Green Book
Adapting South African Settlements to Climate Change

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2019
Urbanisation Challenges in South Africa

- Air pollution
- Climate change
- Urban poverty
- Unaffordable housing
- Exclusion & inequality
- Congestion
- Insufficient public transport
- Unplanned city extension
- Lack of capacity
- Inadequate infrastructure
- Lack of participatory process
- Surging youth
- Ageing population
- Insanitary water
- Informal settlement
- Urban sprawl

Based on UN-Habitat (2018)
Climate change impacts in South Africa

Extreme weather events are becoming more frequent and intense with climate change.

Growing & urbanising population will continue to place pressure on infrastructure & service delivery.

Exacerbate vulnerabilities of communities & place more people at risk of climate induced disasters.
Development and adaptation

Growth can be a catalyst for economic growth but effective planning & policy interventions are needed.

Growing & urbanising population will continue to place pressure on infrastructure & service delivery.

Adaptation planning will be vital to peoples sustainable livelihoods.
Background

Overview and methodology
The purpose of the Green Book is to propose a suite of climate change adaptation actions (with guidelines on how to integrate and implement these) for every settlement in South Africa, based on their individual risk profiles.

- Project is divided into 6 sub-projects (workstreams)
- Project runs from March 2016 – March 2019
- Funded by the IDRC and the CSIR thematic funding
- Involve 50 researchers from BE and NRE in multiple research groups
- NDMC as a project partner
The project focuses on generating scientific evidence, namely climate change projections, vulnerability assessments, population growth projections and hazard footprints, to compile risk profiles and to link adaptation actions to the profiles.

The intended Green Book audience is people in local government involved in spatial planning, land use management, infrastructure development, municipal service provision, growth management, environmental planning and urban design.

The Green Book is being developed as an interactive, dynamic online tool. We will also publish policy briefs, conference papers, journal articles, datasets, maps.

We are currently busy with Workstream 6: Integrating all the findings in the online tool, and preparing for disseminating the findings.

Implementation will only happen after March 2019.
Research design

- Poverty and environmental degradation
- Vulnerability
- Risk
- Exposure
- Poorly Planned Development
- Natural Hazards
- Climate Change
The Green Book methodology is a novel attempt at multi-disciplinary integrated applied science that combines the expertise of 50 CSIR researchers from multiple research fields. Content was co-produced and peer-reviewed by a number of stakeholders from all spheres of government, universities, industry, and government agencies.
C. Value & impact

Anticipated and actual value
Intended value of the Green Book

• Providing a strong scientific evidence base to local government to do long-term planning
• Enable local government to be able to conduct risk and vulnerability assessments in-house
• Building local government adaptation planning capacity
• Use existing planning tools and processes to support local government planning to create resilient settlements

Knowing what change to adapt for and how to adapt for this change is of critical importance to decision makers involved in the planning and design of human settlements.
Intended value of the Green Book

• The Green Book supports legislative compliance as well as the implementation of various national strategies
  • Climate Change Bill, 2018
    • Support provincial and local climate change response assessments and implementation plans by providing risk and vulnerability profiles, information to prioritise areas most at risk, and appropriate adaptation actions
  • National Climate Change Adaptation Strategy, 2018
    • Support adaptation planning at national, provincial and at local level in particular, by providing detailed information for risk and vulnerability assessments, appropriate adaptation actions, and guidelines
    • Support capacity building and awareness with a particular focus on local government by potentially offering technical training, and capacity building to mainstream CCA into planning
  • Spatial Planning and Land Use Management Act (SPLUMA), 2013
    • Provide evidence in support of forward planning and the development of national, provincial, regional and local spatial development frameworks
  • Disaster Management Act & Amendment, 2003 & 2015
    • Support compliance to providing evidence for risk assessments and mapping, also providing adaptation measures to reduce risks.
  • DST’s Global Change Grand Challenge Programme
    • Support research under knowledge challenge no.3 i.e research on to preparing for rapid change and extreme events, and planning for sustainable development
Impact of the Green Book

• Evidence featured in the National Spatial Development Framework
• Risk profiles provided for all 9 provinces as part of the STI4SHS Roadmap
• Risk profile provided for the Steve Tshwete Local Municipality, Mpumalanga to support the development of their local climate response plan that is being supported by ICLEI, Urban Lends project
• Findings presented at 6 international conferences, 4 local conferences, 2 keynote presentations, and a number of presentations to government and private stakeholders
• Active involvement in a number of technical working groups and committees
• Support provided to Master students, 2 completed and 2 underway
• Capacity building of researchers
• 8 Proposals submitted resulting from Green Book
Content and capabilities

Research and development
Downscaled climate change projections

Variables
- Average temperature
- Minimum temperature
- Maximum temperature
- Very hot days
- Heat-wave days
- High fire-danger days
- Rainfall
- Extreme rainfall (also a proxy for lightning)
- Wind speed
2050: The Projected Changes in South Africa’s Climate

Legend
- Provinces
- Decrease in rainfall
- Increase in extreme rainfall events
- Significant increase in rainfall
- Increase in temperature > 3°C
- Increase in temperature 2.5°C-3°C
- Increase in temperature 2°C-2.5°C
- Increase in temperature < 2°C

Map showing projected climate changes with different colors indicating increases in temperature and decreases in rainfall across various provinces in South Africa.
Settlement profiling

Settlement Population Growth Pressure (2011 to 2050)

Population Growth Pressure
- Declining
- No Change
- Medium
- High
- Extreme

Socio-economic vulnerability
Economic vulnerability
Physical vulnerability
Environmental vulnerability

Comparative stats

Local Municipality

Town area
- Socio-economic vulnerability
- Service access vulnerability
- Economic vulnerability
- Primary sector dependency
- Regional economic connectivity
- Environmental vulnerability
- Physical Vulnerability

Neighbourhood level
- Socio-economic status
- Settlement fabric

Comparative spider diagrams

Hotspot maps
Hazard & impact profiling

Impact of climate change on:
• Surface water
• Groundwater
• Agriculture
• Economy

Change in intensity, extent & frequency of:
• Fire
• Heat stress
• Flooding
• Drought
• Coastal Flooding

It is projected that Durban is one of the cities where storms and floods will be more intense.

These storms are projected to have a bigger effect on inland areas than they currently have because of sea level rise.
Risk profiles

- All work on climate change, vulnerability, population growth, climate hazards and impacts are integrated to create composite risk profiles for all municipalities and their settlements.
- The risk profiles will be presented as an online planning support tool that provides quantitative scientific evidence on the likely impacts that climate change and urbanisation will have on South African cities and towns.
Typology of adaptation actions

• A typology of adaptation actions, based on municipal planning functions to respond to a range of climate related hazards and vulnerabilities

• It offers win-win, no-regrets and low-regrets options for local government to adapt towns and cities

• Actions are also linked to each other to offer a basket of related, and supportive actions for immediate and long term impact
greenbook.co.za

Online planning support tool

1. Main webpage
   - Information and support:
     - User guide
     - Adaptation planning support
     - Policy implications
     - Project information
     - Resources

2. Story Maps
   - Provide a national overview and methodology for:
     - Climate change
     - Town profiling
     - Hazard assessment
     - Climate change impacts

3. Risk profile tool
   - Interactive online tool for all municipalities and their settlements. Also linked to adaptation actions tool

4. Adaptation actions tool
   - Interactive online tool in support of municipal adaptation planning. Also linked to risk profile tool
Thank you

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