IDRC | CRDI

The Green Book

Livable Cities Forum

13 September 2016

Halifax, Canada

Willemien van Niekerk

CSIR

our future through science

Content of presentation

The Green Book: Planning and design guidelines for adapting South African settlement to climate change

1. The story behind the project
2. The science behind the project
3. Project communication, dissemination and training

IDRC | CRDI

CSIR
our future through science

1. The story behind the project

The story behind the project

Purpose & aim

- The purpose of this IDRC funded project is to the develop a set of guidelines by March 2019 – called the Green Book – to adapt existing and future South African settlements to climatic changes.
- The Green Book is to be used as a planning and design tool by municipalities and others (private, NGOs, educators).
- The Green Book will look at cities holistically and propose differentiated adaptation options for distinctive types of vulnerable settlements with similar types of risk profiles.
- Focus is on settlements smaller than 2 million people, to potentially benefit more than 18 million people as well as many under-capacitated municipalities.
- The application of the guidelines will improve the resilience and reduce vulnerability of at risk populations living in SA settlements.

IDRC | CRDI

CSIR
our future through science

The story behind the project

Rationale

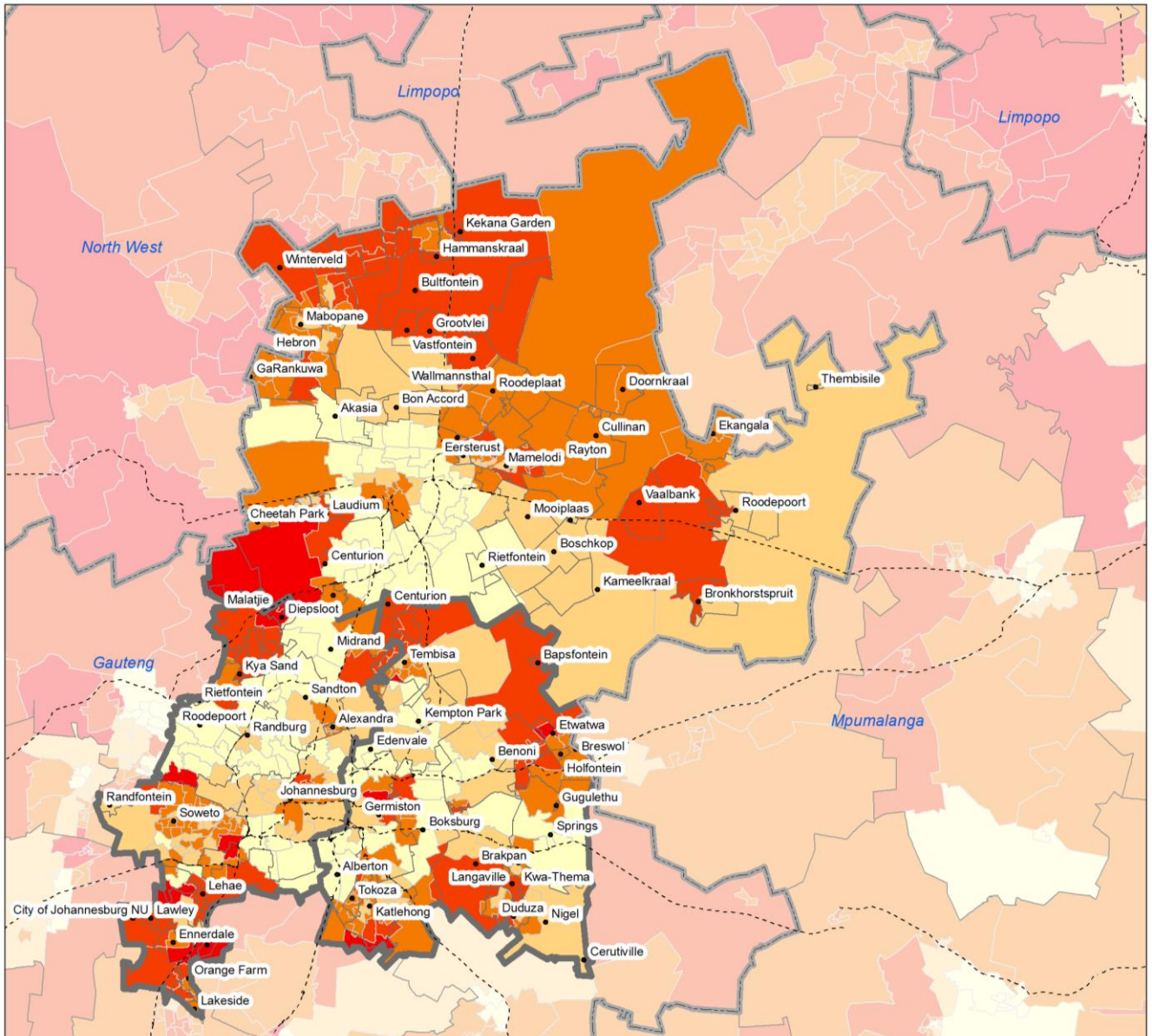
- The rate of urbanisation in SA has increased since the 1990s with an extraordinary increase in absolute number of urban dwellers. 7 million more people are to be added to SA settlements by 2030.
- SA settlements developed in maladaptive ways due to unsustainable and unequal spatial development policies.
- Much of the urbanisation in SA is unplanned, informal, and occurs in unsafe spaces that expose people to multiple and complex human-made and natural risks.
- Urbanisation also poses a tremendous challenge to cities' resource base, for it often occurs with little change in the economic structure and insufficient investment in human capital – "urbanisation without development".

