

National Coastal Assessment & Coastal Climate Change Vulnerability Assessment: *Implications for the future*

Dr Melanie Lück-Vogel
Coastal Systems Research Group
Cluster: Smart Places
CSIR
Stellenbosch



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The National Coastal Assessment Project

Status Quo Assessment of SA coast

- 3 years project (April 2017 – March 2020)
- Desktop based
- 3 phases:
 1. Baseline Assessment & data collation
 2. Hotspot detection
 3. Hotspot (case study) assessment

Conducted by:

CSIR

in collaboration with



STELLENBOSCH • UNIVERSITY

NELSON MANDELA
UNIVERSITY

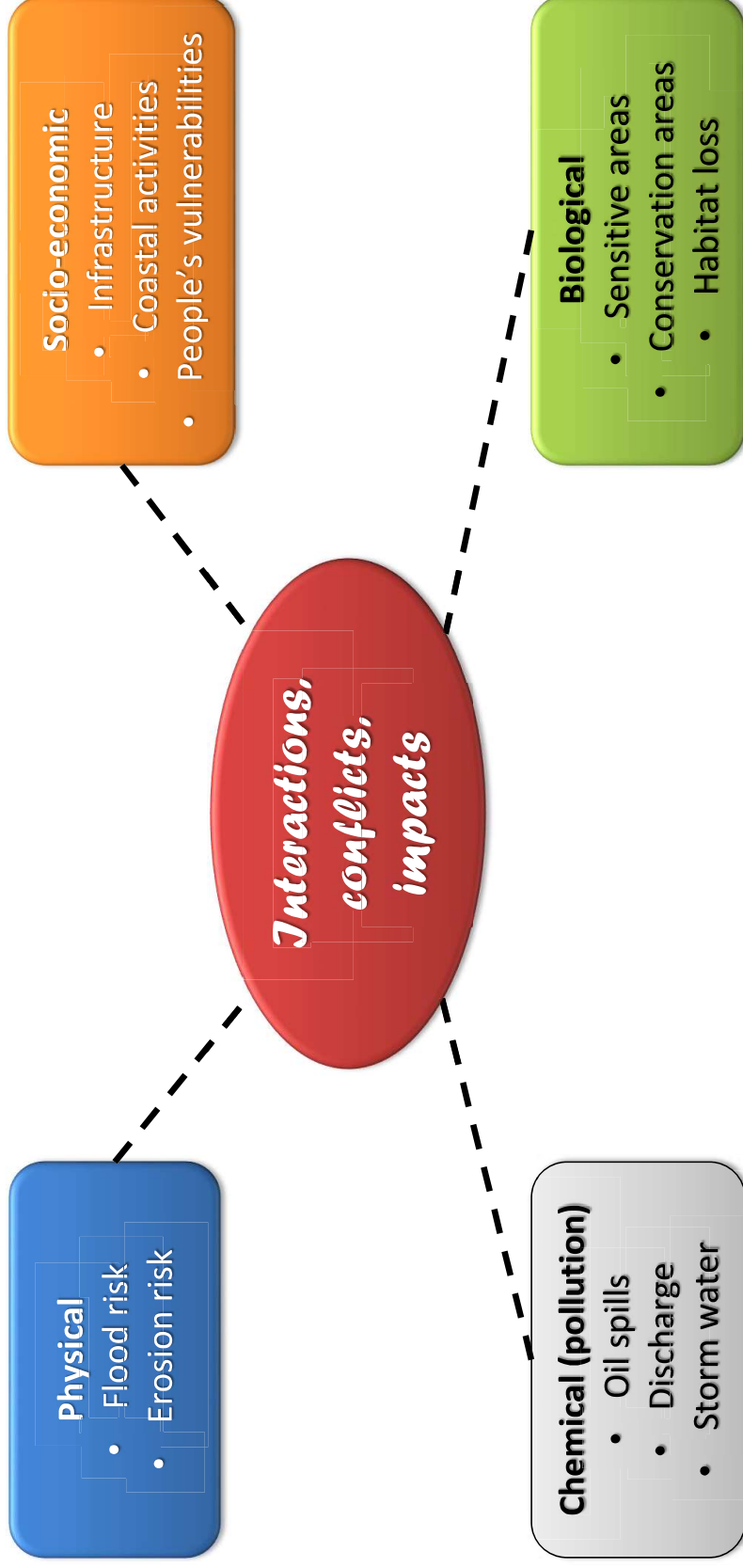
Funded by:



environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

NCA: Coastal assessment within and across domains



(list incomplete)

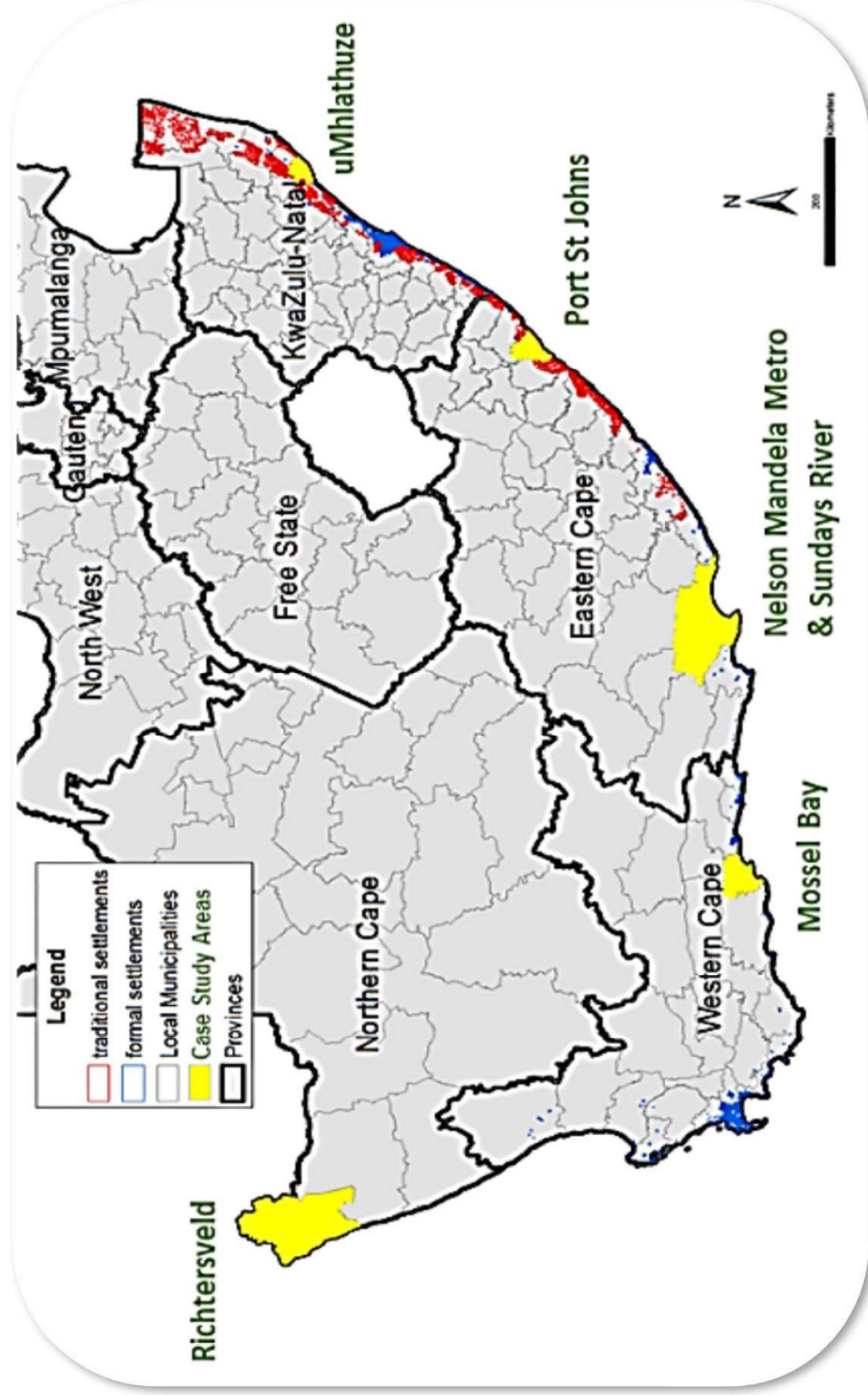
11 proposed Case study sites for NCA Phase 3

	Municipality	NB ISSUES	Municipality	NB ISSUES							
NC	Richtersveld LM	<ul style="list-style-type: none"> Coastal towns (Alexander Bay/Port Nolloth) Transboundary estuary (Orange) Vulnerable communities Mining Small harbour Aquaculture Ramsar/Protected area CBAs/EBAs 	Algoa Bay: Nelson Mandela Metro & Sundays River LM	<ul style="list-style-type: none"> Urban centre Several estuaries Commercial port & Shipping routes Major pollution (WWTW and stormwater) Aquaculture Erosion issues Tourism & Blue Flag beaches CBAs/EBAs & MPAs Islands (Birds and Mammal colonies) 							
		Proposed, but above more diverse case study		EC	East London	Proposed, but similar to PE					
		Would duplicate work already done as per SEA				<ul style="list-style-type: none"> National Coastal Dev. Node Tribal areas & Vulnerable communities Estuaries Tourism, Mining & Aquaculture Small harbour (proposed) CBAs/EBAs & MPA 					
		Well-resource metro using own tools				KZN	Durban	Proposed, but well- resourced metro using own tools			
		Proposed, but Mossel Bay more diverse case study area						<ul style="list-style-type: none"> Coastal town (Richards Bay) & Vuln. communities Tribal areas Estuaries Tourism, Industries & Mining, Aquaculture Erosion issues CBAs/EBAs 			
		WC						Mossel Bay LM	<ul style="list-style-type: none"> Numerous towns with strip development threats Several estuaries Commercial port Pollution (WWTW) Erosion issues Mining (sand) Tourism & Blue Flag beaches Shipping routes (oils spill threats) CBAs/EBAs 	uMhlatuze LM	<ul style="list-style-type: none"> Proposed, but well- resourced metro using own tools Coastal town (Richards Bay) & Vuln. communities Tribal areas Estuaries Tourism, Industries & Mining, Aquaculture Erosion issues CBAs/EBAs

