Cooperación Internacional, http://www.uci.ac.cr.

University of California, Merced, National Parks Institute, http://parkleadership.ucmerced.edu.

Urban National Parks in Emerging Countries and Cities, http://www.upa-network.org.

US National Park Service, Research Learning Centers, http://www.nps.gov/rlc. Includes links to the 19 RLCs.

Guideline 22. Learn from others' experience with collaboration; pay careful attention to structure and process, as well as substance

InterEnvironment Institute. 2014. 'The power of convening.' Claremont, California: The Institute. http://interenvironment.org/The_power_of_convening.html. Drawing on IUCN projects, this webpage explains the benefits of collaboration in contrast to conflict resolution, which are encapsulated in a comment by Jean Monnet, father of the European Common Market: 'Do not come together to argue and negotiate. Come together to solve a common problem.'

International Association for Conflict Management, http://www.iacm-conflict.org.

University of Michigan, School of Natural Resources and Environment, Ecosystem Management Initiative, http://www.snre.umich.edu/emi. Web page has links to many resources on collaboration in natural resource management.

Wondolleck, Julia M. and Stephen L. Yaffee. 2000. *Making collaboration work: Lessons from innovation in natural resource management*. Washington, DC: Island.

GUIDELINES 23-30: PROMOTING, CREATING AND IMPROVING URBAN PROTECTED AREAS

Guideline 23. Promote and defend urban protected areas

Conner, Nicholas. 'Some benefits of protected areas for urban communities: A view from Sydney, Australia.' In Trzyna 2005, 34-43.

Davis, George. 2005. 'Biodiversity conservation as a social bridge in the urban context: Cape Town's sense of "The Urban Imperative" to protect its biodiversity and empower its people.' In Trzyna 2005, 96-104.

O'Neill, Brian and Moore, Greg. 2005. 'Building urban constituencies for nature conservation: The Golden Gate experience.' In Trzyna 2005, 142-146.

TEEB, The Economics of Ecosystems and Biodiversity, http://www.teebweb.org. Website has links to TEEB documents, including a synthesis report and the TEEB manual for cities.

Wong, Fook Yee. 2005. 'A city defends its natural heritage: Hong Kong's Country and Marine Parks.' In Trzyna 2005, 58-61.

Guideline 24. Work to make urban protected areas national and global conservation priorities

California state park system plan. 2002. Sacramento: California Department of Parks and Recreation. Posted at http://www.dpr.ca.gov.

Davey, Adrian, main author. 1998. *National system planning for protected areas*. Gland, Switzerland: IUCN. Best Practice Protected Areas Guidelines Series, No. 1. Posted at http://www.iucn.org/wcpa.

IUCN. 2003. Fifth World Parks Congress Recommendation 5.04, 'Building Comprehensive and Effective Protected Area Systems.' http://cmsdata.iucn.org/downloads/recommendationen.pdf.

Menezes, Pedro da Cunha e. 2005. 'Raising the priority of urban areas in protected area systems in Brazil and beyond.' In Trzyna 2005, 51-57.

Guideline 25. Create and expand urban protected areas

Hise, Greg and Deverell, William. 2000. *Eden by design: The 1930 Olmsted-Bartholomew plan for the Los Angeles region.* Berkeley: University of California Press.

Metropolitan Planning Authority, State of Victoria, http://www.mpa.vic.gov.au. Responsible for planning Melbourne's growth corridors. Website has links to key documents.

SCBD (Secretariat of the Convention on Biological Diversity). 2012. *Cities and biodiversity outlook*. Montreal: SCBD.

Victoria (Department of Environment and Primary Industries, State of Victoria). 'Biodiversity conservation strategy for Melbourne's growth corridors.' 2013. Melbourne: DEPI.

Guideline 27. Recognize that political skills are critical to success, strengthen them and build political capital

Best practices: Mentoring. 2008. Washington, DC: United States Office of Personnel Management. [Online document accessed 14 February 2014] https://www.opm.gov/policy-data-oversight/training-and-development/career-development/bestpractices-mentoring.pdf.