IDRC | CRDI

CSIR
our future through science

The story behind the project

Rationale



Legend

- Roads
- Province
- 9 Cities
- Main place name
- Main places

Social Vulnerability 14class

- Low vulnerability
- High vulnerability

CSIR

NOTE:

Social vulnerability is defined as the inability of people, settlements and societies to cope with, withstand or adapt to the impact of multiple stressors such as disruptive natural or manmade events. The social vulnerability index is based on 14 indicators highlighting South Africa's most vulnerable communities.

Citation: le Roux, A., Naude, A.2014. CSIR Regional Dynamics and Interactions Analyses Note: Social Vulnerability – Locating South Africa's vulnerable people.

The story behind the project

Rationale

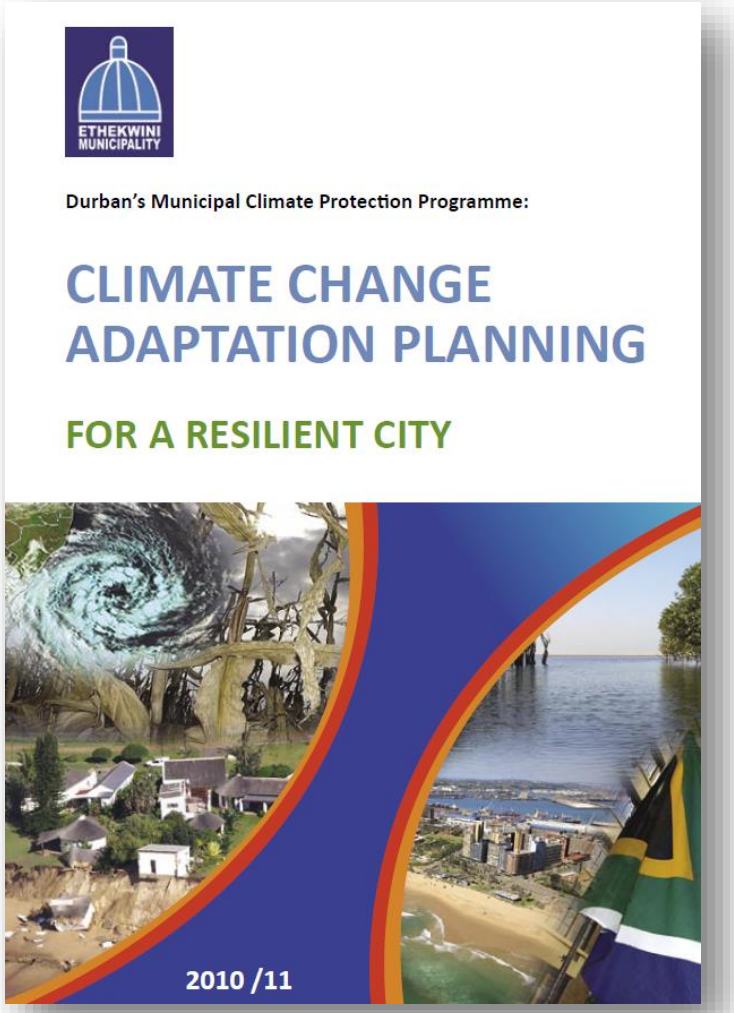
- In the last 4 decades (1975-2015) in SA there were 266 recorded natural disasters that killed nearly 6000 people, displaced 70 000 and affected 21.5 million people. In 2015 disasters alone cost the economy an estimated R28 billion (CAD 2.5 billion).
- The future climate of South Africa is generally expected to be hotter and drier, characterised by more frequent and more intense weather events.
- The multidimensional impacts of CC on human settlements compound the challenges, going far beyond cities' experience and capacity to adapt and respond to climate change, causing major setbacks in hard-won economic and social development.
- Ultimately, poor and vulnerable communities experience the most setbacks from the impacts of CC.

