

Sea level rise in Southern Africa – and what to do about it?

6th AIR Centre High Level Dialogue
Sea Level Rise Session

7 October 2020

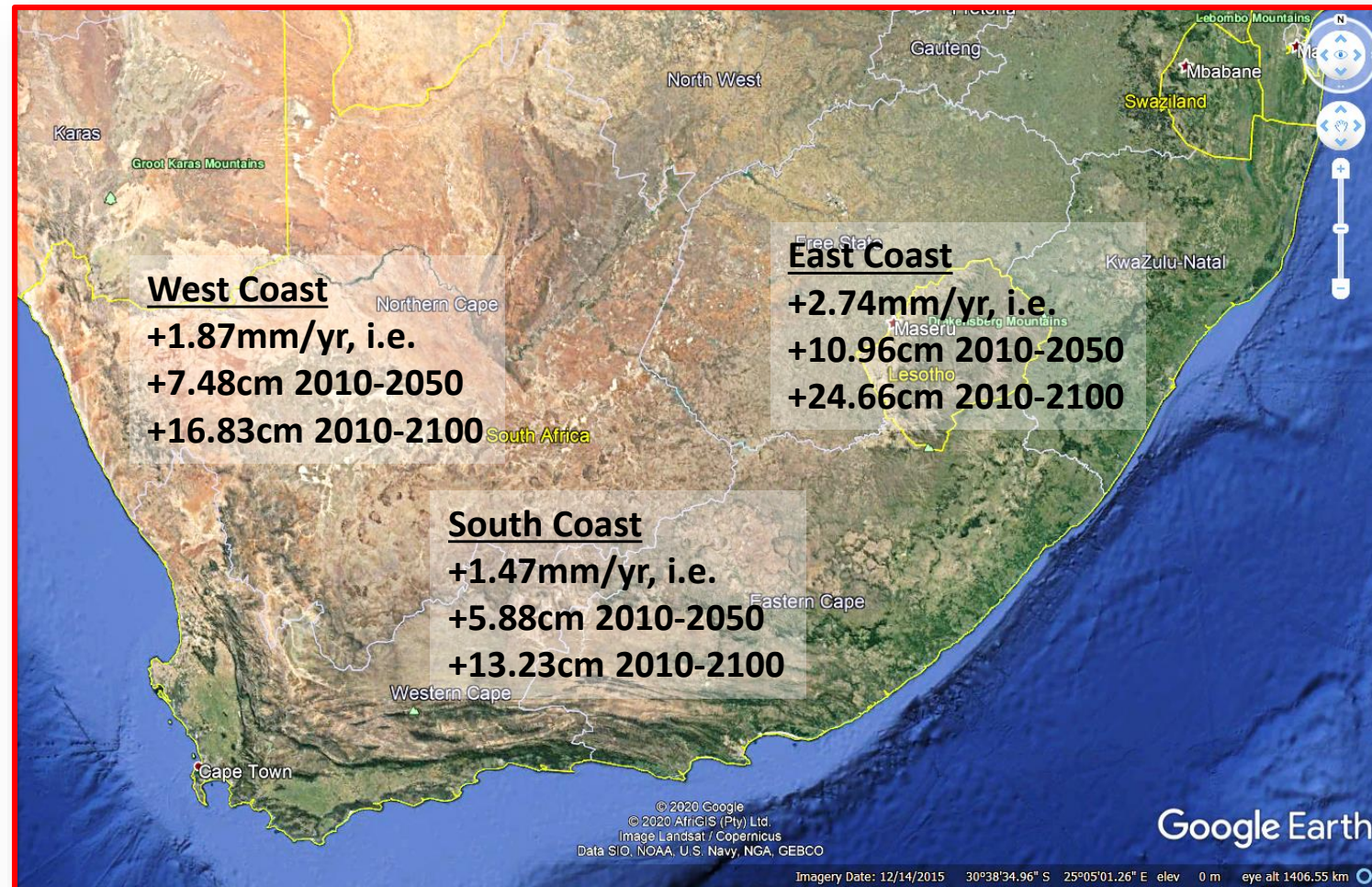
Presented by

Melanie Lück-Vogel

Coastal Systems Research Group

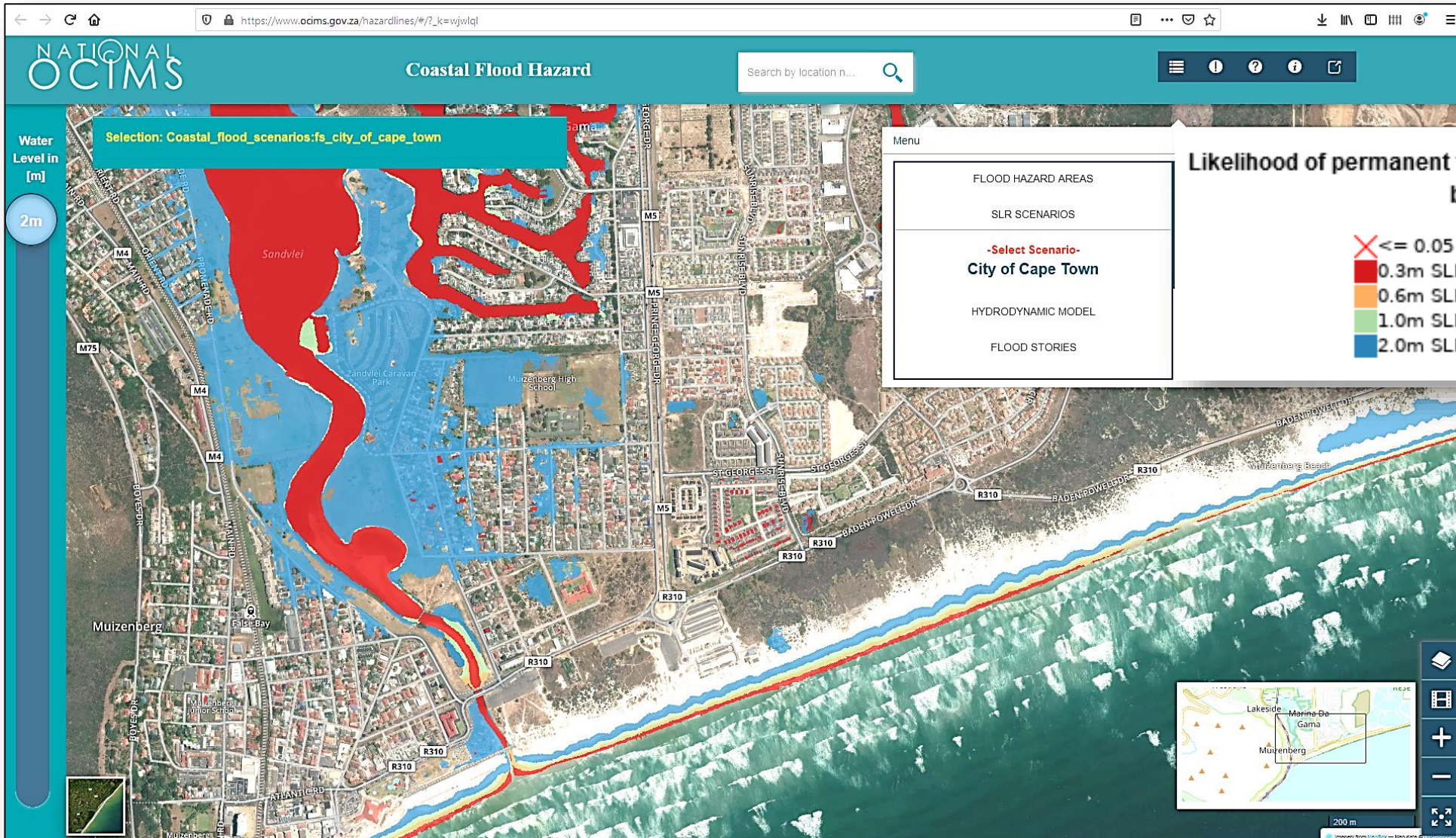
Council for Scientific and Industrial Research CSIR
Stellenbosch, South Africa mluckvogel@csir.co.za

Recorded and projected SLR in South Africa



Source:
Mather, AA, Garland, GG, Stretch, DD 2009:
Southern African sea levels: corrections,
influences and trends. *African Journal of
Marine Science*, 31(2), 145-156.

