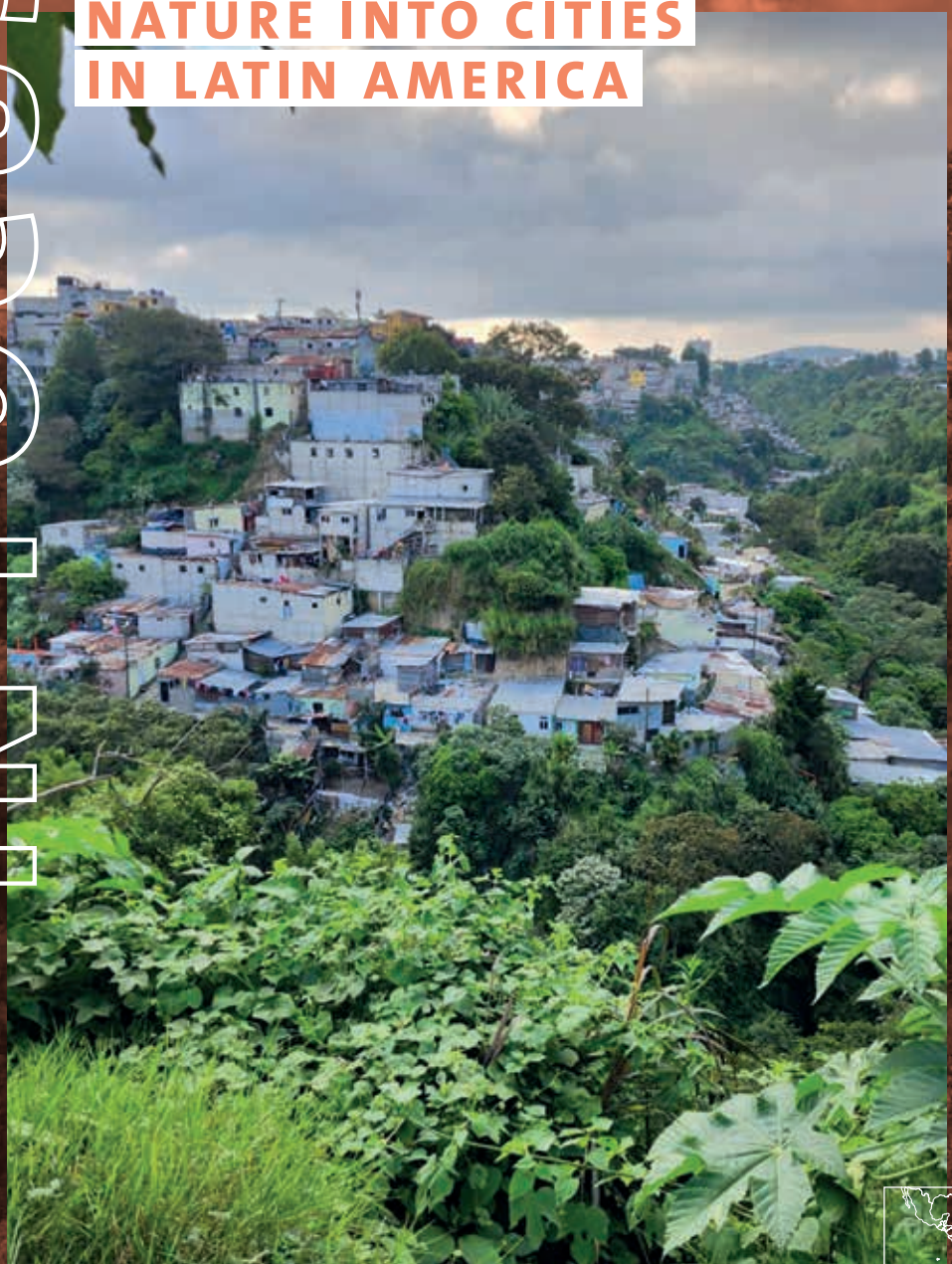
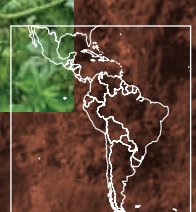
RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

FONDS FRANÇAIS POUR L'ENVIRONNEMENT MONDIAL

IN FOCUS

INTEGRATING NATURE INTO CITIES IN LATIN AMERICA





INNOVATE | EXPERIMENT | SHARE

IN FOCUS is a series of reports on the French Facility for Global Environment (FFEM) capitalisation projects. The aim of these projects is to share solutions and initiate large-scale change.

Since it was created by the French government in 1994, the FFEM has supported innovative projects combining environmental protection and socio-economic development in countries with developing and emerging economies.

Once evaluated and capitalised, these initiatives highlight technical and scientific knowledge, local expertise and novel ways of working.

Biodiversity, aquatic ecosystems, forestry and agriculture, resilient cities, the transition to a low-carbon economy, pollution – the IN FOCUS reports cover a wide range of topics and are aimed at anyone who puts innovation at the heart of their actions: development professionals, public and private actors, civil society organisations, funding partners, international organisations, and curious minds.

Happy reading!

ACKNOWLEDGEMENTS

This report would not have been possible without the support and contributions of national authorities, project teams and all stakeholders involved. We would like to thank the partners of the Guatemala City project for their contributions to the review of this study: Foundation for Ecodevelopment and Conservation (FUNDAECO), National Forest Institute (INAB), Foundation for Conservation of Natural Resources and the Environment (FCG), Barcelona Metropolitan Area (AMB), Departmental Development Councils (CODEDE), Grupo InnovaTerra, Calmecac Foundation, The Nature Conservancy (TNC), non-profit Creamos Guatemala, Crecer Foundation, Millennium Challenge Corporation (MCC), Mesa de Barranqueros collective.

We would also like to thank the partners in the Western Urban Nature Reserve project in Santa Fe: City of Santa Fe, Municipal Enforcement Unit, National University of the Littoral, non-profit Los Sin Techo, City of Rennes, Rennes 2 University, neighbourhood and residents' associations, Fundación Hábitat & Desarrollo, non-profit Aves Argentinas, National Agricultural Technology Institute (INTA), National Water Institute (INA) and our partner municipalities, communities and non-profits, with a special mention for Andres Borthagaray, project evaluator and President of the Furban Foundation.

NOTE:

This publication is the result of a cross-capitalisation exercise, drawing on feedback from the implementation of two projects in Latin America and supported by the French Facility for Global Environment (FFEM) but outsourced by the FFEM Secretariat to independent consultants. The views expressed are those of the consultants and do not necessarily reflect those of the FFEM. This capitalisation exercise aims to harness knowledge and lessons learned from these two projects and to share them as widely as possible. It is not intended to comprise a comprehensive state of the art, nor a full set of rules for preserving and enhancing urban nature.

© FUNDAECO

The French Facility for Global Environment (FFEM) finances innovative environmental projects in developing countries. It supports initiatives that generate environmental, social and financial benefits at a local level. Established in 1994 by the French government following the first Earth Summit, it has already supported 333 projects in over 120 countries, two thirds of them in Africa.

Projects supported by the FFEM aim to preserve biodiversity, the climate, international waters, territorial ecosystems and the ozone layer, and to tackle chemical pollution. The FFEM seeks to learn from these pilot projects so that the most effective solutions can be deployed in other locations or on a larger scale.

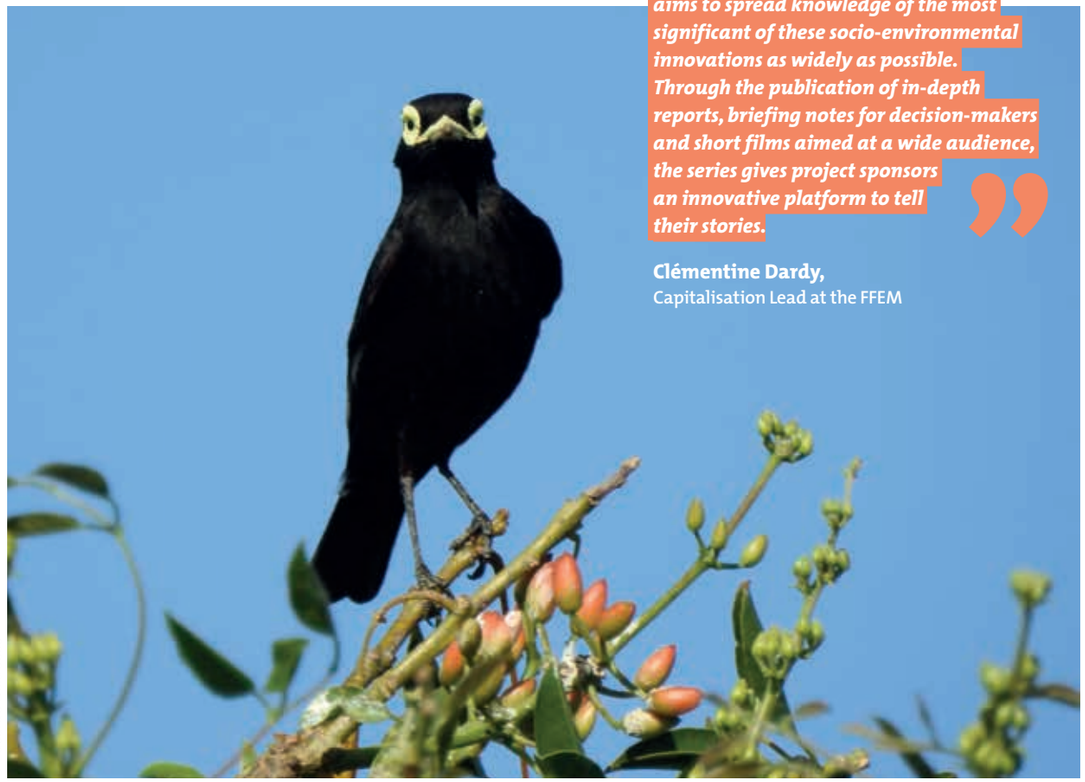
The FFEM works in partnership with public and private stakeholders in countries in both the Global South and Global North: NGOs, local authorities and communities, public institutions, companies and other funding partners and international organisations. The projects it finances are also supported by the member ministries of its steering committee and by the French Development Agency (AFD).

PREFACE

Project evaluation and capitalising on project outcomes are key steps in showcasing scientific and technical understanding, local knowledge and innovative practices to inform future action. The fruit of the interplay between experience gained and forward thinking, the multi-dimensional and dynamic nature of this capitalisation, based on many projects, allows for diverse contexts, past experience and field-proven solutions all to be taken into account. This results in a collaborative, participatory approach to sharing the lessons learned, involving many different parties – project sponsors, field staff, civil society organisations, research and other institutions in France and elsewhere.

The challenge is to learn not only from successes and good practices, but also from obstacles overcome, so that the most relevant solutions can be shared with different stakeholders and rolled out in other locations or at larger scale. The ability to test potential solutions, necessary for any innovation, is an integral part of the evaluation-capitalisation process because overcoming challenges leads to greater knowledge for all. Launched in 2021, the FFEM's new IN FOCUS series, under the theme of 'Innovate, Experiment, Share', aims to spread knowledge of the most significant of these socio-environmental innovations as widely as possible. Through the publication of in-depth reports, briefing notes for decision-makers and short films aimed at a wide audience, the series gives project sponsors an innovative platform to tell their stories.

Clémentine Dardy,
Capitalisation Lead at the FFEM



© FUNDAECO

EDITORIAL

Christophe Bories,
Chairman of the FFEM Steering Committee

France's commitment to preserving and enhancing urban nature as a response to global climate and environmental issues

Christophe Bories: With 55% of the world's population currently living in urban areas (a figure that is expected to rise to 68% by 2050), local authorities are becoming aware of how vulnerable these regions are to increasing climate and natural hazards. Faced with the urgent need to act, France is playing a leading international role in promoting and implementing sustainable urban development. It was a fervent advocate for adoption of the New Urban Agenda at the United Nations Conference on Housing and Sustainable Urban Development (Habitat III) in 2016, and for Sustainable Development Goal 11 on sustainable cities. Through its official development assistance, France has committed €3 billion to sustainable cities since 2019, €1 billion of this to cities in Africa. France also significantly contributed to the success of the 11th World Urban Forum, a contribution which reflected our commitment to one of the key challenges for the 2030 Agenda with its focus on territorial resilience. Around 30 events at the French Pavilion helped to foster international sharing of experience and good practices, highlighting the benefits of preserving urban natural areas to support climate change adaptation and the well-being of local communities.

Urban nature is a strategic priority for the FFEM

Stéphanie Bouziges-Eschmann,
Secretary-General of the FFEM

Sustainable cities, and more specifically urban nature, have been central to FFEM strategy for 10 years. The topic encompasses the issues of biodiversity conservation, adaptation and low-carbon transition in cities and regions with ever-increasing population density.
Human impact on regions is contributing to biodiversity loss, land degradation and climate change. Rapid urbanisation is putting increasing pressure on natural ecosystems, reducing their ability to regulate the microclimate, prevent floods, provide drinking water and food security, etc. Urban regions are also particularly vulnerable to the impacts of climate change. In addition, the COVID-19 pandemic highlighted their greater vulnerability to disruptive events, which resulted in interrupted supply chains and widening inequalities. To provide a coordinated response to these challenges and make cities more resilient to natural and climate risks, the FFEM supports projects for sustainable planning, development and management of urban areas, along with green and blue solutions, urban agriculture and community energy, that take into account the convergence between climate, biodiversity and pollution issues, and use inclusive approaches involving local communities.

Projects that contribute to climate change mitigation and adaptation, as well as social well-being and biodiversity preservation

Sébastien Treyer,
Chair of the FFEM Scientific and Technical Committee

Cities, especially in the Global South, are developing very rapidly. The overall trend is for expansion and land take, at a rate that presents a real challenge for planning. Urban ecosystems are particularly sensitive to climate change, as illustrated by various effects in cities such as heat islands, rainwater runoff on heavily artificialised surfaces and degraded air quality.

These phenomena are affecting densely populated and often disadvantaged districts, where they have significant impacts on health and biodiversity and a knock-on effect on the social climate. The challenge is therefore to reduce or overcome the impacts of climate change, which is now inevitable. Alongside traditional responses focusing on infrastructure (such as flood defences), we need to work first and foremost on reducing the vulnerabilities of each territory. Numerous scientific studies have identified Nature-based Solutions as prime options for achieving this. Cities are also home biodiversity, and a range of solutions exist to preserve it such as managing forest cover and creating cooling islands. For example, these urban nature projects are helping to reduce the risk of flooding in Santa Fe and to mitigate the natural risks of landslides in Guatemala City, both of which are being exacerbated by ever more frequent and intense weather events. These FFEM projects will provide key benchmarks for assessing the benefits of reducing vulnerabilities and thus risks, as well as the social, economic and environmental benefits of these initiatives focusing on urban nature, so that they become an obvious solution rather than an exception.

CONTENTS

01

NATURE IN THE CITY: INTEGRATING, PRESERVING, RESTORING

© FUNDAECO

© FUNDAECO

© FUNDAECO

The concept of urban nature

Since the 19th century, modern cities have been developing at the cost of "nature" and "wilderness", with a tendency to engulf natural areas.
For example, urbanisation – especially urban sprawl on the outskirts of cities – has resulted in soil sealing, destruction of flora and fauna, *and ultimately* disappearance of nature and the biodiversity it harboured. City and nature appeared to be irreconcilable concepts. Not only has the ruthless expansion of cities ravaged the environment (through logging, clearing agricultural land, soil sealing, etc.), it has also degraded it beyond its own borders, for example through water pollution and deforestation.

The idea that cities were inevitably disconnected from nature started to be called into question in 1972, in the Declaration of the United Nations Conference on the Human Environment (Stockholm Declaration) and associated action plan. It was further challenged in Agenda 21 arising from the UN Conference on Environment and Development (Earth Summit) in Rio de Janeiro in 1992. Chapter 7 of Agenda 21, entitled Promoting Sustainable Human Settlement Development, which promoted planning approaches that recognise the individual needs of cities and are based on ecologically sound urban development practices. In the 2000s, the Millennium Development Goals effectively placed the importance of nature and biodiversity to our societies on the political agenda. The quest of city residents for a good quality environment, as well as the climate and health crises, and more generally the ongoing degradation of ecosystems have led urban policy-makers to see it as crucial that cities reconnect to the living world. This represents a complete paradigm shift, as it involves moving away from a **technocratic vision** of the city – which develops by ignoring the environment and leaving it up to engineers to find solutions – towards an **integrated vision** that sees the city in terms of how it interacts with its environment. In a way, we are rediscovering the true nature of the regions on which the cities were built. Regions that have both beneficial and challenging characteristics, which need to be reflected in urban policy.

All of these non-anthropogenic aspects taken together are what is now referred to as "urban nature". The term "nature" is used here in its broadest sense, meaning everything to do with the living world (flora and fauna) and with natural features (topography, climate, water cycles, soil, etc.).

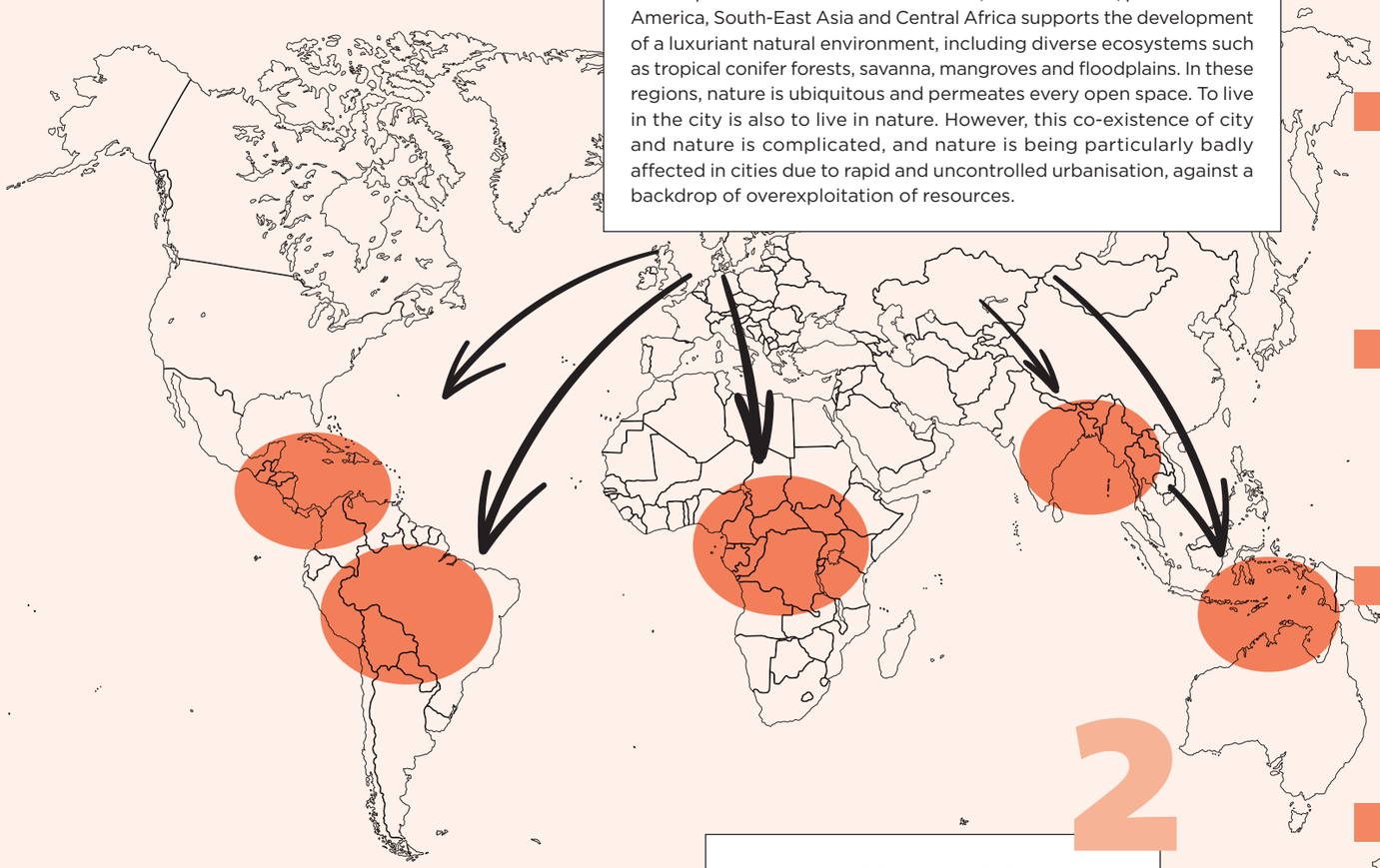
Promoting urban nature means both organising the city so it causes as little destruction as possible to the living world, and making the most of the ecosystem services that nature itself can provide to the city. It is in this dual focus that the concept marks a profound change in the way we look at cities. Although the idea of preserving the living world and protecting nature has a long history, the concept of nature as a service provider is more recent. Urban nature is increasingly considered a tool, a set of "no regrets" approaches to transforming cities while making them more resilient. It is now seen as a vital cornerstone in urban construction and in the well-being of city residents.

Incorporating nature into urban planning and development is often referred to as using "Nature-based Solutions". These are defined by the International Union for Conservation of Nature as **"actions to protect, sustainably manage, and restore natural and modified ecosystems, that address societal challenges effectively and adaptively, simultaneously benefiting people and nature"**. In simple terms, this means that nature can provide services, as long as it is acknowledged and protected. These solutions can be used in addition to or instead of grey infrastructure, which involves engineering and construction.

ADOPTING "NO-REGRET" MEASURES

These are actions that are beneficial even if climate change has less of an impact than expected. It means that they are cost-effective and useful in themselves, in that they make society less vulnerable to a whole range of pressures (including climate variability), regardless of the actual extent of change.

© FUNDAECO



The tropical climate in Central America, the Caribbean, parts of South America, South-East Asia and Central Africa supports the development of a luxuriant natural environment, including diverse ecosystems such as tropical conifer forests, savanna, mangroves and floodplains. In these regions, nature is ubiquitous and permeates every open space. To live in the city is also to live in nature. However, this co-existence of city and nature is complicated, and nature is being particularly badly affected in cities due to rapid and uncontrolled urbanisation, against a backdrop of overexploitation of resources.

URBAN NATURE IS THEREFORE AT THE HEART OF THE URBAN AGENDA. IT COVERS THREE MAIN THEMES:

1 NATURE AS... A PLANNING TOOL

Urban nature features prominently in policies to combat climate change and to manage the associated risks (such as flooding, droughts and landslides). In the face of escalating threats, the preservation, restoration and use of nature are proving to be key factors in making cities less vulnerable and improving urban planning.

2 ...A DEVELOPMENT TOOL

While cities face similar natural hazards regardless of whether they are in the Global North or South, significant inequalities persist, mainly due to greater social vulnerability in cities within the South. However, it is now clear that urban nature also generates positive social impacts, and that it is a factor in individual and community development.

3 ...A RESOURCE PRESERVATION TOOL

Nature-based Solutions are powerful tools for combatting pollution and environmental degradation. This means seeing nature itself as a tool for its own preservation.

The rationale and activities of the FFEM are aligned with this vision of the city. The FFEM's contribution to the **Porto-Novo, Green City** project in Benin since 2013 is one example of how it is supporting resilient cities. This support has subsequently been extended elsewhere in Africa and to other developing regions. For example, between 2016 and 2021 two projects in Latin America were co-financed under the "Sustainable urban territories" strategy: **the Metropolitan Green Belt (MGB) in Guatemala, and the Western Urban Nature Reserve (WUNR) in Santa Fe, Argentina**.

The purpose of this publication is to present a cross-capitalisation of these two initiatives which have the shared goal of preserving, restoring and integrating urban nature, using Nature-based Solutions (NbS). These are ways of using ecosystem services to increase the resilience of cities and their residents, and to limit the impacts of climate change.

Nature and biodiversity in the city represent shared spaces where the built environment and its users coexist with natural components – biotic and abiotic, native or non-native – that have survived and adapted to an artificial environment. They cover all the components that make up the green and blue corridors of the city.

