



WWF

SUMMARY

Urban solutions for a living planet

Learning cases
panda.org/urbansolutions

KEY MESSAGES

Cities are the new hot spots

- Cities are the new hot spots of global environmental change. They are the leading growth centres of population, consumption, resource use and waste.
- In cities, everything is closely connected. So problems tend to multiply – and so can solutions. Cities can exploit positive synergies, or struggle with negative ones.

*Early innovators
can produce a
“snowball effect”*

Renewable Energy Policy
Network for the 21st Century

Cities have abundant opportunities

- Cities have massive leverage over their ecological footprints. Their choices on energy, transport, or building standards, for example, affect huge numbers of users.
- Cities have major impacts on biodiversity via habitat loss, pollution, contribution to climate change, over-exploitation of species’ populations, and introduction of invasive species.
- Cities can improve quality of life while cutting environmental impact. Cities have the option of making smarter choices for housing, transport, energy, green space, water, and waste.
- Cities must lead the clean energy revolution to combat climate change by supporting renewables, efficiency, smart metering, and green retrofits.

Good stewardship rewards itself

- Well-governed and well-designed cities are more sustainable along every dimension, through win-win-win synergies.
- Cities can and must be the centres of change. Cities have large capacities for learning and innovation – and competitive pressures to do so.

Cities need urgent focus

- The majority of future growth in urban populations will take place in small and fast-growing cities, not mega-cities. Diffusing good practices to the huge number of these fast-growing cities is decisive.



WHY CITIES?

The world is facing an extraordinary emergency – the need to reduce humanity’s ecological footprint to

a sustainable level, and to stop the rapid global loss of biodiversity. These challenges are at the centre of WWF’s mission.

Today only 600 urban centres generate about 60% of global GDP

The Climate Group

Cities are now the main growth centres of population, consumption, and resource use, as well as waste. This makes them the new hot spots of global environmental change.

For the first time in history, more than half the world’s population lives in cities. They are responsible for more than 70% of global greenhouse gas emissions. It is

a jarring and rapid change. In 1800, only 3% of humanity lived in cities. At present almost all population growth takes place in cities. According to UN projections, 70% of humanity will be living in cities by 2050.

Cities are changing

WWF’s findings suggest that the transformation has already begun. Cities are slowly becoming drivers of change. All across the field of sustainable development, we find cities taking the lead.

Networks of cities are setting more ambitious goals for greenhouse gas emissions than

their governments. Cities are taking independent action, often with innovative solutions, pushing governments to follow.

In our survey of 100+ learning cases, there are cities transforming transport, creating walkable and livable environments with better air quality. There are cities protecting nature, taking advantage of ecosystem services vital for water supplies, food security, adaptation to climate change and resilience. We find cities that use waste as a resource, sponsor sustainable consumption through green purchasing, and develop urban farming. There are cities investing in smart grids, and in energy-efficient housing. And there are cities promoting renewable energy with regulations, subsidies, and tax relief.

It is their political mandate that makes local governments ideal drivers of change

Renewable Energy Policy Network for the 21st Century



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ONE PLANET FUTURE

WWF's mission is to stop the degradation of the planet's natural environment and build a future in which humans live in harmony with nature. Our vision is a future where we all live well within the capacity of one living planet – a One Planet Future.

The battle for life on earth will be won or lost in cities

Executive Secretary,
Convention of Biological
Diversity, Ahmed Djoghlaif



As it has become clearer that working with cities is critical in achieving the One Planet Future vision, WWF has increased its focus on urban issues. Conservation goals are closely linked to production and consumption patterns, which are largely driven by the demands of urban societies.

WWF is convinced that through improved design of products and services and increased public participation in creating sustainable solutions, our goals can be achieved, while sustaining and even increasing our quality of life. The challenge is now to switch rapidly to sustainable pathways by increasing and sharing learnings from work in progress all over the globe.

