

GARDEN ROUTE WASTE & BIOMASS BENEFICIATION CONFERENCE

12 AUGUST 2021

WASTE & BIOMASS BENEFICIATION CONFERENCE

12 August 2021

Follow-on from 2019 Alien Biomass Expo Day



Assessment of responses – EIF (Ecological Infrastructure Investment Framework)

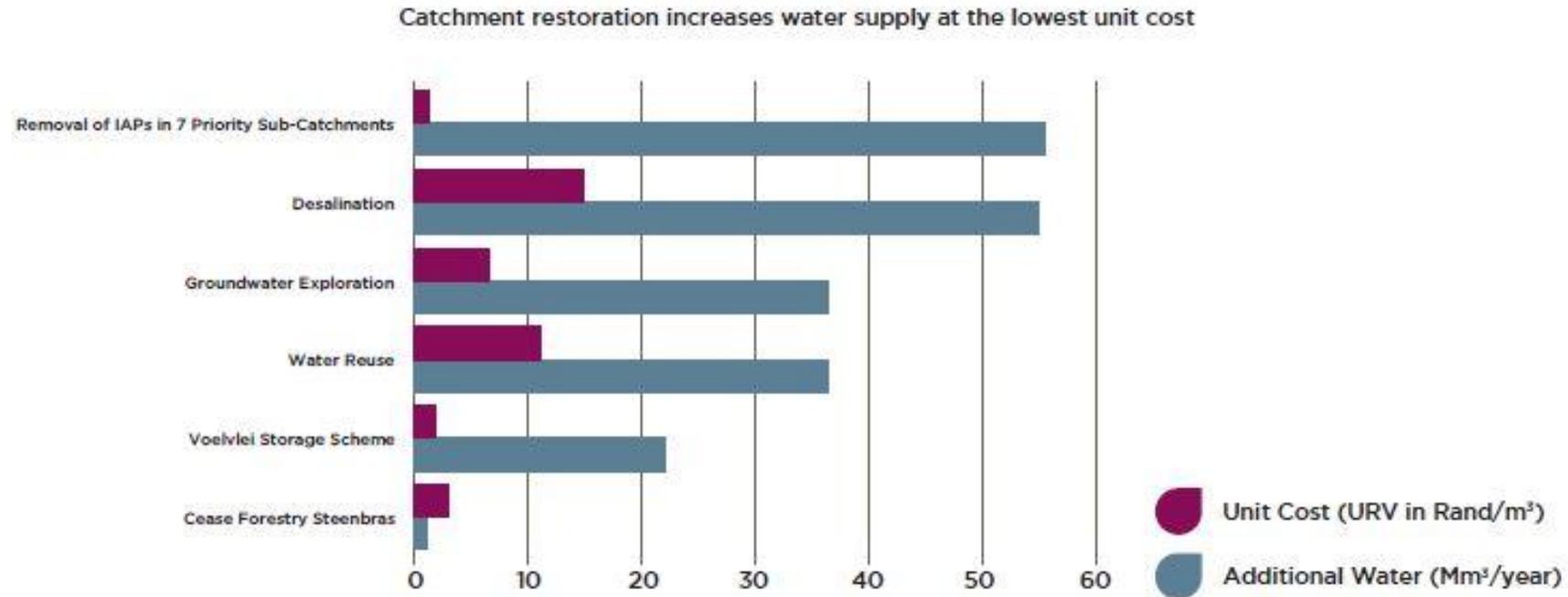
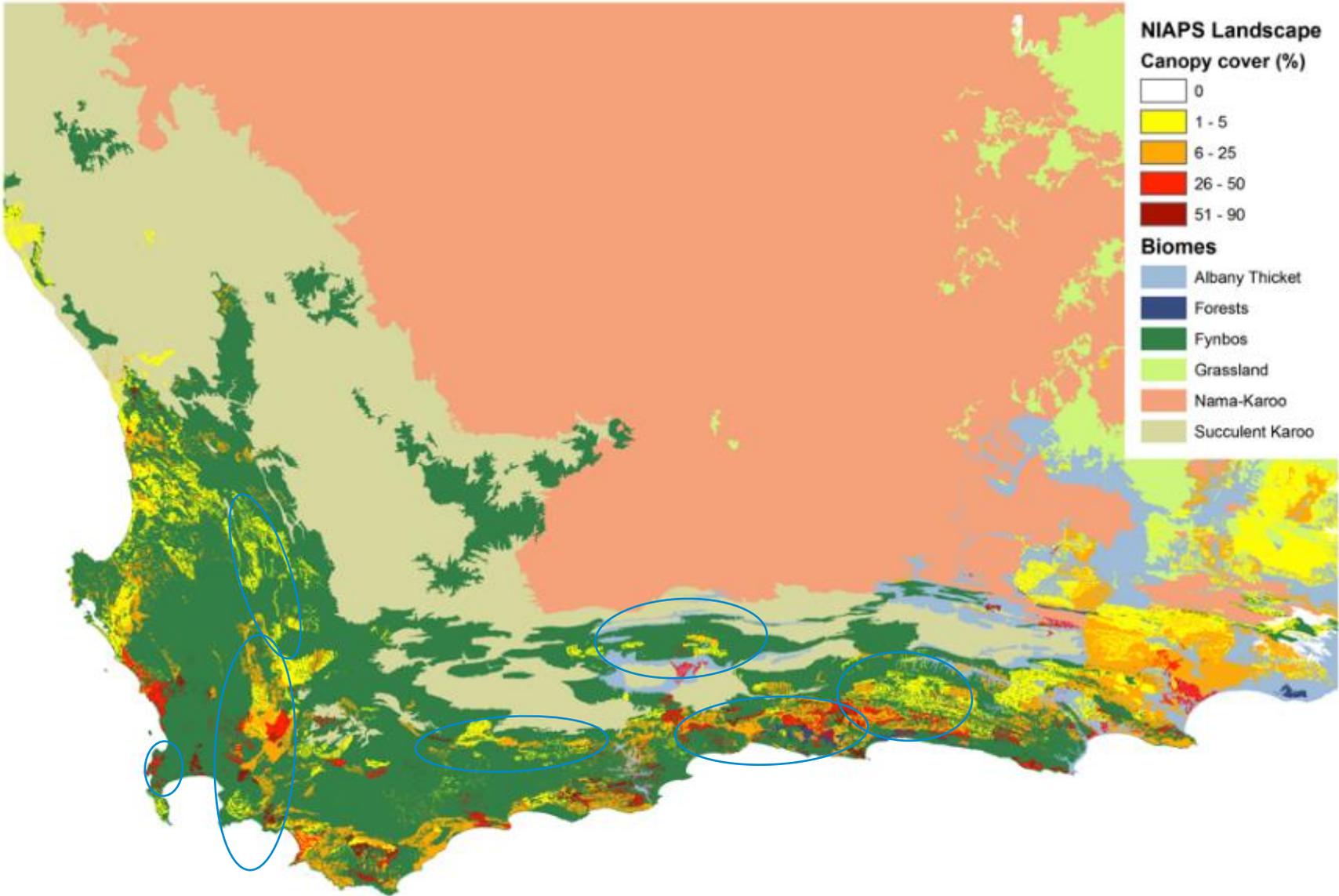
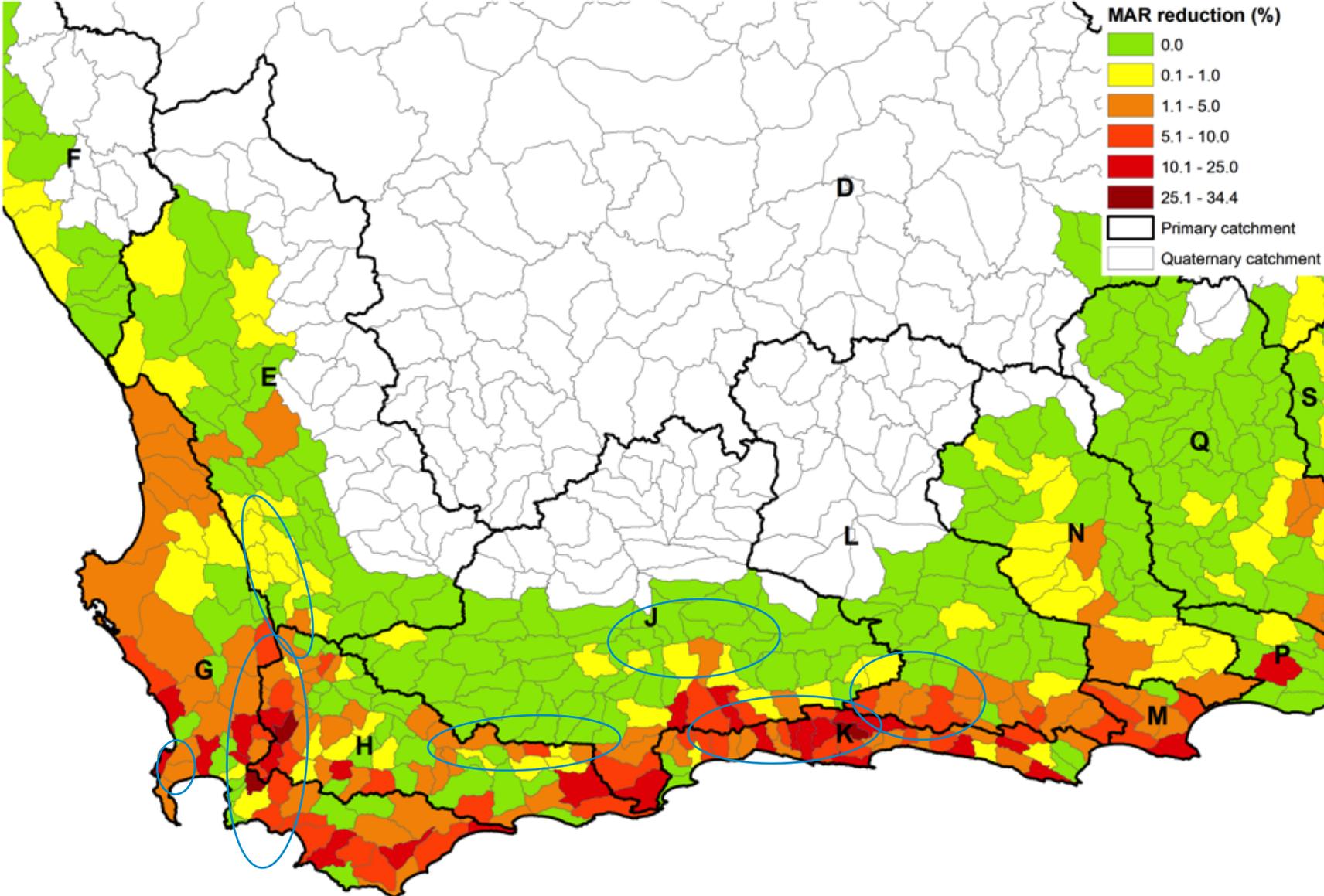


Figure 3: Water supply gain and unit cost (URV) comparison between different catchment restoration and other supply options in the Western Cape (including raw water treatment costs where applicable) (TNC 2018)

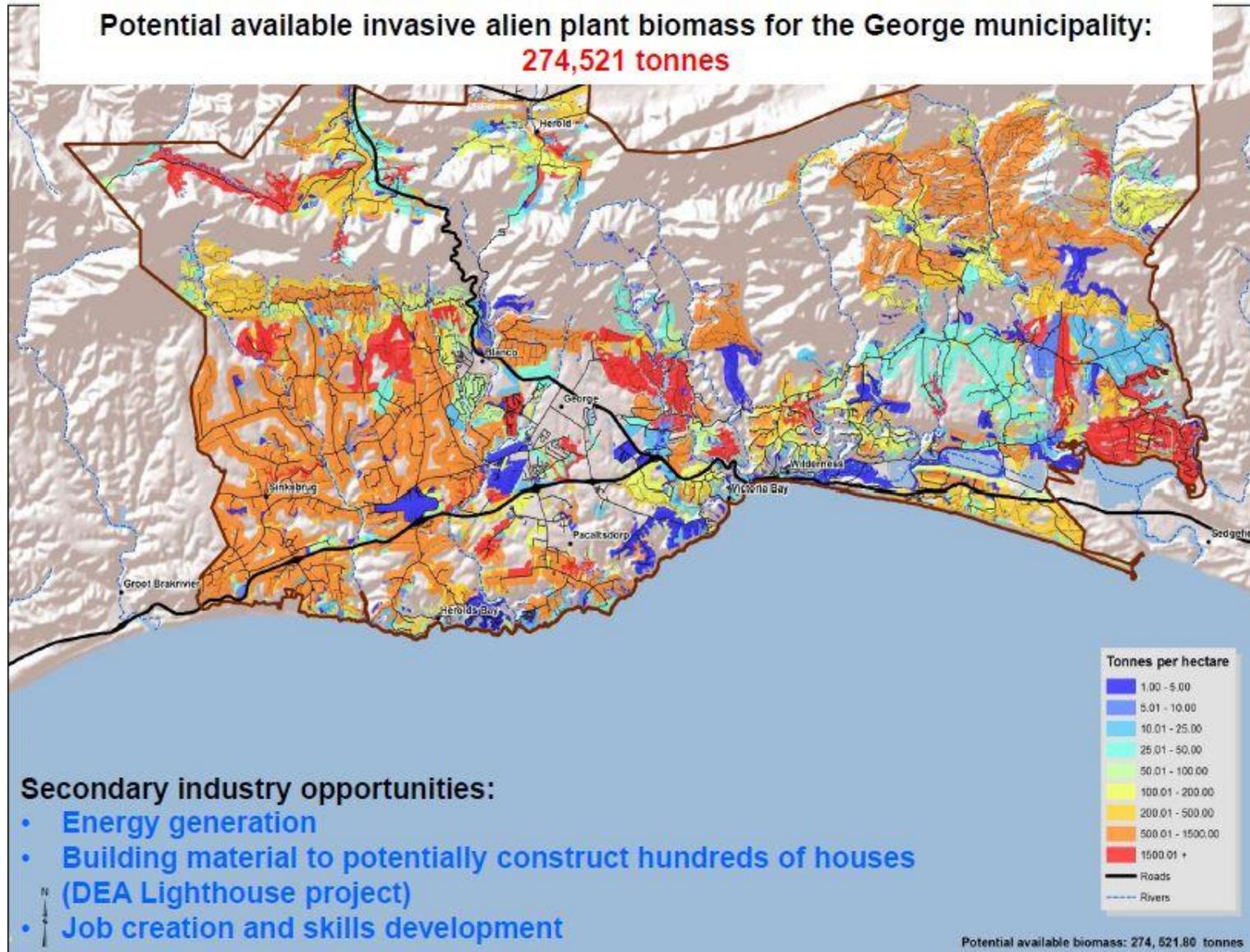
Landscape invasions by Alien Invasive Species - EIIF



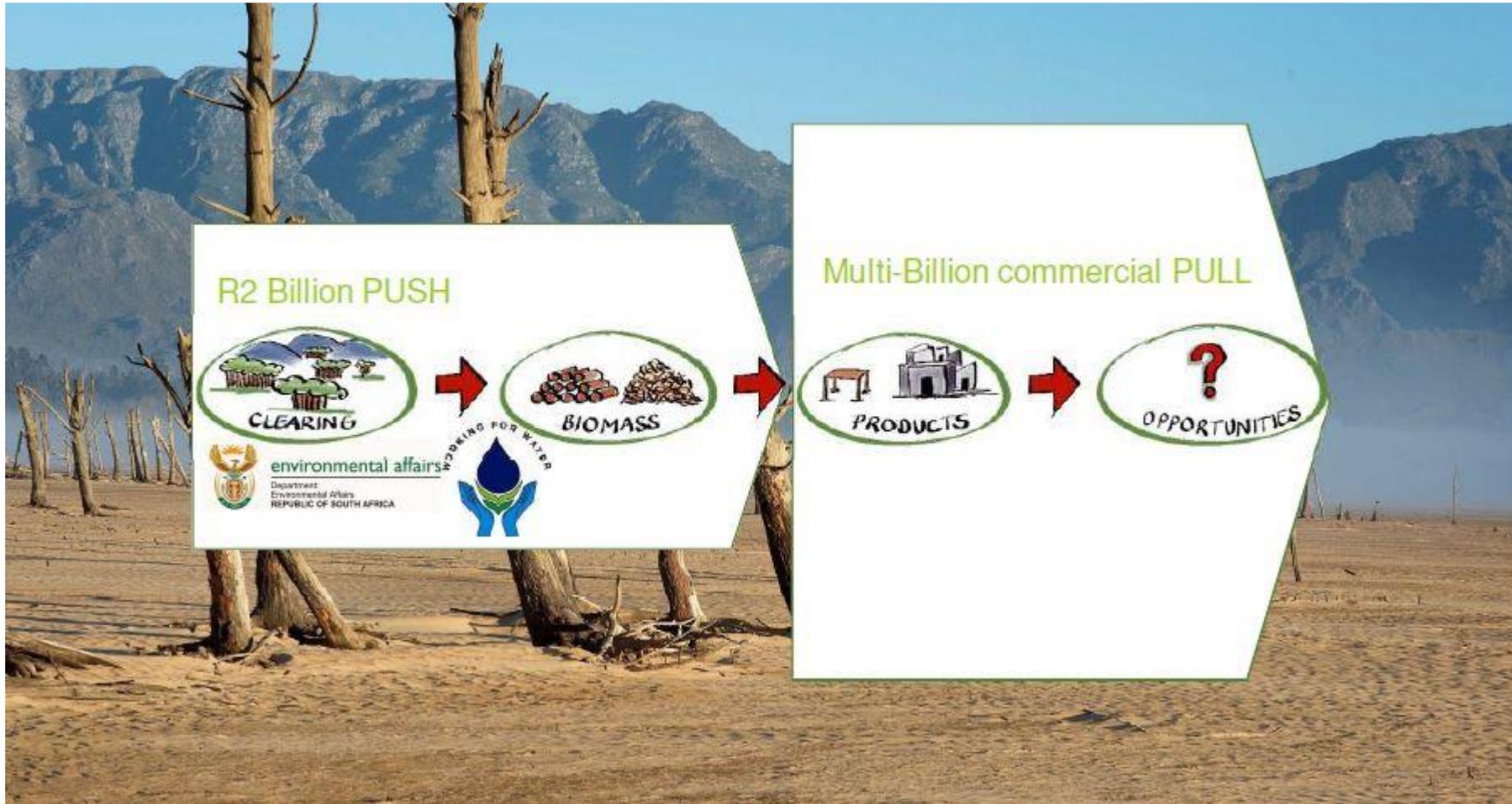
Reduction in Mean Annual Runoff due to Alien invasives - EIF



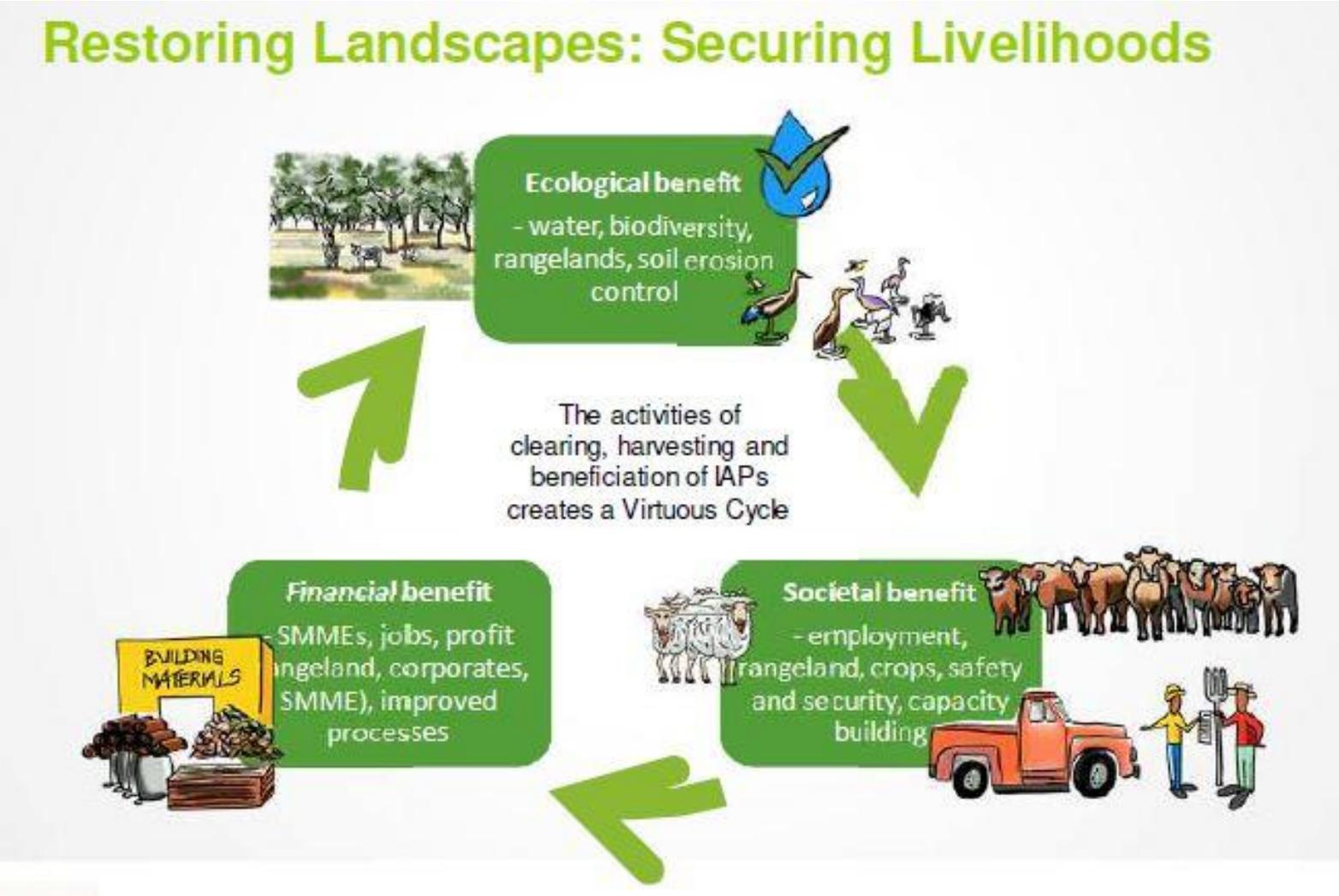
Local IAP's potential



Solution development



Conceptual flow



Biomass products

Energy products

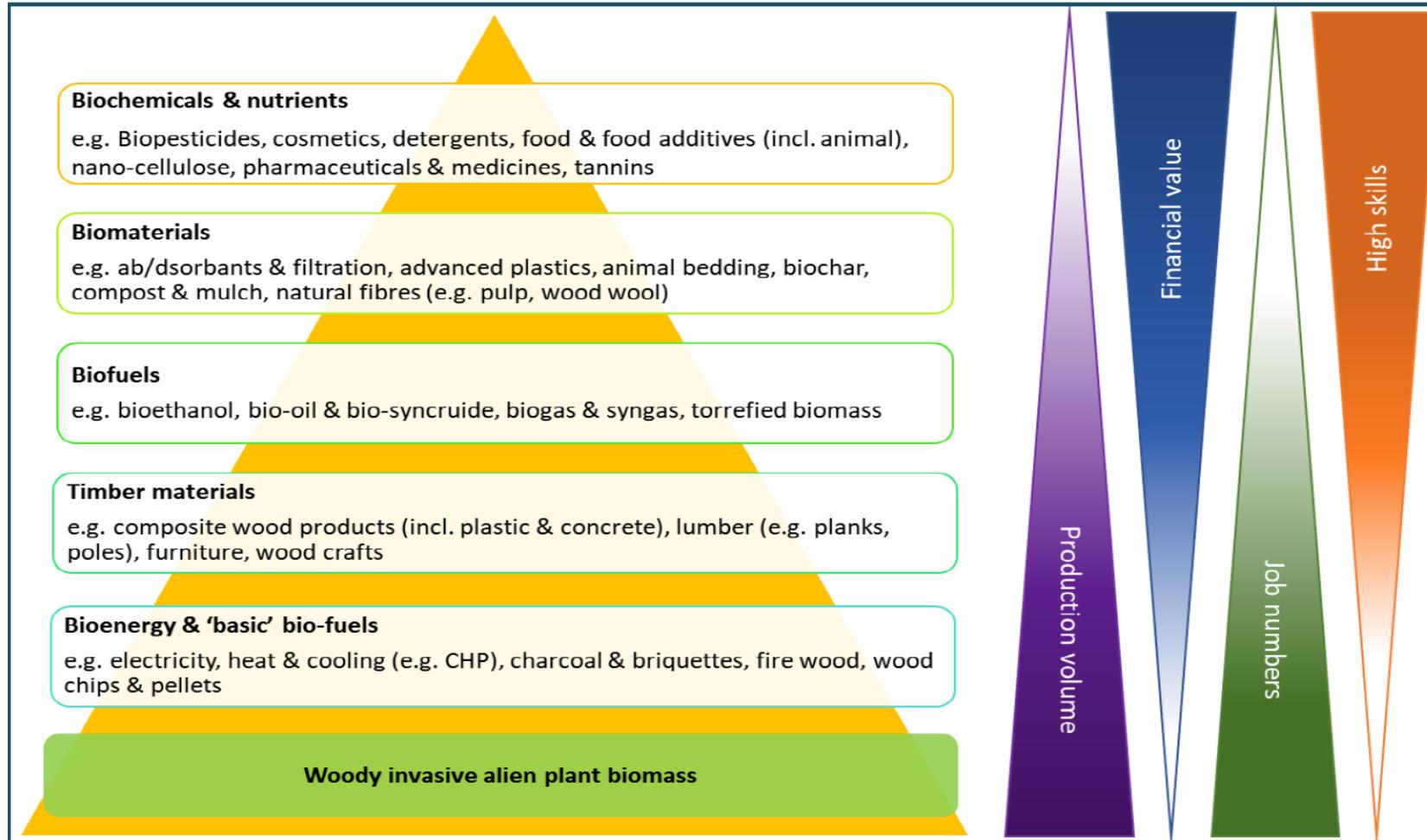


Material products



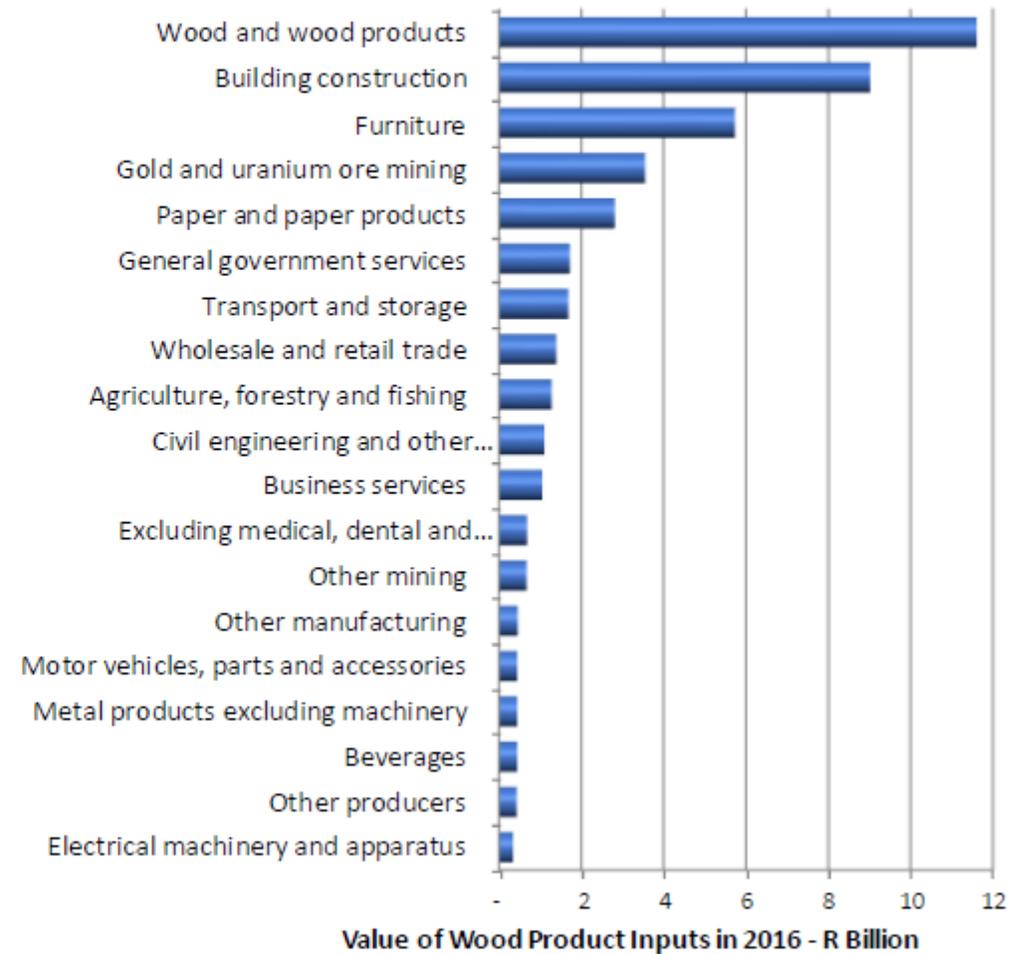
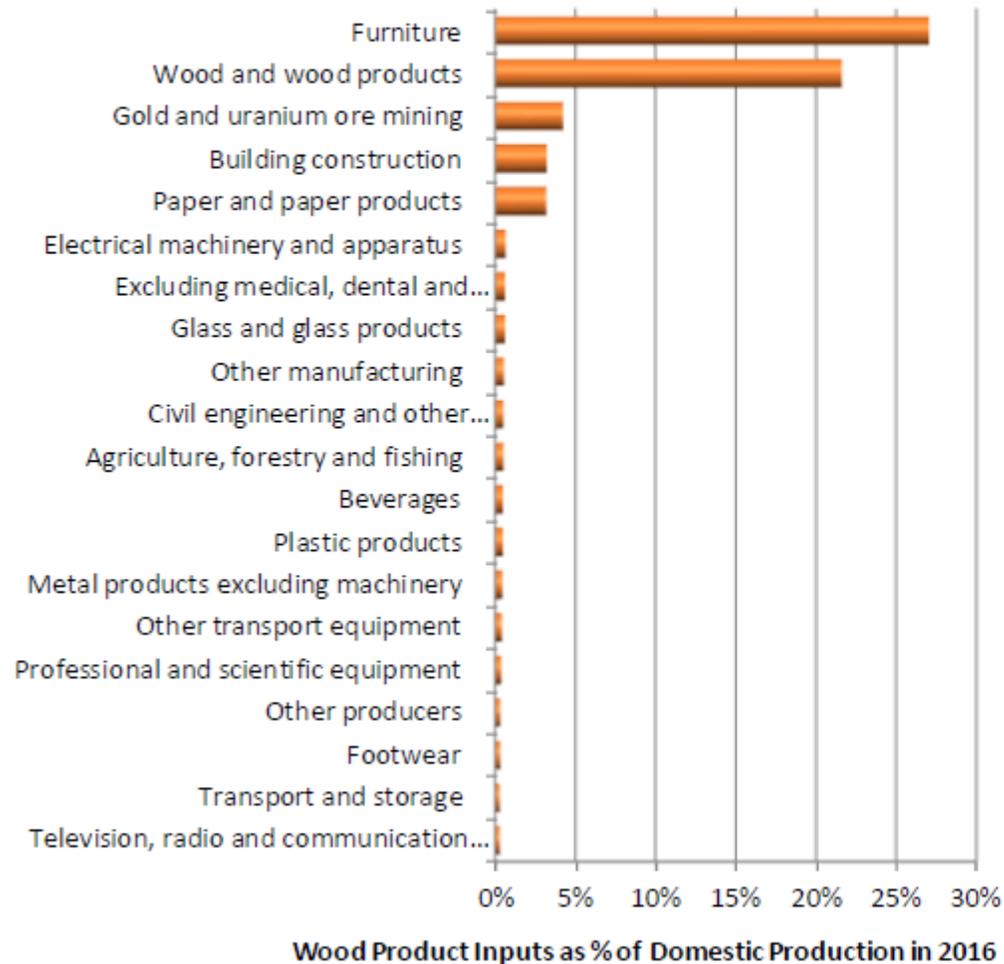
The beneficiation hierarchy

Figure 1: Invasive Alien Plant bioproduct value hierarchy



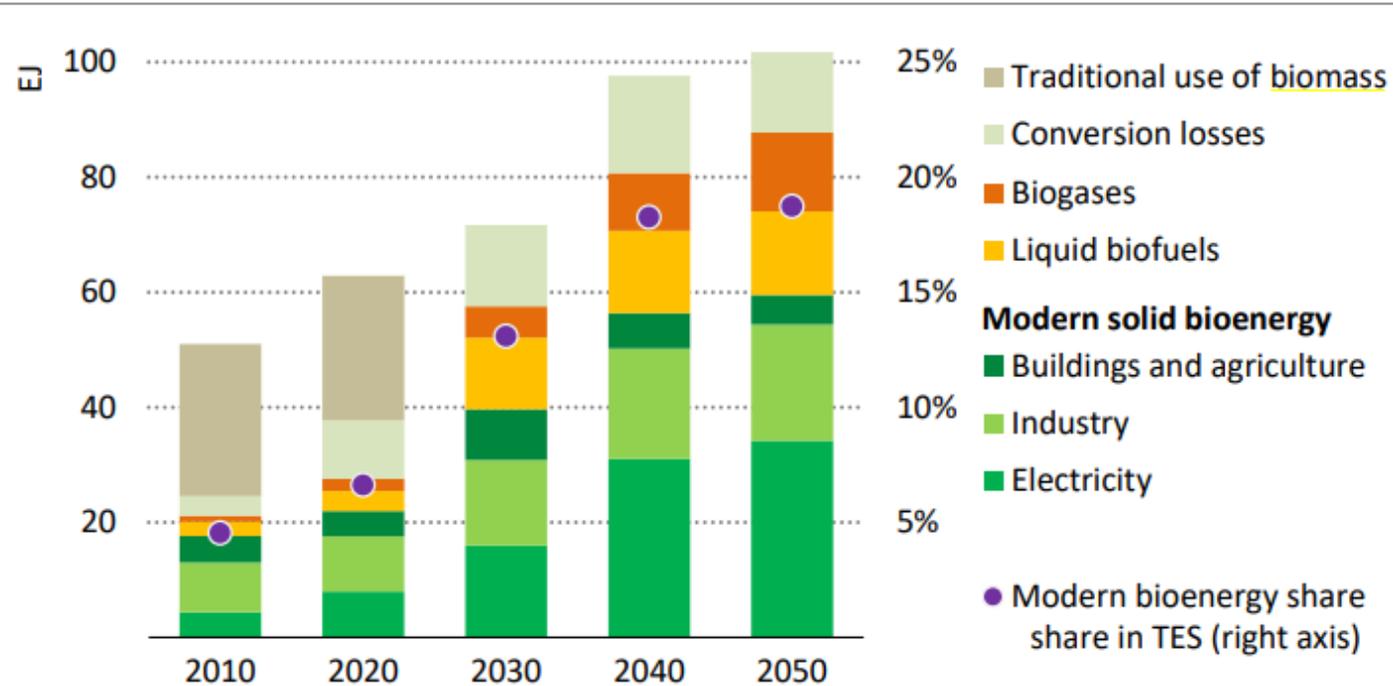
Demand hierarchy

Wood products as inputs into other sectors



IEA – Net-Zero Energy by 2050

Figure 2.20 ▶ Total bioenergy supply in the NZE

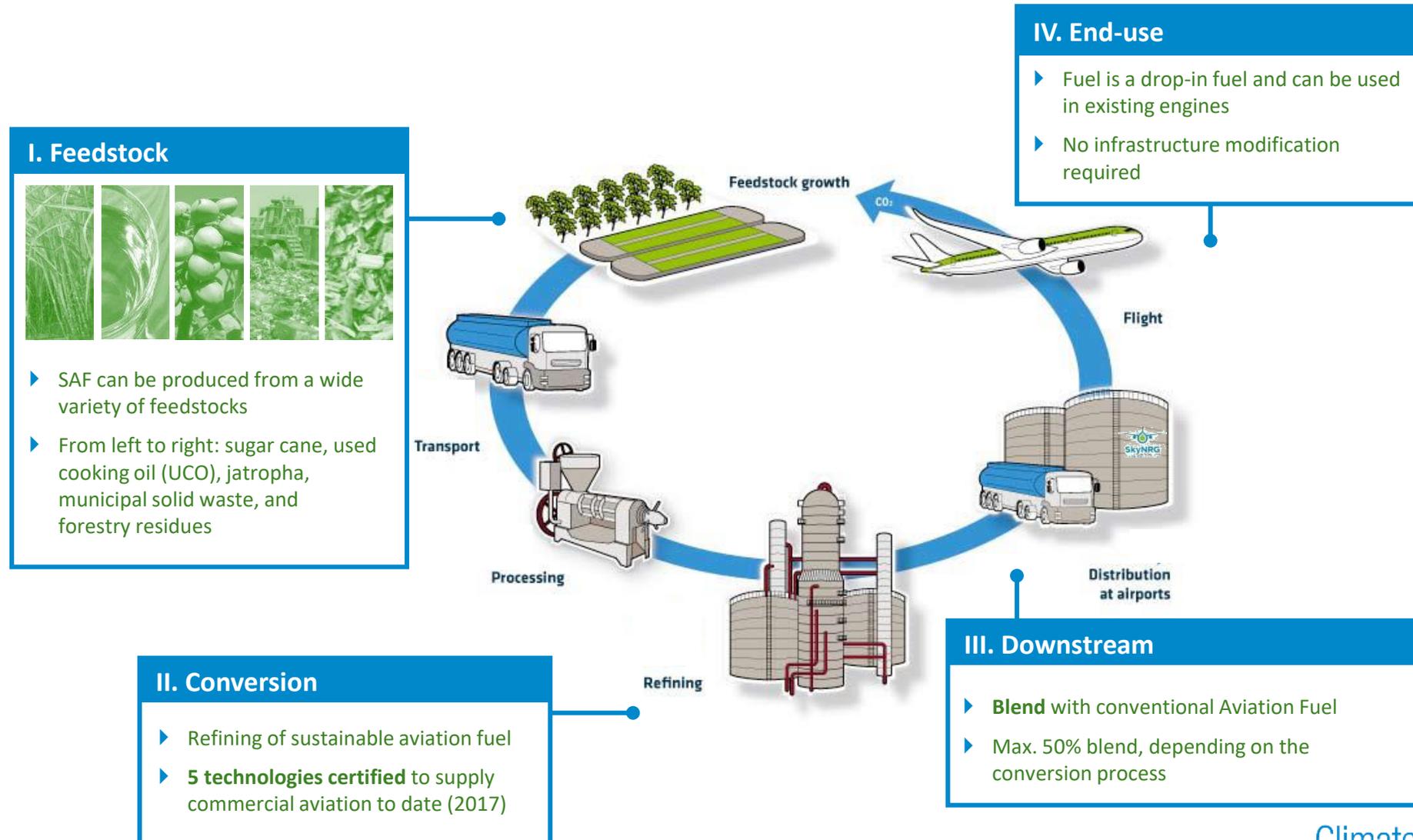


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*Modern bioenergy use rises to 100 EJ in 2050, meeting almost 20% of total energy needs.
Global demand in 2050 is well below the assessed sustainable potential*

Notes: TES = Total energy supply. Conversion losses occur during the production of biofuels and biogases.

Sustainable Aviation Fuel (SAF) is a drop-in fuel for aviation that can be used in existing infrastructure and engines



IAP's - Problem & Solution

1 Month after fire

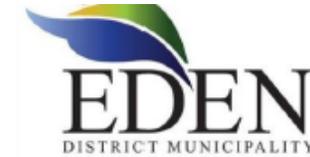


1 Year after the fire – fynbos regeneration



Garden Route DM – waste disposal

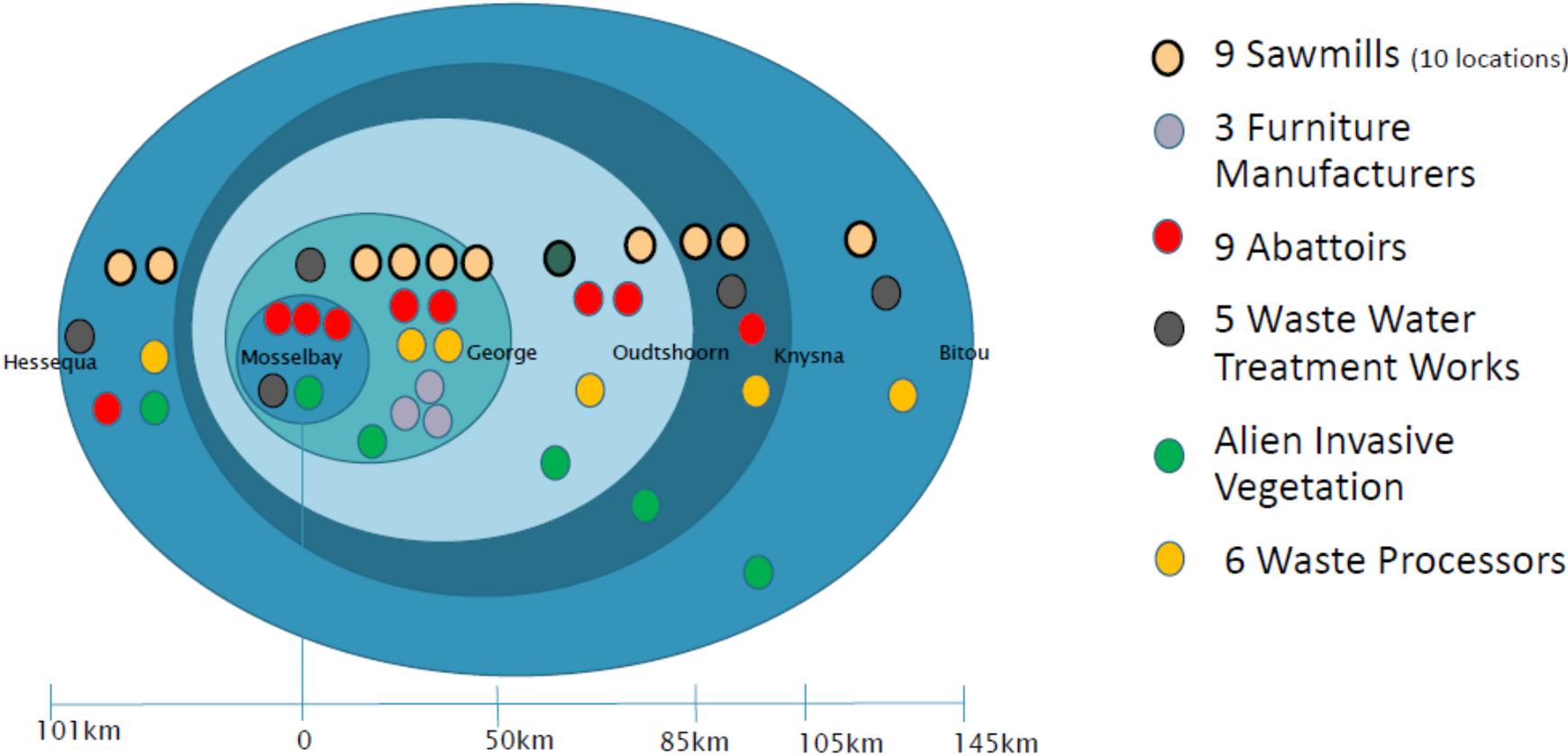
MUNICIPAL DISPOSAL FACILITIES



Municipality	Local licensed landfills available	Green & Building rubble Site available	Currently use Petro SA	Plan to use New Regional Site	Distance from Regional Site
Bitou	1 Closure Licence (Robberg)	Licensed premises but it is currently used for bulk waste	YES	YES	~ 145km
George	None	1 Closure licence (Gwaing)	YES	YES	~ 50km
Hessequa	2 (all waste types)	5 licenced, 1 non-licenced (Jongensfontein)	NO	YES	~ 100km
Kannaland	2 Operational Licences (Ladismith & Zoar) 2 Closure Licences (Calitzdorp & Vanwyksdorp)	Same site	NO	NO	~ 125 km
Knysna	None	1 Licenced (Sedgefield drop off) 1 Closure Licence (Old Place Garden Refuse Facility)	YES	YES	~ 105km
Mossel Bay	4 Sites with closure licences (Friemersheim, Herbertsdale, Buisplaas & D'Almeida)	2 Closure Licences (Great Brak & Louis Fourie)	YES	YES	~ 20KM
Oudtshoorn	1 (all waste types but running out of space)	Same site	NO	Still deciding – may expand	~ 85km

Garden Route DM – waste disposal

WASTE GENERATING LOCATIONS - DISTANCE FROM MOSSELBAY



Conservation finance & Grants

5 major sources of Climate Finance in SA

- Green Climate Fund (GCF)
- Global Environment Facility (GEF)
- Adaptation Fund
- Multilateral donors, i.e. National or regional governments such as Germany, the United Kingdom, (GIZ, FMO, KFW, EU, DFID) and conservation bodies such (FSC, WWF, Conservation International, The Nature Conservancy - GCTWF)
- South African Government: Green Fund; DBSA – Waste Diversion Flagship; Climate Finance Facility; Working for Water; Landcare

BUT!