Definition co-created by stakeholders in the MGB and WUNR projects during cross-capitalisation workshops, March 2023.

THE MILLENNIUM ECOSYSTEM ASSESSMENT DISTINGUISHES FOUR CATEGORIES OF ECOSYSTEM SERVICES

PROVISIONING SERVICES: these are the material benefits we draw from ecosystems, such as raw materials, water and food.

REGULATING SERVICES: usually invisible, but crucial for environmental sustainability, these help to moderate weather events, regulate the water cycle, sequester carbon, regulate the local climate and provide pollination services.

SUPPORTING SERVICES: ecosystems are living spaces for animal and plant species, maintaining genetic diversity and preventing species extinction.

CULTURAL SERVICES: this covers tourism, leisure, heritage and mental health.
The non-material benefits provided by ecosystems are just as essential as the material benefits.

Source: IUCN

Cities in the Global South: trend setters in managing climate resilience

Nature's place in the city has evolved over time, from the hygienist approach through modernism – where nature was considered simply an aesthetic or leisure component – to the garden city, where nature played a role in social well-being.

Many cities in the Global South lived in harmony with nature, understood the natural cycles and adapted urban design to fit them. However, with globalisation, these cities pursued a model of modernity promoted by the industrialised countries. Now, in a time of climate change, cities throughout the world are facing the consequences of having built from concrete.

Because a technocratic vision of the city had previously been taken to the extreme in industrialised countries, reintegrating nature into cities and taking natural ecosystems into consideration have now become key challenges for urban policy in most Organisation for Economic Co-operation and Development (OECD) countries such as France, where "green corridors" have been included in development plans since 2009. The pendulum swing towards urban nature is even more noticeable given that for decades it had been virtually overlooked by urban planners, who believed that modernity was precisely about moving away from the vagaries of nature.

Why reintegrating nature into cities in the Global South is proving so challenging

Some cities in the South are introducing strategies to adapt to climate change and mitigate its impacts, which have been heavily advocated for by civil society organisations and indigenous communities. That said, embedding these processes into public policy in order to widen their impact is somewhat of a slow process.

In Guatemala, 49.8%[1] of children suffer from malnutrition, and in Argentina 39.2%[2] of the population lives below the poverty line. These particularly revealing figures help to explain why investments in development by governments and international cooperation partners are directed towards improving access to health, education and employment, taking priority over an integrated vision of land-use planning.

1 UNICEF, 2017; 2 INDEC, 2022

"A natural city is one that is no longer human-centred, but embraces the living world."

Philippe Clergeau,
professor at the French Natural History Museum and consultant in urban ecology.

However, this apparent lack of interest is deceptive. The leaders, elected representatives, engineers and experts in these cities are fully aware of the importance of this issue. Local academic and community sectors are taking action and often come up with innovative ways of raising the issue of urban nature. Nevertheless, this awareness is not accompanied by the necessary resources. This is understandable given the chronic under-funding of local authorities, which lack capacity for developing and implementing public policies. This applies particularly to land-use regulations, policing of town planning and all measures to protect natural areas, implementation of which requires supervisory capacity that is too often lacking.

Nearly 60% of Guatemalans and 39.2% of Argentinians live below the national poverty line[1]. While both countries experience greater poverty in rural areas (which are home to 48% of the population in Guatemala, compared with only 8% in Argentina), there are significant social inequalities in the cities. Although Guatemala City alone generates a quarter of national revenue and has a per capita income comparable to that in OECD countries, almost a third of its residents live in informal settlements sprawling across green spaces, vulnerable areas that are also seriously lacking in housing and services. In Santa Fe, Argentina, 16% of the population lives in informal settlements.

In these places where the pressure of human activities poses a threat to living conditions and the environment, there is an urgent need to introduce a public policy framework to protect nature, as well as to advise all urban policy-makers about the essential function of natural areas and the benefit of preserving them.

In compensating for the lack of public policy, it is generally civil society stakeholders such as NGOs and residents' associations that take the most active role. However, their initiatives are too often hindered by a lack of financial and human resources, and the absence of political support. These various barriers are reflected in their limited access to data on local biodiversity, a lack of resources for implementing projects, and an institutional instability that prevents them from carrying out developmental projects. Civil society is too often excluded from decision-making processes about urban planning.

There is still a long way to go in this quest for reconnection and reconciliation between human activities and nature. **Yet, we should remember that for thousands of years, cities were designed to be perfectly integrated into their ecosystem and their geographical situation.**

Potential for balance between cities and nature

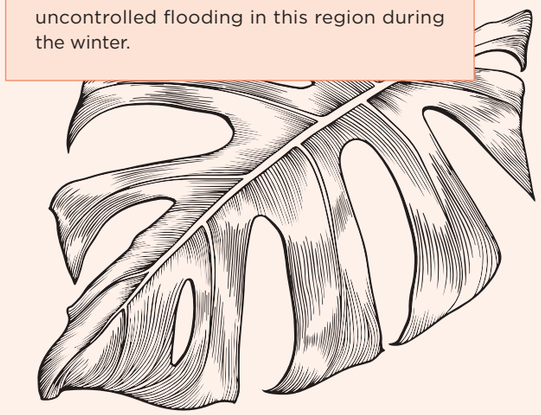
In Europe, sometime between the Renaissance and the industrial revolution cities stopped being thought of as a way of living in a territory by adapting to it, and started to be seen as a way of redesigning an area and improving a territory. Cities took on a new role, that of the ultimate embodiment of human ingenuity, with the ability to restrain and dominate nature. The universal nature of current urban forms bears testimony to this process of urbanisation, one that is disconnected from the environment. Nevertheless, there are numerous historical examples of urban civilisation that show it is possible to achieve balance between cities and nature.

There are two archetypal examples of ways of envisaging the relationship between a city and its environment. The first is Tenochtitlan in Mexico. This Aztec capital was built entirely on a lake. The whole city was designed not only to adapt to this apparently hostile environment, but also to derive benefits from it, mainly through market gardening. The current Mexico City, built on the same but now drained lake, seems to have turned its back on this natural environment. However, nature regularly makes its presence felt, as if to remind people that they cannot build on a lake, even a dried up one, with impunity. The clay soil expands and contracts, the over-use of the water table causes subsidence, and the earthquake risk is exacerbated by the very nature of the soil.

The second example is in Paris, where the 19th Century Haussmann public works are testimony to this "modernist" vision of the city. Huge development projects were undertaken, remodelling large swathes of the city. Rivers (notably the Bievre) were covered, the Seine's banks were built up, and wide boulevards were created. This trend continued until the 1960s and included development of the Boulevard Périphérique (ring road), the construction of vast housing estates in place of the city's ring of fortifications (at that time largely natural areas), developments on wasteland and population densification. Today, there is talk of making the Bievre open to the sky once more, transforming the Boulevard Périphérique into a pedestrian walkway, and planting urban forests. The technocratic vision of the city will perhaps be seen as simply an interlude that we are now drawing a line under.

AN EXAMPLE FROM THE ZENÚ PEOPLE

Between 800 BC and 1200 AD, the Zenú people in northern Colombia developed a drainage system to redirect excess water and use it for agricultural activities, which involved constructing canals with an average length of a kilometre.
In winter, these canals prevented the rivers from overflowing and channelled the water towards wetlands, while in summer they protected the water and channelled it towards drier land. The management of territories at that time contrasts sharply with the current management of agricultural production. Today, major landowners tend to level the land, which contributes to natural disasters due to uncontrolled flooding in this region during the winter.



Ten years of FFEM involvement in integrating urban nature

The French Facility for Global Environment (FFEM) has been involved in funding environmental pilot projects in the Global South for some 30 years. Created by the French government in 1994 following the first Earth Summit in Rio, it has already supported more than 400 projects in over 120 countries, including 57 projects in Latin America since 2011.

The FFEM's mission

The FFEM supports projects that seek to have a beneficial effect on both people and nature, by fostering local commitment and development that has a positive impact on communities and regions. The FFEM proposes innovative solutions, both on the ground and through to public policy, that involve multi-stakeholder planning and development and bring together local authorities, civil society and the private sector.

One of the strategic priorities of the FFEM is **"Sustainable urban territories"**, which has three areas of action:
- strategic **urban planning** as a tool to combat climate change;
- **management of climate risks** and waste;
- **sustainable approach** to urban renovation.

This strategic priority is more relevant than ever, given the increase in natural disasters linked to climate change and the trend towards urbanisation. In the FFEM's 2023-2026 strategy, the focus is on "Adaptation and low-carbon transition in cities and regions". One of the priorities under this theme is establishing **sustainable solutions to feed cities and adapt them to climate change**, linking in with the Paris Agreement, the United Nations Framework Convention on Climate Change and the Sustainable Development Goals.

Since 2013, five projects around the world have been supported under this theme, three of them in Latin America: **Porto-Novo, Green City; Douala, Sustainable City; preservation and sustainable development of the Xochimilco reserve; Metropolitan Green Belt in Guatemala City; Western Urban Nature Reserve in Santa Fe.** The aims are to make the cities more resilient to climate change, restore the functions of ecosystems, and uphold urban agriculture through green and blue solutions and urban planning. The strategy supported by the FFEM encompasses urban planning, integrated management of regions, green and blue corridors and **nature-based solutions**.

Many other development partners, such as the French Development Agency (AFD), are also supporting and co-financing urban nature projects, prioritising Nature-based Solutions to reduce greenhouse gas emissions, limit global warming and adapt regions to the impacts of climate change. This is now a key theme for all urban policy-makers, in both the Global North and South.

However, the FFEM stands out for its unique approach, characterised by:
- **true flexibility and adaptation:** due to its support for projects led both by city authorities and by stakeholders such as NGOs, the FFEM is considered a human-scale development partner in touch with what happens on the ground. It can also adapt projects that have already been launched, and show flexibility in a changing and uncertain situation, such as during the recent COVID-19 crisis.
- **a strong focus on social acceptability and a partnership approach:** the FFEM works closely with the needs of partners and communities and in close collaboration with project sponsors, working only on environmental projects and using participatory approaches to ensure the social acceptability of the projects it co-finances.

Capitalisation on experience is another strategic focus and a core commitment of the FFEM, which it has been scaling up since 2020. It is a way of contributing towards collective learning using the experience of the innovative projects supported by the FFEM. The aim is to promote good practices and learn from trials and pitfalls. It also involves creating international networks for discussion between stakeholders who are harnessing nature for the benefit of cities and their residents.

This cross-capitalisation reports on two projects responding to the same challenges in developing urban resilience to climate hazards: the Metropolitan Green Belt (MGB) in Guatemala and the Western Urban Nature Reserve (WUNR) in Santa Fe, Argentina.

The exercise used a cross-evaluation and cross-capitalisation approach and was highly participatory. It focused on cross-pollination between the lessons learned, in order to examine and pool the practices developed by the stakeholders, along with the knowledge they had acquired during implementation.

The location of the two urban nature projects

Guatemala City and Santa Fe were established in areas that are highly vulnerable to natural disasters, due to both their climate and their geography.

Guatemala has a tropical climate and lies at the intersection of three tectonic plates between the Pacific Ocean and the Caribbean Sea. The Pacific Ring of Fire runs across the country and includes 37 volcanoes, three of which are considered highly active. Guatemala City is located in a valley intersected by characteristic deep ravines. The city is regularly subject to landslides, tropical storms and earthquakes, making it one of the world's cities most exposed to natural hazards.

By contrast, the city of Santa Fe in Argentina is on a plain surrounded by the Paraná river and its tributary the Salado. The alternating periods of drought and heavy rainfall that are characteristic of the local climate result in serious flooding. The many disasters that have struck these two cities have left their mark on the collective memory, due to the extensive damage and loss of human life involved.

Both Guatemala City and Santa Fe have significant but severly threatened natural capital at their disposal. Both cities have started to transition by putting nature at the heart of public policy.
In each city, the environment is increasingly seen as a source of solutions to improve the response to natural hazards, while also providing benefits and services for the population. However, this transition is coming up against political, social and environmental barriers that often stand in the way of action. In political and administrative terms, the territory covered by the metropolitan area of Guatemala City has yet to be officially defined. It includes between 17 and 44 municipalities, and has no authority or legal framework to regulate or coordinate the actions of the individual local administrations. Santa Fe, meanwhile, is managed by a single municipal authority.

Focus on Guatemala

→ 42% of the municipal area of Guatemala City and over 14% of the metropolitan area (219 km²) is comprised of ravines. The Land-use Plan (POT, in Spanish) categorises them as unbuildable, as they are important ecological areas and also high-risk.

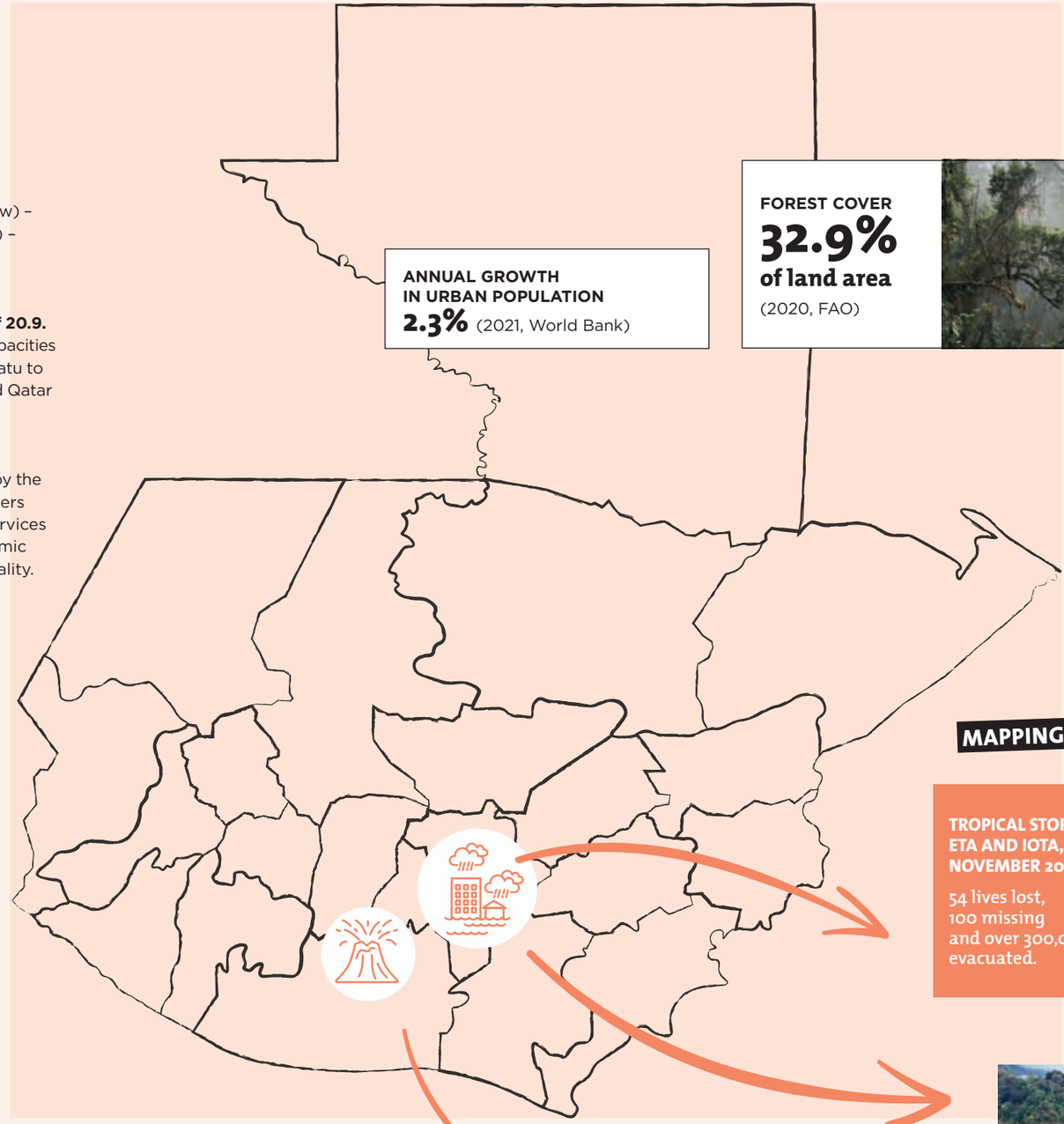
→ The slopes of the ravines typically have gradients between 15% and 40% and have dense forest cover. The gradual deforestation of these areas is increasing the risk of landslides in the event of earthquakes or heavy rain.

→ Guatemala City comprises mid-rise buildings. Although there have been advances in earthquake-resistant building techniques, the city's position on the Ring of Fire increases the risk of earthquakes and limits the construction of skyscrapers. In addition, the airport is located in the heart of the city, which also limits the height of buildings.

→ Due to the rugged topography of the metropolitan area, it has two major categories of climate according to the Köppen-Geiger classification: Equatorial (Aw) – tropical with dry winter, and Oceanic (Cwb) – temperate with dry winter.

→ Guatemala was ranked 10th in the WorldRiskReport 2020, with a risk index of 20.9. This study, which looks at exposure and at capacities for response and adaptation, assesses Vanuatu to be at highest risk with an index of 49.74, and Qatar at lowest risk with an index of 0.31.

→ The five main risks for Guatemala identified in the Global Risks Report 2023 by the World Economic Forum were natural disasters and extreme weather events, collapse of services and public infrastructure, prolonged economic stagnation, state collapse and digital inequality.



ANNUAL GROWTH IN URBAN POPULATION
2.3% (2021, World Bank)

FOREST COVER
32.9%
of land area
(2020, FAO)

© Theodore Moore

POPULATION EXPOSED TO FINE PARTICLE AIR POLLUTION
100% (2017, WHO)

TOTAL POPULATION
17,109,746
(2021, World Bank)

POPULATION OF GUATEMALA METROPOLITAN AREA
3,802,944
(2018, INE)

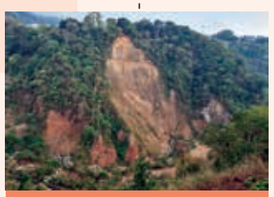
POPULATION LIVING IN SLUMS
38%
(2020, UN-Habitat)

CO_2 EMISSIONS (metric tons per capita)
1.2 (2019, World Bank)

MAPPING OF MAJOR DISASTERS

TROPICAL STORMS ETA AND IOTA, NOVEMBER 2020
54 lives lost, 100 missing and over 300,000 evacuated.

© Violeta Ramirez



LANDSLIDE IN EL CAMBRAY, SEPTEMBER 2015
125 houses destroyed, 280 lives lost.

ERUPTION OF VOLCÁN DE FUEGO, JUNE 2018
Over 400 people dead or missing

ECOLOGICAL AND CLIMATE CHARACTERISTICS

ALTITUDE OF GUATEMALA CITY
1,500m

AVERAGE ANNUAL TEMPERATURE
20°C

AVERAGE ANNUAL PRECIPITATION
1185.5mm
Source: National Institute of Seismology, Vulcanology, Meteorology and Hydrology (INSIVUMEH)

BIOME:
Tropical and subtropical conifer forest

Metropolitan Green Belt project in Guatemala: detailed overview

Background

Nearly 20% of the country's population is concentrated in the Guatemala City metropolitan area, and a large proportion live in poverty. It is the most highly populated city in Central America and is experiencing rapid and uncontrolled urban growth. This means that the city is both exposed and vulnerable to natural hazards, which are likely to multiply due to climate change. For example, projections by the Intergovernmental Panel on Climate Change (IPCC) for this part of the world forecast increased temperatures and greater variability in precipitation, with more frequent periods of drought and increasingly intense rainfall.

For Guatemala, CMIP6 climate models[1] forecast a 1.4°C increase compared with the current average temperature by the middle of the century, under medium emissions scenarios (SSP 2–4.5). Precipitation is expected to decrease by 14% compared with the current average, especially during the dry season (November–April), which poses a threat to water supply and sanitation.

In this context, protecting the environment and biodiversity is **a key factor in climate risk reduction.** There is consensus on this at government level, as demonstrated by its inclusion in the Climate Change Law adopted by the government in 2013. This law requires the Departmental Development Councils (CODEDE) and municipalities to embed climate change adaptation into their land-use planning policies.

Taking the lead from this law, the Green Belt project has helped to develop a more nature-friendly approach to land-use planning, with the aim of making cities more resilient.

General information

SECTOR: Adaptation and low-carbon transition in cities and regions

FUNDING MODEL: grant

TOTAL: €4,960,000 of which €1,510,000 from FFEM

BENEFICIARIES: Foundation for Ecodevelopment and Conservation (FUNDAECO)

GRANT DATE: May 2016

PROJECT DURATION: 2016-2021

1-*Coupled Model Intercomparison Project 6 from the World Climate Research Programme*

HISTORY

2016 → Financing agreement signed

2017 → Project communicated to municipal authorities and agreements signed

2018 → First round of TUYA competition; study into landslide risk launched

2019 → Second round of TUYA competition; Cerro Alux masterplan and parks and trails manual

2020 → Studies for publication of a bill and virtual citizen survey on perception of the Green Belt

2021 → Land-use Plan (POT) for Escuintla and Chimaltenango finalised

2022 → Participatory workshops for Salayá and Sakerti parks

PROJECT COMPONENTS

1. Strategic urban planning for climate change adaptation and development of green infrastructure (€265,409)
2. Green Belt to reduce vulnerability and protect ecosystems (€559,547)
3. Managing and reducing vulnerability across the water catchment (€198,932)
4. Participation, urban consultation and promotion (€99,800)
5. Institutional and operational support (€386,312)

PARTNERS

Project team: FUNDAECO
Co-financing: United Nations High Commissioner for Refugees (UNHCR), INAB, FCG, AMB, CODEDE, municipal authorities, communities and NGOs.
Other stakeholders: Grupo InnovaTerra, CALMECAC Foundation, TNC, Creamos Guatemala, Crecer Foundation, MCC, Mesa de Barranqueros.

The project implementation partners and FUNDAECO produced, collected and analysed a considerable quantity of geographical information, which they shared with the stakeholders involved. This information was used to support the strengthening of Land-use Plans, one of which was approved under this project.

IMPACTS

The development of the parks and the participatory activities under the project helped to change residents' perceptions of these spaces and to reduce tensions between poor and more affluent neighbourhoods. The creation of shared communal green spaces had several practical impacts for the community:
→ access to outdoor spaces for leisure and sports;
→ opportunities to get closer to biodiversity;
→ reduced journey times, as some of the parks themselves provide connectivity corridors.

Lastly, bird-watching communities have emerged, including in lower middle-income neighbourhoods which often do not have access to this type of activity. Perceptions of the ravines and the urban hills have thus slowly evolved thanks to the opening of eco-parks by private owners, civil society organisations and municipal authorities opening.

ACTIONS TO SUPPORT BIODIVERSITY

Inclusion of green spaces in land-use planning

One of the goals in creating the Metropolitan Green Belt (MGB) was to support Land-use Plans (POT) across five communes in the Guatemala City Metropolitan area. These plans inform and regulate urban development and land use. They have been drawn up with consideration for the protection of existing forests and bodies of water, threats in relation to biophysical conditions, and the need to protect and restore riparian buffer zones.

Replanting of urban forests and development of urban eco-parks

The concentration of ecosystem services across the city was mapped out, making it possible to identify sensitive ecological areas to be protected and enhanced, in particular wooded spaces. As part of the MGB project, 181.5 hectares were reforested, and 198 hectares of urban forests were included in the national forest subsidy programme. This programme, Probosque, encourages participants – including municipal authorities, individuals, companies or foundations – to manage their land sustainably to prevent deforestation, through the use of subsidies. The MGB project includes a range of components, for example management of a 15-hectare natural forest to protect and provide ecosystem services, and will receive a subsidy of $4,800 a year.

Within the areas covered by the MGB, the project has financed the creation or restoration of eight eco-parks in the ravines. It has created new spaces for biodiversity, while also optimising the ecological, social and recreational functions of existing spaces. Residents' views of these natural areas, which were previously considered inaccessible and dangerous, have now been transformed. They are now seen as welcoming spaces for playing and learning.