Guideline 28. Seek funding from a wide range of sources

Contact information for regional and country offices of IUCN and major NGOs may be found on their websites: IUCN, http://www.iucn.org; Conservation International, http://www.conservation.org; The Nature Conservancy, http://www.nature.org; Wildlife Conservation Society, www.wcs.org; World Wide Fund for Nature, http://www.panda.org.

Conservation Finance Alliance, http://www.conservationfinance.org.

Cranford, M., et al. 2012. *The little biodiversity finance book*. Oxford, UK: Global Canopy Programme.

Diefendorf, Sarah, et al. 2013. *International guidebook of environmental finance tools: A sectoral approach: Protected areas, sustainable forests, sustainable agriculture and pro-poor energy.* San Rafael, California: Environmental Finance Center West at the School of Business & Leadership, Dominican University of California and UNDP.

Emerton, Lucy, Bishop, Joshua, and Thomas, Lee. 2006. *Sustainable financing of protected areas: A global review of challenges and options.* Gland, Switzerland: IUCN. Best Practice Protected Area Guidelines Series, No. 13. http://data.iucn.org/dbtw-wpd/edocs/PAG-013.pdf. Discusses trends in protected area funding, attracting and administering external funds, generating funds and market-based fees.

Financing Protected Areas Task Force of the World Commission on Protected Areas of IUCN, in collaboration with the Economics Unit of IUCN. 2000. *Financing protected areas: Guidelines for protected area managers*. Best Practice Protected Area Guidelines Series, No. 5. http://data.iucn.org/dbtw-wpd/edocs/PAG-005.pdf. Covers developing a financial strategy; international sources of funding; and national-level and site-level mechanisms, including case studies from Costa Rica, New Zealand and South Africa.

Spergel, Barry. 2001. *Raising revenues for protected areas: A menu of options.* Washington, DC: Center for Conservation Finance, World Wildlife Fund. http://www.conservation.org/global/gcf/Documents/raising_revenues_pa.pdf. [Online document accessed 14 February 2014 in English; also available in Chinese, English, French and Spanish] This 33-page booklet is a concise description of 25 ways of raising revenues for protected areas and the advantages and disadvantages of each.

Guideline 29. Take advantage of international organizations and exchanges

IUCN World Commission on Protected Areas, http://www.iucn.org/wcpa.

— Urban Specialist Group, http://www.iucn-urban.org.

Organization of World Heritage Cities, http://www.ovpm.org.

Ramsar Convention on Wetlands, http://www.ramsar.org.

Secretariat of the Convention on Migratory Species, http://www.cms.int.

Secretariat of the United Nations Convention on Biological Diversity, http://www.cbd.int.

UK MAB Urban Forum, http://www.ukmaburbanforum.co.uk.

UNESCO Man and the Biosphere Programme, http://www.unesco.org/mab.

UNESCO World Heritage Centre, http://whc.unesco.org.

Guideline 30. Improve urban protected areas through research and evaluation

American Evaluation Association, http://www.eval.org. In spite of its name, this is an international professional organization, with members in some 60 countries. Website has links to many Web-based resources.

United Nations Evaluation Group. 'Evaluation Links.' http://www.uneval.org. A list of links to websites of national and international evaluation associations.

Ted Trzyna (www.trzyna.info; Ted_Trzyna@InterEnvironment.org) is Chair of the WCPA Urban Specialist Group. A political scientist and former US career diplomat, he is President of InterEnvironment Institute, an affiliate of Claremont Graduate University in California. Ted has been involved in IUCN since 1972 and chaired the then IUCN Commission on Environmental Strategy and Planning from 1990-1996. He has led numerous projects combining research, convening and writing on environmental policy, focusing on the process or 'how' of doing things. Among the many books he has written or edited are several IUCN publications, including *The Power of Convening, A Sustainable World* and *The Urban Imperative*.