Projecting SLR and climate related flooding inland



Assessing buildings (and people) at risk of coastal flooding

2011

Hazard risk	total	%	NC	WC	EC_urb	EC_trad	KZN_urb	KZN_trad
very high	15	0.002	2	13	-	-	-	-
high	738	0.1	102	585	33	4	14	-
medium	17 044	2.8	467	14 377	1 155	30	989	26
low	106 278	17.2	1 259	73 460	15 700	456	13 464	1 939
very low	494 308	79.9	1 476	353 103	52 343	758	58 116	28 512
TOTAL	618 383	100	3 306	441 538	69 231	1 248	72 583	30 477

Very high risk zone =
Directly affected by
SLR

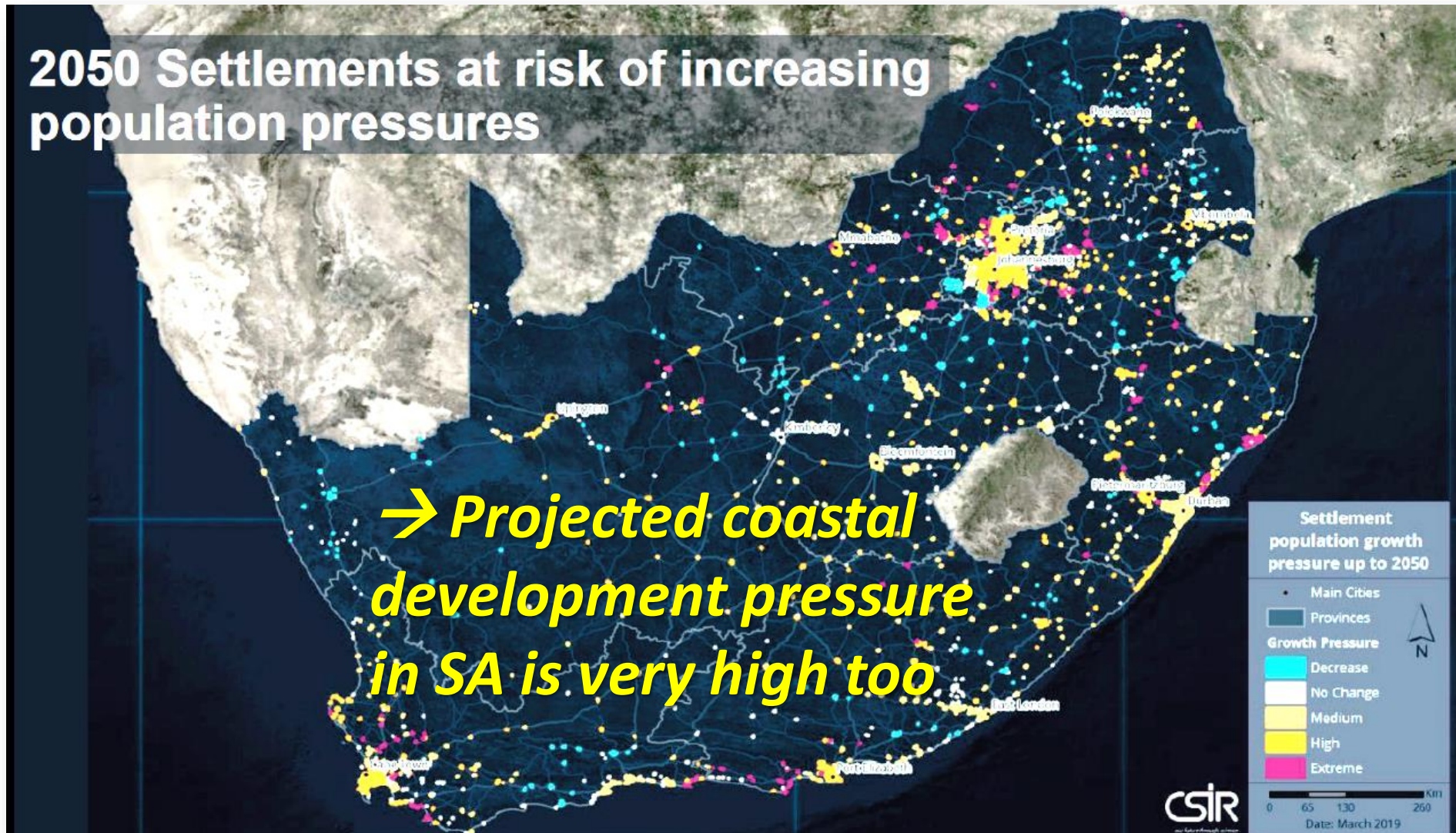
2016

Hazard risk	TOTAL	%	NC	WC	EC_urb	EC_trad	KZN_urb	KZN_trad
Very high	55	0.01	1	52	1	-	1	-
high	1 158	0.1	100	983	60	4	11	-
medium	23 184	2.2	479	19 230	1 969	87	1 401	18
low	161 998	15.3	1 294	114 539	26 524	759	16 298	2 584
very low	873 550	82.4	1 511	655 959	103 347	1 466	69 435	41 832
TOTAL	1 059 945	100	3 385	790 763	131 901	2 316	87 146	44 434