Focus on Argentina

→ **In 2014,** the city of Santa Fe joined the Rockefeller Foundation 100 Resilient Cities network.

→ **In 2017,** Santa Fe was the first city to establish its resilience strategy, of which the Western Urban Nature Reserve (WUNR) is a core project.

→ **In 2019,** the greenhouse gas mitigation strategy was approved.

→ **Köppen-Geiger climate category:** Temperate/humid subtropical (hot summers with no dry season).

→ **The five main risks for Argentina** identified in the World Economic Forum Global Risks Report 2023 are rapid inflation, debt crises, proliferation of illicit economic activity, state collapse and severe commodity supply crises.

TOTAL POPULATION
45,808,747
(2021, World Bank)

POPULATION OF COMMUNE OF SANTA FE
427,000
(2010, INDEC)

POPULATION LIVING IN SLUMS
16%
(2020, UN-Habitat)

POPULATION EXPOSED TO FINE PARTICLE AIR POLLUTION
93.9%
(2017, WHO)

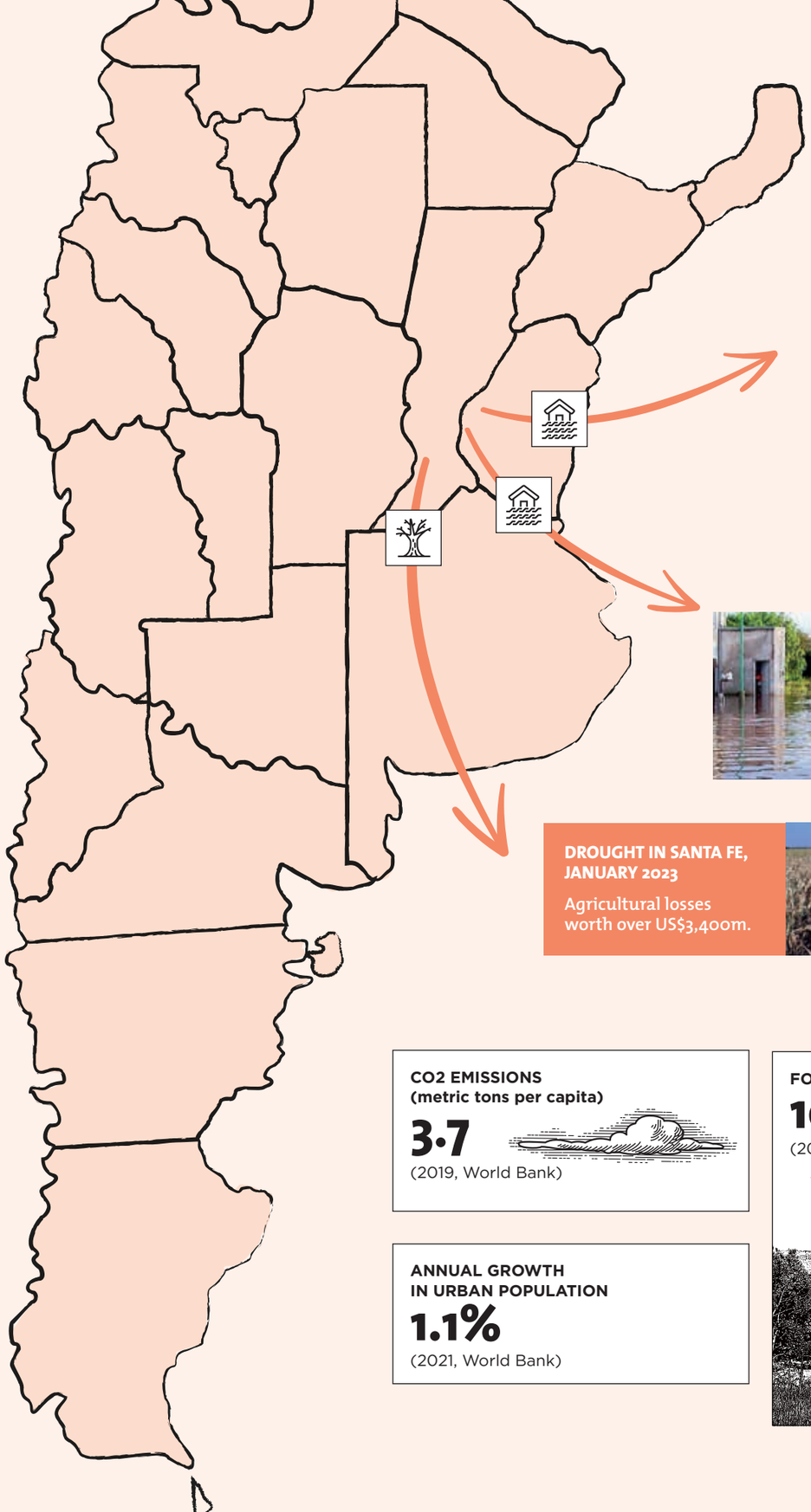
ECOLOGICAL AND CLIMATE CHARACTERISTICS

ALTITUDE OF SANTA FE
25m

AVERAGE ANNUAL TEMPERATURE
19.1°C

AVERAGE ANNUAL PRECIPITATION
1075.8mm
Source: Argentina National Meteorological Service

BIOME:
Savana and floodplains



MAPPING OF MAJOR DISASTERS

FLOODING IN SANTA FE FROM SALADO RIVER, APRIL 2003
67 people dead or missing and over 50,000 evacuated.

FLOODING IN SANTA FE, TORRENTIAL RAIN, MARCH 2007
3 people dead and over 26,000 evacuated.

DROUGHT IN SANTA FE, JANUARY 2023
Agricultural losses worth over US$3,400m.

CO2 EMISSIONS (metric tons per capita)
3.7
(2019, World Bank)

ANNUAL GROWTH IN URBAN POPULATION
1.1%
(2021, World Bank)

FOREST COVER
10.4% of land area
(2020, FAO)

Western Urban Nature Reserve project in Santa Fe, Argentina: concept

Background

Santa Fe is situated 475 km north-west of Buenos Aires, at the confluence of the Paraná river and its tributary the Salado, which enclose the urban area to the east and west respectively. The neighbourhoods to the west of the city are particularly exposed and vulnerable to flooding, as areas of poor quality housing for low-income communities have been built close to the Salado riverbed.

The site where the project is based posed a risk for the communities living there but was also a hotspot for biodiversity, and so needed to be protected from anthropogenic activity. The current team at the municipal authority engaged the *Programa urbano integral* (Integrated Urban Programme) to mobilise financial and human resources to restore and create new areas of biodiversity in conjunction with the WUNR project. As part of this initiative, the project co-financed by the FFEM was designed to support the municipal authority in creating and developing the WUNR.

© Eduardo Beltrocco

HISTORY

2015 → Agreement signed to finance and create WUNR

2016 → Santa Fe joins Argentine Network of Municipalities against Climate Change (RAMCC)

2017 → Resilience strategy established for city of Santa Fe

2019 → Inauguration of WUNR

2021 → National Climate Change Law passed

2021 → WUNR opened to the public

PARTNERS

Project owner:
Municipality of Santa Fe
Project manager:
Municipal Executive Unit
Other stakeholders: National University of the Littoral, non-profit Los Sin Techo, City of Rennes, Rennes 2 University, neighbourhood and district associations, Fundación Hábitat & Desarrollo, non-profit Aves Argentinas (birds), National Agricultural Technology Institute (INTA), INA.

IMPACTS

The project achieved its main objectives despite a particularly difficult economic and health context and changes at the helm of municipal and provincial administrations. Coupling the WUNR with a water risk prevention plan has clearly added value compared with an isolated intervention. The project has had three positive impacts:

→ Better management of informal settlements and protection from natural hazards.

→ Preservation of the site's ecological value, through (i) protecting biodiversity and developing environmental education and awareness-raising activities, (ii) preserving the absorption capacity of the soil, and (iii) enabling better rainwater filtration and retention of solid waste.

→ Social inclusion, as the project supported the reintegration of residents living in extreme hardship.

The Guangzhou Award identified the project as one of the **15 most outstanding projects in the world for urban innovation** because of the way it combines education, poverty reduction, social inclusion and management of water, land and natural resources.

International cooperation partners also contributed to local ownership and continuity of the project, by supporting the municipal team in its commitment to managing the WUNR after the project ended, a commitment that was taken on by the new municipal team.

General information

SECTOR: adaptation and low-carbon transition in cities and regions

FUNDING MODEL: grant

TOTAL: €3,247,612 of which €1,000,000 from FFEM

BENEFICIARIES: municipality of Santa Fe

GRANT DATE: December 2014

PROJECT DURATION: 2015-2019

PROJECT COMPONENTS

1. Creation of Urban Natural Reserve by redeveloping the rainwater reservoirs to the west of Santa Fe (€1,443,000)
2. Reduction in flood risk from rainwater runoff (€1,332,612)
3. Promotion of economic and social development in the area of intervention through pilot projects and training activities (€187,000)
4. Capitalisation and sharing of experience and findings from the project as part of North-South cooperation (€215,000)

ACTIONS TO SUPPORT BIODIVERSITY

Environmental restoration and creation of the Western Urban Nature Reserve

Under project ownership of the municipality of Santa Fe, the creation of the WUNR re-established a wetland ecosystem of 142 ha, within a territory that includes the Espinal ecoregion and the Paraná Delta and islands ecoregion.

To achieve this, a new drainage system was created within the city to limit flooding due to runoff, and new rainwater reservoirs were designed. The new system retains solid waste before channelling the water towards a reservoir which retains it and helps it soak into the ground. In the event of heavy rain, the water in the reservoir is filtered once more and discharged into the river through a pump system.

Improvements to water quality and protection of biodiversity

The project also has a focus on water quality and protection of biodiversity. Checks are carried out under a partnership with the National University of the Littoral, and a team of guides regularly monitors the 780 plant and animal species. To limit residents' exposure to flooding, families have been rehoused and the site has been protected from urbanisation by decree. The project also fulfils a social, educational and informative role, by providing the community with a "green classroom" (*aula verde*) to improve their knowledge and understanding of the biodiversity around them and raise awareness about environmental protection.

02

URBAN NATURE: BACKGROUND AND CHALLENGES

© Eduardo Beltrocco

© Eduardo Beltrocco

© Eduardo Beltrocco

Urban nature, beneficial to city life

The difference between nature and biodiversity in the city

For about 200 years, the construction of cities has focused on optimising human activity – urbanisation as anthropisation, with the aim of controlling or even dominating nature. However, it has now become vital to examine the interactions between human and natural systems, to improve our understanding of cities. We have therefore moved away from adapting nature to the needs of cities (urban engineering) towards adapting cities to their environment (urban ecology). The most iconic examples of this evolution are undoubtedly rivers in urban settings. They generally followed their natural course until the 19th Century, after which they were embanked, engineered and sometimes even covered – only to be recently returned to their natural state and in some cases opened back up.
As a result, new areas of research and new scientific disciplines have emerged, studying all living things in urban environments in order to identify and assess them and understand how they interact with the human sphere. The basic premise of these disciplines is that the city (as a means of occupying a space but also as a human society) is not built on a territory; it actually forms an integral part of it. It is then logical to consider that its future is dependent on the quality of its interactions with the territory.

The concepts of urban biodiversity and urban nature emerged out of this change in perspective. There is only a subtle distinction between the two terms, but they do have different definitions.

Urban biodiversity is defined as the variety or abundance of living organisms and species in a city. More specifically, it is defined as the wealth of species, genes and ecosystems, as well as their interactions. Urban biodiversity therefore refers specifically to living things within cities (fauna and flora).

Urban nature covers everything that is not a result of anthropogenic urban expansion: natural areas in green and blue corridors, domesticated spaces such as private and public gardens, green roofs, trees and bushes in the streets, agricultural areas, etc. Urban nature therefore has a broader meaning than biodiversity, as in addition to living things it includes all the aspects that have not been built by humans out of transformed materials. It includes water, rocks, unsurfaced ground, wasteland, etc.

Every city accommodates different types and quantities of biodiversity. Urban parks, wasteland, private gardens, derelict infrastructure, etc. are all areas that are potentially rich in biodiversity, capable of hosting a wide variety of animal and plant species.

KEY WORDS

Urban ecosystem
Natural areas/topography coexisting with anthropogenic activities/landscapes.

Natural space
A defined area (private or public) with minimum human intervention. The flora and fauna that develop are specific to the ecosystem in which they are found. A space regularly subject to urban pressure.

Protected space
A geographically defined area whose value (environmental, social, historical, etc.) is preserved and protected through legal, institutional, physical or common law instruments.

Definitions co-created with stakeholders in the MGB and WUNR projects, during Nature in the City cross-capitalisation workshops.

URBAN NATURE AND BIODIVERSITY IN Guatemala City

Guatemala has the highest number of endemic species in Central America (*Convention on Biological Diversity*), and one of the highest levels of diversity in the world, as recognised by COP 10 on biodiversity in Nagoya. It contains **13 land-based ecoregions, 4 freshwater ecoregions and 2 marine ecoregions, and hosts at least 11,350 vascular plant species and 5,687 animal species** (CONAP, 2014).

The metropolitan region of Guatemala City is located in a temperate subtropical rainforest, characterised by the presence of pine and evergreen oak. It is home to over 400 species of native and migratory birds, which contribute towards seed dispersal, insect control and pollination in the area. In addition, 16 species of mammals have been identified, along with butterflies and insects.

The ravines, covered by the project co-financed by the FFEM, are genuine reservoirs of biodiversity and are considered to be regional biological corridors for species such as migratory birds, flying insects and bats. When walking through one of these ravines, it is not unusual to spot an acorn woodpecker (*Melanerpes formicivorus*), a Guatemala spikethumb frog (*Plectrohyla guatemalensis*) or some Monarch butterflies (*Danaus plexippus*).
These ravines are also areas of hydrological importance for the whole city. The biodiversity within them plays a key role in water conservation, as the plant cover assists infiltration into the aquifer and helps to maintain the "water currents" that are specific to the water system in the area. Lastly, biodiversity – in the form of plant cover – protects the plants and trees from evapotranspiration and helps to maintain humidity in the area, thus creating urban cooling islands.

Acorn woodpecker

© FUNDAECO

Guatemala spikethumb frog

© FUNDAECO

Monarch butterfly

© Habibi Orellana

In terms of species of flora, the forests of pine (*Pinus pseudostrobus*) and evergreen oak (*Quercus brachystachys, Quercus conspersa* and *Quercus tristis*) are interspersed with agave (*Furcraea guatemalensis*) and lion hand tree (*Oreopanax xalapensis*).

Forest of pine and evergreen oak

Lion hand tree

Agave

© FUNDAECO

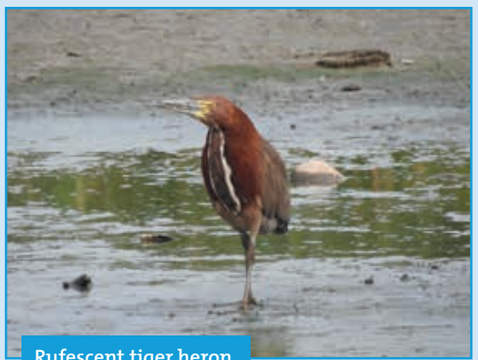
URBAN NATURE AND BIODIVERSITY IN Santa Fe

Argentina is a prime example of the abundance of ecosystems in Latin America. The country's 18 ecoregions form a complex territory that includes a subtropical zone, Antarctica, the highest mountains in the Americas, and some of the deepest waters in the Atlantic Ocean. According to its national biodiversity strategy, Argentina is home to **1,002 varieties of birds and hundreds of reptile, mammal and amphibian species**. Unfortunately, 25% of them are under threat of extinction, according to the International Union for Conservation of Nature (IUCN).

The city of Santa Fe lies on the banks of the Salado river and the Setubal lagoon, two tributaries of the Paraná river. The city is surrounded by natural areas providing refuges for biodiversity, including the Western Urban Nature Reserve along the Salado river, which acts as a green "lung". This wetland area represents a unique ecosystem for the city of Santa Fe.

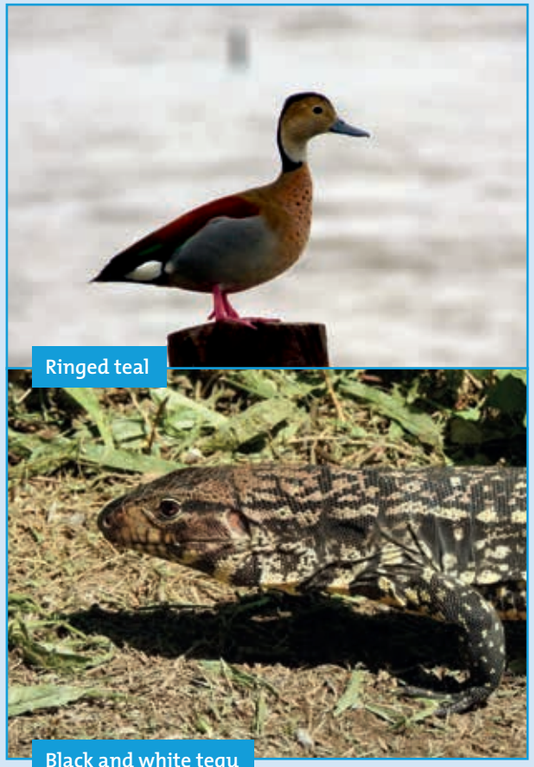
It has rich biodiversity, with a wide range of animal and plant species. There are numerous bird species, including the caracara, colibri, black vulture and peregrine falcon, as well as many amphibian and insect species.

The 516 species of fauna identified in the WUNR include the rufescent tiger heron (*Tigrisoma lineatum*) and the ringed teal (*Callonetta leucophrys*), as well as the black and white tegu (*Salvator merianae*), one of the few known warm-blooded reptiles.



Rufescent tiger heron

© Eduardo Beltrocco

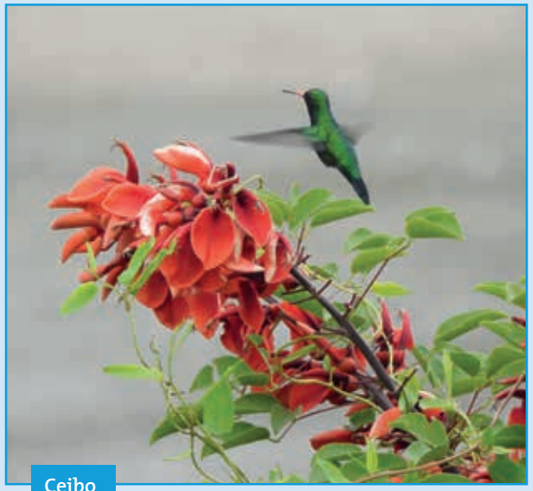


Ringed teal

Black and white tegu

© Pablo Capovilla

© Eduardo Beltrocco



Ceibo

© Eduardo Beltrocco

In addition to the WUNR, the city has numerous other green spaces, including Juan de Garay Park, the university ecological reserve and Lorenzo Parodi botanical garden, which are rich in biodiversity.

In terms of flora, 265 different species have been identified, including ceibo (*Erythrina crista-galli*), the national flower of Argentina, Jerusalem thorn (*Parkinsonia aculeata*) and Roman cassie (*Vachellia caven*).

Jerusalem thorn

© Pablo Capovilla

Why and how to enhance ecosystem services

Ecosystem services degraded and under threat

Cities have a paradoxical relationship with nature. Urbanisation is bound to cause tension with its environment, because of the resulting population density. By definition, urbanising involves building, developing and covering so profoundly transforming the host natural environment. Although this tension is an integral part of the urbanisation process, it too often leads to destruction of the environment, for example through artificial surfacing and pollution caused by human activities. This destruction of nature then ends up causing cities serious issues, through what can be a very strong boomerang effect: the air becomes unbreathable, the water is polluted, climate change outpaces flood protection measures, etc. Thus, cities enter a vicious circle. There is general agreement that the best way to break this negative spiral is to reintroduce life, land and nature into cities. A recent but powerful consensus recognises that the quality of life in cities, so ultimately their sustainability, is also dependent on the living world and the services it can provide.
Urban ecology is therefore one of the key building blocks of urban policy, just as important as the economy and access to services and infrastructure.

To promote conservation of this essential biodiversity, the United Nations carried out work to define and classify it (Millennium Ecosystem Assessment). The assessment focused on ecosystem services, examining all the services that the living world can provide to humans. This approach emphasises the importance of biodiversity and nature in ensuring human survival and well-being. Enhancing these ecosystem services involves various measures to restore and preserve them, and to create areas for biodiversity in urban environments[1].

Among their many recognised benefits, natural areas in urban environments contribute towards:
→ **climate regulation** by mitigating high temperatures during heatwaves, flooding in the event of extreme rainfall, and the urban heat effect, which is set to increase as a result of climate change;
→ **reduction of risks from flooding, landslides and storms.** Dense canopies and plant cover improve rainwater infiltration into the ground, reducing the intensity of runoff. **With regard to landslides**, the risk is much higher if tree cover on the slopes has been affected by urbanisation and forest degradation;
→ **well-being of city residents**, through providing green and blue spaces for leisure, sport and socialising, key factors in maintaining physical and mental health;
→ **enhancement of the city's outdoor space and image,** increasing tourism and/or attracting investors.

The examples above all show that the ecosystem services provided by urban natural areas are **essential to us, although all too often under serious threat**. However, these functions and services can re-establish themselves, thanks to the biotic community which supports their **regulation and development, maintains energy flows, cycles and habitats for living things, and improves water and air quality**. It is also essential that biotic communities include functional redundancy (have several species with the same ecological niche, i.e. performing the same ecological role) and are healthy (have sufficient abundance and connectivity), in order to prevent the spread of pests and invasive species that can harm public health and infrastructure.

1. This density and intensity of land use mean that the population can be concentrated in relatively small areas. Although cities are home to more than half the world's population, they account for only around 2% of habitable land area.

© FUNDAECO

THE CENTRAL ROLE OF WATER CATCHMENTS IN ECOSYSTEMS

A water catchment is the territory drained by a river and its tributaries. It includes surface and underground watercourses, as well as the ecosystems and landscapes supplied with water. Water catchments provide the water needed by human populations for domestic, industrial and agricultural use. They also help to maintain the health of ecosystems.

Integrated Water Resources Management (IWRM) is an ancient concept, but the process as we know it today was developed during the 1992 Earth Summit in Rio de Janeiro. IWRM addresses "water, land and related resources to maximise economic and social welfare in an equitable manner, without compromising the sustainability of vital ecosystems" (United Nations Environment Programme). Any activity that affects water resources in the upper part of a water catchment – whether it involves land use, extraction of water from aquifers, drainage of wastewater or construction of dams – will have an impact on water volume and quality downstream.

In OECD countries and many other high-income countries, dedicated authorities have been established to manage water catchments, in order to prevent negative externalities and ensure **equitable use of resources**. However, such official institutions are rare in many low-income and lower middle-income countries. Moreover, the institutional management of water catchments (or the lack of governing bodies) can be complicated where the water catchment extends over several administrative regions.

In Argentina, for example, provinces are responsible for managing their own water resources. This results in different regulations applying to the same river when it passes from one province into another. The management (or the lack of governing bodies) is even more complex in the case of water catchments that cross country boundaries, such as the Lake Güija water catchment shared between Guatemala and El Salvador.

In Guatemala, the metropolitan area of Guatemala City covers 16 water catchments or micro-catchments, feeding into four main river basins spread across the 44 municipalities. There is a basin-wide governing body (*Autoridad para el manejo sustentable de la cuenca y del Lago de Amatitlán*) tasked with implementing a catchment management plan. However, this management plan is dependent on the sectoral policies implemented in the territory, which prevents true integrated management of resources. Consequently, due to the lack of a dedicated regulatory framework, water resources in the metropolitan region are not managed at water catchment level. In the absence of effective policies, the water catchments are overexploited and water quality is poor.

Nevertheless, it is important to highlight that municipal authorities and technical departments have recently become more aware of the **link between water quality and volume and forest cover**. The protected area of Cordillera Alux extends across 4,500 hectares, and every municipality both inside and outside this natural area has recognised the link between forest protection and water quality, in declaring protected areas.