- Tax, Payment for Ecosystem Services (PES) & Value Added Industries (VAI) and **Carbon Offsets** create alternative financial incentives

The **COAS** system

- The **Carbon Offset Administration System** – DMRE
- Launched in July 2020
- Allows carbon tax liable companies to offset up to 10% of Carbon Tax liability
- Current **tax** price per ton **R127 per ton CO2e**
- R135 in 2022 per ton CO2e
- Current regulatory carbon **offset** price – **R110 per ton CO2e**
- Current demand: +- 10 million tons CO2e per annum
- Current supply: +- 3 million tons CO2e per annum
- Primary potential sources of offsets: Chemical processes; **Nature-Based Solutions and Waste** - ***Liable from 1 Jan**



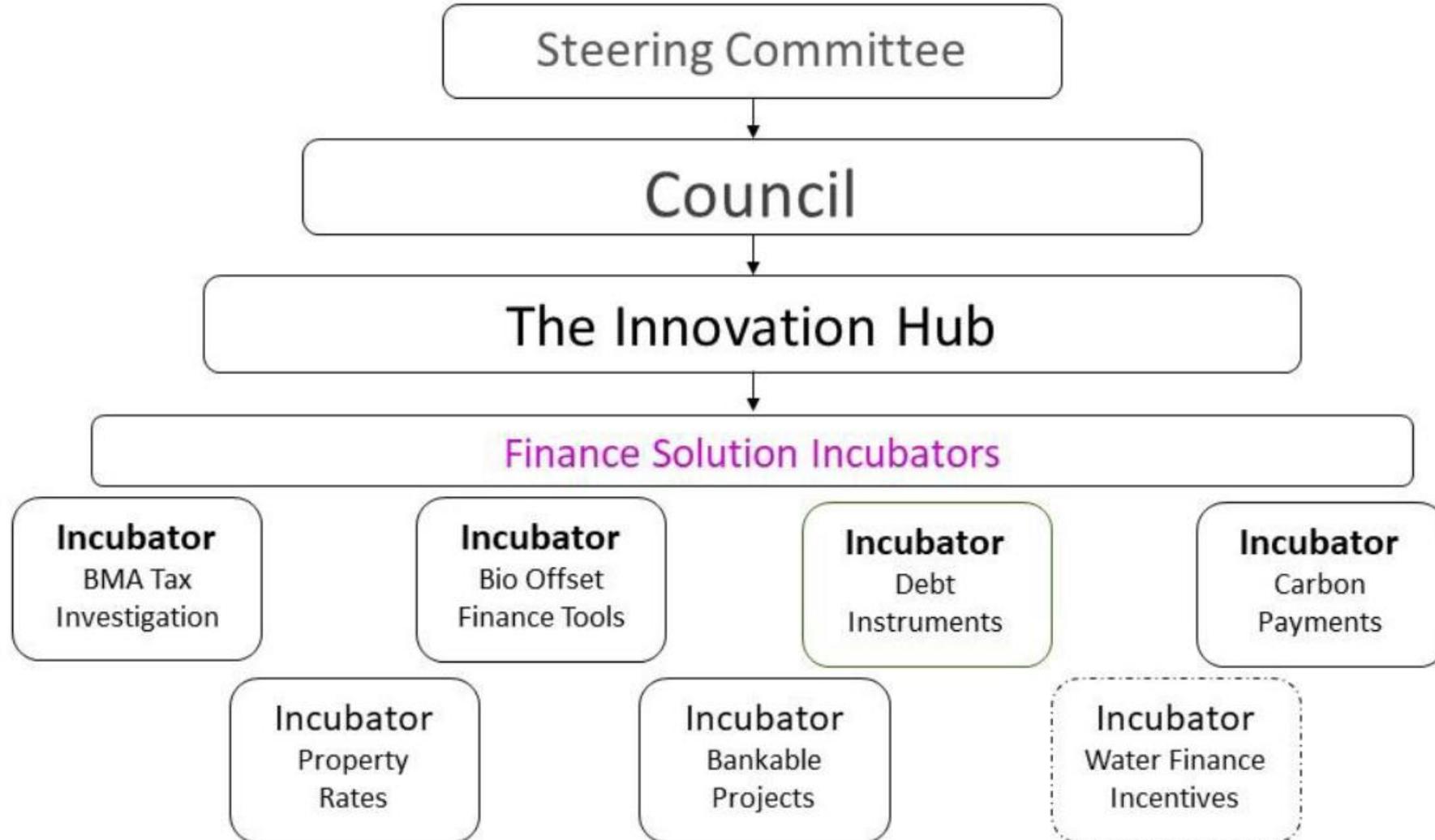
Waste Diversion - example

- Current SA example: Reliance Composting Project in Cape Town established in 2000 delivering **+ -49,175 tons CO2e per annum. = +-R5,7 million pa**
- Primary focus on organic landfill diversion
- Existing **methodology: AMS-III.F. Avoidance of methane emissions through composting**
- **Typical project:** Controlled biological treatment of biomass or other organic matter is introduced through aerobic treatment by composting and proper soil application
- **Windrow composting** to ensure aerobic composting by controlling i) temperature; ii) oxygen content (O₂) and carbon dioxide (CO₂).



SUSTAINABLE
LANDSCAPE
FINANCE
COALITION

WILDERNESS
FOUNDATION
AFRICA

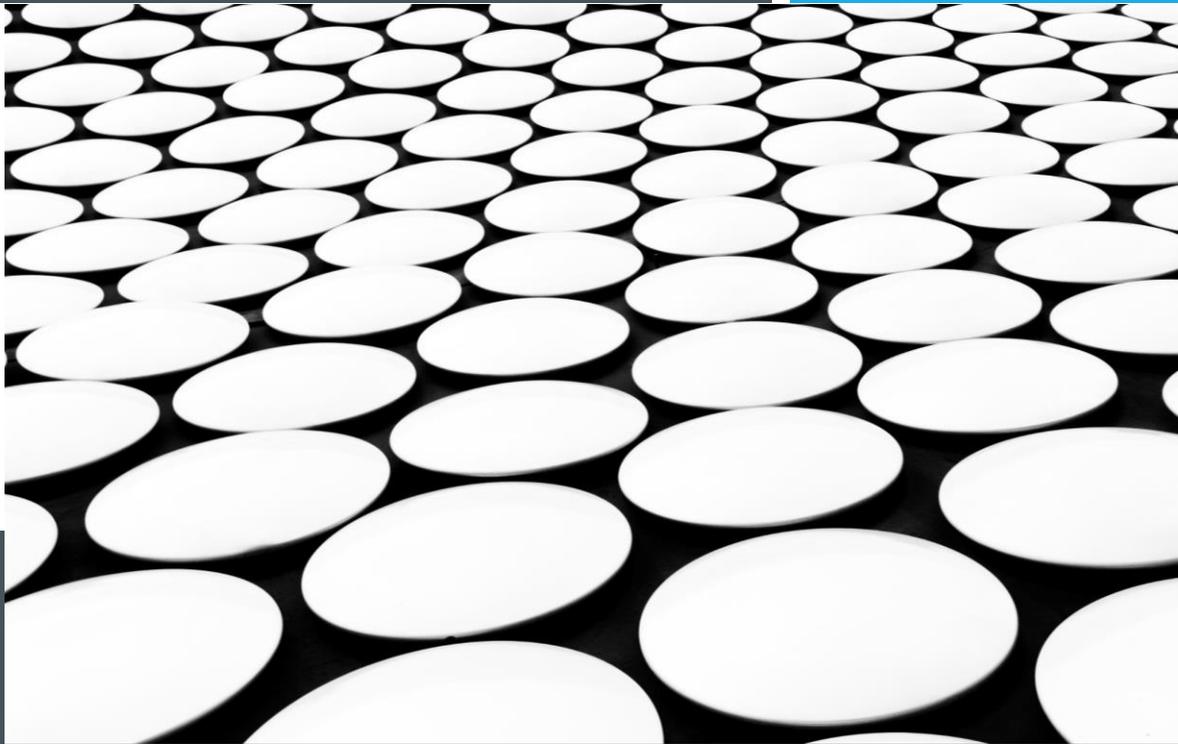




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for better business



- Eddie Hanekom
- Morton Hubbe
 - Johan Gie
 - John Wilson
- Paul Buchholz

WASTE & BIOMASS BENEFICIATION CONFERENCE THEME 1

MODERATOR: ALBERT ACKHURST

12 AUGUST 2021

Waste & Biomass Beneficiation Conference

Organic Waste Characterisation Study

12 August 2021

Morton Hubbe



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**Garden Route District Municipality,
the leading, enabling and inclusive
district, characterised by equitable and
sustainable development, high quality
of life and equal opportunities for all.**

Outline of Presentation

1. Background
2. Purpose of the Project
3. Project Research and Data
Collection Methodology
4. Organic Waste Stream Data
5. Waste Processing
6. Conclusions and Next Steps

Background

This organic waste characterisation study was funded by the USAID South Africa Low Emissions Development Program (SA-LED). The aim of SA-LED was to support the Government of South Africa to transition to a low-carbon economy by promoting green growth.

Ciska Kruger from Alternative Prosperity Holdings (Pty) Ltd has been appointed by SA-LED to assist with the process and to compile a final report.

The organic waste characterisation study did form part of a larger SA-LED GRDM project which was divided into three phases:

- Phase 1: Organic Waste Characterisation Study.
- Phase 2: Framework for decision-making in determining the applicable alternative technology to use and the projected results/impact.
- Phase 3: Assisting the GRDM in implementing the most implementing organic waste management solutions.

However, before phases 2 could be finalised and continued with phase 3, the United States of America has taken the decision not to proceed to fund the SA-LED projected further.

Purpose of the Project

Data pertaining to organic waste quantities, required to underpin decisions supporting solutions for the management of organic waste, is not always readily available.

The purpose of the characterisation study is to provide Garden Route District Municipality with information about the quantities and location of organic by-products and/or waste generated within the district in order to inform decisions and strategies around organic waste management practices and solution within the district going forward.

The study involved six main waste streams namely;

- Waste or by-products generated from Sawmills,
- Furniture manufacturing,
- Abattoirs,
- Municipal Waste Water Treatment Works,
- Household green/garden waste and
- Alien invasive vegetations.

Purpose of the Project

The objective of the study is to characterise the abovementioned waste streams in terms of type, volumes, locations, fluctuations, current disposal/treatment method and potential treatment/ process technologies that could be applied to prevent deposit in a landfill and be utilized as feedstock or other applications. The long term outcome of this study will also be to determine the best strategy required to manage organic waste to the benefit of the community through partnerships and to divert reusable or recyclable organic waste streams from landfill.

In addition the study provides an overview of current practiced waste management/treatment technologies and processes available within the district that include bio digestion, composting, rendering, pyrolysis and waste to energy.

The major drivers for alternative organic waste management solutions include among others;

- Diminishing access to landfill and rising cost of disposal.
- National and Provincial Legislation, National and local waste management strategies and policies favouring alternative solutions to landfill disposal.
- Environmental imperative: Climate Change-a move towards low emissions solutions.
- Economic: Waste beneficiation potential (additional revenue). Availability of improved and proven alternative technology solutions and economies of scale.
- Job Creation.

Project Research and Data Collection Methodology

GRDM identified all the organic waste stream stakeholders who were invited to participate in the study (Study Participants). All Study Participants were offered an invitation to participate in the study and to collaborate in finding optimum solutions for the district.

The data collection for the initial phase of the project consisted of;

- Research was done and organic waste producers were identified by the GRDM.
- Stakeholders were approached and invited to take part in the study.
- 37 Study Participants agreed to form part of the survey which were visited and interviewed on the waste generating/ processing sites.
- Survey forms were compiled in a close-ended format and send electronically to the Survey Participants for self-completion.
- Collected data were processed and also tested against publicly available government and research institution data and reports

Project Research and Data Collection Methodology

Study Participants per Organic Waste Streams

Category	Number of waste producing entities invited	Number of Study Participants
Sawmills	9	8
Furniture Manufacturing	4	3
Abattoirs	9	6
Sewage Sludge	5	5
Household Green Waste	6	6
Alien Invasive Vegetation	NA	NA
Waste Processing Facilities	6	6

Organic Waste Steams - Data

Sawmills (tonnes per annum)	
Study	Proxy
132 182	250 000

Furniture Manufacturing (m ³ per annum)	
Study	Est.(WWWG)
700	24 480

Abattoirs (tonnes per annum)	
Study	Proxy
6 544	12 850

WWTW (Sewage Sludge) (tonnes per annum)	
Study	Proxy
8 621	8 868

Green Waste Municipalities (tonnes per annum)	
IWMP data	Population based data
19 278	35 000

Waste Processing

Technologies currently used	Number of Processors	End product	Municipality
Composting	3	Compost	Albertinia George Bitou
Waste to Energy	1	Energy	George
Rendering	2	Fertilizer, Animal Feed	Mossel Bay Oudtshoorn
Pyrolysis	1	Biochar/ Animal Feed	Sedgefield

Conclusions and Next Steps

Conclusions	Next Steps
<ul style="list-style-type: none">• Organic Waste Management challenges in GRDM is problematic.• Data challenges & needs are ongoing – the characterisation study is just the first step.• Collaboration is needed across industry sectors to optimise opportunities.• Landfill can no longer be considered as an organic waste management option.• There is opportunity in unlocking the waste economy (development and job creation)	<ul style="list-style-type: none">• Evaluate technology options.• Engaged with Technology, Treatment & Processing providers.• Logistic analysis and identification of collaboration opportunities.• Implementing suitable solutions.

Contact Details

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GARDEN ROUTE DISTRICT WASTE CHARACTERISATION STUDIES

12 August 2021
PRESENTER: JOHAN GIE



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Outline of Presentation

1. Background
2. Methodology
3. Results
4. Available Waste for Beneficiation

Background

- Lack of Waste Information huge gap nationally
- Waste Characterisation was identified as gap in the 2nd generation IWMPs of the local municipalities in the Garden Route District
- GRDM procured the required equipment; pilot study in Bitou Municipality in 2015; assistance from DEA&DP
- Studies done in Mossel Bay in 2015; Knysna, Hessequa & Oudtshoorn in 2016; George in 2018; and Kannaland in 2019
- May be considered outdated however no new recycling interventions have been implemented since – recyclable portion assumed to be the same
- George and Mossel Bay Municipalities have introduced a green bag since, but still ending up at green waste landfills – now separated
- Main objectives of the studies were to determine the composition and quantities of household and business waste collected and disposed at landfill as well as to determine the quantity of the recyclable portion of the waste going to landfill

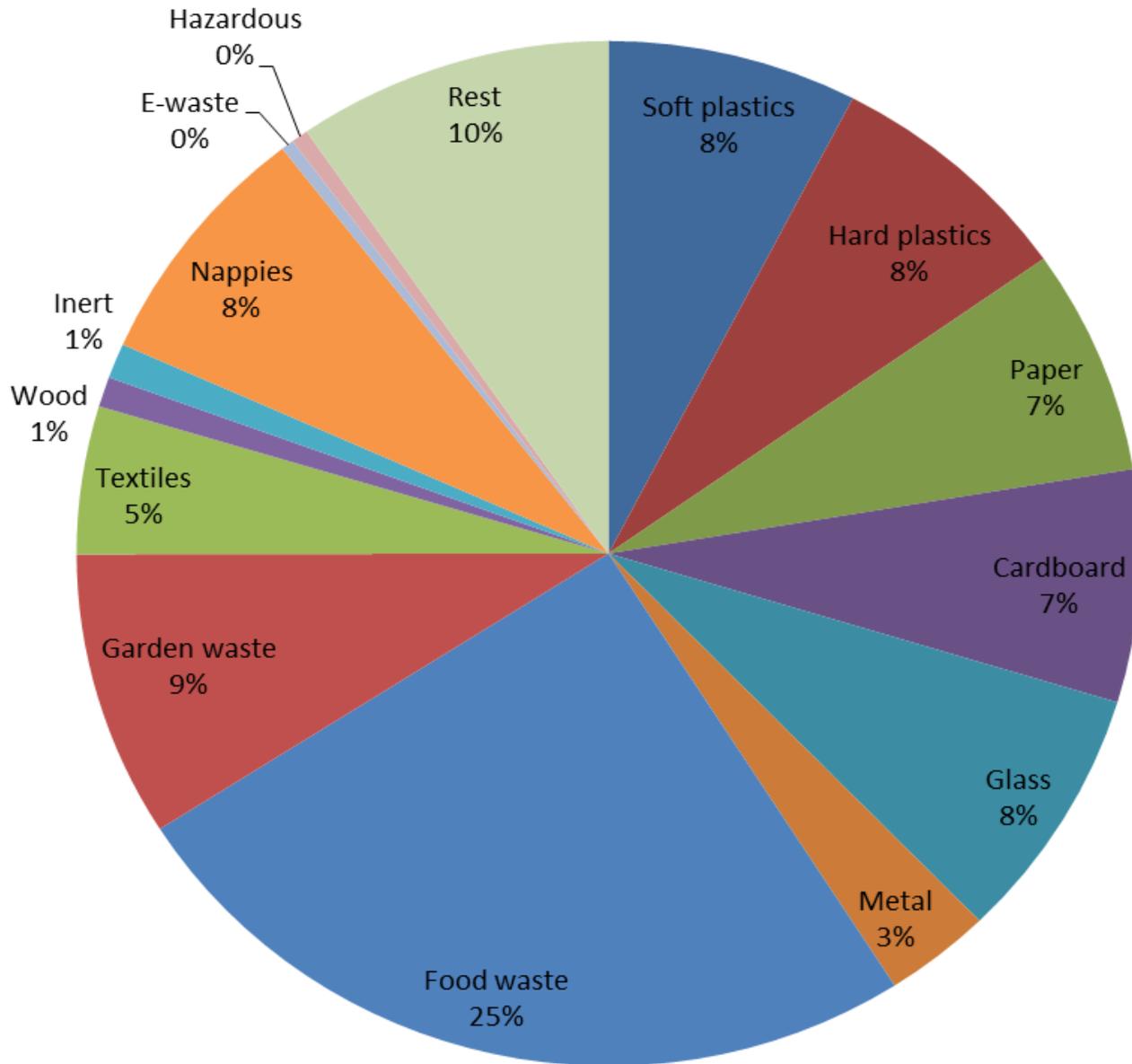
Methodology

- Sample size was determined using the appendixes of the Municipal Waste Characterisation Procedures, EPA, Ireland – determined per no. of households per sub-area
- Samples (black bags) collected prior to collection; labelled and stored per sub-area (different socio-economic areas different waste generation trends)
- Details of label was recorded and contents of each bag was sorted into 15 different waste types, weighed and recorded
- Volumes also determined using average compacted densities of each waste type – converted to m³ to determine landfill airspace (if separated)
- A total of 4 701 samples / 20.5 tonnes of waste was sorted during the seven waste characterisation exercises.
- Study excluded recyclable materials of separation-at-source / two-bag programmes implemented in municipalities – information available reported to municipalities / information systems
- Did not determine the water content or calorific values of the waste

Results

Waste Type	Mass (kg)	% of total (GRDM)
1 Soft plastics	1,562.2	7.6
2 Hard plastics	1,573.1	7.7
3 Paper	1,461.6	7.1
4 Cardboard	1,506.5	7.3
5 Glass	1,648.7	8.0
6 Metal	666.9	3.2
Recyclables sub-total	2681.3	40.3
7 Food waste	5,141.4	25.0
8 Garden waste	1,850.8	9.0
Organics sub-total	2368.3	35.6
9 Textiles	958.5	4.7
10 Wood	194.3	0.9
11 Inert	226.0	1.1
12 Nappies	1,605.8	7.8
13 E-waste	80.0	0.4
14 Hazardous	104.9	0.5
15 Rest	1,975.0	9.6
Total	20,555	100.0

Garden Route Domestic Waste Profile



Results

- 41.0% of the waste stream by mass is composed of mainstream recyclables (paper, plastic, cardboard, glass and metal)
- 34.0% of the waste stream by mass is organics, the majority of the organics (73.5%) is kitchen waste
- Nappies composed 7.8% of the waste stream by mass.
- The results of the waste characterisation exercises were fairly consistent across the seven local municipalities
- Some variation in results, most notable was in Kannaland Municipality - lowest combined organic waste composition (18.1%), the district average is 35.6% - May be due to climatic and socio-economic conditions
- Knysna Municipality only 3.1% of domestic waste comprised of garden waste – had a green bag system in place at the time.

Available Waste for Beneficiation

- No accurate waste disposal data available – Domestic waste generation rates have been estimated based on historic and anticipated population growth of the local municipalities.
- An estimated 110 858 tonnes of domestic waste was generated in the GRDM in 2019 and estimated 121 101 tonnes in 2024 (GRDM 3rd Generation IWMP, 2020)
- Regional Waste Management Facility to be established for disposal of domestic waste from Bitou, Knysna, George & Mossel Bay Municipalities – estimated 76 881 tonnes generated in these municipalities in 2019 (estimated 85 846 tonnes in 2024).
- Bitou, Knysna, George, Mossel Bay and Hessequa Municipalities have recycling / two-bag systems in place
- In excess of 20,551 tonnes of material was collected for recycling in 2018/19 – should increase due to implementation of Waste Minimisation Plans in 2022 onwards (consider Waste Management Hierarchy)
- Waste Tyre Facility earmarked at Regional Waste Management Facility - high calorific properties and valuable products derived from waste tyres
- January – March 2017 – 28 610 passenger tyres; 19 558 4x4 tyres; 1000 light commercial tyres; 2 479 truck tyres; 385 agricultural tyres; 1 464 motorcycle tyres; & 12 OTR tyres.

Available Waste for Beneficiation

- Waste Bureau have indicated that if waste-to-energy / alternative waste management technologies implemented in GRDM – all waste tyres in the Western Cape and Eastern Cape will likely be transported to facility
- Awaiting estimated waste tyre quantities from the WB
- Health Care Risk Waste managed by private sector – IPWIS & GRWIS data
- Hazardous waste also managed by private sector – no available data
- Excludes organic waste available as per GRDM Organic Waste Characterisation Study

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**Western Cape
Government**

Environmental Affairs and
Development Planning

BETTER TOGETHER.

ECOLOGICAL INFRASTRUCTURE INVESTMENT FRAMEWORK

W&BB Conference

John Wilson

12 August 2021

Ecological Infrastructure in the Western Cape

● Key message

What the Ecological Infrastructure Investment Framework (EIIF) is and how it is different to other plans and programmes in South Africa

● Content

- a) Brief overview of Ecological Infrastructure (EI)
- b) Overview of the EIIF
- c) Investment objectives of the EIIF
 - a) *Overview of the Management Unit Control Plan (MUCP) tool*
- d) Financial and supporting mechanisms for implementation



Ecological infrastructure

Investing in nature to reduce the demand for engineering solutions

- Ecological infrastructure comprises of the **ecological and social components of the system that are largely responsible for the realising of ecosystem good or services**.
- **Investing in** the improved management or augmentation of **these components and their relationships** results in **sustained or improved ecosystem service delivery**.
- For goods and services that also rely on built engineering solutions (such as potable water), investing in the ecological infrastructure provides additional opportunities to realise improved goods or services. These alternatives are usually:
 - High labour, low skill, upfront capital and lead time projects
 - Dynamic, and
 - Inclusive of other benefits (improved ecosystem = improved wellbeing).



Ecological Infrastructure Investment Framework

EIF: Document series

Modular framework

Consolidated report

Provides rationale, principles and objectives and explores funding mechanisms. Ties all the deliverables together.

Catchment Prioritisation Report

Documents the process of prioritising catchments for MUCPs, which in turn prioritise investment into EI

Management Unit Control Plans Report

Documents method of using the MUCP tool, including assumptions and limitations

Implementation and Monitoring Plan

To serve as a Monitoring & Evaluation framework that captures feedback loops

Alien Invasive Species Strategy discussion document

Sets out a strategy for eradicating Alien Invasive species in the Province



The EI in the EIIIF

EI focal areas of the EIIIF

- Mountain catchments, rivers, wetlands and estuaries

Water security; absorption and dissipation of flood energy; water purification; recreational, spiritual and cultural value

- Coastal environments

Absorption and dissipation of flood energy; underpins economic activities; purification of water by assimilation; supports food security; recreational, spiritual and cultural value

- Rangelands

Supporting local livelihoods; assists in flood attenuation; sequesters carbon; supports food security



How the EIF is different

Collaboration and

Participated approach

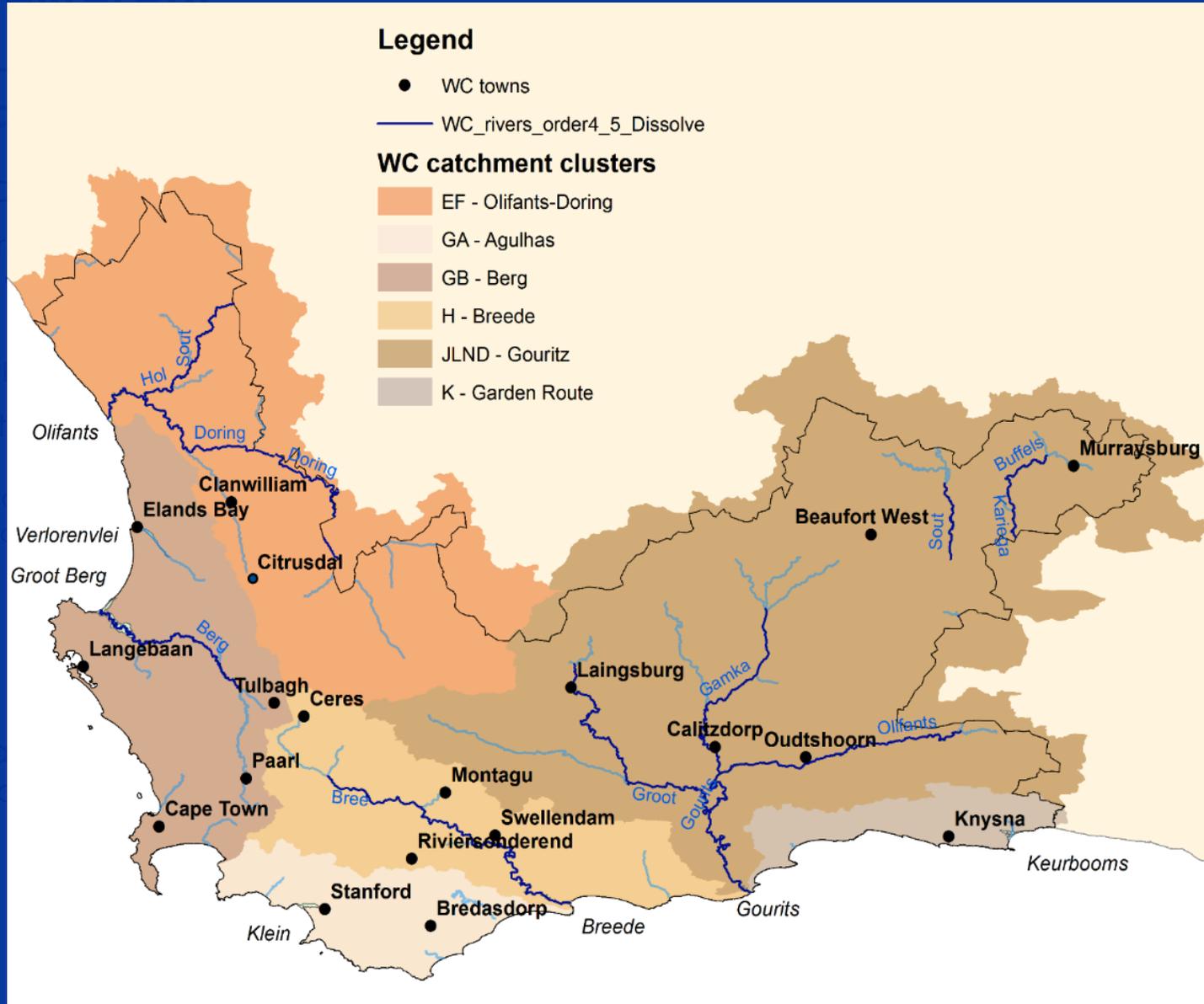
The EIF incorporated peer Universities Membership

Prioritisation of inter

Four investment objectives of the Western Cape:

- Gouritz, Gamtoos, Sur
- Olifants-Doring, Nama
- Kogeleberg-Agulhas
- Berg, West Coast
- Breede-Goukour and
- The Garden Route.

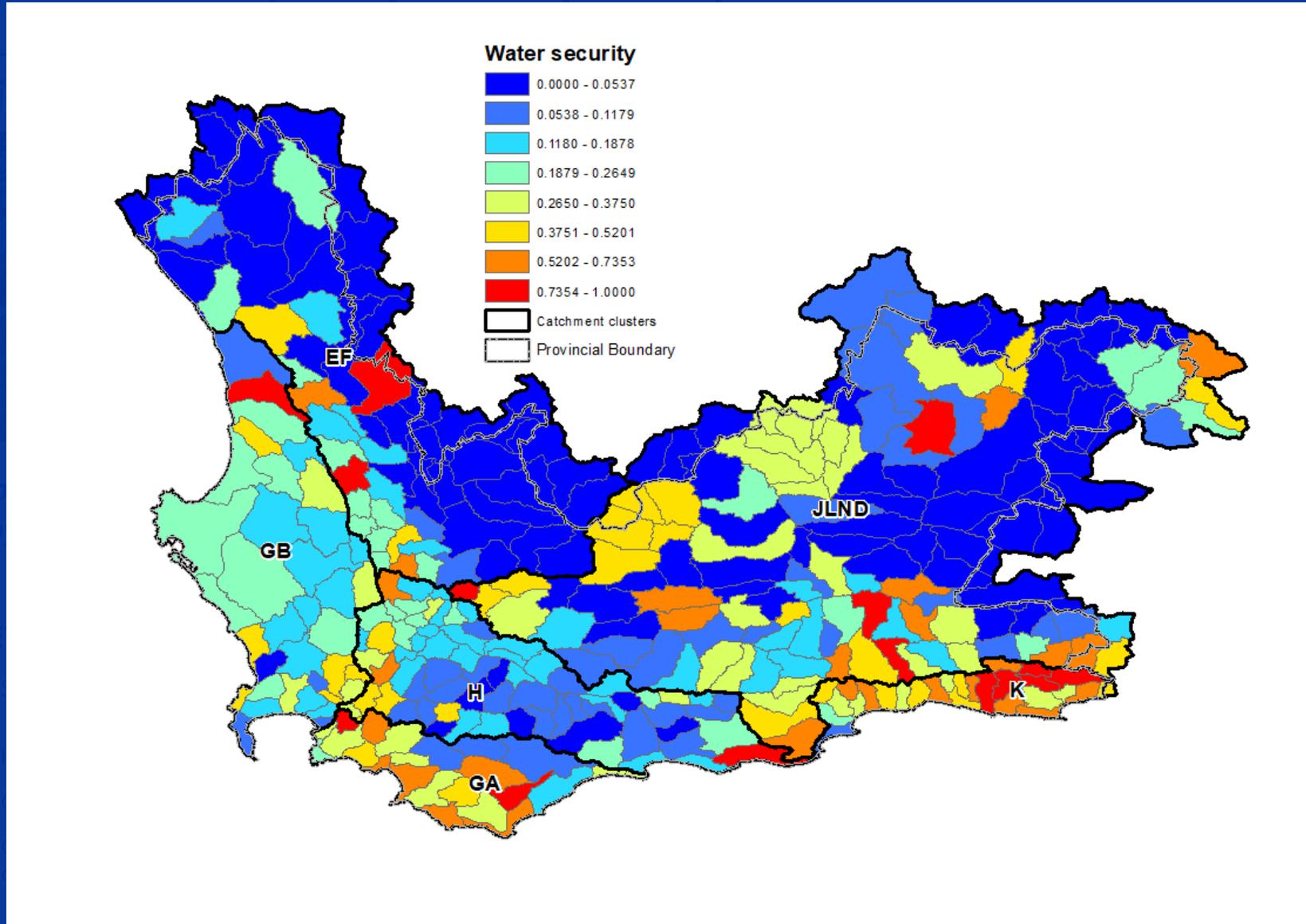
The outcome is a spatially greatest enhancement of catchment clusters.



“By 2040, people of the Western Cape live and organise themselves in a way that promotes healthy and resilient ecological infrastructure, so that it yields goods and services that support physical, psychological and spiritual well-being in the face of population pressure, rapid urbanisation and climate change.”

IO1: Improved water quality and quantity

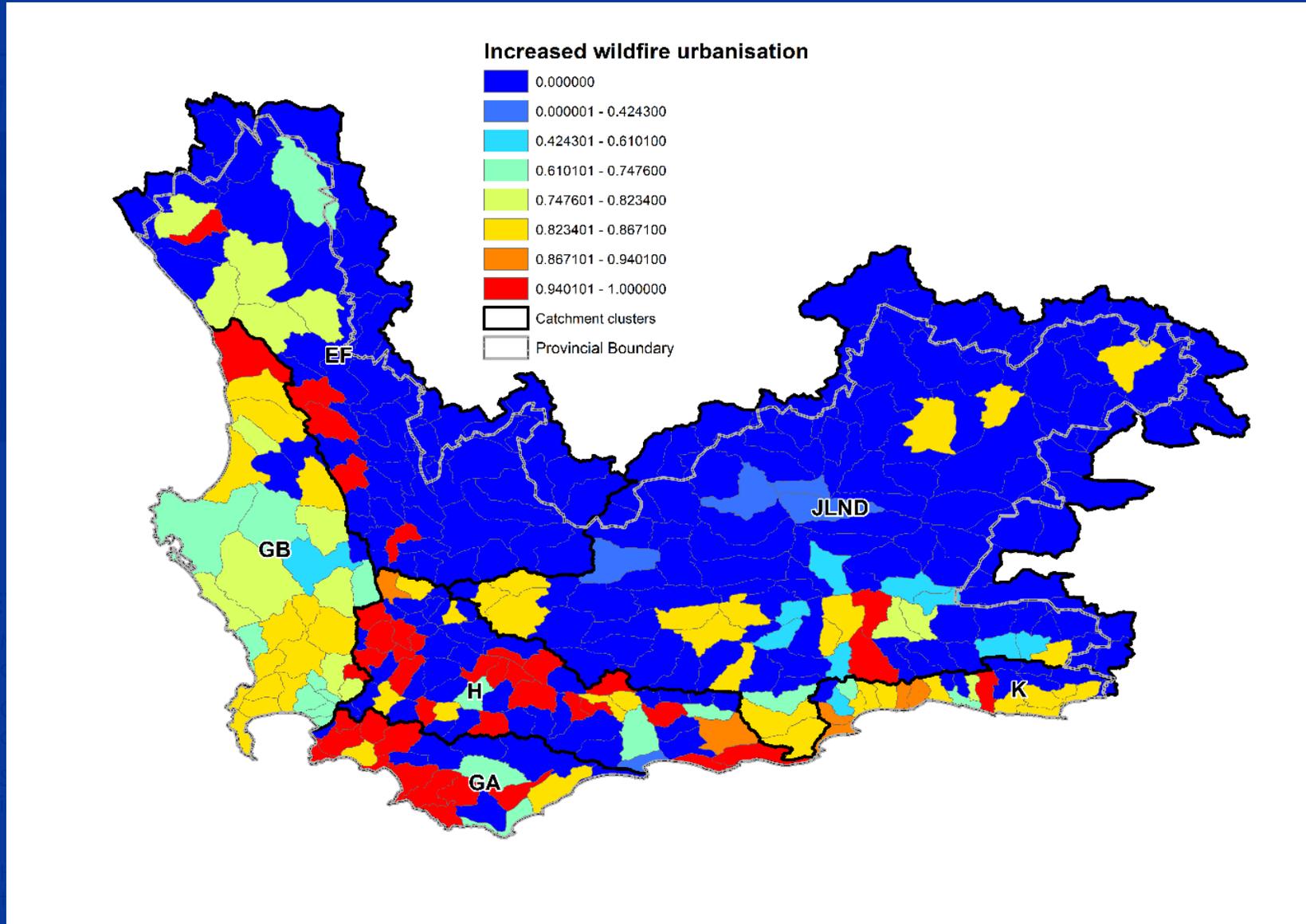
Investment Opportunity



Priority areas (shaded red) for investment in addressing water security, including runoff reduction based on the impacts of IAPs, town water security, town groundwater dependence and occurrence in a WSA (ground and surface water)

IO2: Reduced threat of wildfires

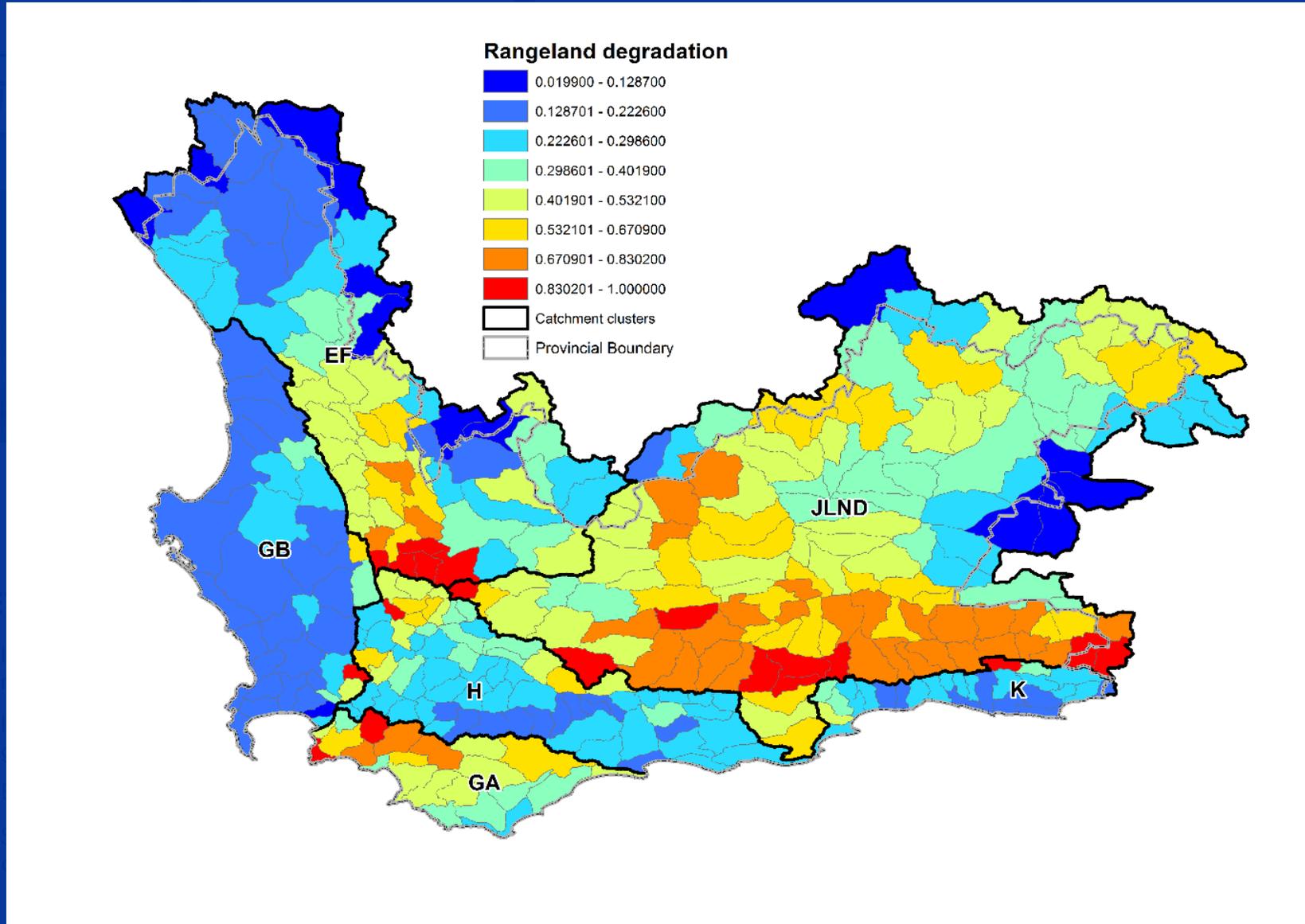
Investment Opportunity



Priority areas for investment in addressing increased wildfire hazard due to urbanisation extending into flammable vegetation.