→ *Observed coastal development pressure in SA is very high*

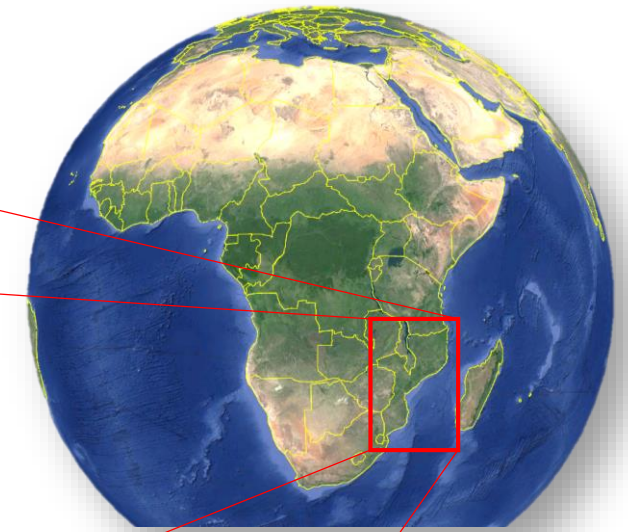
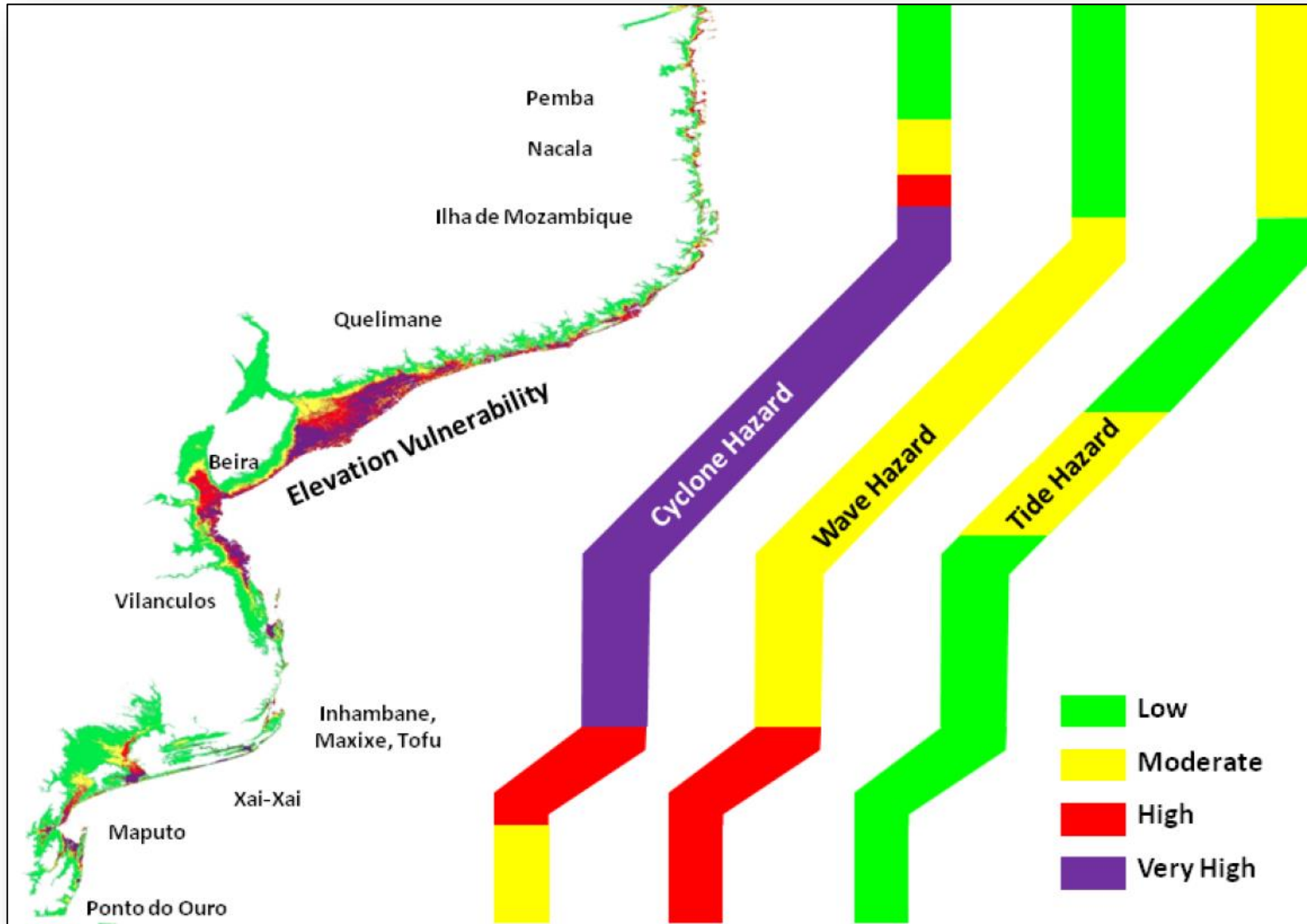
Source:
M. Luck-Vogel et al. 2020:
National Coastal Assessment for
South Africa: Situational
Assessment Report.

Future coastal population trends



Source:
<https://greenbook.co.za/>

Coastal risk in Mozambique ...



Theron, AK, Barwell, LB, Rossouw, M, Maherry, A, Lück-Vogel, M 2012. Coastal Planning and Adaptation to Mitigate Climate Change Impacts - Responding to Climate Change in Mozambique (Phase II, Theme 2). Report prepared for National Institute for Disaster Management (INGC) by CSIR, Stellenbosch, South Africa. pp 266