Projects to enhance and protect biodiversity and ecosystem services

Biodiversity can be returned to cities, and ecosystem services enhanced, through policies to control urbanisation – but also through biodiversity restoration approaches such as the creation of ecological corridors, hedges and wildlife corridors, and through greening approaches such as green roofs, façades and walls or tree planting in public spaces. Promoting natural growth also represents a powerful lever for encouraging the development of biodiversity in cities, by making it integral to all public policy. There are other major ways of protecting biodiversity: communication, awareness-raising and engaging all stakeholders in the territory in the various activities by establishing participatory democratic processes.

In many respects, policies and projects to support urban nature are no different to other types of urban project. They have a technical aspect (resources, activities, objectives, tools, etc.), a political aspect (willingness to change, consensus, stakeholder management) and a social aspect (communication, information, employment, training). It is essential to take all three aspects into account to ensure their success and longevity.

It is also important to emphasise that the ecosystem services provided are different for each project and each location. They depend of course on the geographical and climatic context, but they also depend on the cultural or socio-economic context. This is why the ecosystem services provided by nature were different for the two projects MGB and WUNR, even though they were working towards the same objectives – preserving and restoring natural areas in urban environments.

© FUNDAECO

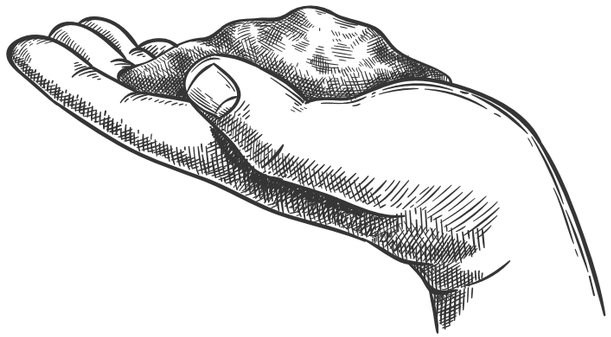
THE ECOSYSTEM SERVICES PROVIDED BY THE TWO PROJECTS IN GUATEMALA AND ARGENTINA

	ECOSYSTEM SERVICES PROVIDED	ECOSYSTEM SERVICES PROVIDED BY MGB PROJECT (GUATEMALA CITY)	ECOSYSTEM SERVICES PROVIDED BY WUNR PROJECT (SANTA FE)
SUPPLY	**Food**	Development of an urban vegetable garden, forest nurseries and coffee plantations	Development of an urban vegetable garden and a nursery
	Water supply	Protection of natural areas from artificial surfacing, enabling groundwater recharge and guaranteeing water supplies	
	Soil protection	- Soil stabilisation and erosion control - Mitigation of landslide risks through reforesting of water catchments	
SUPPORT FOR BIODIVERSITY		- Area for development of biodiversity and as a refuge for species - Creation of an ecological corridor	Area for development of migratory and local species
REGULATION	**Air purification**	Carbon storage and improvement of air quality	Carbon storage
	Water management		Retention and infiltration of rainwater, water purification
	Risk reduction (flooding and landslides)	Mitigation of flood and landslide risks through limiting construction in at-risk areas and maintaining the stabilising role of vegetation. Water can also infiltrate more easily in the event of heavy rainfall	Buffer effect of flood zones and regulation of flood risk
	Heat regulation	Cooling the air during hot weather	Cooling the air temperature
CULTURAL	**Social interaction and well-being**	Recreational and informative spaces and creation of social links	- Spaces for teaching and environmental education - Memorial space - Reduction in violence
	Health and well-being	Reduction in stress and obesity risk	Reduction in eco-anxiety
	Aesthetics	- Attraction of visitors through presence of nature - Landscape identity linked to *barrancos* (ravines)	Landscape identity
	Tourism	Leverage of topography and attraction of local tourists	Attraction of visitors to explore local fauna and flora

Knowledge of ecosystems: a fundamental prerequisite for ecological monitoring

"The original idea for the project was to grow native species in nurseries. However, no prior study was carried out and no attention was paid to the condition of the soil, which was polluted. We are therefore currently in the process of cleaning up the ground and transferring over healthy soil."

Luciana Manelli, Deputy Director of the Environmental Assessment Cluster, Municipality of Santa Fe.



How and why to carry out an initial assessment and ecological monitoring

Knowledge and profiling of ecosystems are essential steps towards understanding how biodiversity works in cities. Establishing a reference database and associated monitoring indicators helps public policy-makers and city residents to understand the nature around them better and to monitor how it changes. This is particularly important during implementation of a project or activity aiming to restore or develop urban nature, so the impact of the project can be evaluated. It is also helpful in deciding whether or not it is worth preserving a particular natural space, and if so, in choosing the appropriate actions to take.
There are numerous tools available for **mapping, quantifying and monitoring urban biodiversity**. Monitoring indicators such as richness, abundance and diversity of species provide accurate data for profiling and categorising ecosystems.

The experts are familiar with methods for data collection and monitoring, but these sometimes prove difficult to implement. It is vital to have a presence on the ground and to conduct rigorous observation of biodiversity in order to log species based on existing national or regional inventories. This census task is even more time-consuming and difficult in developing countries due to **existing databases being incomplete, obsolete and scattered**. This generally accounts for the lack of a comprehensive scientific inventory of biodiversity in most cities.

"Since the protected area was introduced, we have been recording high numbers of migratory birds arriving week after week. They have been using the reservoir as a rest stop during their migration, despite it being artificial. What is more, when water is very low in the Salado river, we start to notice more species using the WUNR reservoir; however, the only way to illustrate these changes is to collect data."

Pablo Capovilla, nature guide at WUNR.

ASSESSING THE HEALTH OF ECOSYSTEMS

Ecosystem health is determined by the functional diversity and redundancy of ecosystem processes, such as energy and matter flows, which depend on the diversity of species, the area covered and the spatial complexity of the main components.

For example, the tree cover, the canopy structure or, for aquatic ecosystems, the composition, structure and area of the benthos[1] are good indicators of ecosystem health, as are indicator species for functional groups (carnivores, herbivores, detritivores, etc.). Monitoring indicator species or groups also means that surveys can concentrate on taxa that are easily identifiable and not cryptic, which is generally true of birds in terrestrial ecosystems, and fish and benthic macrofauna in aquatic ecosystems. Mapping and measuring ecosystem health requires specific technical skills in data collection and analysis, such as analysis of aerial and satellite imagery, field surveys, etc. These procedures are time-consuming and onerous, which often limits their use.

1. Benthos: community of aquatic organisms living at the bottom of a body of water.

Existing measures and policies to protect biodiversity

There are several tools that can be used to protect biodiversity. They include environmental impact assessments (EIAs), key biodiversity areas (KBAs) and grading of water quality.

Environmental impact assessments (EIAs)

In many countries, including Guatemala and Argentina, it is mandatory to conduct an EIA before granting a construction permit. However, local authorities do not have sufficient financial or human resources to enforce this rule, and informal housing is built with disregard for this obligation.

Key Biodiversity Areas (KBAs)

Key Biodiversity Areas are identified based on the presence of rare or endangered species, and are used to advocate for legal protection of these areas. In Europe, for example, there is a high degree of overlap between protected areas and KBAs. Protected areas have specific legal protection, involving the application of national and/or local rules. They are also subject to management plans and to monitoring and surveillance arrangements.

Grading of water quality

Grading of bodies of water is a means of controlling water usage according to its quality. Deterioration in water quality may justify and result in the closure of bathing and leisure areas and a ban on residential and industrial construction projects, and may trigger the implementation of specific protection measures.

Other tools not directly linked to protecting biodiversity may contribute to its preservation. For example, introducing protection zones in areas at risk of landslide or flooding helps to protect areas of biodiversity. As an illustration, the land use plans for Guatemala's municipal area and the WUNR in Santa Fe have addressed the dual challenge of limiting natural disaster risk for the communities and protecting local biodiversity.

© Eduardo Beltrocco

Monitoring tools used for each project and problems encountered

Guatemala and Argentina are both proactive in protecting urban biodiversity, having adopted environmental instruments such as EIAs, statutes on land-use planning and the creation of protected areas.

Nevertheless, these initiatives come up against **political, social and financial barriers**. These include most land in the metropolitan region being in private ownership, and obsolete urban planning instruments that encourage speculation based on land value. The local authorities are under pressure from real estate developers to urbanise these natural areas, which are understandably highly prized by city residents.

Faced with this real estate speculation, it is even more difficult for local authorities to introduce strong protection measures for natural areas, as this represents a double cost – on the one hand, foregoing gains from urbanisation (land sale, taxes, etc.) and on the other, having to invest to enhance and protect these spaces. Moreover, the lack of practical options for responding to the housing crisis often results in informal occupation of natural areas.

At the same time, the **high running costs (for protection, security, maintenance, etc.)** associated with implementing ecosystem protection measures and the shortage of human resources within local authorities prevent adequate monitoring and undermine these schemes.

Because of the numerous problems encountered by public authorities in introducing the measures mentioned above, protection of the environment and of ecosystems in urban environments is **increasingly led by academic institutions and Non-Governmental Organisations**. These entities are often dynamic and promote innovative, high-impact initiatives, but without the support of the local authorities who have legal jurisdiction, the long-term future and deployment of these projects is far from assured.

© Aleiram de Paz

Researcher and professor Emiliano Lopez presents the open data water monitor for the WUNR in Santa Fe.

"The water monitoring project run by the National University of the Littoral in the WUNR aims to provide the municipality with easily accessible data. The reservoirs act as a buffer zone, temporarily storing water. When the water reaches a level that poses a danger to the city's residents, pumps are activated to empty the reservoirs into the Salado river. One of the main objectives of this project is to gather real-time information on the reservoir and the river basin, in order to prevent risk."

Emiliano Lopez, researcher and professor,
Faculty of Water Science and Engineering
at the National University of the Littoral in Santa Fe.

Description of data collection process

It is essential to collect data on urban biodiversity to inform the introduction of regulatory measures and to ensure effective monitoring. The FUNDAECO foundation and the municipality of Santa Fe used several methods to collect data.

Gathering secondary data

In the case of Guatemala, FUNDAECO received financing from the FFEM and additional funds to conduct a study into landslides, map ecosystem services, and bring this all together in a geographic information system (GIS). The foundation complemented this with the use of forest cover and forest trend maps, land use maps, and mapping tools created by governmental institutions.

Developing expertise and knowledge through cooperation

FUNDAECO and the municipality of Santa Fe both have technical teams with in-depth knowledge of local biodiversity. However, they do not have sufficient staff to monitor and manage areas as extensive as the Metropolitan Green Belt in Guatemala City and the Western Urban Nature Reserve. The two organisations therefore established partnerships with universities and Non-Governmental Organisations that have qualified staff and also have access to external funding.

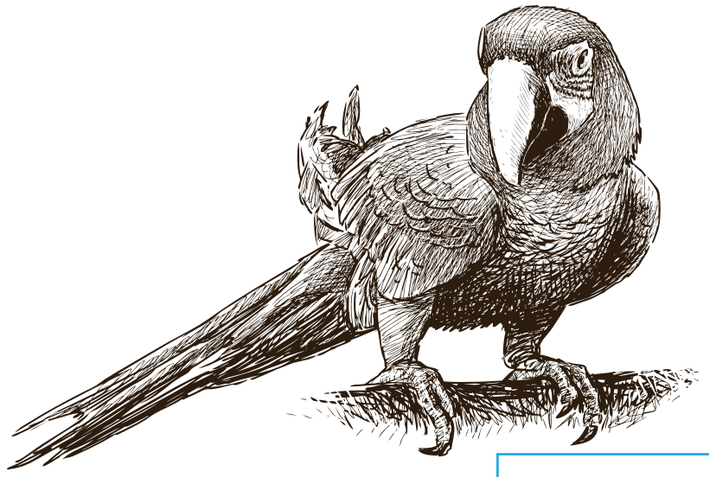
Using citizen science

Over the past decade, citizen science has proved to be an effective and relatively low-cost tool for generating key information on biodiversity. One of the world's best-known citizen science initiatives is the Cornell Lab of Ornithology eBird database.

Thousands of city residents monitor birdlife in their cities and share geo-tagged data on species. These data are mapped to determine the distribution and abundance of these bird species. They are then stored in worldwide databases, such as the Global Biodiversity Information Facility (GBIF), but can also be used at smaller scales. Birds are ideal indicator species (not cryptic, relatively easy to identify, and good indicators of ecosystem health). The data on birds can therefore be used to monitor changes in protected areas or provide information on the state of biodiversity in a given space.

Citizen science can also be used to monitor water quality (baseline data on water quality and macrofauna), endangered species and aquatic ecosystems (fish monitoring) listed in national or worldwide databases such as GBIF, iNaturalist or FishBase.

Citizen science initiatives have the benefit of being low-cost, both for the beneficiaries and for municipalities. What is more, they represent an effective and playful way to raise awareness among civil society about protecting biodiversity. However, use of these initiatives requires rigorous monitoring and robust institutions, to control data quality and also to ensure sufficient server storage.



The database can be accessed here

OBSERVING BIRDS IN GUATEMALA

FUNDAECO and the municipality of Guatemala City encourage and support local birdwatching groups such as the *Club de Observadores de Aves Urbanas*. In addition, the municipality of Guatemala City organises weekly bird watching walks for citizens in the city's eco-parks. These urban walks are helpful on two levels – they provide an opportunity to monitor bird populations and to raise public awareness about their preservation, and they also contribute to the overall protection of natural areas and urban parks.

Birdwatching data gathered under this initiative can be consulted on eBird.

View data collected in the Kanajuyú urban park managed by FUNDAECO here

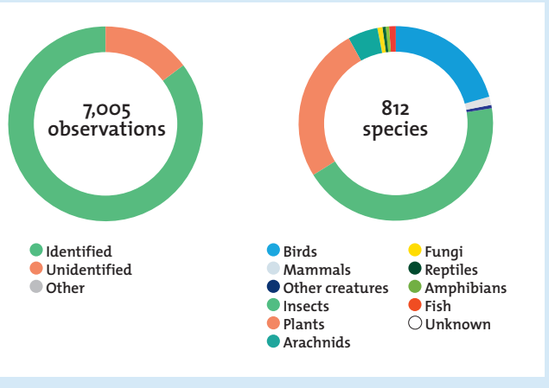
© FUNDAECO

Public birdwatching days in the eco-parks of the Guatemalan metropolis

OBSERVING BIODIVERSITY IN SANTA FE

The WUNR project team uses the Argentinat platform to monitor and catalogue the fauna, flora and various species of fungi, lichen and moss which inhabit the reserve.

Data gathered by the WUNR team are available here



Assessing ecosystem services and their impacts: cost-benefit analysis

As the economic aspect is still a predominant consideration in evaluating public policy, cost-benefit analysis is seen to be an effective tool for justifying choices. Cost-benefit analysis is a tool to support decision-making, aiding identification of the environmental projects and policies that will deliver maximum benefits to society, and helping to assess their effectiveness once introduced. Cost-benefit analysis compares different options by quantifying the costs in relation to the benefits, in terms of total present value (monetary value of cost and benefit flows, updated over the expected lifetime of the project). This type of analysis therefore prioritises **current costs and benefits over future benefit streams** (which are updated using the average annual interest rate). When assessing the costs and benefits of a new urban development, the destruction of ecosystems is not generally viewed as a cost, because the services provided by the ecosystems usually have no monetary value.

Economic valuation of biodiversity and ecosystem services generally follows the same principles as for other goods and services, except that ecosystem services are often non-market goods and are therefore not traded on any market. As their value therefore cannot be established through the system of supply and demand, it is difficult to reduce them to a monetary value.

To obtain an approximation of non-market value, three types of valuation method have been developed: cost-based methods (costs of avoided damage, replacement, substitution, restoration, impact on productivity), revealed preference methods (hedonic pricing, transport costs, market prices) and stated preference methods (willingness to pay based on contingent valuations and conjoint analyses).

Nevertheless, it is **difficult to assign a monetary value to ecosystem services** – particularly those involving regulation, such as the nutrient cycle or climate regulation, which are essential to human life itself. There is no clear cause-and-effect relationship between impacts on health and productivity and reduced air quality or rise in temperature due to loss of plant cover in urban areas. Preferences as to the valuation methods used are inherently subjective and reflect the social value assigned to nature, which can be very limited in low- or middle-income countries, where the benefits of nature are not well understood and are not priorities compared with more urgent needs such as decent work, housing, schools and medical services.

In the case of the projects studied here, a cost-benefit analysis was not carried out. This analysis can be complicated and costly, and can also result in ecosystem services being undervalued, notably because it does not reflect the multiple dimensions of human well-being and the complexity of ecosystems. The two projects MGB and WUNR demonstrated the value of ecosystem services in a more immediate way, by enabling city residents to experience the benefits of urban nature by visiting and enjoying protected areas and parks created or enhanced by the projects.

COSTS AND BENEFITS ASSOCIATED WITH MONITORING ECOSYSTEM BIODIVERSITY AS PART OF THE PROJECTS IN GUATEMALA CITY AND SANTA FE

Indicators	Cost	Benefit
Abundance of birds / species richness and distribution	Low in urban natural areas that are generally relatively small in geographic extent, particularly thanks to citizen science	Native and migratory bird species are good indicators of the health of ecosystems and therefore of ecosystem services
Extent of forests and wetlands (per ecosystem / type of forest)	Very high	This is a key parameter for good management of urban nature, as forest cover is directly linked to essential ecosystem services
Number of visitors to urban natural areas	High if it includes permanent staffing	Used to assess people's preferences and provide economic justification for protecting other natural areas
Water quality parameters (conductivity, turbidity, temperature, pH, dissolved oxygen, biological oxygen demand, chemical oxygen demand, nitrogen, coliforms)	Medium to high, depending on parameters observed and frequency required	These may be legally required and necessary to determine authorised uses in relation to water bodies, with direct implications for supply of drinking water
Aquatic macrofauna indicator	Relatively low, especially when combined with citizen science approaches	These indicators represent an excellent way to assess the effectiveness of the measures introduced

"The reservoir in the WUNR provides society with multiple services, in particular a 'self-purification' service in cleaning rainwater from the city. This is a more economical solution than installing water purification techniques based on engineering systems."

Florencia Gutierrez, researcher at National Scientific and Technical Research Council (CONICET) and professor at National University of the Littoral.

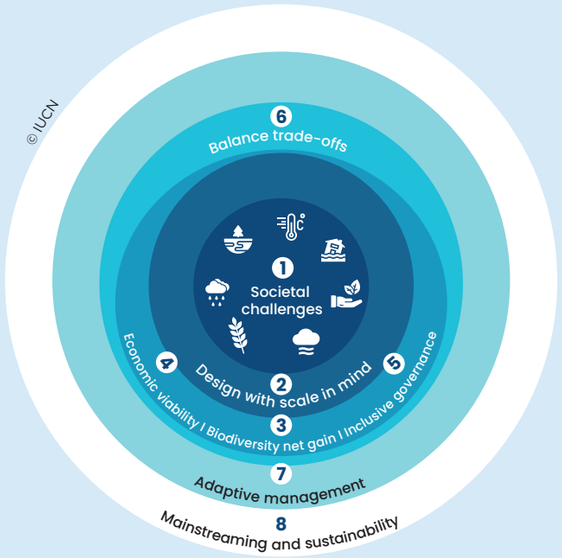
© Eduardo Beltrocco

IUCN GLOBAL STANDARD: A TOOL FOR DESIGN AND MONITORING OF NBS

The IUCN has introduced an international standard to provide users with a framework for intervention and for monitoring measures introduced. It consists of 8 criteria and 28 indications, as described below.

The standard provides public decision-makers with a framework for reviewing performance and checking the quality of design and delivery of NbS. This makes it possible to:

- Justify the intervention carried out by the local authorities to financiers, donors and other stakeholders.
- Draft recommendations and improvements if required.
- Establish a framework for discussion between stakeholders based on factual information.



The 8 criteria in the IUCN Global Standard for NbS are all linked.

CRITERIA	OBJECTIVES
Societal challenges	Focuses on identifying the issues in society to which the NbS is a response.
Design with scale in mind	Guides the design of a solution to suit the scale of the problem (geographic scale as well as economic, ecological and societal aspects of the land/seascape). While intervention activities can be focused at the site scale, the robustness, applicability and responsiveness of the solution should take into consideration the broader systems at play.
Biodiversity net gain	Correspond to the three pillars of sustainable development – environmental sustainability, social equity and economic viability. For each criterion, some understanding of the current resources and context, in the form of a baseline, and sustainable actions going forward is required for implementation of a strong NbS.
Economic viability	
Inclusive governance	
Balance trade-offs	Addresses the balance to be found between achieving short- and long-term objectives and the project costs and potential risks. As ecosystems are complex systems, they may create unintended, unforeseen and undesirable consequences.
Adaptive management	Responds to the need to adopt a form of adaptive management, which facilitates continuous improvement in project-wide processes and adaptation of the NbS to reflect systemic changes.
Mainstreaming and sustainability	Aims to encourage long-term implementation of NbS at scale, through embedding them into policy or regulatory frameworks and through their linkage to national targets or international commitments.

Urban nature: a tool for risk reduction

Risk and climate change in urban environments: the need to adapt

The world is becoming increasingly urbanised. Urban societies are the drivers of socio-economic development, but also the main contributors – directly or indirectly – to climate change, due to the scale of greenhouse gas emissions they generate. At the same time, cities are highly exposed to extreme weather events (such as flooding, storms and wildfires), which have become more frequent in recent years due to climate change. As they are both victims and protagonists, cities are central to climate action.

Cities in low- and middle-income countries are especially exposed and vulnerable to climate risks, mainly due to rapid and often unchecked urban expansion, coupled with inadequate public policies for managing these risks. This represents a significant challenge, given that the World Bank (2013) predicts that the number of people in these cities exposed to natural hazards is likely to double by 2050.

Because they are often in hazardous locations (such as on steep slopes or in flood zones), **informal settlements are the first to be affected by the impacts of climate change**. Moreover, the communities living in these neighbourhoods are socially and economically vulnerable, so they have lower adaptive capacity to cope with natural disasters.

In view of this, the IPCC stresses the importance of taking the impact of urban activities into account, in relation both to mitigating carbon emissions and to capacity for adaptation due to the serious impacts on society. In the long run, rising temperatures, extreme rainfall events and more severe droughts could have catastrophic consequences for societal stability in the Global South, population health, access to resources and living standards.

"Withdrawal of water from the lagoons because of droughts is causing serious damage to biodiversity by fragmenting habitats. Another problem linked to climate change is the salinisation process. When the water level falls, because of either increased evapotranspiration or reduced precipitation, the salt concentration of the water increases. This results in significant changes to the chemical composition, as well as an increase in dissolved nutrients, leading to eutrophisation processes with very serious consequences for society and biodiversity. It is important to conserve and monitor water to understand the changes that are currently occurring."

Florencia Gutierrez, researcher at National Scientific and Technical Research Council (CONICET) and professor at National University of the Littoral.

Urban nature and climate change adaptation

There are two aspects to climate change challenges: mitigation and adaptation. Mitigation – the process of reducing greenhouse gas emissions – is a powerful lever but primarily and logically concerns countries with high emissions. In other countries, climate change adaptation has emerged as an effective response to make a territory (city or neighbourhood) less vulnerable to climate hazards. Because of their higher vulnerability and the greater risks to which they are exposed, adaptation is central to public policy for cities in these countries. However, the roll-out of adaptation measures is often hampered by a lack of financial and technical resources, the fragility of the institutions responsible for land-use planning policies, and the absence of scientific data to justify such measures.

According to the IPCC, adaptation is "an adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities" (IPCC, 2001).

Nature-based Solutions (NbS) are among the key tools for improving adaptation in cities. As demonstrated by the MGB and WUNR projects, these solutions involve using nature to better protect a territory.