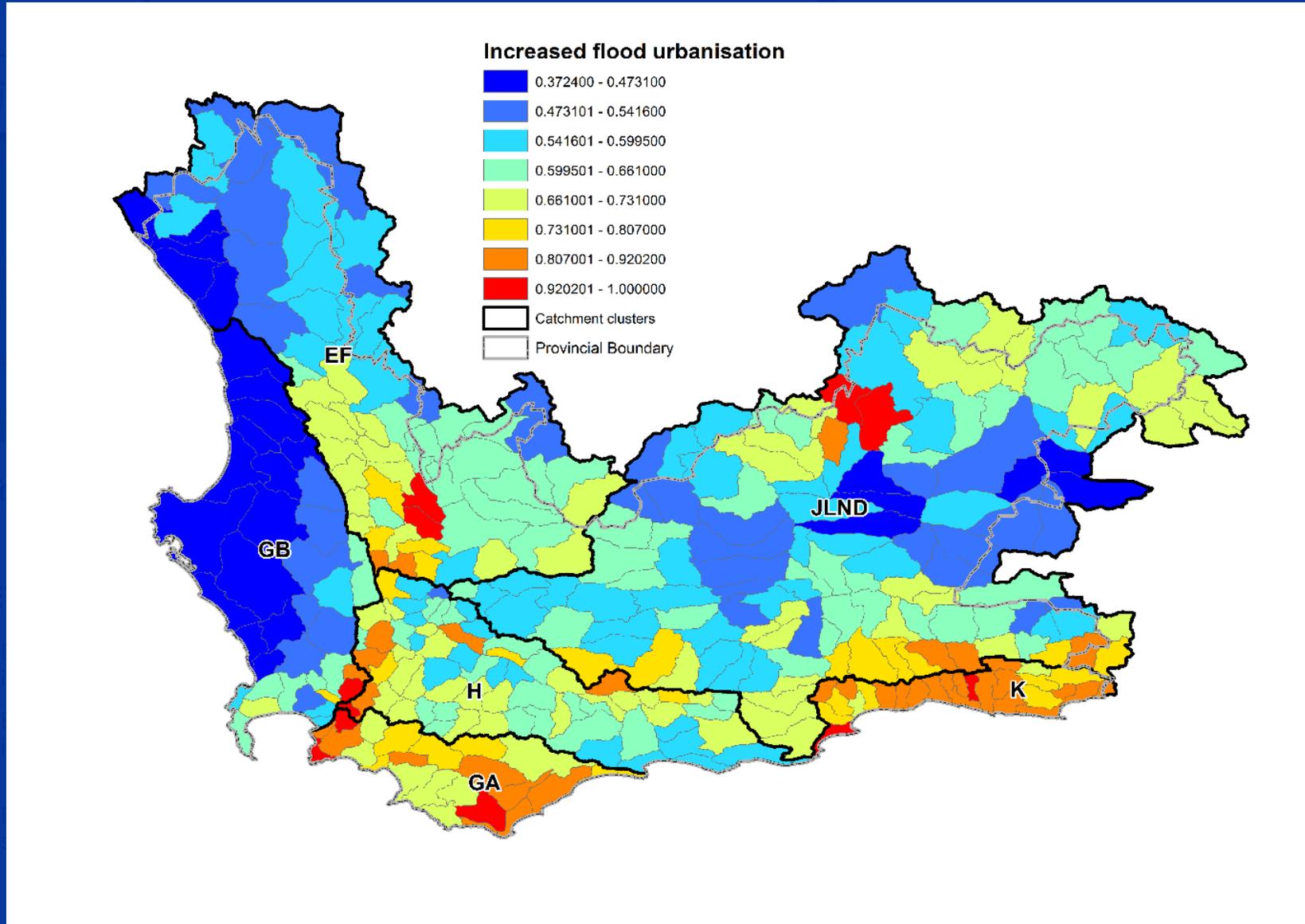
IO3: Improved rangeland management

Investment Opportunity

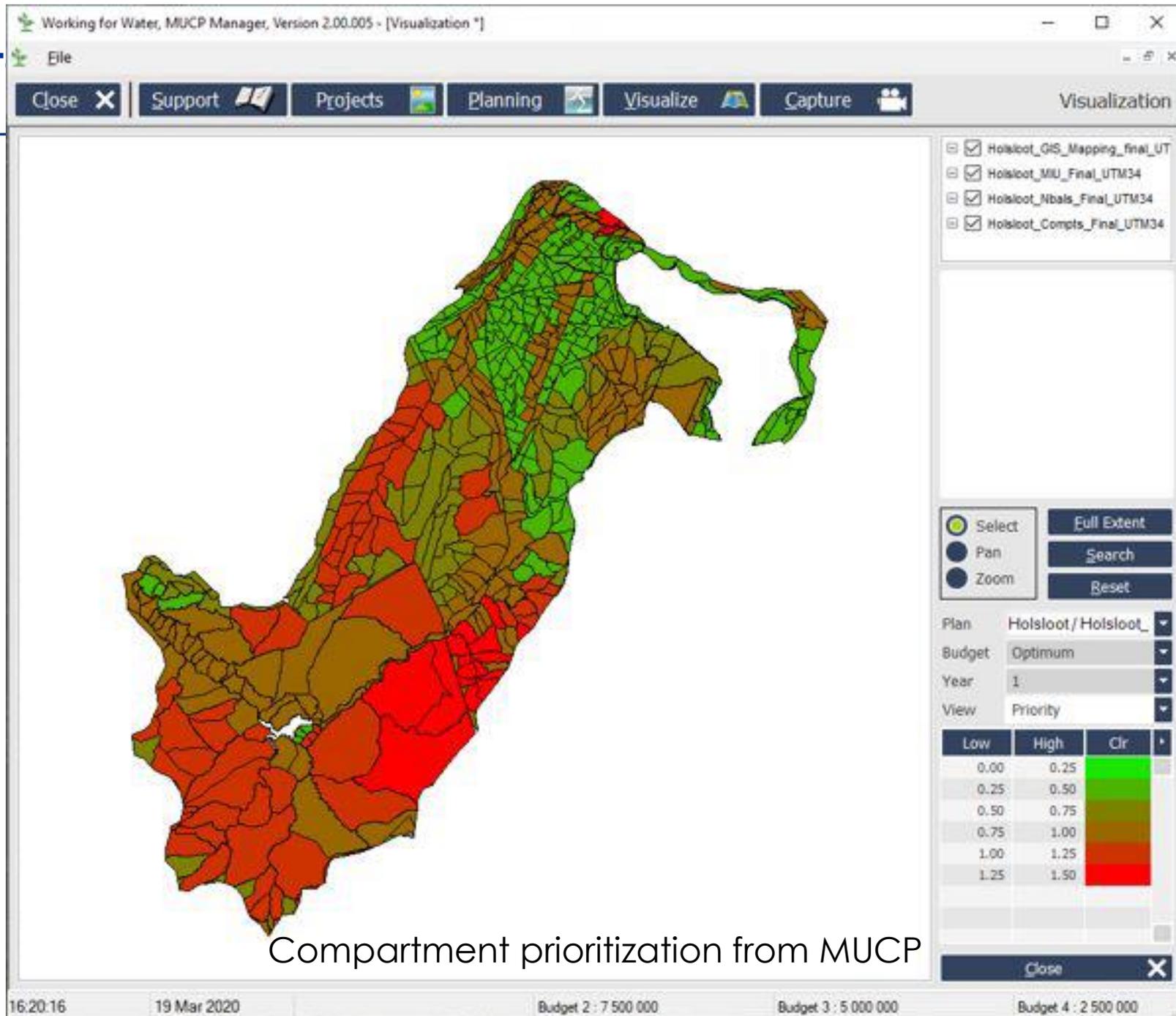


IO4: Reduced exposure to increased flooding

Investment Opportunity

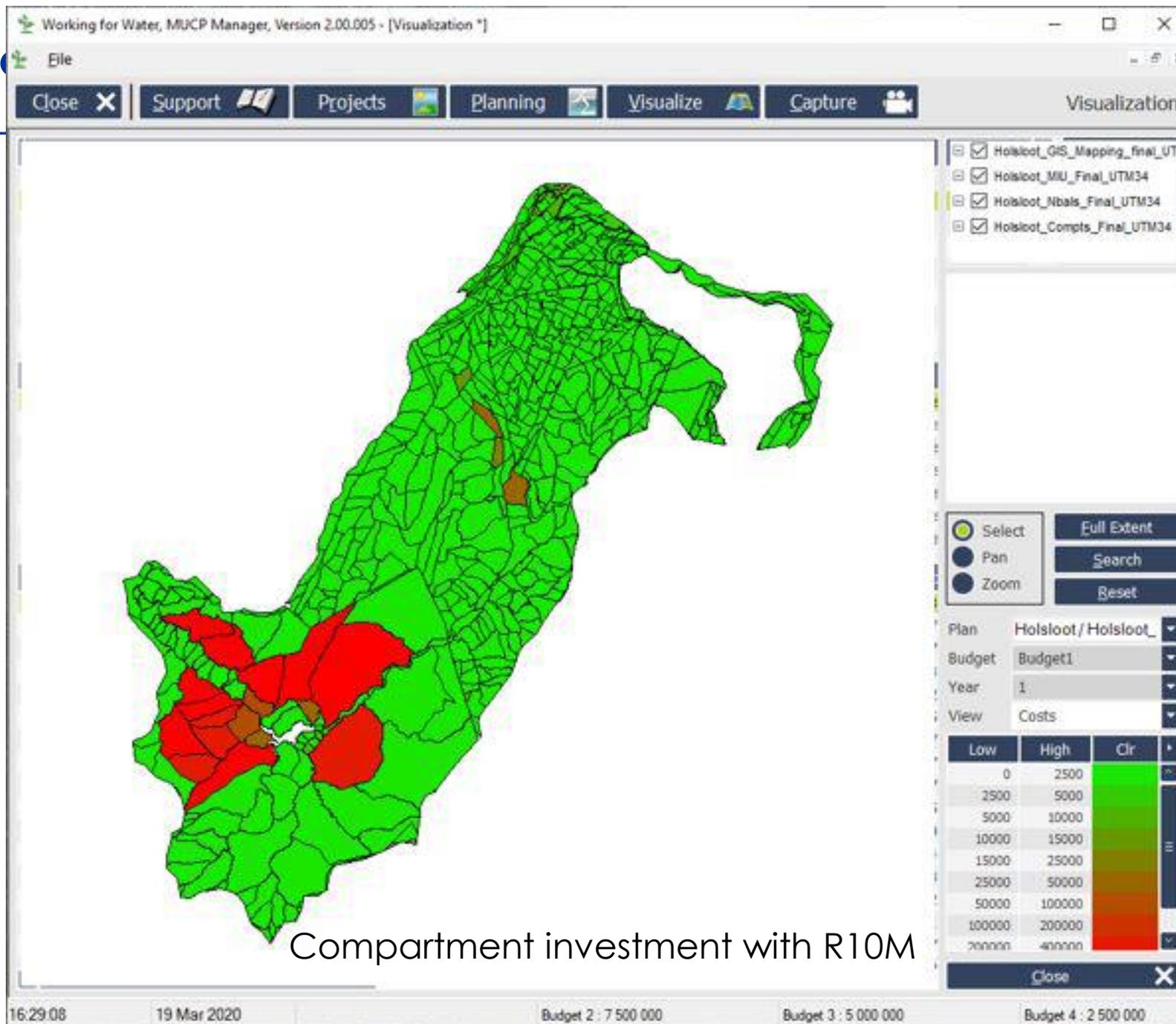


Holsloot cat



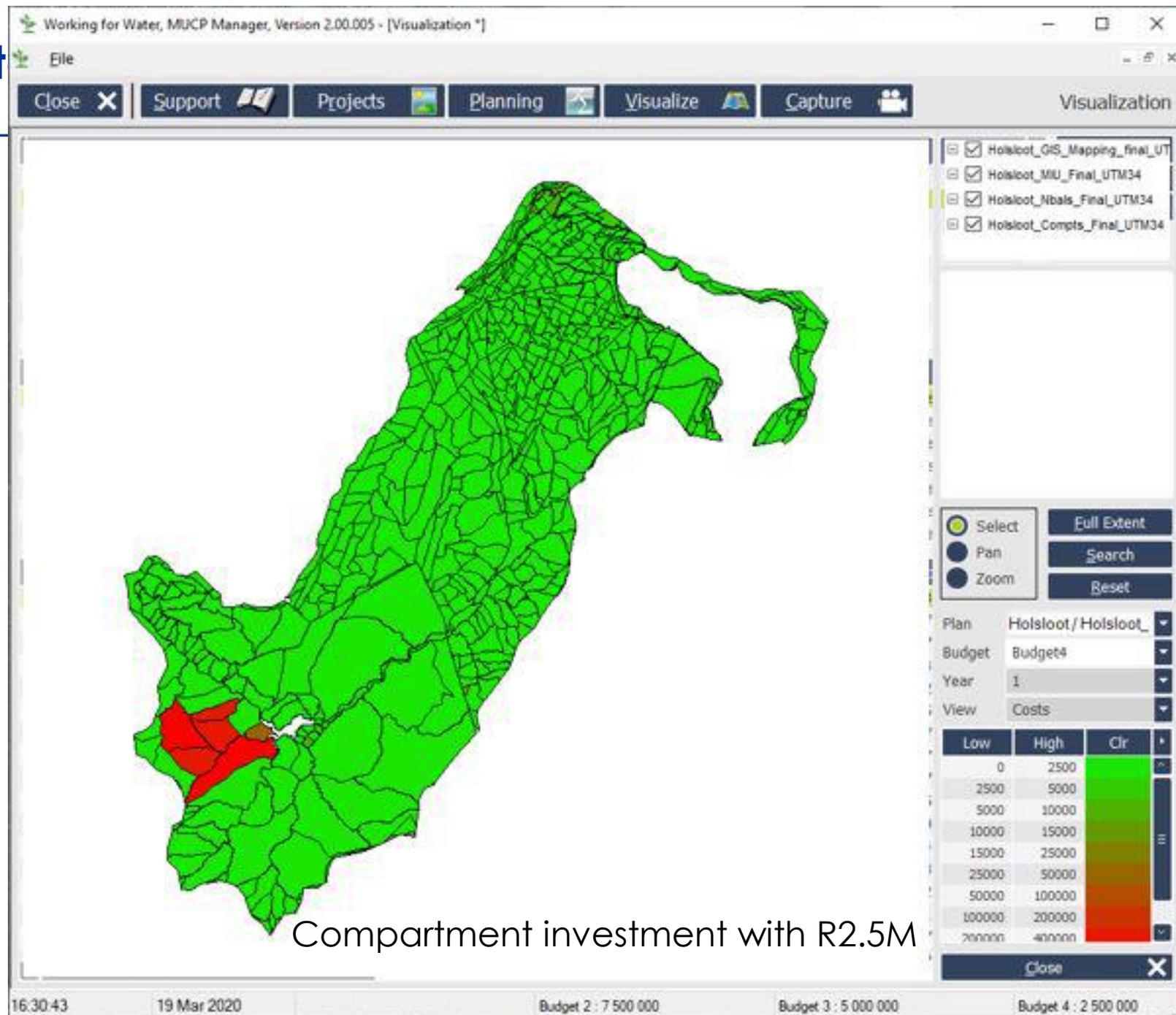
Compartment prioritization from MUCP

Holsloot catchment



Compartment investment with R10M

Holsloot cat



Financial and supporting mechanisms

Funding and supporting EI investment

- Financial mechanisms for improved investment
 - Government appropriation
 - Water tariffs and charges
 - Water Resource Management Charges
 - Water Resource Development Charges
 - Water tariffs
 - *Keurbooms Karatara PES project (KKEI IWG)*
 - *Greater Cape Town Water Fund*
 - Govt. financial and regulatory incentives
- Supporting mechanisms
 - Use of NGOs to convene and coordinate
 - Encouraging markets for ecological infrastructure
 - Encouraging markets for beneficiated products
 - *Biomass and carbon economies project*
 - Improved data
 - *Holsloot mapping project*



Thank you

Contact Us



**Western Cape
Government**
Environmental Affairs and
Development Planning

BETTER TOGETHER.

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Development of a Strategic Framework and Action Plan for the Invasive Biomass Economy in South Africa

1. Project context
2. Project objective
3. Project implementation

Project funder: Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)

Project partner: Department of Forestry, Fisheries & Environment



On behalf of:



of the Federal Republic of Germany



Project context

- Invasive alien plants pose a direct threat to South Africa's biological diversity and water security, the ecological functioning of ecosystems, and the climate-wise use of land.
- Bush encroachment degrades land and reduces the benefits and ecosystem services from grasslands and savannas.
- Climate change is a measurable reality that affects all South Africans, the environment and the economy.
- Climate change strategies and policy documents identify alien invasive species and bush encroachment as a common challenge for climate-smart terrestrial management and restoring carbon sinks.
- Through an integrated biomass strategy, multiple benefits can be achieved for mitigation, adaptation and in the green economy.



On behalf of:



of the Federal Republic of Germany



Project objective

- Biomass from invasive and bush encroachment species can provide mitigation and co-benefits for adaptation and biodiversity benefits, while at the same time supporting the uptake of an economy around the biomass use with the aim to support the creation of jobs.
- The key objective of the project is therefore to develop a Strategic Framework and Action Plan that identifies and unlocks the opportunities of an Invasive and Alien Biomass Economy in South Africa that targets problematic alien and invasive woody biomass through ecosystem rehabilitation.
- The establishment of an **Industry Platform**, the identification of **Leverage Professionals** and **Communities of Practice** will be included.
- **Business cases** for appropriate pilot landscape sites will also be identified that would help accelerate the implementation of pilot projects for the Invasive and Alien Economy.



On behalf of:



of the Federal Republic of Germany



Project implementation

- A series of national dialogues with key stakeholders and desktop research will lead to the completion of a Strategic Framework with an Action Plan
- The project will be executed through 3 Phases
- **Phase 1:** Desktop study describing the existing invasive and alien biomass industry landscape in South Africa, which will include the identification of relevant stakeholders and the identification of key themes that will be used to catalyse the dialogues in Phase 2.
- **Phase 2:** The focus will be facilitated and participatory dialogues that will seek to enhance the desktop study with key themes distilled from Phase 1, augment the stakeholders identified, and then identify potential Communities of Practice led by identified Leverage Professionals
- **Phase 3:** In conclusion, the third and final phase will consolidate learnings from Phase 1 and 2 into a Strategic Framework and Action Plan for the Invasive and Alien Biomass economy in South Africa.



On behalf of:



of the Federal Republic of Germany



Thank you

Register as a stakeholder

Sel nr.: 079 881 4447 **Email:** p.buchholz@outlook.com

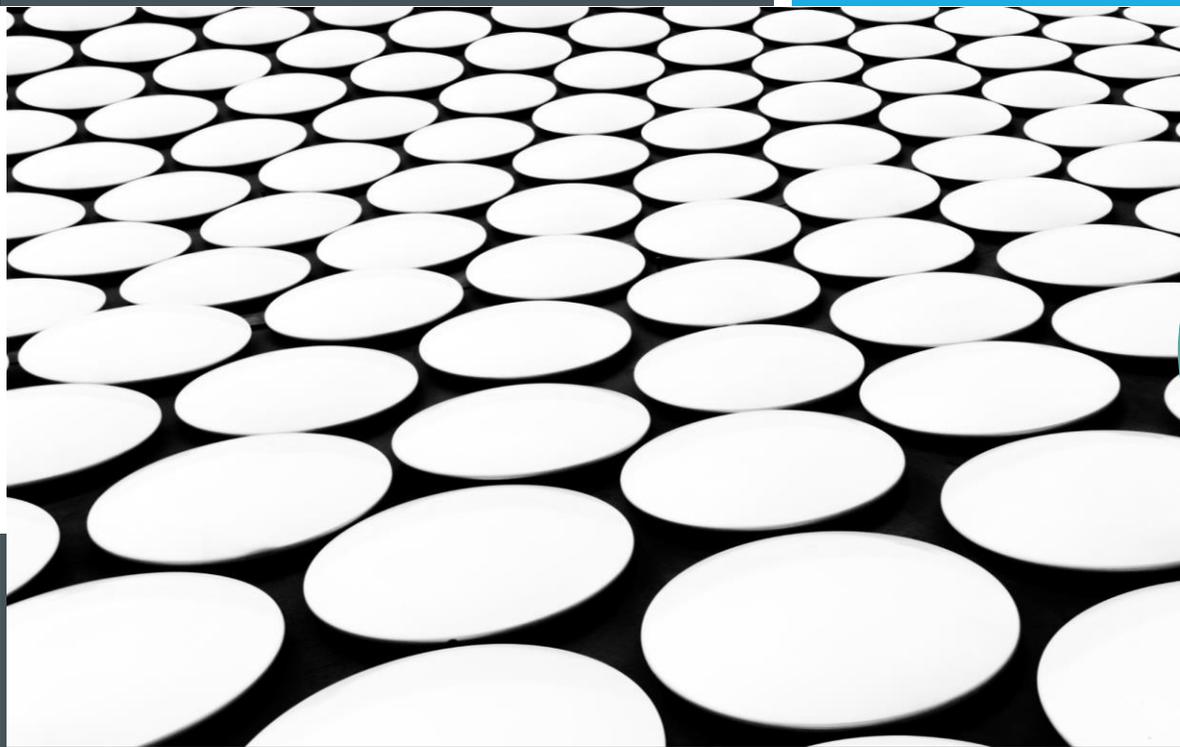


On behalf of:



of the Federal Republic of Germany





- Tjasa Bole-Rentel
- Jan-Louis Spoelstra
 - Gert Ludick
- Passmore Dongi
- Lusanda Menze
- Paul Hoffman

WASTE & BIOMASS BENEFICIATION CONFERENCE THEME 2

MODERATOR: GRAY MAGUIRE

12 AUGUST 2021



Technical and economic pre-feasibility of biomass & waste utilization for production of sustainable aviation fuel

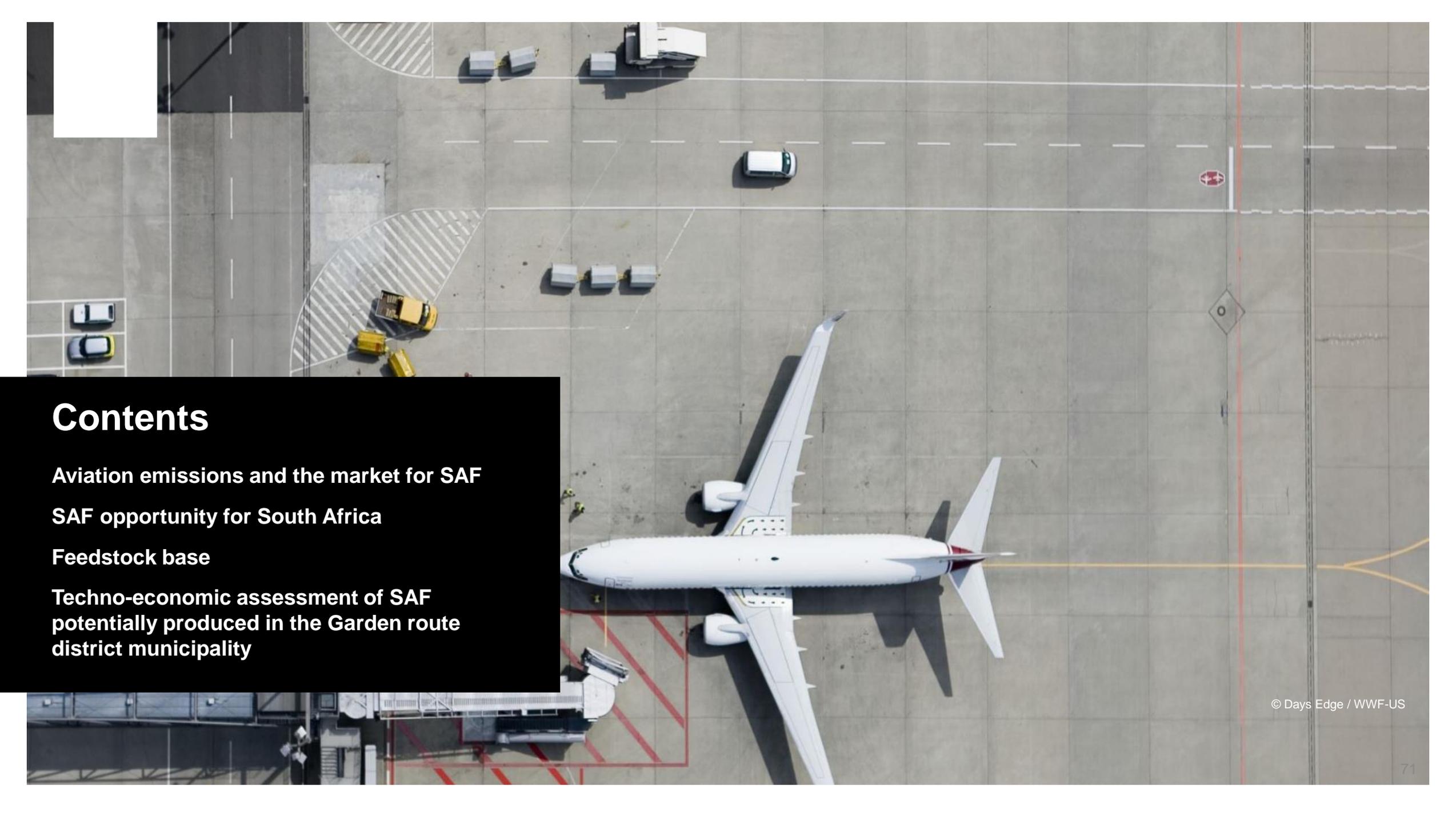
Tjaša Bole-Rentel on behalf of WWF-SA, Stellenbosch University, Imperial Logistics, CSIR

Garden Route Waste and Biomass Beneficiation Conference, MS Teams

12/08/2021

29 July 2021

Stock Image



Contents

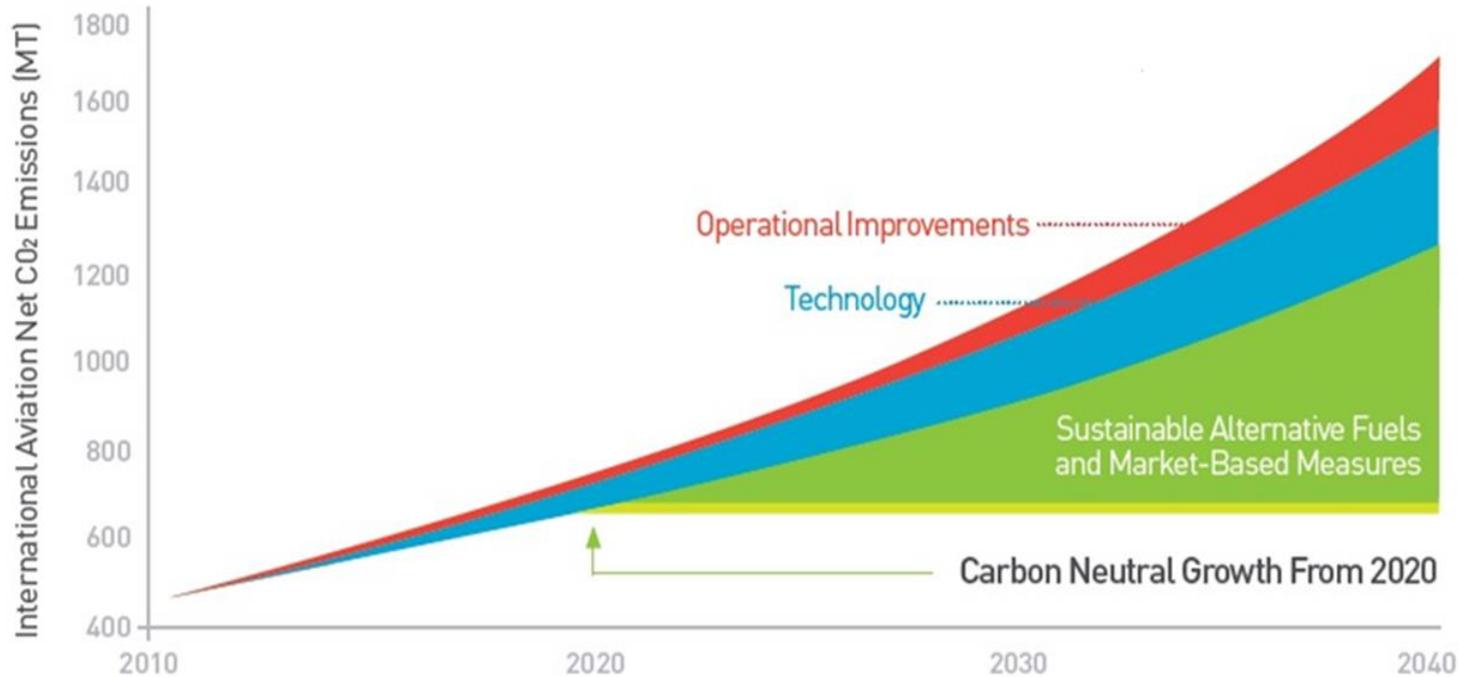
Aviation emissions and the market for SAF

SAF opportunity for South Africa

Feedstock base

Techno-economic assessment of SAF
potentially produced in the Garden route
district municipality

Aviation emissions & SAF market opportunities



Renewed interest in biofuels; demand pull by the aviation industry

2016: ICAO sets goal of “climate neutral growth by 2020”

South Africa:

- Emissions from domestic aviation fall under carbon tax net
- Emissions from international aviation will need to be addressed latest from 2027 – CORSIA mandatory implementation
- EU introduced blending mandate: SAF to account for at least 5% of aviation fuels by 2030 and 63% by 2050 -> export market opportunity

SAF “masterplan” for South Africa



Key objectives

- Explore a wide feedstock base
 - Energy crops (Solaris & sugarcane)
 - IAPs & garden waste
 - Waste gasses
- Assess possible conversion technologies
- Cost the supply chain to determine SA SAF competitiveness globally
- Estimate potential socio-economic impacts of a domestic SAF industry



Underpinning study



Project Title : “Technical and economic pre-feasibility of biomass waste utilization for production of sustainable aviation fuel by PetroSA”

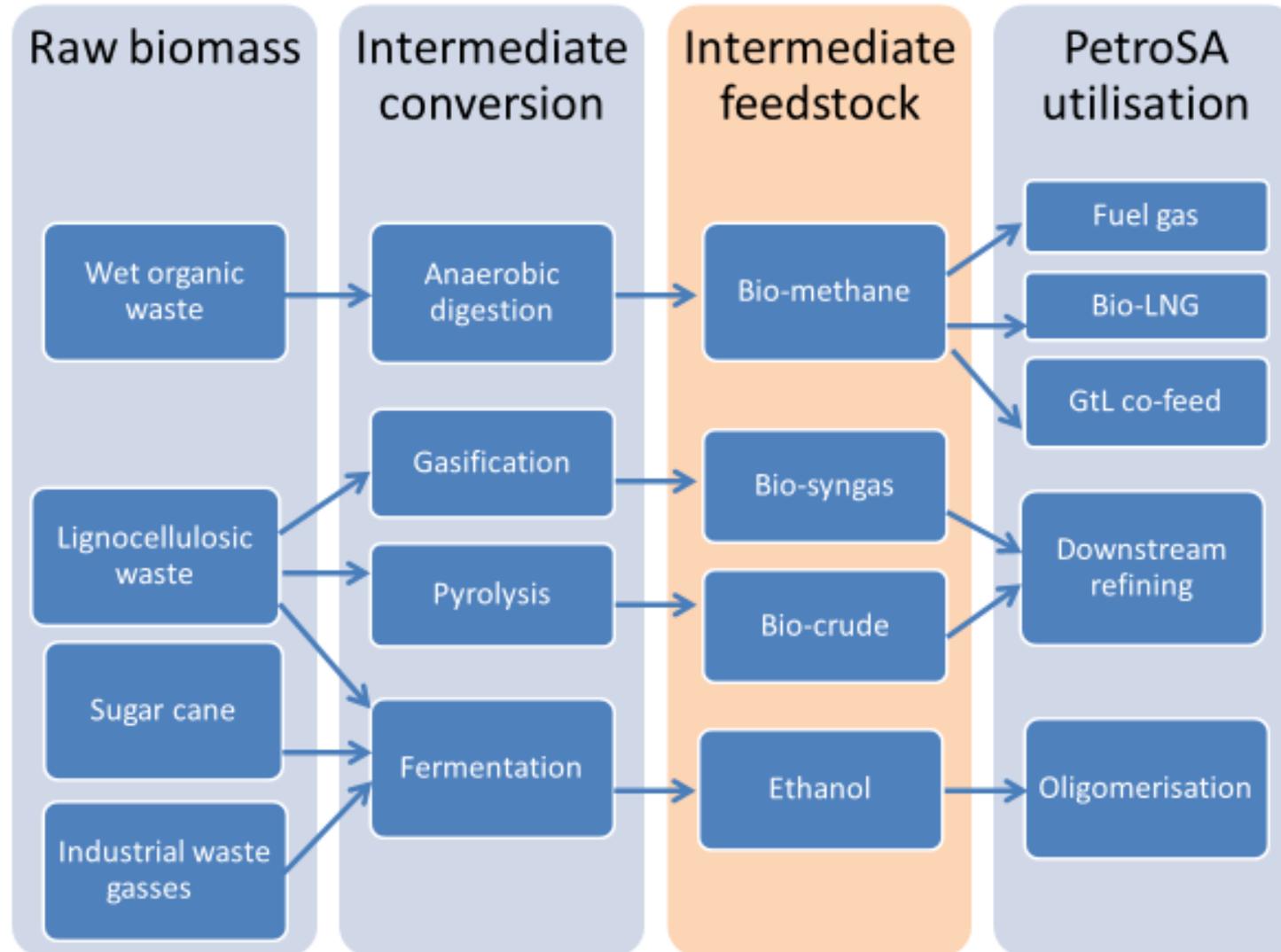
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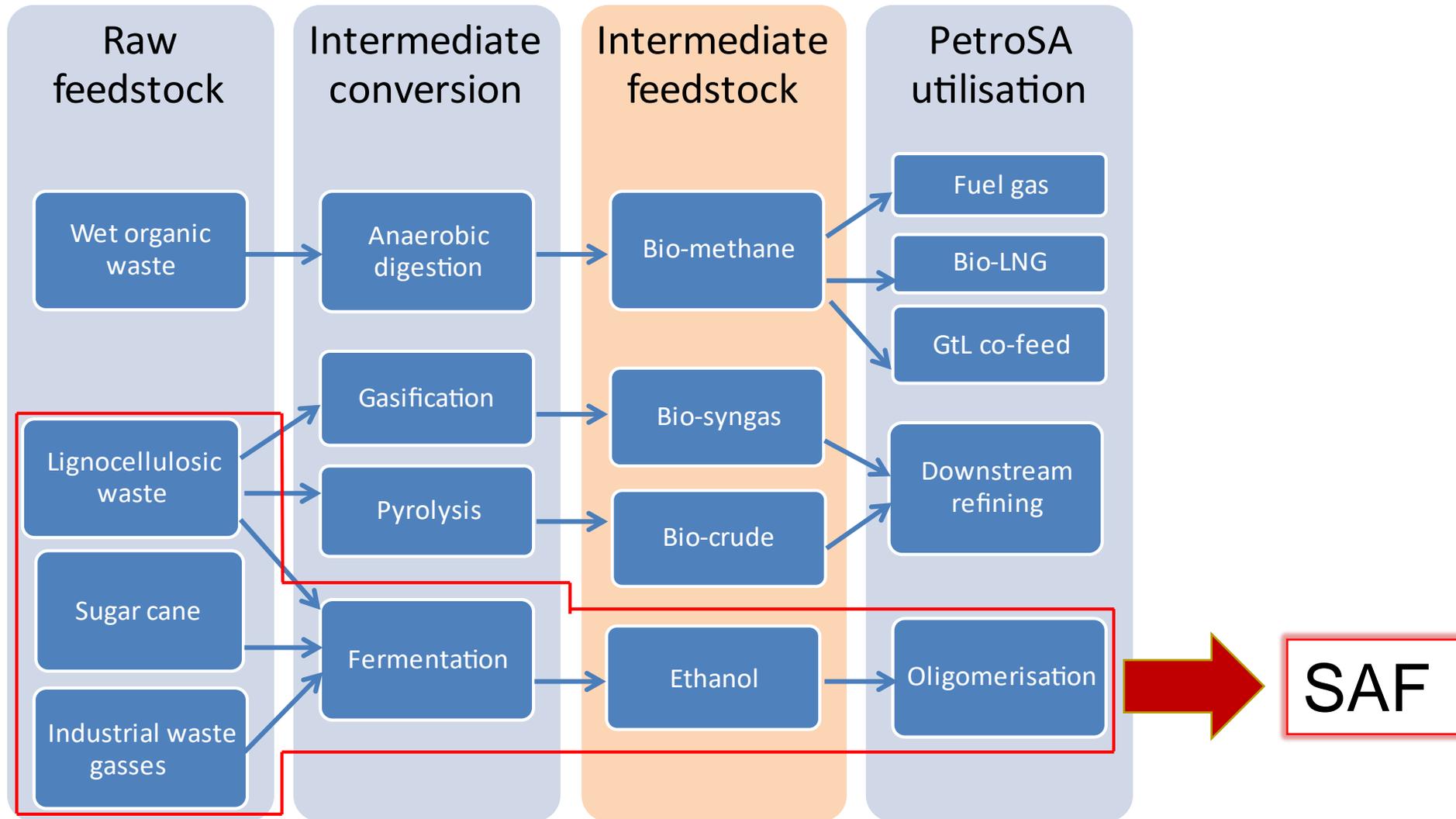
Executed by:



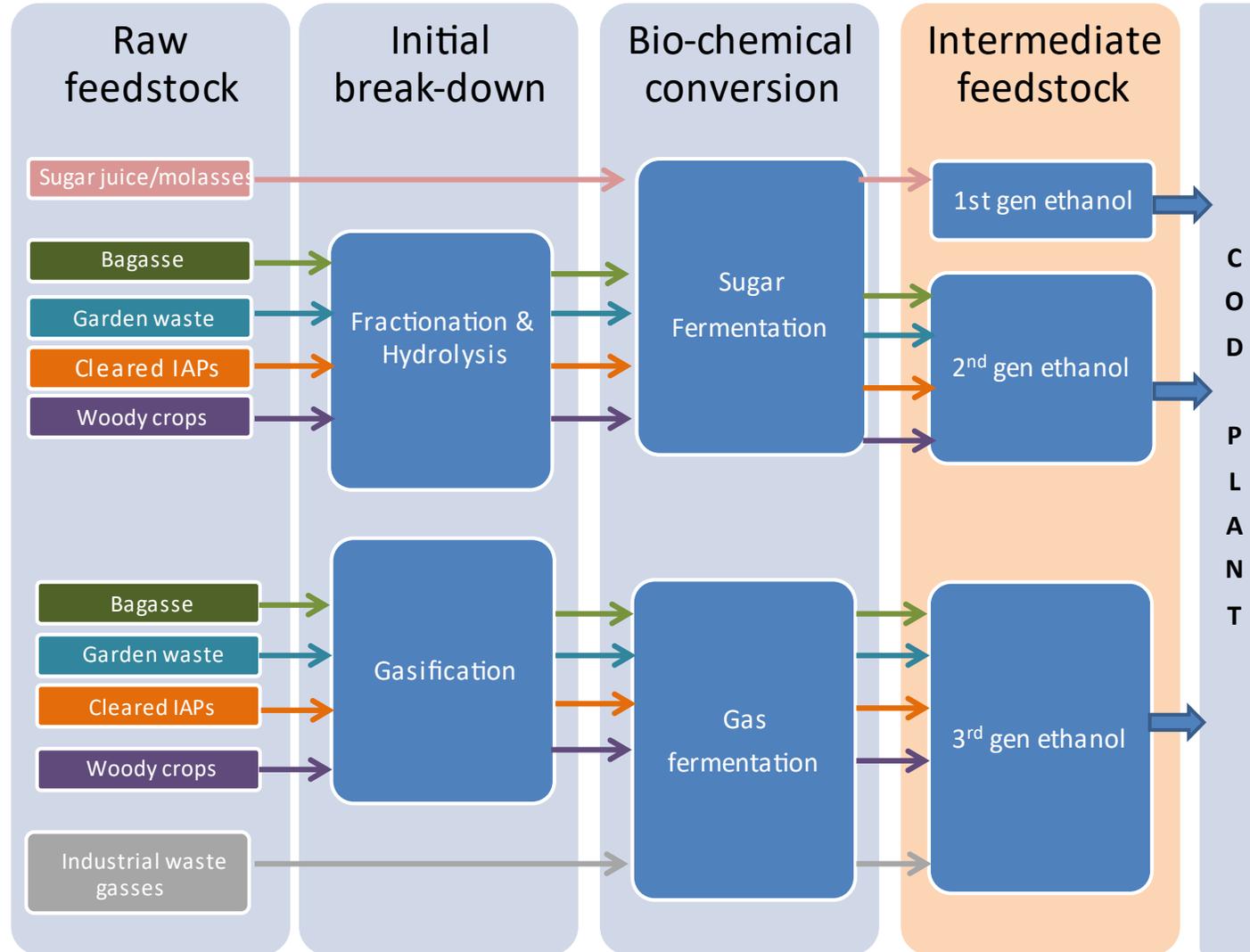
Large scale opportunity for biomass and waste beneficiation in the Garden Route district municipality



Large scale opportunity for biomass and waste beneficiation in the Garden Route district municipality



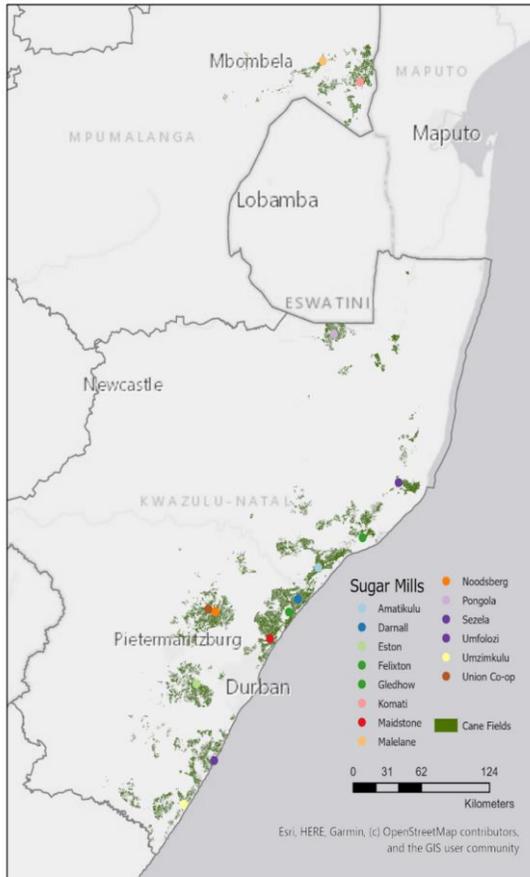
Candidate ethanol supply chains to the COD plant



Assessed feedstocks



Sugarcane (molasses)



Based on existing supply of sugar cane

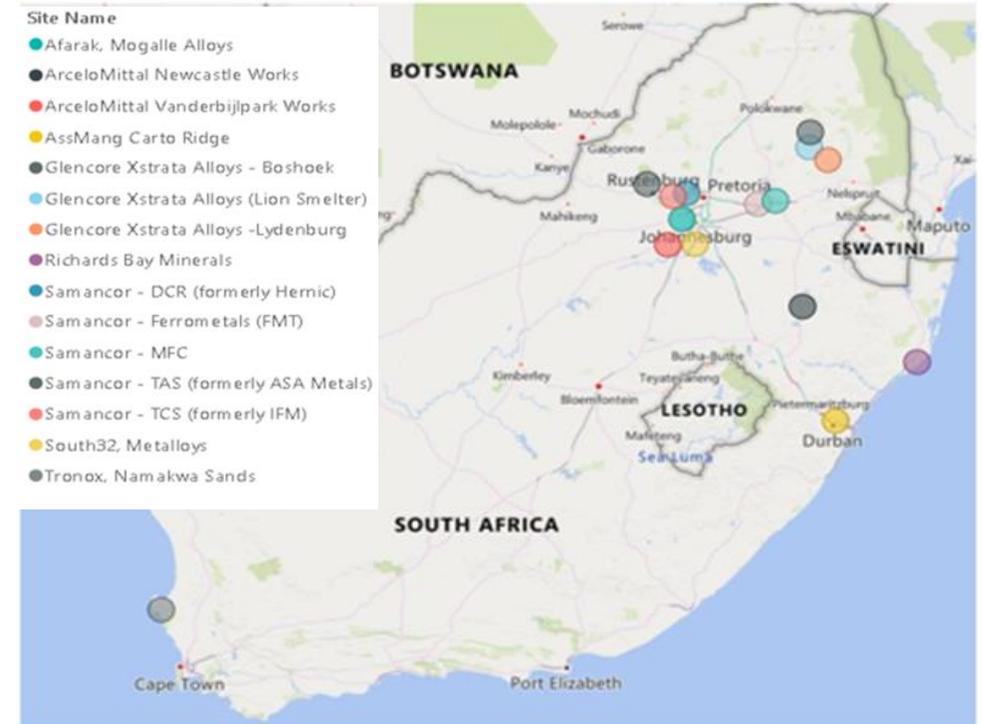
Optimising mill profitability by diverting A-molasses for ethanol production

Potential production approx. 300 mio l/a

Garden waste

Combined with other lignocellulosic waste (5% co-feed)

Industrial off-gasses



Carbon recycling into ethanol -> SAF

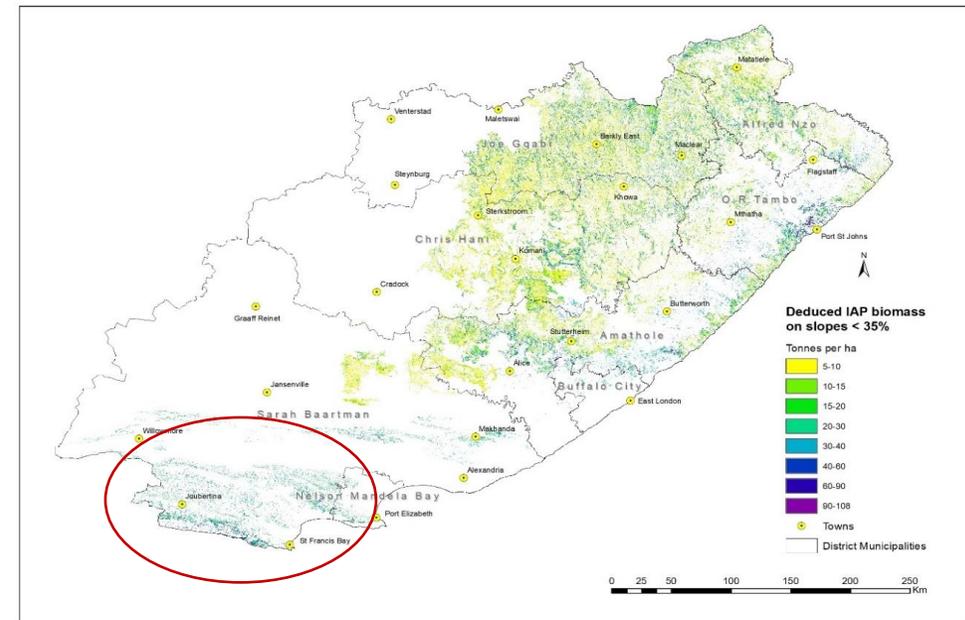
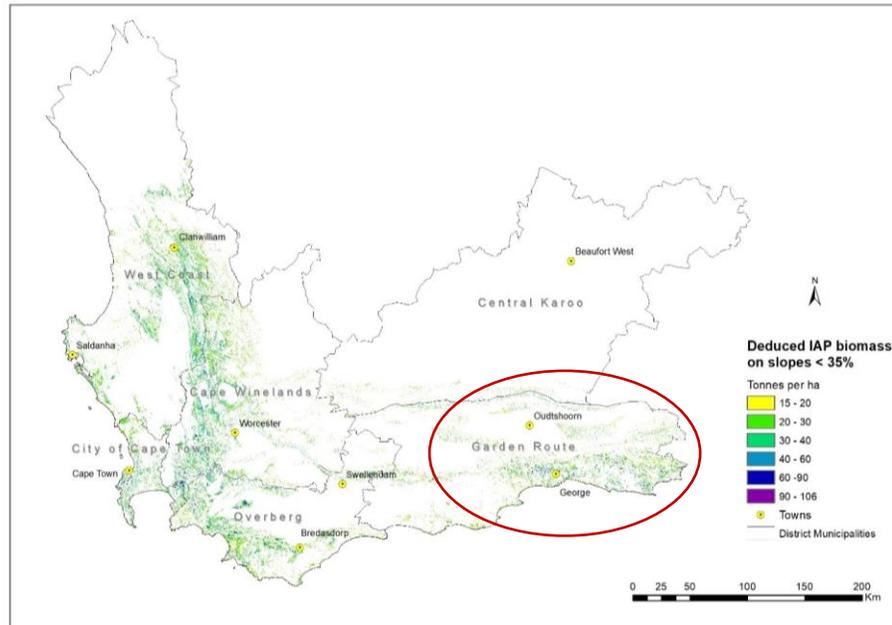
Assessed feedstocks - Alien invasive plants



Waiting for updated NIAPS

CSIR deduced IAP estimate per province

Province	Total deduced invasive plant biomass estimate, 2018 (million odt)	Easily accessible (up to 20% slope)	Fairly accessible (20 to 35 % slope)
Western Cape	43	14.6	9.7
Eastern Cape	60	22.5	17.0
TOTAL	103	37.1	26.7

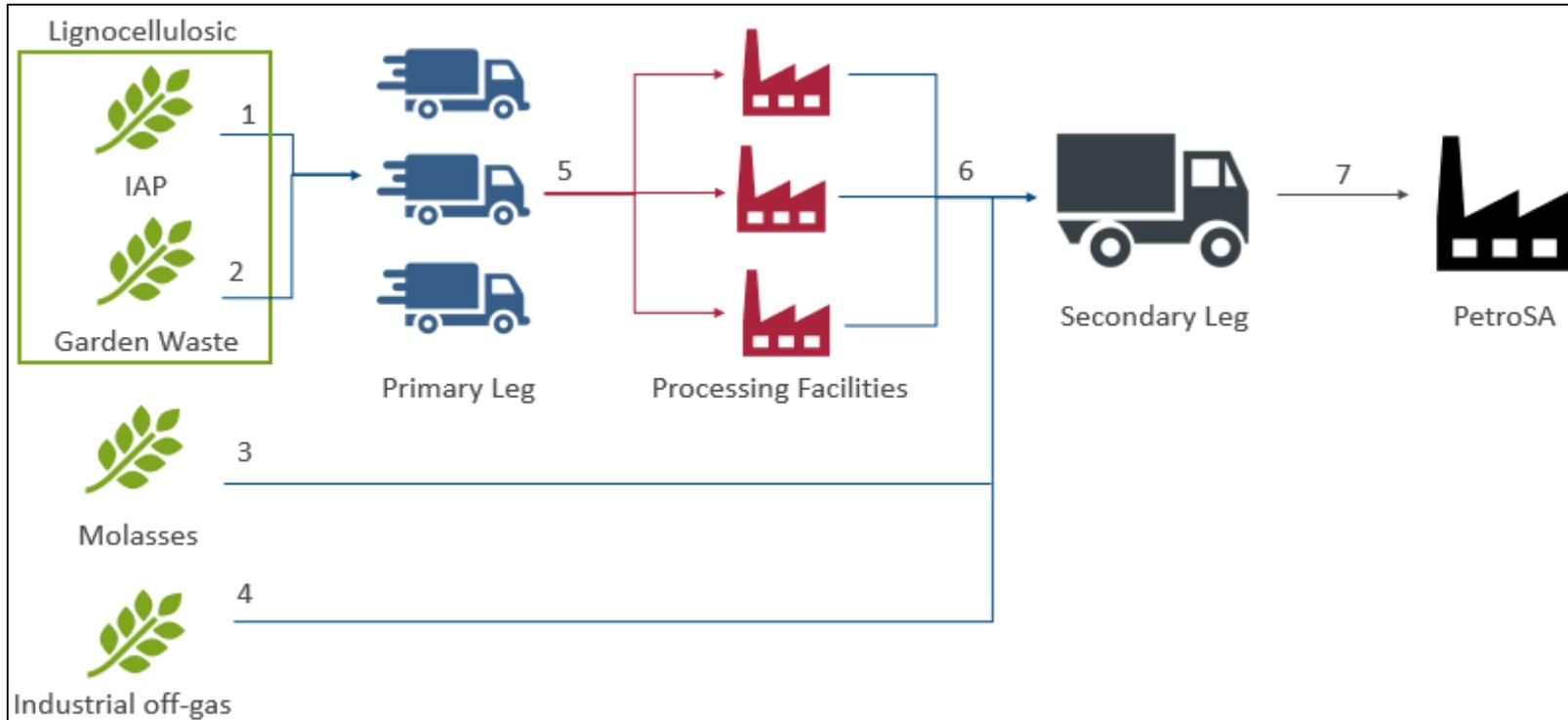


Sustainability risk assessment



Sustainability risks	Low iLUC	Overall risk
A-Molasses		
<p>Co-product of sugar production; reduce the sugar output of the mill. If the sugar market was a tight one, this could potentially lead to direct land use change through expansion of the sugar cane plantation.</p> <p>Bear a proportion of the water and GHG impacts of sugar cane production; on average high in the South African context where irrigation is powered with coal-dominated grid electricity and fields are burnt prior to harvesting.</p>	No	Low to medium
Industrial off-gas (CO)		
<p>Waste product of iron & steel & ferro-alloy smelters; currently flared. No obvious sustainability risk to its utilization. Land footprint of bioreactor is small. Some water usage is required.</p>	No	Low
Garden waste		
<p>Only about 40% of garden waste is currently used (i.e. for composting or biogas production), while the majority of it, 60%, is landfilled.</p> <p>Because of it, garden waste can qualify as a feedstock with low indirect land use change. This may change in the future in light of national waste diversion plans aimed to save landfill space, and the commercialisation of organic waste.</p>	Yes	Low
Invasive alien plants		
<p>Eradication operations may damage biodiversity and surrounding ecosystems through the release of chemical and biological agents contained in herbicides and other chemical control products, and through eradication over the boundaries of a farm (incentivised by demand for this feedstock).</p> <p>The widespread use of subcontractor for eradication on agricultural farms bears the risk of poor labour rights.</p> <p>Changes to land use can result in a net negative carbon flux. If cleared land is converted to conventional commercial agriculture, there will be a loss of carbon with negative impacts for the climate. Conversely, if the cleared land is restored to indigenous forest, there will be a saving of carbon if the biomass is used for production of SAF.</p>	Yes	Medium