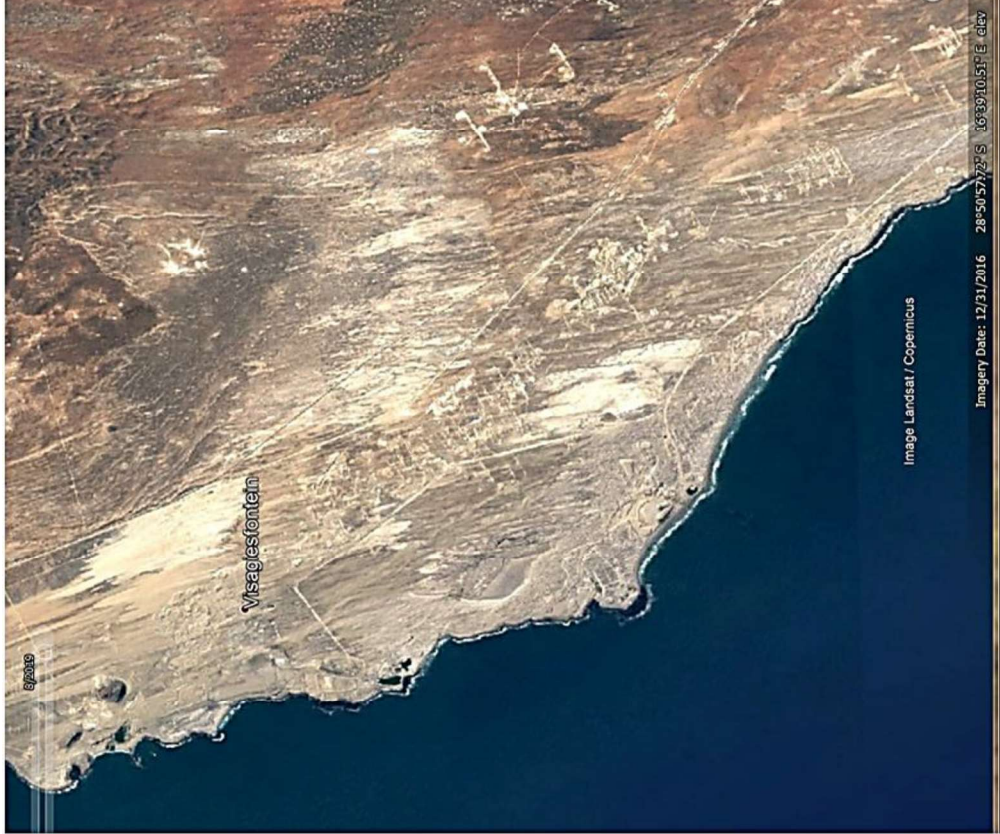
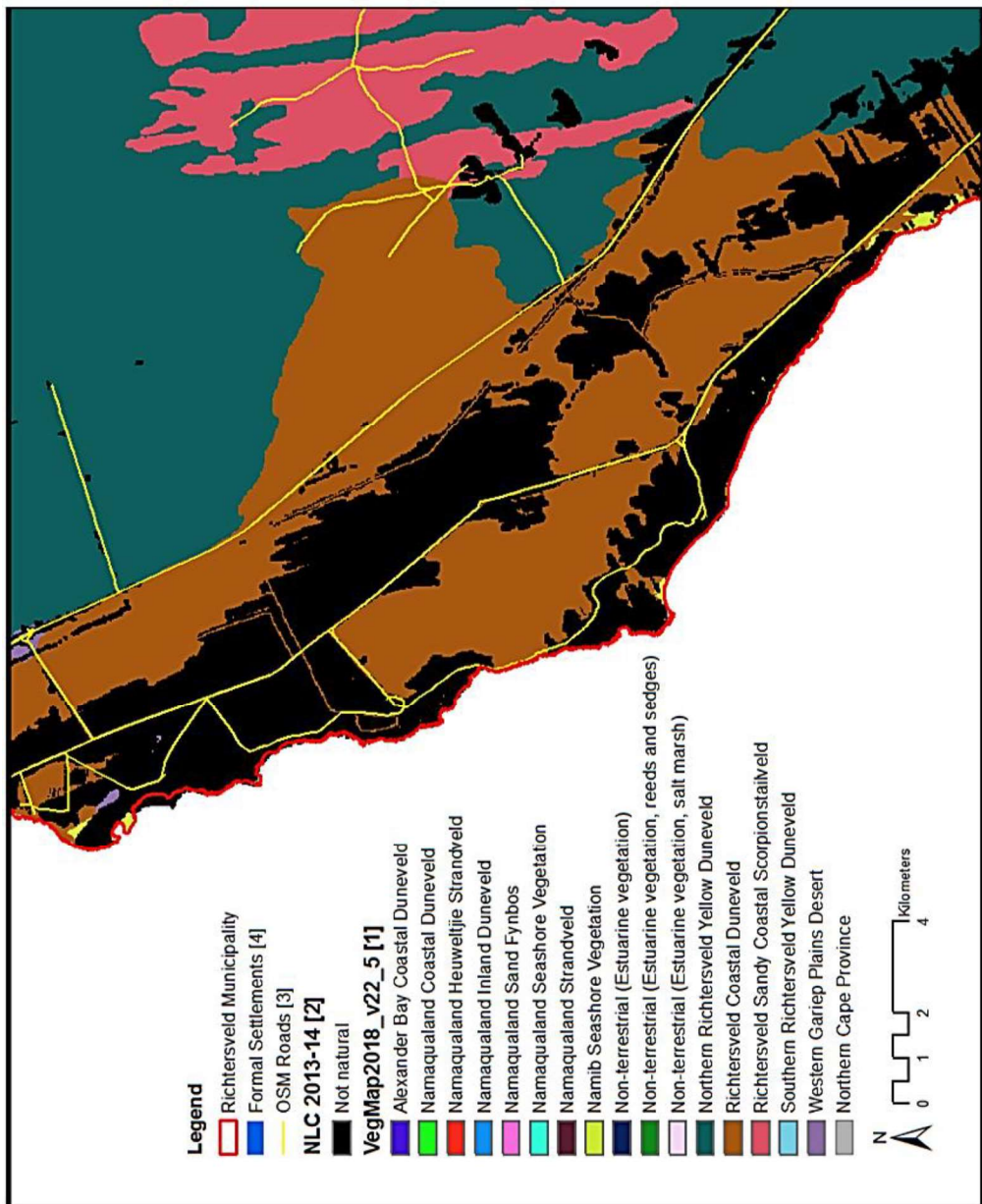
5 Case study sites selected

	Municipality	NB ISSUES	Municipality	NB ISSUES
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			EC	
			Port St Johns LM	
			uMhlatuze LM	
			KZN	
				<ul style="list-style-type: none"> Coastal town (Richards Bay) & Vuln. communities Tribal areas Estuaries Tourism, Industries & Mining, Aquaculture (in port?) Erosion issues CBAs/EBAs

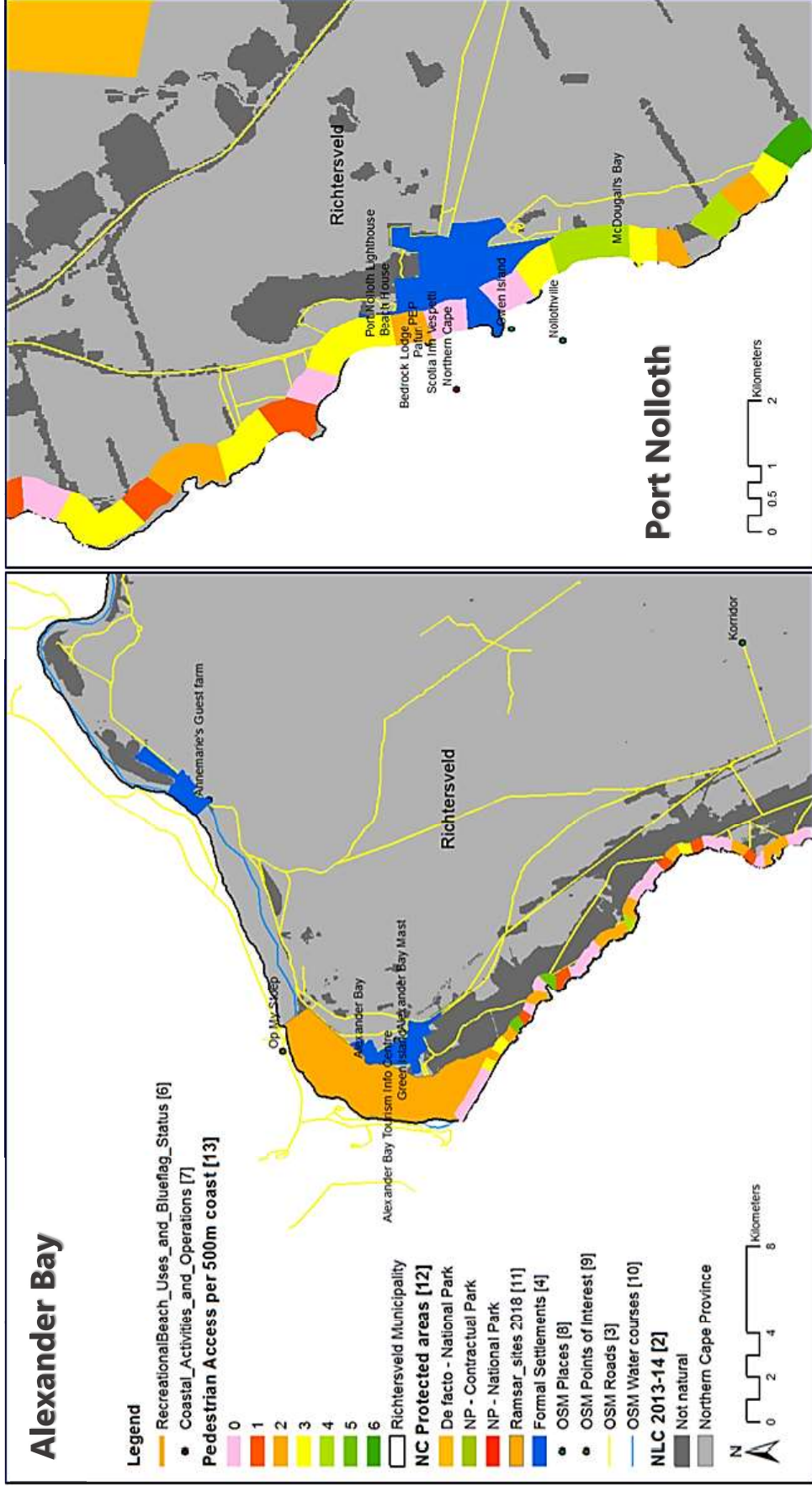
Some (preliminary) Phase 3 Results



Loss of natural environment: implications for tourism in the Richtersveld LM?



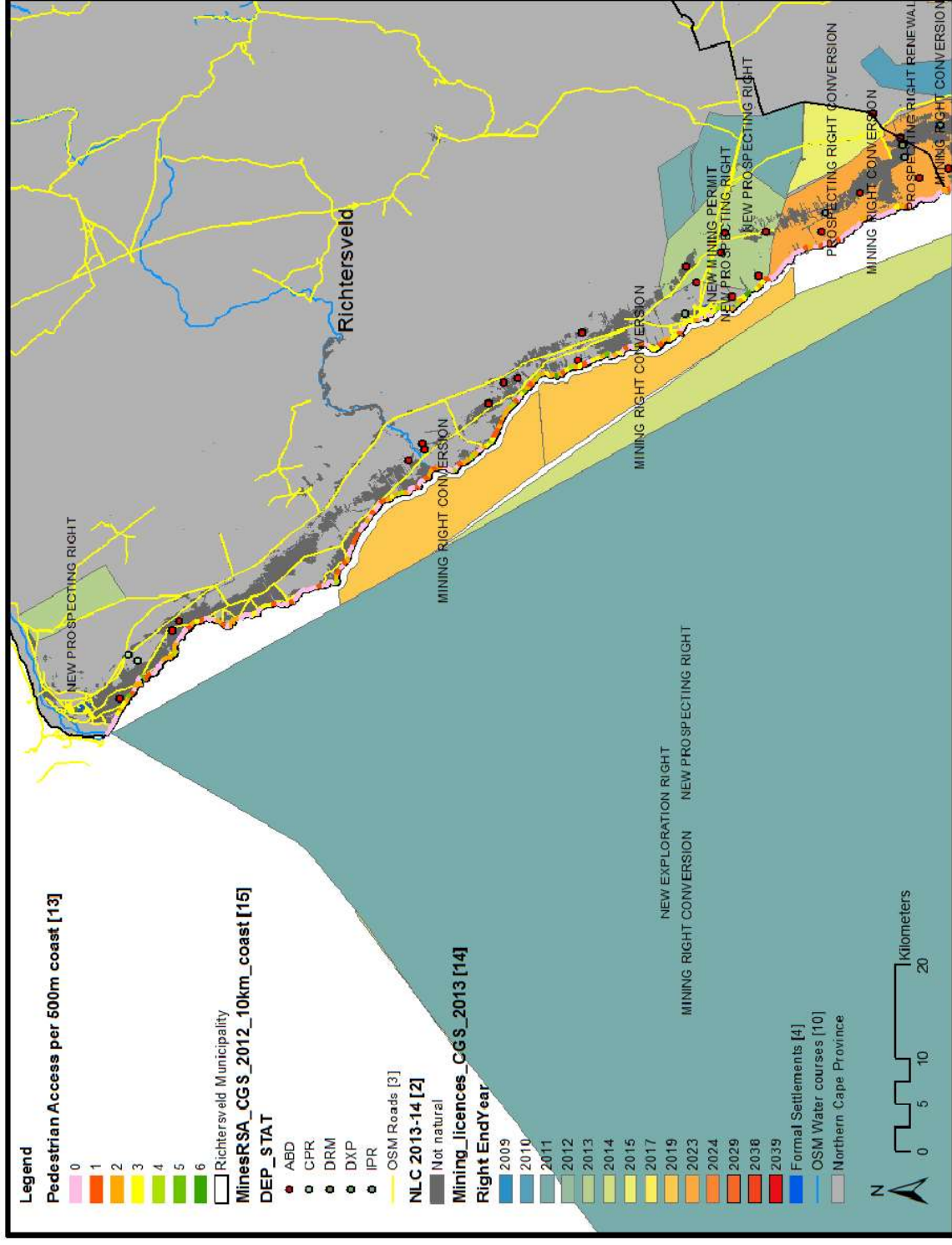
Coastal access, points of touristic interest, places and road network and not natural land cover



