THE LONG, HARD JOURNEY: EXPANDING THE USE OF NASA DATA AND MODELS FOR SUSTAINABLE DEVELOPMENT PLANNING AROUND THE WORLD

Maudood Khan[1], Ashutosh Limaye[1], William Crosson[1], Alper Unal[2], Nancy Kete[2], Douglas Rickman[3]

[1]*Universities Space Research Association (USRA), Huntsville, AL*
[2]*EMBARQ, World Resources Institute (WRI) Center for Sustainable Transport, Washington, DC*
[3]*NASA-Marshall Space Flight Center, Earth Science Office, VP61, Huntsville, AL*

Abstract

In 2007, the National Research Council's committee on Extending Observations and Research Results to Practical Applications recommended that NASA's Applied Science Program (ASP) directly engage with a broader community of users – not just federal agencies. Soon afterwards, scientists at the NASA Marshall Space Flight Center began discussions on a collaborative research project with EMBARQ – the World Resource Institute's Center for Sustainable Transport. The discussions initially focused on how best to utilize satellite observations and atmospheric models for assessing the impact of a proposed transportation project on land use and air quality. Discussions exposed the participants to a broad spectrum of science and policy challenges that these diverse organizations face on a routine basis. It brought into clear focus the need for an observation-modeling system that will allow a proactive approach towards development planning, and the fact that satellite systems do not always provide the spatial and temporal resolution useful for urban-scale applications, underscoring the need for earth system models to bridge this gap. Realizing the significant risk that unplanned urbanization and climate change pose to the social and functional stability of large cities, both organizations decided to expand the scope of their preliminary discussion to include water resources and agriculture. A pilot project, funded by NASA ASP, EMBARQ and Istanbul Technical University focused on quantifying the magnitude and extent of urbanization in Istanbul, and analyzed the combined effect of urbanization and projected climate change on local climate, air quality, and its consequent effects on agricultural productivity. Preliminary results show that Istanbul has undergone a significant amount of Land Use/Land Cover change over the past two decades. While some forested areas have been lost to urban landscapes, urbanization has mostly occurred over former croplands due to the fact that in contrast to forested areas, croplands have flat terrain, making them a more attractive target for conversion to urban land. The reduction in land area for agricultural and increase in temperature has reduced agricultural production in the vicinity of the city.

The United Nations expects the world population to reach 9.2 billion by 2050. Most of this increase will be absorbed by countries that are least able to sustain it. Rapid economic growth is likely to continue and will require massive infrastructure investments. If not properly managed, the magnitude and extent of these initiatives will overwhelm sensitive ecosystems around the world. Successful relationships such as the one described here are critically important if we are to stabilize the threatened ecosystems on which human systems ultimately rely. The challenges, needs, culture, and operating environment of development planning organizations are fundamentally different from a research organization. An appreciation of these differences is a prerequisite for any successful collaboration.