IDRC | CRDI

CSIR
our future through science

2. The science behind the project

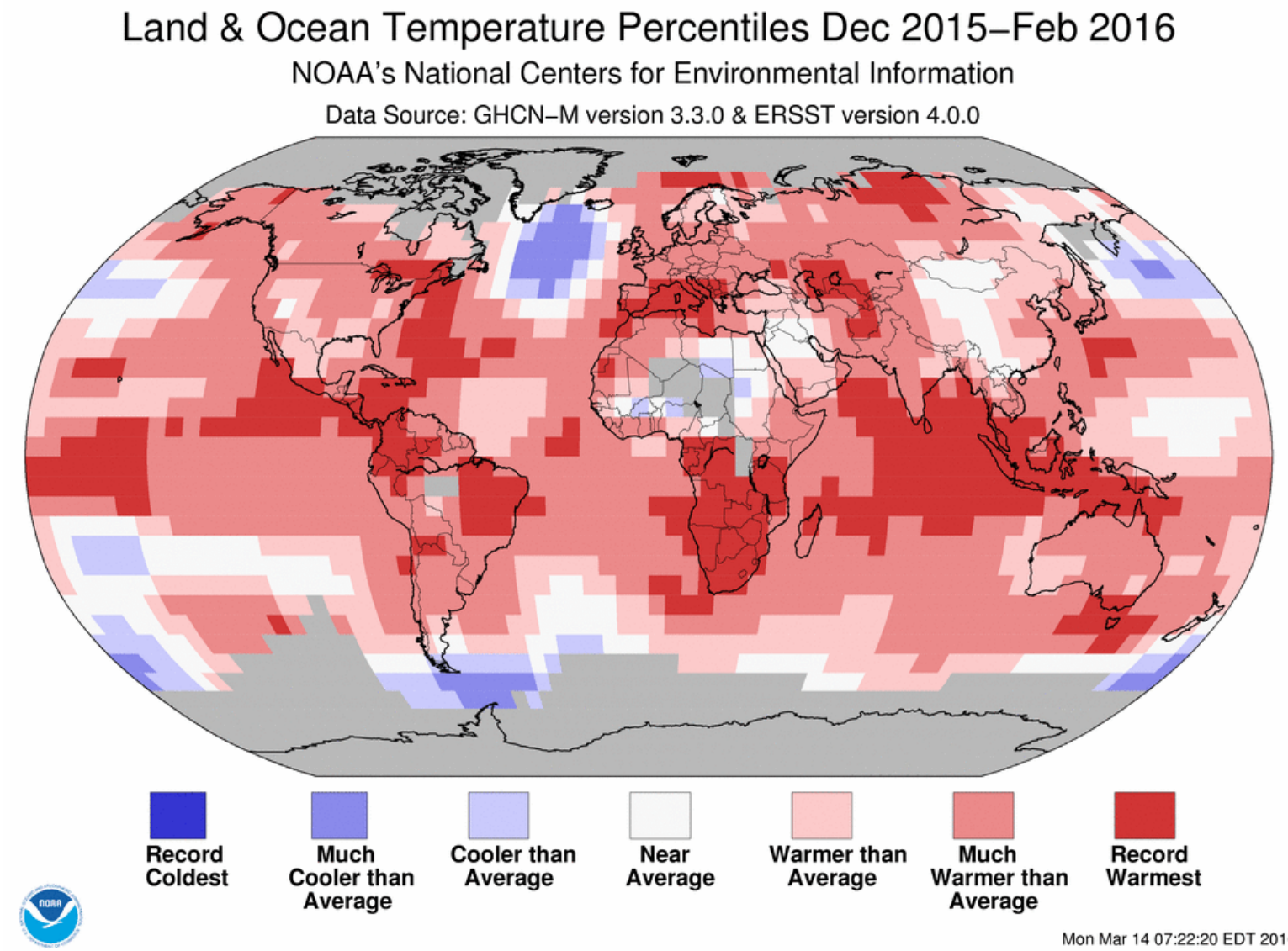
Step 1: Scope and assess existing adaptation plans