... and what to do about it

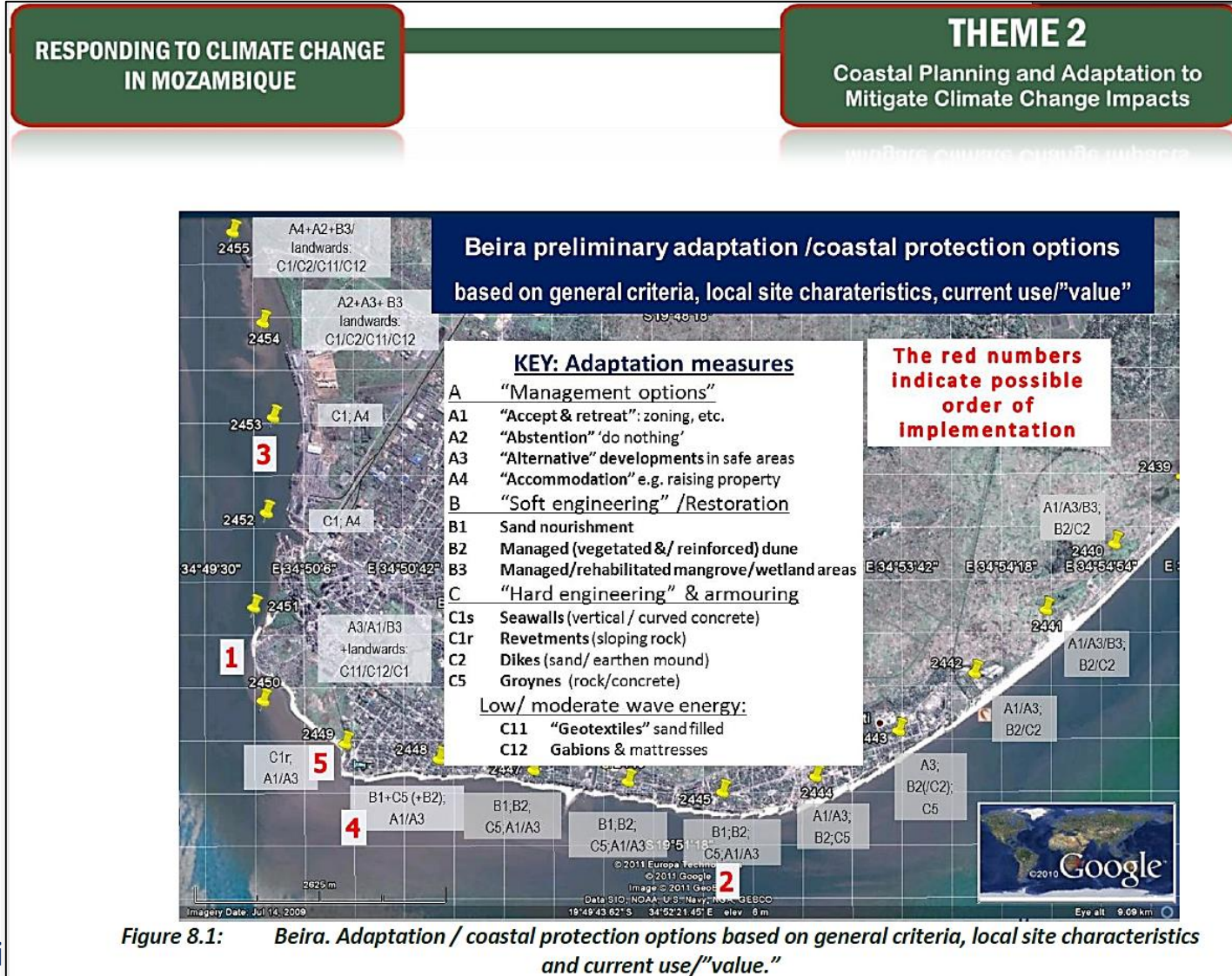


Figure 8.1: Beira. Adaptation / coastal protection options based on general criteria, local site characteristics and current use/"value."