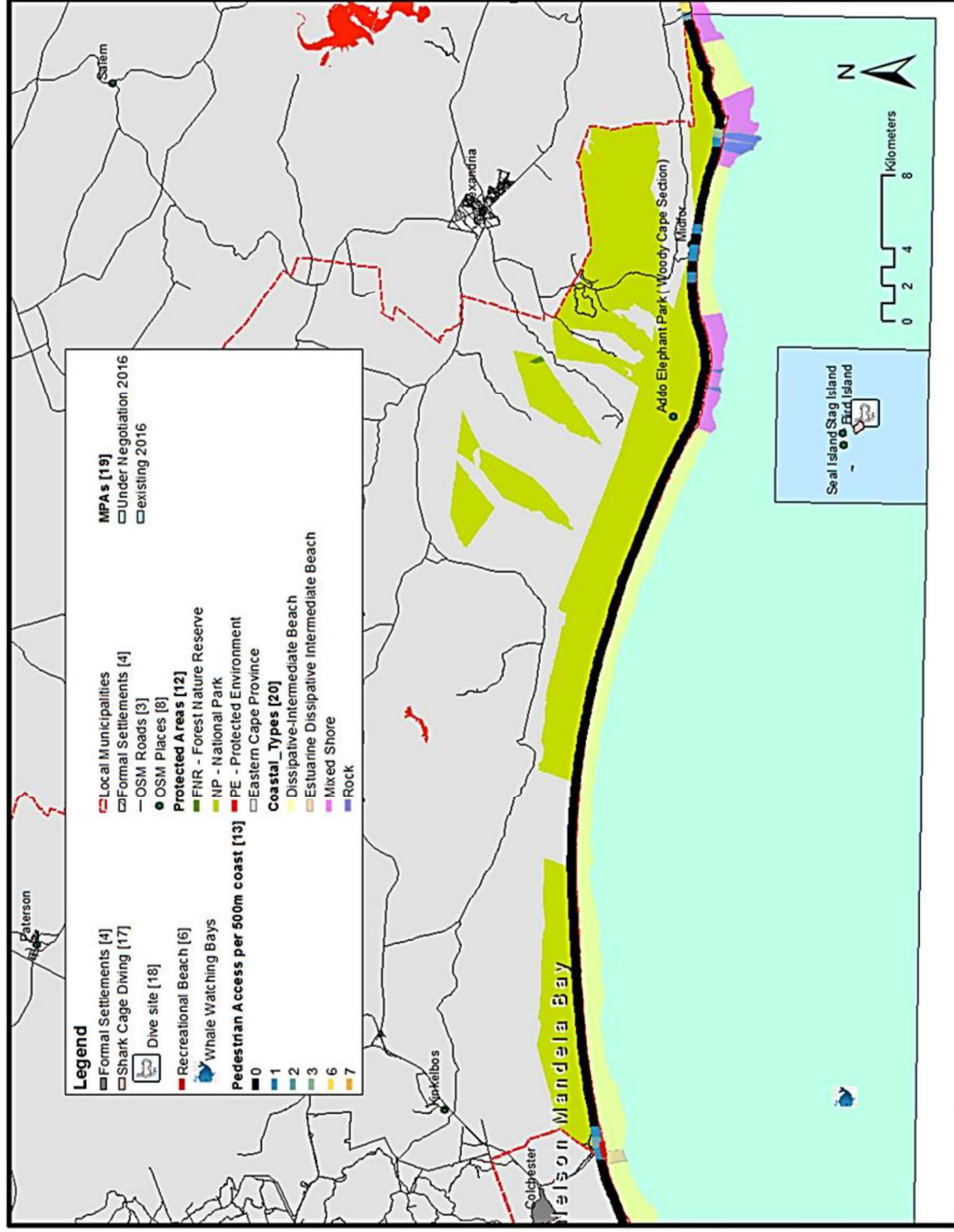
Source: National Coastal Assessment project – Phase 3. Conducted by CSIR on behalf of DEA O&C 2019

Coastal access
per 500m coast
& active and
abandoned
mining areas in
Richtersveld LM

→ no relation?

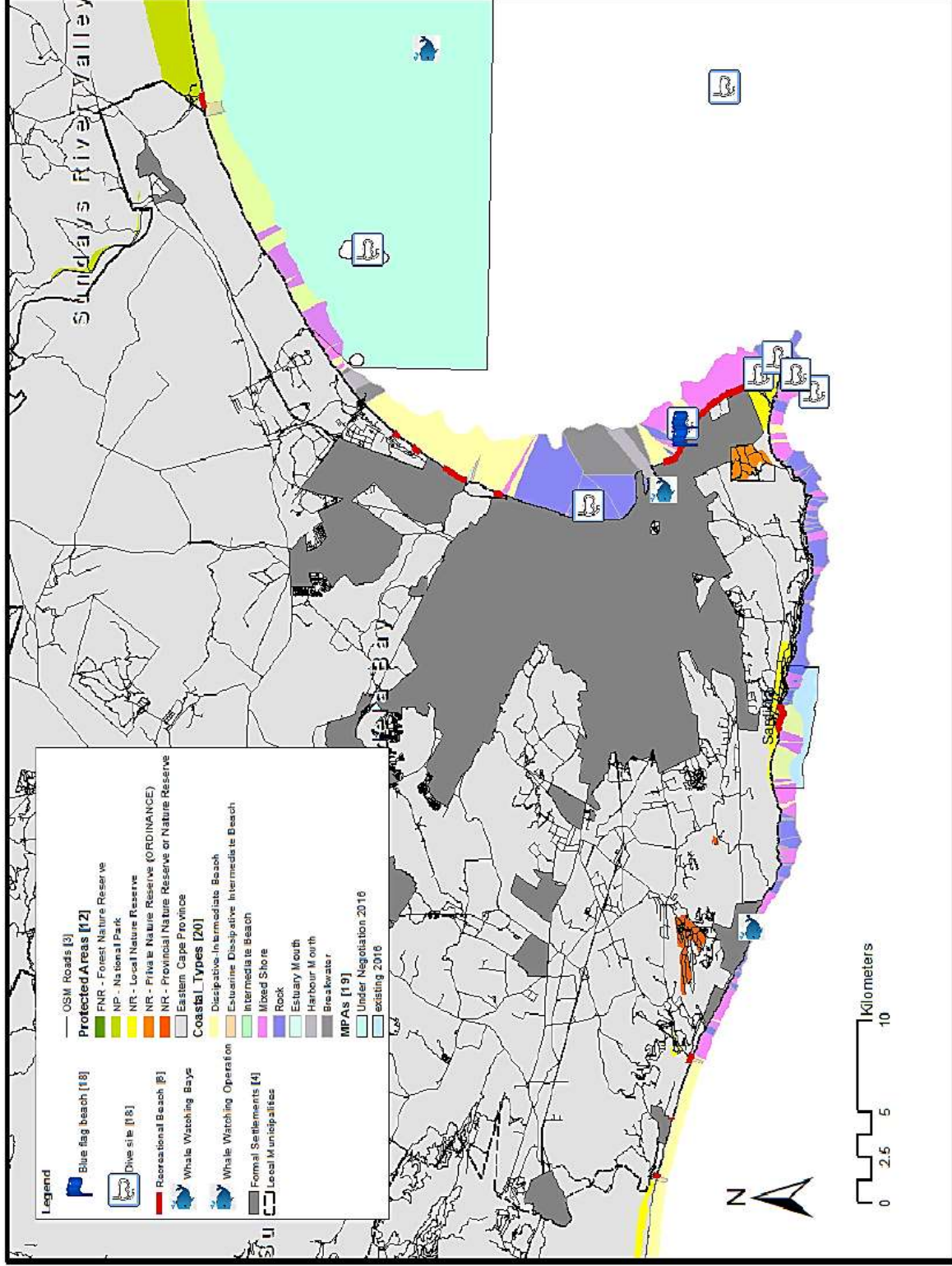


Algoa Bay: Sites of tourist interest and number of pedestrian access points on the Sundays River Municipality Coast.








Source:
National Coastal Assessment
project – Phase 3.
Conducted by CSIR on behalf
of DEA O&C
2019

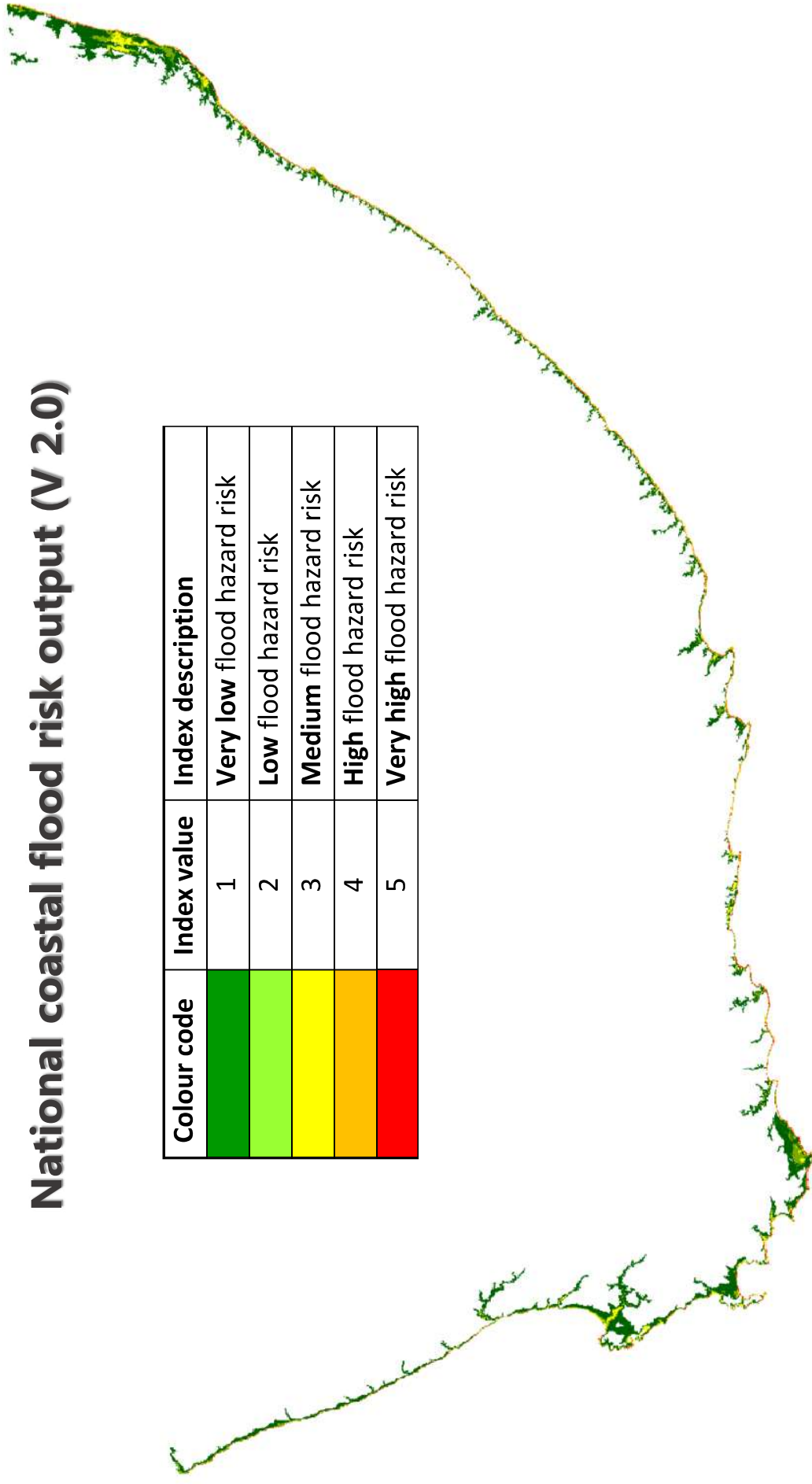
Algoa Bay: Sites of tourist interest on the Nelson Mandela Metro Municipality Coast.



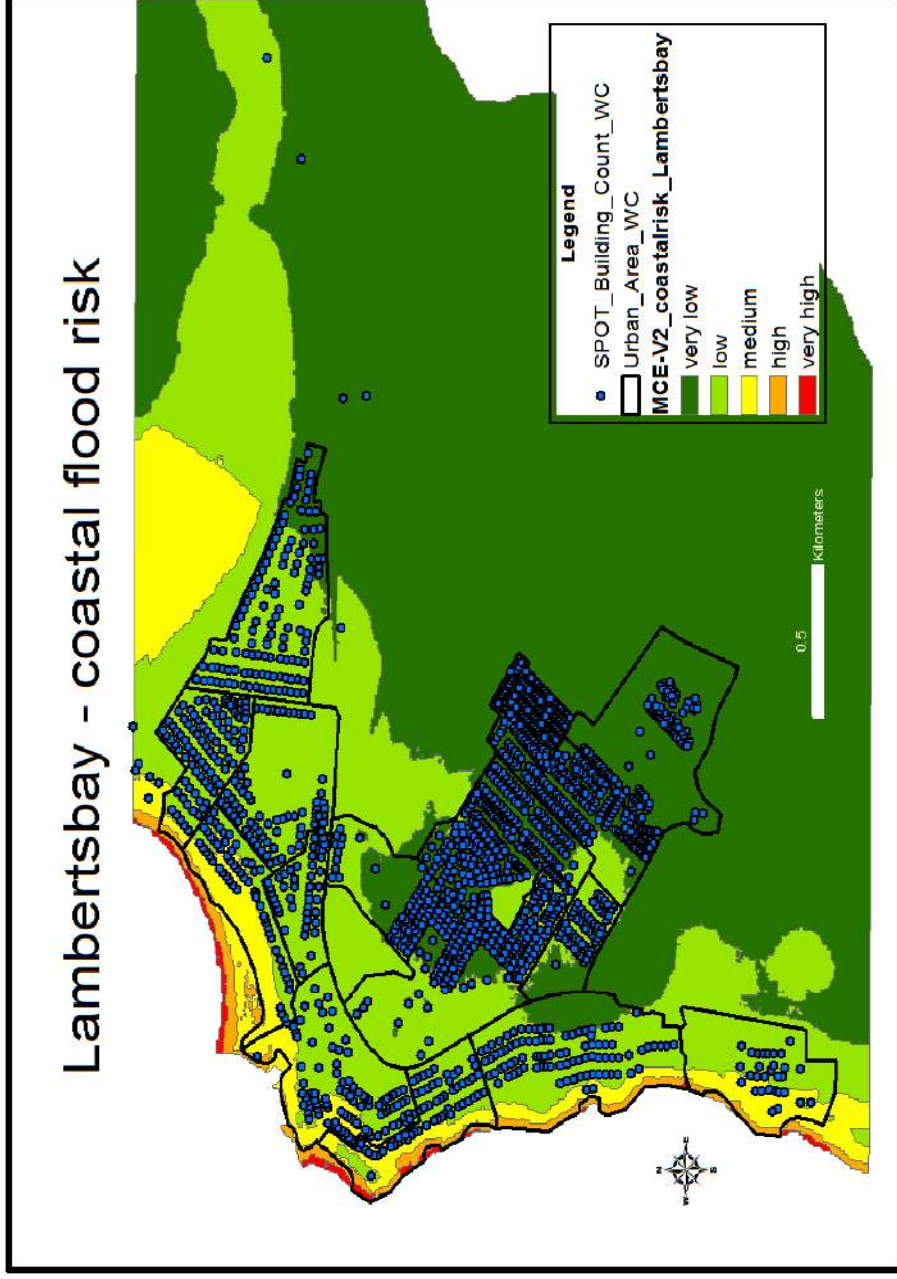
Source:
National Coastal Assessment
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Conducted by CSIR on behalf
of DEA O&C
2019