IDRC | CRDI

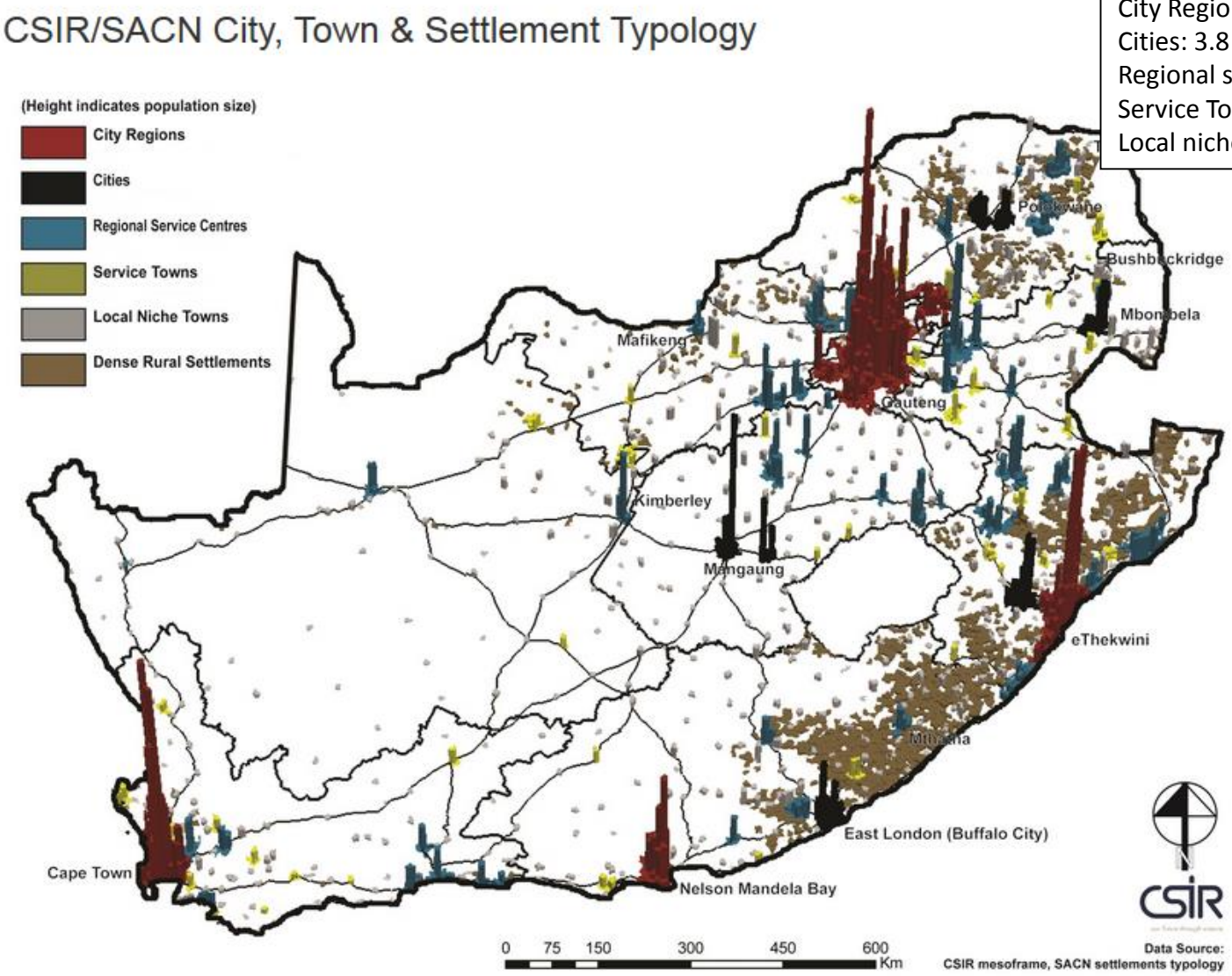
CSIR
our future through science

Step 2: Analyse downscaled climate projections



Step 3: Profiling the current and future vulnerability of South African settlements