Network overview

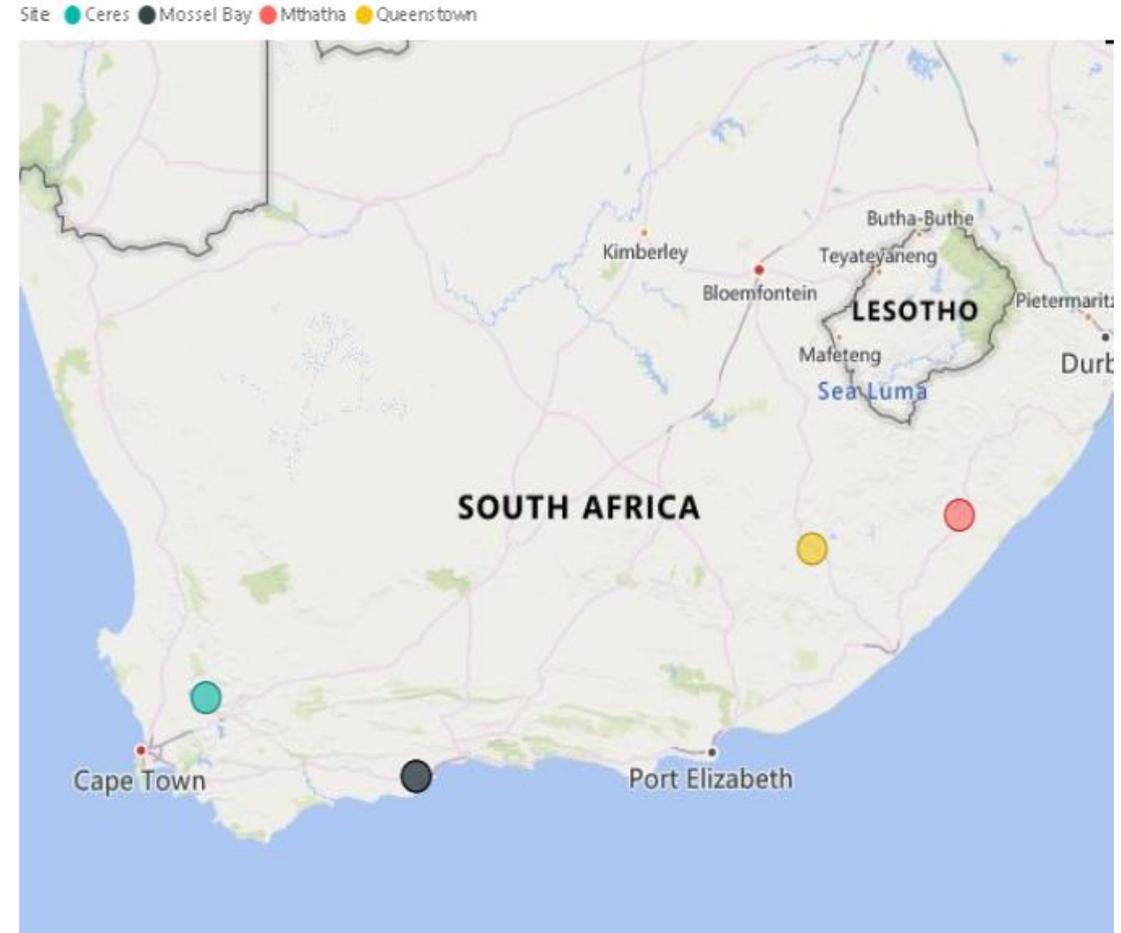


Estimated maximum available ethanol output per feedstock:

- ❖ From off-gasses: 400 mio l +
- ❖ From A-molasses: 1.1 billion
- ❖ From IAPs in WC & EC: >2 billion l

Centre of gravity for IAP pre-processing

Assumed plant capacity: cca 300 000 t/a inout (IAPs), 100 mio l 2G ethanol output



Estimated ethanol supply costs



Single feedstock scenarios	Lignocellulosic	Industrial Off-Gas	Molasses
Average cost per l	R 19.23/l	R 14.95/l	R 9.55/l

Cumulative costs over 20 years	Lignocellulosic	Industrial Off-Gas	Molasses
Feedstock cost	R 41,968,176,255	R -	R 29,001,509,693
Primary transport cost	R 5,901,994,651	R -	R -
Secondary transport cost	R 3,170,800,610	R 9,235,625,113	R 8,006,773,067
Processing cost	R 64,354,366,080	R 80,442,957,600	R 20,289,501,528
Total cost	R 115,395,337,595	R 89,678,582,713	R 57,297,784,288

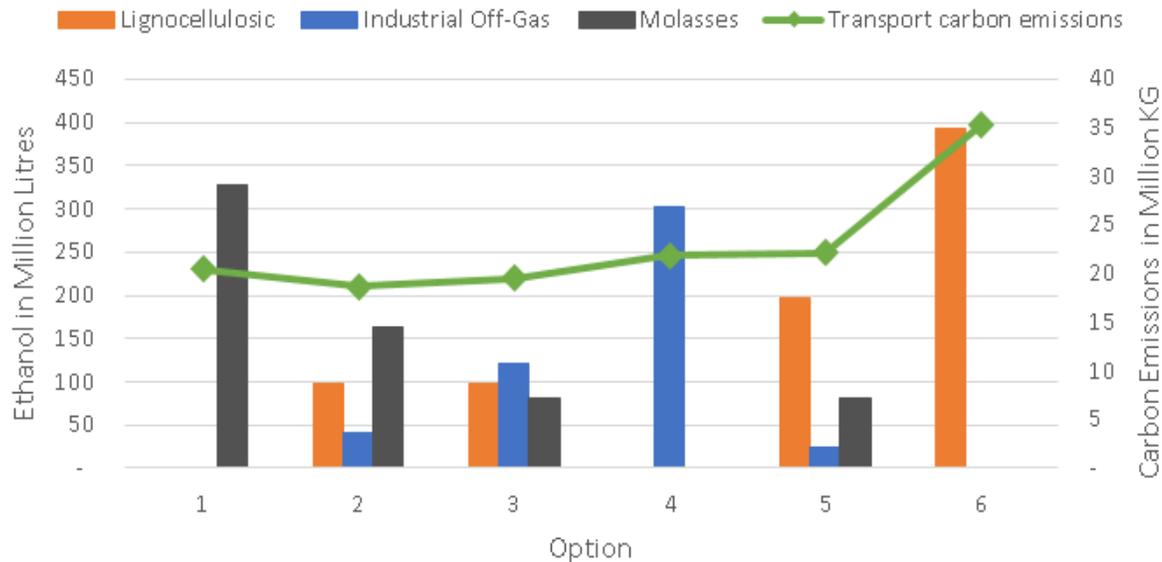
Key observations:

- Cheapest ethanol is from molasses; transport cost saving if a shipping lane were to be instituted between either Richards bay and/or Durban ports and the Mossel bay port
- If 2G ethanol is to be part of the mix: a 2G ethanol plant in Ceres would be able to supply cheapest 2G ethanol (due to relatively denser IAP infestation around Ceres -> shorter trips to processing facility).
- 3G ethanol from off-gasses would appear a much more attractive option if process energy needs could be met by importing renewable electricity.

Multi-objective ethanol sourcing strategy



- Additional objectives: job creation and improving drought resilience
- Ethanol supply mix: Mostly molasses, and at least some ethanol from IAPs.
- Optimal combination includes 1 IAP-based facility (in Ceres), 2 molasses-based facilities in KZN and 1-2 industrial off-gas based facilities
- Multiple objectives achievable at an additional
- Additional cost: cca R1 billion per year.



Option	Total cost (in ZAR)	Total cost for minimum requirement (in ZAR)	Transport carbon emissions (in kg CO ₂)
1	3,123,111,229	2,864,889,214	20,447,768
2	4,016,114,100	3,967,839,892	18,661,565
3	4,413,389,489	4,409,267,633	19,502,728
4	4,519,063,022	4,483,929,136	21,805,433
5	4,846,086,744	4,829,340,683	22,170,562
6	7,542,239,265	5,769,766,880	35,272,191

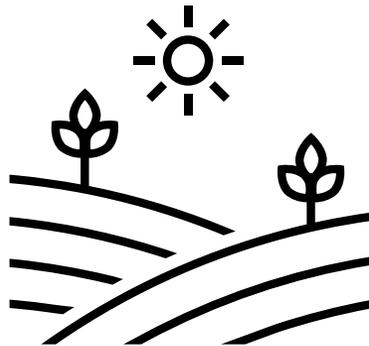
GHG considerations



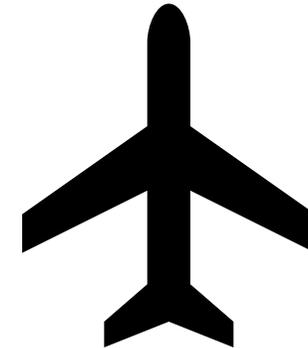
- Not all 1G ethanol from molasses offer the same savings; molasses will have to account for part of the GHG burden of sugar cane production, GHG savings heavily dependent on cane production and harvesting methods.
- Accounting of IAP-based 2G ethanol GHG savings still under discussion
 - Non-renewable resource
 - Currently classified as waste
 - For genuine savings (not just accounting) needs to be coupled with ecosystem restoration

THANK YOU FOR YOUR ATTENTION!

For more information on our work on Sustainable Aviation Fuels please visit
[Sustainable aviation biofuels | WWF South Africa](#)



Any questions and queries may be directed to:
tbole@wwf.org.za





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TRANSNET FREIGHT RAIL

The use of Rail in an integrated waste management system for
Garden Route District Municipality

2021/08/12

Jan-Louis Spoelstra



Rail lines in Garden Route District Municipality



Operational Railway Lines:

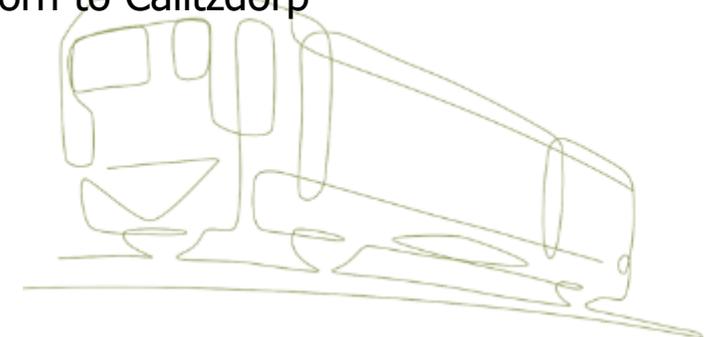
From De Rust (Port Elizabeth) through
Oudtshoorn to George
George to Mosselbay
Mosselbay to Heidelberg (Worcester)

To become operational through Private Sector Investment

George to Knysna (Concession opportunity to
be advertised this calendar year)

Non-Operational Rail Lines

Avontuur (in George Municipality) to Port
Elizabeth – narrow gauge rail line
Oudtshoorn to Calitzdorp



Changes regarding Rail transportation in SA

1. White Paper on Rail Reform – National Rail Policy

Address monopolistic nature of freight and passenger rail and Create new adequate funding models:

Policy to address role of rail as a competing transport mode by Infrastructure investment interventions to enhance rail's inherent competitiveness and adjusting the institutional arrangements to ensure rail functions effectively.

2. Private Sector participation in Rail activities in South Africa

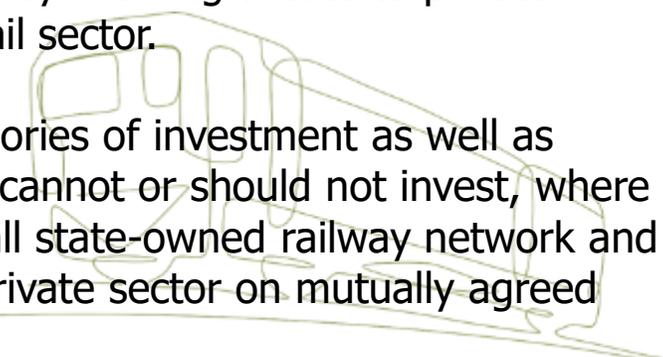
Reference to the State of the Nation address by President Ramaphosa in 2020 and 2021:

"The Infrastructure Fund implementation team has finalised the list of shovel-ready projects and has begun work to expand private investment into public infrastructure sectors with revenue streams. These includes area like..... Rail freight branch lines,...." (2020)

"Our ability to compete in global markets depends on the efficiency of our ports and rail network." "We are repositioning Durban as a hub port for the Southern Hemisphere and developing Ngqura as the container terminal of choice. The rail corridor from Gauteng is being extended to enable the export of vehicles through Port Elizabeth. These are crucial steps to move freight from road to rail and increase the competitiveness of the rail system." (2021)

Reference to Minister Pravin Gordhan at launch of ARIA - Introducing competition by allowing access to private operators is expected to improve the viability and sustainability of the country's rail sector.

This will lead to attract, encourage and regulate private sector participation in all categories of investment as well as operations and maintenance; invite private sector participation where the government cannot or should not invest, where it demonstrates superior value for money or where it is quicker to market; and retain all state-owned railway network and rights of way in state ownership but, where appropriate, make them available to the private sector on mutually agreed terms to facilitate private sector participation.

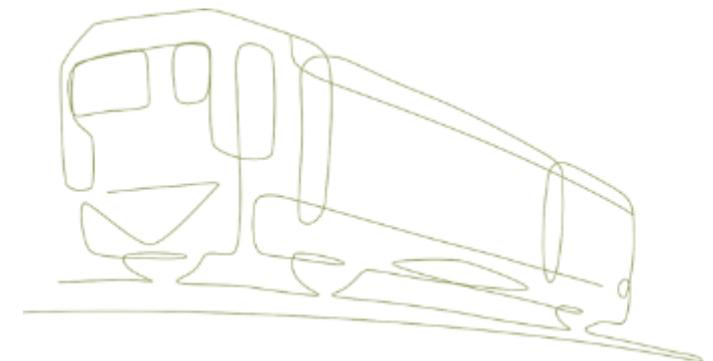


How Transnet Freight Rail is adjusting?

- Refocused structures – 6 Corridors and Garden Route is part of Cape Corridor.
- Busy with a process to separating the operations and infrastructure and accounting separation is being executed with the hope of it to be concluded before the end of the year.
- Expanding the definition of branch lines and more lines to be included as branch lines
- Accelerate the process of awarding Concessions on Branch lines to allow for Private Sector to co-invest in railway infrastructure and assets.
- Focus on the growth of freight on rail and expanding into more commodities

- Initial Commodities focussed on by Transnet Freight Rail
 - Coal export
 - Iron Ore Export
 - Manganese
 - Mineral Mining
 - Domestic Coal
 - Containers
 - Automotives

- Expanded Commodities
 - Agriculture – especially export fresh fruit and grain as a start
 - Fast Moving Consumer Goods
 - Waste on Rail



Waste on Rail – what is the opportunity

- Total domestic waste being transported per annum – 109 million tonnes – more than double the export of iron ore volume.
- Garden Route District Municipality – more than 210 000 tonnes or more than 7500 lorries per annum.

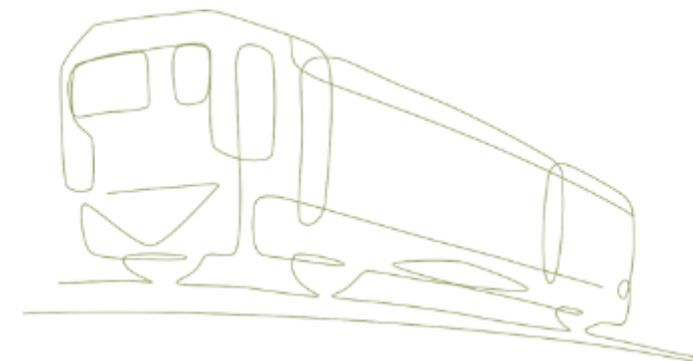
Statement made in the Western Cape Freight Strategy published by Provincial Department of Transport:

“the value of moving waste-on-rail is immense, particularly with regards to the potential cost savings. Efforts to take forward this initiative may include the completion of feasibility studies for additional waste-on- rail sites in the Western Cape, engaging with Transnet on branch line requirements, or taking steps to locate transfer stations near existing branch lines with support from private sector partners.”

The development of intermodal transfer stations will enable other commodities, all containerised, to be loaded at the same sites.

The benefits of using rail instead of road for any freight movement, also include the following:

- Reduction in road accidents;
- Reduction in road infrastructure damage;
- Reduction in congestion on roads – especially during high demand periods;
- Reduction in air pollution;
- Reduction in noise pollution;
- Reduction in land use requirement for infrastructure.

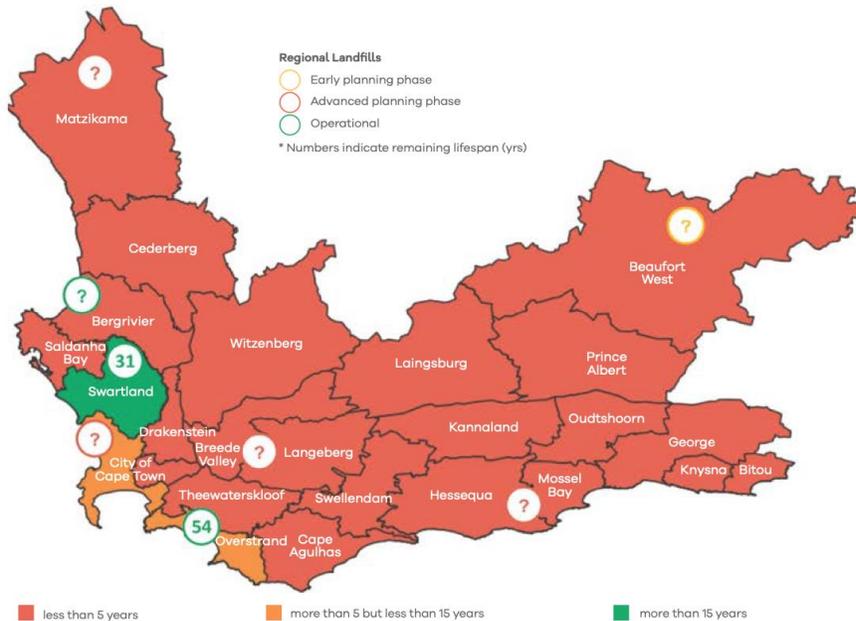




Waste on Rail – What is required?

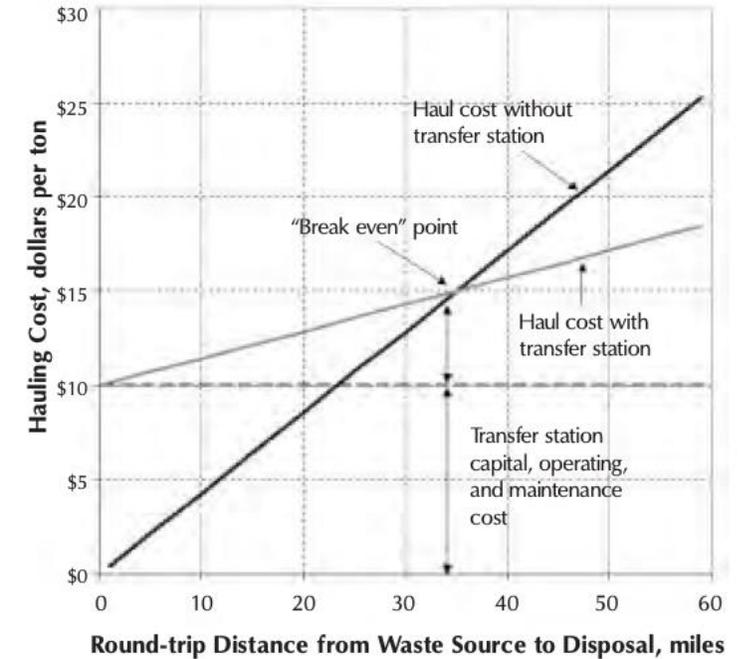
Complete designed intermodal solution:

1. Transferable intermodal waste collection bins.
2. Transfer facilities on intermodal terminals for loading and offloading of trains at collection sites (towns) and at waste processing or landfill sites.
3. Wagons for the rail based transportation
4. Road vehicles for the collection of waste using the intermodal bins.
5. Centralised waste processing location.



With limited landfill and waste processing sites planned in Western Cape, waste by rail will result in the reduction of cost.

Figure 1. Sample Comparison of Hauling Costs With and Without a Transfer Station



Waste on Rail – Transnet examples

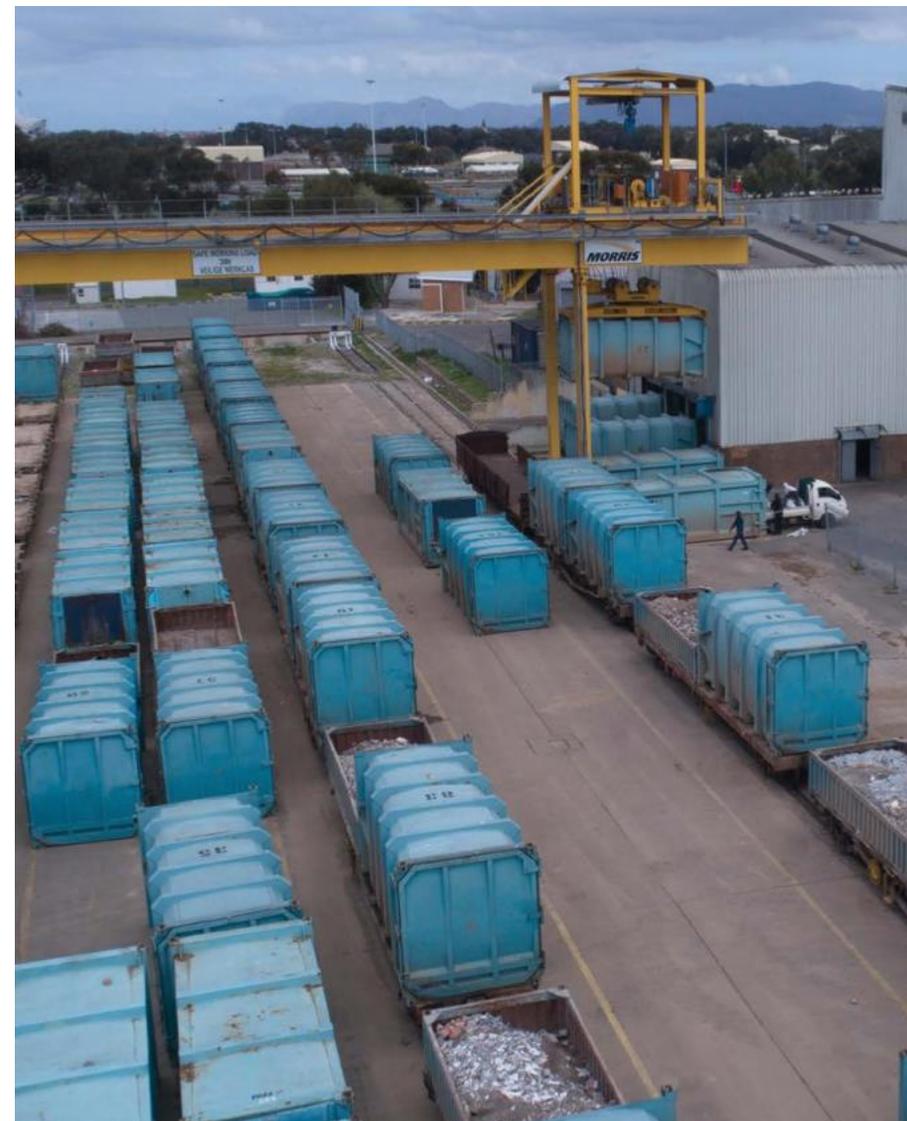
Transnet Freight Rail successfully transported waste from Knysna to PetroSA up to 2006 when line closed after floods.

Transnet Freight Rail supply a service to the City of Cape Town from Athlone to Kalbaskraal.

In the planning phase with several Metropolitan municipalities in the other Provinces.

The George Knysna Railway Concession:

A specific requirement will be the re-opening of the line with the provision of waste by rail options for the Knysna and Bitou Municipalities



The way forward

Feasibility study

Location of waste transfer stations – can this be multi-purpose intermodal facilities?

Design of equipment – inclusive of collection bins, road vehicles, railway wagons, handling equipment.

Sorting of waste – what is the destination of any waste with value (aluminium, steel, recyclable plastics, paper and others).

Electricity generation – possible use of NECSA technology.

Collaboration between Transnet, District and local Municipalities and any private sector entity interested in the future of our green Garden Route as part of the Green Cape initiative.



Thank you

Questions and Answers



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PORT OF MOSSEL BAY – Development Framework

GARDEN ROUTE WASTE AND BENEFICIATION CONFERENCE

12 August 2021

TNPA Managed Ports – South Africa





Transnet National Ports Authority: Core Functions

TNPA's core functions are outlined in the Ports Act, as follows:



Port Development Framework Plans

Port of Mossel Bay:

- **Role** of the Port:

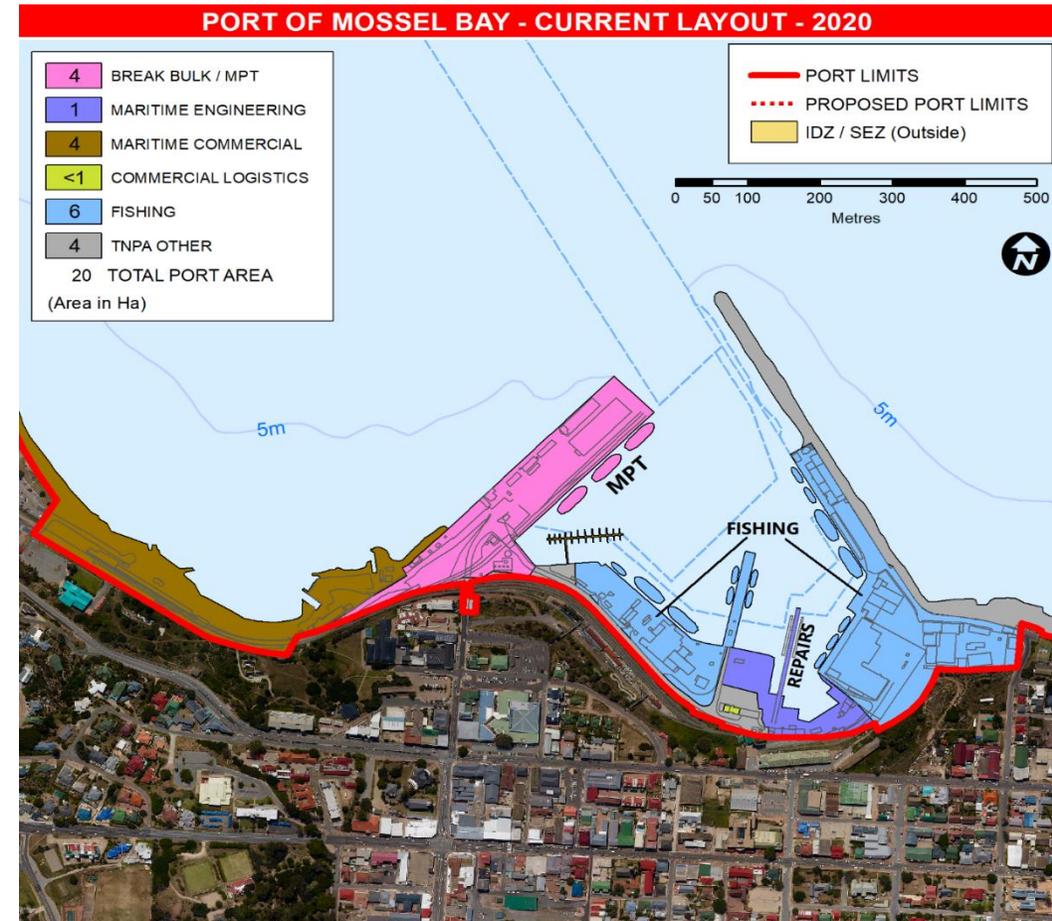
To provide marine related services for fishing, cruise-liner, oil & gas vessels and provide logistics support for the off-shore oil and gas sector, including ship repair and underwater inspections and salvage.

- **Vision** of the Port

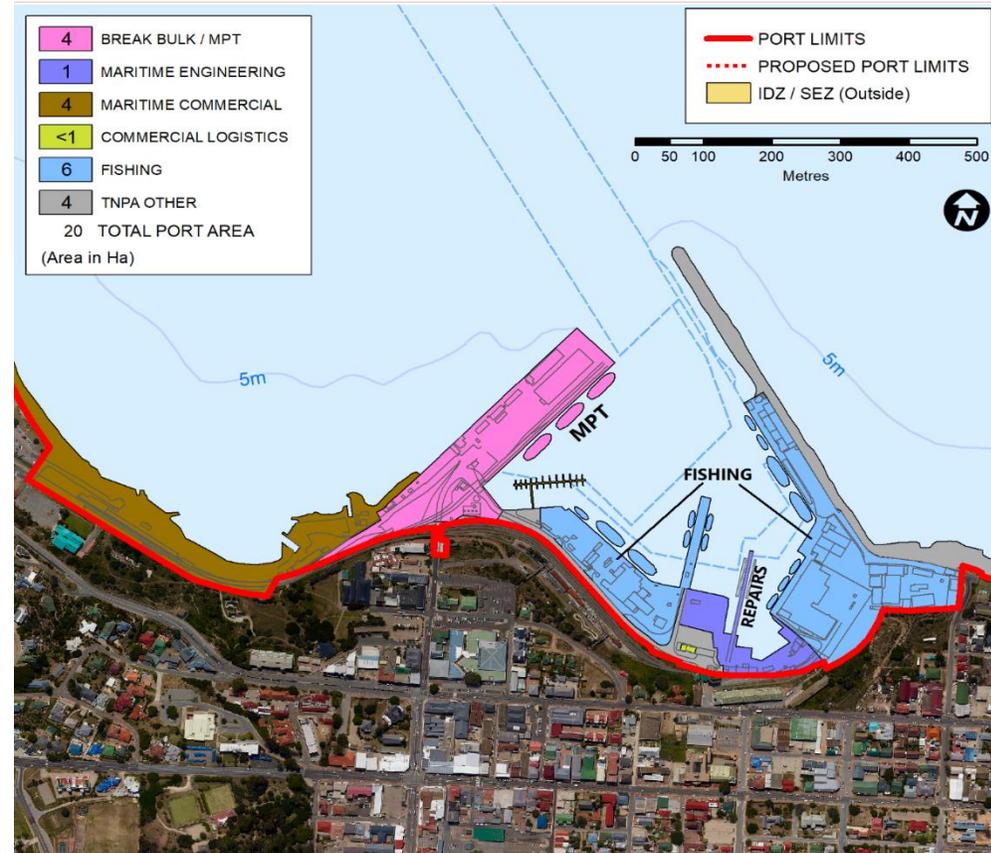
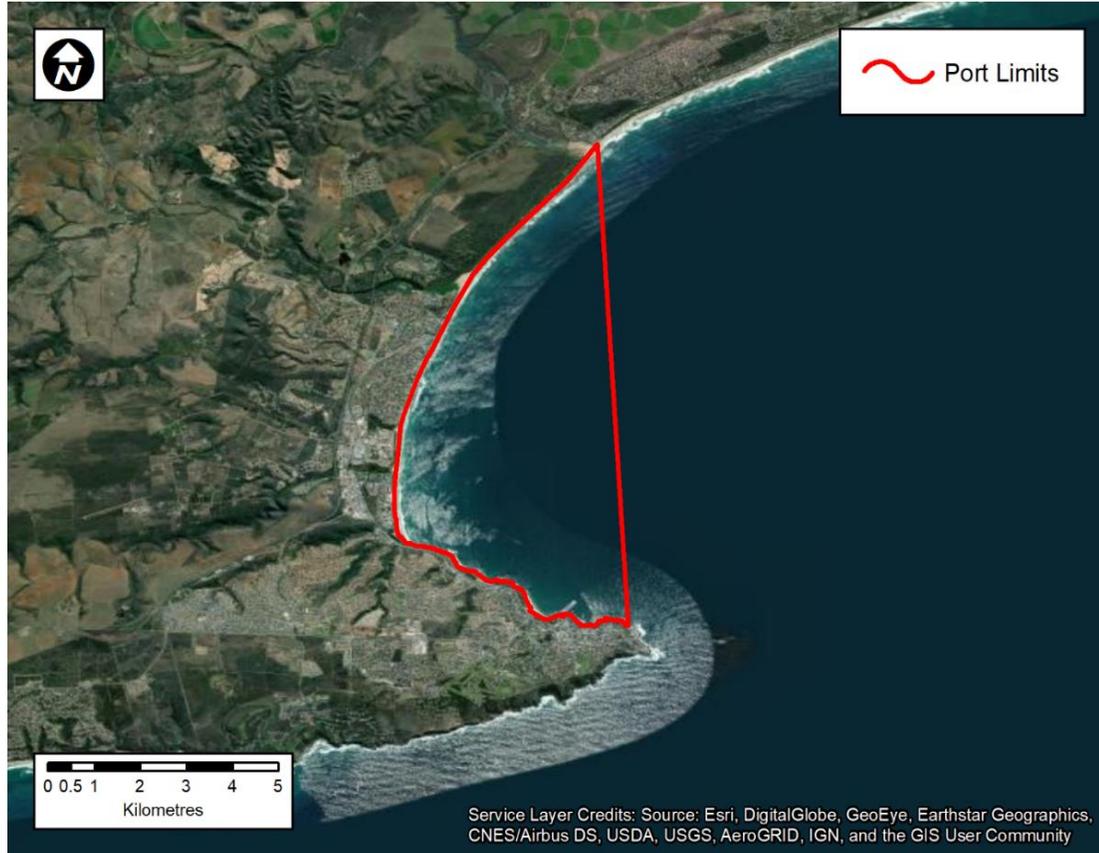
To keep playing a dynamic role in both the oil and gas sector, fishing industries, ship repair, cruise-liners/tourism and become a recreational hub with a waterfront and commercial development.

- **Objectives** of the Port:

- › *Expand the infrastructure to support oil and gas exploration.*
- › *Provide improved facilities for cruise liners and ensure integration with the city.*
- › *Develop a waterfront on the western side of the port outside the operational area of the port.*
- › *Rehabilitate the rail infrastructure to tap into the flow of cargo through the Garden Route into the hinterland.*



Port Development Framework Plans

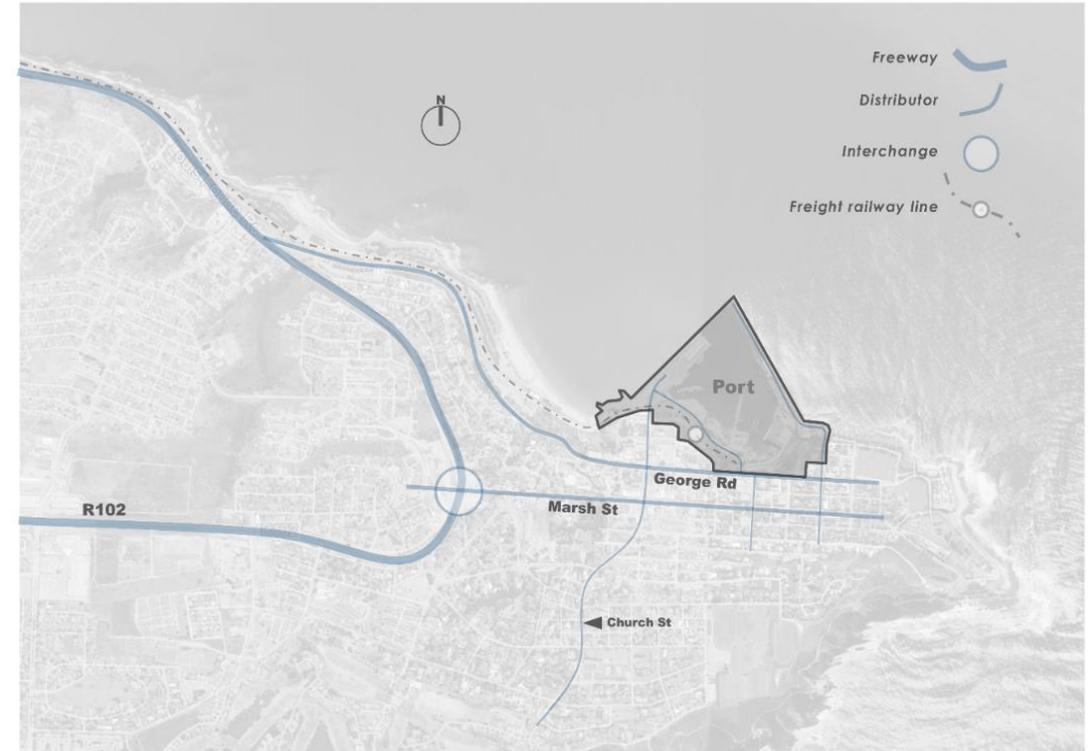




Port Development Framework Plans

Landside Transport Assessment:

- The Port of Mossel Bay is located in the south-eastern parts of Mossel Bay, directly opposite the Mossel Bay Central Business District (CBD). The site is bound by George Road/ Bland Street in the south, which separates the port from the Mossel Bay CBD.
- **Road Network** comprises:
 - › Access infrastructure linking the Port of Mossel Bay to Mossel Bay and to the inter-regional access infrastructure.
 - › The inter-regional access infrastructure comprises the R102, a high capacity dual carriageway, which links to the N2 freeway. The N2 freeway links Mossel Bay and its port to George located east of Mossel Bay, and to Cape Town located west of Mossel Bay
 - › The Port itself is served by a relatively low capacity urban road network. The main local port access Road is Marsh Road, and it runs through the central business district (CBD). While it has two lanes per direction, roadside parking and frequent intersections constrains its capacity and compromises access to the port. This is not an ideal situation and detracts from any long-term plan to upgrade or increase freight volumes through the Port.
 - › The Port of Mossel Bay is linked to the R102 via 2 distributor roads. The first is Marsh Street, which passes south of the port through the Mossel Bay CBD. Marsh Street is connected to the R102 via an interchange. **Marsh** Street is directly linked to the port via Church Street. The second distributor road is **George Road/ Bland Street**, which directly connect the R102 to the port.