WWF and sustainable cities

In line with our mission, WWF challenges cities to reduce their ecological footprints and protect biodiversity. The aim of the Urban solutions project is to support learning about and action toward sustainable cities. Another prominent WWF initiative is the Earth Hour City Challenge aimed at supporting cities in the transition to a 100% renewable and sustainable future. Some of the best practices reported by cities in the Earth Hour City Challenge are also cited as learning cases in this project.

In the Urban solutions survey, WWF has studied and catalogued real examples of how cities are approaching the need to minimize their ecological footprints and protect ecosystem services and biodiversity. We can think of no better motivator than these inspiring examples, which highlight how cities are working, in real life and in real time, to reduce their footprints and protect biodiversity and ecosystem services.

This report is an introduction to the survey of 100+ learning cases, which is published at panda.org/urbansolutions. Your participation is vital in our shared co-creation of sustainable cities. It's time for us all to start asking tough questions, seeking out real answers, and using what we learn to live sustainably.



WWF's Earth Hour City Challenge is an initiative aimed at moving cities towards a 100% renewable and sustainable future. Read more at panda.org/ehcc.

100+

LEARNING CASES

URBAN SOLUTIONS FOR A LIVING PLANET

Explore via themes

How can cities adapt water, air, mobility, or building systems to reduce ecological footprints and protect biodiversity? Some answers on how to begin can be found within these 100+ learning cases, organized around 13 vital themes: air, water, food, ecosystem services and biodiversity, housing and buildings, mobility and accessibility, consumption, waste and sinks, energy, climate change mitigation, climate change adaptation, governance and citizenship, and resilience.

The focus of the learning cases is on human needs – with high priority given to biodiversity and ecosystem services, key elements of human wellbeing.

Selection and focus

The selection of learning cases is diverse and international, focused on positive examples of cities where smart ideas have been implemented and concrete results reported.

We have focused on learning cases rather than “best practices” for several reasons. It is never possible to claim with certainty that a case is the current best practice, as new information can arise that may overturn such claims. Further, learning points are process-oriented and dynamic, and can support the expansion of ideas in different contexts. Finally, it is important to avoid the impression that there are definitive “best practices” out there – actions so sustainable that more innovation and learning are not needed. Instead, we work with the conviction that our learning cases can and should continue to foster rapid and creative action in cities worldwide.

Take part actively

WWF hopes that these learning cases will support you in becoming an active stakeholder in your own local context. Your questions and comments are also vital to the evolution of this project. Please share them with us by visiting our website Urban solutions for a living planet at panda.org.

It is also essential to apply what is learned to real places and real situations – to your own life. Please be active in the work for sustainable cities – locally and globally. Contact decision-makers to tell them what you think are key learnings for the sustainable development of your own city. Every one of us has a vital role in the urgent work for a sustainable future.

Learning cases
panda.org/urbansolutions

Visit the web site at
panda.org/urbansolutions





AIR CONNECTS EVERYTHING

Air quality is a major concern for cities, and for good reason. Air pollution seriously affects human health – with potentially deadly and disabling effects. Air quality is crucial for ecosystems that cities

depend on, forests and agriculture, for example. So air pollution presents a major economic threat.

In some cities the air is so polluted that breathing is equivalent to smoking two packs of cigarettes a day
Earth Policy Institute

Since the problems with smog of the 1970's, many cities in the developed world have done a lot to improve air quality, mainly through relocation of polluting industries and regulations of fuel, vehicles, and traffic. The last two decades have seen the same measures enacted in major cities in the developing world. Now some cities are taking the next step, becoming more walkable and livable through further transformation of the transport system, regulation of the use of hazardous substances, and air quality monitoring.



Delhi

Air quality improved by civil society and Supreme Court

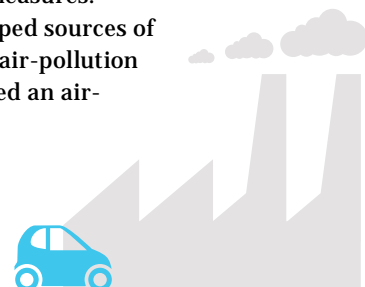
By the 1990s, Delhi had among the world's worst urban air quality. Air pollution's heavy impacts on human health, including higher rates of infant mortality and asthma, led to sustained efforts for improvement by Indian civil society. Ultimately, India's Supreme Court intervened. It ordered a transition to compressed natural gas (CNG), shutting down hazardous-emissions industries, phasing in catalytic converters, and lowering sulphur content in diesel and petrol. Major gains in air quality and health have been found in published studies, but they are threatened by Delhi's booming growth in vehicles.