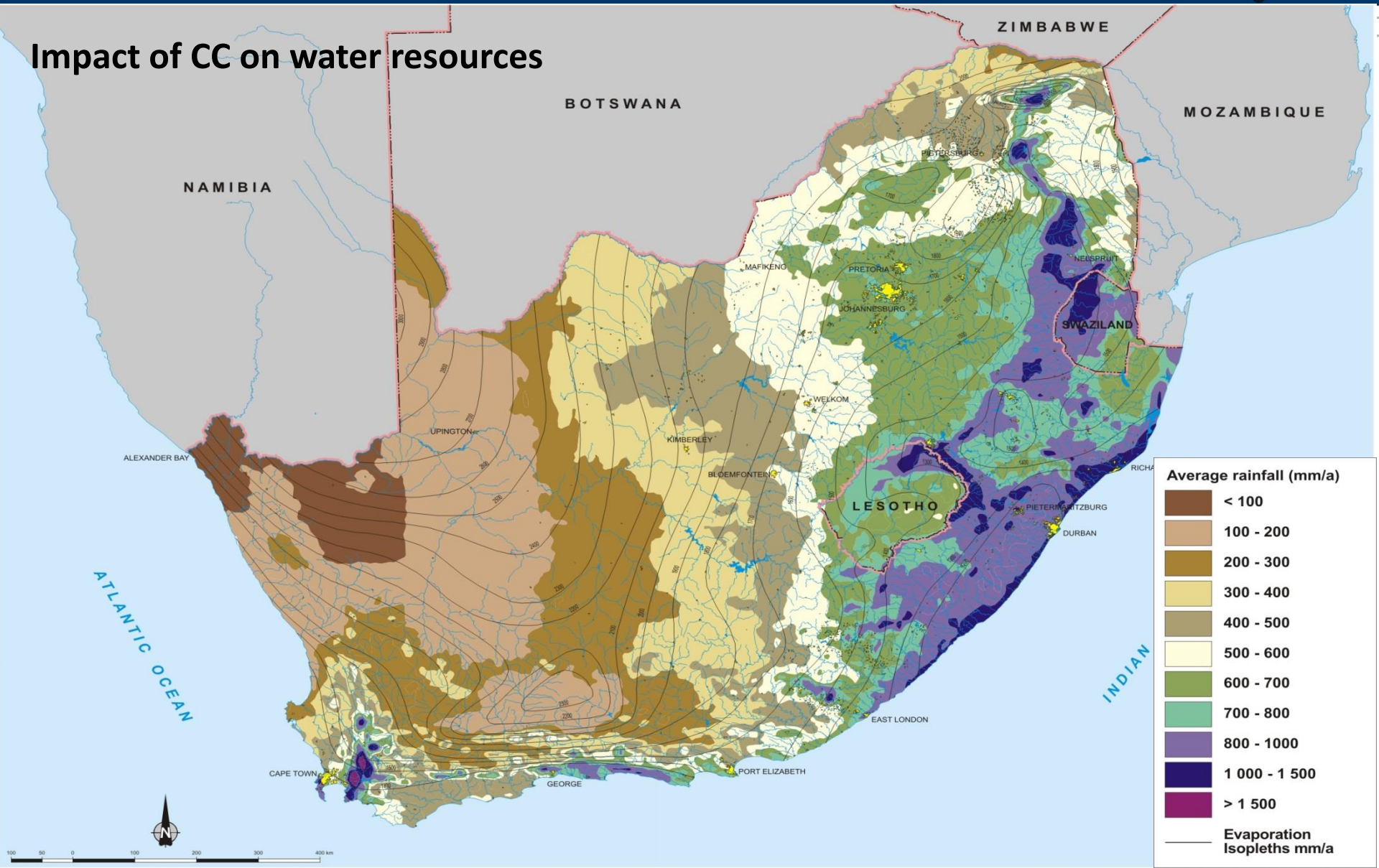
Excluded: 20 Million (5) 54%
City Regions: 1.1 Million (1) 3%
Cities: 3.8 Million (5) 9%
Regional service centres: 7.3 Million (41) 11%
Service Towns: 2.7 Million (44) 4%
Local niche town: 4.3 Million (>600) 6%