According to the Federation of Red Cross and Red Crescent Societies (IFRC) and the World Wide Fund for Nature (WWF), NbS could reduce the intensity of climate hazards by 26% through various measures to protect and enhance biodiversity. For example, protecting or developing wetlands (WUNR in Santa Fe) or forests (MGB in Guatemala City) are very effective measures for reducing flood impact and stabilising soils, at a much lower cost than conventional development. Restoring these spaces through tree planting has also enabled both cities to reduce the effect of urban heat islands.

NbS are **adaptation measures particularly favoured by funders and municipalities** because of their many benefits:
→ They present a more attractive cost-benefit ratio than grey infrastructure developments.
→ They benefit regions and communities even without changes to climate conditions. They are considered to be "no-regret" measures in the face of uncertainties about climate change.
→ They provide "co-benefits", as in addition to responding to climate change issues, they are seen as addressing societal challenges by contributing to action on biodiversity loss, ecosystem degradation and human well-being. Their impact extends well beyond simply protecting against the impacts of climate change.

La Asunción eco-park in Guatemala City

© FUNDAECO

Enhancing and protecting soils as part of water management, and the concept of a permeable city

Climate change has a direct impact on the water cycle, by altering the volume of water that falls on a territory, and also by significantly changing the hydrological regime, resulting in more frequent intense events (e.g. drought, heavy rainfall).

These alterations to the water cycle are occurring in urbanised regions that are frequently subject to soil sealing, heavy pollution and already highly overexploited water resources. Climate change is therefore adding to water stress and vulnerability in regions that are already under pressure. This is why water resource protection is central to urban public action and one of the main focuses in initiatives to promote urban nature.

The concept of the "sponge city" is a good example of how integrating urban nature can provide an opportunity to reimagine urban development as a whole.

This new way of designing cities focuses on harnessing green infrastructure, and in particular on protecting and enhancing soils, so that urban development can coexist with water resources. The term "sponge" is a reference to the soil and its capacity to store, conserve and purify water, and also to the living organisms and ecosystem services associated with the wealth of life supported by this soil.

The concept of a sponge city therefore involves no longer simply channelling water out of the city, but enabling as much water as possible to permeate the soil, which has a dual benefit: replenishing groundwater and reducing the burden on existing drainage networks.

According to a report by the World Meteorological Organization in 2021, temperatures have risen by an average of 0.2°C per decade in Latin America and the Caribbean, and glaciers in the tropical Andes have lost over 30% of their area since the 1980s.
In South America overall, drought conditions have led to a decline of 2.6% in cereal harvests. The "Central Chile Mega-drought", which has lasted for 13 years to date, constitutes the longest drought recorded in this region for at least a thousand years. Meanwhile, extreme rainfall in 2021 reached record levels in many places.

THE IMPORTANCE OF SOIL IN COMBATTING CLIMATE CHANGE

Soil has too often been overlooked, when in fact it plays a central role in the functioning of ecosystems and through the services it provides in urban environments. Its functions include regulating the water cycle, producing biomass, providing edible plants, storing carbon and acting as a reservoir for biodiversity.

Soils also play a role in regulating natural hazards such as flooding and erosion, by allowing water to infiltrate into the ground. Where there is soil sealing, water runs off the surface without infiltrating, exacerbating the impacts of flooding. It is also essential to manage the soil through regulating its use and preserving its original properties, to limit any risk of erosion.

Both projects have an emphasis on soil protection, to mitigate the impacts of climate change and also to encourage biodiversity. For its part, the MGB project has encouraged soil protection through land use standards and reforesting of micro-catchments, in order to prevent erosion and landslides. Meanwhile, the WUNR project is undertaking a soil decontamination process so that native plant species can be planted in the reserve.

Rainwater and airborne water recovery system installed in La Asunción eco-park in Guatemala City

© FUNDAECO

Urban nature: providing multiple services to communities

Urban nature is seen as a combination of green infrastructure. Unlike grey infrastructure which relies on engineering techniques, green infrastructure draws on the living world through harnessing biodiversity and ecosystem services. Among the multitude of ecosystem services provided by biodiversity, social and cultural services are often overlooked and underestimated, although they do contribute to public health and well-being. The instigators of the MGB and WUNR projects have paid particular attention to harnessing cultural services such as:

- Reduction in illicit activities
- Reduction in violence
- Limit to urban sprawl and informal settlements
- Educational benefits
- Improved social cohesion
- Provision of meeting spaces and recreational areas
- Support for research activities
- Development of capacity and professionalism in the municipality's technical services
- Creation of green spaces in the most disadvantaged parts of the city

In the case of the city of Santa Fe, the location of the WUNR was chosen mainly on the basis of cultural and social considerations, which took priority over the ecological value of the area. For the local authorities, the primary objective was to protect the landscape and cultural heritage from anthropogenic pressures (informal urbanisation, hunting and trading in protected species, etc.), while also sheltering vulnerable populations exposed to flood risk.

"The western sector of the city is one of the most disadvantaged, with limited access to essential services such as sanitation, decent housing or even quality natural areas. The WUNR project is harnessing and preserving nature, not only because of its ecological benefits, but also to provide a pleasant environment for the city's residents, while also helping to forge a sense of belonging."

Luciana Manelli, Deputy Director of the Environmental Assessment Cluster, Municipality of Santa Fe.

"We take a social approach. We do not condemn any particular behaviour, because we are aware that it is not so much behaviour that is damaging the environment, but practices essential to the survival of the most vulnerable people. So we need to take action by supporting a transition towards a society that is more sustainable both for people and for the environment."

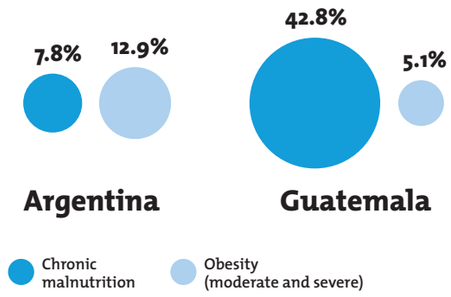
The effects of urban nature on health

Although numerous debates and studies have now given us a more objective view of how the natural environment benefits urban health, it is still difficult to find tangible and accurate evidence of the correlation between the two. Urban nature projects are an attempt to improve human well-being in response to the health issues that countries may encounter.

Health in the Latin America and Caribbean region

In Latin America and the Caribbean, obesity in children and adolescents is a serious public health issue, which worsened during the COVID-19 pandemic. According to the United Nations Children's Fund (UNICEF), in 2020 7.5% of children under 5 in this region were overweight, higher than the global average.
Paradoxically, this part of the world is facing a dual malnutrition problem: chronic malnutrition and obesity. As an illustration, Argentina has one of the highest rates of overweight children, while Guatemala has the highest rates of chronic malnutrition in the region. Malnutrition and obesity lead to increased mortality rates and disability, incurring significant economic and social costs for economies that are already fragile.
In Guatemala, the cost of treatment and medical care related to malnutrition and obesity is reported to have amounted to 16.3% of GDP (US$12 billion) in 2018, according to the World Food Programme (WFP).

KEY FIGURES ON MALNUTRITION AND OBESITY



TO GO FURTHER

In 2015, scientist Kathleen Wolf conducted a study to quantify the economic impacts of urban nature on the United States healthcare system. The study showed that:
- A 20-minute daily walk in a park reduces attention deficit disorders, generating savings of $1.9 billion.
- Proximity to green spaces helps to reduce the risks of cardiovascular mortality by 5%, generating annual savings of $1.2 billion.
- Urban nature allows a 10% reduction in the amount of medication used by people with Alzheimer's disease, meaning annual savings on healthcare of $725 million to $1.5 billion.

Sports facilities in La Asunción eco-park in Guatemala City

© FUNDAECO

Cities, health and nature

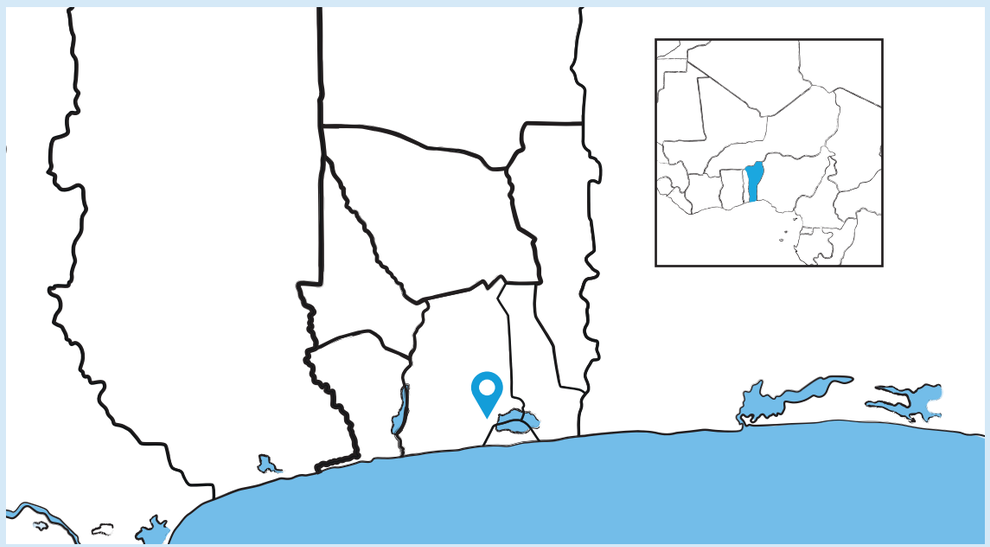
Urban density is the cornerstone of the urban model. It generates economic activity and social cohesion but it also causes problems. According to the World Health Organization (WHO), more than 150 million people in Latin America live in cities with poor air quality, which increases the risks of respiratory infection, heart disease, stroke and lung cancer. Cities do not only have **impacts on physical health; mental health is also affected**. The pace of life, concentration of people, traffic jams and noise can impact well-being and even lead to conditions such as anxiety, stress and depression.

Numerous studies show urban nature to be a valuable remedy for many public health issues. This is because natural areas encourage physical activity such as walking, sports and games. Studies also show that the presence of green spaces has positive effects on obesity, cardiovascular symptoms, high blood pressure and diabetes. In addition, urban nature directly reduces stress, promotes well-being, contributes to thermal comfort and improves air quality.

REGREENING THE CITY OF ABOMEY-CALAVI: CREATING A NURTURING AND BIODIVERSE CITY

Abomey-Calavi is the second most populous city in Benin (117,824 people), with annual population growth estimated at 6.7%. This rate of growth is accelerating urbanisation, causing multiple environmental and social pressures, such as severe food insecurity. The IUCN and the FFEM have supported a project to develop unused land into agroecologically productive green spaces, such as community garden-farms, and non-productive green woodland spaces. It has achieved a green space to population ratio of 0.20m² per capita, improving the population's connection to nature. A tree planting plan has been established, with the aim of planting 500 trees over a minimum area of one hectare. The tree species have been chosen to maximise the provision of ecosystem services, minimise socio-economic and health costs, and be suitable for current climatic conditions.

LOCATION OF PROJECT IMPLEMENTED BY ACED (2020–2021)



In Guatemala, looking beyond cultural ecosystem services to a change in perception at multiple levels

Up until the 1960s, *barranquear* (exploring the ravines) was the favourite activity of children, young people and families in the Guatemala City conurbation.

These areas subsequently became less and less popular, as the community saw them as dangerous or inaccessible. Previously places of persecution during the civil war, they more recently became crime hotspots with the arrival of *maras* (gangs) in the country, and are often used as illegal rubbish tips. In fact, the city's largest open landfill site can be found in the "Zone 3" ravine at the heart of the metropolitan area. In 2013, it was receiving 3,200 tonnes of rubbish a day, brought in by more than 550 lorries.

In 2013, an initiative driven by academics and professionals from various disciplines gave rise to a research project, "Barranco invertido". Building on other existing initiatives, this helped to transform the ravines with the aim of improving "territorial justice". The vision was to turn the ravines from repellent places into natural areas providing an amenity for the city and surrounding communities. FUNDAECO has supported these various projects from the start. The foundation's support has also leveraged new initiatives, drawing on international cooperation and FFEM co-financing, to regenerate the ravines and engage local stakeholders at various levels.

Within civil society

In 2020, FUNDAECO conducted an online survey among the community. The findings showed that 85% of respondents felt that contact with nature was very important, and that 63% lived close to the ravines. They also showed that 52% of respondents had not entered the ravines for many years, as they were seen as dangerous and inaccessible. These figures show that local residents have a deep distrust of the ravines, which are seen as a hostile environment.

However, a different initiative in Guatemala City shows that residents have a more nuanced and ambivalent relationship with these spaces. The Crecer Foundation, a partner of FUNDAECO, ran public engagement days in the Jungla Urbana eco-park in 2017. This initiative confirmed residents' distrust of the ravines, but also showed that people saw these spaces as ripe for reinvestment, with all sorts of potential uses. For example, participants expressed visions of places "free from pollution, with recreational spaces", of "natural meeting places" and "shared spaces for sports".

"The way that urban societies visit a space varies depending on the dominant species in the landscape and their perception of the space."

Ingo Kowarik, Professor of Ecosystem Science/ Plant Ecology, Technical University of Berlin.

©FUNDAECO

Various educational and cultural activities are organised in the eco-parks (birdwatching, scouting, etc.).

"The barranco was seen as a waste disposal site – neglected and dangerous. This project has transformed it from a dangerous place into an eco-park open to the public. Local residents have taken back ownership of this space, creating genuine social cohesion as it lies at the convergence of three neighbourhoods representing different social classes."

Erick Mazariegos, deputy mayor of Mixco (Zone 6).

Footpath in La Asunción eco-park in Guatemala City

© FUNDAECO

Within the private sector

The change in community perception of the ravines has made them much more attractive, and ultimately increased their land value. They are now subject to **potential property speculation**.

In Guatemala City, 80% of the ravines are in the hands of private owners. For obvious economic reasons, there is a strong trend towards selling the land to private developers, who build new residential schemes there. As a result, it is not unusual to see new marketing slogans popping up in the city, encouraging households to invest in these areas, such as "return to a life in touch with nature" or "live in the heart of nature in a forest of tranquillity".

This new attraction to the ravines is not without consequence, as it is generating land speculation in these spaces, which may encourage urbanisation in high-risk areas and accelerate the process of gentrification and socio-spatial segregation. Moreover, there are significant challenges in regulating these spaces through Land-use Plans, not only in passing legislation, as **one of the barriers is the capacity of the authorities to combat real-estate pressure**. Drawing up regulations is one thing, but enforcing them in a particular economic context is another, especially when the financial stakes are so high.

Meanwhile, the MGB project has had an indirect influence on initiatives by private owners to create eco-parks. These projects are helping to protect the ravines from urbanisation, offering residents leisure activities such as glamping, cycling and walking.

Within public institutions

In 2021, Guatemala City's urban planning department established its new local strategy "Opportunity Districts", which lists priority regions. This planning document identifies "strategic areas for development and opportunity" and promotes the construction of a compact and interconnected city with mixed-use development. As part of the strategy, seven development areas have been identified.

At the same time, what is now known as the "Green District" has been defined with reference to the areas not authorised for construction identified in the Land-use Plan (POT). The collaboration between FUNDAECO and the municipality of Guatemala City to embed the Green Belt (areas not authorised for construction) in the POT was fundamental to the designation of this Green District. This represented a change in municipal strategy, granting protected status to natural areas and proposing regeneration projects such as cycle bridges, a green urban network, urban parks, recreational areas and eco-parks with high environmental value.

As part of the communication campaign to accompany adoption of this strategic plan, there was a consultation with residents. They were asked which areas within their city they considered most important. The findings showed that the city's residents were more interested in the Green District than in the areas earmarked for urbanisation. This demonstrates the importance of nature for the residents, and a real change in perception of these spaces.

It also reveals growing awareness within the municipality of the value of protecting and enhancing biodiversity. However, to improve the coherence and effectiveness of the proposed measures, it is important that this is taken up at metropolitan and national level.

The Green District is made up of the city's interconnected network of ravines

©Taller ACÁ

Urban nature: a lever for economic development

The green economy

The concept of a green economy means reconciling economic growth, nature and ecology, with a view to sustainability and equity. It is based on assigning a value to nature, and represents an opportunity to create new jobs. It includes green businesses aiming to protect the environment and contributing to the sustainable management of natural resources.

Green business to stimulate job creation

Although the concept of a green economy is still under-appreciated around the world, certain initiatives in France have indicated that sectors linked to biodiversity (e.g. eco-materials, green technologies) generate almost 1.5 million jobs (10% of all salaried jobs) and €275 billion in revenue (MEEDDM, 2016).

According to the International Labour Organization (ILO), the unemployment rate in Latin America was 7.2% in 2022. However, this relatively low rate conceals a different story: the insecurity due to the high proportion working in the informal sector. In this context, the two projects financed by the FFEM have been seen as a lever for creating green jobs to combat informal employment.

For example, since 2020 FUNDAECO has been working with the Office of the United Nations High Commissioner for Refugees, which has been supporting refugees and asylum seekers since 1950. FUNDAECO has run a project called "Green jobs for refugees", which aims to train and provide **professional experience to refugees and asylum seekers**, with a focus on vulnerable groups including women. As part of this project, FUNDAECO has provided technical training for 25 beneficiaries of the programme, in working as forest rangers, plant nursery staff or administrative assistants.

While establishing natural areas in urban environments provides an opportunity to create jobs, it is also important to **provide training and support the development of new skills**. For this reason, during the launch of the WUNR, the city of Santa Fe helped to create 14 green jobs – as plant nursery staff, educational guides, administrative staff and a warden – for which training was provided. This human resource support improved team integration and strengthened skills within the municipality.

"For me, working in an eco-park is a great opportunity, as I'm learning to get closer to nature and to be aware of the importance of preserving biodiversity."

Francisco (not his real name), forest ranger in Cayalá eco-park and sport park.

"The green economy is one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities."

UNEP, 2011.

© Eduardo Beltrocco

Urban pressure and urban nature: a constant tension

In 2007, the world's urban population exceeded the rural population for the first time in human history. In 2021, 56% of the global population – more than 4.3 billion people – were living in cities, and by 2050 two thirds of the global population will be living in urban areas. It should be emphasised that most of this urban growth is expected to occur in the countries of the Global South, in particular in sub-Saharan Africa but also in Asia, Latin America and the Caribbean.

Uncontrolled urbanisation and pressure on land

In the cities of the Global South, informal urban growth linked to the development of new residential and industrial properties is threatening the social and ecological equilibrium in urban systems. As an illustration, 51% of city residents in sub-Saharan Africa, 50% in South-East Asia and 16% in Latin America and the Caribbean are migrants resulting from the rural exodus, who are living in informal settlements.

Every year, urban sprawl in low- and middle-income countries is advancing at the expense of natural areas – including some of the world's most endangered biomes such as tropical moist forests and dry forests, mangroves, tropical floodplains and wetlands – and also at the expense of agricultural land. The degradation and destruction of these natural areas is making fast-growing cities, and in particular their informal settlements, even more vulnerable to environmental hazards such as flooding and landslides, and threatening their water and food supplies.

This highlights the need to introduce measures to protect urban nature, all the more so in the context of climate change.

HOMES IN THE RAVINES

Informal housing emerged in the ravines of Guatemala City following large-scale internal displacement caused by an earthquake in 1976. This devastating event led to 1.2 million people losing their homes. Subsequently, during the country's 36-year civil war, the ravines provided a refuge for families fleeing the conflict zones.

"We are working with FUNDAECO on legislation for the Metropolitan Green Belt. This is seen as an opportunity to protect green spaces from urban speculation. In a metropolitan area like Guatemala City, without protection measures all spaces are available for construction. There is strong urban pressure, contributing to land scarcity and speculation. Without a robust set of national and municipal regulations, natural areas will end up disappearing."

Jean-Roch Lebeau, CEO, Grupo InnovaTerra.

One of the biggest challenges for the municipality of Santa Fe is finding land available for housing developments in the city. This was an obstacle to implementation of the project co-financed by the FFEM, because the project included relocating 28 households exposed to flood risk. To prevent any future urbanisation in this area and to create a physical boundary clear to all, a "perimeter" road was built.

This relocation project was carried out under the "Resilient Santa Fe" programme launched by the Rockefeller Foundation, in close collaboration with the Secretariat of Housing and Urban Development and the non-profit Los Sin Techo. This NGO has cross-disciplinary teams that support the relocated households and carry out surveillance to prevent the subsequent establishment of new communities within the reserve.

Having municipal teams in the reserve and disseminating information about conservation have also helped to reduce illegal hunting and wildlife trafficking within the WUNR.

"Usually, when there is water in the reservoirs, it stops people from moving back in. But for the past three years, they have not reached their full capacity as there is no rain. As a result, we have lots of informal housing and the public authorities are slow to act because of the complexity of the situation. It is aggravated by the social and economic context in Argentina, which leaves these people no other choice but to practise activities such as illegal hunting, fishing or raising livestock in the reservoirs."

Luciana Manelli,
Deputy Director of the Environmental Assessment Cluster, Municipality of Santa Fe.

© Municipality of Santa Fe

© Municipality of Santa Fe

© Aleiram de Paz

Housing on the reservoir before the project; relocation project.

"Those living close to the reserve are still largely unaware of its protected status; they do not see it as an accessible public space capable of providing them with services. This is one of the main challenges for the project, which aims to engage residents in managing the reserve. However, this natural space clearly has public appeal, given the many requests to visit the site and for guided tours for schools."

Luciana Manelli, Deputy Director of the Environmental Assessment Cluster, Municipality of Santa Fe.

Social tensions and ownership of projects by local residents

The major projects shaping the city have been designed by the local or national authorities, using "top-down" approaches which provide only limited opportunity to involve local stakeholders and particularly residents. These approaches can result in social conflict.
In light of this, **more inclusive and deliberative approaches to public decision-making** are seen as essential in successfully transforming societies and making them more resilient.
It is therefore important to run public consultation at various key stages of a project, to ensure the project is properly accepted and has longevity.

"FUNDAECO was approached by a number of organised collectives, such as cycling groups, who support conservation activities and the creation of eco-parks. There is also a strong network of residents' associations in the territory, which are keen to contribute on environmental issues."

Gabriel Valle, Director of the Metropolitan Division at FUNDAECO.

GREEN SPACES AND GENDER-SENSITIVE URBANISATION

Studies into geography and gender have recently resulted in recognition that cities have mainly been designed by and for men. Among the multiple gender inequalities to be found in organisation of and access to urban spaces, one key issue is the creation of leisure and recreational areas.
Most women living in cities feel insecure on a daily basis. This is compounded by the roles and responsibilities society assigns to them – such as childcare, which includes responsibility for leisure activities. However, insecurity and the lack of recreational spaces in slums widen the inequalities between men and women. Town planning traditionally favours male use of urban spaces. Urban planning projects must include gender as a category for analysis, in order to identify and respond to the specific needs of different social groups.

Participation is central to the MGB and WUNR

Residents saw the creation of parks in the ravines as an opportunity for them to develop economic activities that were in some cases incompatible with protecting local biodiversity, such as raising livestock. To ensure that these spaces are used in appropriate ways and to avoid any social conflict with communities, it is essential to organise dialogue, awareness-raising and education in environmental issues. FUNDAECO therefore focused its activities on citizen participation and on publicising these sites which were not well understood by residents.

The impacts of citizen participation have been more obvious in the parks located in the poorer areas of the city. For example, citizen participation and investment by the municipality and through international cooperation facilitated the creation of Salayá eco-park, which returned a neglected and abandoned piece of land to the municipality. Sakerti eco-park benefited from strong commitment by the residents' association, which managed to change people's habits through awareness-raising activities – for example, stopping illegal dumping and keeping the spaces clean.

Citizen participation is a strong component of the MGB project. In addition, the FUNDAECO team launched a competition for architecture students and young professionals, named *La metropolis verde es TUYA* (The Green Metropolis is Yours), which has now been run twice. The first round involved analysing the city's natural areas to identify and prioritise the environmental challenges facing the metropolitan region. The main objective of the second round was to increase the number of natural areas within various metropolitan regions.

This competition attracted interest from architecture students, but from others too. It showed that urban nature could bring together students from different fields, such as agronomy, engineering and even psychology.