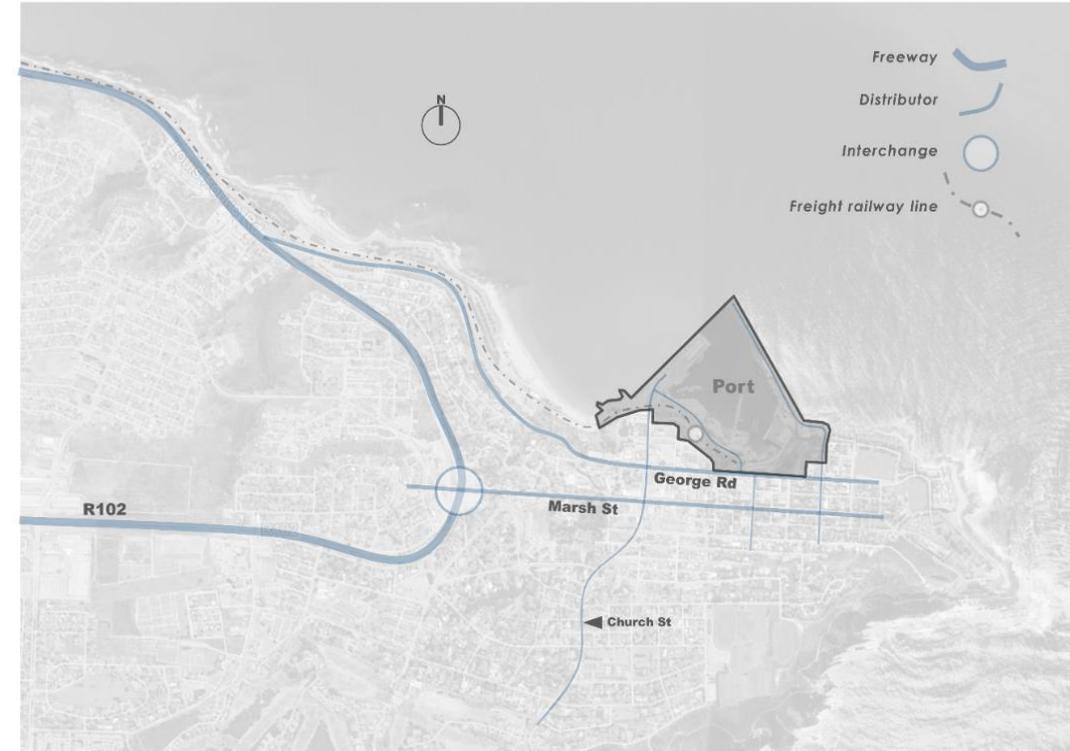


Port Development Framework Plans

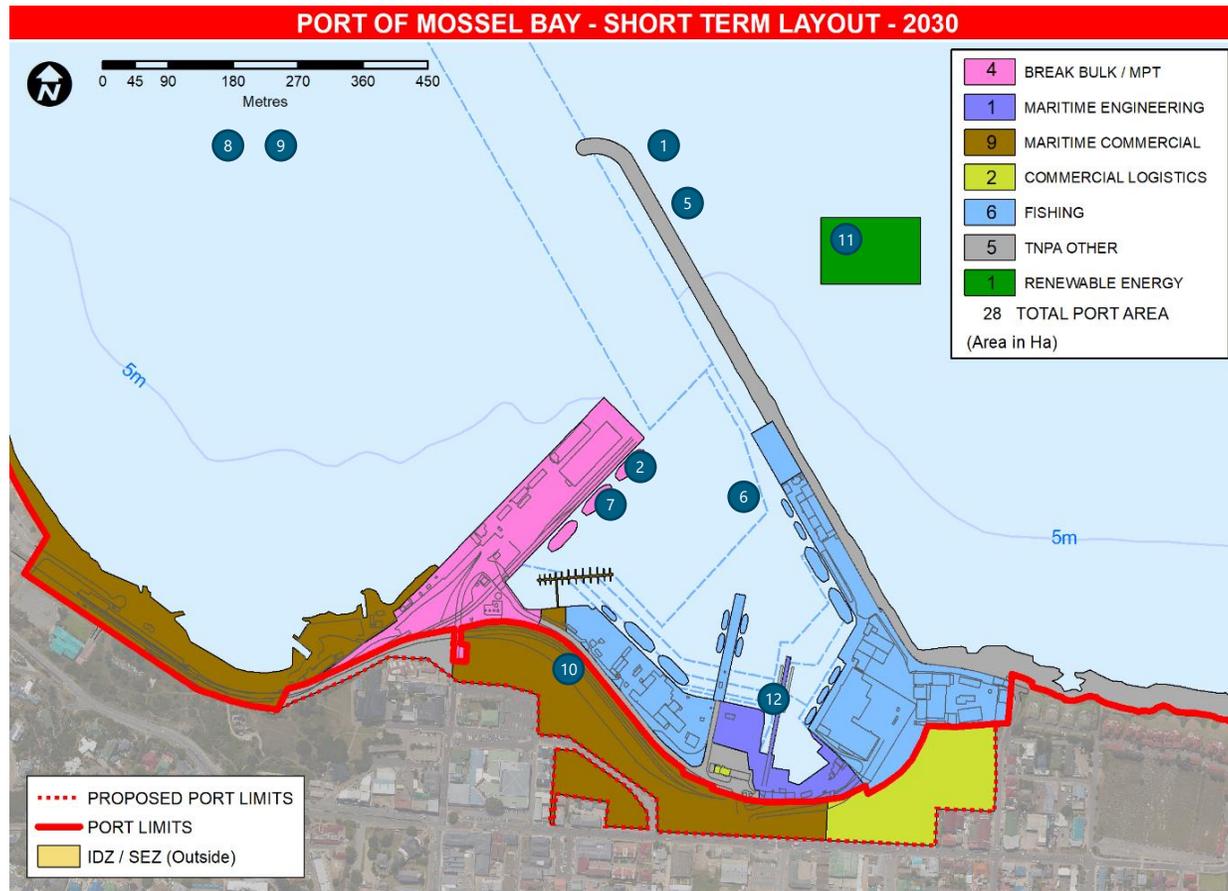
Landside Transport Assessment:

- **Rail Network** comprises:

- › *Freight railway line runs parallel to the R102 and George Road and has direct access to the port*
- › *This freight railway line connects the Port of Mossel Bay to George located east of Mossel Bay, and to Cape Town located west of Mossel Bay.*
- › *This low capacity freight railway line forms part of the Cape Town to Port Elizabeth rail freight corridor and is underutilized.*
- › *The line into Mossel Bay meanders along the coast and connects to George in the east and Cape Town in the west.*

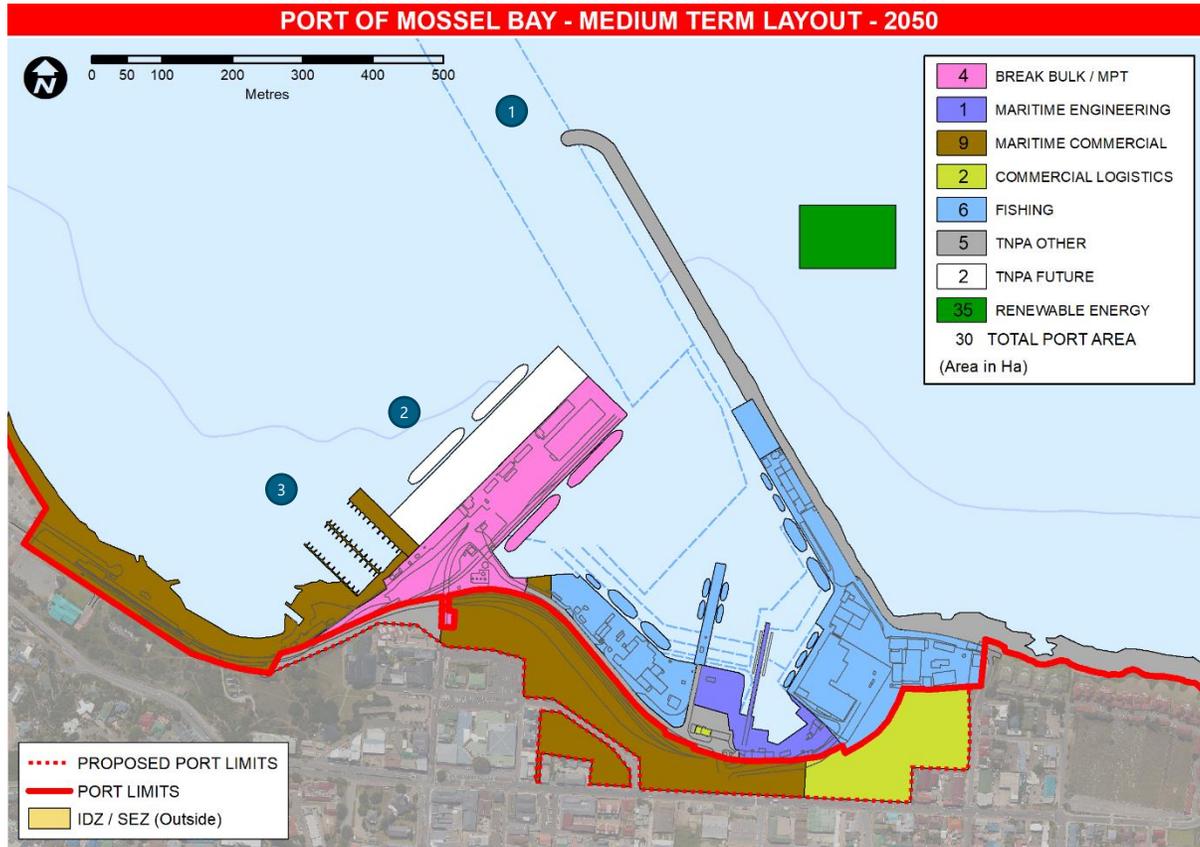


Port Development Framework Plans



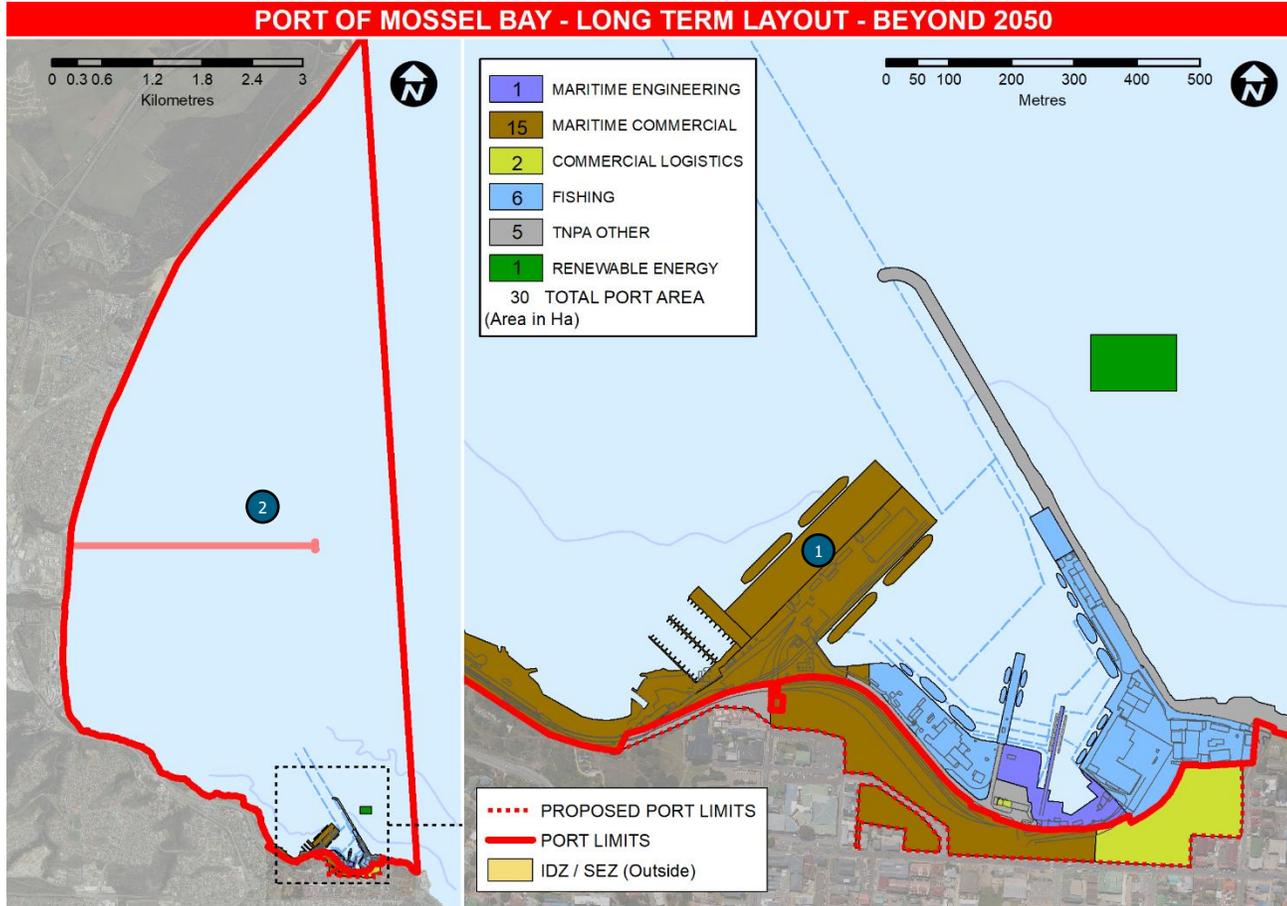
Project #	Commodity Type	Project Description	Operational Date
1	Other	FEL 3: Breakwater refurbishment	2023
2	Breakbulk	FEL 3: Quay 4 refurbishment	2024
3	Other	FEL 4 Upgrading of service networks (electrical) in Port	2024
4	Other	FEL 4: Upgrading of service networks (water) in Port	2023
5	Other	FEL 4: Breakwater refurbishment	2028
6	Breakbulk	FEL 4: Quay 4 refurbishment	2027
7	Fishing	FEL 4: Replacement of sheet piles for Q3	2027
8	Liquid Bulk	FEL 3: Replace CBM with new SPM and associated infrastructure	2026
9	Other	MSB Waterfront Development	2026
10	Other	Green water + energy initiatives - windfarms/wave converters, desal	2026
111	Other	Upgrade slipway facility for ship repair / ship building	2025

Port Development Framework Plans



Project #	Commodity Type	Project Description	Operational Date
1	Other	Dredging of entrance channel	2040
2	MPT	New MPT + Cruise Terminal	2037
3	Other	Small Craft Harbour	2037

Port Development Framework Plans



Project #	Commodity Type	Project Description	Operational Date
1	Other	Re-purposing MPT to maritime commercial	2050+
2	Liquid Bulk	New SPM (upgrade to large capacity).	2050+



Artistic impression of Long Term Layout



Multi Purpose Terminal (MPT): Quay 4

Key Characteristics:

- Maximum Length Overall (LOA) 130m
- Maximum draft 6.5m
- Gross Tonnage (GRT) 10 000t

The Port of Mossel Bay does have spare capacity to handle break bulk on the Multi Purpose Terminal (Quay 4)





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THANK YOU

Contact details

Port of Mossel Bay
55 Bland street
Admin building
6500
Mossel Bay



GARDEN ROUTE WASTE AND BIOMASS BENEFICIATION CONFERENCE

12 August 2021



 @GardenRoute_dm #GardenRoute
 www.facebook.com/gardenroutedm

www.gardenroute.gov.za



**Garden Route District Municipality,
the leading, enabling and inclusive
district, characterised by equitable and
sustainable development, high quality
of life and equal opportunities for all.**

Converting the landfill site into a centralized Waste Beneficiation Centre and Dedicated Economic Zone

NATIONAL CONTEXT

- National Waste Management Strategy 2020
- Entry point to waste minimisation and the circular economy is waste prevention and waste as a resource.
- Waste Prevention – this emphasises avoiding and reducing waste before substances, materials and products are discarded
- Waste as a Resource – this focuses on stimulating a secondary resources economy based on recycling and recovery of materials and energy from waste i.e. interventions that take place after a product or material has become waste.

NATIONAL CONTEXT Cont....

- Circularity can deliver substantial material savings throughout value chains and production processes, generate extra value,
- The main economic driver lies in exploiting the full potential value of waste.
- South Africa's strategy for waste minimisation and implementing the circular economy will result in the diversion of waste from landfill and the displacing of demand for virgin materials

GRDM CONTEXT

- We hereby reaffirm our commitment and our call for greater collective climate change response action to implement the 2030 Agenda for Sustainable Development Goals, the Paris Agreement on Climate Change, the South African National Development Plan and the Garden Route Spatial Development Framework (SDF) which was approved on 5 December 2017 by the Eden District Council.
- We recognize that the Energy sector world-wide is undergoing fundamental change called the “**Sustainable Energy Transition**” (SET) – GRDM “GDS 2020”.
- Our Spatial Development acknowledges that our **Economy is the Environment**. Therefore, any rehabilitation and restoration of the natural environment needs priority.

GRDM CONTEXT

We remain committed to working with all the stakeholders to realise the region's ambitious energy objectives of energy driven regional economy, energy driven job creation and energy driven livelihoods. *(State of the District Address GRDM Executive Mayor, 2019)*

- Our Regional Waste Management Facility will be a hub that will see activities viz:
 - i. Waste-to-Energy Facilities
 - ii. Producing Bio Gas to PetroSA.
 - iii. Producing steam to Industry.
 - iv. Producing electricity directly to the national grid.
 - v. Producing Hydrogen
 - vi. Recycling

PROPOSED FUTURE OF THE RWMF

- Waste to Energy Project
- Tyre Recycling Facility
- Liquid Petroleum Storage Facility
- Chemical Industry
- Recycling of Waste to Reusable Products
- Logistics

CONCLUSION

ONE DISTRICT PLAN – DDM

“a practical guide for how we share and shape our future together”

Our plan for building “One District” focuses on three priorities:

- Creating a new economy for the District that is growing and diversified;
- Ensuring that District residents are prepared for the jobs of the new economy;
- Improving the quality of life for all.

The future is in our hands, let's do this.

Thank you | Enkosi | Dankie

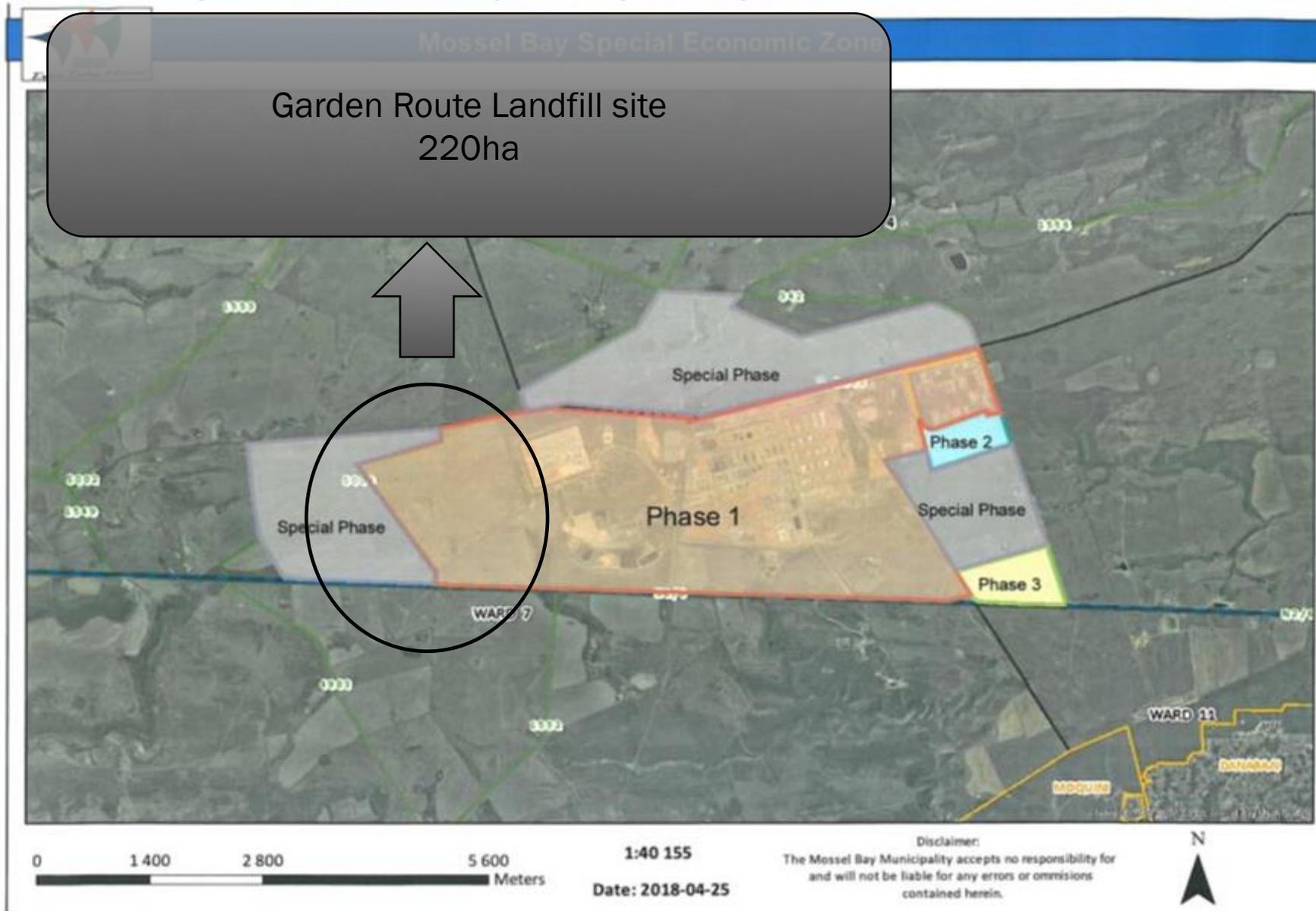




INDUSTRY EXPANSION: EXPLORING CLUSTER COOPERATION AND DEVELOPMENT

Paul Hoffman

WASTE BENEFICIATION ZONE

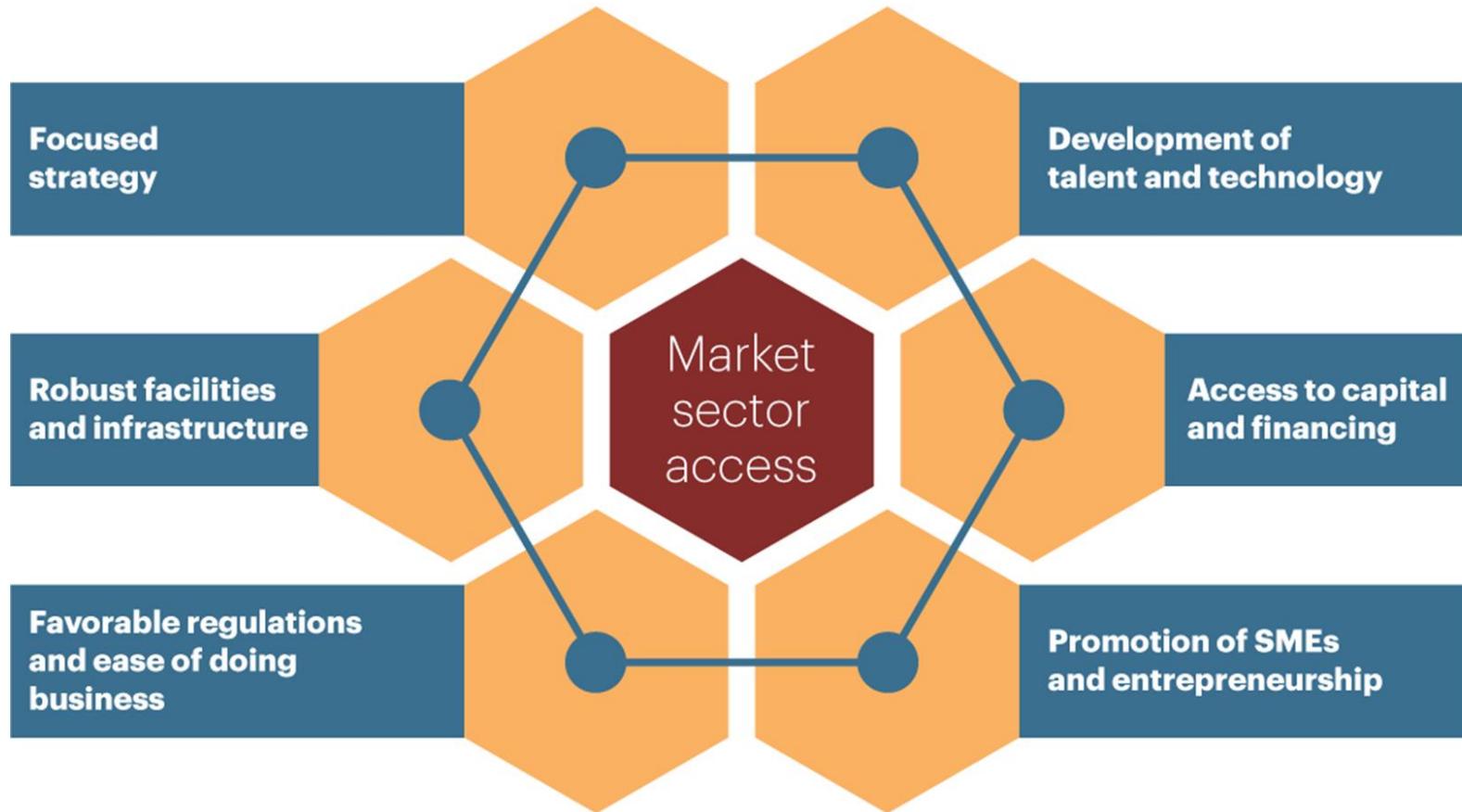


Next-generation economic clusters – Key Considerations

- These emerging economic clusters have jump-started industries and accelerated economic development in mature and developing markets worldwide.
- Globally, economic clusters (EC) are abundant in a variety of forms
 - special economic zone, industrial zone, free zone, economic city, and technology clusters
- Focus on sectors and parts of the value chain aligned with the long-term local or regional economic development agenda
- Orchestrate the right ecosystem to enable sector and value chain growth
- Create a sustainable link to the country, provincial and regional economy

Figure 1

Six ecosystem enablers facilitate access to local, regional, and global markets

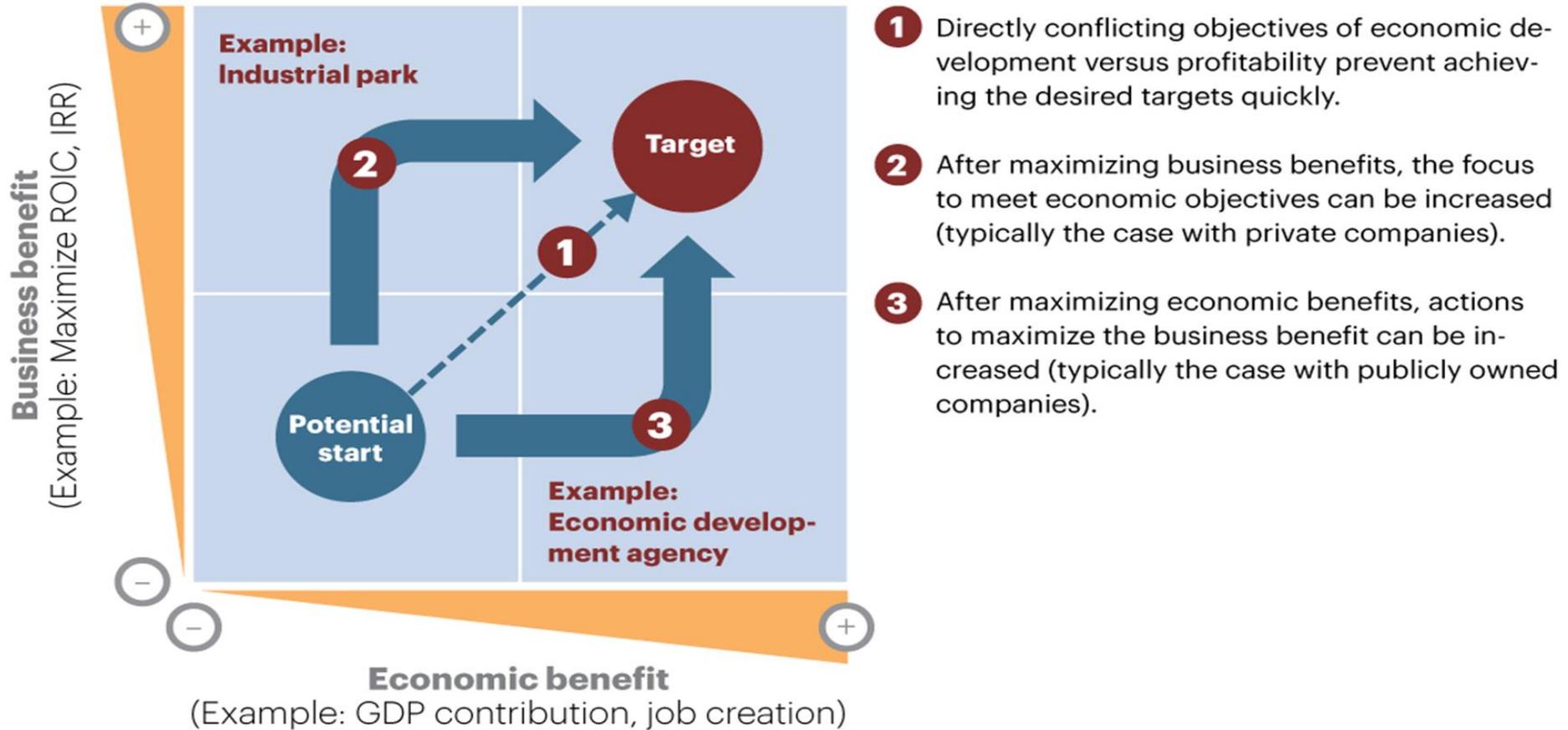


Note: SMEs are small and medium-sized enterprises.

Source: A.T. Kearney analysis

Figure 2

The most successful ECs have clear paths for gradual achievement of both economic and financial goals

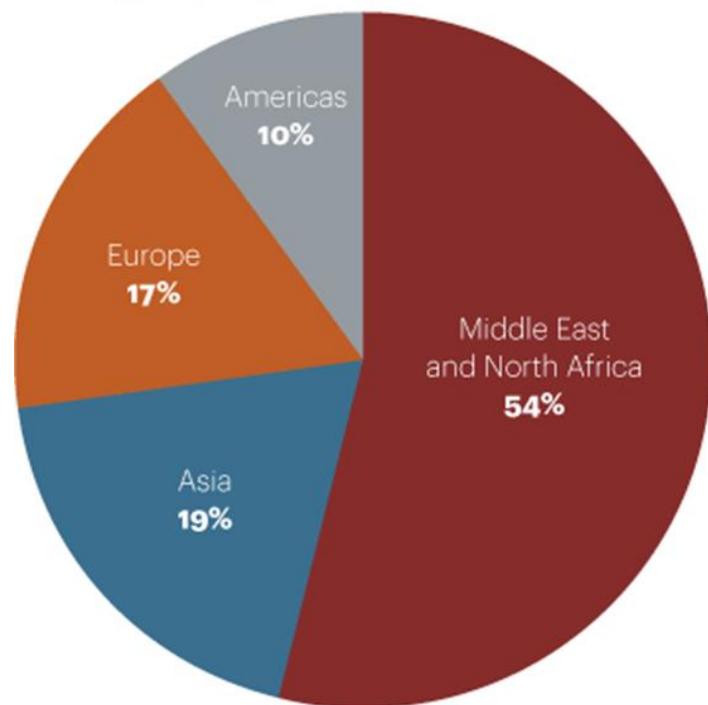


Source: A.T. Kearney analysis

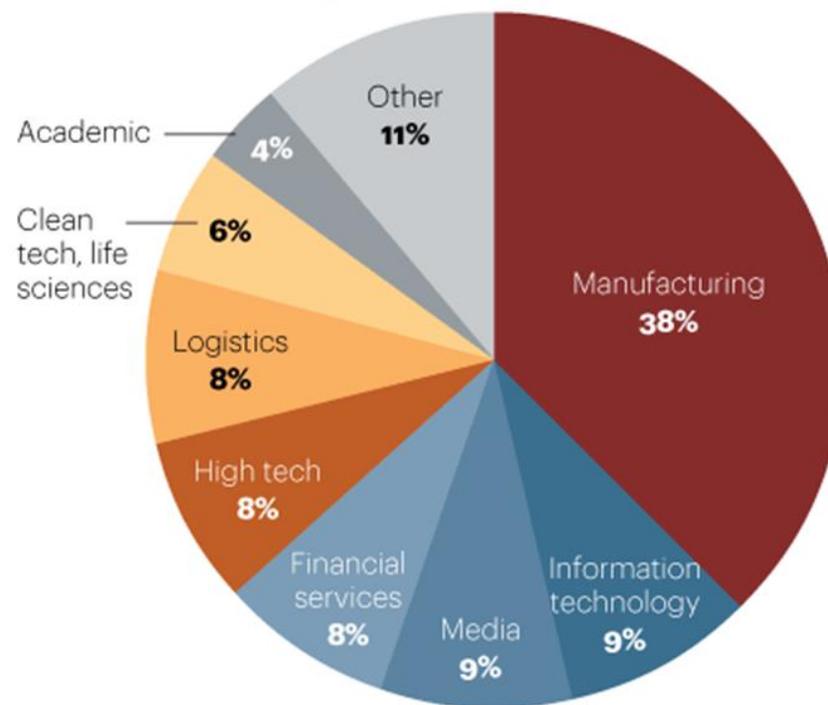
Figure 4

Geographic and industry spread of special economic clusters studied (% of sample)

Geography



Industry



Note: Sample does not represent market share distribution.

Source: A.T. Kearney analysis

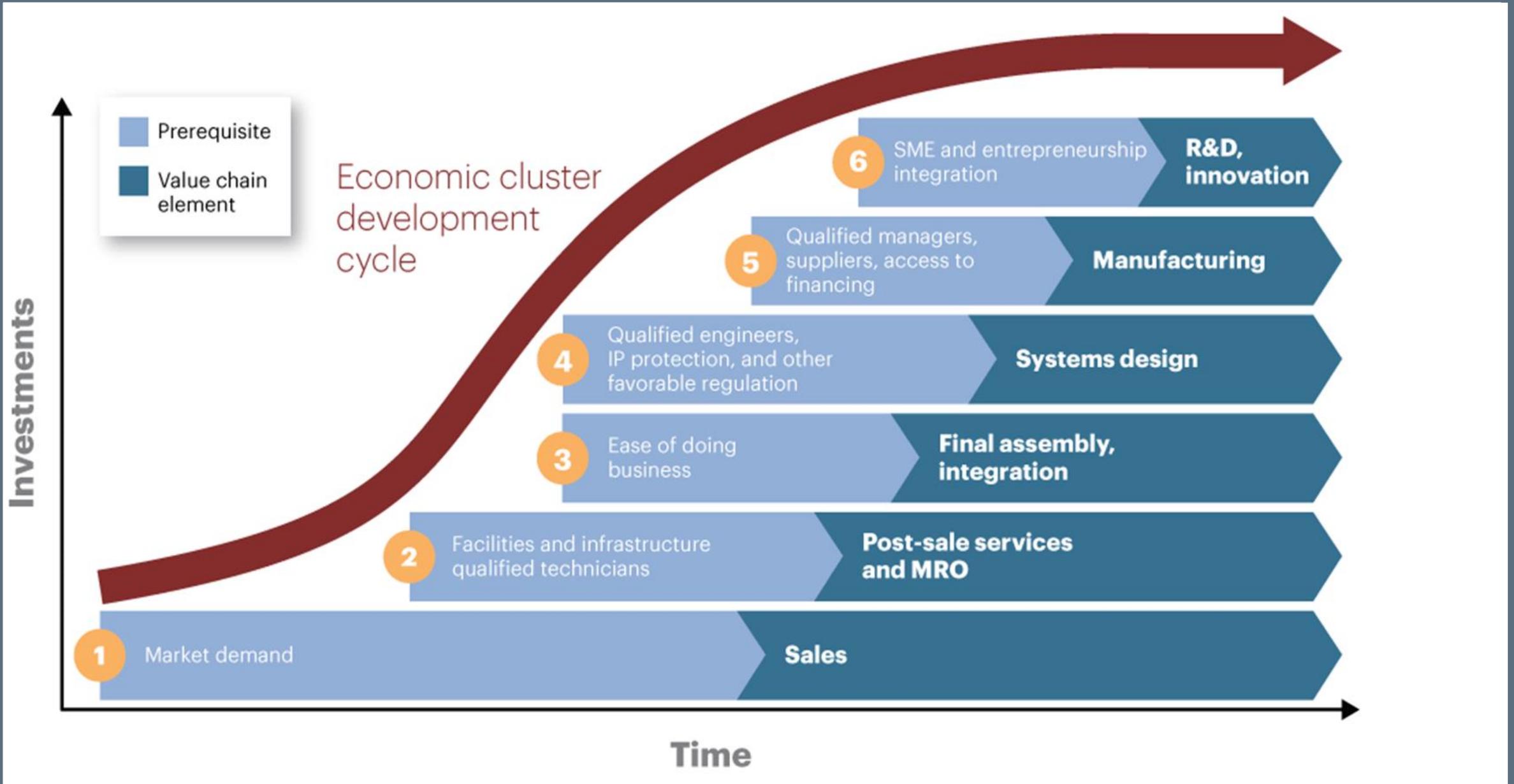
Ecosystem Enablers

Qualifying enablers

- Facilities and infrastructure
- Favourable regulations and ease of doing business

Differentiating enablers

- Focused sector strategy
- Access to capital and financing
- Co-investments
- Talent and technology development
- Entrepreneurship





Garden Route Specific Considerations

- Central logistics (warehousing and distribution)
- Central procurement and bulk buying
- Regional industry marketing
- Shared infrastructure
 - Access roads and rail connections
 - Sorting and re-distribution areas
 - Training and development

Next steps?

- Task team to investigate and work on cluster concept
- Engagement with stakeholders
- Creation of an industry body

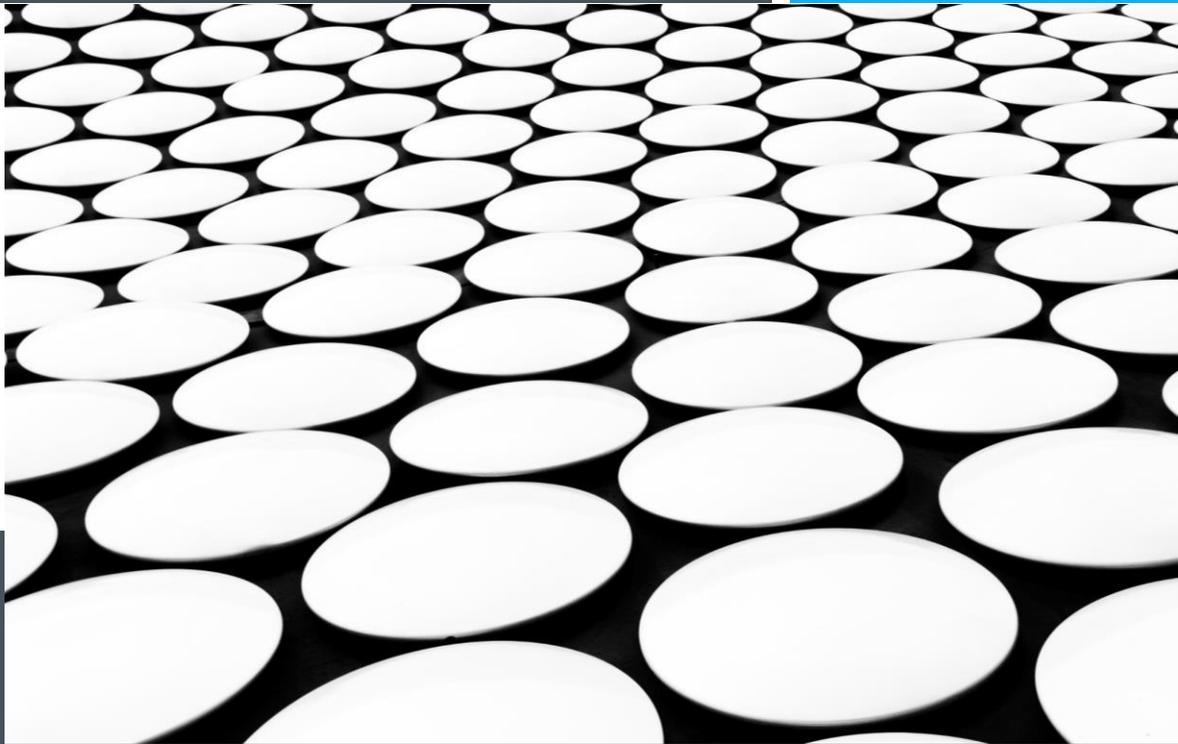
**THANK
YOU!**

Paul Hoffman
paul@wcedp.co.za



WESTERN CAPE
Economic
Development
Partnership





- Thabiso Manne
- Gareth Shaw
- Yaseen Salie
- Melanie Ludwig

WASTE & BIOMASS BENEFICIATION CONFERENCE THEME 3

MODERATOR: PAUL HOFFMAN

12 AUGUST 2021



PetroSA

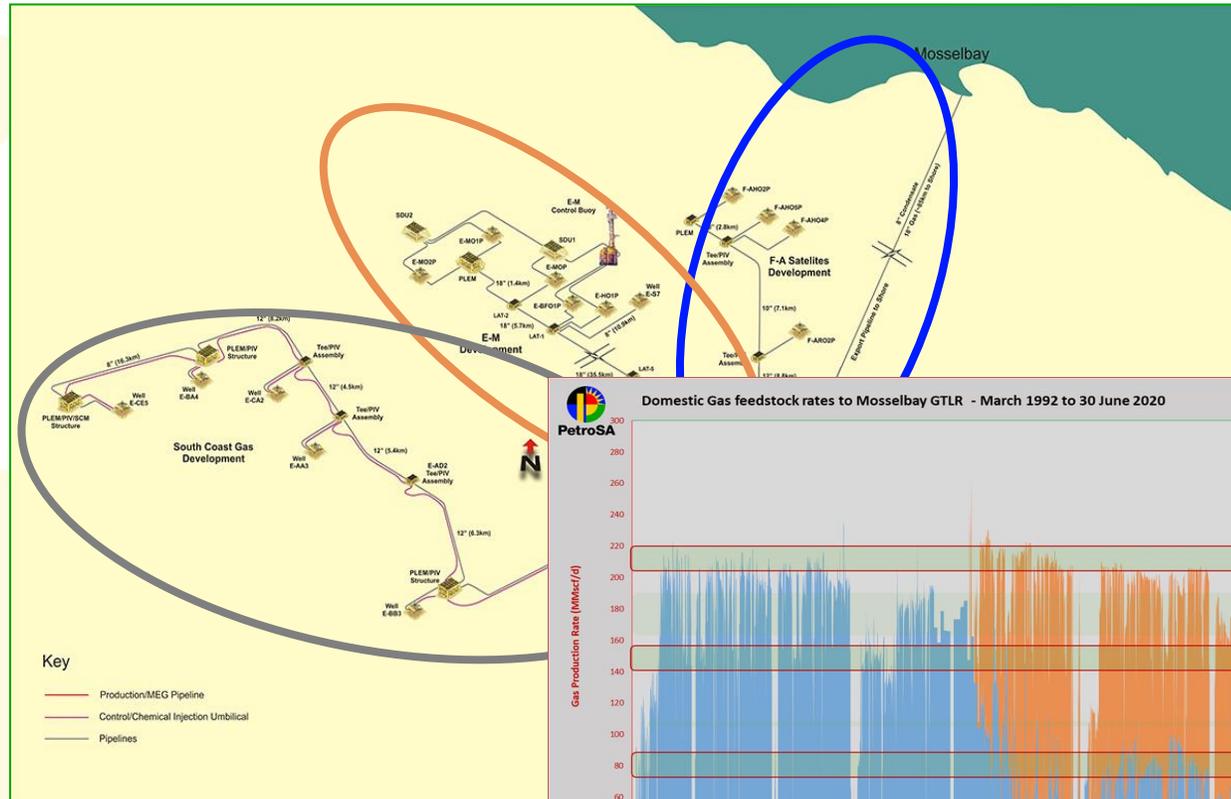
PetroSA Options

Waste and Biomass Beneficiation Conference
AUGUST 2021

PetroSA's GTL refinery.



Offshore Infrastructure development: 1992 to 2021

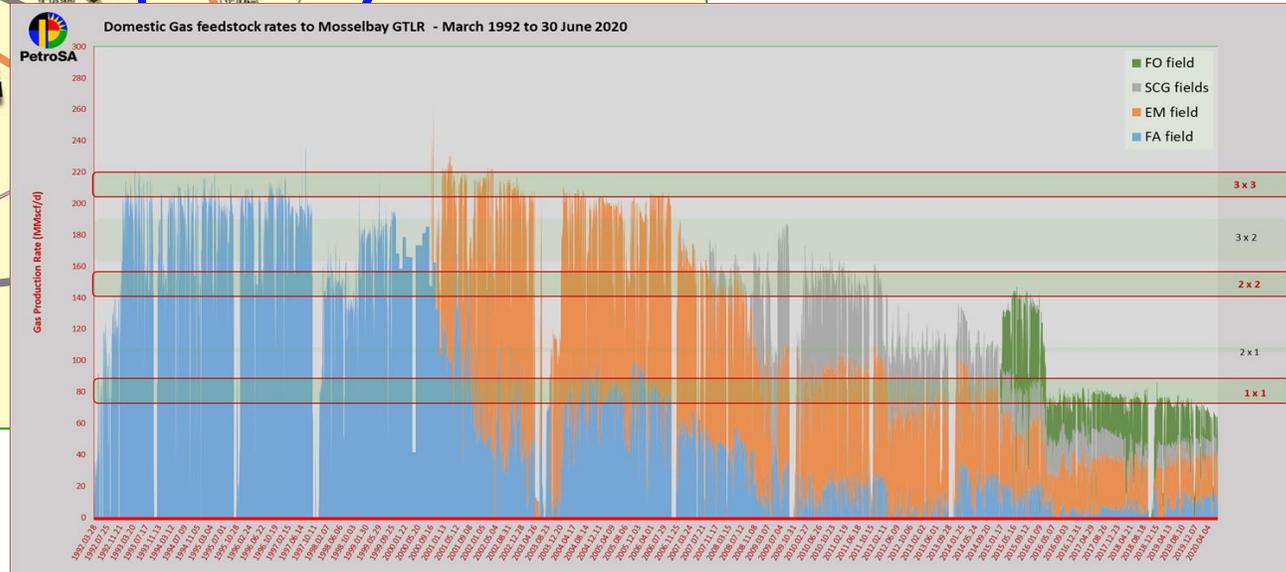


April 1992:
F-A field; Platform; Export line to Mossel Bay

September 2000
E-M fields; E-M buoy

September 2007
South Coast Gas fields

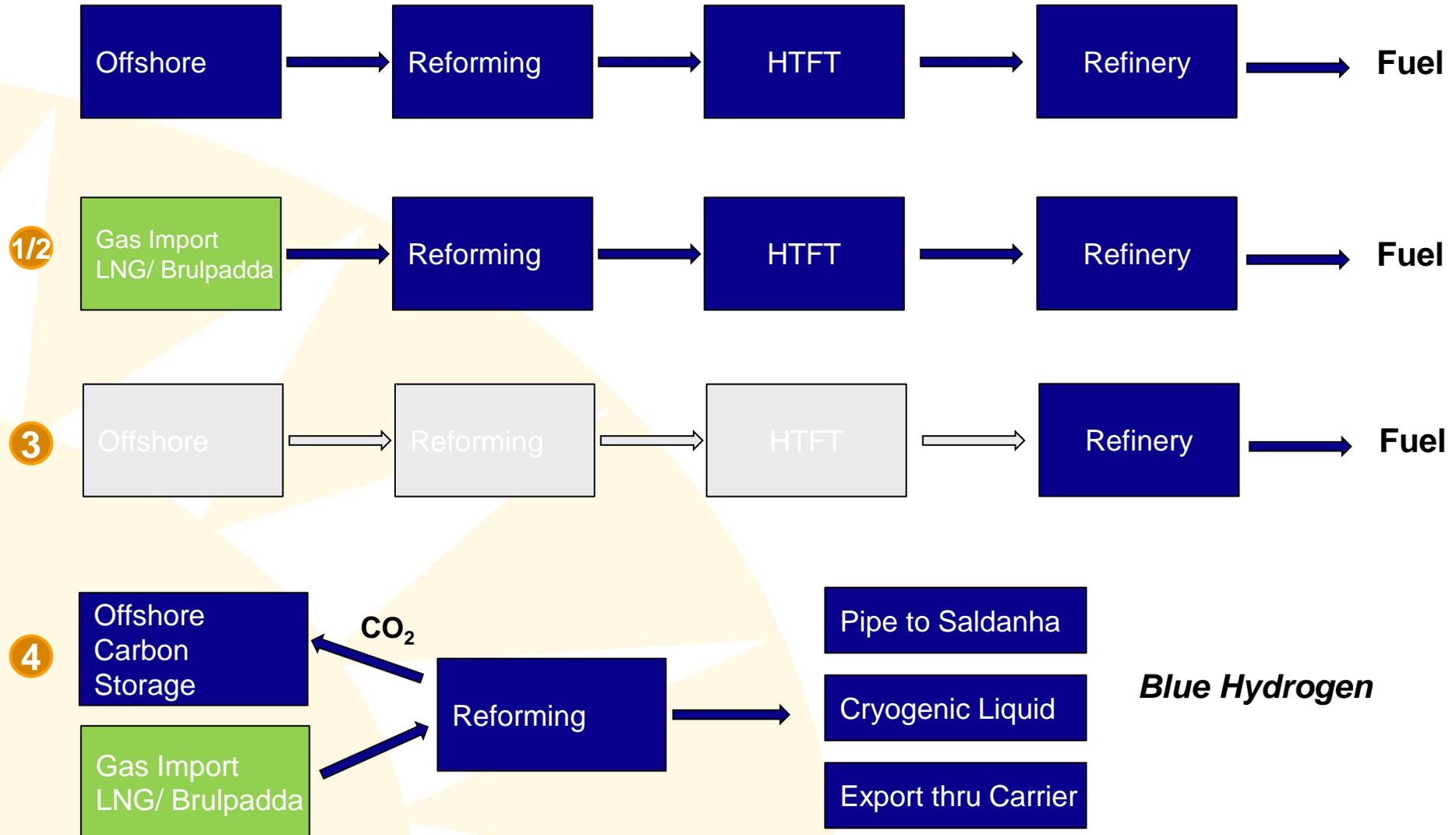
December 2014
F-O field



Potential Technical options

- 1 Import LNG feedstock from international suppliers
- 2 Indigenous Brulpadda/Luiperd feedstock supply
- 3 Convert to liquid refinery with imported feedstock
 - 46 000 barrels/day
 - 135 000 barrels/day
- 4 Convert to hydrogen production facility
- 5 Carbon capture and storage
- 6 Abandon onshore and offshore

Technical options



PetroSA GTL and Eskom Power Plant

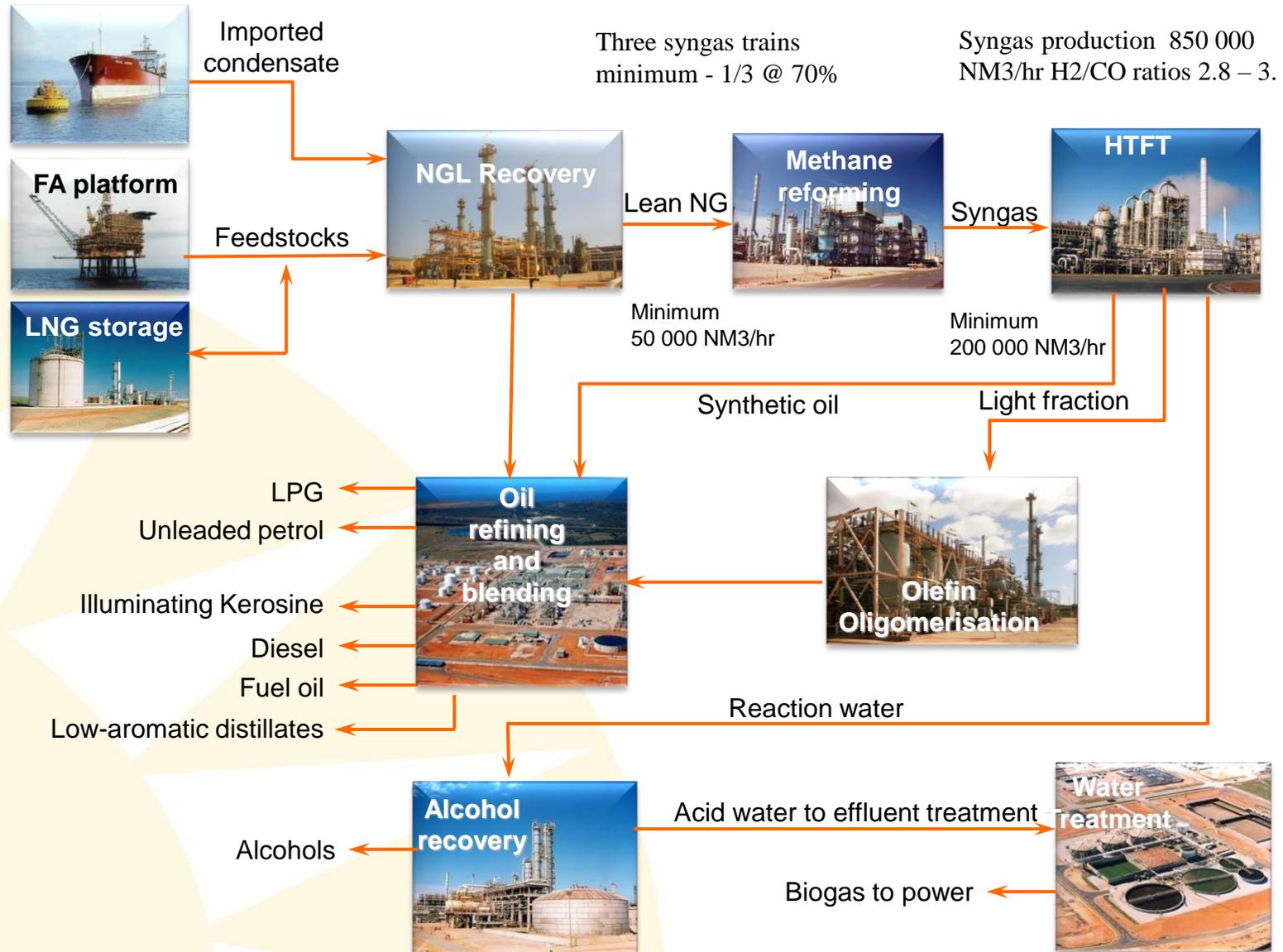


PetroSA GTL Plant



PetroSA GTL production

Natural gas design
200 000 NM3/hr



Biogas potential

- 1 Supply minimum biogas feedstock for synthetic fuel production
 - 50 000 N3/hr as Methane
 - 200 000 N3/hr as Syngas
- 2 Supply fuelgas for boiler operation after restart.
 - 1000 to 5000 Nm3/hr as Methane/Syngas
- 3 Supply of biogas for power production.
 - 600 to 1800 Nm3/hr as biogas



GreenCape

The IPP legislative impact
of the market potential
and opportunities

Yaseen Salie
Garden Route Waste and Biomass
Beneficiation Conference
12 August 2021



Who we are

How we work

Who we are

GreenCape is a non-profit organisation that drives the widespread adoption of economically viable green economy solutions.