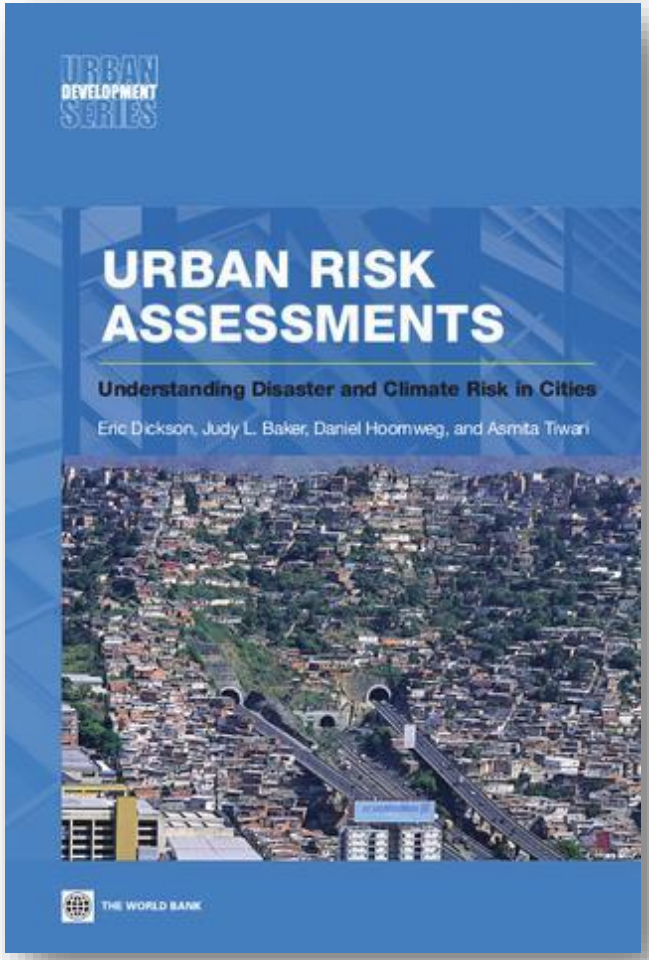
CSIR
our future through science

Step 4: Identify high risk areas under a changing climate

Impact of CC on water resources



Step 5: Develop risk profiles for different settlement types



Settlement typology		Hazard footprint						Risk profile
		Sea-level rise	Flooding	Heat waves	Drought	Landslide	Fire	
	Coastal settlements							
	Cities							
	Richard's Bay	x	x			x		Coastal area at risk of SLR, flooding and landslides
	Nelson Mandela Bay	x	x					Coastal area at risk of SLR and flooding
	Regional centres							
	George	x	x		x	x		Coastal area at risk of SLR, flooding and landslides
	Mossel Bay	x	x			x		Coastal area at risk of SLR, flooding and landslides
	Central service towns							
	Port St Johns	x	x	x		x		Coastal area at risk of SLR, flooding and landslides
	Still Bay	x	x					Coastal area at risk of SLR and flooding
	Arid settlements							
	Cities							
	Upington		x	x	x			Inland areas at risk of drought, heat waves and flooding
	Kimberley			x	x		x	Inland areas at risk of drought, heat waves and veld fires
	Regional centres							
	Kathu			x	x			Inland areas at risk of drought and heat waves
	Cradock			x	x		x	Inland areas at risk of drought, heat waves and veld fires
	Central service towns							
	Calvinia			x	x		x	Inland areas at risk of drought, heat waves and veld fires
	Hopetown			x	x			Inland areas at risk of drought and heat waves

IDRC | CRDI

CSIR
our future through science

Step 6: Develop climate change adaptation options

Managing Flood Risk

City Level

District Level

Step 1: Consideration of zone-wide regulations for flood-prone areas

To limit development in flood-prone areas, vulnerable zones should be indicated on an environmental map. The relevant administrative department should create such environmental maps at the city or district level and these should be elaborated in the early stage of planning to adjust new developments. The planning results at the district level will establish the necessary measures at the project site level.