© FUNDAECO

© FUNDAECO

© FUNDAECO

Participatory workshops to design Sakerti and Salayá eco-parks in Guatemala

FOCUS ON INNOVATION

"Before the project, the ravines were not included in discussions on city building, especially in university courses. However, it is essential for student training to cover the landscape and biodiversity, so we can train tomorrow's decision-makers and urban project managers, especially in the context of climate change."

Karen Aguilar, Director of Land Use Planning and Climate Change Mitigation at FUNDAECO.

© FUNDAECO

Meanwhile, the city of Santa Fe, working in collaboration with the University of the Littoral, also introduced a citizen participation process. This involved raising residents' awareness about the water cycle and empowering them to become actively involved in the monitoring system. A group of residents was entrusted with monitoring, collecting data on water quality within the reservoirs, and checking rainfall and water table levels. All the data collected can be accessed on the website below.

Consult the data here

"Participation by those living close to the reserve is a key element of the water monitoring project. So individuals were entrusted with communicating data and uploading them to the internet. They were also invited to use a mobile app called "Preservamos", which enables local residents to map solid waste and pollutants such as hydrocarbons in the canal water. Ultimately, this will provide a body of information reported by the city's residents themselves."

Emiliano Lopez, researcher and professor, Faculty of Water Science and Engineering at the National University of the Littoral in Santa Fe.

FOCUS ON INNOVATION

"This was an innovative project, as nothing else like it had been introduced in Santa Fe province. It enabled areas considered "lost" or with low natural value to be seen in a different light. The project is also innovative in contributing towards multiple objectives: it is an urban nature conservation project, a socio-educational project and also a risk management project."

Luciana Manelli, Deputy Director of the Environmental Assessment Cluster, Municipality of Santa Fe.

© City of Santa Fe

© City of Santa Fe

The critical challenge of integrated territorial protection

"Legal protection does not necessarily mean effective protection."

Karen Aguilar, Director of Land Use Planning and Climate Change Mitigation at FUNDAECO.

Pressure on land means that it is crucial to have legal protection for natural areas. To implement actions to protect nature and urban biodiversity, it is also important to have a conducive national regulatory framework. However, this is not in place in Guatemala, where there are no laws on land use planning.

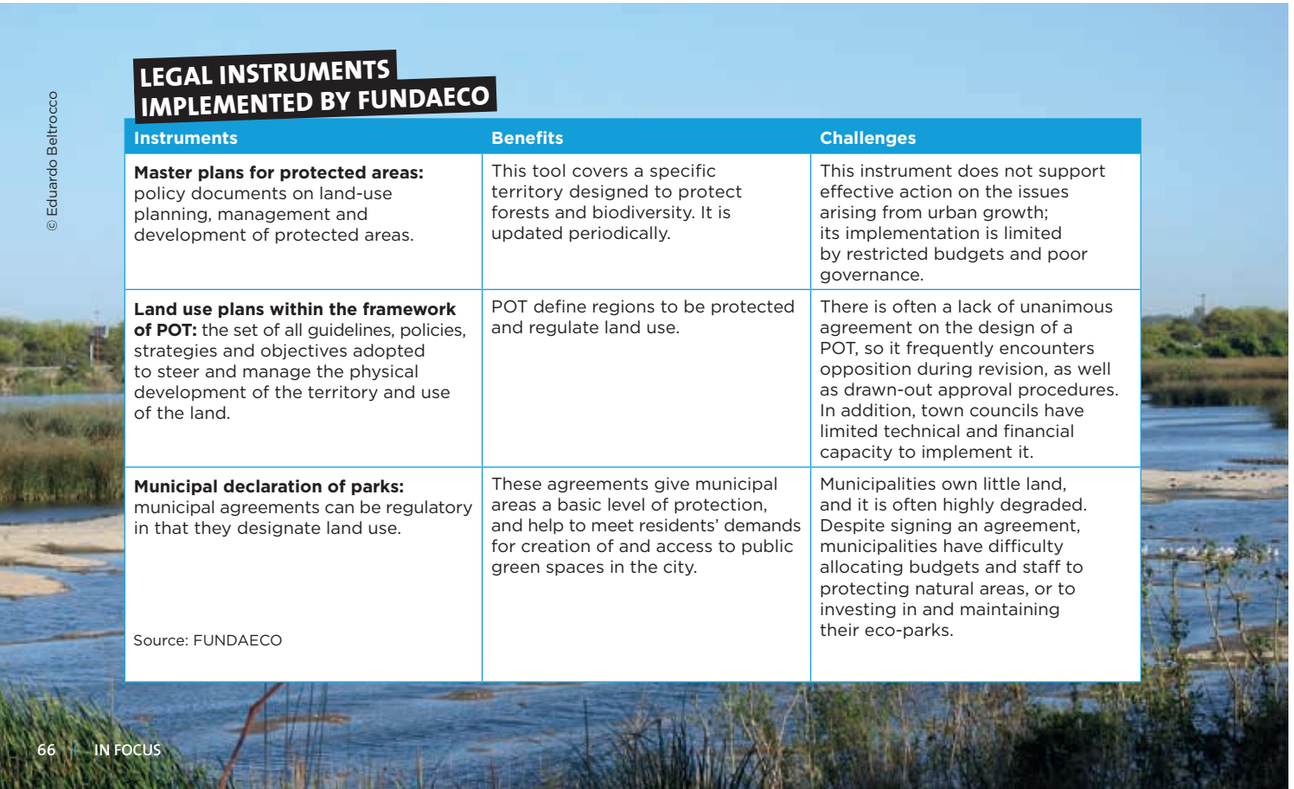
In Santa Fe, the Urban Planning Regulation (ROU, in Spanish) was approved in 2008, and in 2009 Guatemala City adopted the country's first ever Land-use Plan (POT, in Spanish). Following this initial success, FUNDAECO supported the development of five more POT for the metropolitan area. Two of these were approved during the project and one is currently in force.

Despite this progress, there is still a long way to go as there are 340 municipalities throughout Guatemala, 44 of which are metropolitan ones. Nevertheless, these advances in integrated land-use planning are the first signs of a transition towards more sustainable urban policy, a more inclusive society and more participatory governance.

Tools for protecting and managing urban nature

To make up for the lack of national legal frameworks, both projects used other existing instruments from various institutions. In many cases, these instruments are now outdated and no longer reflect current environmental and social challenges, due to a high level of administrative inertia.

The metropolitan area of Guatemala City has long suffered from uncontrolled urban growth, linked to ineffective urban planning. There are currently two POT in force. For almost 14 years, there has been a single POT adopted, but this has never been updated to reflect the constantly changing urban reality.


© Eduardo Beltrocco

LEGAL INSTRUMENTS IMPLEMENTED BY FUNDAECO

Instruments	Benefits	Challenges
Master plans for protected areas: policy documents on land-use planning, management and development of protected areas.	This tool covers a specific territory designed to protect forests and biodiversity. It is updated periodically.	This instrument does not support effective action on the issues arising from urban growth; its implementation is limited by restricted budgets and poor governance.
Land use plans within the framework of POT: the set of all guidelines, policies, strategies and objectives adopted to steer and manage the physical development of the territory and use of the land.	POT define regions to be protected and regulate land use.	There is often a lack of unanimous agreement on the design of a POT, so it frequently encounters opposition during revision, as well as drawn-out approval procedures. In addition, town councils have limited technical and financial capacity to implement it.
Municipal declaration of parks: municipal agreements can be regulatory in that they designate land use.	These agreements give municipal areas a basic level of protection, and help to meet residents' demands for creation of and access to public green spaces in the city.	Municipalities own little land, and it is often highly degraded. Despite signing an agreement, municipalities have difficulty allocating budgets and staff to protecting natural areas, or to investing in and maintaining their eco-parks.

Source: FUNDAECO


© Aleiram de Paz

LEGAL INSTRUMENTS IMPLEMENTED BY THE MUNICIPALITY OF SANTA FE

Instruments	Benefits	Challenges
Provincial law: establishes rules at province level.	Allows the creation of networks of protected areas that extend beyond municipal boundaries.	There is little control of protected natural areas at province level.
Ordinance: represents the highest municipal regulatory declaration, equivalent to a law adopted by congress at national level.	An ordinance is permanent and ensures the finalisation, continuity and long-term management of a project.	The reserve must have a budget to deal with other pressing issues.
Urban Planning Regulation (ROU): governs land use and land cover, volume of building allowed and urban fabric, preservation of high-value environments and management of environmental vulnerability.	An ROU establishes some level of protection for green areas, and guarantees them prominence in urban planning and development.	If there are informal dwellings in the area, the regulation does not cover their integration or relocation.

Source: Municipality of Santa Fe

A POT is a regulatory planning tool covering the metropolitan area. It is intended to regulate land use. For example, it is a way of preserving areas subject to natural hazards from urbanisation, and of protecting ecologically sensitive zones. What is more, the POT applies to all stakeholders in the territory – government, private sector, contractors, individuals and farmers. The aim is to define a shared vision for the territory, for the common good.

In Santa Fe, the Western Urban Nature Reserve is also perceived as a regulatory instrument for protection, and more besides. As part of its strategic planning, the city of Santa Fe sees the urban nature reserves as an effective way of regulating and controlling urbanisation to ensure a more sustainable city.

The creation of this reserve was governed by a specific ordinance under supreme municipal law. This ordinance commits the municipality to continuing a project because of its importance, regardless of any changes in political governance.

In countries with a limited legal framework, there are other non-regulatory instruments that can be used to protect nature in urban environments.

→ Cooperation agreements with municipalities define joint actions to be taken and establish responsibilities and commitments to work towards a common goal.
→ Cooperation agreements with the academic and scientific community help to validate public policies by providing the project team with tools, experience and scientific expertise.
→ Incentive programmes encourage public and private stakeholders to protect land with ecological value, through providing a monetary contribution towards the maintenance and sustainable management of biodiversity.
→ Land reserves: land purchase by the public or private sector limits building development and helps to preserve endangered habitats.

There is no ideal instrument for protecting urban nature. However, our collaboration with stakeholders in the MGB and WUNR projects has identified certain essential characteristics of an effective protection instrument, being mindful of the context in which it will be applied.

Diagram co-created during capitalisation workshop with stakeholders from the two projects

"In Santa Fe, we have the 'Reglamento de Ordenamiento Urbano'. This regulation was influenced by the interests of private stakeholders and has only weak application in the most vulnerable districts of the city. It came into force in 2008, and now after 15 years of application it is already showing a degree of obsolescence, as society has changed faster than the regulation has."

Francisco Garrido,
Project Coordinator at Secretariat of Housing and Urban Development

"The most powerful economic actors have the ability to change the standards and adapt them to suit their needs, but the informal sector has its own rules. It is not just about putting regulations and instruments in place; it is essential that they are used in a way that is appropriate for the location. This is what has stopped the WUNR being a site for informal housing as it was in the past."

Andrés Borthagaray,
President of Furban Foundation

© FUNDAECO

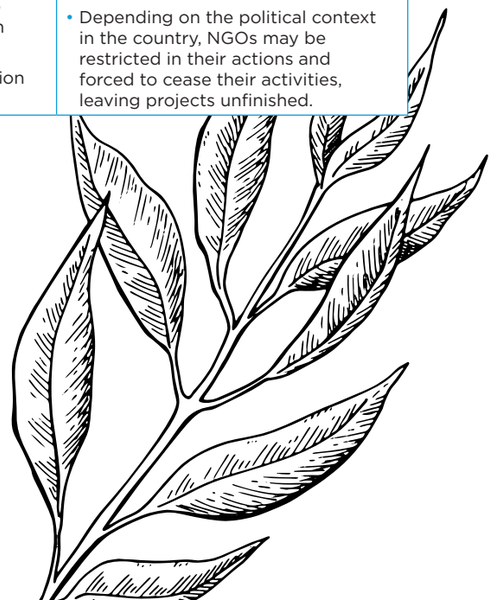
Project implementation arrangements tailored to the specific local context

Every international cooperation project needs robust project ownership, to ensure it runs smoothly and also that the impacts are felt by the target beneficiaries. To support this, the FFEM co-finances local project owners who have a full and up-to-date overview of the context and situation in the project's host country. The local partner may be a public body or an NGO – the management option chosen must be informed by the project itself and by the specific local context. The workshops for cross-capitalisation between the MGB and WUNR projects **identified the benefits and drawbacks of public or private project ownership**.

"It is a challenge to demonstrate that the State is on board and able to implement public policies that reflect reality and are free from corruption. It's a tough task to show that the State wants to do something good."

Luciana Manelli, Deputy Director of the Environmental Assessment Cluster, Municipality of Santa Fe

Management option	Benefits	Drawbacks
Public Municipality of Santa Fe	• Dedicates a significant budget to co-financing a project and ensures continuity of finance if there are delays in payments or changes to economic conditions such as inflation. • Enables collaboration with other municipal departments in design and implementation of projects. • Establishes local skills to ensure the long-term viability of projects.	• In some contexts, there is a lack of trust in public institutions. • Potential staff turnover following change of government or municipal leadership, which may affect the continuity of a project.
NGO FUNDAECO	• The continuity of a project is not affected by changes to public administration. • Depending on the image of the lead organisation and the projects it has previously run, it may be closer to the local communities and have greater legitimacy in their eyes. • Specialised expertise within the organisation in relation to the field in which it operates.	• Sometimes limited co-finance and inability to respond to unforeseen events. • Depending on the political context in the country, NGOs may be restricted in their actions and forced to cease their activities, leaving projects unfinished.



Approaches to ensure the longevity of a project under either management option

In addition to protection instruments, it is essential that the management team has an array of regulatory and project management tools to support the creation and development of each new space for urban nature and to ensure its long-term viability. These tools need to be more flexible and adaptable to everyday local reality. Depending on the nature of the project, there are certain plans that can be implemented.

→ Management plan

A management plan is an essential strategic planning tool to guide the management, monitoring and evaluation of a natural space or protected area. It defines the long-term vision, the strategy to ensure longevity of the project, the priorities and the short- and medium-term actions.

The French Biodiversity Agency provides a reference guide for developing management plans for natural areas.

→ Governing committee

The municipality of Santa Fe recommends creating a management committee when planning a project. This brings together all stakeholders in the project. It facilitates discussion on various issues and problem solving, with a focus on inclusion and dialogue between those involved. This is an opportunity to involve various stakeholders and give them a say in management of the project. However, even if there is a management committee, it is important to ensure that the stakeholders are motivated to contribute.

→ Economic sustainability plan

Both projects included economic sustainability strategies. Particularly when there is only a limited budget allocated to project management and implementation, it is vital to have an economic sustainability plan. This involves analysing opportunities for the project to generate income, in particular to fund its continuity and management.
Strategies introduced include hiring out space for outdoor events, charging admission to the parks, using spaces for the municipality's own activities, supplying the municipality with resources – for example by planting coffee trees or ornamental and forest plants to decorate the city, or hiring out spaces for photo shoots, trade fairs or private functions.

→ Species monitoring plan

Both FUNDAECO and the municipality of Santa Fe find a good practice for observing and evaluating projects is to monitor species, by using nature guides or working with civil society groups that specialise in this. Monitoring of birds, which yields important information about the impact of biodiversity, can be accompanied by monitoring of butterflies and mammals.
This approach does not require significant financial resources, but it is important to use a trained team with local knowledge and the ability to disseminate information to a variety of audiences. In managing biodiversity, it is essential to have staff to communicate the value of nature to the community.

Depending on the characteristics of the natural space being managed, it may be useful to introduce **a fire management plan** to mitigate the threat of wildfires. Another option is to create **development plans and design guidelines**, as FUNDAECO did in producing a manual for the design and maintenance of future trails in the eco-parks.

"Although there is an ordinance for the WUNR, it is also important to have a management plan to guide planning and review and to ensure the long-term viability of the project. It is vital to define who will be involved and how they will contribute. Management goes hand in hand with land-use planning; if there is no management plan, the green space remains vulnerable to anthropogenic pressures."

Eduardo Beltrocco, nature guide at WUNR

Urban nature: from an optional extra to a core feature of today's cities

Nature is undoubtedly a universal value that transcends borders. As well as being in social demand and representing visible and tangible heritage, nature is much more than an operations engineering issue as it is invaluable to present and future generations of the whole human race. While the media are awash with bad news, these two projects offer grounds for optimism by showing that change can be achieved and that **urban nature can become a pillar of urban and territorial planning in the countries of the Global South.**

Eradicating nature and degrading natural resources has never been the right response to the pressures of population growth. In facing up to the triple planetary crisis of climate change, pollution and biodiversity loss, it is vital that we create a paradigm shift in making nature a major focus of urban planning and strategies.

The MGB and WUNR projects are demonstrating that preserving, restoring and embedding nature in cities is as beneficial for people as it is for the flora and fauna that reflect the richness of the local ecosystems. Looking beyond the ecosystem services that nature can provide, these projects have prompted transformation in public policy and different ways of imagining cities. Instead of focussing on mobility routes and corridors for motor vehicles, green planning approaches look first and foremost at the flows of nature, which is in constant motion.

This leads us to **design the city as a network instead of the sum of individual parts**. To protect our living systems and regain a sense of nature cohabiting with humans, we need to think of the city in terms of the movements of air, water, flora and fauna. As well as plans for more green and blue, in some climates it may be a case of more brown and yellow, bearing in mind that even sand dunes provide the planet with valuable ecosystems.

Recreating symbiosis between nature and the city requires public policies with a joint approach that protect undeveloped parts of the city, alongside project teams committed to creating and managing models where nature reclaims the territory. The MGB and WUNR projects have inspired other municipalities, operators and managers – and when others show an interest in a model and want to reproduce it, that is proof of the impact the work has achieved. These two case studies leave us with lessons and discussions about good practices to take on board and replicate in planning the environmentally-friendly cities of tomorrow in the Global South.

"Learn from nature. That is where our future lies."

Leonardo da Vinci

TRANSFORMING POLICY

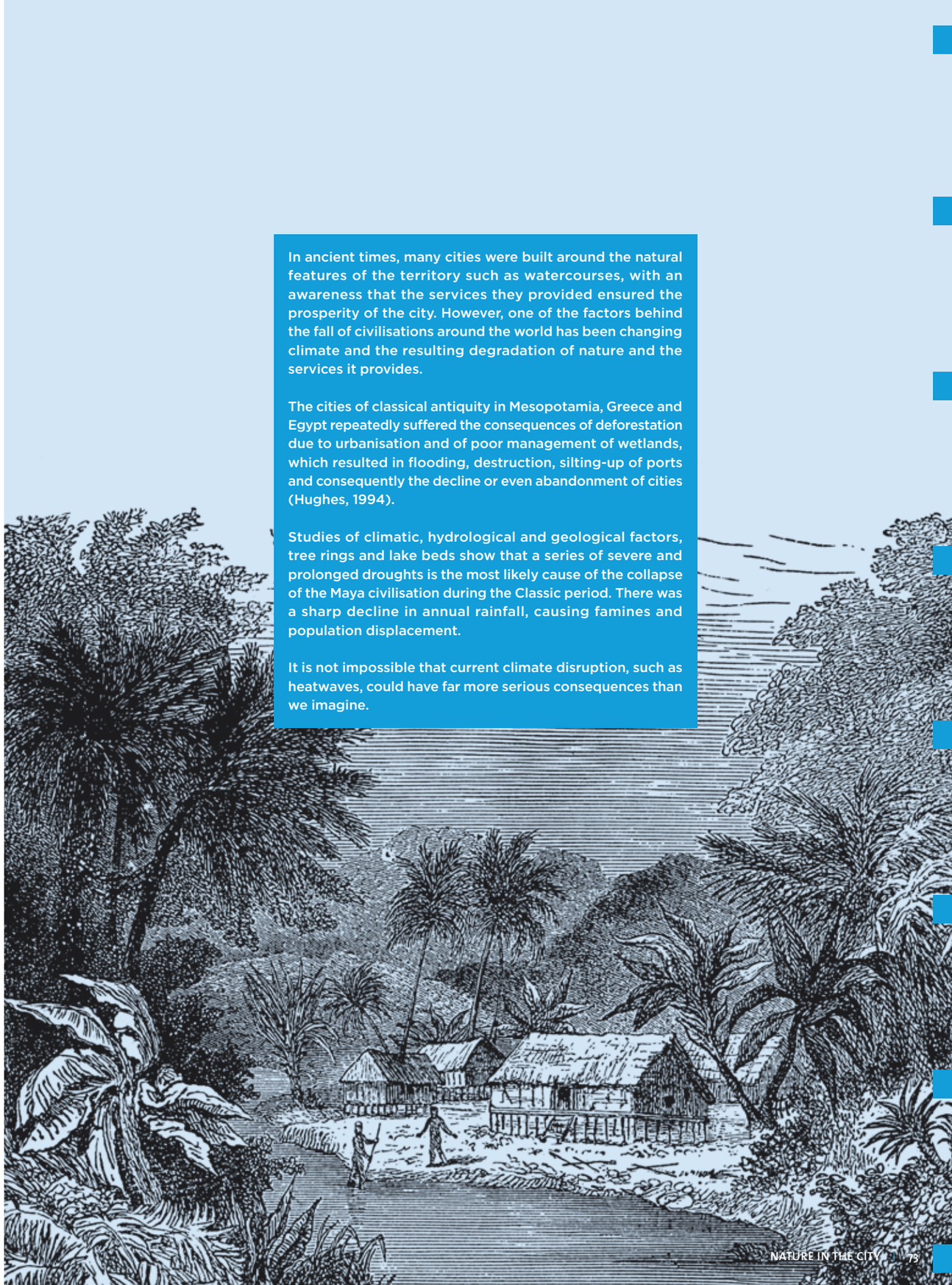
The project managed by FUNDAECO has led to a number of changes in public policy in the metropolitan area. Previously, only the municipality of Guatemala City had any eco-parks. This project motivated three other municipalities to create eco-parks through municipal declaration. In addition, the Land-use Plans (POT) underpinned by the project focused on analysis and regulation of the "vitality layer" (environmentally valuable areas and those at high risk from disasters), which was a first for the country. The only POT in existence prior to the project – the one for Guatemala City – was based on land use intensity. The creation of a Green Belt also attracted the interest of other municipalities beyond the metropolitan area, which are starting to integrate this model into their own territorial planning, joining a network of municipalities with increasing national and regional visibility.

In ancient times, many cities were built around the natural features of the territory such as watercourses, with an awareness that the services they provided ensured the prosperity of the city. However, one of the factors behind the fall of civilisations around the world has been changing climate and the resulting degradation of nature and the services it provides.

The cities of classical antiquity in Mesopotamia, Greece and Egypt repeatedly suffered the consequences of deforestation due to urbanisation and of poor management of wetlands, which resulted in flooding, destruction, silting-up of ports and consequently the decline or even abandonment of cities (Hughes, 1994).

Studies of climatic, hydrological and geological factors, tree rings and lake beds show that a series of severe and prolonged droughts is the most likely cause of the collapse of the Maya civilisation during the Classic period. There was a sharp decline in annual rainfall, causing famines and population displacement.

It is not impossible that current climate disruption, such as heatwaves, could have far more serious consequences than we imagine.



03

SIX RECOMMENDATIONS FOR INTEGRATING, PRESERVING AND RESTORING URBAN NATURE

© Eduardo Beltrocco

© City of Santa Fe

© City of Santa Fe

© FUNDAECO

01

Maintaining collective memory of disasters so that communities can take action, prevent and prepare for risks

Every individual has a different image and perception of nature and risk, depending on their history, culture and place of residence. This variety of image and perception among urban stakeholders needs to be taken into account, as it represents a determining factor for the success of any urban nature or risk management project. To facilitate implementation of urban nature projects, it is therefore essential to provide support and awareness-raising for residents and public decision-makers.

→ **Urban nature is a powerful way of reducing the risks of natural disasters**, especially in the context of climate change. It is therefore particularly important to preserve and enhance it. Nature and "green" infrastructure effectively complement conventional civil engineering – "grey" infrastructure – in preventing flooding, while also providing an opportunity to showcase and regenerate landscapes that are sometimes overlooked.

