

coordinated input of local authorities, global agendas are better prepared to respond to urban needs and to take advantage of urban strengths.

Conclusion

Climate change is both a local and a global problem, and it requires action at all levels, including the city level, if it is to be addressed effectively. Strong linkages between the local, national, regional and global levels are essential if cities are to receive the support they need to be able to carry out the climate change activities assigned to them. However, neither this support nor the assignment of tasks can be properly targeted unless the needs and abilities of cities have been fully integrated during the development of conventions and multilateral environmental agreements. Additionally, the valuable work which cities are already carrying out in addressing air pollution, renewable energy and sustainable transport can only strengthen and improve global policy-making negotiations if a free flow of information is encouraged at all levels. Climate change is already part of daily life – now measures to combat it must become part of cities' formal work programmes and action plans. With the cooperation and support of partners at all levels, including the United Nations, future actions in the cities to reduce emissions will be key to global success in reducing global climate change.

United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol

The UNFCCC is the foundation of global efforts to combat global warming. Its ultimate objective is the stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic [human-induced] interference with the climate system. Industrialized countries commit themselves to adopting policies and measures aimed at returning their greenhouse gas emissions to 1990 levels by the year 2000.

The Kyoto Protocol to the UNFCCC strengthens the international response to climate change. It contains legally binding emissions targets for industrialized countries.

For more information on the UNFCCC and the Kyoto Protocol, please go to <http://unfccc.int/2860.php>

Information and Support

United Nations Environment Programme (UNEP)
www.unep.org

UNEP is the principal environment organization of the United Nations system. It supports governments and their partners to develop and implement environment policies and activities.

United Nations Human Settlements Programme (UN-HABITAT)
www.unhabitat.org

UN-HABITAT is the United Nations agency for human settlements. It promotes socially and environmentally sustainable towns and cities with the goal of providing adequate shelter for all.

Partnership for Clean Fuels and Vehicles (PCFV)
www.unep.org/pcf

The PCFV is a UNEP-led global partnership to promote better air quality in developing country cities through cleaner fuels and vehicles.

Sustainable Urban Mobility (SUM)
www.unhabitat.org/programmes/sustainablecities

SUM is a Sustainable Cities Programme project to promote sustainable urban mobility, focusing on non-motorized transportation.

The World Bank
www.worldbank.org/climatechange

The World Bank incorporates considerations of climate change into all its development operations.

Global Environmental Facility (UNDP, UNEP, World Bank)
www.undp.org/gef/undp-gef_focal_areas_of_action/sub_climate_change.html

The GEF supports activities that protect the global environment, including activities to combat climate change.

ICLEI – Local Governments for Sustainability
www.iclei.org/co2/index.htm

ICLEI's Cities for Climate Protection Campaign (CCP) is a global campaign to support city efforts to reduce climate change.

Eurocities – INTEGAIRE project
www.integaire.org/indexuk.html

EUROCITIES's three-year INTEGAIRE project was designed to help European cities work towards a sustainable solution in which all citizens could enjoy a good quality of life as well as clean air.

CitiesAlliance
www.citiesalliance.org

The Cities Alliance is a global alliance of cities and their development partners committed to improve the living conditions of the urban poor through City Development Strategies (CDS) and slum upgrading.

United Cities and Local Governments
www.cities-localgovernments.org/uclg

United Cities and Local Governments is the global voice of cities and the main local government partner of the United Nations.

Intergovernmental Panel on Climate Change
www.ipcc.ch/

The Intergovernmental Panel on Climate Change (IPCC) assesses scientific, technical and socio-economic information on climate change, its potential impacts and options for adaptation and mitigation.

United Nations University – Zero Emissions Forum
www.unu.edu/zef/

The Zero Emissions Forum works to integrate industrial systems so that the waste products of one industry become inputs for another.

World Meteorological Organization – Atmospheric Research and Environment Programme (AREP)
www.wmo.ch/wmo50/e/wmo/today_pages/arep_e.html

AREP coordinates and encourages research activities in atmospheric and environmental sciences.

World Climate Research Programme (WCRP)
www.wmo.ch/web/wcrp/wcrp-home.html

WCRP focuses on how climate can be predicted and the extent of human influence on climate.