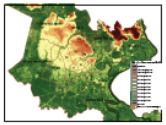


Fig. 2: Digital Elevation Model of HCMC

Source: Storch, H. et al. 2012

Identify flood-prone areas

To identify if the project site is located in a flood-prone area, the developer should consult an Environmental District Map as part of the Environmental Impact Assessment (EIA). If the project site is in a flood-prone area, special measures regarding flood protection should apply (Fig. 2).

→ *To be decided according to Environmental District Map/ Strategic Environmental Assessment (SEA) on general planning level (Construction Master Plan, Land Use Plan) and on district planning level (Zoning Plan)*

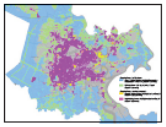


Fig. 3: Maintaining the urban water balance in HCMC

Source: Goedecke, M. and Rujner, H. (2012)

Decentralised urban basins

To decrease flood level in rivers and channels during flood events, a network of urban basins should be planned (Fig. 3). Excess floodwater will be diverted from rivers and channels to the basins, and released back to the water network when flood events are over, or when river capacity is available. These urban basins should be located in the Zoning Plan, which indicates the land use zones on city and district level. Impact on these urban basins must be avoided.

→ *To be decided according to an Environmental District Map / Strategic Environmental Assessment (SEA) at the general planning level (Construction Master Plan, Land Use Plan) and on district planning level (Zoning Plan)*

Re-naturalising rivers and channels

To assure a successful flood protection, rivers and channels should be re-naturalised to their original state. This will encourage infiltration, help to reduce bank erosion and enhance the natural habitat along the rivers and channels.

There are four main strategies to re-naturalise rivers:

- Remove obstruction such as solid waste, fallen trees, weirs and impounding constructions in order to increase flood retention capacity and retain the original flow velocity. Modifying rivers and channels by removing sediments and increasing the depth and or width of channels are not recommended, unless the assessments of the modifications are positive.
- Re-meandering riverbeds to their natural curves to enhance storage capacity of river plains and delay flood peak. Other benefits are reduced flow rates and erosion, increased bank infiltration and wider distribution of silt deposition.
- Reconnecting rivers with floodplains to allowed better water storage capacity. Possible measures to reconnect rivers include lowering riverbanks to their natural levels; lowering embankments, setting back levees and dikes, and reconnecting borrow pits.

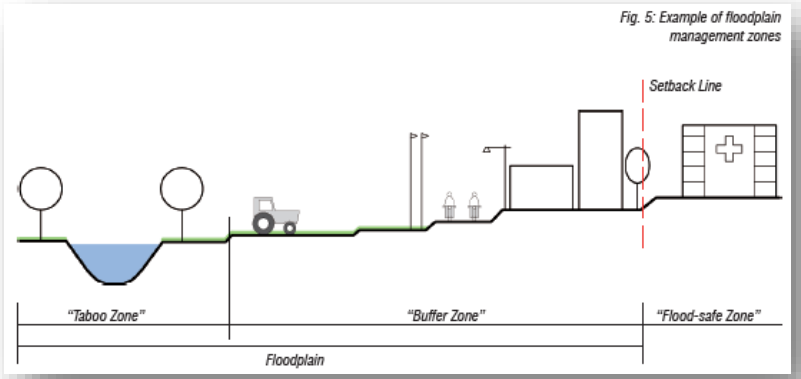


Fig. 5: Example of floodplain management zones

Source: Guideline on CC adapted urban planning and design for Ho Chi Minh City/ Vietnam

IDRC | CRDI

CSIR

our future through science

3. Project communication, dissemination and training

Communication, dissemination & training

Purpose

- The Green Book will engage practitioners, policy-makers, academics and researchers, and other interested parties throughout the project. The purpose of the engagement is to:
  - Test our research design and scope of work
  - Incorporate the lessons learnt, concerns and needs of experts, end-users, educators and policy-makers (in content and dissemination practices)
  - Gain access to critical information and past experiences
  - Consider the wide-ranging policy implications of the Green Book

IDRC | CRDI

CSIR
our future through science

Communication, dissemination & training

Purpose

- Test and share the interim and final results of the Green Book (peer review)
- Increase the accessibility of the Green Book
- Train practitioners and educators
- Influence policy and policy makers around key aspects pertaining to urban planning and climate change adaptation
- Contribute to the body of knowledge and discourse on adapting settlements to CC
- Encourage present and future collaboration among researchers, projects and institutions.