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**RESPONDING TO CLIMATE CHANGE
IN MOZAMBIQUE**

REPUBLIC OF MOZAMBIQUE
MINISTRY OF STATE ADMINISTRATION
NATIONAL INSTITUTE OF DISASTER MANAGEMENT

National Institute for Disaster Management (INGC)
PHASE II

THEME 2
Coastal Planning and Adaptation to
Mitigate Climate Change Impacts

October 2012

André Theron and Laurie Barwell

Ashton Maherry
Melanie Luck-Vogel
Wesley Robberts
Marius Rossouw

Luther Terblanche
Pierre de Wet
José Rafael
Figueiredo Araujo

THEME 2

... and what to do about it

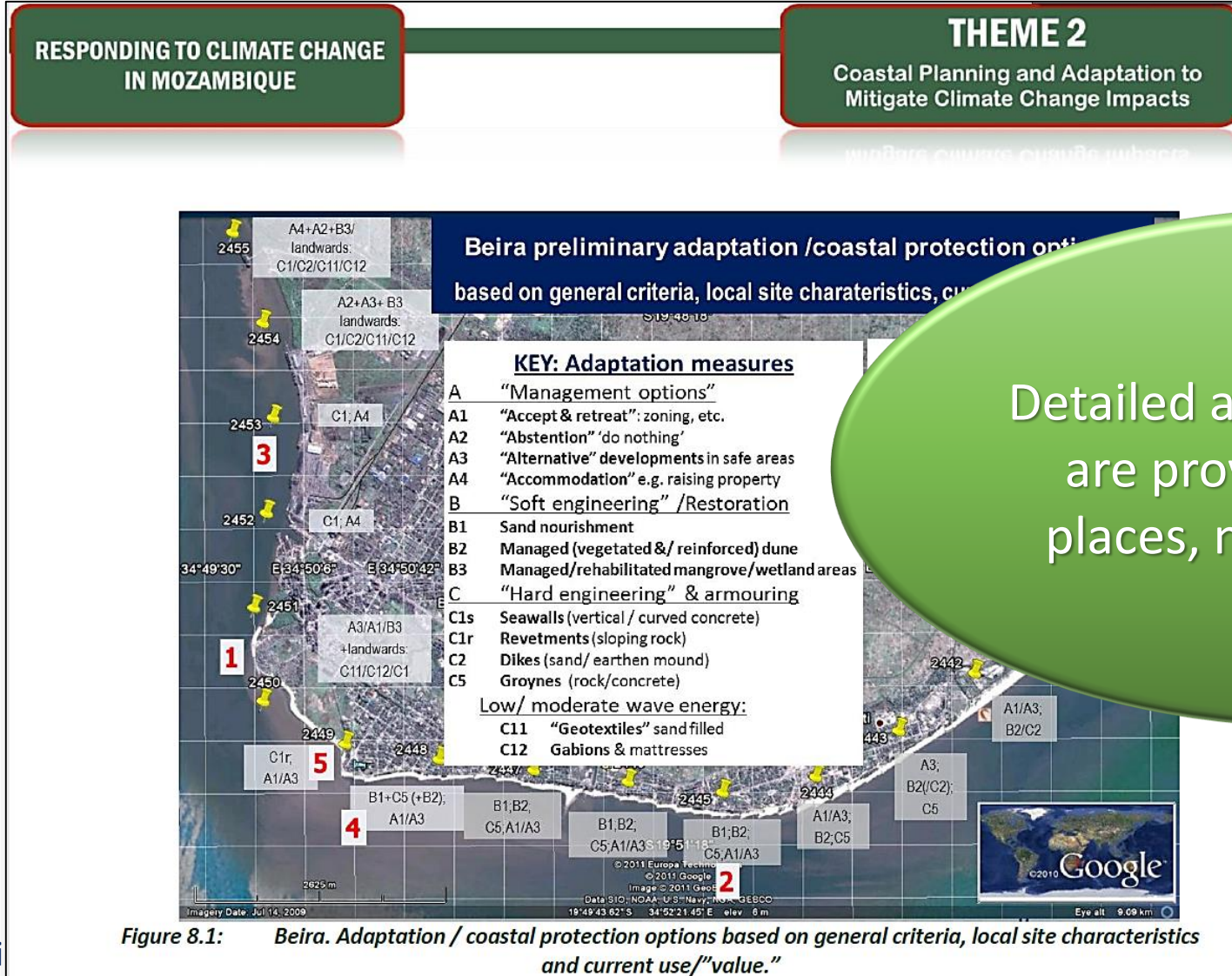




Figure 8.1: Beira. Adaptation / coastal protection options based on general criteria, local site characteristics and current use/ "value."