National coastal flood risk output (V 2.0)

Colour code	Index value	Index description
	1	Very low flood hazard risk
	2	Low flood hazard risk
	3	Medium flood hazard risk
	4	High flood hazard risk
	5	Very high flood hazard risk



Analysis of flood risk for buildings in 2011 and 2016



Increase of buildings in the coastal zone 2011 – 2016 using NCA Flood Risk Index (V2.0)

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

2011

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

2016

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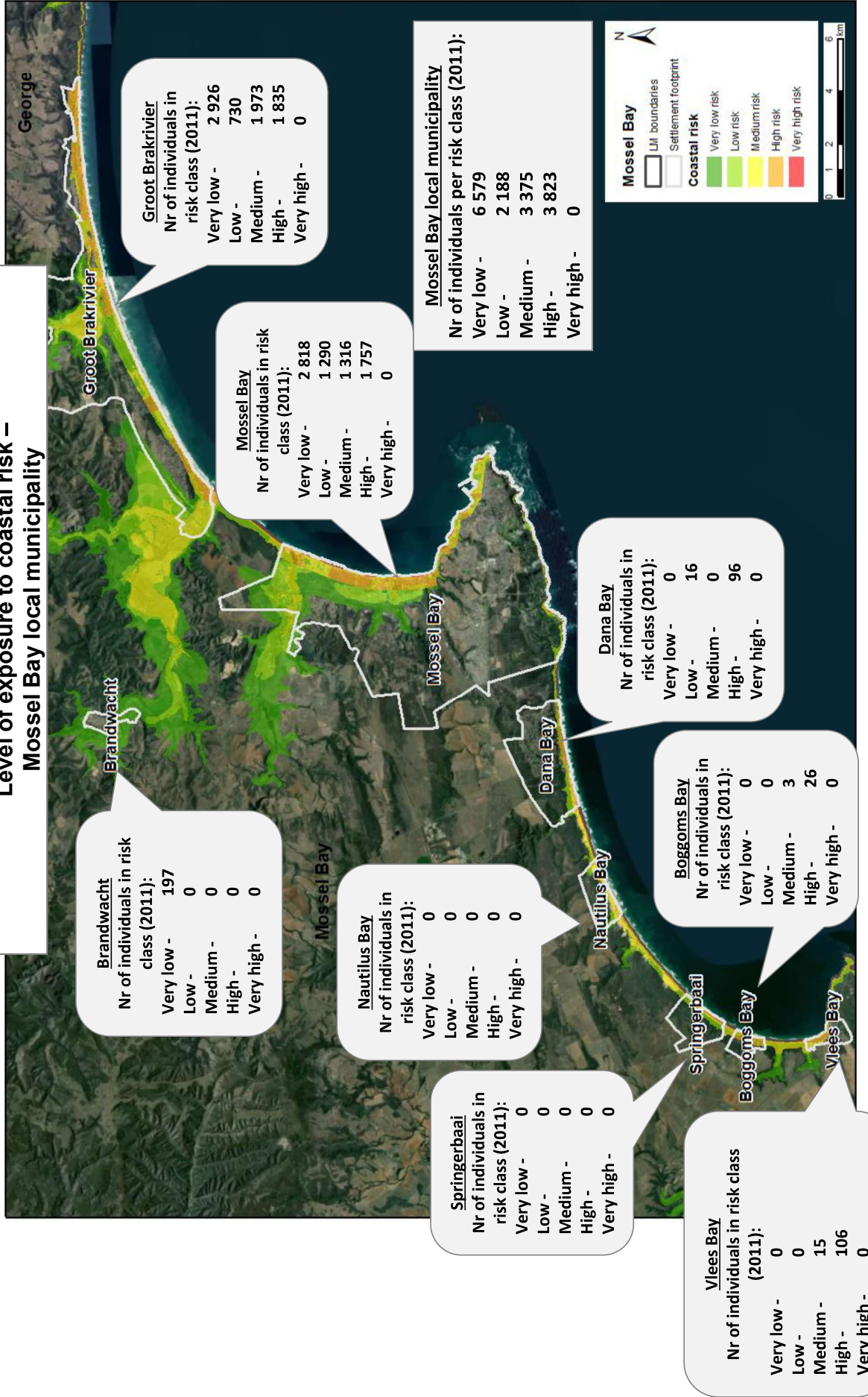
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2016

* In 5 years No. of houses almost doubled
* worst: WC and EC

Level of exposure to coastal risk – Mossel Bay local municipality





GIZ CoVu project (March 2019 – March 2020)

OBJECTIVES

- **Development of a National Coastal Spatial Vulnerability Index** for SA's coastline and estuaries from physical hazards attributable to climate change, namely flooding (through storm surge and sea level rise) and erosion.
- The CoVu Index will be **embedded in a or Decision Support Tool (DeST)** for long-term spatial planning for climate change resilience and coastal zone management in South Africa. Intended users: primarily government officials at all spheres of government.

Conducted by:



in collaboration with

CSIR

Funded by:

On behalf of:



Federal Ministry
for the Environment, Nature Conservation
and Nuclear Safety

of the Federal Republic of Germany

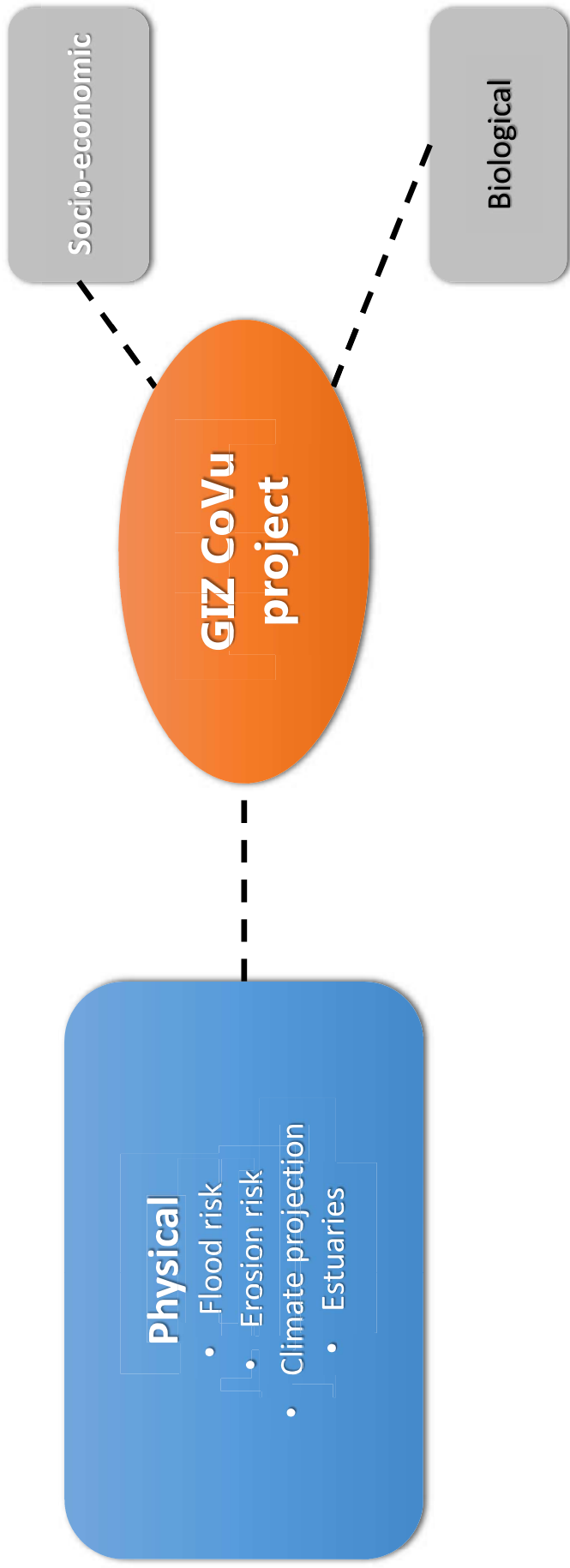


Supporting:

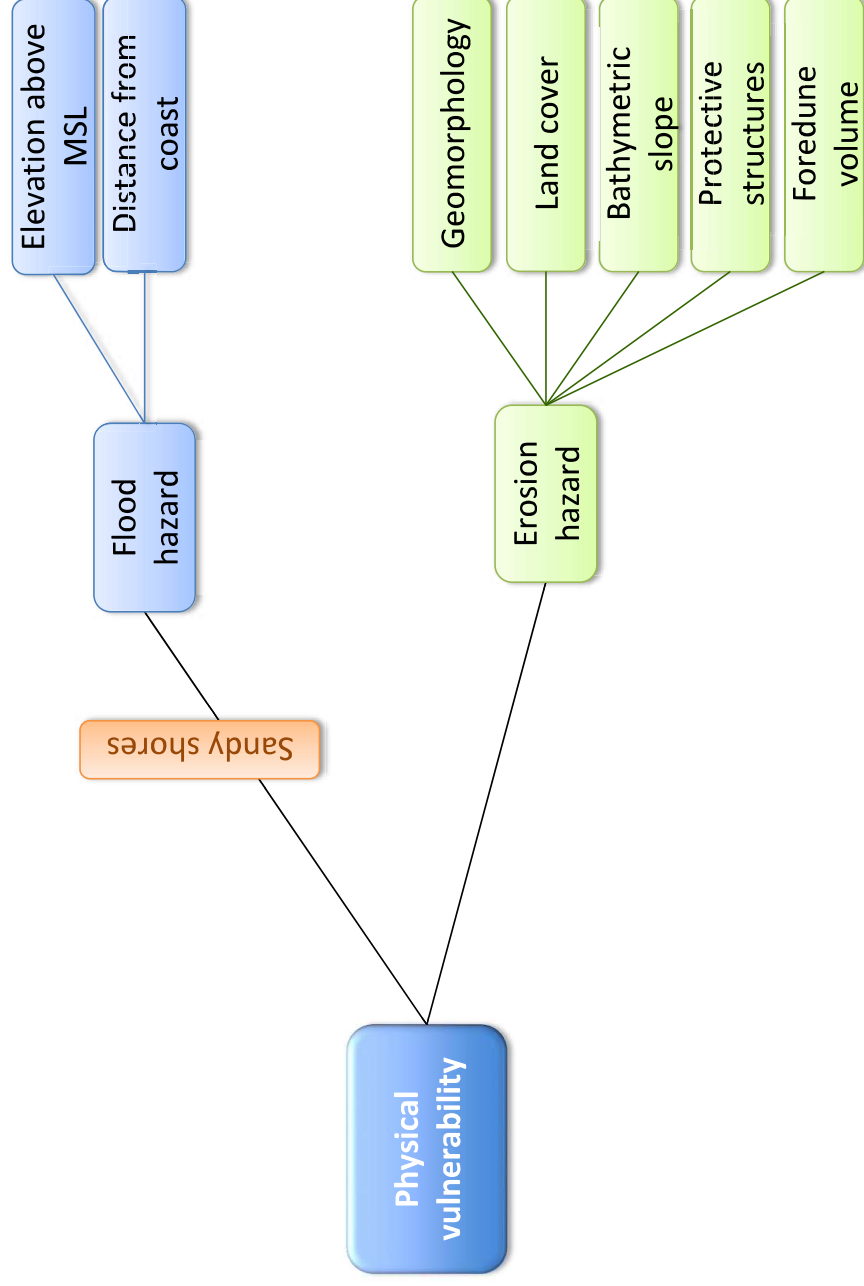


environmental affairs
Department:
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REPUBLIC OF SOUTH AFRICA