Toronto

Researching effects on health from air pollution

Toronto, Canada, is a pioneer in research on the health effects of air pollution. Toronto Public Health has published a dozen reports in the past ten years that quantitatively document the link between poor air quality and illness. They also measure major sources of air pollution, such as coal plants, traffic, and industry. These reports have built up support for remedial measures.

In addition to this, Toronto has mapped sources of air pollution, developed a model for air-pollution at the neighborhood level, and created an air-quality index.





WE'RE ALL ABOUT WATER

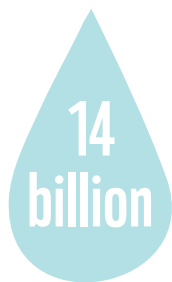
Water holds the biosphere together – it links many environmental issues – pollution, biodiversity, food, energy, and climate regulation. How we use, manage, waste, or pollute water can determine the sustainability of our environment. Water also connects many issues in urban systems.



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Water leakage costs water utilities worldwide US\$14 billion every year
IBM Smarter Cities

In the face of water shortages, cities are increasingly taking responsibility for water management. Some cities link water systems with regional nature conservation, for example by protecting forests, wetlands, and catchment areas vital to local water supply and biodiversity. In other cities, water treatment is integrated with urban farming, to recycle nutrients like phosphorus, and with the energy system to produce biogas. Cities increasingly engage in rainwater collection, recycling, and desalination. The vision is cities where water is essentially re-circulated.



New York

Saving water, nature and money

New York City's history of facing and solving water problems goes back at least two centuries. In the past 30 years, the city has again crafted innovative solutions for improving supply and managing demand. Investing in natural capital to protect vital ecosystem services is the cornerstone of the city's watershed management, a widely cited programme. To manage demand for water, the city first relied on three strategies: tracking water use, detecting and fixing leaks, and water-saving appliances.

Singapore

Centre for innovative water management

As a densely populated city-state on an island lacking fresh water lakes, Singapore has risen to the challenge to become a world leader in water management. Thanks to the award-winning holistic work of its public utilities agency, the city currently receives more than half of its water supply from the unorthodox sources of rainwater collection (20%), recycled water (30%), and desalination (10%). The long-term plan is to become entirely self-sufficient in water.



A SALAD OF ECOSYSTEM FUNCTIONS

The basic need for food is interconnected with other needs and ecosystem services – air, water, waste management, and energy. Problems in one system tend to multiply into other areas. Yet solutions can also be multiplied. For reasons of food safety and

health, cities are increasingly engaging in food policies and urban farming.



In 2005, urban farming supplied food to 700 million people, according to the FAO

Food policies include meat-free days, school lunches, local procurement and regulation of restaurants. Agriculture near or in cities reduces the need for transport of food, cutting a city's dependence on fossil fuels, and reducing emissions of CO2 and other air pollutants. When urban agriculture is combined with waste recycling, composting, and wastewater irrigation, cities are solving several problems at once. Today nearly 15% of the world's food is supplied by urban farming, increasing cities' resilience as well as providing employment and community building.



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Ghent

Meat-free Thursdays yield multiple benefits

Ghent, Belgium, promotes a meat-free day each week in order to achieve a range of objectives: meeting climate emissions goals; improving health; reducing overall environmental impacts; improved animal welfare; and sustainable consumption. After Ghent launched its meat-free day in 2009, it has been copied by cities worldwide: Bremen, Helsinki, San Francisco, Cape Town, Sao Paulo. Ghent aims to be climate neutral by 2050, all urban activities combined. Meat consumption is responsible for a significant share of greenhouse gas emissions.