We work with businesses, investors, academia and government to help unlock the **investment** and **employment** potential of green technologies and services, and to support a transition to a resilient **green economy**.

GreenCape was established in 2010 to support the development of the green economy in the region.



Vision

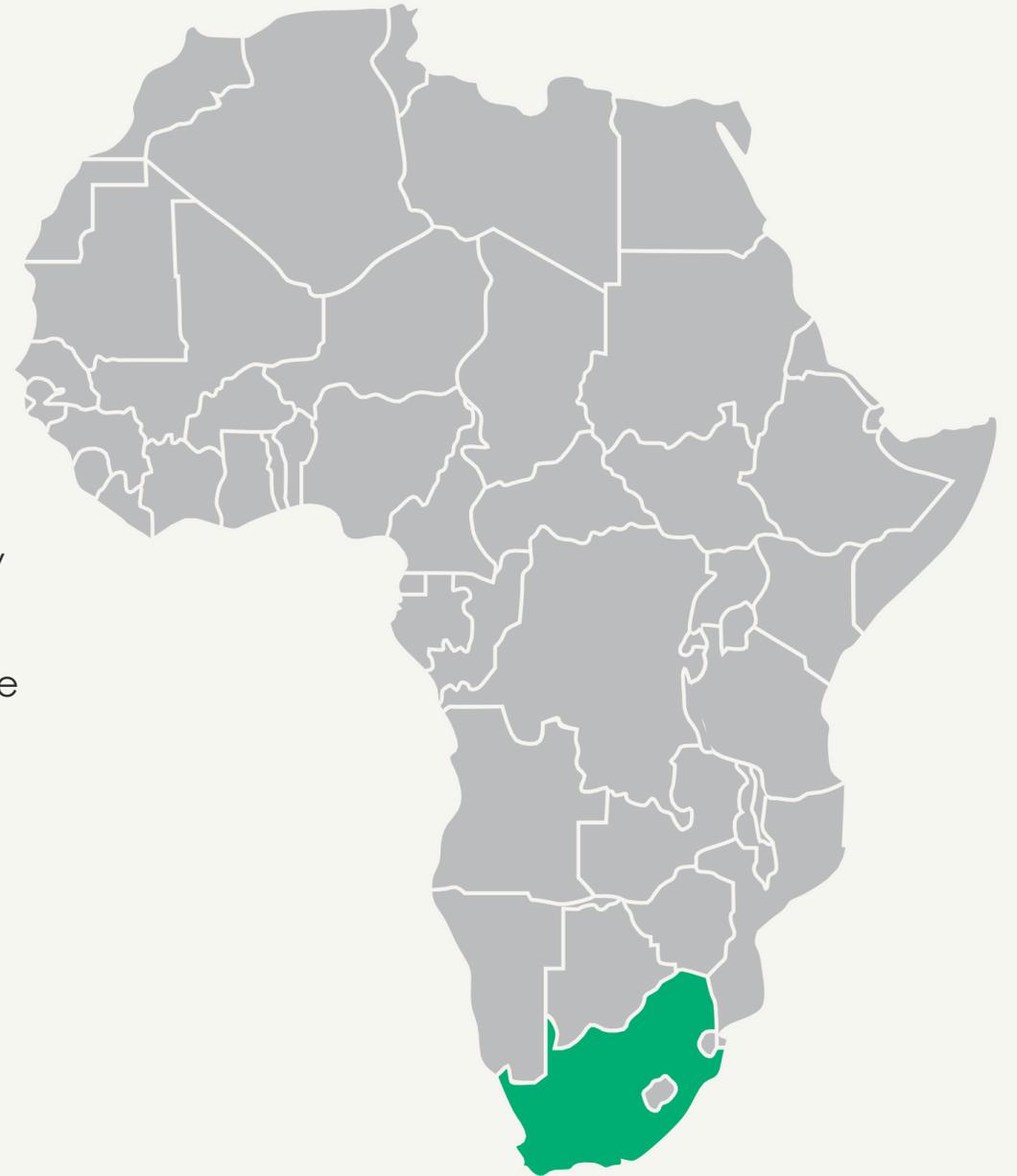
GreenCape's vision is a thriving prosperous Africa mobilised by the green economy.

Mission

We work at the interface between business, government and academia in order to identify and remove barriers to economically viable green economy infrastructure solutions in developing countries, thereby catalysing their replicable and large-scale uptake to enable each country and its citizens to prosper.

Ambition

In the next 5 years, GreenCape aims to be globally relevant in driving the uptake of green economy infrastructure solutions in the developing world context.





How we work



The range of work crosses a wide variety of **sectors** and **outputs**

Internal

Client - Facing

←				→
Research examples:	Tools examples:	Stakeholder engagement examples:	Front-line activity examples:	
<ul style="list-style-type: none"> • Field data through key relationships, site visits and networking • Market Intelligence Reports • Industry updates • Drought Support Page 	<ul style="list-style-type: none"> • Green-Agri Portal • Decision-making tools e.g. waste, non-revenue water • Regulatory and legislative advice e.g. tariff work • Green Business Support Services Directory 	<ul style="list-style-type: none"> • Networking events • Thought leadership presentations • Setting up cross-sectoral and triple helix meetings • Support for industry gatherings • South African Renewable Energy Masterplan 	<ul style="list-style-type: none"> • Western Cape Industrial Symbiosis Programme (WISP) • Alternative Service Delivery Unit • SA Plastics Pact • Green Outcomes Fund 	
				

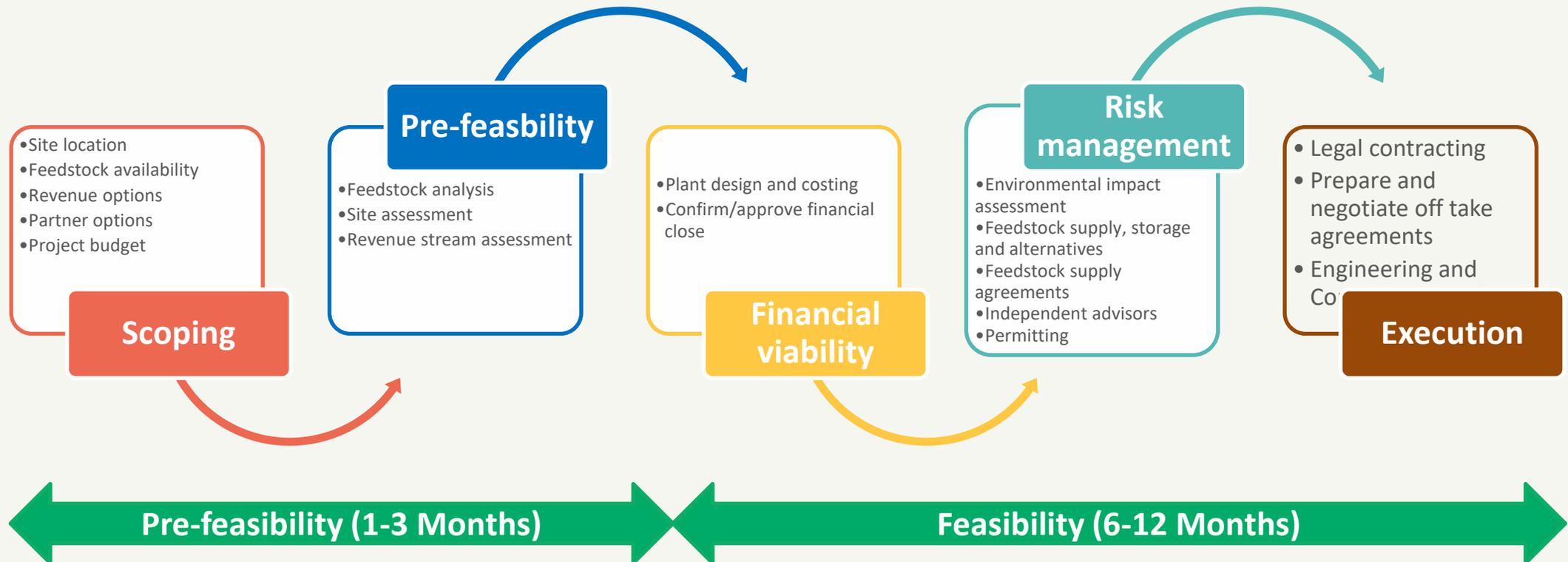
Bioenergy projects and biomass /waste beneficiation

National bioenergy market drivers

Key drivers for bioenergy uptake include

- **Legislative pressure** – Landfill bans for various waste streams
- **Waste disposal costs** – Increasing landfill gates fees as landfill still the primary disposal method of choice
- **Electricity price increases** – Eskom continues to struggle to meet the energy demand, electricity prices have consistently increased above inflation, with over a 300% increase since 2004.
- **Increased energy security** – As a result of on-going load shedding by Eskom
- **Lower carbon footprint** - Fossil fuel alternative and renewable energy electric generation

Waste-to-energy project development (thermal processes)



Bioenergy project – Legislative considerations

Products

- On-site usage
- **Third party usage (wheeling)** – Eskom, specific municipalities
- **Own generation / SSEG option** – up to 1 MW

By-products

- Disposal
- On-site usage
- Additional revenue stream



Feedstock

- National Environmental Management Act (NEMA) Act 107 of 1998 – Licensing, permits, etc
- Norms and Standards for organic waste treatment



Process / project

- National Environmental Management Act (NEMA) Act 107 of 1998 – Licensing, permits, etc.
- Planning permissions



Feedstock considerations

- **Biomass** – wood waste, invasive alien vegetation
- **Plastics** – non recycled, soiled
- **General waste** – high calorific value RDFs
- **Waste management license**
 - National Environmental Management Waste Act (NEM:WA),
 - Listed activities with thresholds which determine if authorisation is required
 - Norms and standards for organic waste treatment



Process / project – Legislative considerations

- **Thermal processes** – Pyrolysis, gasification, incineration, etc.
- **Licensing and permits**
 - National Environmental Management: Air Quality Act (NEM:AQA) – Atmospheric Emissions
 - National Environmental Management: Biodiversity Act (NEM:BA) - Permit
 - National Environmental Management: Protected Areas Act (NEM:PAA) – Environmental Authorisation
- **Local authorisation** – Municipal planning laws, Building regulations, Engineering and design, Site and zoning approvals, Fire and safety approvals, Environmental and waste approvals, Installation and commissioning approvals, Operational and trading approvals, Recertification and periodic inspections



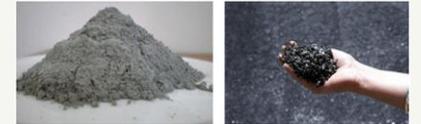
Products – Legislative considerations

- **Products** – Electricity generation, fuel (oils, coal, etc.)
- **Usage** – On-site only, Third party, combination of own usage and third party/SSEG
- **Own usage**
 - > 1MW generation license required
 - Wording on “up to 100 MW” expected to be released 13 August 2021
- **Third party**
 - Within municipality – simple
 - Across municipalities – more complex
 - Wheeling – Municipality dependent (e.g. George municipality have released draft wheeling framework)
 - SSEG – Status of SSEG in RSA municipalities, November 2020
 - NRS097-2-3 and NRS097-2-1 specifications (based on the Grid Code, NRS048 etc) – These are the two key SSEG standards to follow to ensure compliance.



By-products – Legislative considerations

- **Disposal**
- **Re-use**
- **Additional revenue option**



Additional GreenCape resources

- Market intelligence reports (MIRs) – <https://www.greencape.co.za/market-intelligence/>
- Waste-to-Energy industry brief – <https://www.greencape.co.za/content/industry-brief-waste-to-energy-is-it-viable-for-your-business/>
- Digital Global Biogas Cooperation (DiBiCoo) Web seminar 10: Thermal Gasification of Wooden Biomass – <https://dibicoo.org/?p=2473>



AVAILABLE NOW! 2021 MARKET INTELLIGENCE REPORTS



Thank you.

info@green-cape.co.za

www.greencape.co.za

Food waste: Separation, Transport and Processing

Melanie Ludwig



Organics Recycling
Association of South Africa

What can be Defined as Food Waste?

- Fruit and Vegetable Peelings
- Tea Bags and Coffee Grounds
- Meat Trimmings and Bones
- Bread and Cake Waste
- Dairy Waste (milk, cheese etc)
- Egg shells
- Sea food and shells

Wasting Food

- **No point increasing recycling percentages if more waste overall**
- We each waste approximately 110kg of food per year
- Incorrect storage, packaging, portion size and poor planning
- www.lovefoodhatewaste.com
- Waste Free Kitchen Handbook by Dana Gunders
- **A real effort should be made to distribute excess food to the thousands of hungry people in Cape Town – Food Bank.**

Why should we be concerned about Food Waste?

- +- 50% of hotels/restaurants waste is food waste
- 30%-40% of office block waste is food waste
- Produces methane and leachate in landfills
- Contains valuable nutrients that should not be lost
- Contaminates dry recycling waste streams

City of Cape Town- Smart Living Handbook



Source Separation of Food Waste



WHAT GOES IN THE BLUE BIN?

Recycling tips

- If it's not listed under **Yes**, it doesn't go in the Blue Bin.
- Rinse containers to remove residue.
- Put items in the Blue Bin **loose and not bagged** (except for plastic bags and shredded paper).
- Remove plastic covers and over-wrap from newspapers, flyers, magazines, catalogues and pop/water cases. Put plastic covers and over-wrap in garbage.

If you don't recycle properly, we can't either. If in doubt, use the WASTE WIZARD or call 311.



RECYCLING - YES ✓

Beverage and food containers

Rinse clean and recycle

- Plastic bottles, jugs (lids screwed on tight)
- Milk/juice cartons and boxes (put straws in garbage)
- Glass bottles and jars (put lids in garbage)
- Aluminum cans
- Plastic food jars, tubs and lids
- Metal cans (place lid inside can and pinch closed)
- Cardboard cans (e.g. frozen juice, milk, granola cereal, chips, nuts, powdered drink mix - put plastic pull-out straws in garbage; place metal ends inside cardboard can and pinch closed)
- Aluminum trays, burner liners, pie plates and roasting pans



Home and personal product containers

Rinse clean and recycle

- Plastic bottles (lids and sprayers screwed on tight)
- Plastic kitty litter tubs with plastic handles
- Plastic laundry detergent tubs and lids
- Aerosol cans (empty, put caps in garbage)
- Metal paint cans (empty; separate lids from cans)



Foam polystyrene and plastic retail shopping bags

Rinse clean and recycle

- Foam food and protective packaging (e.g. drinking cups, egg cartons, meat trays, take-out food containers, electronics packaging)
- Plastic grocery and retail shopping bags **without drawstrings, metal detailing or hard plastic handles** (remove receipts, place all plastic bags in one retail or grocery plastic bag and tie handles together)



Paper

Not contaminated with food or chemicals

- Bags, rolls, junk mail, writing/computer paper, envelopes, window envelopes
- Shredded paper (put in clear plastic bag and tie closed)
- Gift wrap, cards (no ribbons, bows, foil wrap)
- Newspapers, flyers, telephone directories, magazines, catalogues, soft/hardcover books (remove plastic covers, liners, overwrap and put in garbage)
- Boxboard boxes (e.g. cereal, tissue, detergent, egg cartons - flatten; remove liners, plastic windows and put in garbage)
- Corrugated cardboard (clean, unwaxed, flattened; pizza boxes must be empty, remove plastic overwrap from pop/water cases and put in garbage)



toronto.ca/recycle

Call 311

WHAT GOES IN THE GREEN BIN?

YES ✓

- Fruits, vegetables
- Meat, poultry, fish products
- Pasta, bread, cereals, rice
- Dairy products, eggs and shells
- Coffee grounds/filters, tea bags
- Cake, cookies, candy
- Diapers, sanitary products
- Animal waste, bedding, cat litter
- House plants, including soil
- Paper - soiled
 - Food packaging, ice cream containers, popcorn, flour and sugar bags
 - Tissues, napkins, paper towels (not soiled with chemicals such as cleaning products)



Green Bin tips

- Do not use biodegradable bags.
- Twist or loosely tie the plastic bag (no twist ties).
- Take food items out of their plastic bags/wrap; too much plastic causes problems.

NO X

Packaging

- Plastic or foil bags/wrap/trays
- Outer packaging
- Foam polystyrene meat trays and liners
- Plastic food containers, glass jars, pop cans
- Hot drink cups, lids, sleeves

General garbage

- Dryer sheets, baby wipes, make-up pads, cotton tipped swabs, dental floss
- Hair, pet fur, feathers, wax, wood pieces, cigarette butts, wine corks, vacuum bags/contents, fireplace and BBQ ashes

Medical waste is garbage

- Cloth and plastic bandages, gauze, intravenous, catheter/colostomy bags and tubes, etc.

Curbside collection

- Line either your kitchen container or Green Bin. Do not line both.
- Use either a plastic bag or kraft paper bag to line either container.
- Excess material? Put non-food waste (e.g. tissues, diapers, animal waste) in a clear plastic bag beside your Green Bin.

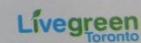
Multi-residential collection (if applicable)

- Line your kitchen container with a plastic bag.
- Take bag to your building's Green Bin.

Food item goes in Green Bin, wrap goes in garbage



metre dans la balle bleue: plastique en polyéthylène, sacs en plastique pour les emballages et de détail, les aérosols et pots de peinture vides.
 的東西可以放入藍箱內: 泡沫聚苯乙烯、塑料袋、空油漆罐和氣霧罐。
 polistirolo espanso, sacchetti di plastica per la spesa, le lattine di vernice e le lattine di aerosol vuote.
 wosunki: taczki przeciwno-ze styropianu (polistyrene), plastikowe reklamówki, papierowe torby firmowe, puste puszki po farbach i aerosolu.
 poliestireno de espuma, bolsas de plástico de supermercados y tiendas, latas vacías de pintura y aerosoles.



Source Separation starts in the Kitchen

- Source Separation of waste is the best way to recycle. Relies on separation where the waste is produced instead of trying to separate it out later
- Rather start with the food waste and then move onto other waste streams instead of the other way around
- Low cost sorting method which is easy to implement

Source Separation of Food Waste

Negative Perceptions

- The Yuck Factor
- Generates Odours
- Attracts Flies
- Requires daily collections
- Too much effort
- Extra bins required
- Costs

Benefits

- Can control odours with collection schedule, sawdust or bokashi
- Removes wet, organic waste before it contaminates other waste streams
- Increases total recycling percentages up to 90%
- Makes sorting of dry recycling easier and more hygienic for recycling staff

More Benefits of Separating Food Waste

- Clean wheelie bins
- Fewer flies and cockroaches in waste areas
- Save landfill space
- Prevent leachate and methane production in landfills
- Recover nutrients to enrich soils
- Extract Energy – Anaerobic Digestion
- Compost can be used for soil erosion prevention, land rehabilitation, grow food
- Cheaper over long term than landfilling

Pre-Consumer waste



Post- consumer waste



Food waste contamination



Contamination

- Plastic: Breaks down in the sun, becoming very brittle and breaks into very small pieces
- Glass: Broken pieces are a hazard in the final product
- Metal: Small pieces of metal eg jar lids will rust and are a hazard

Compost Quality



Nitrogen 1,29%
Phosphorus 0,28%
Potassium 0,19%

Mixed Solid Waste Composted



Packaged food waste

- Generated by Retailers
- Fridge Failure
- Expired food still in packaging
- Must be removed before processing
- Packaging removed manually or shredding machines used



Scott Turbo Separator



Transporting Food Waste



Transportation of Food Waste

- Food Waste 80% water: Heavy and Wet
- Plastic Bags not strong enough, tear and become contaminated
- Compostable bags – expensive, sometimes difficult to compost, cause litter, not readily available in South Africa
- Use bins to transport with swap bins – no bin liners. Bins are washed and swapped.
- Bins emptied into sealed vehicle and washed by waste producer
- Costly, difficult to compete with municipal compactor trucks

Collect and Transport - Bins



Types of Vehicles



Processing Food Waste



Many Different Methods

- Composting – Open Windrow Composting (passive or forced aeration)
In-Vessel Composting
Bokashi Fermentation
- Vermicomposting - Earthworms
- Anaerobic Digestion
- Black Soldier Flies

- On-site or Off-site

Economics of Processing Food Waste

- High Capital Cost/High Tech/Low volume of waste = High Value Product. eg. Anaerobic Digestion = Electricity
- Low Capital Cost/Low Tech/High volume of waste = Low Value Product eg. Open Passive Aeration Composting = Compost
- Aim is to be more economical than landfill ie site closer than landfill, save on transport costs
- Gate fee: Processor accepts liability for the waste

Challenges



Persuading Waste Producers to Recycle Food Waste

- Just not important!
- Too much effort
- Costly
- Limited landfill space – will be a WASTE CRISIS soon!

Legislation

- Site specific composting permit now changing to norms and standards
- No hazardous organic waste can be composted under norms and standards
- Positive: Protection against attempts to close facilities down
- Organic Waste Landfill Ban – 50% by 2022 and 100% by 2027

Potential Sites to Process Food Waste?

- NOT IN MY BACK YARD! Neighbour objections/perceptions sometimes difficult to find suitable locations
- Close to waste producers to minimise transport costs
- Depending on technology a large amount of space is required
- Odour control
- Zoning

Radnor and Bellville Composting Facilities



Kraaifontein Transfer Station



Composting in New York City



NYC – Composting Equipment



Organics Recycling Councils and Conferences



Conclusion

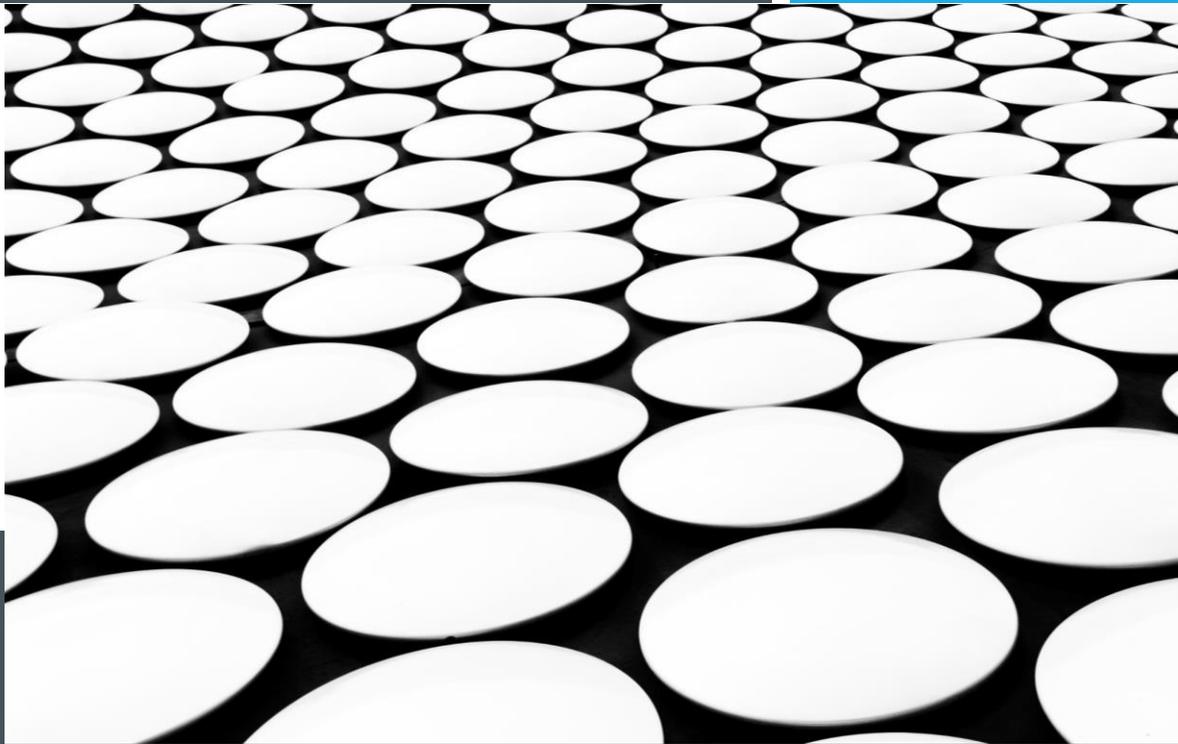
- Food Waste Separation takes effort and care but is possible
- Contamination must be controlled to make sure that the recycling loop can be closed
- Vital nutrients and energy can be recovered from food waste – composting, anaerobic digestion.
- Food Waste produces methane and leachate and should not be landfilled

Thank You
Any Questions?

info@orasa.org.za
Melanie Ludwig
083 696 5138



Organics Recycling
Association of South Africa



- Tjasa Bole-Rentel
- Ivan Vera Concha
- Glenn Moncrieff
 - Julia Glenday
 - Masithandaze Falitenjwa

WASTE & BIOMASS BENEFICIATION CONFERENCE THEME 4

MODERATOR: JOHN WILSON

12 AUGUST 2021



**WWF-SA AND RSB
WORKING TOGETHER
TOWARDS SUSTAINABLE
SOLUTIONS IN
AVIATION BIOFUELS**



RSB
Roundtable on
Sustainable Biomaterials
www.rsb.org

Alternative energy crops to ensure sustainability

**Garden Route Waste and Biomass
Beneficiation Conference, MS Teams
12/08/2021**

Tjaša Bole-Rentel (WWF-SA)
Based on work conducted by
Dr Günther Fisher and
Dr Sylvia Tramberend (IIASA)



OVERVIEW

01 INTRODUCTION

02 METHODOLOGY

03 RESULTS

04 MAIN MESSAGES

Underpinning study



- Continental-scale study -> coarse resolution (approximately 9x9 km)
- Systems view of energy crop production in the food-water-energy nexus
- 1st step: estimate land available for production of energy crops
- 2nd step: optimize energy/ha by assuming production of most productive plant under specific agro-ecological conditions

Land Resources & Agro-ecological Zoning

- **FAO and IIASA** have developed a **spatial analysis system** that enables **rational land-use planning** on the basis of an inventory of land resources and evaluation of biophysical limitations and production potentials of land.
- The **AEZ methodology** follows an environmental approach; it provides a **standardized framework** for analyzing synergies and trade-offs of **alternative uses of agro-resources** (land, water, technology) for producing food and energy, while **preserving environmental quality**.
- The AEZ analysis provides knowledge about current and future **production potentials** of land, helps identify **land and water limitations** and provides insight into current **yield and production gaps** and their causes.



The RSB Principles



1.

Legality



2.

Planning, monitoring & Continuous Improvement



3.

Biofuels must deliver min 60% GHG saving after all LC + dLUC emissions are considered



4.

Human & Labour Rights



5.

Rural and Social Development



6.

Cropland reserved for food production (now & in the future) & reserve sufficient grazing land for ruminant livestock



7.

No deforestation for biofuel feedstock production Safeguard protected areas -> Exclusion Layer ENVIRONMENT



8.

Exclude slopes Do not extract residues above a rate that preserves sufficient soil organic matter content



9.

No irrigated biofuel feedstock production Exclusion of strategic water source areas



10.

Air Quality



11.

Use of Technology, Inputs & Management of Waste

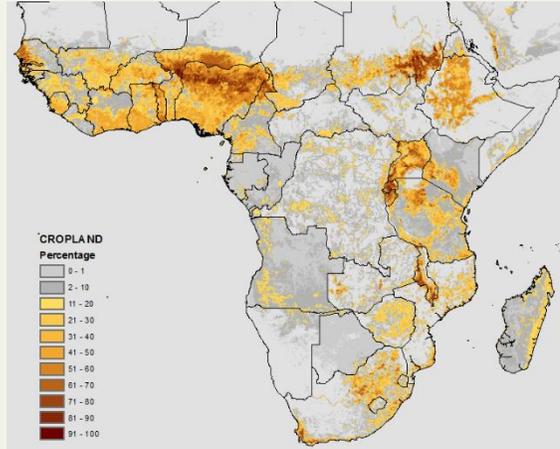


12.

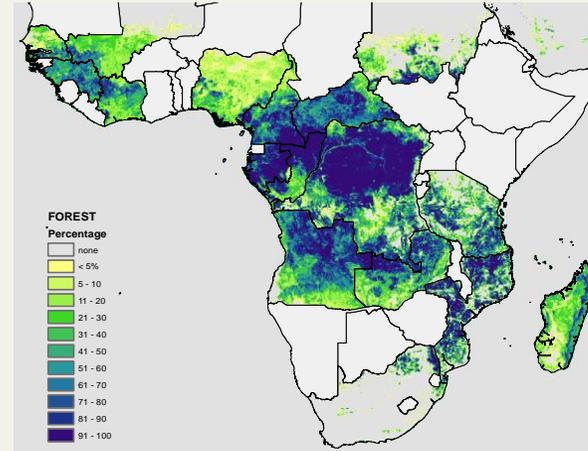
Land Rights

Exclusion layers: Forest, Cropland, Grazing Land, Environment

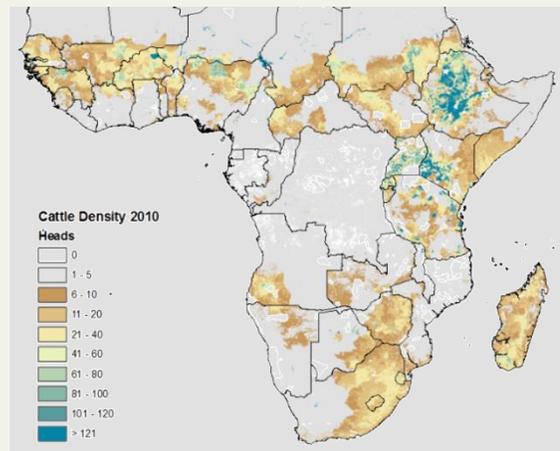
CROPLAND



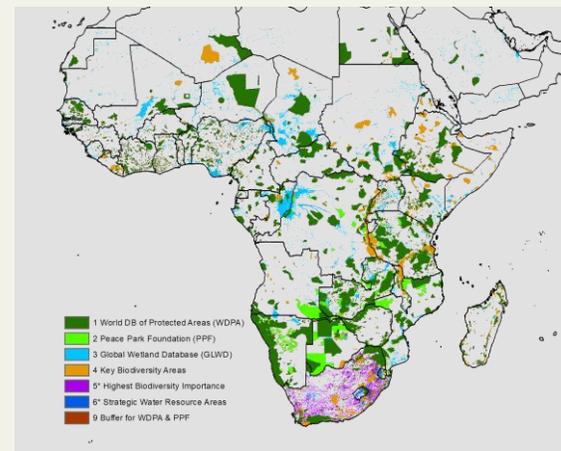
FOREST



GRAZING LAND



ADDITIONAL PROTECTED AREAS



Biofuel feedstock selection

1st generation biofuel production chains

BIODIESEL

- Solaris
- Jatropha
- Oil palm
- Soybean
- Camelina

1st generation biofuel production chains

BIOETHANOL

- Sugarcane
- Maize (grain + stover)
- Sweet sorghum
- Cassava
- Triticale

2nd generation biofuel production chains

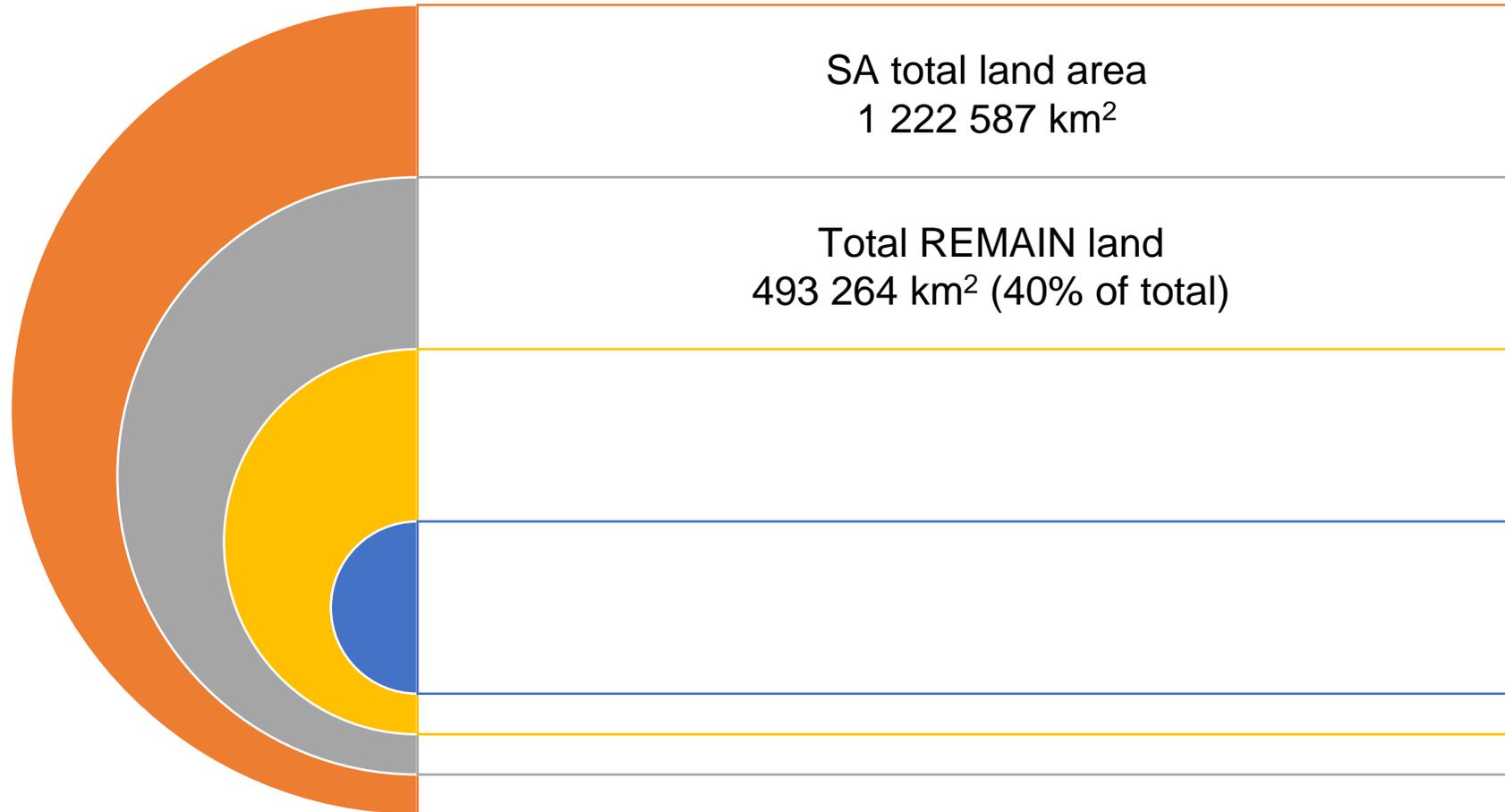
LIGNOCELLULOSIC ETHANOL

- Miscanthus
- Crop residues

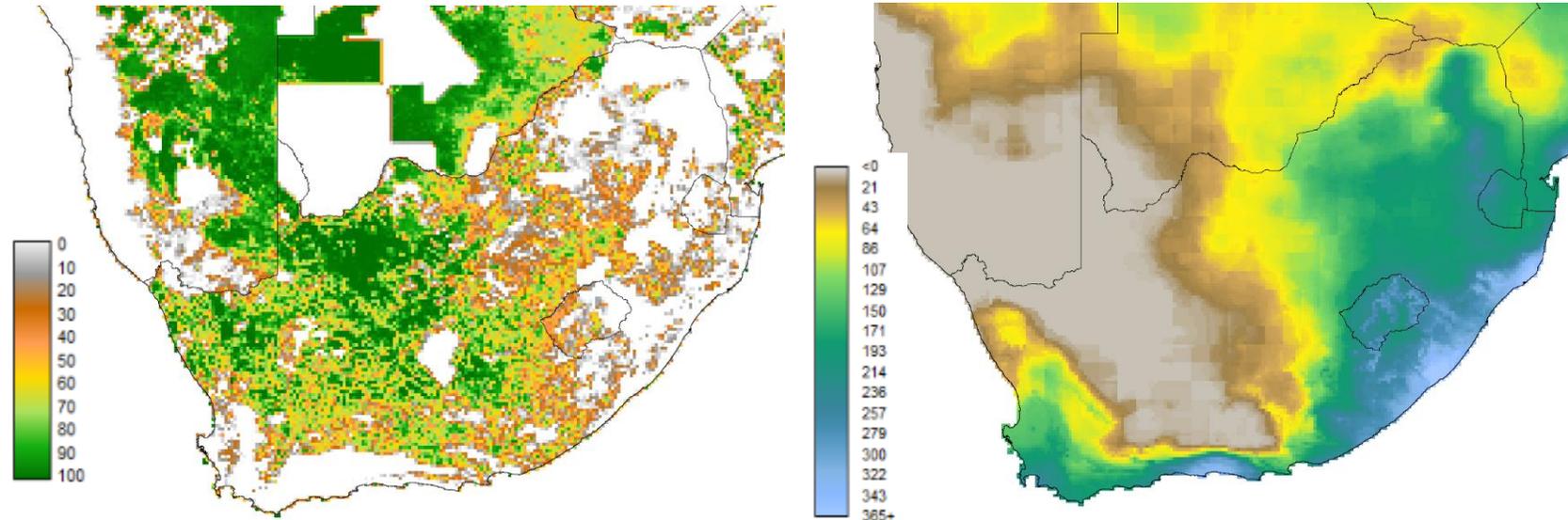
'UMBRELLA CROP'

- Selects the best biofuel feedstock in terms of biofuel energy output and thereby defines an upper technical potential.