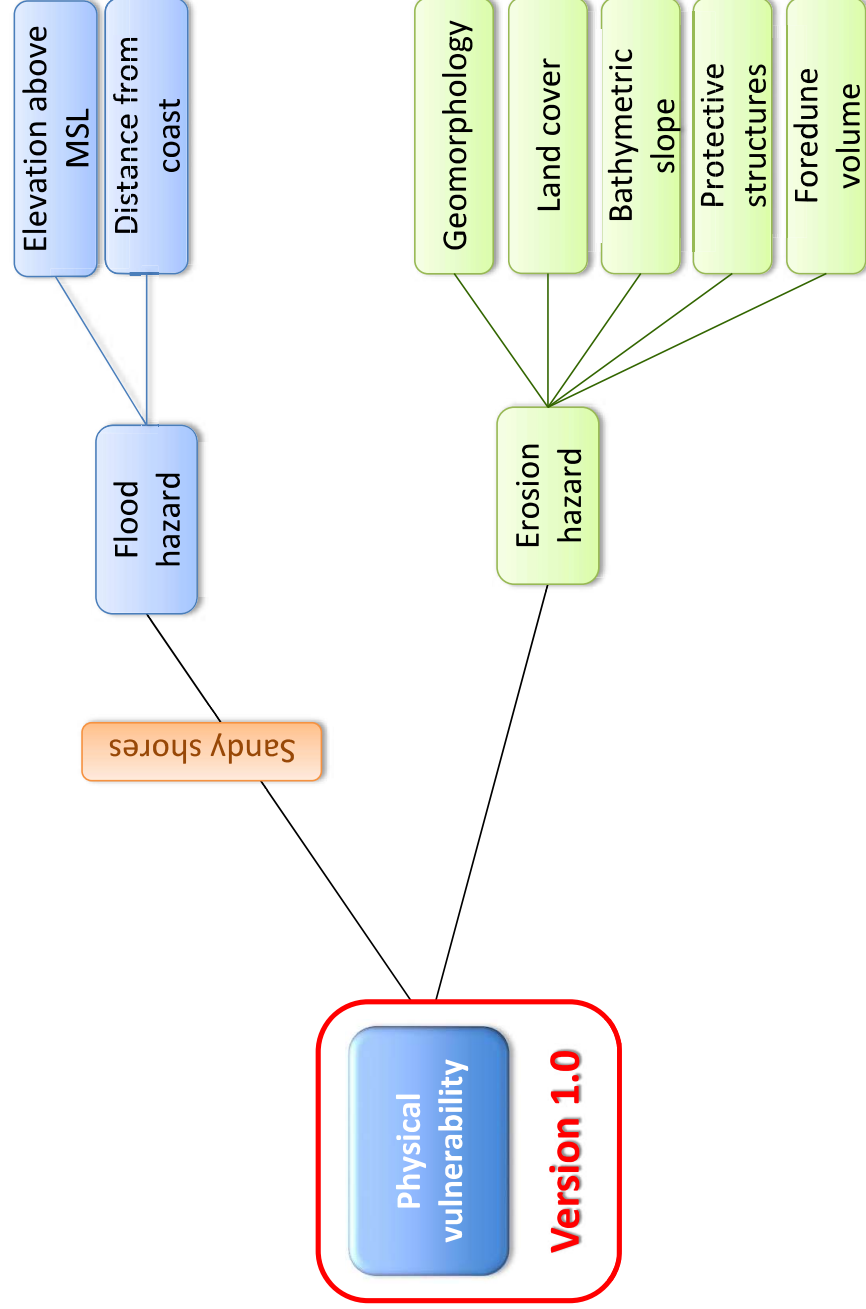
Difference to NCA project



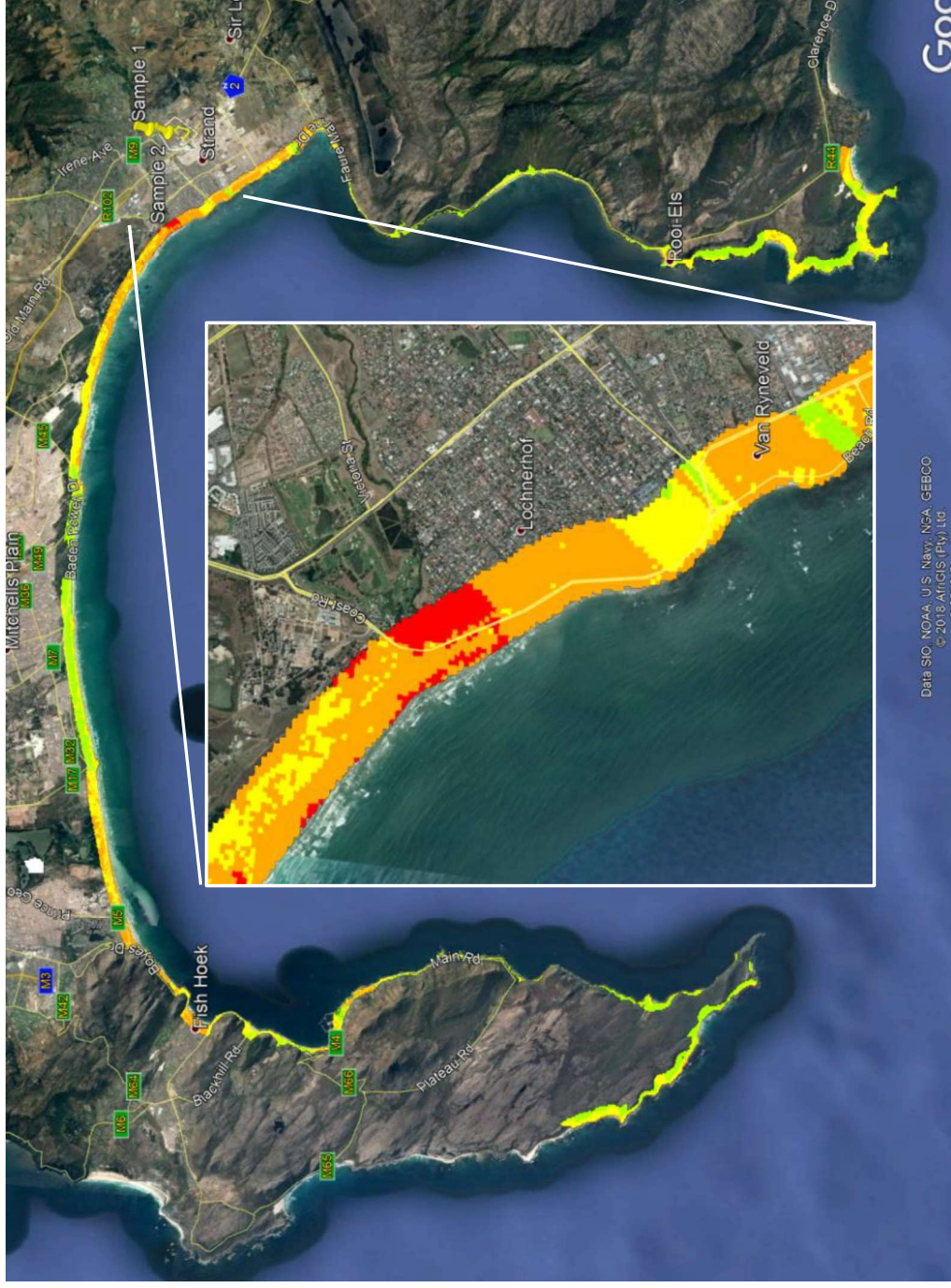
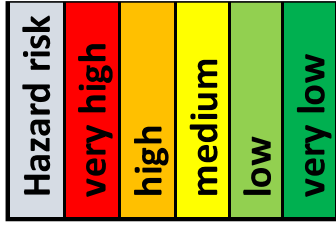
Physical vulnerability assessment in the NCA



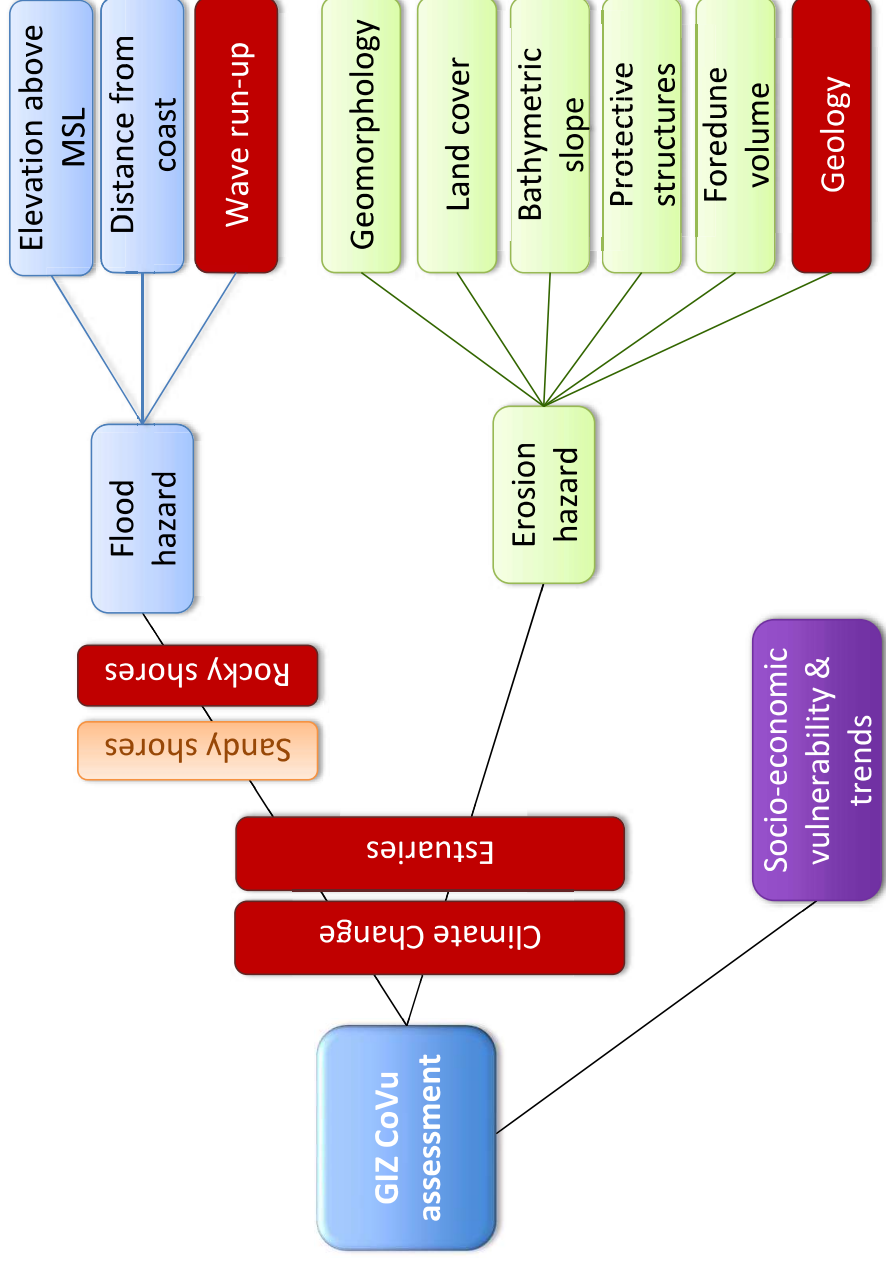
Physical vulnerability assessment in the NCA