Havana

Fighting oil addiction with urban agriculture

Urban agriculture can promote a wide range of sustainable development goals – for example, food security, energy efficiency, waste management, and employment. Cuba's capital city Havana is cited as a world-leading example of good practice in urban food cultivation, producing 45-100% of its fresh vegetables, and up to 20% of the national fresh food total. Urban farming not dependent on oil saved the city when the collapse of the Soviet Union led to a sudden oil shortage and monetary shortfalls.





NATURE - A CITY'S SKIN AND LUNGS

Many of cities' basic needs depend on nature's ecosystem services. These in turn are dependent on biodiversity. A wide range of ecosystem services come from the natural spaces in and around cities. They clean the air and water, temper floods, provide water and food, and conserve biodiversity.

Rich biodiversity can exist in cities

Cities and Biodiversity Outlook



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The breadth of ecosystem services provided by nature is often undervalued – they can also reduce noise, increase physical and psychological wellbeing, regulate the local climate, sequester CO₂, and provide renewable energy. Some cities have started to safeguard biodiversity and ecosystems services – for the benefit of current and future generations – by preserving and recreating greenbelts, natural parks and waterways, using land trusts and anti-sprawl regulations, and generally prioritizing nature protection.

Auckland

Green corridors = green city

Low Impact Urban Design and Development (LIUDD) is an approach developed primarily in New Zealand for creating sustainable urban spaces. LIUDD advocates alternative, cost-effective urban design and development by working with nature and creating community environments that respect, conserve, and enhance natural processes, with solutions such as rain-gardens, green roofs, green corridors, open swales, detention ponds, and ecologically friendly pervious surfaces. Auckland's green corridors facilitate flood protection, protect biodiversity, and enhance the cityspace with walkways and cycle paths.



Stockholm

World's first national city park

Conserving nature and biodiversity often depend on learning more about humans – and this is the focus of extensive research on Stockholm's Royal National City Park – the world's first national city park. When parks in the area were threatened by construction plans, linking them in a “national city park” was crucial for their protection. Creating gigantic networks of stakeholders, communicating via media, and changing analytical frameworks to bring more of the park areas' diverse values to bear on conservation legislation have been key strategies in establishing the park.



KEYS TO CO₂ REDUCTIONS

Buildings account for almost 40% of carbon dioxide emissions globally, and in bigger cities up to 80%. Many cities have turned to retrofitting buildings as one of the most cost-effective ways to make good on promises of greenhouse gas reductions. Most energy-efficiency upgrades pay for themselves through energy savings.



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\$22 trillion invested today in ICT to improve building and transportation efficiency would save cities \$33 trillion and reduce future emissions by as much as 50%
WWF and Booz & Co

Some cities have been trailblazers in this trend, among other things by developing energy performance contracts which allow for financing through energy savings. Several cities have started green building programs, mandating energy efficiency in new and renovated buildings. Many cities have built demonstration districts, showing how housing in the future could save up to 80% in resource usage. And some cities have supported the development of passive houses, where energy consumption is cut to zero.

Berlin

Building retrofits save energy and money

Via its Energy Saving Partnership, Berlin has retrofitted more than 1,400 buildings since 1996. This has delivered increases in energy efficiency of 26% and more. Berlin was among the first to introduce energy performance contracts, where energy savings finance the retrofit. The Energy Saving Partnership has been replicated in more than 20 projects worldwide with the assistance of the Berlin Energy Agency. It also inspired a German nationwide program in the last decade, that has retrofitted millions of apartments and created hundreds of thousands of green jobs.

Sonoma

Ecological footprint reduced by 80%

Sonoma Mountain Village is the largest approved One Planet Community project – a programme of BioRegional and WWF for sustainable living – to reach the construction phase. Two solar power plants, of more than 1 MW each, will help provide 5,000 residents with green energy. Compared to US averages, carbon dioxide emissions from transport will be reduced by 82%, water consumption by 65%, and local food production will cover 65% of consumption needs. Developed in the spirit of new urbanism, Sonoma Mountain Village has also become a new hub for green technology, creating green jobs.