IDRC | CRDI

CSIR
our future through science

Communication, dissemination & training

Engagement

- The vehicles and processes to engage throughout will include:
  - Reference groups
  - Project partners and their networks – NDMC (government) and AIIG (NGO)

- The National Disaster Management Centre is part of national government and responsible for making policy, among others.
- It also hosts technical committees, advisory forums, etc.
- The Green Book project therefore has a direct link with government to influence policy, particularly disaster risk management policy in SA.
- It also has access to disaster managers and others in provinces and municipalities.

IDRC | CRDI

CSIR
our future through science

Communication, dissemination & training

Engagement

- The vehicles and processes to engage throughout will include:
  - Reference groups
  - Project partners and their networks – NDMC (government) and AIIG (NGO)
  - Site visits to projects and interviews with project champions
  - Other projects (the Red Book) and knowledge dissemination initiatives (Knowledge Hub)

- The Red Book are well-known and widely used guidelines planning and design guidelines for residential neighbourhoods in SA (in process of being updated). It includes guidelines for infrastructure and municipal service and township lay-out.
- The two projects run simultaneously, share resources, learn from each other, integrate findings, and share dissemination platforms.

IDRC | CRDI

CSIR
our future through science

Communication, dissemination & training

Engagement

- The vehicles and processes to engage throughout will include:
  - Reference groups
  - Project partners and their networks – NDMC (government) and AIIG (NGO)
  - Site visits to projects and interviews with project champions
  - Other projects (the Red Book) and knowledge dissemination initiatives (Knowledge Hub)
  - Local and international conferences and workshops
  - Journal articles, conference papers, book chapters on open source platforms
  - Guest lectures, supervision of students, student research projects.

IDRC | CRDI

CSIR
our future through science

Communication, dissemination & training

Engagement

- The final product will be shared via:
  - A hard copy book
  - An interactive web resource (available on- and offline) with links to other resources (in particular the Red Book)
  - Targeted training seminars and workshops with end-users, educators and others
  - Continued professional development courses through professional council accreditation (open to all)
  - Policy briefs and policy dialogue sessions.

IDRC | CRDI

CSIR
our future through science

Conclusion

Lessons learnt

What we have found from experience with other projects, are that:

- Many municipalities are under-capacitated and -resourced (people, skills, technology, funds, etc.) to develop and implement adaptation strategies.
- There is a huge need for data, interpretation of the data, tools, and training on the tools among local municipalities and practitioners.
- Co-production of tools delivers good results in integrating user needs, concerns, experience and constraints, and a willingness to apply and implement the tools/findings (living laboratory, communities of practice, reference groups) (UrbanSIM project).
- Choose your partners wise to impact policy, find avenues for dissemination, do training and have access to data.

IDRC | CRDI

CSIR
our future through science

Conclusion

Lessons learnt

- Highly regarded complementary projects (the Red Book) increases uptake of product, shared learning and resource efficiency.
- Policy dialogues helps policy-makers and practitioners understand the implications of the evidence (StepSA project).

IDRC | CRDI

CSIR
our future through science

Conclusion

What we would like from others

- Project has kicked off recently. There is still opportunity to influence the research design, scope of work, content and structure of the Green Book.
- Please share your knowledge and insight with us on how best to communicate and disseminate the findings from the Green Book.
- Bring us into contact with other projects, knowledge dissemination initiatives, and open source platforms to publish the results.
- Send us examples of good adaptation practices, as well as challenges and opportunities adaptation afford to municipalities.

IDRC | CRDI

CSIR
our future through science

Contact details

Willemien van Niekerk
CSIR Built Environment
wvniekerk@csir.co.za