Example of NCA Physical Vulnerability Index V 1.0

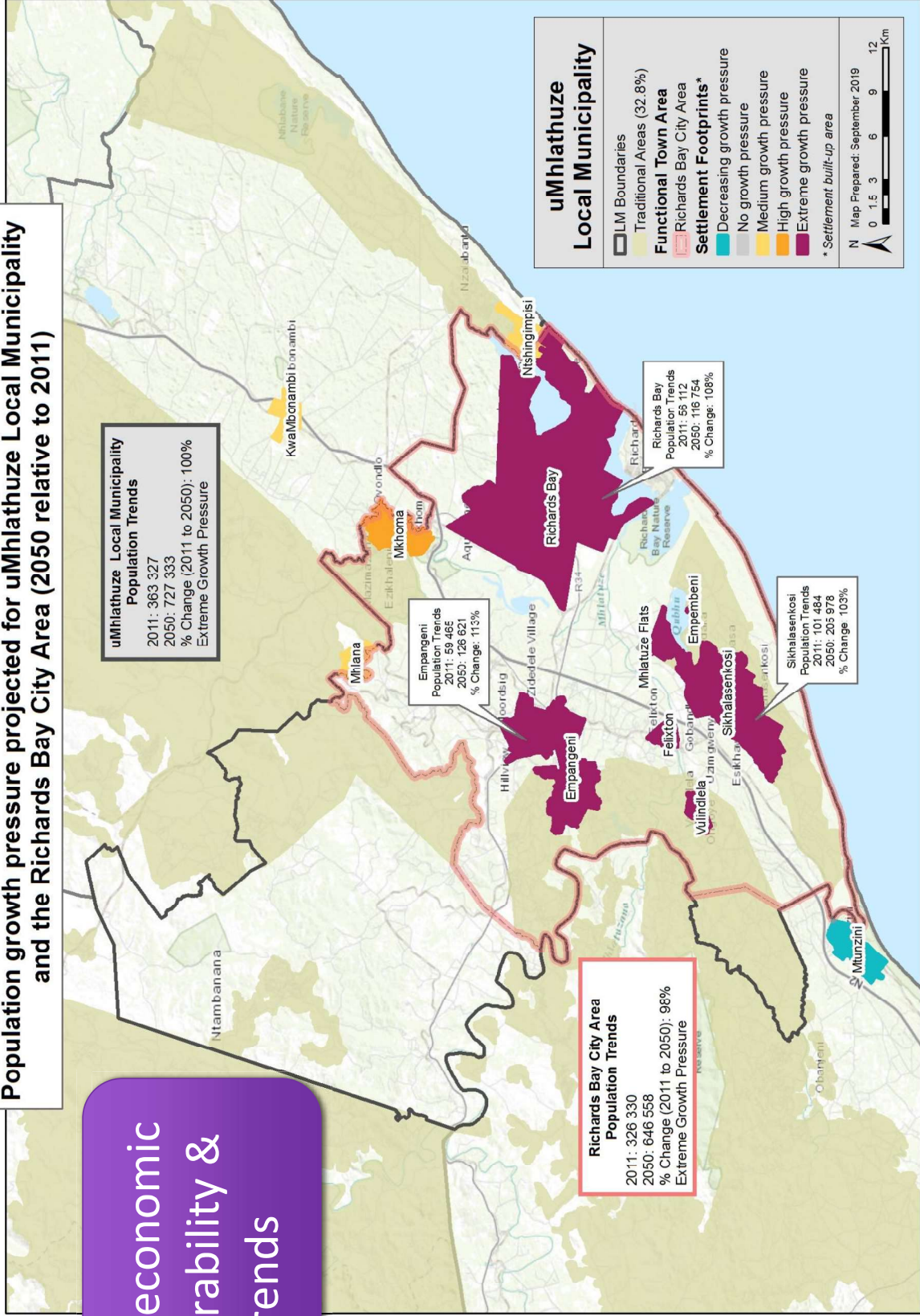


Improvement of the physical risk index in the GIZ CoVu project

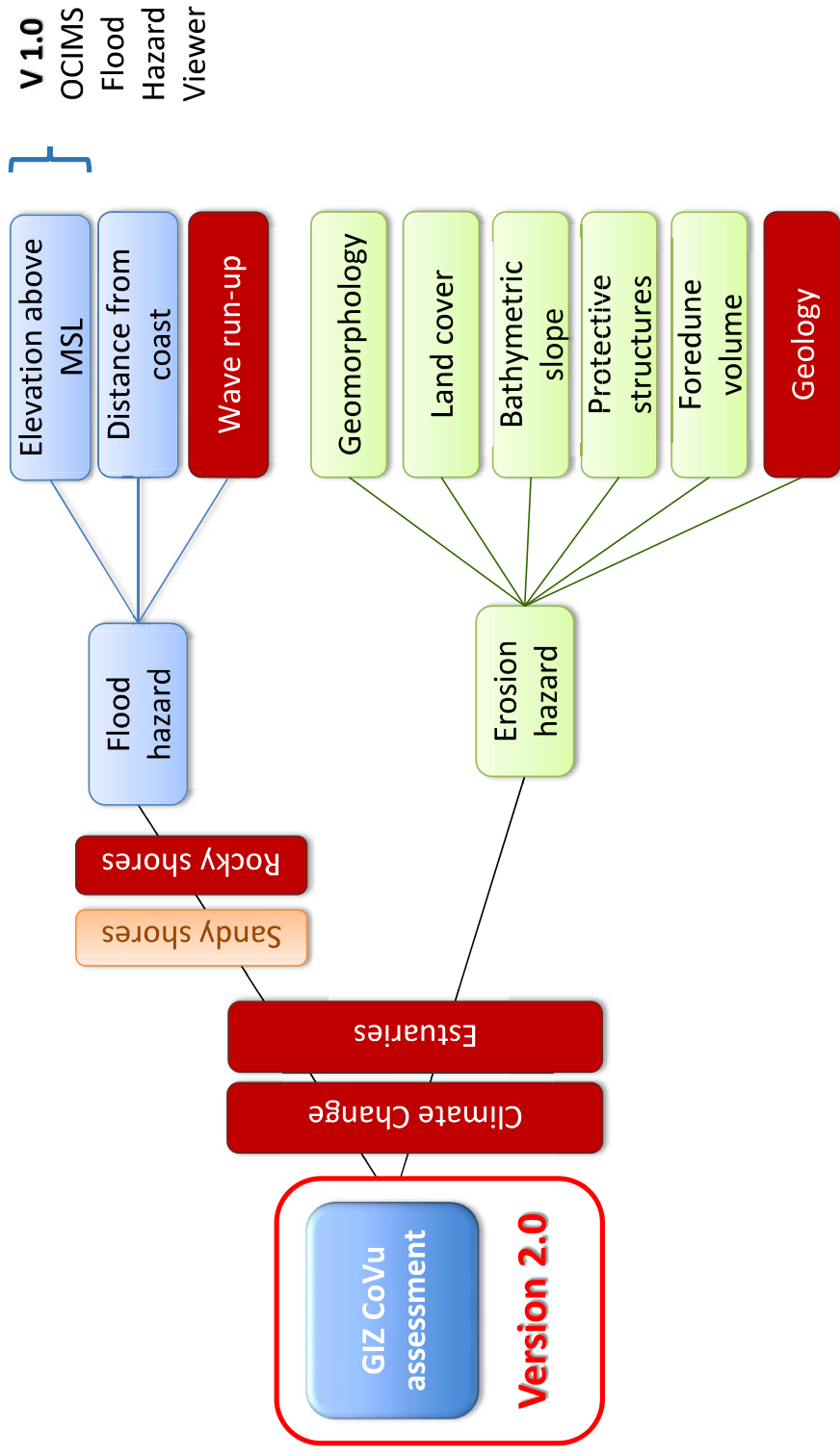


Socio-economic & vulnerability & trends

Population growth pressure projected for uMhlathuze Local Municipality and the Richards Bay City Area (2050 relative to 2011)



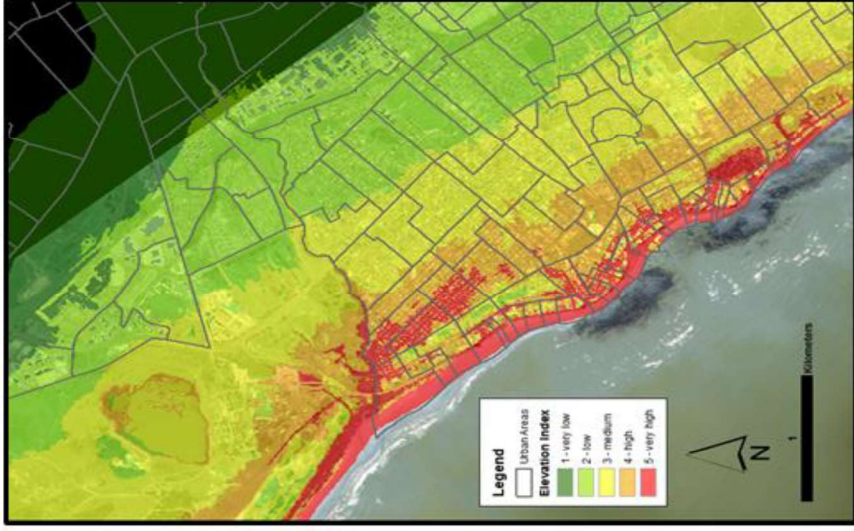
Different versions from different projects



OCIMS Flood Risk Index V 1.0

<https://www.ocims.gov.za/hazardlines/>

Elevation above MSL



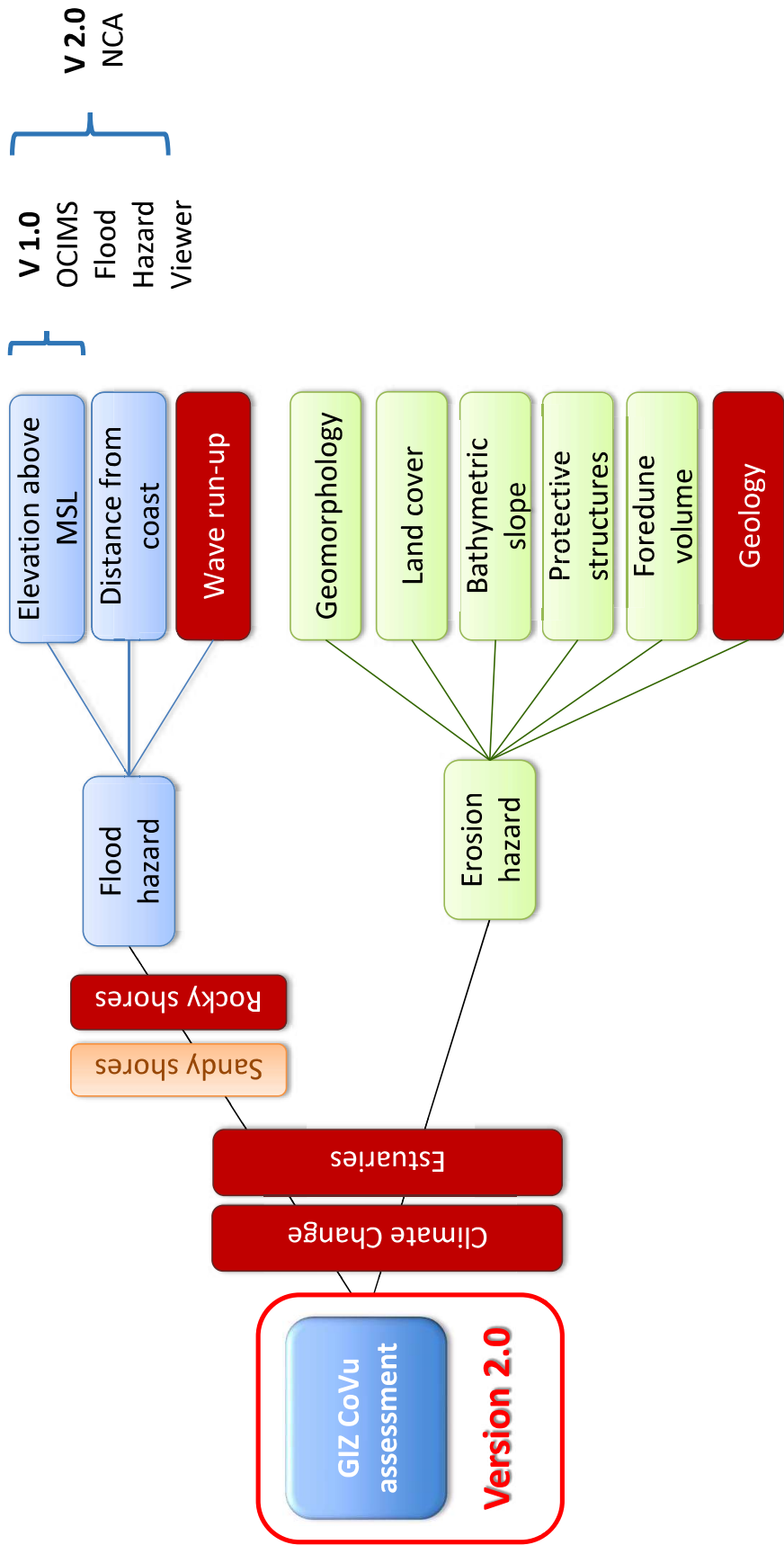
The screenshot shows the OCIMS Coastal Flood Hazard web application. The interface includes a search bar at the top with the text "Search by location n...". Below the search bar, the application title "NATIONAL OCIMS Coastal Flood Hazard" is displayed. A selection dropdown menu is open, showing "Coastal_floodlines:bergrivier" as the selected option. Other options include "SLR SCENARIOS", "HYDRODYNAMIC MODEL", and "FLOOD STORIES".

The main map area shows a satellite view of a coastal region with a blue overlay representing flood hazard. A "Water Level in [m]" slider is positioned at the bottom of the map, with a current value of 6.3m. The slider has markers at 10, 8, 6.3m, 4, and 2 meters. A "Menu" button is located in the top right corner of the map area.

On the right side of the interface, there is a "Flood levels above Mean Sea Level in [m]" legend with a color scale ranging from light blue (≤ 0.2) to dark blue (> 11). The legend also includes a red 'X' icon next to the first two categories.

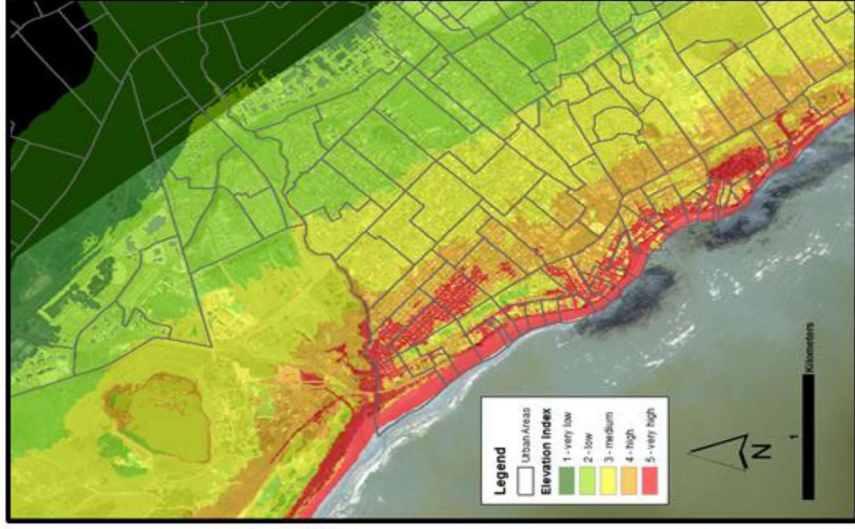
The map includes labels for various locations: "Schreijegbaai", "Dwaarskroonbos", "Veldrif", "Vredenburg", "K27", "K39", and "Western Cape". A scale bar at the bottom right of the map indicates 5 km. The footer of the application reads "ImageV from MapBox — Map data © OpenS...".