SUSTAINABLY FROM A TO B

Cities need space – and people need to access the city. Mobility and accessibility are tied to a range of other choices that affect ecological footprints and nature conservation. How much land will be used, and



how much will be left for nature and agriculture? What energy sources will be used and what kinds of emissions into air, water, and soils?

Transportation is a key issue for ecological sustainability and quality of life. Cities are able to achieve huge gains in both areas through strategies such as car-free and car-restricted areas, expanding public transport, promoting cycling, making the city more compact and pedestrian-friendly, and developing only where sustainable transport is available. The transition from unsustainable patterns of automobile dependence, sprawl, and relying on fossil fuels is being accomplished in a number of ways – reducing the overall costs of transportation to people and the environment.

Traffic congestion costs the European Union over 1 percent of GDP
IBM Smarter Cities

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Amsterdam

The world's most bike-friendly city

In 2007, the bicycle overtook the car as Amsterdam's most popular means of private transport. It didn't happen by accident – Amsterdam's status as the world's most bike-friendly city is the result of cycling inclusive planning, which has made cycling more attractive and practical than commuting by car in the city. It has also led to dramatic improvement in the city's air quality. An NGO, Interface for Cycling Expertise (I-ce), is now spreading Dutch bicycle culture to the rest of the globe.

Bogotá

Rapid transit to sustainable development

Bogotá, Colombia, is a forerunner in efforts for sustainable transport, due to its introduction of a Bus Rapid Transit (BRT) system. The city radically improved public safety, greenspace, housing, transport, air quality, and education, during a 3-year term of office of mayor Enrique Peñalosa, elected as an independent in 1998. Among Peñalosa's main integrating concepts were the visions of equality and child-friendliness. BRT has since then spread to dozens of cities, mainly in developing countries, as a cheap and flexible form of sustainable transport.



CITIES ARE MEGA CONSUMERS

Cities import huge amounts of resources from other places. As cities' footprints spread and join in complex supply chains, urban dwellers may unknowingly cause major environmental damage through their consumption patterns. We are currently consuming nearly 50% more than our planet can sustainably provide.

It's the wealthy cities – not big cities in general – that produce most greenhouse gases

Environment and Urbanization Journal

Central and local governments are important as consumers, since their purchasing, when salaries are excluded, make up almost 10% of the world's gross national product. Some cities have been forerunners in developing green purchasing regulations that, given their size as consumers, has an effect on the market. The last decade has also seen a tremendous development of complementary currencies, some of which are designed to promote a sustainable lifestyle and strengthen the local community.

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Calgary

Sustainable money for bioregionalism

Calgary Dollars is one of the most active local currencies in the world. It is aimed at sponsoring sustainable consumption and the local community in the Canadian city. With it, Calgary residents can buy some 500 products and services from 200 participating companies. Behind Calgary Dollars stands The Arusha Center, an NGO with a long history of work for a resilient local society, social justice, and ecological sustainability. Today there are 5,000 complementary currencies circulating in the world, a phenomenon that has grown rapidly since the 90s.

Sendai

Forerunner in green purchasing

Sendai was one of the leaders of the Japanese movement for green purchasing in the 1990's. It led to Japan becoming one of the first nations to adopt a law mandating green purchasing for government institutions in the year 2000. More than 90% of Sendai's municipal purchases observe a list of green products the city has set up, and green consumption is promoted in the private sector. Sendai also hosted the first International Conference on Green Purchasing 2004, where the International Green Purchase Network was founded.



ON 1 PLANET, WASTES ARE RECYCLED

Given that we have one inter-connected planet, we cannot throw stuff away and forget it. It is still there, and can come back in our air, our water, and our food. Expanding the concept of reduce, reuse, recycle should include another 'r' – repair, while sinks must be properly

maintained as the part of our environment that can uptake some waste and pollutants.