Joseph T. Edmiston (edmiston@smmc.ca.gov) is Executive Director of the Santa Monica Mountains Conservancy, a California state government agency, having been appointed by Governor Jerry Brown in 1979. Under his leadership, the Conservancy has preserved some 28,000 hectares of public parkland within and surrounding the Los Angeles metropolitan area in a zone extending from the edge of the Mojave Desert to the Pacific Ocean. Joe has lectured extensively on environmental planning, park development and urban land use. He and the Santa Monica Mountains Conservancy have received numerous national awards including, most recently, the highest honor of the American Planning Association, the Daniel Burnham Award. He is a Deputy Chair of the WCPA Urban Specialist Group.

Glen Hyman (glen.hyman@sciencespo.fr) is a doctoral researcher with the Center for the Sociology of Organizations at Sciences-Po in Paris, Deputy Director of the Policy Research Center at the School of Government and Public Policy in Indonesia and a former Deputy Chair of the WCPA Urban Specialist Group. Long interested in the interdependence of nature and cities, he has conducted extensive field research on UNESCO Biosphere Reserves near urban areas in Australia, Canada and South Africa. Glen also contributes to UNPEC, an interdisciplinary applied research program on urban national parks in Cape Town, Mumbai, Nairobi and Rio de Janeiro. He lives in Brazil.

Jeffrey A. McNeely (jam@iucn.org; jeffmcneely2@gmail.com) has worked on international conservation issues for 45 years, including 15 years in Asia and 30 years at IUCN where he was Executive Officer of WCPA's predecessor (1980-1983), Secretary General of the 1992 Caracas World Parks Congress, founder of IUCN's Biodiversity Programme and Chief Scientist until he retired in 2009. Author or editor of over 40 books and author of over 500 papers, Jeff now resides in Thailand and serves as a consultant to the country's Department of National Parks. He is on the editorial board of 10 conservation-related journals, a Member of UNDP's International Resource Panel, and A.D. White Professor-at-Large at Cornell University.

Pedro da Cunha e Menezes (cunhaemenezes@gmail.com) is a Brazilian career diplomat whose posts have included serving in Nairobi as Brazil´s deputy permanent representative to the United Nations Environment Programme. He has also been an advisor to the Rio de Janeiro Olympics Project; senior advisor to the protected areas of the Rio de Janeiro Municipality; executive director of Tijuca National Park in Rio de Janeiro; and director for creation and management of protected areas in ICMBio, Brazil´s federal protected areas agency. Author of over 15 books, Pedro is a frequent contributor to conservation-related periodicals. His thesis at the Brazilian Diplomatic Academy is on transboundary protected areas. He is a Deputy Chair of the WCPA Urban Specialist Group.

Brett Myrdal (Brett.Myrdal@sanparks.org) is the General Manager of Environmental Planning Research for South African National Parks. He was previously Park Manager of the Table Mountain National Park from 2003 to 2009, a period of intensive ecosystem restoration through jobs for the poor. Prior to that Brett managed the Table Mountain Fund for its first five years. Exiled with the African National Congress in the eighties, he served in its armed wing before returning to earn the national housing award for the conversion of 'Hostels to Homes' in post-apartheid Cape Town. He has a degree in chemistry and a Masters in urban planning and is working towards a Ph.D. in urban protected areas. He is a Deputy Chair of the WCPA Urban Specialist Group.

Adrian Phillips (adrian.phillips@gmx.com) was formerly a staff member of IUCN. After a career in conservation in the UK, he was WCPA chair from 1994-2000. He initiated the WCPA Best Practice Guidelines, edited the first twelve volumes in the series and wrote an influential paper: 'Turning Ideas on their Head – the New Paradigm for Protected Areas'. In recent years, Adrian has focused most of his energies on conservation within the UK, for example as a trustee of the National Trust and other conservation NGOs. Throughout, he has tried to raise the profile of conservation in towns and cities, and supported efforts to persuade IUCN to take the urban dimension seriously.

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