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This brochure is published by UNEP and UN-HABITAT to raise awareness and strengthen initiatives within cities regarding urban-global linkages. With mandates drawn from the UN-HABITAT-led initiative 'Local Capacities for Global Agendas', established as one of the partnership implementation commitments of the World Summit for Sustainable Development (WSSD), the Millennium Development Goals and UNEP's Bali Strategic Plan, both UNEP and UN-HABITAT work to integrate local level perspectives into global policies. Both agencies emphasize the important role of cities at the national, regional and global levels.

Brochures are also available on Cities and Biodiversity, and Cities and Coastal Zone Pollution.

June 2005

Climate Change The Role of Cities

involvement
influence
implementation



Climate change is a global phenomenon. Rising global temperatures will result in disturbed weather patterns and a rise in sea level. Urban centres are strongly affected by climate change. However, cities are also a key contributor to climate change, as city activities are the main source for carbon dioxide (CO₂) emissions. If global efforts to address climate change are to be successful, they will need to integrate city requirements and environmental management capacities. Only with a coordinated approach and actions at the global, regional, national and local levels can success be achieved. Many cities are now taking the initiative to reduce their impact on the global climate.

Local capacities for global agendas

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Human activities are releasing greenhouse gases into the atmosphere. Carbon dioxide is produced when fossil fuels are used to generate energy and when forests are cut down and burned. Methane and nitrous oxide are emitted from agricultural activities, changes in land use, and other sources. Transport, industry and households — all concentrated in urban centres — are among the key sectors which release greenhouse gases. Artificial chemicals called halocarbons (CFCs, HFCs, PFCs) and other long-lived gases such as sulphur hexafluoride (SF6) are released by industrial processes. Ozone in the lower atmosphere is generated indirectly by automobile exhaust fumes and other sources.

Rising levels of greenhouse gases are already changing the climate. By absorbing infrared radiation, these gases control the way natural energy flows through the climate system. In response to humanity's emissions, the climate has started to adjust to a 'thicker blanket' of greenhouse gases in order to maintain the balance between energy arriving from the sun and energy escaping back into space. Observations show that global temperatures have risen by about 0.6 °C over the 20th century. There is new and stronger evidence that most of the observed warming over the last 50 years is attributable to human activities.

Global climate change and cities

Climate change has severe impacts world wide, both on rural areas and on urban centres. Extreme weather conditions threaten human health and productivity, and natural disasters

such as flooding, wildfires and cyclones increase. More than half of the world's population now lives within 60 km of the sea, and three-quarters of all large cities are located on the coast.

Melting ice caps will result in a rise in sea level which will threaten coastal infrastructure, while a thaw will reduce the stability of cities located on permafrost. The provision of water, sanitation and energy are all affected. Climate change leads to changes in the natural habitat, which facilitate the spread of vector-borne diseases such

as malaria and dengue fever. Climate change also affects local and regional weather patterns, which can have effects on agricultural outputs and may result in food shortages in cities.

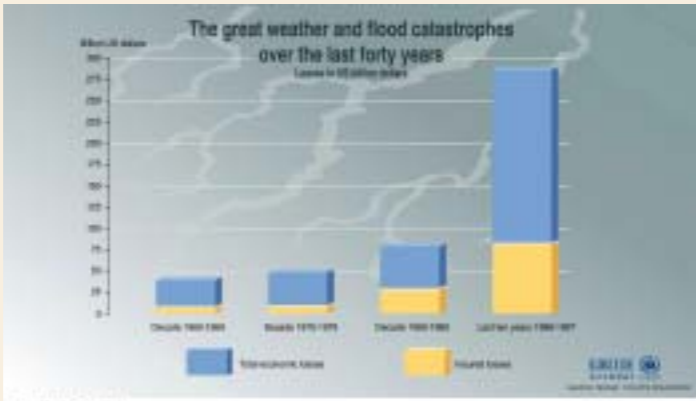
Rising temperatures also result in increased energy use, especially in cities where temperatures are already higher than in the surrounding rural areas due to large expanses of concrete and pavement. Loss of green cover in cities in the form of parks, trees and agricultural land raises urban temperatures, as well as contributing to climate change.

How cities add to climate change problems

Urban activities generate close to 80 per cent of all carbon dioxide (CO₂) as well as significant amounts of other greenhouse gases. Direct sources of greenhouse gas emissions include energy generation, vehicles, industry and the burning of fossil fuels and biomass in households. Emissions from vehicles and transport equipment are rising at a rate of 2.5 per cent each year, and contribute not only to CO₂ emissions, but

also to local and regional pollution problems through the emission of carbon monoxide, lead, sulphur oxides and nitrogen oxides. The electrical energy for public lighting and transportation, and industrial, commercial and household consumption, is also a source of emissions. Industry is responsible for 43 per cent of the global CO₂ emissions from fossil fuel combustion.

