

# **The development of Climate Change Impact Assessment Toolkit for Urban Policy Makers**

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## **Abstract**

The urban areas of Asia are growing and will, in all likelihood, continue to grow at a rapid rate. This process could result in unprecedented risks to urbanized populations from climate change impacts, such as sea level rise, storm surge, extreme rainfall and temperature events, and cascading secondary effects. There is an urgent need from urban planners and policy makers for information of integrated climate change impact assessment results in order to make science-based future city development decisions. This study introduces the development of a policy-making support toolkit that focuses on the core issues of adaptation, mitigation, risk, and economics of climate change and how they interrelated with aspects of water, energy, the built environment, transport, waste, and ecosystems at urban scale.

The objective of the toolkit is to become an integrated climate change impact assessment tool for urban policy makers, which will allow them to assess the costs and benefits of mitigation and adaptation measures in light of the local development opportunities and constraints pertinent to the city, including for example, pollution problems and expected climate variability. To best serve the decision support purpose, the proposed toolkit must be simple to use and is required to be flexible and utility oriented.

Urban area is a complex dynamic system. The planning of its future development involves the processing potentially a large amount of data, and consideration of cross sector effects. Compared to the assessment of the biophysical impacts from climate change, the socio-economic consequences of such impacts is even more difficult to analysis but is exactly the information that more relevant to urban planning.

The nature of a city as a complex dynamic system necessitates a systematic approach to assess its future under climate change impact. The system dynamics theory provides the scientific foundation for building such a powerful toolkit for such purpose. System dynamics is a computer-aided approach for policy analysis and design that applies to problems arising in complex social, managerial, economic, or ecological systems. The approach is appropriate for any dynamic system characterized by interdependence, mutual interaction, information feedback, and circular causality. System dynamics method has gain great substantial benefits from the fast advancing of computer science and technology. It is possible now to build high-efficient model with intuitive graphical user interface to support complex dynamic system simulation. The focus of the system development is on the conceptual structure based on existing concepts before mathematical details. In fact, many of the details can be encapsulated during software engineering, which makes the system easy to understand and use.

It is expected that the deployment of the toolkit will speed up climate change impact assessment in urban area; facilitate interpersonal communication and learning; reveal new approaches to the formulation of problems and generate new evidence for decisions; and encourage exploration and discovery on the part of the decision maker. It will help to address the climate change issues appropriately and mainstream then into the policy making and planning process for maximizing the values of human well-being.