Land area in South Africa that would support production of energy crops for RSB-compliant biofuel

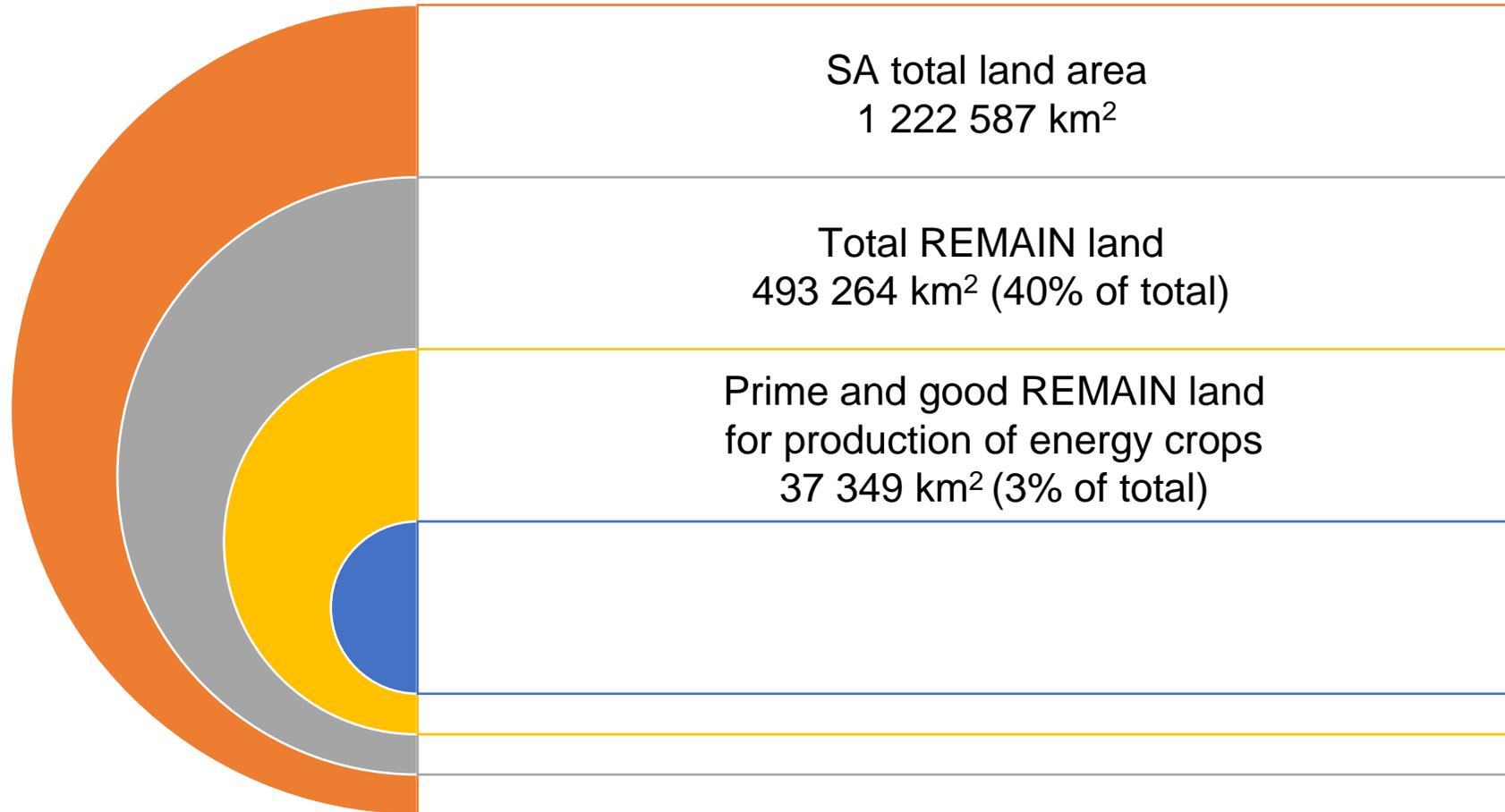


Intensity and spatial distribution of REMAIN land (%), and number of annual growing period days, in 2010



- **Only a relatively small fraction of REMAIN land can support economically viable energy crops production because of differences in prevailing agro-climatic, soil and terrain conditions**
- These areas are classified as very suitable (VS) (prime) or suitable (S) (good) for specific energy crop production (where 60–100% of potential yield will be achieved by rain-fed agriculture and advanced input/management regimes)
- Moderately suitable (MS) land where 40–60% of best yields can be achieved is often not economically viable for commercial production, but may become so with high agricultural commodity prices

Land area in South Africa that would support production of energy crops for RSB-compliant biofuel

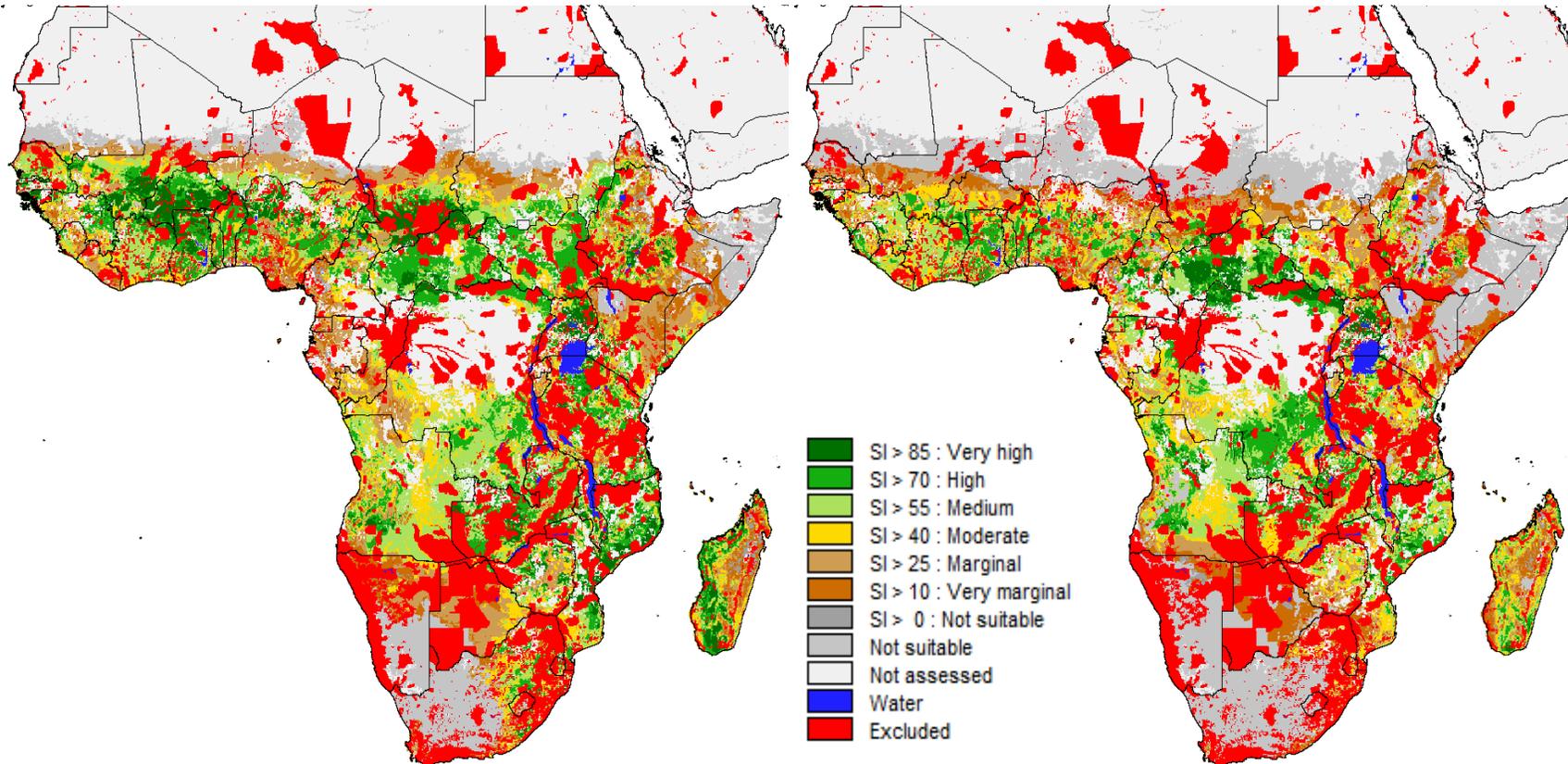


Agro-ecological suitability of rain-fed ethanol feedstock crops on REMAIN land

The maps shows for 'remaining' land the assessed agro-ecological suitability index (SI) of

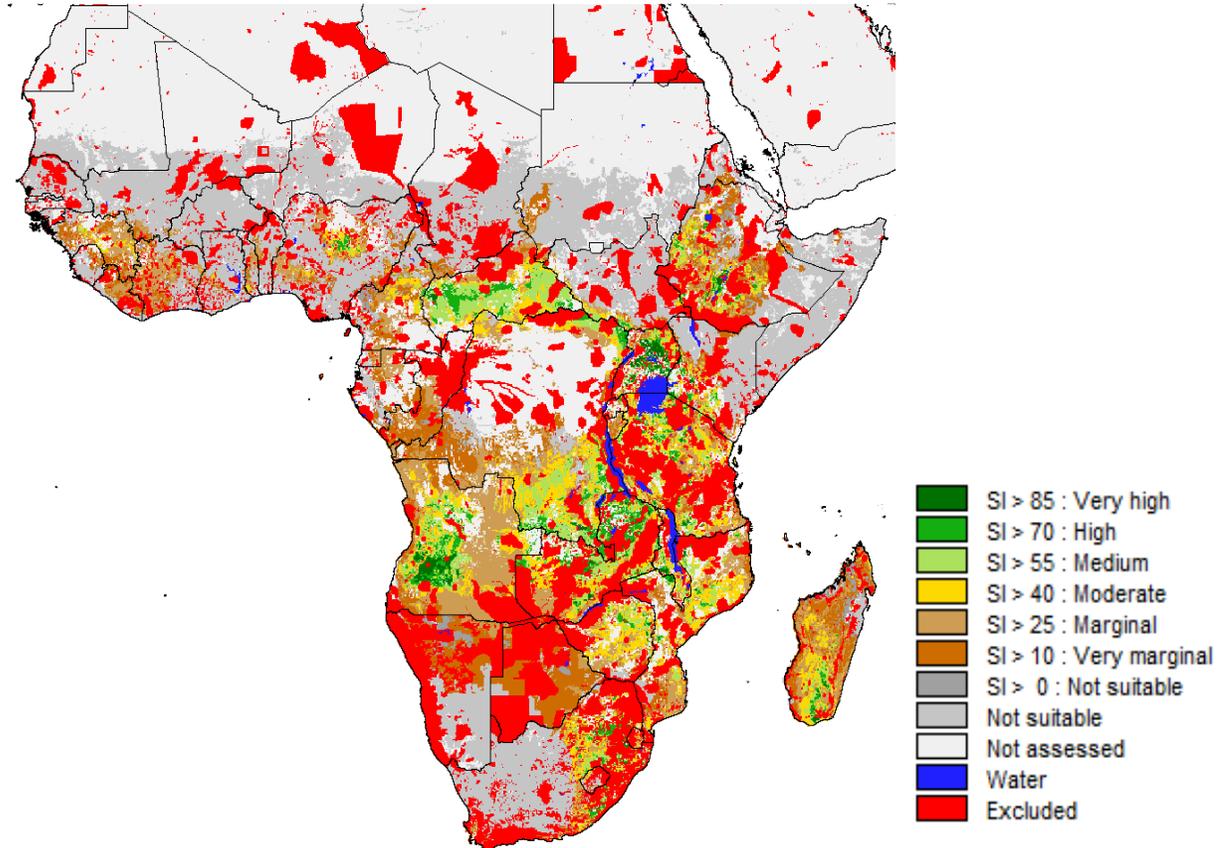
(c) rain-fed sweet sorghum

(d) rain-fed cassava



Agro-ecological suitability of rain-fed oilseed crops on REMAIN land

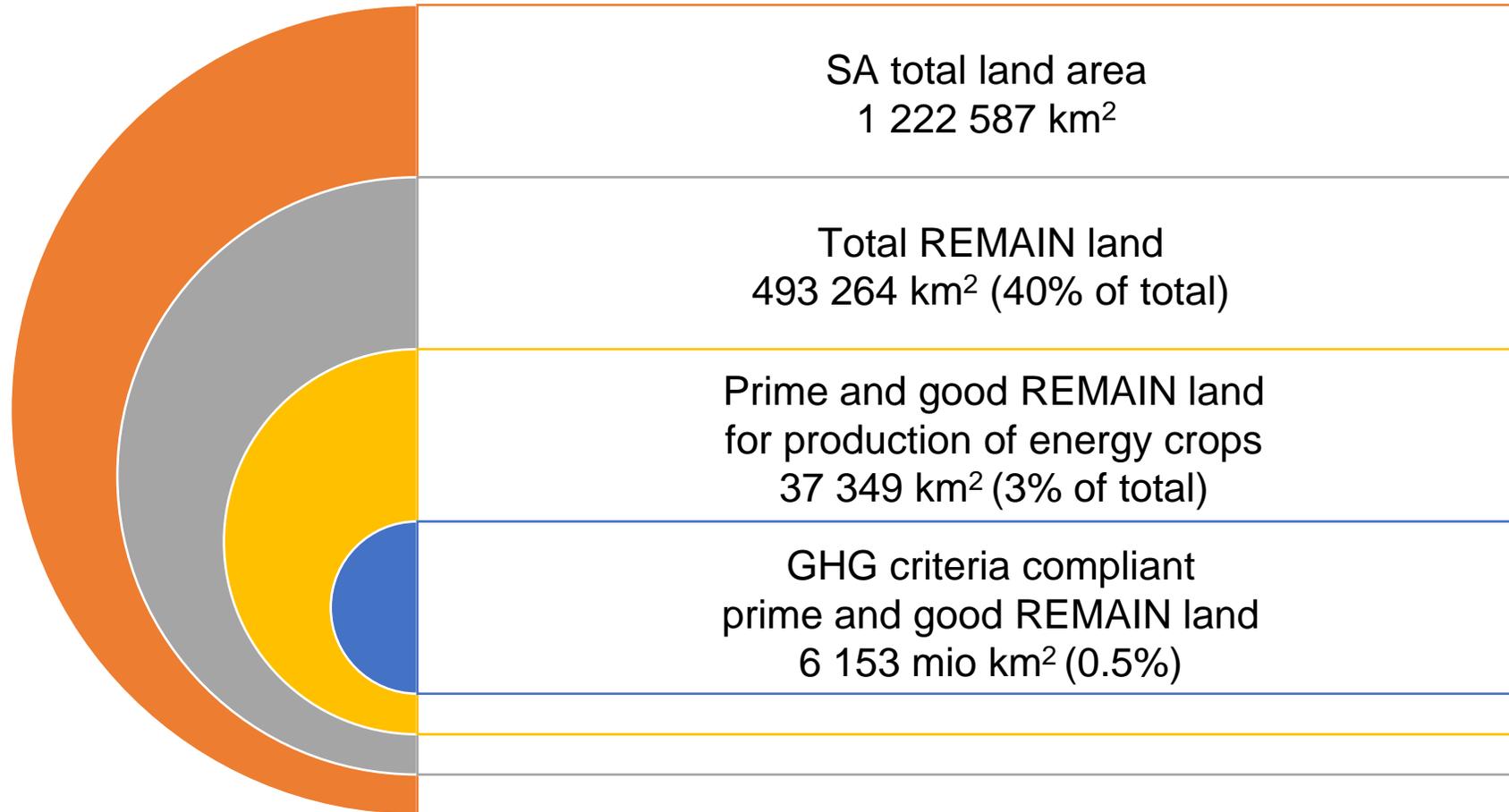
The maps shows for 'remaining' land the assessed agro-ecological suitability index (SI) of Solaris



Adding the GHG restrictions

- Biofuels must deliver min 60% GHG saving after all LC + dLUC emissions are considered
- dLUC: soil carbon & above and below ground biomass
- Indirect land-use change
- Allocation of GHG burden to multi-product crops

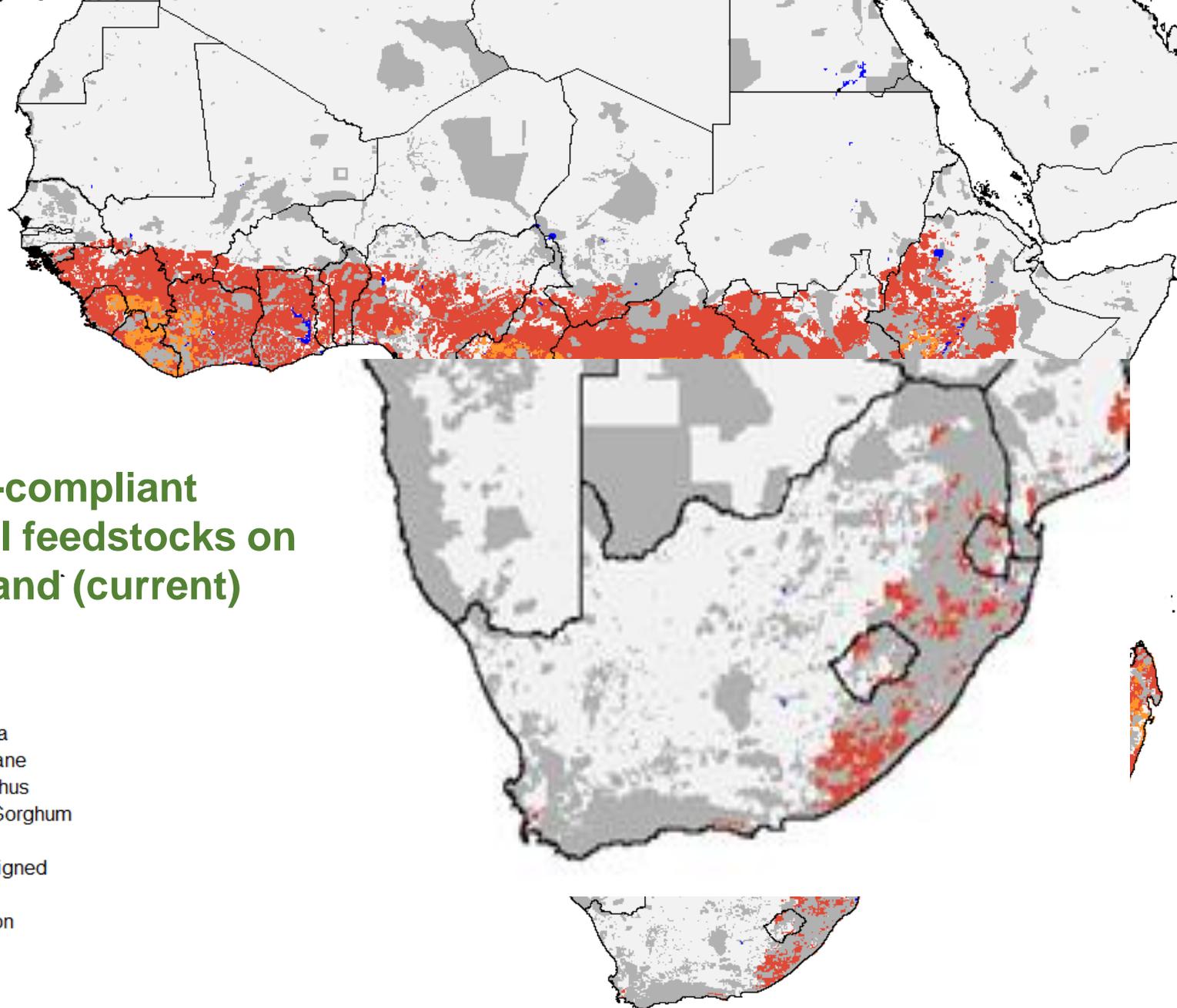
Land area in South Africa that would support production of energy crops for RSB-compliant biofuel



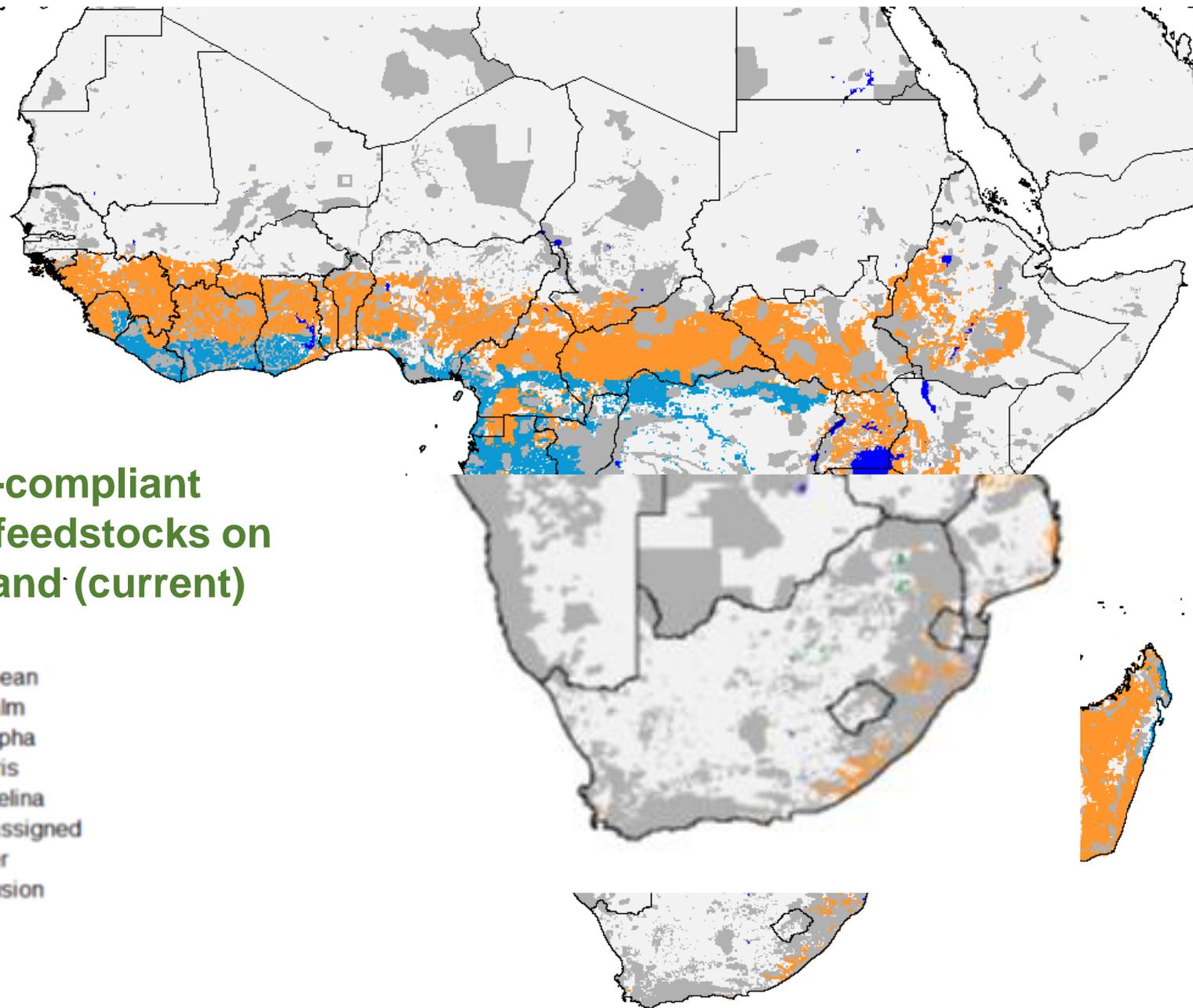
Moderately suitable GHG compliant REMAIN land – 11 261 km²
(0.9%)

Best RSB-compliant bioethanol feedstocks on REMAIN land (current)

- Maize
- Cassava
- Sugarcane
- Miscanthus
- Sweet Sorghum
- Triticale
- Not assigned
- Water
- Exclusion



Best RSB-compliant biodiesel feedstocks on REMAIN land (current)



Current technical potential for “umbrella crops” with max energy yield and min 60% GHG saving

Very Suitable + Suitable Land

	Sugarcane	Oilpalm	Miscanthus	Jatropha	Solaris	Sweet Sorghum	Total
Planting area (ha)			586 700	7 100	21 500		615 300
Energy yield (PJ)			72	0.2	0.8		73

Very Suitable + Suitable + Moderately Suitable Land

	Sugarcane	Oilpalm	Miscanthus	Jatropha	Solaris	Sweet Sorghum	Total
Planting area (ha)	1 800		1 705 400	3 400	30 900		1 741 400
Energy yield (PJ)	0.2		160		1		161.2

Future technical potential for “umbrella crops” with max energy yield and min 60% GHG saving (SC1)

Very Suitable + Suitable Land

	Sugarcane	Oilpalm	Miscanthus	Jatropha	Solaris	Sweet Sorghum	Total
Planting area (ha)	2 800		989 500	11 200	570 400	90 000	1 663 700
Energy yield (PJ)	0.4		118	0.4	26	8	153

Very Suitable + Suitable + Moderately Suitable Land

	Sugarcane	Oilpalm	Miscanthus	Jatropha	Solaris	Sweet Sorghum	Total
Planting area (ha)	8 600		2 281 900	700	548 700	297 400	3 137 200
Energy yield (PJ)	1		223		25	20	269

Main messages emerging from the modelling work

- The **potential for the production of energy crops in South Africa** on virgin land is limited (but still significant in terms of contribution to domestic fuel security and emission reductions).
- Most of the RSB-compliant energy crop production potential lies in the Eastern and North-eastern region.
- Opportunities for **annual feedstock crops are not on virgin land**; if dLUC is involved, they mostly cannot meet the GHG criteria. Rather focus on abandoned agricultural land, inter/rotation cropping or marginal land.
- **Perennial crops**, with soil carbon stock change factors > 1 and considerable carbon stocks in vegetation, **can very often meet the strict GHG criteria**, so have a wider range of options in terms of planting areas.
- Miscanthus is showing by far the largest potential in South Africa, suggesting that **the long-term future of crop-based biofuels is lignocellulosic**. However, there is no experience with miscanthus in South Africa -> agricultural trials and full risk assessment (invasiveness!) should commence asap.

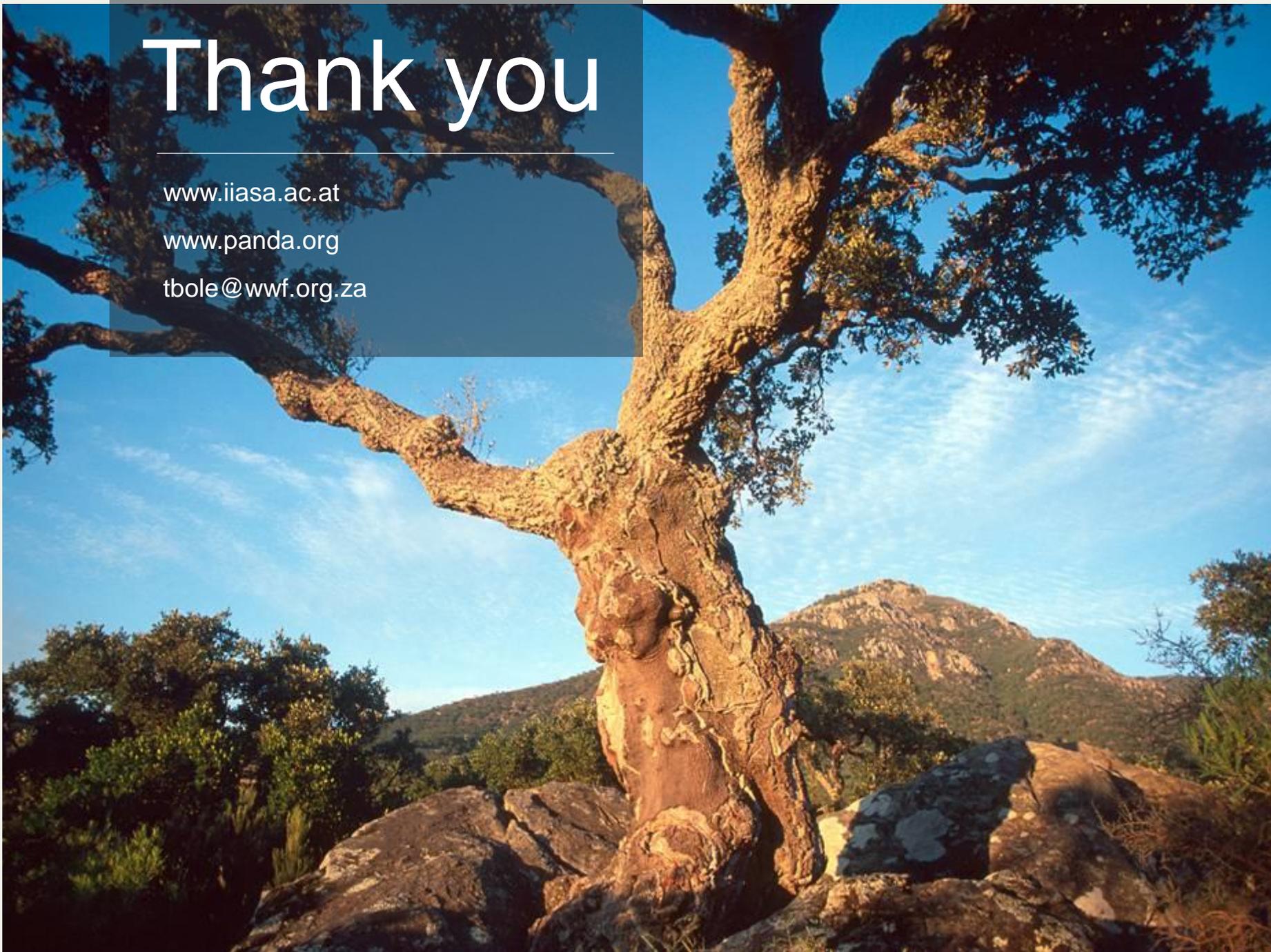


Thank you

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Sustainability of using IAPs for bioenergy:

*Analysis of environmental and socio-economic
impacts - case study in Eastern Cape, South Africa*



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**Questions or discussion please
contact: i.c.veraconcha@uu.nl**



SAEON & EFTEON monitoring and research platforms

Invasive plant mapping & monitoring

Kaluke Mawila (NMU-George), Glenn Moncrieff (SAEON), Julia Glenday (SAEON)

Waste & Biomass Beneficiation Conference - 12 Aug 2021

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science & innovation
Department:
Science and Innovation
REPUBLIC OF SOUTH AFRICA



SAEON
South African Environmental
Observation Network

SAEON: South African Environment Observation Network

- Nodes across the country
- Support & conduct long-term environmental observation & research
- Curate data & make available



BioEnergy Atlas (<https://bea.saeon.ac.za/>)
Hydrological impacts of IAPs
Mapping IAP cover over time

EFTEON: Expanded Freshwater & Terrestrial Environment Observation Network

- Six landscapes: similarly instrumented, field survey, remote sensing analyses
- Platform for socio-ecological systems (SES) research
- Garden Route landscape - NMU George

<https://efteon.saeon.ac.za/>



Invasive plant mapping at SAEON

Many current project aim at invasive plant mapping suffer from the following issues:

- Infrequent updates (e.g NIAPS - 2010)

- National Scale not appropriate for local decision

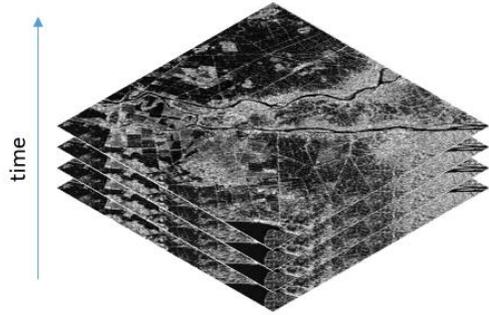
- Municipal scale not implemented or out-of-date

Massive proliferation of free satellite data

Computing power to analyze these data also becoming available

A better solution is to have repeatable workflows that cost nothing to run and rely on simply input data

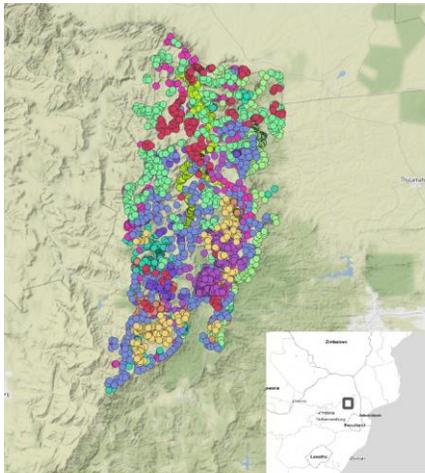
Input data: Sentinel 2 time series



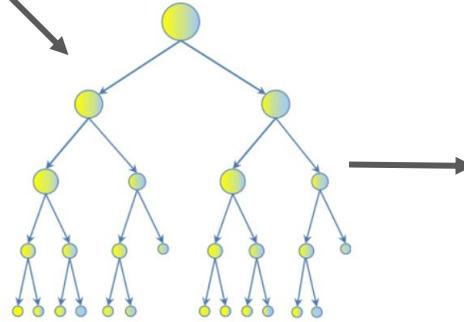
Processing: Google Earth Engine



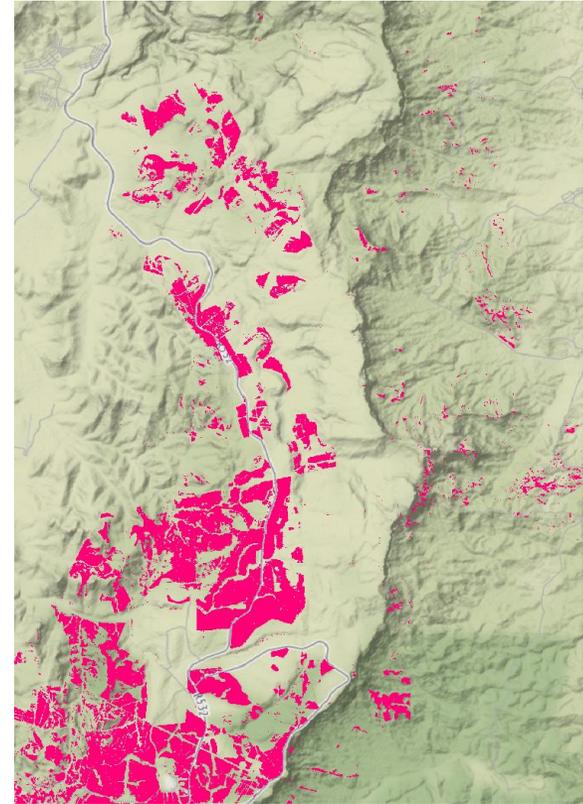
Training data: Field/Image interpretation

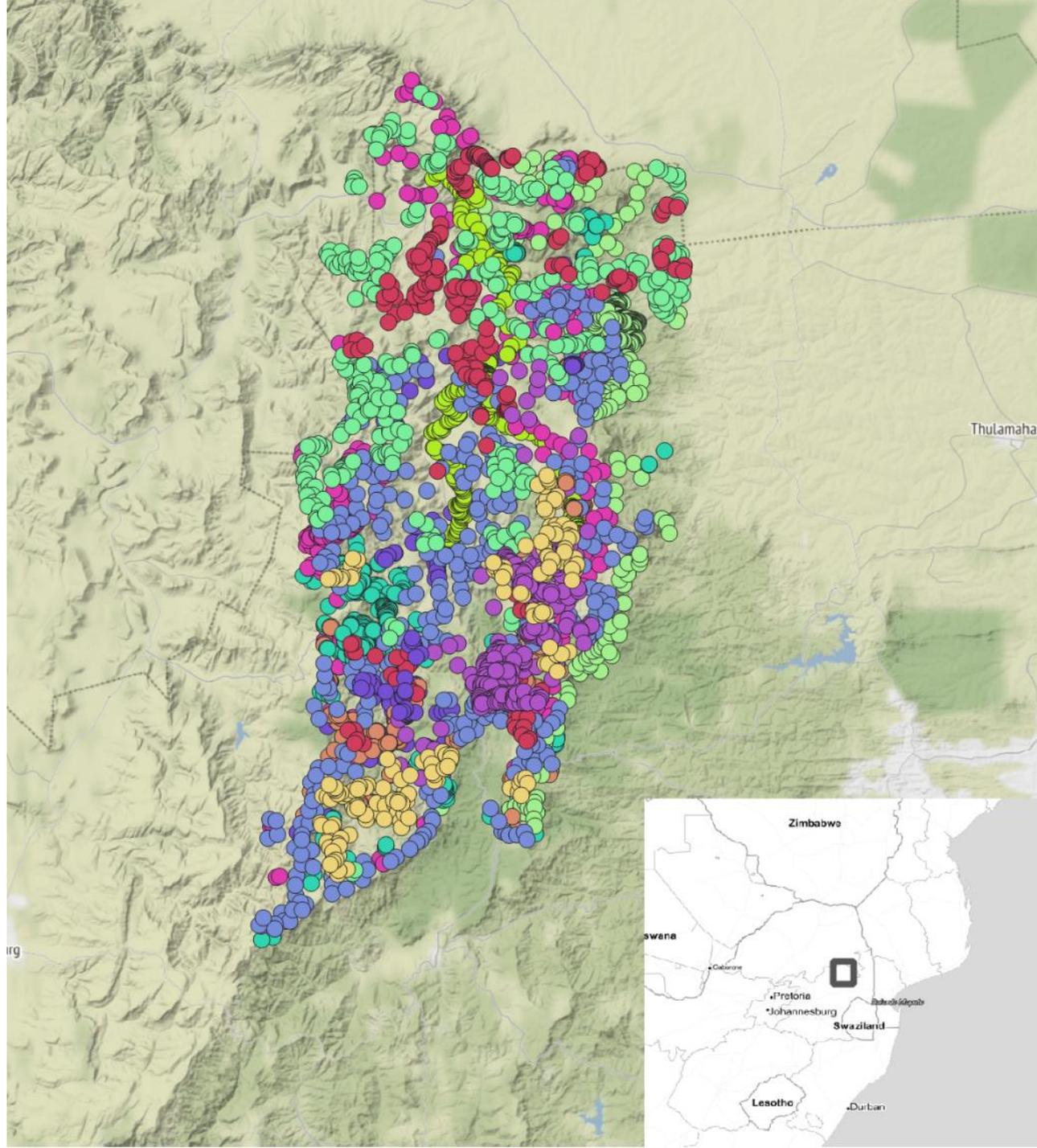


Machine learning



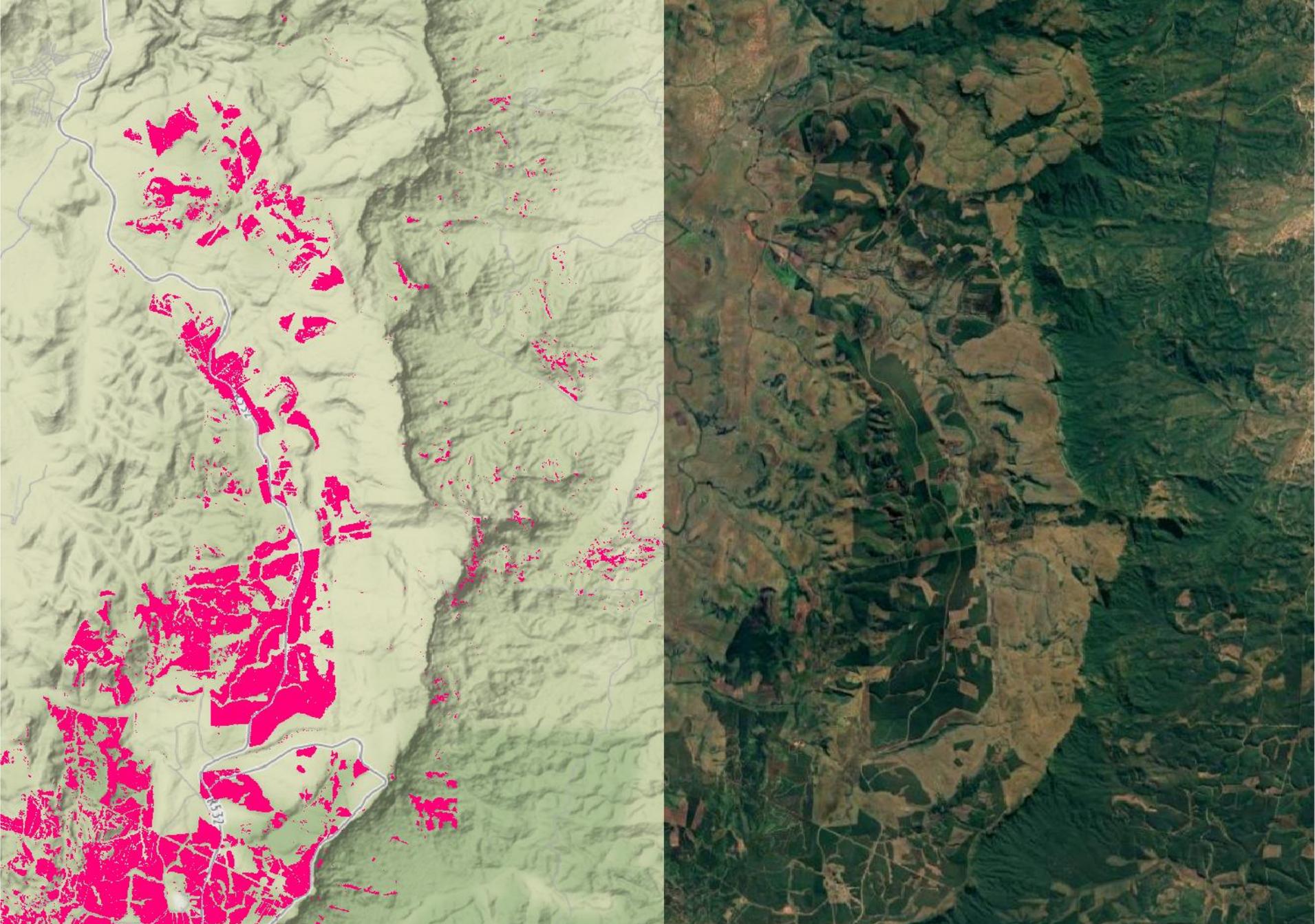
Land cover map



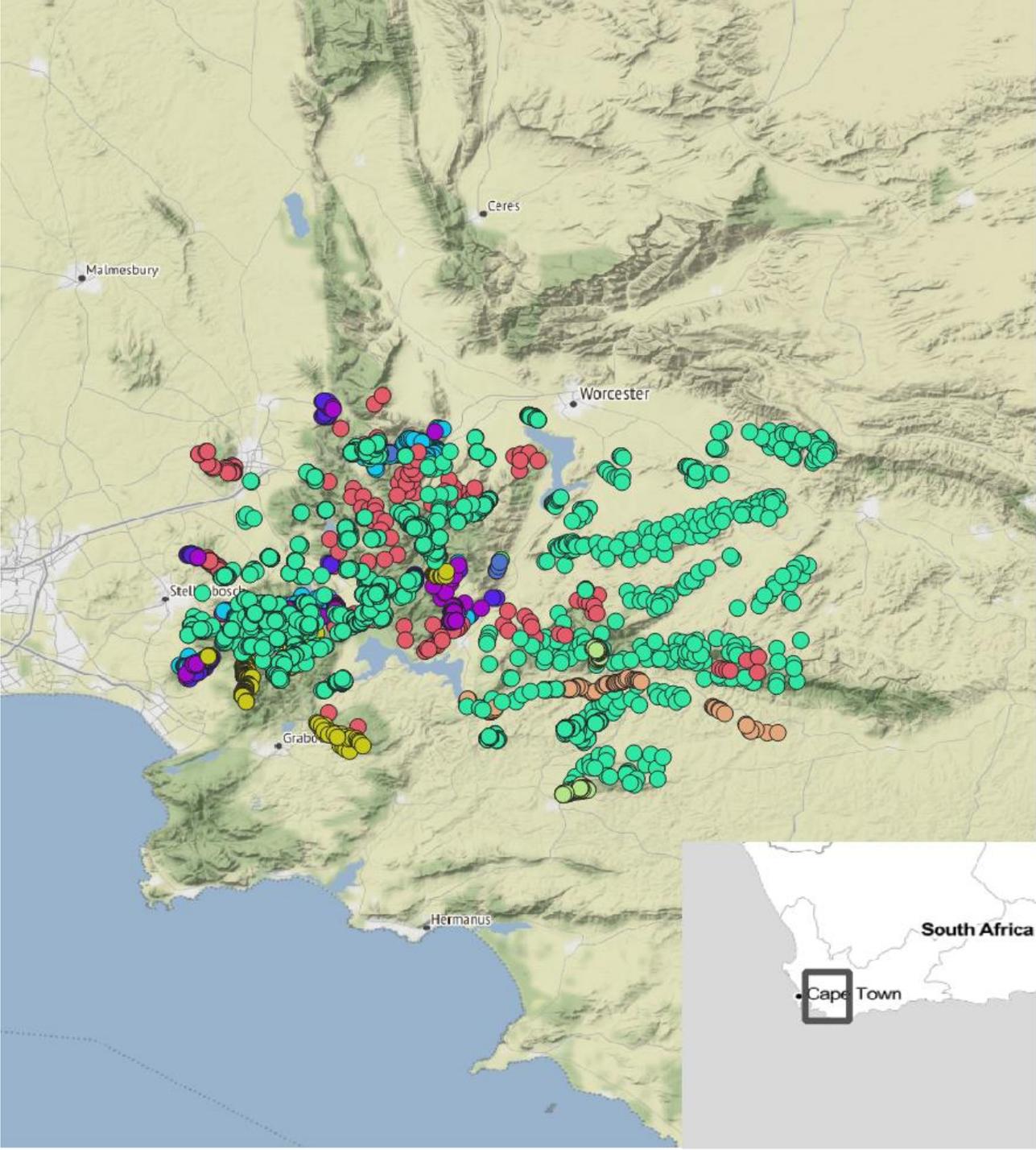


Escarpment
grasslands

Work by MSc
student Keletso
Moilwe

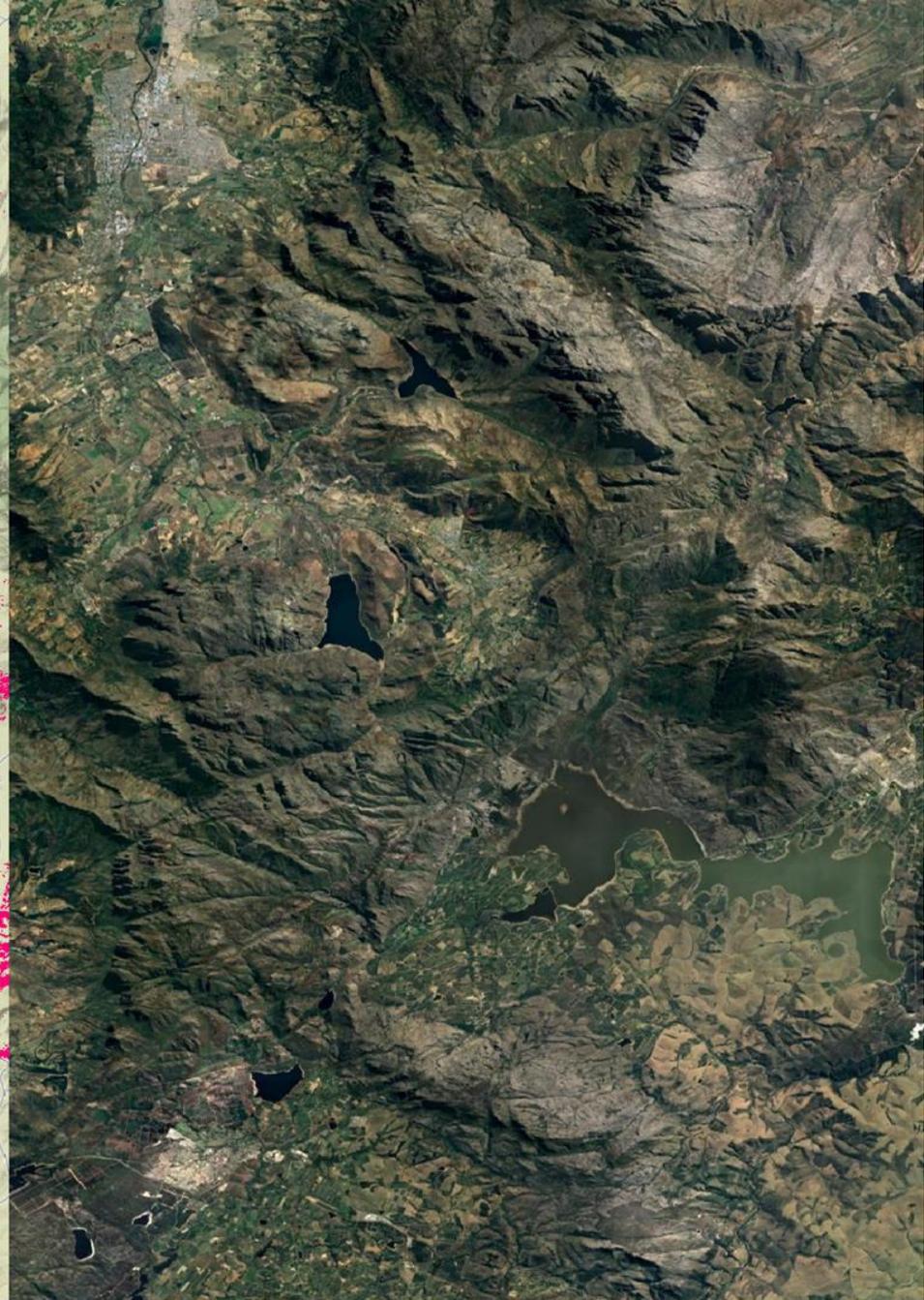
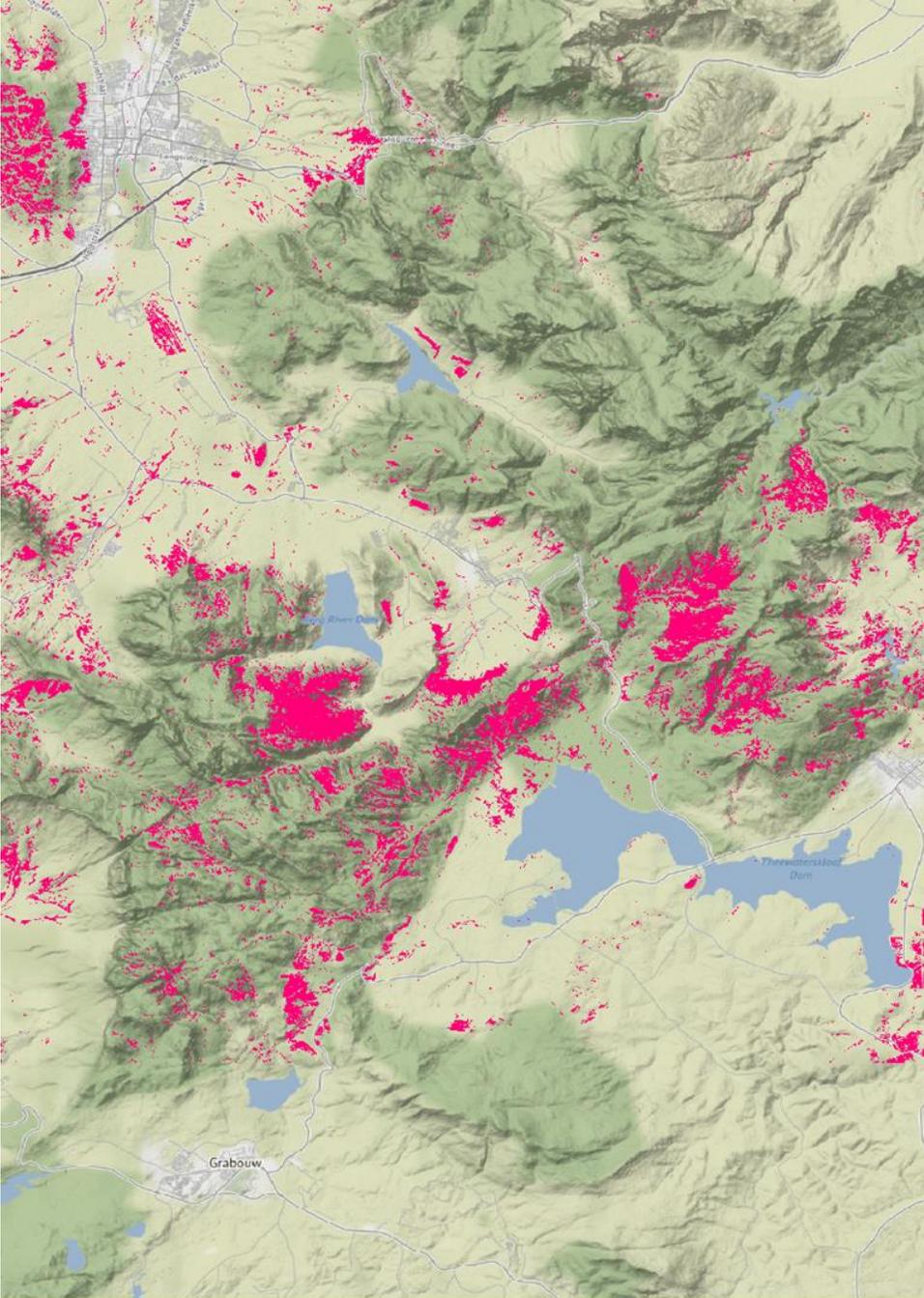


