

Climate Change: Implications for Cities

Key Findings from the
Intergovernmental Panel on Climate Change
Fifth Assessment Report

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Local
Governments
for Sustainability

Climate Change: Cities & Rising Temperatures

Climate change impacts are projected to raise **global average surface temperature 2.6–4.8°C** by 2100.

Home to a large proportion of global population and vulnerable economic activities, **cities concentrate many climate change risks.**

The world's urban population is forecast almost to double by 2050. **Climate change impacts on cities are increasing**, and present threats to commerce, business and livelihoods.



Global urban areas contain:

- More than half the **world's population**
- Most **built assets**
- Most **economic activities**

Climate Change: Impacts on Environment

climate
everyone's
business

Temperature rise threatens:

- Urban temperatures **2.5–4°C higher** than pre-industrial levels
- More frequent **hot days and warm spells**
- **Urban heat island** effects, causing heat-related health problems and air pollution

Rising sea-levels and ocean acidity threaten:

- Sea levels **0.45–0.82m higher**
- Impacts on **low elevation property, coastal vegetation and ecosystems**
- Changes in seawater temperature, pH, and oxygen levels **decreasing production of fish and shellfish**



Low-elevation coastal zones are 2% of the world's land, but contain **two-thirds of large cities** and **600 million people**.

Climate Change: Impacts on Weather

Drought impacts include:

- Reduced **arable land productivity**
- **Lower crops yields** of wheat, rice, and maize
- Insecure **freshwater availability**
- Decreased **hydropower electrical production**
- Risks for **power station cooling**
- Increased **water-related diseases**

Extreme weather events include:

- **Flooding**
- Heavy **rainfall** and strong **winds**
- Increased **cyclones** and **storm surges**

City development over natural drainage channels and flood plains **may exacerbate urban flooding**, increasing the speed and volume of runoff, or by a failure to maintain drainage channels.



Climate Change: Risks to Urban Areas

Urban area risk levels for climate change hazards **will increase over the near-term.**

By 2050, some urban areas will be exposed to a temperature rise of 2.5°C, and **in some cases over 4°C.**

Key issues for cities include:

- Rising temperatures
- Heat stress
- Water security and pollution
- Sea-level rise and storm surges
- Extreme weather events
- Heavy rainfall and strong winds
- Inland flooding
- Food security
- Ocean acidification



Extensive port facilities and large-scale petro-chemical and energy-related industries are especially vulnerable to flooding risks.



Climate Change: Implications for Cities

Well-governed cities with **universal provision of infrastructure and services** provide a strong base for building climate resilience.

Many rapidly developing cities lack the financial, technological, institutional and governance capacity required for effective mitigation. **Impacts may worsen access to basic urban services and the quality of life.**

City sectors with mitigation potential:

- **Buildings**
- **Energy**
- **Transport**
- **Industry**



Adaptation will become progressively more difficult for every degree of temperature rise.

Climate Change: Resilience (1/5)

Resilience and adaptation options exist in areas such as:
water, food, energy and transport.



- **Water security:**
 - Strengthened, distributed, and autonomous water management and treatment**
 - Encouraging **water recycling**
 - Use of **greywater**
 - Improved **storm and runoff management**
 - Developing **new/alternative water sources**
 - Expanding **storage facilities**
 - Expanding capacity for **water-independent energy generation**



- **Food security:**

- Support for **urban and peri-urban agriculture**

- Widespread **green roofs, local markets, and social safety nets**

- Improving the **efficiency of urban markets**

- Promoting **farmers' markets**

- Investing in **infrastructure and production technologies**

- Supporting **streetfood vendors**

- Access to **cheaper food**

- Measures like **cash transfers**

- Develop **alternative food sources**

- Strengthen **alternative foodstuffs distribution logistics**

- Introduction of **inland aquaculture**



- **Housing:**

Good quality, affordable, well-located housing to provide a strong base for city-wide climate change adaptation that **minimises current exposure and loss.**