© FRANK PARHIZGAR / WWF-CANADA

The existing water-based waste disposal economy is not viable

Earth Policy Institute

Waste management is a city's need to deal with its waste in a sustainable way. Reducing flows to minimise waste is a key strategy. Caring for sinks and not overloading them is also vital. Another approach is converting sinks into sources. Waste is increasingly used by cities as a resource, delivering biogas, district heating, compost, fertilizer, irrigation, and recycled goods. Leading closed-loop solutions include: using wastes for energy, wetlands to provide food, and recycling centres to provide economic and social benefits. Some cities are now moving closer to the goal of zero waste.

Curitiba

Waste as resource – integrated thinking

Behind the genius of the Brazilian city Curitiba's programmes "Garbage that is not Garbage" and "Green Exchange" is the recognition by city officials of the interconnections of many of Curitiba's severe problems. Poverty, hunger, pollution, failing education, and the need for formal job creation are addressed together. Curitiba created complementary currencies to reward people for separating their organic and non-organic recyclable wastes and bringing them to waste stations, where they can be exchanged for bus tickets, food, and schoolbooks. Participation reached 70% in the 1990s.



San Francisco

Mandatory composting and recycling

In San Francisco, both composting and recycling became mandatory in 2009. The three-stream sorting system – compost, recycling, and trash for landfill/incineration – had been developed in pilot programmes and voluntary systems in San Francisco for more than a decade. The work was motivated by two main goals: by 2010 to achieve 75% diversion from landfills, and by 2020 to achieve zero waste – that is, no use of landfill or incineration. Already in 2008, San Francisco reached 77% diversion from landfills.



LEADING THE CLEAN REVOLUTION

Preventing climate change and building resilience in cities require real energy revolutions, shifting towards greater efficiency, and renewable energy use. Cities are leading actors in the transition from fossil fuels to alternative energy sources, as well as “negative-cost” strategies like building retrofits and smart metering.

City and local governments continue to become increasingly important players in promoting the local generation and use of renewable energy

Renewable Energy Policy Network for the 21st Century

Cities have much to gain from the cleantech revolution: climate protection, improved air quality, energy security, and sustainable economic development through the establishment of cleantech centres. Local policies include setting targets for renewables or for CO2 reduction, urban planning, building regulations, tax relief, financial assistance, and municipal purchases and investments. Some cities have been trailblazers, for instance in mandating solar water heaters in new buildings, in providing subsidies for installations of solar panels and in financing construction of wind farms and smart grids.

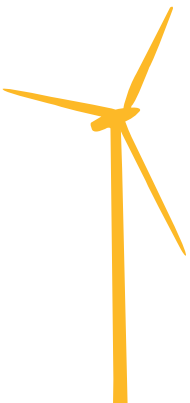


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Gainesville

Feed-in tariffs give solar shine

In a unique initiative for a city, Gainesville, Florida, introduced feed-in tariffs for solar panels on its own in 2009. Within a year, electricity production from solar panels grew fivefold in the city. In the absence of a national policy, several US states have followed Gainesville’s example in recent years, including California, Vermont, New Jersey, and Florida. Furthermore, the German and Spanish successes with national feed-in tariffs have led to the policy spreading to more than 60 countries, feeding a boom in solar PVs.



Rizhao

Regulations boost renewables

Almost all households in central Rizhao, China, utilize solar water heaters – and almost all the city’s lighting is powered by solar energy. The city requires solar water heaters on all new buildings and all renovated public buildings. This is part of an environmental policy that has won several international awards and has led to clean air and a boom in foreign investment. Other Chinese cities are now following Rizhao’s example in implementing regulations and subsidies to boost renewables.



HEEDING THE URGENT WARNINGS

Climate change is one of the largest threats facing people and nature. Climate is basic to our life systems – yet through our actions, humanity is causing the climate to change dangerously. Cities have risen to the challenge and are setting some of the world's most ambitious goals for

reducing their impact on the climate.