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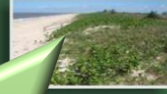

RESPONDING TO CLIMATE CHANGE IN MOZAMBIQUE



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MINISTRY OF STATE ADMINISTRATION
NATIONAL INSTITUTE OF DISASTER MANAGEMENT



Instituto Nacional de
Gestão de Calamidades

Disaster Management (INGC)

II

Adaptation to
Impacts

THEME 2

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...erry
...Luck-Vogel
...Robbarts
...ius Rossouw

...Luther Terblanche
...Pierre de Wet
...José Rafael
...Figueiredo Araujo

Detailed adaptation options
are provided, for many
places, not just in MOZ...

... and what to do about it



For discussion: Alternative approaches on how to protect the people from the coast?

- Educate the public on Climate Change and SLR challenges
- Prepare them for future scenarios and potential new coast lines (i.e. with interactive risk maps)
- Provide no-regret adaptation options to coastal communities
- Create dis-/incentives
- Successful examples exist

Vulnerable areas
Specific beaches and neighbouring areas that are most likely to be impacted upon in KwaZulu-Natal, especially at spring high-tides, include:

Living with coastal erosion
Living with coastal erosion in KwaZulu-Natal requires that the following principles are acknowledged:
• Continued global warming will cause sea-level rise and increased intensity and frequency of coastal storms.

Future events of this nature
The slowly increasing sea level off the KZN coast due to global warming, coupled with a reduction of sand reaching the coast from inland catchments – a consequence mainly of dam construction and sand mining – mean that there is a strong likelihood that this event will repeat itself in the coming years.

Background
Over the last few months, the KwaZulu-Natal (KZN) coastline has been subjected to unprecedented levels of erosion and the result of storm events, most notably that of 19 and 20 March 2007. This event occurred at a time when the tide reached an exceptional height, known to happen once every 18 years. Combined with huge storm waves in excess of 8m, it caused widespread property damage and erosion to the coastline over a distance of approximately 350 kilometres. According to marine geologists, the sand was moved from the shoreline to deeper waters where some of it may never return to the beaches.

Coastal erosion risk in KZN
Coastlines with mixed rocky shores and sandy beaches were most vulnerable during the March 2007 storm and sandy shores have general characteristics of the most-affected areas include:
• Stretches of coast that have been drained (e.g. Ballito) and where the cohesiveness that was supplied by the groundwater has been lost.
• Narrow, sand depleted beaches and bays.
• Sandy bays which are north of points, rock.
• Beaches with a thin veneer of sand over rock.
• Beaches whose natural defence mechanisms such as foredunes, naturally vegetated dunes, offshore sand bars and reefs have been removed.
• Beaches with, and adjacent to, inappropriate sea defences.
• Beaches where the built environment is located too close to the shoreline and the high-water mark.
• Beaches with badly planned, inappropriate and poorly maintained stormwater systems.
• Beaches where the natural dune vegetation has been removed and replaced with alien ornamental gardens.

What is coastal erosion?
Coastal erosion is the weathering of rocks and wave action, tidal currents, wave currents or drainage.
Coastal erosion results in three different types of impacts:
• Loss of land and damage to the built environment.
• Destruction of natural sea defences such as dunes.
• Undermining and failure of artificial sea defences.

The character and nature of the coast at any one place or time results from combinations of geological, climatic and oceanographic processes, as well as human intervention. Coasts are continually changing and either erode or build seawards. Most people perceive coasts as stable because coastal change is generally slow with only occasional exceptional events such as storm-induced erosion. However, coastal change is constant and, over the long-term, inevitable.

LIVING WITH COASTAL EROSION IN KWAZULU-NATAL

coastcare

Thank you

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