Different versions from different projects



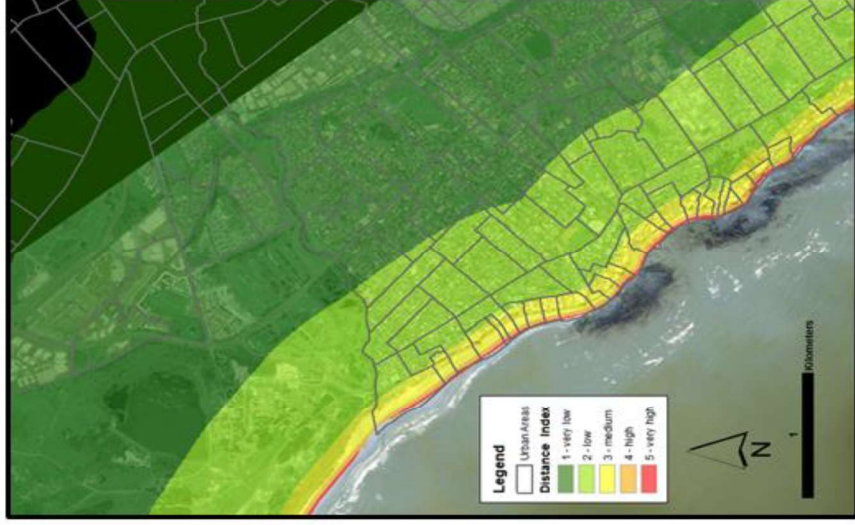
NCA Flood Risk Index V 2.0

Elevation above MSL



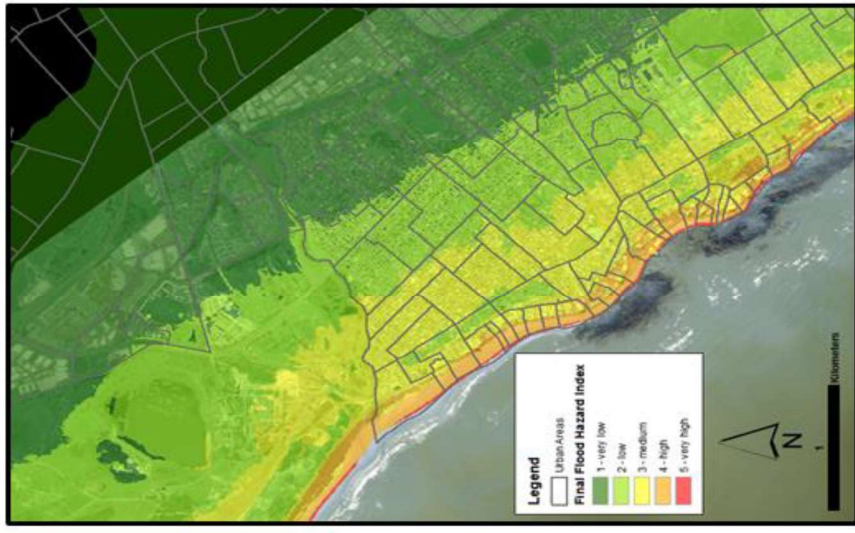
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Distance to coast

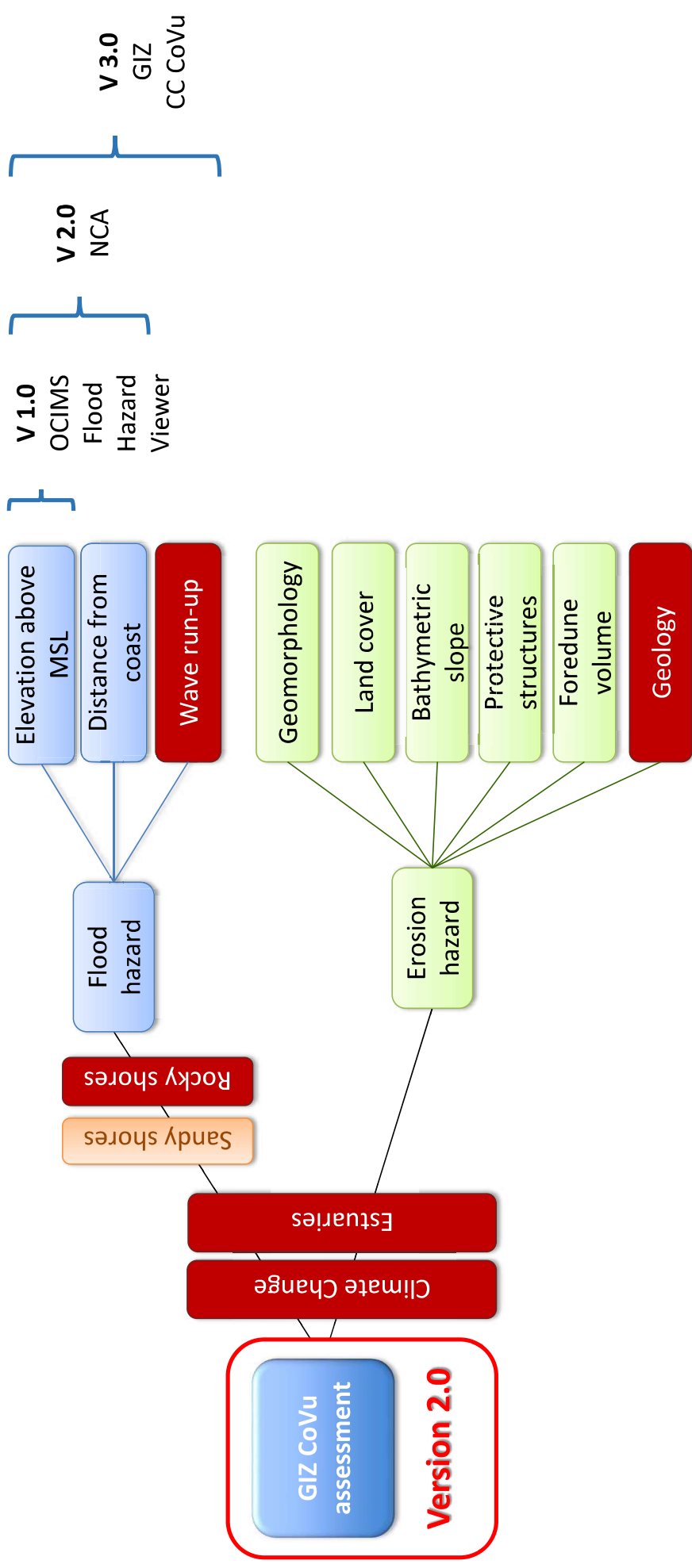


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V 2.0 Flood Index

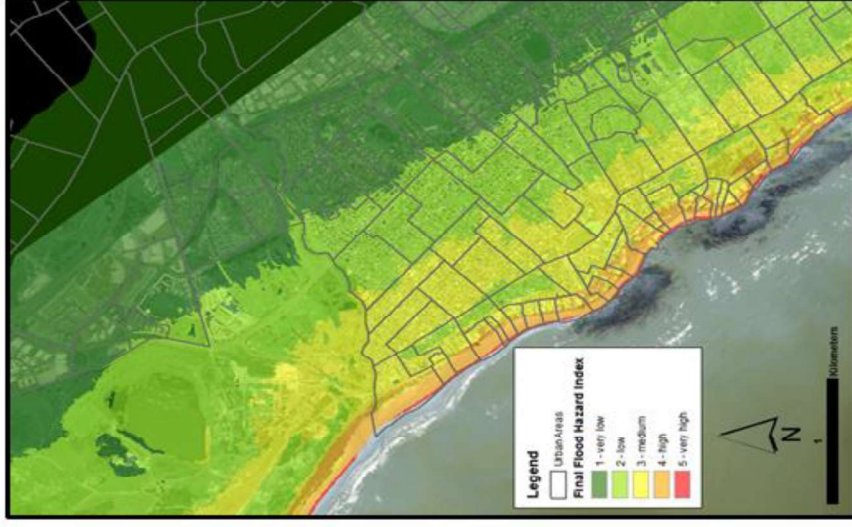


Different versions from different projects



GIZ CoVu Flood Risk Index V 3.0

NCA Flood Index



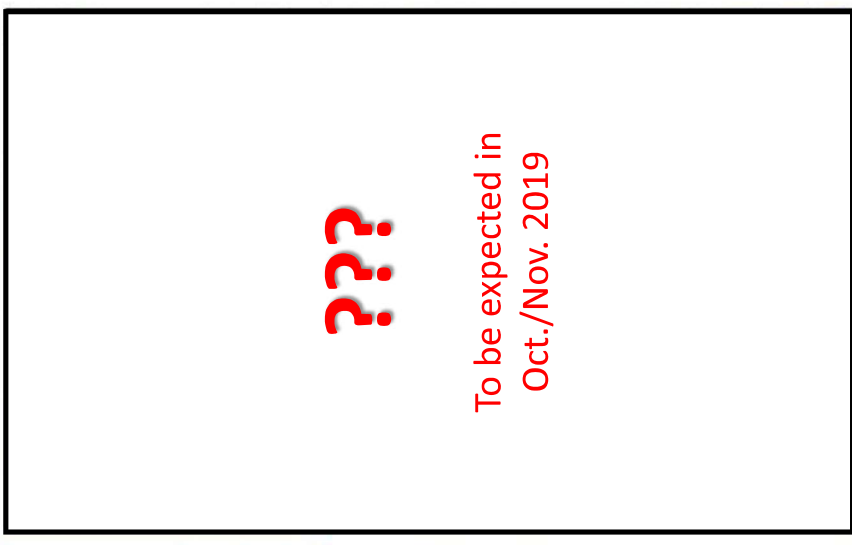
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Wave Run-up

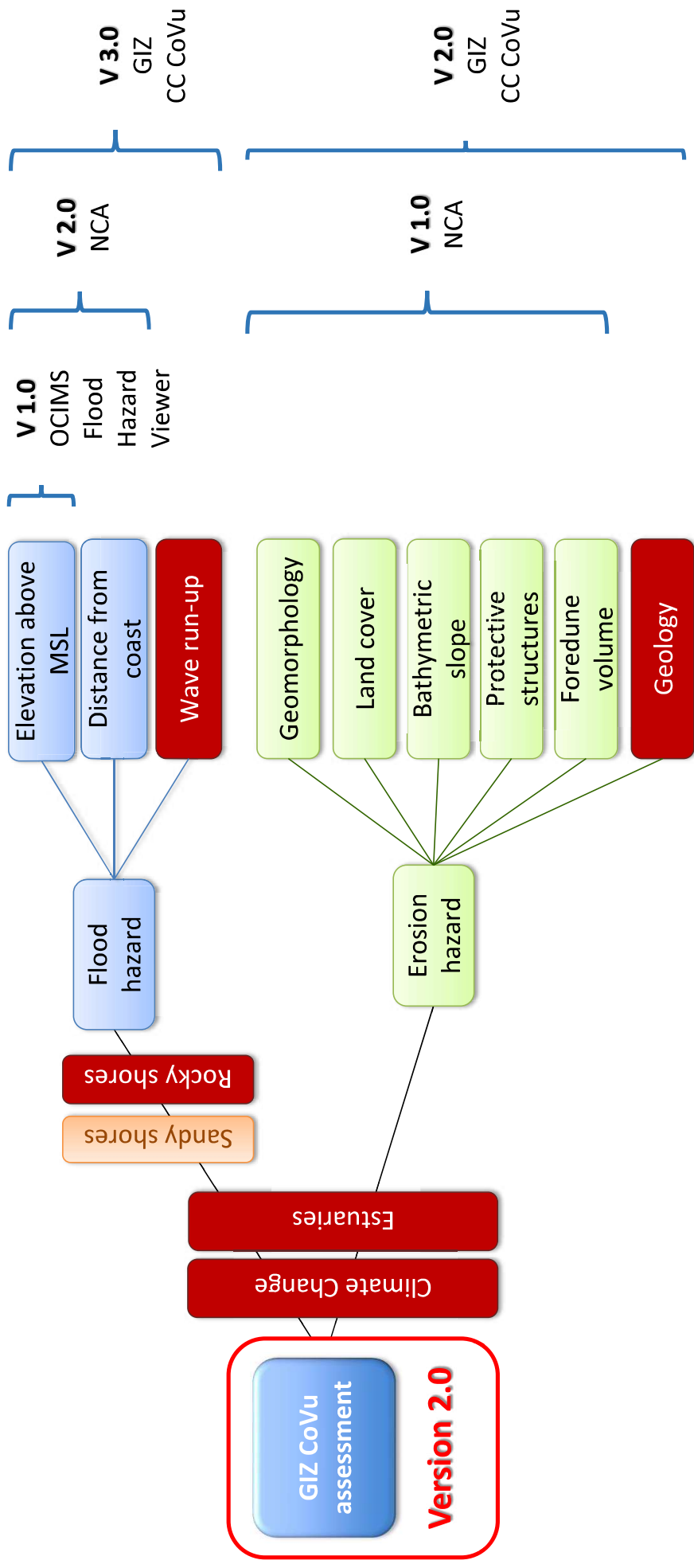


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GIZ CoVu Flood Index



Different versions from different projects



GIZ CoVu Objective 2: Decision Support Tool

Outcomes of Stakeholder engagements:

