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Megacities Face Mega Problems

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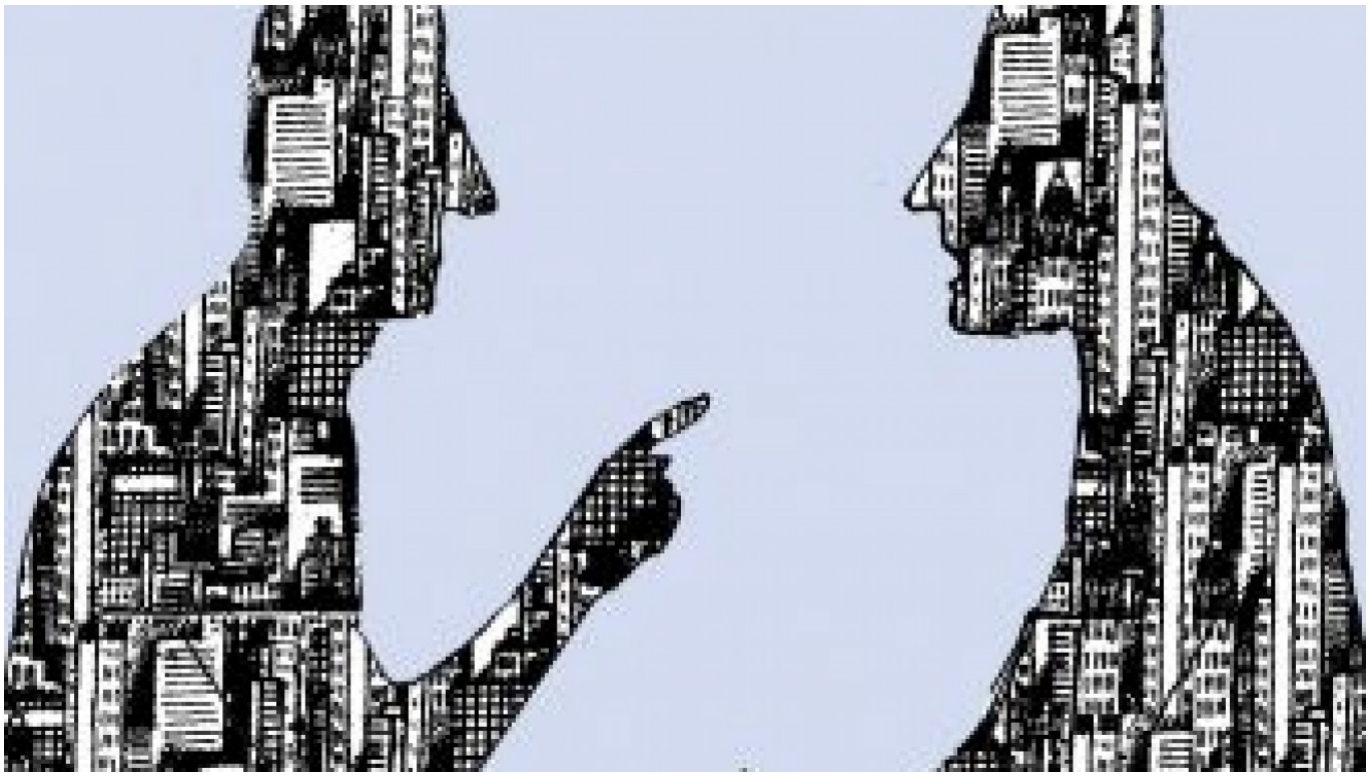

One of the most striking changes at last week's Rio+20, when compared with the original 1992 Earth Summit, was the extensive discussion of population issues. In part, this reflects the fact that many developing countries, including the BRICs, are seeking to redefine what sustainability means in light of their generally rapid annual growth rates and high population growth. It is estimated that the world's population will rise from about 7 billion today to between 8 billion and 11 billion by 2050.

This reminds us of the massive challenges, especially in the developing world, created by an ever-increasing number of humans on the planet.

Growing populations are also driving another mega trend: urbanization through migration. In 1800, less than 3 percent of the population lived in cities, yet by the end of 2008, this had risen to more than 50 percent. And there are 26 megacities (cities of 10 million or more inhabitants), including Rio and, of course, Moscow.