In addition, a reduction in the amount of green cover in urban areas reduces a city's ability to reabsorb CO₂, and poor waste management releases CFCs and gases such as methane into the atmosphere.



Economic damages from weather related disasters have increased in recent decades, although this may be due to more people living in vulnerable areas.

Map by Philippe Rekacewicz, UNEP/GRID-Arendal, Norway and Le Monde diplomatique, Paris

How cities can contribute to a solution

Cities around the world do, however, carry out a vast range of activities related to increased energy efficiency, improved air quality and public health. The introduction of renewable energy, cleaner production techniques and the establishment of regulations to control industrial emissions contribute directly to the reduction of CO₂. An emphasis on energy efficient housing and construction, focusing on simple measures such as solar water heating, adequate insulation, double glazed windows and improved architectural designs for heating or cooling can dramatically reduce the energy consumption of a city's housing



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stock. City efforts to diminish traffic or to improve traffic flow, and to improve public transport are just some local authority actions which make a measurable difference to CO₂ emissions. Actions to address air pollution, such as measures to reduce vehicle emissions and promote non-motorized transport, also reduce CO₂. Many city activities, whether focused on local health, economic or environmental improvements, contribute significantly to the control of CO₂ emissions, and to the improvement of the planet's health as a whole. By linking current initiatives in these fields to climate change activities at the global level, cities can tap into global support for climate change actions. Often, a clearly defined climate change component in a city's programme of work can mobilize useful seed funding for a range of actions.

Networking

City networks provide local authorities with support, and with a forum for the exchange of information with other cities. ICLEI-Local Governments for Sustainability operates a Cities for Climate Protection (CCP) campaign, which sets out five performance milestones, and provides cities with the tools necessary to meet each of these milestones. The campaign has a membership of some 500 local governments around the world, representing eight per cent of global greenhouse gas emissions. When the CCP campaign was first introduced, many local governments were able to promote the programme to their decision-makers on the strength of co-benefits such as reduced energy costs, improved quality of life and economic development. Today, more municipalities are participating under the mantle of global stewardship and the desire to be part of an international effort.

Global mean sea level is projected to rise by 9 – 88 cm by the year 2100. More than half of the world's population now lives within 60km of the sea and some of the most vulnerable regions are the Nile delta in Egypt, the Ganges-Brahmaputra delta in Bangladesh, and many small islands including the Marshall Islands and the Maldives.

World Health Organization, Fact sheet N° 266, revised December 2001



A one metre rise in sea level would have a very serious effect on Egypt's coastline. Map by Otto Simonett, UNEP/GRID-Arendal, Norway

In Adelaide, Australia, methane captured from landfills is being used to generate 15 gigawatt-hours of electricity, enough to power 5,000 homes, and offsetting the fossil fuel previously used.

Querétaro, Mexico, replaced 10,000 high wattage street lights with more efficient lamps, cutting CO₂ emissions by nearly 4,000 tonnes per year.

ICLEI, *Local Strategies for Accelerating Sustainability: Case Studies of Local Government Success, 2002*

An electricity plant in the town of Palenciana, Spain, uses olives as a source of renewable energy. Olive residue is turned into biomass, which is then burnt to generate electricity and heat. The Palenciana plant currently produces enough green electricity for 27,000 households. According to the World Wildlife Fund and the European Biomass Association, 15% of electricity in OECD countries — enough to supply 100 million homes — could come from biomass by 2020. This could cut CO₂ emissions by about 1,000 million tonnes each year, an amount equivalent to the combined annual emissions of Canada and Italy.

World Wildlife Fund, http://www.panda.org/about_wwf/what_we_do/climate_change/stories/news.cfm?uNewsID=13254

In 2004, the Municipality of Olavarria, Argentina, embarked on a new project to recover gases emitted by the municipality's sanitary landfill. These gases are among those that contribute to climate change and global warming. The Olavarria Landfill Gas Recovery Project will capture and destroy the landfill gases through flaring. The resulting reductions in landfill gas emissions will be monitored, verified, certified and sold as verified greenhouse gas emission reductions to the Community Development Carbon Fund (CDCF).