→ **Preserving collective memory of disasters is a key component of "risk culture"**. Remembering past events informs understanding of risks and preparation for future events. Keeping alive memories of disaster can also help to reduce vulnerability, through maintaining awareness of danger and communicating best practices to adopt in an emergency. For all these reasons, memory of disasters is an effective tool for taking action, working on prevention, better preparing communities to face hazards, and increasing their resilience. The collective memory needs to be sustained to avoid future disasters. There are various ways of doing this: conducting a literature review – going back as far as possible, leading urban walks around the disaster sites, holding public meetings, organising commemorative events, or using art as an evocative and emotional force.

→ **Perceptions and images of nature develop through individual access to knowledge and education, through public participation and also through messaging and information relayed by the media.** Change can work in two directions: (i) the public authorities inform, support and influence residents to change their perceptions, or (ii) conversely, it is citizens – usually organised into groups – who speak up and influence urban policy-makers.

→ **Communication is crucial**. Whether informing people about risks, scientific understanding or the benefits and drawbacks of a particular strategy, it is through communicating a structured argument that mindsets can be changed. From this perspective, we can learn a lot from all the mechanisms in place on the topic of climate change (COPs, IPCC, articles and documentaries, scientific studies, etc.). It is important to remember that urban nature is a scientific pursuit. It calls for studies and surveys, and often involves complex concepts. Moreover, it is rarely directly experienced by individuals. Therefore, we need a way of sharing knowledge and disseminating it ad hoc, so that everyone living in the city can take ownership of it.

TO GO FURTHER

1. How can we communicate information about biodiversity to all those living in the territory?
2. What methods can we use to preserve collective memory of natural disasters?
3. How can we ensure an effective prevention and risk management policy that particularly targets vulnerable populations?
4. How can we use collective memory as a catalyst for urban nature projects?

PARTNER TESTIMONIES

"The main objective for FUNDAECO was to protect and restore nature, but this is a secondary issue for society and the authorities. By contrast, risk is a critical issue – as a disaster has direct impacts, while degradation of nature happens gradually without us realising. This is why the project uses tools such as risk analysis to justify nature protection."

Karen Aguilar, Director of Land Use Planning and Climate Change Mitigation at FUNDAECO.

"A common factor in the two projects (MGB and WUNR) is that the public authorities emphasise disaster risk reduction to justify them. In Santa Fe, the primary objective was to prevent flood risk and protect families living in the areas at risk. At the same time, nature started to regenerate spontaneously, which we are also highlighting."

Luciana Manelli, Deputy Director of the Environmental Assessment Cluster, Municipality of Santa Fe.

02

Involving experts in the living world in urban design

In an urban nature project, the staff training and dedicated governance put in place are key to success and long-term viability. Alongside this, collaborative work with other sectors and entities helps to enrich the project, encouraging a multi-disciplinary approach and dialogue between urban stakeholders.

→ The role of urban nature has evolved over time. However, today there is an urgent need to harness the benefits provided by nature in responding to the ongoing climate crisis. Nature must no longer be reduced to an ornamental role. It goes much further than that: nature and biodiversity are central to green and sustainable urban development.

→ This paradigm shift involves **rethinking the design of municipal institutions such as urban planning departments and those overseeing environmental issues**. Managing an urban nature project requires moving away from a "siloed" approach, towards a cross-cutting arrangement based on inter-departmental cooperation.

→ It is one thing to set up an institution or body, but another to give it the means to achieve its objectives. To ensure this, it is essential to **provide sufficient financial and human resources** to the institutions involved, and to train staff in specific subjects such as urban ecology or climate change. It is vital to provide municipal staff with continuing professional development in adapting to a changing environment.

→ A key factor in the success of urban nature projects could be **the creation of a hub for handling biodiversity issues**, comprising a multi-disciplinary team of urban engineers trained in managing natural areas. To ensure the continuity of the projects introduced, the staff and operations of this body will need to be assured regardless of any changes in municipal teams.

→ Where it is not possible to draw on existing public (particularly municipal) bodies, an alternative would be to call on external organisations, such as foundations possessing specific expertise in local biodiversity and understanding of the social and political challenges within the action sectors. These would be organisations perceived to be true intermediaries, and their history and social anchorage would justify their involvement in urban nature projects. Moreover, they often have the appropriate resources and flexibility that public bodies sometimes lack.

© FUNDAECO

© City of Santa Fe

TO GO FURTHER

1. Are universities incorporating the new careers in urban biodiversity into their course offerings?
2. What strategies could be used to increase dialogue between municipal departments, and how can environmental issues be raised to the top of the agenda in urban public policy?
3. How can we promote the involvement of civil society, the private sector and foundations in urban nature projects, while ensuring this is properly coordinated with the interests of cities?
4. How can international cooperation support the creation of competent organisations tailored to the realities of urban nature projects?

PARTNER TESTIMONY

"We need to support the creation of jobs in the public sector dedicated to environmental and natural resource management. The establishment of a new natural area must always be accompanied by the introduction of a new skilled and trained team, right from the design stage."

Luciana Manelli, Deputy Director of the Environmental Assessment Cluster, Municipality of Santa Fe.

03

Environmental assessments and indicators, essential planning tools for greener cities

Providing for green and blue space in the city involves looking at urban ecology. More specifically, it means understanding the composition of biodiversity and its variations in time and in space, as well as its interactions and impacts on human activities, whether positive (mitigating disaster risk, physical and mental well-being) or negative (invasive non-native species, conflict between humans and wildlife).

→ Introducing public policies to support biodiversity and measuring their impact relies on **a significant quantity of data**. However, many municipal administrations have to find additional technical and human resources to generate, update and communicate data on biodiversity. To address the lack of resources experienced by the municipalities of Guatemala City and Santa Fe, partnerships were established between the local administrations and non-governmental and academic institutions.

→ Collecting data on biodiversity provides information on how it is changing. Close monitoring means that authorities and citizens can be alerted to any degradation of natural areas. Improving understanding of the functioning and health of natural areas is also a way of bringing nature conservation to the forefront of the political stage.

→ Ecosystem degradation within and around urban areas occurs gradually over the years. In the absence of a solid baseline for biodiversity, this gradual degradation is imperceptible and becomes the norm, reducing the call for restoration and conservation interventions.

→ Numerous tools exist for the monitoring of urban biodiversity and natural areas. Among these is **citizen science**, which in view of its educational value and high cost-effectiveness offers great potential.

→ Alongside this, to ensure efficient production and use of data, it is essential to **build knowledge and skills among staff in public institutions** and to create partnerships with national governments and with academic and non-governmental institutions that regularly produce data on biodiversity.

TO GO FURTHER

1. What are the least costly tools for generating and communicating the necessary data, and for informing and convincing governmental, non-governmental and private stakeholders to commit to preserving biodiversity?
2. What partnerships could public policy-makers and civil society organisations establish with existing international, non-governmental and academic organisations?
3. How can we effectively integrate citizen science tools into urban planning?

PARTNER TESTIMONY

"Monitoring flora and fauna is an effective and economically accessible tool. Birds, in particular, provide indicators of baseline state and improvements in the environment. The information we gather enables us to demonstrate to society the ecological value provided by the reserve. It is also uploaded to an international data network, which helps us to give the project global visibility and to attract investors concerned about preserving biodiversity."

Eduardo Beltrocco, nature guide at WUNR.

04

The right to nature: providing equitable access to green spaces, without compromising on protection of biodiversity

Contact with nature provides a sense of well-being. Urban natural areas allow city residents to escape the noise and polluted air of the city to practise sport, watch birds, forge social links or relax under the trees. In addition to these "cultural" services, ecosystems provide services in water supply and sanitation, and help to mitigate natural disaster risks and urban heat island effects. It is only recently that urban stakeholders have begun to recognise the services provided by nature. Around the world, this recognition has been accompanied by increasing demand and respect for natural areas.

→ **There are often limitations and inequalities in access to nature in the Global South.** For example, residents of affluent neighbourhoods have access to larger areas of natural space than the residents of low-income neighbourhoods. Nature has become a desirable asset, as we can see from the increased value of land situated close to natural areas that have been regenerated. As a result, in many cities in Latin America, Africa and Asia, natural areas are also being appropriated by private operators and affluent populations.

→ **Natural areas are under threat from informal housing.** For example, in many cities in the Global South, it is not unusual to see bodies of water, streams, hills and ravines flanked by makeshift dwellings with poor sanitation. As well as being exposed to natural hazards, these communities are unintentionally contributing to the degradation of ecosystem services while also causing wider damage to their environment and increasing their exposure to risk. This forms a vicious circle that is hard to break without robust public intervention.

→ Projects financed by the FFEM have shown that opening urban natural areas to the public has improved residents' understanding of their environment and discouraged criminal activity and damage to nature, while increasing footfall in parks. These projects have also demonstrated **residents' interest in natural areas**, and justified the mobilisation of additional resources to continue to restore and enhance natural areas with the support of civil society organisations.

→ In any project to restore natural areas, it is crucial to involve local communities, including those from informal settlements. Their active involvement is a factor for long-term success of the project, and at the same time encourages them to take care of their environment.

© Antonio Cabo

1 Working-class neighbourhoods in Mexico City with few natural areas. Luxury apartments "immersed in nature" are often built at the expense of nature: 2 Colonia El Zapote in Guatemala City 3 Four Seasons Riviera (under construction) on the banks of the Pasig river, Binondo, Manila 4 Neighbourhood of informal settlements in Guatemala City

TO GO FURTHER

1. How can we effectively engage groups not currently involved in preserving urban natural areas (e.g. developers, residents of affluent neighbourhoods, residents of informal settlements)?
2. What measures could be introduced to learn from indigenous communities who have been protecting nature and biodiversity on their territory for centuries?
3. How can we encourage cooperation between civil society organisations and local and national administrations in preserving and restoring urban natural areas?

"In Guatemala City, there are no natural areas or welcoming spaces in working-class neighbourhoods. The eco-parks supported by the project therefore offer working-class and middle-class residents new natural areas for leisure and relaxation."

Marco Cerezo, Chief Executive Officer, FUNDAECO.

PARTNER TESTIMONIES

"In the city of Santa Fe, we have a very high ratio of green space per capita; however, our challenge is in creating a city with fair and equitable access to these natural areas. For example, it is difficult for those living in the north of the city to access the high-quality public spaces located in the south of the city. Equitable access to these spaces means more than just area in m^2 per capita; it is above all a question of ensuring easy access to these spaces for everyone."

Luciana Manelli, Deputy Director of the Environmental Assessment Cluster, Municipality of Santa Fe.

"Households in the (neighbouring) residential complex tend to dump their waste there. Since we have been managing the park, we have had some problems with residents encroaching by extending their walls and buildings on the park side. At the same time, developers around the park market their new houses as "living in the woods". However, they make no effort to contribute to management of the park."

José Luis González, Kanajuyú Park administrator, FUNDAECO.

05

Designing natural areas as a tool for integrating nature into the city

Developing green spaces in cities is an effective tool for harnessing urban nature and contributing to more sustainable urban planning. To ensure this vision is shared by all urban stakeholders and to bring new perspective to natural areas, it is essential to provide information and awareness-raising.

→ For urban nature projects to be truly effective, they must be accompanied by **agile management plans that can be readily adapted to societal changes**. In addition, they must comply with current regulations, be aligned with existing governance, and be part of the short, medium and long-term development vision for the city. However, the act of creating a natural area such as an eco-park or biodiversity reserve provides a "bottom-up" stimulus for these plans and may lead to the introduction of regulations to support urban nature. When these spaces start to demonstrate benefits for the city, in terms of climate change adaptation but also the accompanying social benefits, the institutional framework may start to reflect on these models with a view to reproducing, regulating or integrating them on a larger scale.

→ Urban nature projects provide an opportunity to transform the way that cities are planned, especially in the cities of the Global South, some of which are currently at a preliminary stage of drawing up their planning documents. Protecting existing natural areas and identifying new places to develop biodiversity can help to **steer and control urbanisation to limit land take**. Land-use regulations are an essential component of urban nature projects.

→ Protecting urban nature is also a way of containing urban sprawl, defending the public interest and **helping to establish a common identity and shared vision and values**. Nature also provides a wonderful opportunity to showcase the city's history and traditional knowledge, and to contribute to forming collective memory.

→ New residents often see natural areas as "empty space". Urban developers, and particularly the residents of informal settlements, therefore see no problem in "filling" these spaces with buildings. Cities often do not have the means to address this situation, due to absence of planning or regulations, or their lack of enforcement. Alternatively, in finding new uses for these natural areas, the "empty" spaces can come alive in other ways than through building development. For this policy to be successful, it is vital that residents take ownership of these areas. Opening the spaces to the public, fully or partially, is often a good way to ensure that they are used rather than remaining empty.

→ Integrating and enhancing urban nature is often **a lengthy process**. The project team needs to set coherent objectives and a realistic timetable that anticipates any obstacles that could slow down or hinder delivery of the project. In addition, consultation and involvement of all stakeholders in implementation of the project is time-consuming and needs to be considered well in advance.

TO GO FURTHER

1. What types of use, that are compatible with protecting nature, can be developed within a natural area?
2. What communication and awareness-raising strategies can be used to change societal perception of natural areas?
3. How can we use nature to inform urban development trends and urban forms?
4. How can we integrate the topic of urban nature into the design of land-use planning documents?

PARTNER TESTIMONIES

"One aim of the project was to protect natural areas from the advance of urban development, whether legal or illegal, authorised or not. It also aimed to reduce wood consumption, which is significantly affecting pine and oak populations in Guatemala; they are currently in decline."

Karen Aguilar, Director of Land Use Planning and Climate Change Mitigation at FUNDAECO.

"Other than the POT, the only way of stopping the urbanisation of natural areas has been to create public parks and spaces for recreation and sport, and to attract people to them. This has really helped to protect and maintain natural areas."

Carlos Barillas, Managing Director, Grupo InnovaTerra

"We tend to have a very human-centred view of the services that water provides to society. We sometimes forget the significance of water in itself. In a section of the WUNR, the water network provides a habitat for wonderful biodiversity that is unique in the region. Simply by hosting this diversity, it is important in its own right. I think it is important to emphasise the inherent natural value of the reservoir."

Florencia Gutierrez, researcher at National Scientific and Technical Research Council (CONICET) and professor at National University of the Littoral.

"In recent years, citizen engagement has been an important driving force in significantly changing perceptions of natural areas in the city. The ravines were forgotten spaces that the city had turned its back on. Thanks to collective efforts, institutional perception of these spaces slowly changed and the ravines started to be integrated into urban planning, something that the POT itself had failed to achieve."

Jean-Roch Lebeau, CEO, Grupo InnovaTerra.

06

Combining democracy and ecology by mobilising multiple urban stakeholders at different territorial levels

It is essential to identify all stakeholders in the territory and their potential contribution at each stage of delivering an urban nature project: identifying the project type and ecosystem services to be harnessed, collecting data, analysing the current natural environment, designing the project, delivering it, and identifying the protection instruments and policies to be applied during management and environmental monitoring of the project.

→ The success of an urban nature project relies on **political will, but also on mobilising all of the city's stakeholders**, at multiple territorial levels (residents' associations, civil society organisations, municipal and metropolitan administrations, etc.). This is because water catchments and biodiversity flows do not respect administrative boundaries and require dedicated governance that often extends beyond the city limits.

→ **A steering committee is one way of creating a multi-level governance system**. In projects such as those co-financed by the FFEM, the steering committee provides an opportunity to involve all key stakeholders in enhancing, restoring and preserving urban natural areas. It enables dialogue between all stakeholders running the project.

→ **Involving civil society groups such as residents' associations** is a factor for success in urban nature projects. Due to their good understanding of the local context, these organisations are a particularly good fit for delivering communication and awareness-raising activities to local communities. Their involvement should begin prior to the start of the project, and be made formal through signing specific agreements.

→ **Involving the academic research community** in an urban nature project brings many benefits. For one thing, making it party to the design and monitoring of new urban natural areas enables the institutions involved to approach the projects from a different angle by drawing on various disciplines relating to the environment – such as psychology, law and anthropology. This type of project also provides benefits for the research community, as the involvement of researchers and students helps to develop new understanding and to ensure that ecology and biodiversity are included in university curricula.

→ **Local democracy is a prerequisite for success** of the project, in the form of transparent and inclusive public consultation processes at every stage of the project, including evaluation and capitalisation. Consultation must include the most vulnerable and less visible members of the public, such as women and children.

TO GO FURTHER

1. Which stakeholders should be on the steering committee for an urban nature project?
2. Are there as many approaches to project governance as there are local contexts?
3. What consultation tools should be put in place to involve local communities?

PARTNER TESTIMONIES

"It was very useful to deliver projects together with partners from outside the institution. The differing expectations and perspectives of the NGOs and external consultants involved led the municipality to discover and take an interest in different methodologies to those conventionally used."

Maria José Avedaño, Director, Department of the Environment for the municipality of Guatemala City

"In Argentina, academia holds high prestige for civil society. Involving the academic community ensures quality projects."

Luciana Manelli, Deputy Director of the Environmental Assessment Cluster, Municipality of Santa Fe.

"One of the greatest challenges for FUNDAECO was in adapting to the big differences in project management capacity between different municipalities in the metropolitan area."

Julia Vianey, Planning Assistant, FUNDAECO

"It is important to understand the territory we are working in. However, it is not uncommon for this information to be non-existent or unavailable. One of the problems at the start of the project was that we didn't know the boundaries of the ravines or who owned them. So we have done some research and created a database in conjunction with local stakeholders, allowing us to identify potential areas to include in creating the Green Belt."

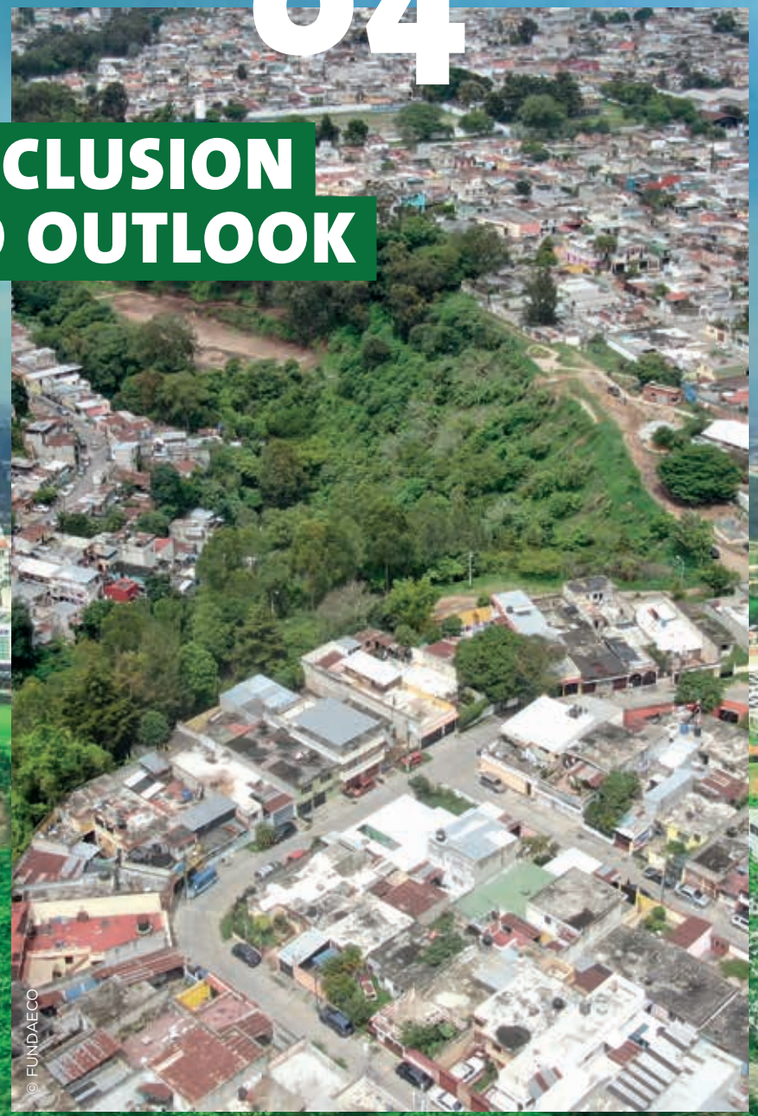
Violeta Ramirez, Technical Assistant, FUNDAECO.

"Urban nature projects cannot be carried out without political support. Environmental activism by civil society has limited influence without political will. However, without citizen participation, institutions have little impact. So these two types of action are complementary."

Marco Cerezo, CEO, FUNDAECO.

04

CONCLUSION AND OUTLOOK



© FUNDAECO

© FUNDAECO

Capitalisation means analysing and understanding how a project works, defining the interplay between those involved and creating a model of the knowledge acquired, so that others can take ownership of this experience and learn from it. It should therefore be helpful to the project sponsors themselves, to the funders and the local stakeholders involved, and also to anyone interested in urban nature issues.
Although this capitalisation could not cover all the aspects or challenges in urban nature projects, it has highlighted four key issues.

The time frame of projects

City building is a long process, naturally contrasting with the short time frame of projects, and the two projects in Santa Fe and Guatemala City are no exception. They were carried out over a few years, and one of the key challenges is how to replicate them in the long term, as part of urban transformation. They represent an opportunity to make changes and to introduce innovative ways of doing things, and in this way they have an impact on long-term urban development. They are a necessary but not sufficient lever in transforming cities. Reporting on projects necessarily involves looking into what happens post-project – what is left once the project (in terms of activities on the ground) has finished. In this case, both projects undoubtedly had positive impacts but it is still too early to tell whether they will have acted as levers to usher in a new way of designing cities.

The positioning of the FFEM

The FFEM played a very specific role in both projects. As it was only providing co-finance, it had to help the project owners to build coalitions of stakeholders to supplement and implement its funding. This is both a weakness – the FFEM finance is not enough to guarantee that the project can go ahead – and a strength. The projects it supports have to rely on partnership, and the FFEM is itself as much a partner as a funder.
The "tailor-made" approach was critical to the success of both projects. Although they are both urban nature projects, they were designed to be adapted to local political, social and administrative realities.

The size of the projects

If we compare the finance allocated to the amounts usually provided by international funding partners, we can see that this capitalisation covers two "small" projects. However, this does not mean they are any less ambitious or informative. Committing smaller amounts of funding helps to clarify the expectations and objectives of the project and to facilitate local ownership. Nevertheless, there is still the issue of scaling up. Taken individually, the two projects are not enough to change the entire territory covered by the two cities. They need to be followed by other equally ambitious projects and related actions before we can draw conclusions on the extent of their impact. There are already initiatives under development that are taking inspiration from these two projects.
These two urban experiences clearly demonstrate the importance of the right to experiment. They represent levers for future action which will hopefully help to change the design of these cities so that nature is better preserved and enhanced.

The overall approach

Urban nature is not a sector in urban policy. This capitalisation clearly shows that it permeates all public policy. In both cities covered by this capitalisation, preserving ecosystems, a wetland or a wooded ravine depends on all the public policies in place. Preserving and enhancing urban nature means rethinking the way we do things in light of this responsibility towards the living world. The actions financed under the two projects address legal, regulatory, technical, financial and social aspects, among others.
Here too, this is both a weakness in these projects, in that they are dependent on inputs over which they have no control, and their strength in that they can potentially have a profound impact on local urban policy and have influence far beyond their area of intervention in the strict sense.

This publication showcases the benefits of investing in urban nature, which is a powerful lever for making cities more pleasant to live in and more resilient to climate change. It also highlights the momentum in this field in Latin American cities, which are a true source of inspiration on a global scale.

Reasons to study urban nature in countries undergoing rapid urban development

Urban nature is a universal topic. It applies to all cities, without exception. However, urban nature projects are usually launched in developed countries that have the financial and human resources needed to implement them. Nevertheless, preserving nature is a key issue that needs to be addressed by all cities, regardless of their level of development.

→ The areas that are richest in biodiversity are found in the Global South, for example Madagascar, the Democratic Republic of the Congo, Brazil, Central America and Ecuador. Natural areas are of inestimable value to these countries, but also to the rest of the world.