Despite the economic success of megacities, governments at every level are preparing for the growing risks that these massive urban centers pose. It is therefore fitting that one of the

focal points of Rio+20 was laying the foundations for a more sustainable development model for megacities and other large urban areas.

Key questions to be addressed include whether it will be possible to continually meet the everyday needs of food, water and health and also deal with the growing vulnerability of megacities to environmental stresses exacerbated by the effects of climate change.

There is already cause for some alarm. For instance, the 2003 heat wave in Paris was so devastating because both the public and the authorities were unprepared for dealing with such extreme weather conditions, which were exacerbated by building practices, especially the lack of air conditioning. Moreover, the tsunami in Japan last year forced Tokyo to reconsider its approach to nuclear power and to protecting its cities.

During the 21st century, megacities across the world will continue to grow, as will other large urban conglomerations that have megacity features. Energy demands will thus increase, since supplies of food, water and resources for industries and infrastructure require energy for transportation.

The associated increased carbon emissions are contributing to global warming and pose their own climate risks. In China, where people are being subsidized to move from the countryside, cities have grown by a factor of two in only five years. The urban "heat island" effect means temperatures are increasing about three times faster than the rate of temperature rise over global and national land areas.

The main risk for riverine megacities on coastal plains is their increasing vulnerability to rising sea levels and river flooding. There will be further episodes such as the one in New Orleans seven years ago, when it was hit by Hurricane Katrina without adequate protection and flood warning systems.

In at-risk countries, such as the Netherlands, researchers are preparing for these types of problems. For instance, Delft University's hydraulic engineering department has been developing a state-of-the-art early-warning and monitoring system to protect coastal communities.

The larger the urban area, the greater the damage that natural hazards can inflict. And increasingly, it may be impossible to protect life and property even if there is a perfect warning system. As a major hurricane in Houston showed last year, despite the known dangers from combined hazards such as winds and floods, there is now insufficient time to evacuate some cities safely, even highly developed ones.

So there is a pressing need for cities to develop emergency refuge areas. In some cases, these may already exist. For instance, Canvey Island in England still keeps its mound in case severe floods like those of 1953 return.

In most cases, however, refuges will need to be built from scratch. Thus, engineers and planners are considering how to identify and design such emergency centers, whether outside or within buildings, and how these should be connected to the wider urban system, including transportation.

Training populations to use the centers effectively is also essential. Refuges have successfully withstood cyclones and floods in Bangladesh and, unlike those in some other developing countries, have been used by vulnerable communities, because they could take their vital farm animals with them. Without the animals, they are destitute.

Emergency energy supplies for communities that are essential for medical emergencies should improve in the future.▣This is especially true of the use of advanced solar power, which is effective even in cloudy conditions.

Because of the failures to deal with some of the recent hazards affecting megacities, governments at every level are planning for multiple hazards and developing strategies for managing the range of environmental factors that could emerge. Moreover, other research teams are collaborating in construction of "system dynamics" models for the operation of infrastructure, environment and socioeconomic aspects of megacities.

These models resemble well-known computer programs for global climate change and its interconnections to economic developments. As with Delft University's coastal monitoring system, these will help cities to predict which hazards they face and help them decide how to prepare.

The London Mayor's Office is taking a particular interest in which policy options emerge as London continues to expand. Meanwhile, several cities are experimenting with air-quality-hazard indicators based on complex system models to apprise citizens about how the environment in their cities varies hourly and over the longer term.

What these models need is improved availability of relevant environmental and socioeconomic data. Here, international agencies such as the World Health Organization and the World Meteorological Organization, as well as national governments, need to collaborate with a wider range of organizations and make maximum use of new media.

This will enhance data showing how people experience both rapidly occurring hazards such as tornadoes, and slower, but still deadly, phenomena such as loss of crops from rising sea levels and salt penetration.

Fortunately, megacities have a global organization for information exchange and collaboration called C40 Cities. The future agenda here includes improving intercity cooperation on policies for dealing with hazards and putting more pressure on national governments to assist, especially with finance and data, the strategic priorities.

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