Over the last three decades, all greenhouse gas emissions increased by an average of 1.6% per year

United Nations

Cities' lead on climate mitigation has taken many forms; international networks of cities, focused on mitigating climate change, is one such form. The US Mayors' Climate Protection Agreement, the EU's Covenant of Mayors, the Climate Neutral Network, the carbonn Cities Climate Registry, and the C40 Cities Climate Leadership Group all set higher goals than agreements between governments. Individual cities are also taking the lead with very ambitious targets like carbon neutrality before 2030 along with comprehensive action plans to reach the goals.

© MICHEL GUNTHER / WWF-CANON



Cape Town

Climate strategies in developing countries

Cape Town, South Africa, is one of the first cities in developing countries to implement a climate mitigation plan. It has targets for both greenhouse gases and renewables, and has worked to equip 10% of all households and 10% of city-owned housing with solar water heaters by 2010. The programme is largely financed by the UN's Clean Development Mechanism. The fastest growing cities are to be found in the South, which creates both a problem and an opportunity, since the infrastructure of these cities is yet to be developed.

Sønderborg

Citywide participation for carbon neutrality

The Danish city of Sønderborg has one of the world's most ambitious climate goals – citywide carbon neutrality before the year 2029. The comprehensive programme includes renewables, energy efficiency measures, green transport and agriculture and sustainable lifestyles. The city is also one of the initiators of the project Low Carbon City Development Index, one of several new efforts to create a system for measuring cities' climate action. The Carbon Disclosure Project Cities is another, which published its first report on cities in 2011.



RAPID AND INTEGRATED ACTION

Global climate change carries huge risks – for food security and water security and other life-supporting services. Some impacts will be felt distinctly at the city scale: extreme weather events like heat waves, floods, storms, landslides, and droughts. Urban populations are particularly vulnerable to extreme weather events.

Without adaptive efforts, a 2.5°C increase in temperature is likely to result in a 0.5-2 percent decrease in gross domestic product
United Nations

This is partly due to cities' high-risk locations, for example on coasts or slopes, and has led many cities to engage in urgent action, both to mitigate the extent of climate change, and to adapt and become more resilient to a changed climate. Flood-prevention solutions through new wetlands and landscaping are just one of the many innovations being sought. Deadly heat waves are being tackled by large-scale plantings of green roofs and trees. Cities are also adopting new strategies on where to develop land, and how to preserve greenspaces and water bodies.



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TYRONE TURNER / WWF

New Orleans

Foiling flooding with wetlands protection

New Orleans has begun a project to protect and restore wetlands in the Mississippi Delta in order to increase resilience against flooding, hurricanes, and rising sea levels caused by global warming. This is a reversal of previous tactics, which relied solely on dams and river levees. Research has shown that wetlands play a crucial role in the defence against flooding. The Mississippi Delta wetlands are an ecosystem vital to the whole region. They constitute 30% of the total coastal wetlands in the United States, yet account for 90% of the country's wetland losses.

Stuttgart

Cooling with green corridors

Stuttgart is a forerunner in the protection of greenspaces. Using green ventilation corridors and construction bans at strategic places, Stuttgart has not only protected its climate with winds that hinder overheating. It has also improved air quality and increased resilience against global warming. With the support of detailed local climate maps, Stuttgart has stopped planned construction totalling over 60 hectares in recent years. More than 60% of Stuttgart's area is green and more than 39% is protected – the highest percentage in Germany.





GOOD STEWARD- SHIP IS ITS OWN REWARD

In cities, everything is closely connected, thus problems tend to multiply, though so too can smart solutions. Cities can exploit positive synergies, or struggle with negative ones. Those that are well-governed and well-designed are usually more sustainable along every dimension.

Responsible decisions for people and environment often pay for themselves.



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JAKUB WÓJTOWICZ

High-quality public pedestrian space in general and parks in particular are evidence of a true democracy at work

Enrique Peñalosa

Some cities started improving the environment early and have subsequently developed comprehensive strategies for sustainable development. This has led to paradigm shifts, such as moving from fossil fuel to renewables, and from road to rail transport. These shifts need good governance and mediation among economic interests, given the potential for employment and green economic development. Creativity and determination, supported by good science, networks, and stakeholder participation, are critical ingredients for achieving this shift.