→ The presence of urban nature is primarily, but not only, linked to climate features. Cultural and social considerations also play an important role, shaping the way that city residents perceive and represent urban nature. For example, urban agriculture has long been considered a relic of rural practices, but it is now seen as an opportunity to address urban food supply issues and to enhance biodiversity.

→ The countries of the Global South are more sensitive and vulnerable to climate risk because of their level of development, high levels of social inequality and lack of financial and human resources for risk management and climate change adaptation. In these countries, urban nature represents both a risk and a resource that needs to be harnessed to safeguard people's livelihoods.

→ Perceptions of urban nature have changed over recent years. Whereas it had long been relegated to an aesthetic role, it is now synonymous with modernity and contributes to the identity and attractiveness of cities. It is therefore seen as an asset, a cornerstone of a sustainable city and an ideal that most cities are seeking to achieve for more sustainable and environmentally-friendly development.

→ Urban ecology is a field in which the cities of the Global South are showing an increasing interest. Understanding the interactions between cities and natural ecosystems is a springboard for reviewing traditional planning models in these countries. In addition, through the many ecosystem services it provides, nature gives us a systemic view of how we can drive development, while helping to protect the environment. It offers cities and international cooperation bodies an opportunity to approach urban planning differently.

TO GO FURTHER

1. How can we encourage sharing of expertise and draw on the knowledge and skills of countries in the Global South in managing climate resilience?
2. What innovative finance mechanisms could be introduced to enable cities in the Global South to implement urban nature and biodiversity protection projects?
3. Could urban nature projects in countries with rapid urban growth, low Human Development Index scores and low GDP help to reduce climate migration?

"I analysis satellite images, which show very rapid urban deforestation. These days, however, harnessing nature in response to climate change provides an opportunity to act "in the here and now". But, for this to happen, all climate finance needs to include a specific clause to cover urban nature."

Kathya Mejía, GIS Coordinator, FUNDAECO

THE FFEM APPROACH

The FFEM finances environmental projects in developing countries. Innovative projects supported by the FFEM aim to preserve biodiversity, the climate, international waters, soils and the ozone layer, and to tackle chemical pollution. Its geographical priority is the African continent, with 70% of its financial commitments directed towards sub-Saharan Africa and the Mediterranean.

Involving stakeholders from the private sector

To avoid socio-economic disruption, we need to rise to the challenge in harnessing the synergies of public-private partnerships. There is a tendency to look to the private sector to provide co-finance for projects when the public sector cannot, or to see it as a homogenous group. However, it is important to break it down to understand its capacities and why it may be interested in contributing to nature and biodiversity projects.

→ **Private sector stakeholders can take various forms and it is important to see them in terms of their specific characteristics**. Businesses can potentially contribute to strategies reconciling economic activity with biodiversity (e.g. managing a park so as to include leisure activities, engaging developers to better integrate Nature-based Solutions into construction projects). But there is also a multitude of private individual stakeholders – such as the owners of small residential gardens, which can add up to a significant total area and which play a fundamental role in preserving biodiversity and creating ecological corridors.

→ Urban nature projects need to identify possible sites with high biological value and good potential for protecting nature and ecosystem services. This list may result in selecting sites on private land; hence the need to propose actions to include these sites in overall connectivity and protection of the territory.

→ In contexts where national nature protection policies are weak or not being implemented, or where there is low public investment in instruments to protect urban natural ecosystems, **one strategy available is land acquisition**. The criteria used in purchasing land can be based on biological value or on strategic location in order to limit urban sprawl. The private sector may be involved in this acquisition, as long as the future use of these spaces is clearly established.

→ The private sector also has a key role to play in designing and delivering adaptation initiatives and green solutions, and in environmental management. Projects can seek support from entrepreneurs and SMEs right from the diagnostic, planning and priority setting stage. It is therefore important to provide training in NbS for companies operating in construction and public works.

TO GO FURTHER

1. What types of incentives could be offered as part of public policy for the private sector?
2. How can we involve private stakeholders who own smaller parcels of land, such as private gardens?
3. How can we train the construction and public works sector in NbS approaches?
4. How can we support municipal administrations to provide a better framework for private stakeholders in urban nature projects?

"Firstly, it takes multiple stakeholders to carry out territorial development – whether in urban contexts or in rural territories or those with high environmental value. Major urban and territorial transformation, including the management and preservation of next generation areas of high environmental value, can only be achieved through public-private collaboration. Secondly, current construction and urban development must integrate NbS approaches rooted in sustainable development, which is essential now. These practices must be regulated under land-use planning standards, following a process that initially encourages pilot projects that can be replicated, scaled up and then promoted until they become mandatory."

Silvia García Vettorazzi, architect/urban planner and director of the urban planning department for the municipality of Guatemala City.

South-South cooperation and cross-capitalisation in urban nature projects

Natural systems do not always follow the boundaries established in land-use planning. Many cities are interconnected by natural flows. Rethinking and reforming urban planning to take account of these interconnections also means changing how we view territory and its dynamics as a determining factor in the establishment of major conurbations. These interconnections, which also have parallels in the main problems faced by cities in the Global South (accelerated and uncontrolled growth, poverty, limited health facilities, high air pollution, etc.), make it increasingly important to build dialogue between cities that takes ecosystem flows into consideration.

→ **Nature has both local and cross-border dynamics, which depend on the biomes and living zones in which it is found**. This may represent an opportunity for South-South cooperation: although it is difficult for a single city to buck habits and trends, social mobilisation and international cooperation can drive global approaches. Networks between cities are powerful catalysts for protecting biodiversity and mitigating climate change together.

→ South-South cooperation is an opportunity to **share local expertise and replicate good practices** implemented in urban nature projects. It is essential to develop, store and manage ecological baseline and monitoring information, but it is also important to disseminate it to the public and to other countries to improve the quality of work, attract investments, establish partnerships and help to replicate projects.

→ **Numerous networks financed by development aid agencies have been set up** to identify good urban planning practices in cities of the Global South, such as the initiative *Making Cities Resilient* – MCR2030. Nevertheless, there is more work to be done in increasing the sharing of specific experience that takes into account how the environment functions. Sharing experience, and also data and information gathered on the status of shared or similar ecosystems and how they function, can help to drive tangible action at various levels and to replicate or expand positive practices to reconcile nature and cities. At the planning stage, projects can be encouraged to adopt a variety of South-South cooperation arrangements, such as partnerships between national or municipal institutions and NGOs, or between collective civil society movements.

→ Cross-capitalisation using a participatory approach, with both in-person and remote workshops and round tables, is a way of sharing experience, disseminating good practices and learning from mistakes. This allows teams to take the time to evaluate their own work from an external angle, by drawing on international experience and perspectives. It is also an approach that helps each organisation to conduct internal reflection on how to move forward in managing and implementing projects.

TO GO FURTHER

1. How can we continue the sharing generated during cross-capitalisation?
2. Following cross-capitalisation, could the FFEM support further joint projects between the countries invited to contribute, that were designed either during or after this sharing exercise?
3. How can we use social networks to share local projects and disseminate the lessons learned?

"The cross-capitalisation exercise showed me that we were not alone. Capitalisation creates a network and a safe space to meet and talk frankly about project successes and mistakes, planning, management and future expectations. We can table two projects, one managed by a government body and the other with very strong citizen involvement, which can help us to be objective and to rethink how we can continue to protect our natural areas."

Pablo Capovilla, nature guide at WUNR.

Field visits, project presentations and meetings during participatory cross-capitalisation workshops attended remotely or in-person by stakeholders from the MGB and WUNR projects March 2023, Santa Fe, Argentina.

© City of Santa Fe

Financing opportunities and international cooperation

Financing is often a stumbling block for urban nature projects, even though most of these projects require low investment. Faced with multiple crises, cities in the Global South are reluctant to channel their scarce resources into urban nature projects. All the more so as this type of project is often seen as having impact only in the medium to long term, and also impact that extends far beyond the city itself. Protecting nature and biodiversity and combatting climate change are global issues, but ones that must be addressed at the local level.

NbS are an effective way of integrating nature into projects by arguing for the services that this nature will directly provide, on a par with "traditional" interventions. However, this is more complicated in the case of projects to preserve or protect natural areas, as these projects often – quite rightly – oppose increasing urbanisation. **The drive for urban expansion turns existing natural areas needing protection into areas with very high potential market value**. Ultimately, they become targets for land speculation, which is very difficult to combat. There is an enormous difference in land value between areas available for construction and "empty" natural areas where it is not permitted. The price per m^2 of land available for construction is several hundred times higher than land where it is prohibited.

This means that preserving or protecting a natural space in an area undergoing urbanisation does not in itself constitute a major investment expense, but rather a "freeze" – foregoing potential direct gain, whether financial gain for the city or the construction companies, gain for future residents, or gain for the owners of private land. It therefore requires fierce political will and powerful instruments for controlling land use.

→ International finance provides for compromise in project management and continuity. It can help to legitimise the financial and human resources that an institution allocates to a project prioritising the environment over other needs that residents may consider more urgent or more of a priority.

→ Over recent years, we have seen ever increasing finance allocated to promoting urban nature. However, too often this "green" approach is still no more than a filter through which traditional projects can be "greened". At the end of the day, it still involves financing urban infrastructure, but just promoting different technical solutions and paying particular attention to the economic and social due diligence required.

→ It should be possible to **go further in providing direct finance for urban nature, by recognising the value (including economic and even monetary) of this nature**. This should make it possible both to finance projects themselves and, above all, to compensate cities for preserving nature. For example, in the context of preserving a natural space in an area of high urban growth, we could imagine international institutions financing not what the city does (an investment plan) but what it refrains from doing (in protecting or preserving a natural area that could be urbanised).

→ Financial and technical cooperation is largely based on North-South flows. However, throwing the issue of urban nature into the mix definitely calls for a rethink of this dynamic. Given the concentration of rich biodiversity in the cities of the Global South, a South-South dynamic is to be encouraged here. Experience-sharing would support cities in the South in taking action, as they could follow the examples of their peers. Moreover, South-North cooperation also seems a worthwhile future avenue, as there is much to learn from the cities of the South.

TO GO FURTHER

1. How can we give cities in the Global South the resources to protect nature? How can we help them to combat land speculation?
2. How can financial engineering be used to support urban ecology?
3. How can we ensure strong and effective global cooperation on this issue, in promoting a network approach that goes beyond the traditional dynamics of technical and financial cooperation?
4. Nearly all cities finance their activities through loans. Could we therefore contemplate specific financial tools to preserve or develop urban nature?

PARTNER TESTIMONY

"We definitely consider the support from the FFEM as providing added value, as apart from a few multilateral entities, there are no other programmes or bodies that provide this scale of funding for initiatives to support nature in urban environments. In addition, the FFEM stands out in the way it supports projects that have real impact on the ground, unlike other programmes which mainly support the introduction of advisory services that have no impact on communities or territories."

Karen Aguilar, Director of Land Use Planning and Climate Change Mitigation at FUNDAECO.

05

APPENDICES

GLOSSARY

AFD	French Development Agency
CBD	Convention on Biological Diversity
CMIP6	Coupled Model Intercomparison Project Phase 6
CODEDE	Departmental Development Council
CONAP	National Council for Protected Areas (Guatemala)
COP	Conference of the Parties
EIA	Environmental Impact Assessment
FAO	Food and Agriculture Organization of the United Nations
FFEM	French Facility for Global Environment
FUNDAECO	Foundation for Ecodevelopment and Conservation (Guatemala)
IFRC	International Federation of Red Cross and Red Crescent Societies
ILO	International Labour Organization
INA	National Water Institute (Argentina)
INDEC	National Institute of Statistics and Censuses (Argentina)
INE	National Institute of Statistics (Guatemala)
INTA	National Agricultural Technology Institute (Argentina)
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
IWRM	Integrated Water Resources Management
KBA	Key Biodiversity Areas
MEEDDM	Ministry of Environment, Energy, Sustainable Development and the Sea (France)
MGB	Metropolitan Green Belt (Guatemala)
NbS	Nature-based Solutions
NGO	Non-Governmental Organisation
OECD	Organisation for Economic Co-operation and Development
POT	*Plan de Ordenamiento Territorial* (Guatemala)
ROU	*Reglamento de Ordenamiento Urbano* (Argentina)
SIGAP	National System of Protected Areas (Guatemala)
UN	United Nations
UNCED	United Nations Conference on Environment and Development
UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations Children's Fund
WB	World Bank
WFP	World Food Programme
WHO	World Health Organization
WUNR	Western Urban Nature Reserve (Argentina)
WWF	World Wide Fund for Nature

BIBLIOGRAPHY AND REFERENCES

- Auvray Alexandre, Poyer Laura, *Guide technique biodiversité en ville*, Agence Française de Développement, document drafted by the "Biodiversité en Ville" team of the Urban Development Division, Planning and Housing, September 2021.
- Barra Marc, "Villes résilientes, réconcilier urbanisme et nature". *Urbanisme* Review 417, Habiter un monde plus chaud, November 2010.
- Fournet-Guérin Catherine, "La nature dans les villes du Sud : pratiques et représentations". *Géographie et cultures*, 62 | 3-6, 2007.
- Centre d'études et d'expertise sur les risques, l'environnement, la mobilité et l'aménagement (CEREMA), "Nature en ville, La nature comme élément du projet d'aménagement urbain". *Connaissances*, Lyon, November 2015.
- Clergeau Philippe (ed.), *Urbanisme et biodiversité. Vers un paysage vivant structurant le projet urbain.* Rennes, Éditions Apogée, 327 p, 2020.
- European Commission, *Créer une infrastructure verte pour l'Europe*. Publications Office of the European Union, Luxembourg, 2014.
- Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. *Infrastructure verte – Renforcer le capital naturel de l'Europe*, 2013.
- Dorst Hade, Van der Jagt Alexander, Raven Rob, Runhaar Hens, "Urban greening through nature-based solutions – Key characteristics of an emerging concept". *Sustainable Cities and Society*, May 2019.
- Dupré Sophie, "Perceptions et représentations géographiques : un outil pour aménager les forêts touristifiées ?". *Téoros* [Online], 25–2 | 2006.
- Feuillette Sarah, Levrel Harold, Blanquart Stéphanie *et al.,* "Évaluation monétaire des services écosystémiques. Un exemple d'usage dans la mise en place d'une politique de l'eau en France". *Natures Sciences Sociétés*, 2015/1 (Vol. 23), p. 14–27.
- French Facility for Global Environment (FFEM), MAVA Foundation, IUCN France, IUCN Med - *Pour une société civile africaine au coeur de l'action environnementale* – Capitalisation croisée du PPI et du PPI OSCAN. Paris, France. 2021.
- French Facility for Global Environment, *2023-2026 Strategy*. Paris, 2023.
- Friends of Ecosystem-based Adaptation (FEBA), *Ecosystem based Adaptation and the successful implementation and achievement of the Sustainable Development Goals*, IUCN, Gland, Switzerland. 40 pp, 2022.
- Froger Géraldine *et al*., "Controverses autour des services écosystémiques". *L'Économie politique* 2016/1 (No 69), p. 36–47, 2016.
- Guerry Anne D., Smith Jeffrey R., Lonsdorf Eric, Daily Gretchen C., Wang Xueman and Chun Yuna, "Urban Nature and Biodiversity for Cities. Policy Briefing". *Global Platform for Sustainable Cities*, World Bank, Washington, DC, 2021.
- Hughes J. Donald, *Environmental Problems of the Greeks and Romans. Ecology in the Ancient Mediterranean*. Second edition. Pp. xii + 306, ills. Baltimore: Johns Hopkins University Press (first published as Pan's Travail: Environmental Problems of the Ancient Greeks and Romans, 1994), 2014.
- Libertun Nora, López Benítez Benigno, Bonilla Juan Pablo, *et al., Inclusive cities: healthy cities for all*. Banco Interamericano de Desarrollo, September 2022.
- Liégeois Marie, "Mémoire des catastrophes et culture du risque", *Pour*, 2014/3 (No 223), p. 89–96.
- Mata Menocal Melissa, *Barrio-Barranco, Los barrios autoconstruidos de la ciudad de Guatemala como oportunidad para la visibilización del paisaje*. Universidad Politécnica de Cataluña, Barcelona tech, 2022.
- Ministerio de Ambiente y Recursos Naturales, Sistema Guatemalteco de Ciencas del Cambio Climático. UNDP, *Tercera Comunicación Nacional Sobre Cambio Climático de Guatemala*, Guatemala City, 2021.
- Nicolas-Artero Chloé, Fuster-Farfán Xenia and Velut Sébastien, "Introduction. Contestée, appropriée et dépossédée : la place de la nature dans les villes latino-américaines". *Cahiers des Amériques Latines* [Online], 97 | 2021.
- Olson David M., *et al*., "Terrestrial Ecoregions of the World: A New Map of Life on Earth: A new global map of terrestrial ecoregions provides an innovative tool for conserving biodiversity". BioScience, Volume 51, Issue 11, Pages 933–938, November 2001.
- United Nations Organisation, *Rapport de la conférence des Nations Unies sur l'environnement*. Stockholm, 5-16 June 1972, New York, 1973.
- United Nations Organisation, *United Nations Conference on Environment and Development*. Rio de Janeiro, Brazil, 3 to 14 June 1992, New York, 1992.
- United Nations Environment Programme, *Progrès relatifs à la qualité de l'eau ambiante.* Suivi de l'objectif 6 des objectifs de développement durable (ODD) : mises à jour de l'indicateur mondial 6.3.2 et besoins d'accélération. Nairobi, 2021.
- Reghezza-Zitt Magali, Benitez Fanny and Devès Maud H., "Vivre avec la mémoire de la catastrophe". *VertigO - la revue électronique en sciences de l'environnement* [Online], Vol. 20 No 3 | December 2020.
- TECHO-Guatemala, *Recensement des établissements informels*. Guatemala City, Guatemala, 2021.
- International Union for Conservation of Nature, KBA Standards and Appeals Committee, *Guidelines for Using a Global Standard for the Identification of Key Biodiversity Areas*. Version 1.2, Gland, Switzerland, 2022.
- Wegner Giulia, Pascual Unai, "Cost-benefit analysis in the context of ecosystem services for human well-being: A multidisciplinary critique". *Global Environmental Change*, Volume 21, Issue 2, Pages 492-504, 2011.

Websites

- ***Climate Change Knowledge Portal*** **(World Bank)**
https://climateknowledgeportal.worldbank.org

- **Les Horizons: média d'intelligence écologique**
https://leshorizons.net/que-retenir-concept-villes-eponges-chine/#:~:text=Au%20lancement%20du%20programme%2C%20l,le%20faire%20d'ici%202030.

- **Demain la ville, le blog *by* Bouygues Immobilier**
https://www.demainlaville.com/la-ville-eponge-modele-de-resilience/

- **CEREMA, Climat et territoires de demain**
https://www.cerema.fr/fr/actualites/solutions-ville-demain-renaturation-sols-retour-journee

- ***Latin America Bureau***
https://lab.org.uk/transforming-urban-spaces-guatemala-citys-barrancos/

- **Métropolitiques**
https://metropolitiques.eu/Quelles-politiques-publiques-pour.html
https://metropolitiques.eu/Le-paysage-outil-de-l-action.html

- **Décroissances – blog**
https://decroissances.ouvaton.org/2020/09/11/la-perspective-dune-valeur-intrinseque-de-la-nature/#:~:text=Affirmer%20une%20valeur%20intrins%C3%A8que%20de,et%20impos%C3%A9es%20par%20les%20hommes.

- ***City Adapt***
https://cityadapt.com/en/nature-based-solutions-and-the-private-sector-keys-to-adaptation-to-climate-change-in-latin-america-and-the-caribbean/

- **PCA–STREAM**
https://www.pca-stream.com/fr/articles/gilles-boeuf-comprendre-la-biodiversite-94#:~:text=Quelle%20diff%C3%A9rence%20faites%2Dvous%20entre,min%C3%A9ral%2C%20sur%20une%20g%C3%A9odiversit%C3%A9%20ant%C3%A9rieure.

- ***Prensa Libre (online periodical)***
https://www.prensalibre.com/guatemala/comunitario/obesidad-y-sobrepeso-afectan-a-siete-de-cada-diez-guatemaltecos-pero-pandemia-podria-haber-aumentado-la-cifra/

AUTHORS' COMMENTS

“There is no city without nature and the living world, and we have forgotten this for too long. Every city is part of its natural environment; every city is both shaped by its unique geography and alters that same geography. We need to acknowledge and understand aspects such as topography, climate, water cycles and soil in order to improve urban planning. A city is not just a man-made, technical superstructure that must be optimised to make it ever more efficient, but above all a way of creating society – a cohesive, intense society that interacts with the living world that hosts it.

With support from the FFEM, the municipalities in Santa Fe and Guatemala City set out to rediscover this living world, and they can testify to the achievements of these two projects to protect and enhance natural areas. Here as elsewhere, protecting urban nature has many obvious positive impacts, such as reducing vulnerability, preserving biodiversity, improving the quality of life and combatting pollution.

These projects also remind us that protecting urban nature is a complex issue, requiring specific regulatory, technical and financial tools, and above all needing to rely on a coalition of stakeholders with a shared vision that must go beyond individual interests. Because in Argentina and Guatemala, just like everywhere else, protecting natural areas means resisting the powerful forces of speculation and urbanisation. It means resisting short-termism and a laissez-faire attitude, and staying focused on the long term and the common good. We also need to understand how the cities of the Global South are working towards reconciliation with nature, providing us with roadmaps for building the cities of tomorrow.”

José Antonio Cabo Bujan
expert in biodiversity management and climate change adaptation

Aleiram Estefanía de Paz
architect/urban planner

Guillaume Josse
geographer/urban planner

Amandine Millet
specialist in climate change adaptation

Paula Pinto
sociologist, specialist in environmental and social safeguarding

groupehuit
Développement urbain

© FUNDAECO

Authors: Groupe Huit: Antonio Cabo, Aleiram Estefania de Paz, Guillaume Josse, Amandine Millet, Paula Pinto

Management: FFEM – Stéphanie Bouziges-Eschmann

FFEM team members: Séverine Barde Carlier, Janique Etienne, Ilhem Satouri

Photo credits: Karen Aguilar, Eduardo Beltrocco, Antonio Cabo, Pablo Capovilla, Municipality of Santa Fe, FUNDAECO, Habibi Orellana, Aleiram Estefania de Paz, Theodore Moore/Unsplash, Taller AKÁ, jenrikeofficial, Fermin Rodriguez Penelas, Violeta Ramirez

Graphic design: bear**ideas**

Legal deposit: April 2024

Member institutions of the FFEM Steering Committee

French Ministry of Economics, Finance and Industrial and Digital Sovereignty
Directorate-General of the Treasury
139, rue de Bercy
75 572 Paris Cedex 12
www.economie.gouv.fr

French Ministry for Europe and Foreign Affairs
Directorate-General for Globalisation, Culture, Education and International Development,
Sub-directorate for Environment and Climate
27, rue de la Convention • CS 91 533
Paris Cedex 15
www.diplomatie.gouv.fr

French Ministry of Ecological Transition and Territorial Cohesion
Department of European and International Affairs
Arche Sud, 92055 La Défense Cedex
www.ecologique-solidaire.gouv.fr

French Ministry of Higher Education, Research and Innovation
Directorate-General for Research and Innovation
1, rue Descartes • 75 005 Paris
www.enseignementsup-recherche.gouv.fr

French Ministry of Agriculture and Food Sovereignty
Directorate-General for Corporate Economic and Environmental Performance
Sub-directorate for International Relations
3, rue Barbet-de-Jouy
75 349 Paris 07 SP
www.agriculture.gouv.fr

French Development Agency
5, rue Roland Barthes • 75 598 Paris Cedex 12
www.afd.fr

FFEM Secretariat

French Development Agency
5, rue Roland Barthes • 75 598 Paris
Tel: +33 1 53 44 42 42
Fax: +33 1 53 44 32 48
Email: ffem@afd.fr

Follow us on social media
@FFEM_Fr
FFEM – Fonds français pour l'environnement mondial

www.ffem.fr