Michael Smith/UNEP/Still Pictures

World Bank press release, 9 December, 2004

Regional thematic networks such as the Clean Air Initiative for Asian Cities and Eurocities' INTEGAIRE project provide cities with a platform for participation in decision-making at the regional and global levels. In the case of INTEGAIRE, for example, the three-year project was designed to respond to European cities' desire to work towards a sustainable situation in which all citizens could enjoy a good quality of life as well as clean air. The project allowed cities to influence the European agenda on air quality and a good cooperation was established between the European Commission and the cities.

Global support

Local activities which contribute to global environmental solutions and multilateral environmental agreements (MEAs) can have considerable benefits for a city. The World Bank's Community Development Carbon Fund, for example, will purchase certified greenhouse gas reduction credits. While a local government planning to buy a new fleet of eco-friendly buses will not be able to finance the fleet purely from the Carbon Fund, it may be able to mobilize some support from the Carbon Fund which will in turn help the city to leverage additional funding elsewhere.

Cities may also choose to address climate change issues through their participation in United Nations programmes such as UNEP and UN-HABITAT initiatives which result in the direct and indirect reduction of climate change gas emissions. Examples of such initiatives are the joint UNEP/UN-HABITAT Sustainable Cities Programme (SCP), promoting sustainable urbanization at the local and national levels, SCP's Sustainable Urban Mobility Partnership for Clean Fuels and Vehicles (PCFV), which is a global programme to reduce the emissions from vehicles, and UNEP's activities to develop cleaner production policies, strategies and practices.

The Global Environment Facility (GEF) also addresses climate change. For example, a GEF component focuses on strengthening the enabling environment so that countries can more effectively implement commitments made as Parties to the United Nations Framework Convention on Climate Change (UNFCCC). GEF also provides support to the identification and development of tools and methodologies to reduce greenhouse gas emissions. All these tools are useful to local as well as national authorities. The UNEP/GEF-supported Solar and Wind Energy Resource Assessment, for example, can provide local authorities with an overview of their locality's capacity for solar or wind energy generation. Cities approach their local GEF Focal Points for assistance in developing GEF-funded projects, or they can also make contact with UNEP-GEF for advice.

A variety of other tools, publications and programmes is also available to cities from international organizations working in fields such as urban planning and management, climate change and air pollution.

How cities can influence the development of global policy

The inclusion of experiences in climate change activities at the city level improves national policies, and results in a better understanding of the capacities and needs of both the local and national levels. This leads to more targeted support and improved policy implementation, as city experiences are an important resource for decision-makers at the national level. City



Permdhai Veismaporn/UNEP/Still Pictures

UNEP's Solar and Wind Energy Resource Assessment (SWERA) team has assessed wind and solar energy resources using a range of data from satellites and ground-based instruments — often with surprising results. In Nicaragua, for example, SWERA assessments of wind resources demonstrated a much greater potential than the 200 megawatts (MW) estimated in the 1980s. The results prompted the Nicaraguan National Assembly to pass the Decree on Promotion of Wind Energy of Nicaragua 2004 that gives wind generated electricity 'first dispatch', meaning it has the first priority over other options when fed into electricity grids. The US Trade and Development Agency and Inter-American Development Bank have subsequently launched wind energy feasibility studies in Nicaragua, and wind investment projects are now advancing with 40 MW planned in two projects and two more exploration licenses granted.

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Kevin Lane/UNEP/Still Pictures

participation in national level meetings ensures that information flows freely between the two levels. The process of decentralization can also ensure that local level activities and expertise are recognized, supported and utilized.

By integrating climate change issues into policy documents such as City Development Strategies (Cities Alliance) or Poverty Reduction Strategy Papers (International Monetary Fund, UNDP, World Bank), and by participating in UNEP's Global Environment Outlook (GEO) process in cities, local governments can ensure that such issues are included in local and national development strategies from the start. The GEO Cities process is designed to analyse the state of the urban environment, and to assess the effects of cities on the local, national and global environment.

In addition, taking part in organizations such as United Cities and Local Governments (UCLG) and Metropolis allows cities to speak with one voice from a global platform. UCLG is the global voice of cities and the main local government partner of the United Nations, spearheading the United Nations Advisory Committee of Local Authorities (UNACLA).

National governments can use their cities' experiences to improve global policies for climate change. Participation in intergovernmental meetings allows concrete experiences from the city level to feed into and inform global policies. With the