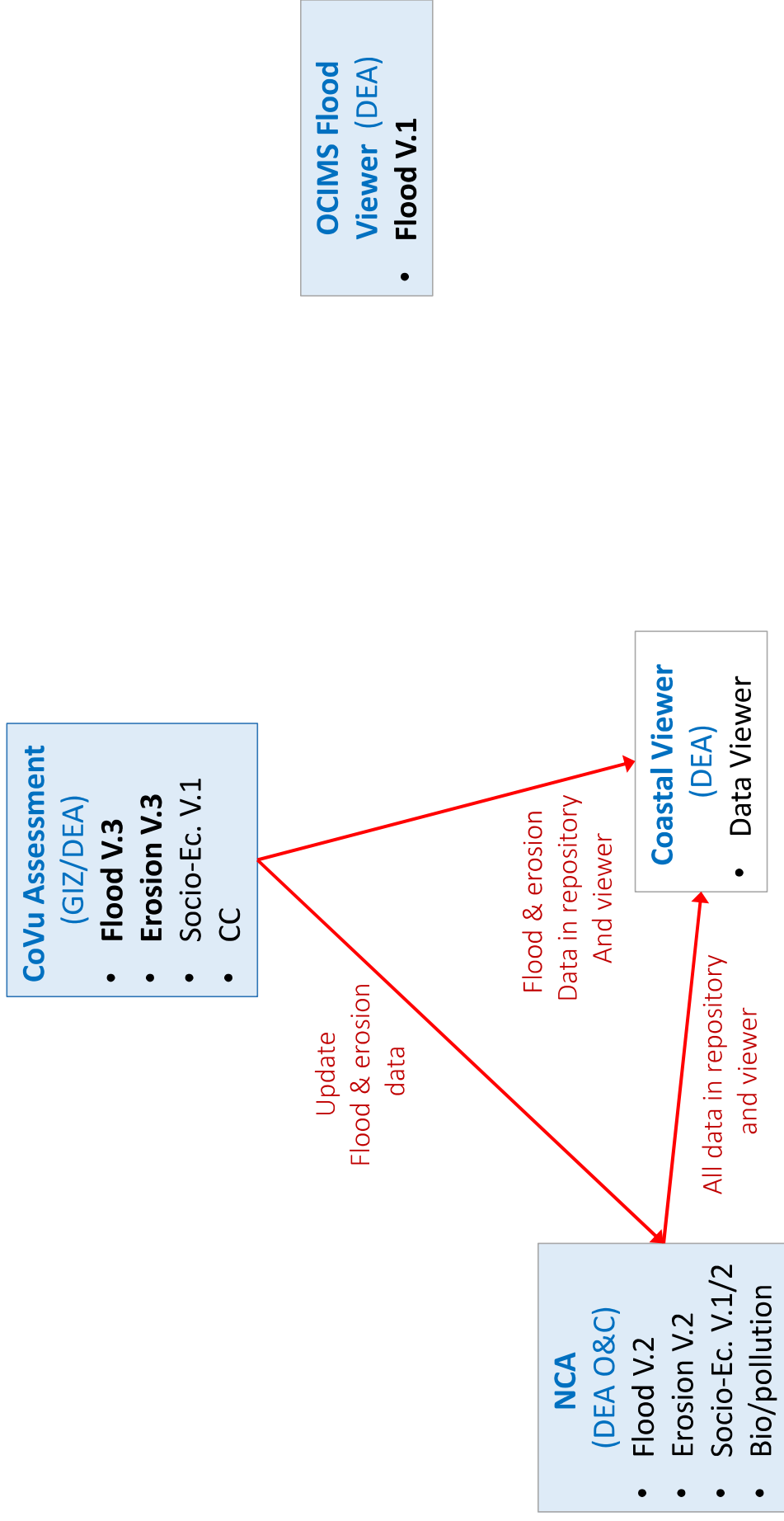
GIZ CoVu Objective 2: Decision Support Tool



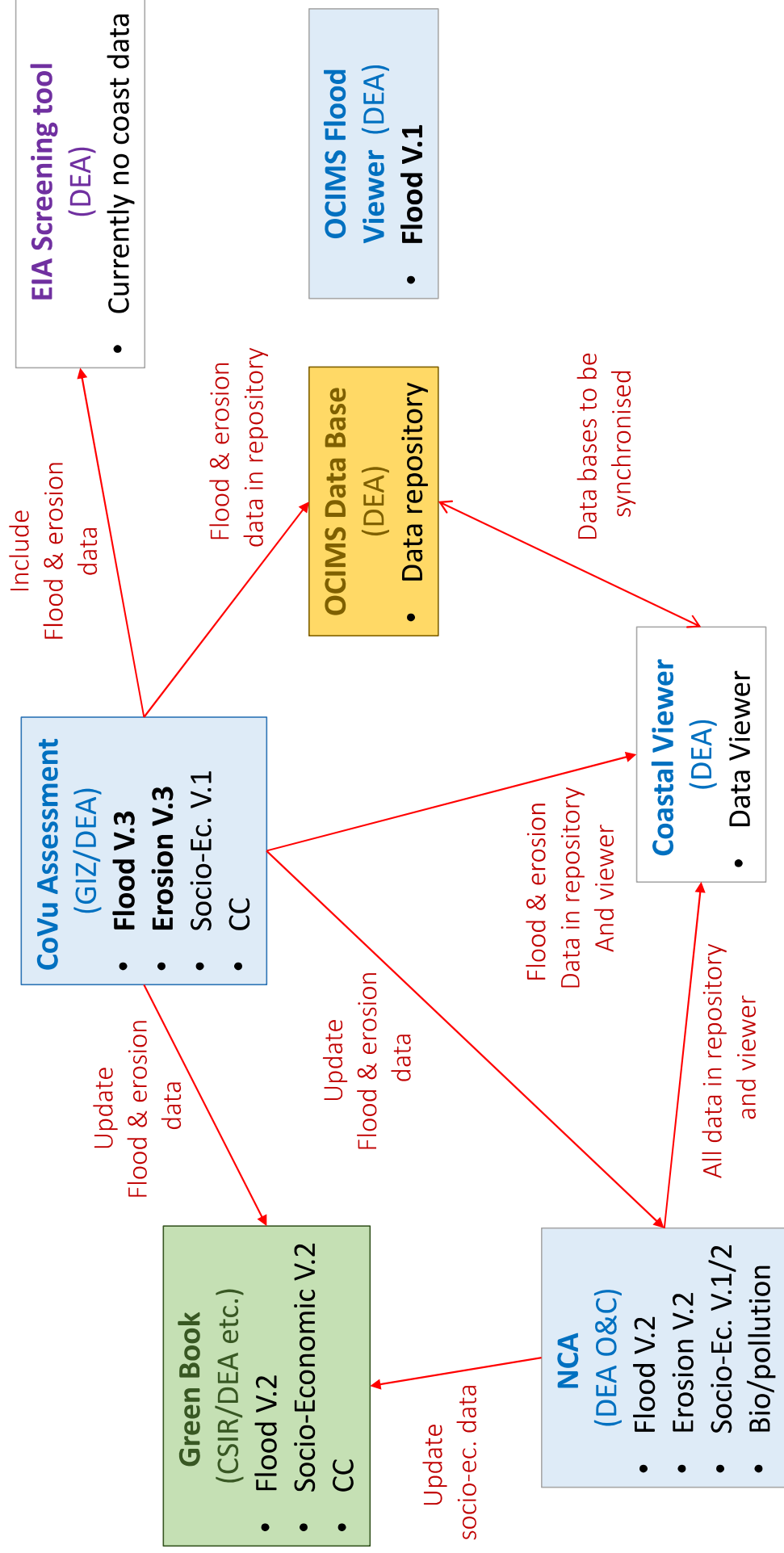
Solutions

1. Integration of data in existing DEA online data viewing tools
2. Access to GIS data via OCIMS
3. Generation of offline geospatial viewer to serve remote / disconnected areas & stakeholders
4. Create “Coastal Tool Box Portal” in OCIMS to point to existing tools

Relationships between DEA coastal and CC tools



Relationships between DEA coastal and CC tools



Development of off-line Data Viewer

The screenshot shows the ArcReader application window. The title bar reads "DeST - ArcReader". The menu bar includes "File", "Edit", "View", "Bookmarks", "Tools", "Window", and "Help". The toolbar contains various navigation and tool icons. The main map area displays a satellite-style map of a residential area with a color-coded risk overlay. The overlay uses a gradient from blue (Low) to red (High). A legend in the bottom-left corner identifies the risk levels: Low (blue), Low-Medium (green), Medium (yellow), Medium-High (orange), High (red), and Aerials (checkbox). The legend also shows "MCE_EC.tif" is checked. The map shows a residential area with a color-coded risk overlay. The overlay uses a gradient from blue (Low) to red (High). The map also shows a large body of water on the right side. The software interface includes a menu bar, toolbars, and a legend.

1. Implemented using e.g. ArcReader (ESRI)

2. Distribution of tool through

- OCIMS data portal
- On flash drives

Proposed OCIMS Coastal Tool Box

The screenshot displays the OCIMS website interface. At the top, a navigation menu includes links for HOME, ABOUT, DOCUMENTS, DATA, TOOLS, and THEMES. The main header features the 'NATIONAL OCIMS' logo and the title 'National Oceans and Coastal Information Management System'. A prominent 'Coastal Tool Box' is highlighted with a red border, listing several tools: Coastal Operations at Sea Decision Support Tool, DEA Coastal Viewer, Harmful Algal Bloom Decision Support Tool, Integrated Vessel Tracking Decision Support Tool, Marine Spatial Planning Support Viewer, and Water Quality Decision Support Tool. Below the tool box, a large teal graphic shows a coastal landscape with the text 'National Oceans and Coastal Information Management System'. At the bottom, a white box contains the text: 'The National Oceans and Coastal Information Management System (OCIMS) provides decision support for the effective governance of South Africa's oceans and coasts.' followed by a teal downward-pointing arrow.

https://www.ocims.gov.za

NATIONAL OCIMS

National Oceans and Coastal Information Management System

Coastal Tool Box

- Coastal Operations at Sea Decision Support Tool
- DEA Coastal Viewer
- Harmful Algal Bloom Decision Support Tool
- Integrated Vessel Tracking Decision Support Tool
- Marine Spatial Planning Support Viewer
- Water Quality Decision Support Tool

The National Oceans and Coastal Information Management System (OCIMS) provides decision support for the effective governance of South Africa's oceans and coasts. ▼

Proposed OCIMS Coastal Tool Box



TOOLS

The National Oceans and Coastal Information Management System (OCIMS) provides information and decision support to key stakeholders for the day-to-day management of South Africa's oceans and coasts. The following Decision Support Tools can be used to assist with informed decision making.



Coastal Viewer

The South African west and south coasts suffer from the frequent occurrence of Harmful Algal Blooms (HABs). These blooms can have considerable negative impacts on commercial marine concerns such as rock lobster and aquaculture operations. In addition to local marine ecosystems and communities.



Coast KZN

South Africa's Exclusive Economic Zone (EEZ) encompasses the coastal ocean and shelf sea waters. The region is characterised by one of the world's most energetic and productive ocean systems, namely the Agulhas Current and Benguela Upwelling System. Both play fundamental roles in the marine environment, its resources and ecosystem and the regional weather and global climate.



Marine Spatial Planning Support Viewer

The National Oceans and Coastal Information Management System (OCIMS) Marine Spatial Planning (MSP) Support Viewer Decision Support Tool (DeST) provides consolidated view of data sources that can inform MSP and the development of Marine Area Plans (MAPs).

Coastal Tool Box

- Coastal Operations at Sea Decision Support Tool
- DEA Coastal Viewer
- Harmful Algal Bloom Decision Support Tool
- Integrated Vessel Tracking Decision Support Tool
- Marine Spatial Planning Support Viewer
- Water Quality Decision Support Tool

ystem (OCIMS) provides
a's oceans and coasts.

Unresolved issues

- **Conflict with existing flood and erosion risk lines:**
 - Replace, complement or delete?
- **The Future: Update of all data and results** from NCA and GIZ CoVu project (physical, pollution, bio and socio-economic)?
 - "all existing data are always out-dated"

Thank you!

Project leader for NCA project
at DEA O&C:

Mr Ryan Peter

Rpeter@environment.gov.za

Project leader for NCA and GIZ
CoVu project at CSIR:

Dr Melanie Lück-Vogel

mluckvogel@csir.co.za

Project leader for GIZ CoVu project
At DEA O&C:

Mr Potlako Khati

PKhati@environment.gov.za