Freiburg

Integrated leadership = sustainability leader

Freiburg, Germany, is widely considered the single best city for sustainable urban development. Starting early, in the 1970s, with opposition to a planned nuclear power station, Freiburg has tackled energy and climate change, transport and land use, urban livability and safety, and democratic issues – all using a highly integrated approach. Seeking energy sustainability, Freiburg chose public transport, compact urban design, and investments in renewable energy. As a result, Freiburg is now also a leading centre for solar energy.

Vienna

Excellence in sustainability programmes

Vienna, capital of Austria, stands out for its comprehensive programmes for climate protection, sustainable procurement, sustainable business, and electronic re-use and recycling. These have all grown out of systematic planning processes at the city, national, and supranational levels. The programmes are characterised by high-level political support and participation from diverse stakeholder networks. Vienna was a forerunner in developing the programmes, and has helped to spread them to other cities.



SOCIAL-ECOLOGICAL SYSTEMS IN FOCUS

The new field of resilience has grown with the approach of catastrophic climate change. Resilience can be defined as the ability of a system to withstand and recover from hazards. The question

is how resilient cities will be in the face of climate change and other environmental problems like air pollution or natural disasters.

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Resilience is understood to depend on factors like redundancy, diversity, available knowledge, and the ability to learn and to adapt. Preventing “failed cities” is a key concern – especially with climate change. The vulnerability of cities is crucially important, because cities are often national lifelines and centres of economic, cultural, research and innovation activities. Rapid, uncontrolled urbanisation does make cities more vulnerable. The UN’s ongoing effort “Making Cities Resilient” uses a multi-dimensional approach to increase disaster preparedness.

Chengdu

Role model for resilient development

Chengdu is at the fore of Chinese cities attempting to combine rapid growth with green policies. A comprehensive, award-winning cleanup of the city’s rivers and slum areas in the 1990’s laid the foundation for an ambitious and broad sustainability agenda. In response to the earthquake of 2008, Chengdu invested in infrastructure and disaster preparedness and adopted a new city vision – to be a “Modern World-Class Garden City”. It was appointed as a Role Model for Resilient Development by the UN for its two-year reconstruction efforts.

Local governments deliver essential services to their citizens, which need to be made resilient to disasters

United Nations

Mexico City

Saving water forest in a sinking city

Mexico City has increasingly improved its environmental management, especially of air quality, transport and climate mitigation. Now the city has also started to tackle its greatest problem, water supply. A city of 20 million people, Mexico City is sinking, as ground water supplies drop up to 40 cm per year. The city government is now stepping up its work to protect the woods surrounding the city, which supply most of the water, and is investing in new pipes, sewage systems, treatment facilities, rainwater collection, and tree planting.

CONTRIBUTORS

Contact

Sabina Andrén, Världsnaturfonden WWF
Carina Borgström Hansson, Världsnaturfonden WWF
Share your comments and viewpoints at:
urban.solutions@wwf.se

Writing and research

Martin Jacobson and Aaron Thomas

Copy editing

April Streeter

Format and design

Sven Björnekull

Contributions

WWF wishes to thank the many people who have contributed information: Jeffrey Kenworthy and Peter Newman (Curtin University), Göran Finnveden (Royal Institute of Technology, Sweden), Lars J. Nilsson, Per Svenningsson and Elisabeth Dahlholm Hornyanszky (Lund Institute of Technology), Stefan Anderberg (Lund University Centre for Sustainability Studies), Norman Duke (James Cook University), Angela Espenberger (International Passive House Association, iPHA), Andrea Broaddus (University of California, Berkeley), Thierry Goger and Carmencita Malimban (European Cooperation in Science and Technology, COST), Jessica Morris (Institute for Transportation & Development Policy), Gael Leopold (WWF International), Karin Wessman (Senior Consultant), Lisen Schultz (Stockholm Resilience Centre), Peter Rahtje (ProjectZero, Sønderborg), Jennie Organ (BioRegional), and the Queensland Department of Environment and Resource Management.

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