Urban economic simulation tool to support climate change adaptation

In rapidly growing cities in the Developing South, an increasing proportion of poor urban households live in informal settlements located in areas that are prone to flooding. The World Bank Research Group received funding from John Hopkins University to create new knowledge products to support urban policies for climate change adaptation in developing countries, given the high degree of vulnerability to adverse impacts of climate change faced by cities in developing countries across the world.

The Research Group's leader, Dr Harris Selod – in partnership with the Paris-based Centre for International Research on the Environment and Development – commissioned Claus from PDG to help develop a granular land use and transportation integrated simulation model spatially calibrated to Cape Town. The model makes it possible to assess specific city structure responses to climate damages at a more granular (i.e., city district or even small neighbourhood) level. The model relies on standard urban economics land-use theory to study the interactions among transport infrastructures, planning policies and housing demand at the metropolitan scale. Spatial patterns can be modulated by the presence of actual amenities, such as the existence of parks, proximity to the ocean, and landscape characteristics. Planning policies and restrictions (heights limitations for example) may also differ spatially and reflect actual variations throughout the city. The model will thus be able to generate accurate spatial patterns accounting for developing country constraints.

Claus was commissioned to support on this project as he was previously involved in the initial adaptation of the urban economic model ('NEDUM 2D') to Cape Town's fragmented housing market. His role on the project was to evaluate the

spatio-temporal interaction between various flooding processes and informal settlement formation across Cape Town, including inter alia: analysis of long-term rainfall data, derived flood hazard data from 3rd party sources and medium-term flooding incident data from the City of Cape Town. Expert interviews were conducted with City officials and hydrologists from Stellenbosch University. Where flood incident reporting data was sparse due to under-reporting in informal settlement contexts, advanced spatial analytical methods were devised to simulate flood depth and incidence by means of calculating sink depths from a digital elevation model (DEM). Another innovation was to develop a probability layer classifying parcels of vacant land across Cape Town for susceptibility to illegal land occupation over the next twenty years based on the attributes of those parcels, including location, property ownership and adjacency.

Project Leader:
Claus Rabe
+27 21 6711402 / claus@pdg.co.za

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