



## Hot Times in the City: The Impact of Climate Change in an Increasingly Urban World

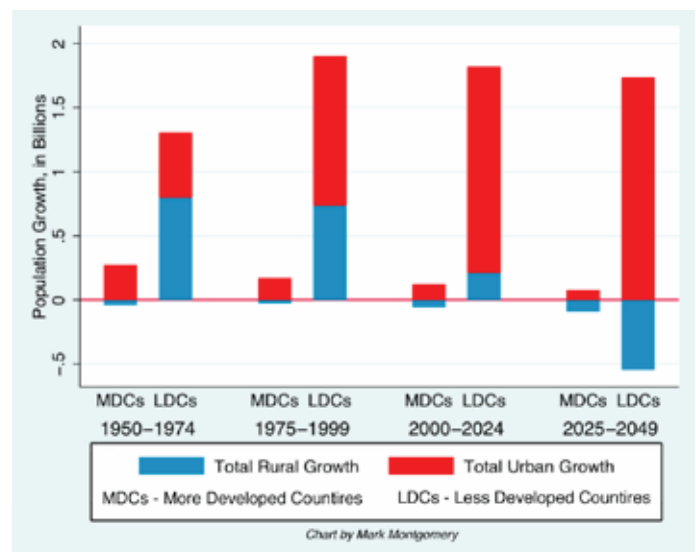
While scientists continue to study the pace and consequences of climate change, the overwhelming consensus in the scientific community is that increased emissions, particularly higher carbon dioxide concentrations, are affecting our atmosphere and climate. Since the 1950s, the level of carbon dioxide has risen from 316 parts per million (ppm) in 1959 to 385 ppm in 2008 (Keeling, et al., 2009).

A direct outcome of increased emissions is climate change—especially rising average global temperatures. If temperatures continue to rise, scientists expect increasingly unpredictable and severe weather, including stronger storms, and more frequent and more damaging floods and droughts. Scientists are focusing on two primary strategies to address climate change and its impacts: mitigation and adaptation. Population scientists are contributing to these efforts by studying: 1) the impact of demographic changes on future emissions; 2) populations most vulnerable to climate change impacts; and, 3) possible strategies for reducing susceptibility to natural disasters and long-term climate changes.

### Location, location: future population growth and urban population trends

Between 2007 and 2050, the world's population is expected to grow by 2.5 billion, with cities and towns in developing countries absorbing almost all of these additional people.

According to the United Nations Population Division, by 2030, more people in the developing world will live in urban than rural areas; by 2050, two-thirds of the population is likely to be urban. In developing countries, almost all new growth will be in smaller cities rather than “mega cities” (cities with populations in excess of 10 million people). Typically, mega cities have more resources and infrastructure and are better prepared than smaller cities to respond to natural disasters. Thus, residents in smaller cities, where most of the predicated future growth will occur, will be more vulnerable to the impact of natural disasters than their “mega city” counterparts.



**The location of these cities influences their vulnerability.** To date, most attention has focused on threats to coastal urban areas. The focus is warranted, but maybe overstated. While coastal cities are more densely populated than arid cities, more urban dwellers live in arid cities than in other ecozones—a fact confirmed when comparing data from three continents, Africa, Asia, and South America (Balk, et al., 2010).

### Three continents compared: urban coastal and arid zones

The percentage of urban dwellers who live in arid zones is much greater than those who live in coastal ones.

Both coastal and arid zones are susceptible to warming and flooding. Population scientists argue that policymakers should prioritize the needs of small and medium-sized cities in arid and coastal regions when considering potential climate change impacts. Further, policymakers should focus efforts on reducing vulnerability in Africa and Asia where

most future population growth will occur. Given the poor economic state of many countries in these continents, population scientists also suggest that contingency planning should consider the socioeconomic profile of the people and their needs when preparing for the possibility of natural disasters induced by climate change.

### Impact of demographic change on carbon emissions

Another unique way in which population scientists are contributing to climate change research is by modeling how demographic changes may affect carbon emissions.

They have concluded that demographic changes, including population size and age, matter in analyzing future energy demands and emissions. Specifically, population research has determined that:

- Aging can significantly reduce emissions, particularly in industrialized countries, by slowing the growth of the labor force, and, therefore, the economy and the rate of energy use.
- Urbanization can significantly increase emissions in developing countries because urban populations *typically* contribute to a faster growing economy.

Slower population growth cannot solve the climate problem, but it can help mitigate it. The largest reduction in emissions should occur after 2050, but even by the middle of the century slower population growth could reduce emissions by as much as 2 billion tons of carbon per year.

### Future research

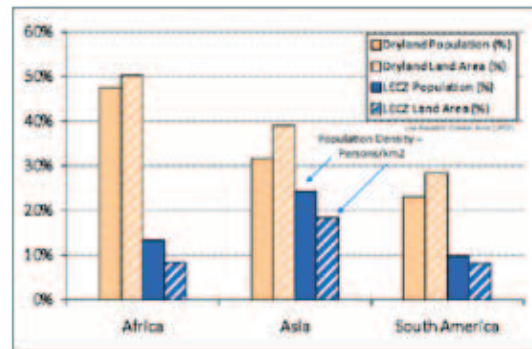
Population scientists believe there are many unanswered questions related to climate change that their field is uniquely positioned to address. These questions include:

- Where within cities will future growth occur? Slums? Suburbs? Providing accurate data about future urban growth patterns will inform state and local governments on where to direct services.
- How will socioeconomic inequalities exacerbate the impact of climate change natural disasters and how can these inequalities be considered?

To do their jobs effectively, scientists and policymakers alike need more data for research and evidence based decision-making. For example, in developing countries, more data and local expertise are needed for spatial measurement of exposures (floods, storms, and droughts) as well as more information about at-risk economic assets.

Researchers rely on funding from the public and private sectors. To maintain and expand research on the socioeconomic and health impacts of climate change, the U.S. government, through agencies such as the National Science Foundation and National Institutes of Health, should support more research linking social scientists, such as demographers and other population scientists, with bio-geophysical scientists, and encourage more international collaboration between U.S. and developing country researchers.

### Three Continents Compared: Urban Coastal and Arid Zones



- Coastal cities are denser than arid ones: 991 vs. 490, global average.
- Asia and Africa are much different from one another.
- The percentage of urban dwellers who live in arid zones is much greater than those who live in coastal zones.