- **Rising temperatures:**

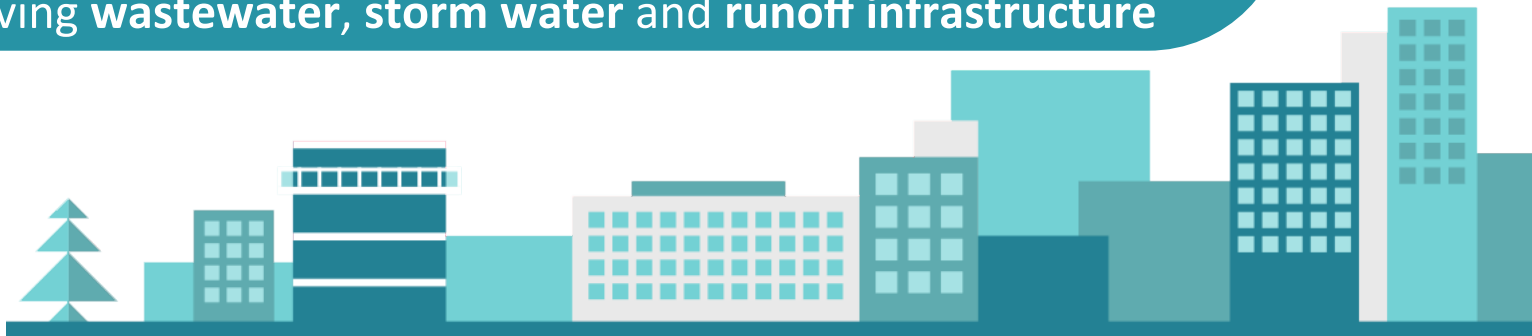
Green zones, wind corridors, green roofs, and water features – especially for schools, retirement facilities, and hospitals.

- **Basic services:**

Establishing resilient systems for **water supply, sanitation, storm water drains, electricity, transport, telecommunications, health care, education, and emergency response.**



- **Rising sea levels and storm surge:**
 - Construction of **barriers, floodgates, and dikes**
 - Rezoning and upland expansion**
 - Relocation of **critical services**
 - Improving **early warning, evacuation, and crisis response**
 - Development of **alternative intra-coastal transport routes**
 - Capacity in **non-coastal, distributed energy generation**
- **Extreme weather and inland flooding:**
 - Distributed, resilient **energy, healthcare, and command services**
 - Strengthening **public transport infrastructure**
 - Stockpiling **fuel, water, and food**
 - Improving **building standards**
 - Improving **wastewater, storm water and runoff infrastructure**



Climate Change: Resilience (5/5)

- **Planning:**

Local, sub-national, national and international development policies can provide benefits at all scales.

- **Funding adaptation:**

Local revenue raising policies (taxes, fees, charges)

The use of **local bond markets**

Public-private-partnership (PPP) contracts and concessions

National or local financial markets

National (or state/provincial) revenue transfers or incentive mechanisms

Market-based investments

Grants and concessional financing



Climate Change: Mitigation Potential (1/3)

The best plan for advancing **sustainable urbanisation** and **low carbon development**, especially in fast-growing parts of the world, **requires political will** and **institutional capacity**.

- **Energy Supply**

Low-carbon technology: **renewables, nuclear, or carbon capture and storage**
Switching from coal to gas as a bridging solution

- **Transport**

Reducing emissions by **avoiding journeys**

Shifting to **low-carbon transport systems**

Enhancing **vehicle and engine efficiency**

Substituting **natural gas, biofuels, electricity, or hydrogen** power for oil



Climate Change: Mitigation Potential (2/3)

Urban form and **infrastructure** significantly affect GHG emissions. They are strongly linked to the **use of materials and energy** in a city, **waste generated**, and **system efficiencies** of a city.

- **Buildings**

Retrofits to reduce heating energy requirements in existing buildings
Virtually eliminating emissions for new buildings

- **Energy Demand**

Increasing **efficiency of buildings, appliances** and **distribution**
Changes in **awareness and energy using behaviour** of residents
Demand may be reduced by **20% in the short term** and **50% by 2050**



Climate Change: Mitigation Potential (3/3)

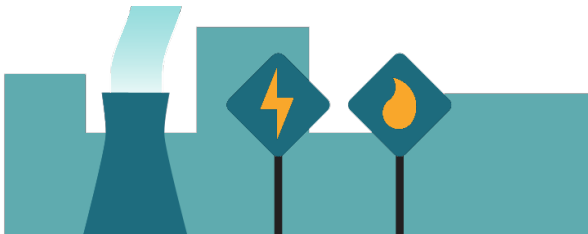
Energy use in human settlements mainly concerns urban areas. **Cities account for about 71% of energy-related CO₂ emissions**, but only 37-49% of global GHG emissions.

■ Low Carbon Cities

Urban regeneration through **compact, mixed-use development**
Promoting **transit, walking, and cycling**
Adaptive **reuse of buildings**
Rehabilitation and/or conversion to energy-efficient building designs

■ Policy Instruments

Co-locating **high residential with high employment** densities
Achieving **high land-use mixes**
Investing in **public transit**





For more information

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