Pine accuracy: 72%



Boland Mountains

Work by MSc
student Lungile
Khuzwayo



Pine accuracy: 71%

One size does not fit all (i.e. a national map), but that does not mean we cannot use the same template in different regions

Once the template is established, it can be reused by a non-expert

Annual updates at no cost

New regions when updated training data is collected

Soon-to-launch new satellites and new national data will dramatically improve mapping accuracy

25cm national aerial photos

Hyperspectral satellites

LiDAR satellites

glenn@saeon.ac.za



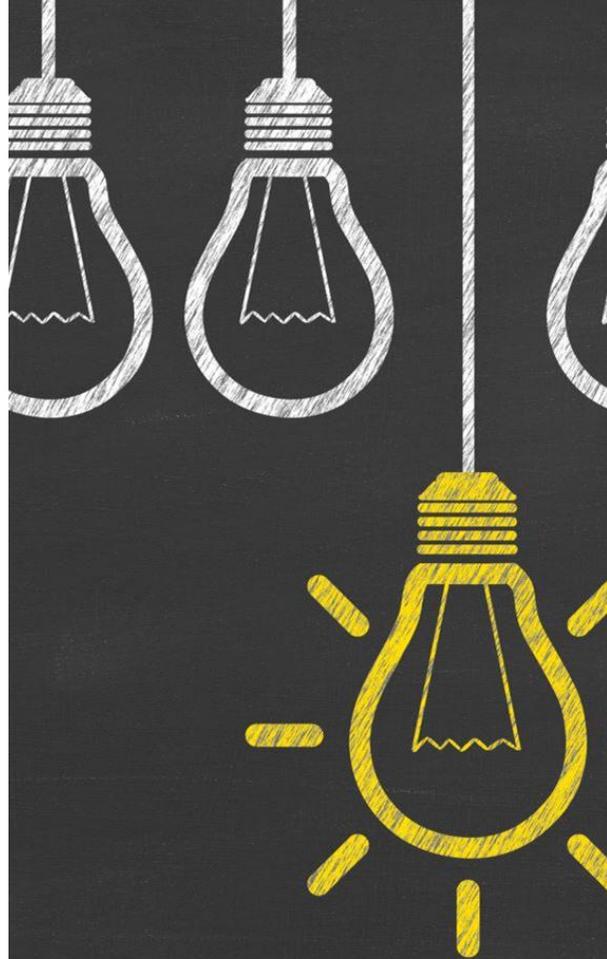
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EFTEON Garden
Route Landscape

The need to increase our understanding of the complex relations between ecosystems, people, the social and ecological drivers of changes in nature is now in sharp focus





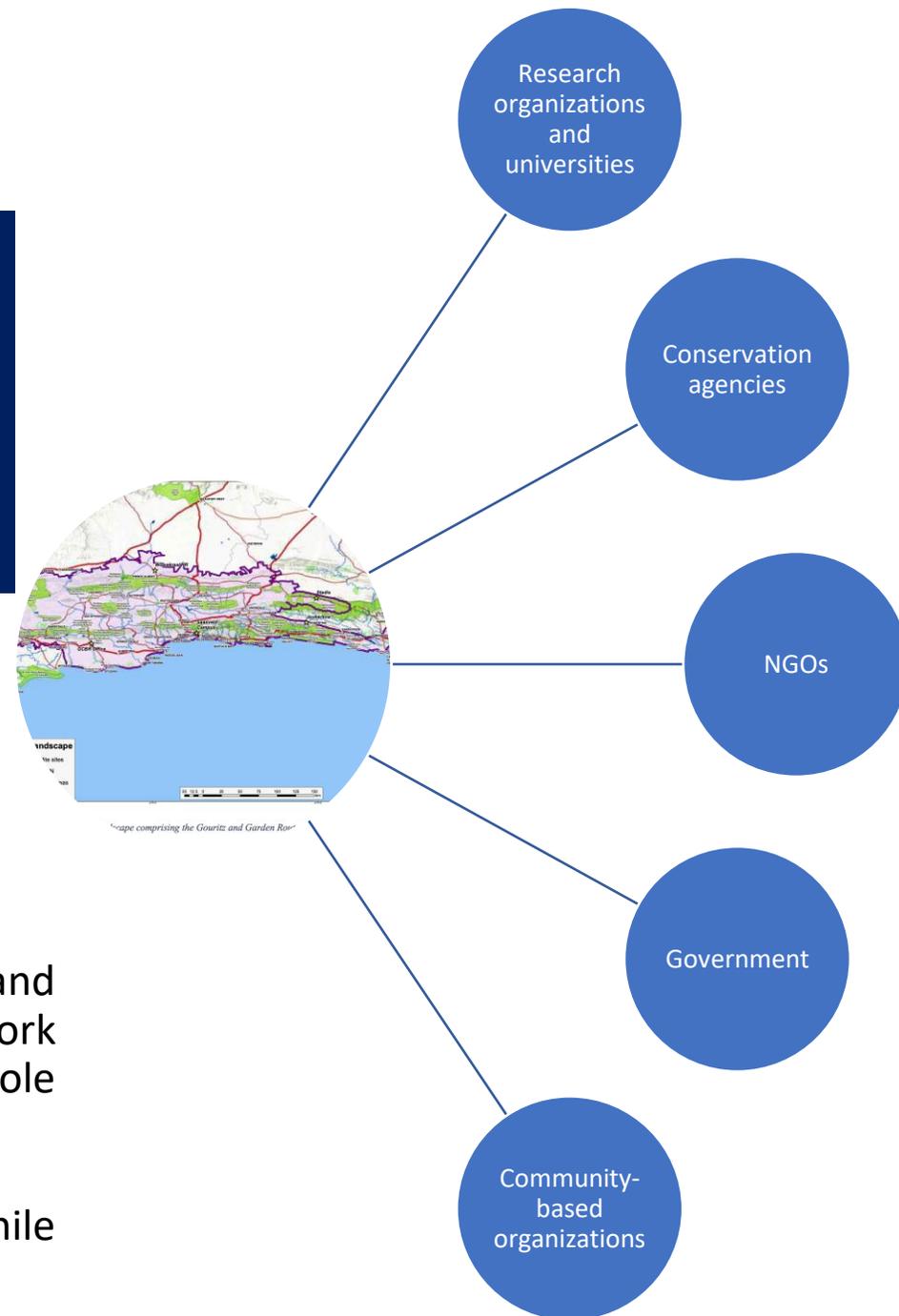
There are challenges as well as opportunities for advancing the science-policy interface to enhance evidence-led decision-making and future planning

- Science must ask incisive questions, not shy away from inconvenient truths
- Example of an incisive questions:
 - *Where is most of the invasive alien plant biomass located - at the biome scale and at the catchment scale?*
 - *How is commercial biomass extraction likely to affect the rate of spread of invasive alien plants?*
 - *What are the intended and unintended consequences of commercial biomass extraction for people, nature and the economy?*

Science can help to link scientific findings to policy development and implementation

The Garden Route Expanded Freshwater and Terrestrial Environmental Observation Network (EFTEON) site brings together different role players

To provide relevant data to advance science while helping decision makers



New incentives and partnerships are needed

- To nurture and promote community-based environmental stewardship, transformative inter- and transdisciplinary collaborations between policy-makers, academic institutions, funders
- Dialogues between scientists, policy makers, funders and local communities
 - ...universities are able, and willing, to facilitate this
- Accessible communication and sharing of findings
- Using hard evidence to help us deal with difficult trade-offs between short-term wealth and job creation, long term human well-being, climate change and biodiversity conservation

Contact Details

Dr Kaluke Mawila

Campus Principal: George Campus

Kaluke.Mawila@mandela.ac.za

The logo for Nelson Mandela University is displayed on a white rectangular background. The text "NELSON MANDELA" is in a bold, dark blue, sans-serif font. The letter "O" in "NELSON" is replaced by a solid yellow circle, and the letter "A" in "MANDELA" is replaced by a solid yellow triangle. Below this, the word "UNIVERSITY" is written in a smaller, dark blue, sans-serif font with wide letter spacing.

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DEPARTMENT OF FORESTRY, FISHERIES AND THE ENVIRONMENT

FORESTRY EXIT REVERSAL STRATEGIES

Garden Route Waste & Biomass Conference
12 AUGUST 2021



**forestry, fisheries
& the environment**

Department:
Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA



TABLE OF CONTENTS

- Background
- Western Cape government plantations / state land
- Status of re-commissioning of the Vecon Areas
- Conclusion



BACKGROUND

- The Branch Forestry owns an estimated 44000 hectars of state land in the Western Cape province
- In 1998 government restructure state owned commercial forestry plantations
- In 2001, Cabinet approved that approximately 44763 ha of plantations in the western Cape be converted to other land uses (Exit strategy)
 - Conservation
 - Community forestry
 - Agriculture
 - Settlement
- Most of the plantations were leased to a commercial forestry company called MTO Pty Limited from SAFCOL



Background cont.....

- The former department of Water Affairs and Forestry commissioned a study in 2006 to re-assess the exit process and its socio-economic impact
- The study recommended that 22 000 ha of plantations be retained for Forestry and the other 22 000 ha be on the exit strategy.
- In 2008, cabinet approved the exit reversal of forestry in the Western Cape in line with government agenda on economic growth and development, transformation and socio-economic imperatives (Exit reversal strategy)
- To effect the exit reversal strategy IDC was approached in 2014 to advise on the implementation of exit reversal strategy
- IDC proposed the plantations be into packages



WC plantations Excl... Witfontein

EXIT REVERSAL AREAS

Region	Plantation name	Total area now available to be replanted ha	Areas still to be Clearfelled & Replanted ha	Total area to be Planted ha
Boland	Kluitjieskraal	686.56	685.20	1371.76
	Grabouw	2108.35	2579.60	4687.95
	La Motte	281.83	755.56	1037.39
Sub-Total		3076.74	4020.36	7097.10
Outeniqua	Bergplaas	2425.89	2730.31	5156.20
	Buffelsnek	793.17	3717.14	4510.31
	Homtini	226.03	553.68	779.71
	Jonkersberg	1331.74	2864.67	4196.41
Sub-Total	Other	4776.83	9865.80	14642.63
Total		7853.57	13886.16	21739.73



Status of re-commissioning in the WC

- The land will be leased
- A transactional adviser will be appointed for community trust formation
- The target is to complete the lease before March 2022



CONCLUSION

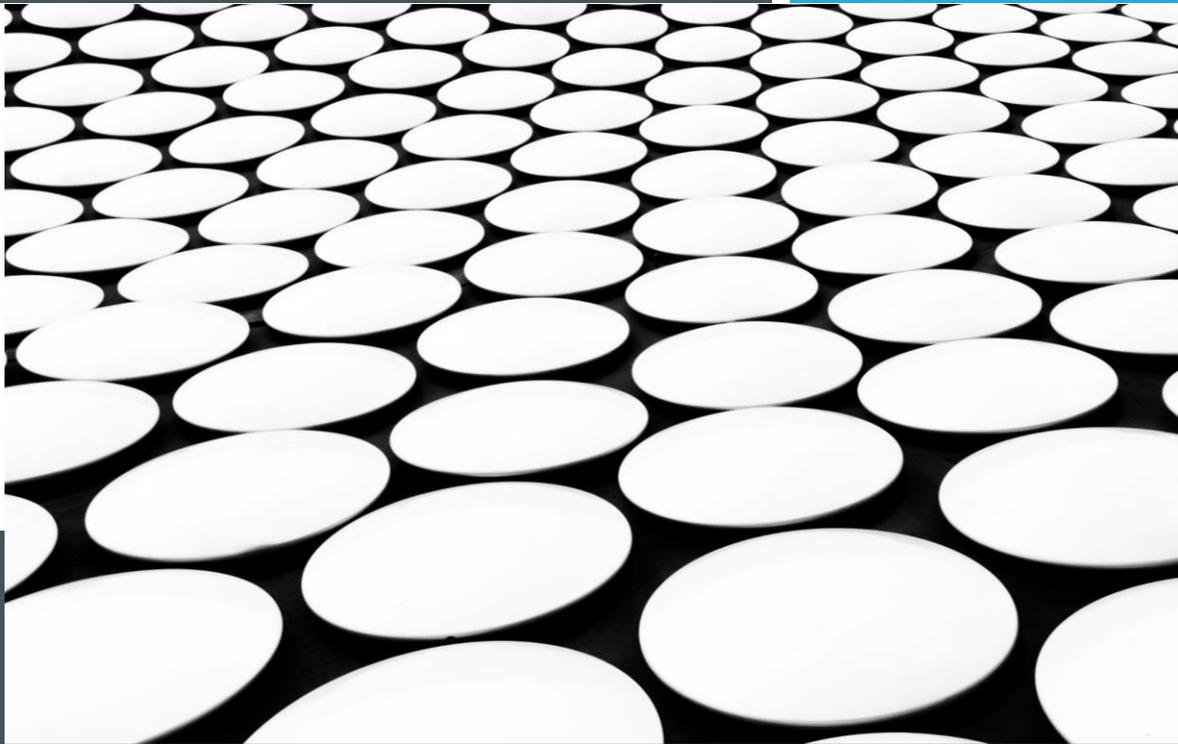
- The biomass waste from plantation is generated from pruning, harvesting, thinning, coppicing etc
- Currently the bio waste from plantations is:
 - ✓ Crushed
 - ✓ Sold or given as fuelwood
 - ✓ Burnt
 - ✓ Sometimes left in the plantation
- The current land invasions in the WC pose a risk to the Forest sector



THANK YOU!

- Name: Masithandaze Falitenjwa
- Contact Details: 021 944 1415 / 0828087026
- Email: Masithandazef@daff.gov.za

Thank You



- Ellané van Wyk
 - Pam Booth
- Petrus van Niekerk
 - Schalk Kapp

WASTE & BIOMASS BENEFICIATION CONFERENCE THEME 5

MODERATOR: LUSANDA MENZE

12 AUGUST 2021



SUSTAINABLE
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AFRICA

**The Sustainable Landscape Finance Coalition
is a catalytic and innovative driving force
for the development of finance solutions
for effective and enduring landscapes in
South Africa and across Africa.**

The Aim

Address the urgent need for additional finance for sustainable landscapes across Southern Africa.

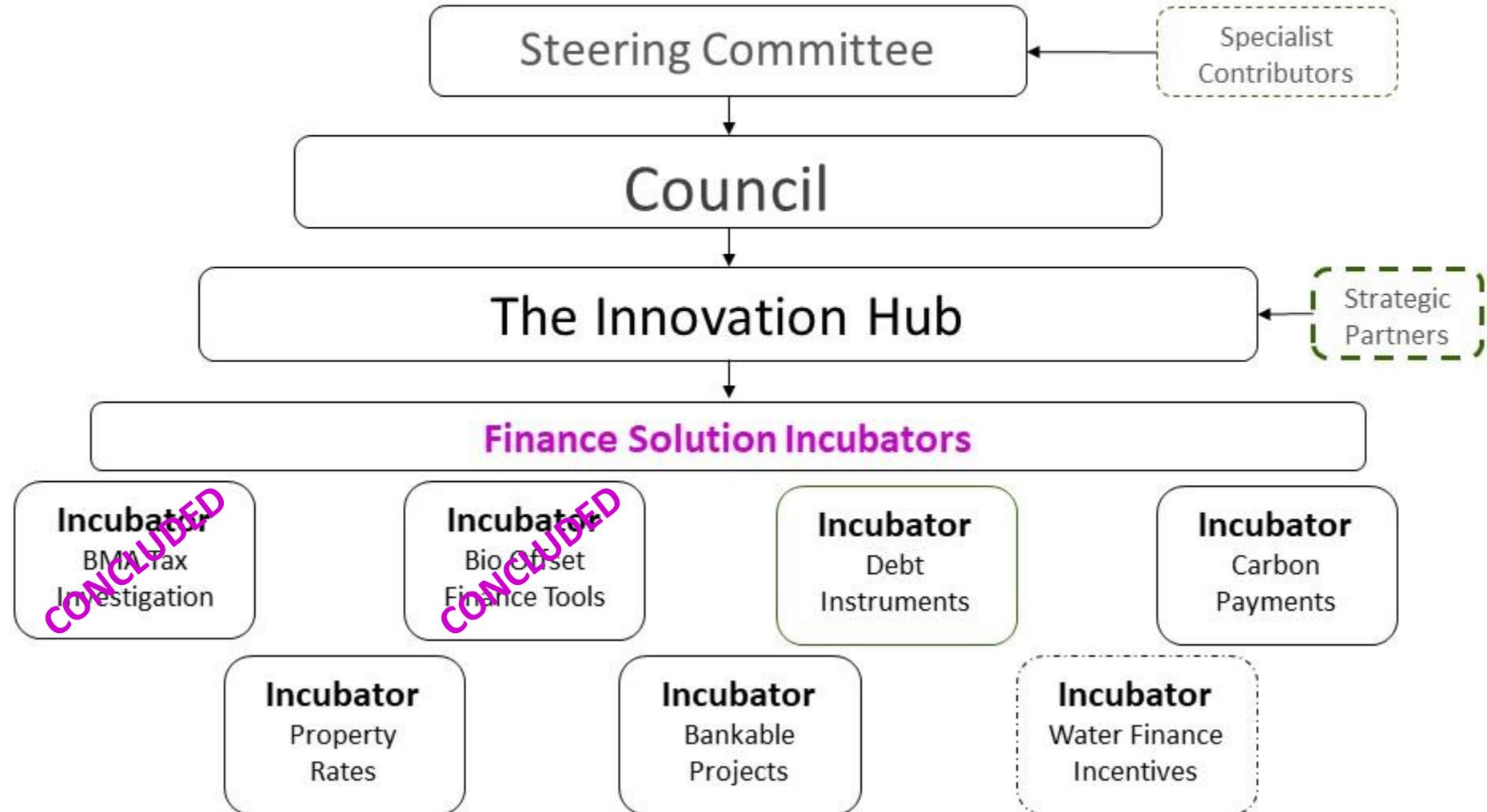
1. Foster a cohesive landscape finance sector.
2. Develop new and innovative finance solutions.



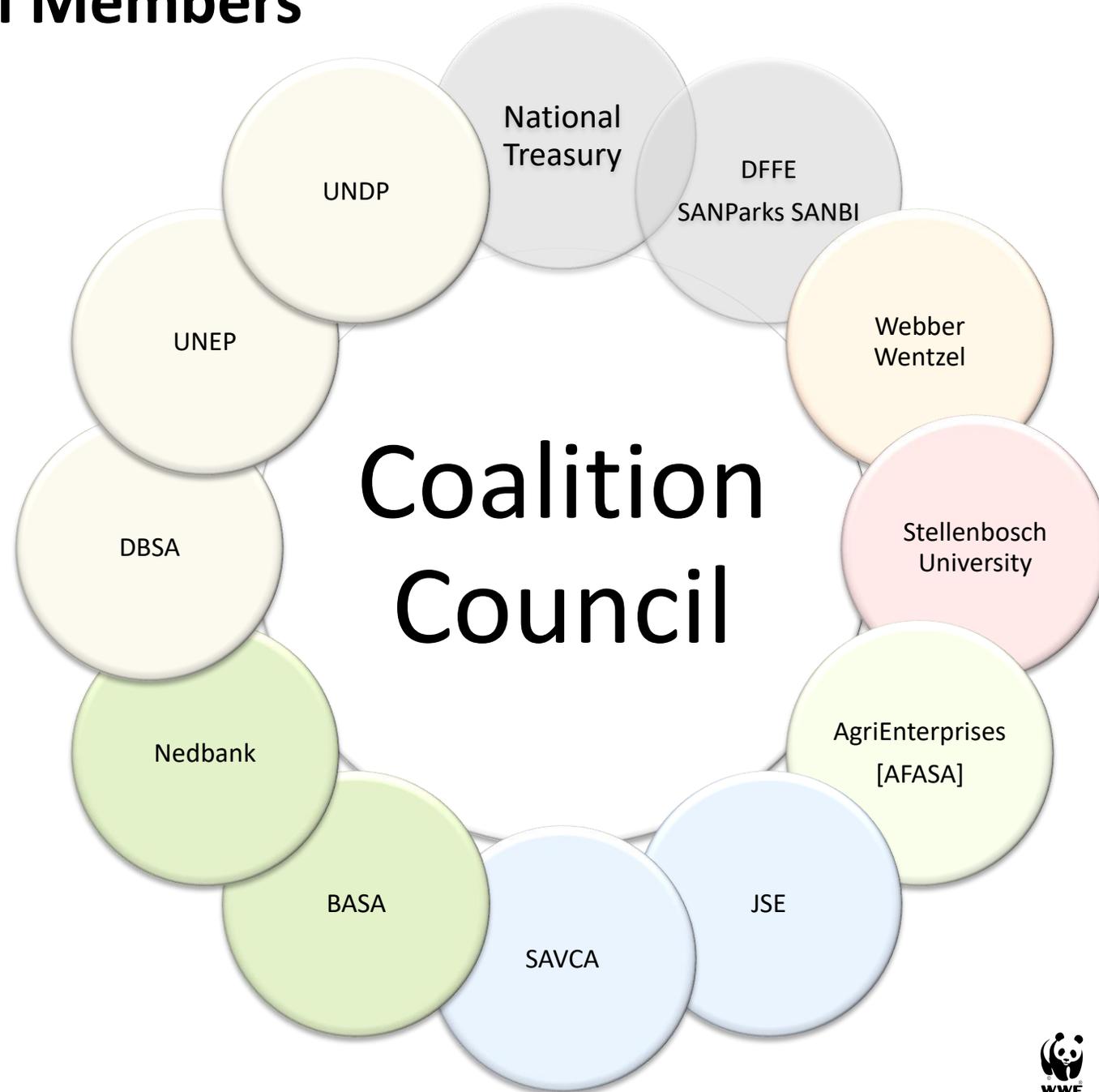


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AFRICA



Council Members





Innovation Hub

- 1. Knowledge Exchanges: 1h30 | 1h topic presentation | 30 min Q&A**
- 2. Showcases: 1h30 | 45 min showcase | 45 min networking**
- 3. Dialogues: 1h | 10 min topic intro | 40 minute moderated discussion | 10 min closing**

The Coalition



Impact, Growth, Expert Input, Stakeholders

FINANCE SOLUTION INCUBATORS:
FIVE LAUNCHED WITH ONE READY FOR PILOT, 50+ MEMBERS CONTRIBUTING TIME AND EXPERT INPUT

STAKEHOLDERS, REACH, FOLLOWERS:
THE COALITION LINKEDIN FOLLOWING TOTALS 569 (AND GROWING!), REGULAR NEWSLETTERS SENT TO DATABASE, SECOND INNOVATION HUB EVENT HOSTED ON 14 JULY 2021: KNOWLEDGE EXCHANGE ON GREEN BONDS



THE COALITION HAS **FOUR STRATEGIC PARTNERS** ENSURING EFFECTIVE IMPLEMENTATION OF THE WORK OF THE COALITION AND ITS INCUBATORS

THE **COUNCIL TO THE COALITION** REPRESENTS 16 ENTITIES FROM SECTORS IN GOVERNMENT, BANKING, CONSERVATION, LEGAL, AND OTHERS

11 SPECIALIST CONTRIBUTORS PROVIDE EXPERTISE TO SUPPORT THE WORK OF THE COALITION

Coalition Finance Solution Approach ©

Stage 1: Incubate

Incubator acts as strategic approach to investigate a specific finance solution with a niche group of experts.

Stage 2: Strategize

Strategy involves development of finance strategies and/or feasibility studies that provide a road map for implementation and detail the viability of finance solutions.

Stage 3: Pilot

Piloting of finance solutions is based on finance strategies or feasibility studies in elected landscapes to test practical implementation. *(Also includes feeding findings from Stages 1 and 2 into Anchor Projects.)*

Stage 4: Scale

Mainstreaming successful pilots to all landscapes that can benefit from the same finance solution.



Stage 1: Finance Solutions **Incubators**

Unlocking finance mechanisms and innovations

→ Independent Valuation Study commissioned: Dr Hugo van Zyl: determine environmental and economic impact of each Incubator and create model to track impact over time

1. BMA Tax Incentive Investigation Incubator **completed** and being piloting
 - 5 months of investigation: solutions to unanswered questions plaguing the sector since 2009
2. Carbon Payments Incubator launched and moving quickly
 - Intersection between conservation grasslands and sustainable agri
3. Property Rates Rebates Incubator moving and local implementation happening simultaneously
 - Local access critical for SA citizens and protected areas
 - Scope for sustainable cities
4. Bankable Projects Incubator launched and integrated into a number of key Anchor Projects
 - Fundamental questions facing green recovery
5. Biodiversity Offset Finance Mechanisms Incubator **linked** to pilot and feasibility study | WFA
 - Grappling with longstanding, nationwide issues
6. Debt Instruments Incubator soon to be launched



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Stage 2: Finance Strategies and Feasibility Studies

Ensuring viable financing to landscapes and entities through strategic implementation

1. UNDP SLM Finance Strategy
2. GLTFCA Secretariat Finance Strategy
3. SANParks Green Bond Feasibility Study
4. Grasslands National Park Finance Strategy



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Stage 3: **Pilots** and/or Anchor Projects

Testing innovations and applying new finance to stakeholders in critical landscapes

1. SANParks Section 37D and National Parks | WFA
2. Biodiversity Offsets Corporate Finance Mechanism with Webber Wentzel | WFA
3. Municipal Property Rebates: Local Access | WFA
4. BMA Tax Incentive Pilot | WFA



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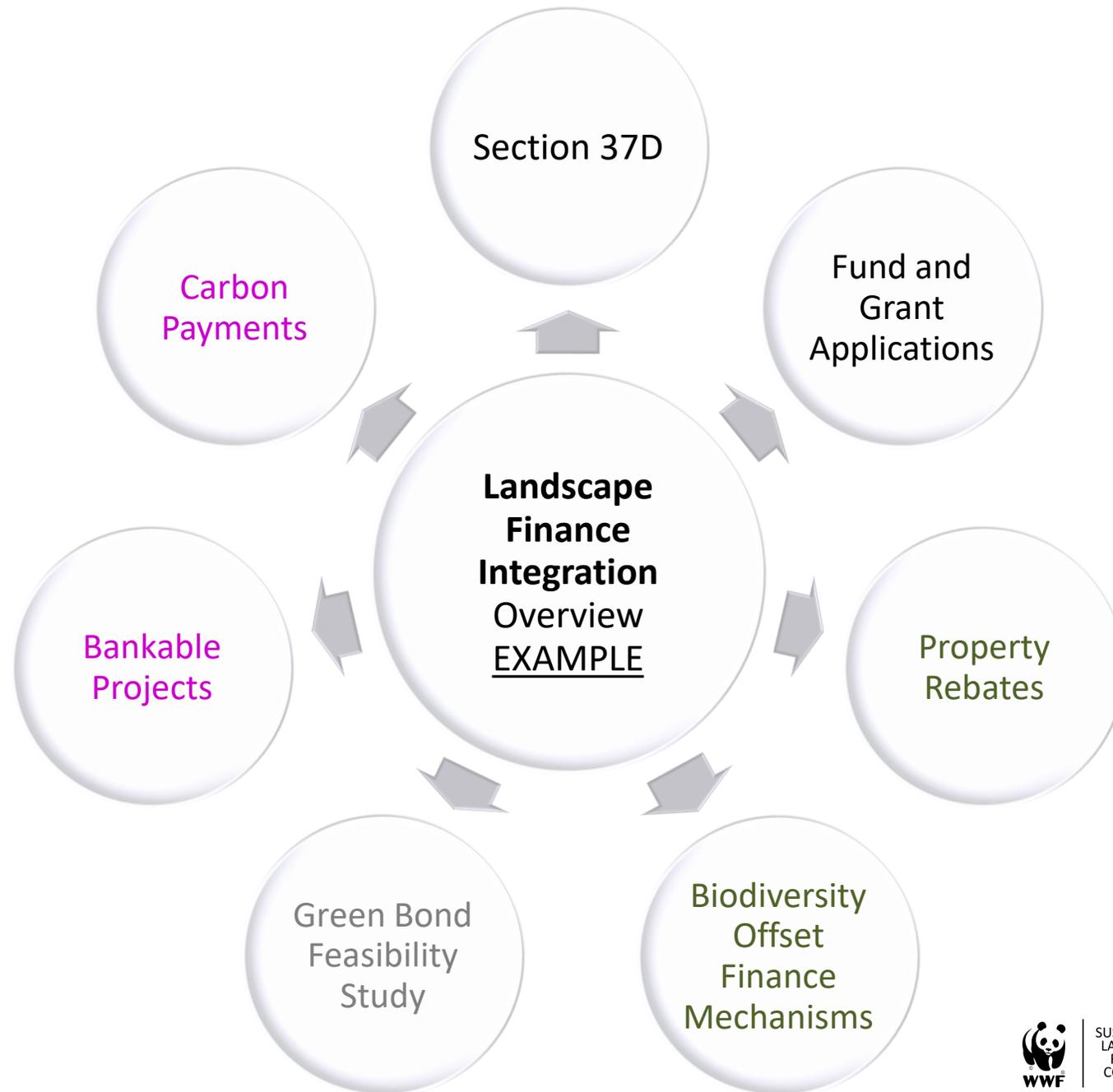
Stage 4: Scale

Established Green Finance Solutions

1. SECTION 37D

- To date: introduced approx. R200 million into SA's protected areas of new finance
- By 2026, estimated total of USD 83mil (R1.4bil)
- Loss to fiscus negligible and return on investment approx. 180% (notably with state owned landscape management costs)
- Institutional support from SA Government: NT, SARS, DFFE, SANBI, SANParks
- Tax efficiency has a key role to play with SMMEs
- Tax deduction increases liquidity = boosts sustainability and growth for green sectors

Coalition Finance Solution Approach ©: Integration Example





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Disclaimer

In the interests of advancing the development and implementation of innovative finance solutions in conservation, we encourage you to talk about our work. Please ensure that you reference the Coalition appropriately in all communications relating to our work and provide this link

<https://www.linkedin.com/company/the-sustainable-landscape-finance-coalition/>

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Ecological Infrastructure & SMME development

12 August 2021



Pamela Booth

Environmental Manager: Knysna Municipality

Chairperson: Keurbooms Investment in Ecological Infrastructure Working Group

pbooth@knysna.gov.za Cell: + 27 60 998 6967

Petrus van Niekerk

Owner: Econ-I Consulting – email: petrus@econ-i.co.za Cell: +27 76 721 7343

What is Ecological Infrastructure?



Nature's equivalent of built infrastructure.

Naturally functioning ecosystems such as river catchment areas and wetlands that deliver services to society like fresh water and flood mitigation.

Why do we need to protect our Ecological Infrastructure?

Crucial role in socio-economic development – no water = no economic growth.

BUT:

When we look at supporting ecological infrastructure against the backdrop of extreme climate-driven natural disaster we start to see the opportunities for job creation, capacity building and skills development that weren't there before.

2020 – 3 women qualified as Chainsaw operators
2021 – 5 women qualified as Chainsaw operators



How do we go about doing this?

Keurbooms Investment in Ecological Infrastructure Working Group

Karatarra catchment business model for biochar, activated carbon and wood vinegar from Alien Invasive Plant clearing.

Policy
Strategy
Implementation



At the local government level:

- Council funding (not so much)
- Grant funding (NRM – DFFE)
- Partnerships
- Enforcement



How do we do it practically?

Recruit, train, develop work programme that addresses fuel load reduction; firebreaks; invasive plant clearing and wetland rehabilitation.



Some of the challenges: not everyone can turn this...



Into this:





What have we tried?

Just about everything



Mobile biochar retorts at Keurbooms







FUTURE CHALLENGE AND WAY FORWARD:

Not everyone is sensitive to “Conservation clearing methods” VS
“Extractive clearing methods”

In short it’s the difference between restoring ecological infrastructure
and destroying it further.

This is why the development of a new brand of SMME is a critical
component that will elevate our biomass value chain beyond supply and
demand towards a more restorative economic model.

SMME Development

- What's an SMME? Beyond the buzzword
- SIC Classification by employees & revenue
- 80 % + of businesses in Garden Route are SMMEs
- A regional business unit (SMME) survey that identify and classify by type, area of operation, employees, revenue – data-driven development
- What informs development methodology?
- Who develops SMMEs? How?
- Making sense of all SMME development stakeholders
- Opportunities & Challenges for SMME's in the Waste & Biomass Beneficiation Value Chain

SCHEDULE 1

The new National Small Enterprise Act thresholds for defining enterprise size classes by sector, using two proxies

Column 1	Column 2	Column 3	Column 4
Sectors or sub-sectors in accordance with the Standard Industrial Classification	Size or class of enterprise	Total full-time equivalent of paid employees	Total annual turnover
Agriculture	Medium	51 - 250	≤ 35,0 million
	Small	11- 50	≤ 17,0 million
	Micro	0 - 10	≤ 7,0 million
Mining and Quarrying	Medium	51 - 250	≤ 210,0 million
	Small	11- 50	≤ 50,0 million
	Micro	0 - 10	≤ 15,0 million
Manufacturing	Medium	51 - 250	≤ 170,0 million
	Small	11- 50	≤ 50,0 million
	Micro	0 - 10	≤ 10,0 million
Electricity, Gas and Water	Medium	51 - 250	≤ 180,0 million
	Small	11- 50	≤ 60,0 million
	Micro	0- 10	≤ 10,0 million
Construction	Medium	51 - 250	≤ 170,0 million
	Small	11- 50	≤ 75,0 million
	Micro	0- 10	≤ 10,0 million
Retail, motor trade and repair services.	Medium	51 - 250	≤ 80,0 million
	Small	11- 50	≤ 25,0 million
	Micro	0 - 10	≤ 7,5 million
Wholesale	Medium	51 - 250	≤ 220,0 million
	Small	11- 50	≤ 80,0 million
	Micro	0 - 10	≤ 20,0 million
Catering, Accommodation and other Trade	Medium	51 - 250	≤ 40,0 million
	Small	11- 50	≤ 15,0 million
	Micro	0 - 10	≤ 5,0 million
Transport, Storage and Communications	Medium	51 - 250	≤ 140,0 million
	Small	11- 50	≤ 45,0 million
	Micro	0 - 10	≤ 7,5 million
Finance and Business Services	Medium	51 - 250	≤ 85,0 million
	Small	11- 50	≤ 35,0 million
	Micro	0- 10	≤ 7,5 million
Community, Social and Personal Services	Medium	51 - 250	≤ 70,0 million
	Small	11- 50	≤ 22,0 million
	Micro	0 - 10	≤ 5,0 million

Source: DSBD, 2019

Common Challenges

Access to finance

- Financial institutions do not understand small business structures
- Funders prefer to lend during later stages of development
- Access to finance is dependent on location

Access to markets

- Leads to the failure of many small businesses
- Rural small businesses mostly affected
- Preferential procurement requirements put pressure on SMMEs

Technology

- Vital for improving efficiency and output
- Expensive
- Requires capital, which is difficult for many small businesses to access

Infrastructure

- Power cuts have a negative impact on small businesses as productivity is reduced
- There is also a lack of physical infrastructure
- Access to infrastructure is dependent on location

Regulatory environment

- Regulatory environment in South Africa is not conducive for the development of small businesses
- Labour laws are restrictive and labour costs are high
- Small businesses are burdened by the costs of licensing, registration and settling of legal claims

Management and technical skills

- Education in business is vital when starting a company
- However, many small business owners do not have the skills
- This undermines the success of the business

Other challenges faced by small businesses

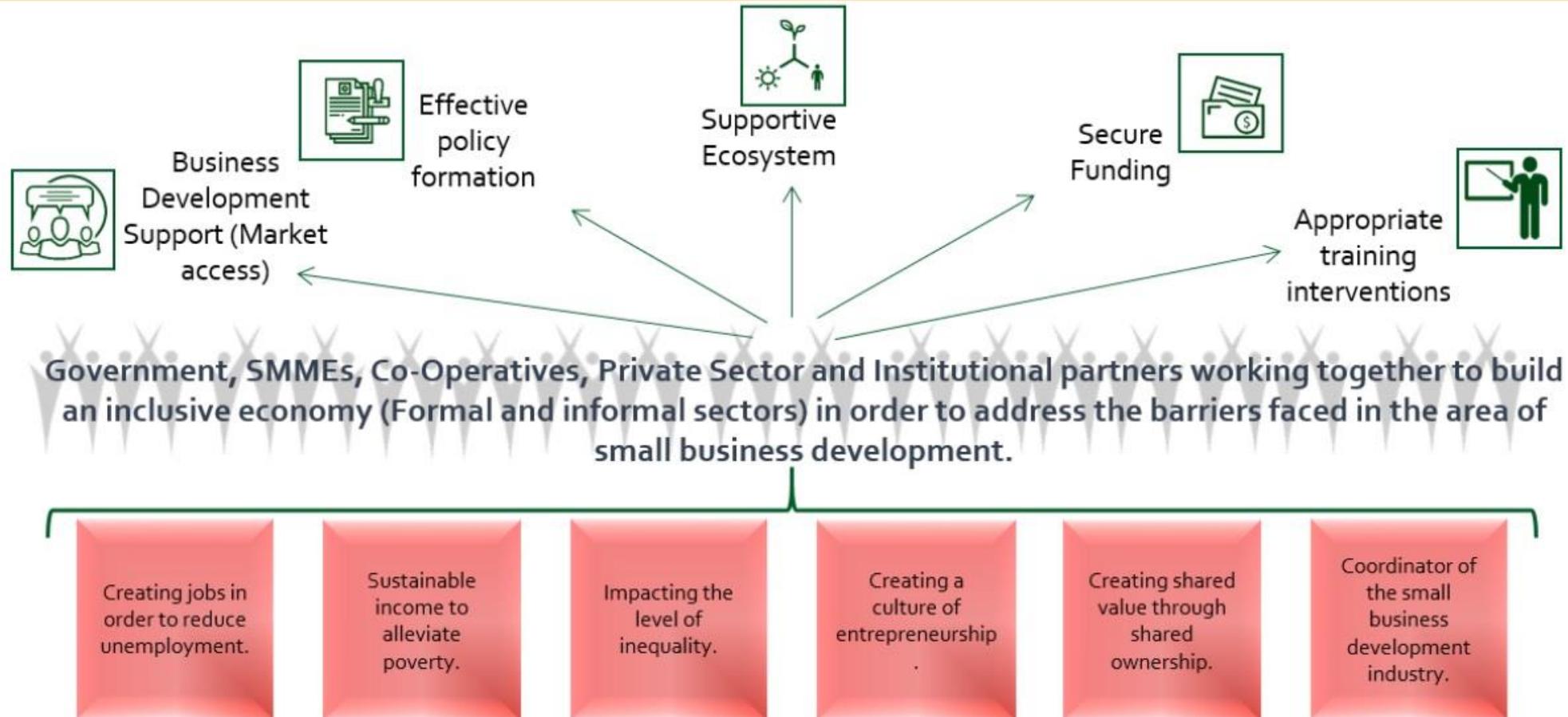
- Lack of trust between co-operative members
- Co-operatives do not interact with each other
- Lack of research and development
- Crime
- Macroeconomic factors

Challenges faced by government in developing the small business sector

- Inadequate economic and social impact statistics
- Lack of co-ordination between the departments in the public sector
- Limited support from existing government enterprise development agencies
- Policy
- Limited promotion and awareness
- Small business prefer to remain informal

Developing an SMME Development Eco-System

A sustainable, supportive entrepreneurial society and ecosystem.



Source: DSBD, 2017

Garden Route Growth and Development

& Economic Recovery Plan

Waste & Biomass Value Chain & SMME Development

Harvesting /Sourcing Logistics/ Transport Secondary Processing Manufacturing/ Beneficiation Marketing & Selling



Finance, insurance, real estate and business



Wholesale and retail trade, catering and accommodation



Manufacturing



Transport, storage and communication



General government



Community, social and personal services



Construction



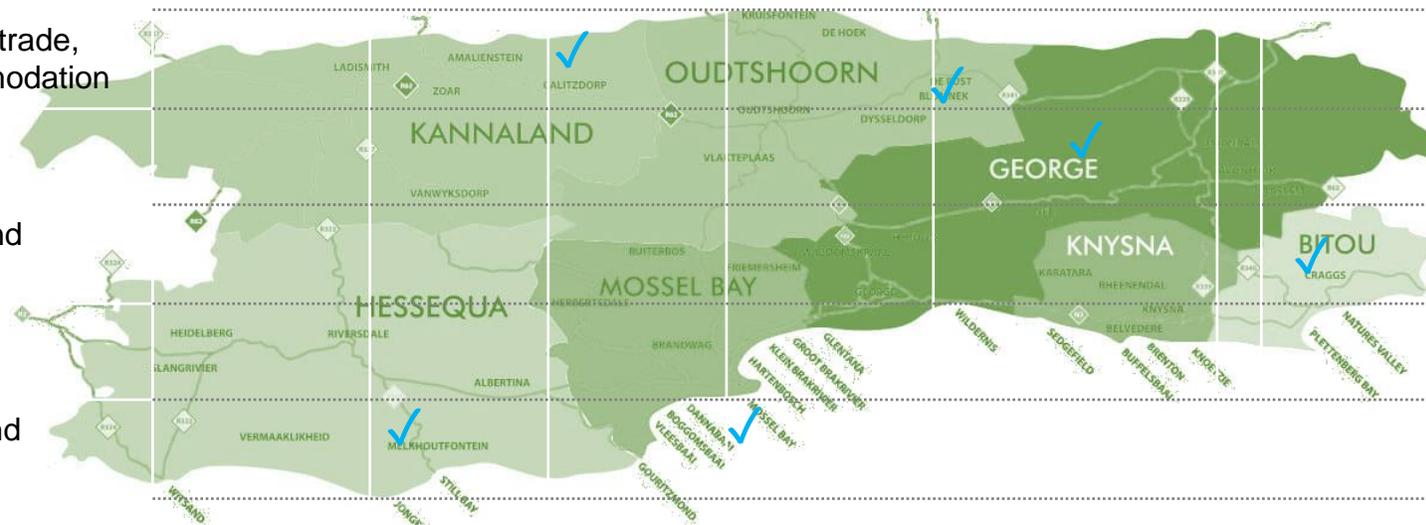
Agriculture, forestry and fishing



Electricity, gas and water



Mining and quarrying



1. A water secure future
2. A circular economy
3. Resilient agriculture
4. Sustainable tourism
5. Supporting wellbeing and resilience
6. A connected economy: transport and rural-urban integration and ICT
7. Sustainable local energy transition

Identification & Classification of SMMEs Across Region & Value Chain

Way Forward

- Data-driven SMME development & resource allocation
- Identification, training, support of local entrepreneurs already active in the waste and biomass beneficiation value chain
- CSR investment, enterprise and supplier development programmes (corporates – ESG targets)
- Business Incubation and Acceleration programmes – targeted and focused (waste & “biomasspreneur” development)
- Business mentorship (Business chambers can help)
- Knowledge sharing among SMME development partners (public & private sector stakeholders)
- Balance SMME development resources: Start-ups (1000 day-journey, low success rate) Vs BR&E (Quick wins; pivot, re-skilling, jobs)
- Resource matchmaking & regional/local procurement (trade between SMMEs)
- Market access & development – think global



Thank you

An Equity Fund Manager's Perspective on Funding Biomass Energy Projects

Key Takeaway

“More money than good projects.”

Criterion Africa Partners (CAP)

- Private Equity fund manager with \$250 m under management.
- Mandate covers agro-forestry, wood processing & biomass energy.
- Fund I portfolio includes a majority shareholding in MTO.

CAP Biomass Energy Projects

- Biomass focus areas:
 - Steam
 - Power
 - Pellets
 - Charcoal (pyrolysis)
- R100 million (\$6.5 million) invested so far by portfolio company MTO in three projects:
 - Woodlands Dairy (steam)
 - Tradelink Textiles (steam)
 - George Sawmill power generation (power)

Woodlands Dairy Biomass Boiler (12 tph)



George Sawmill Steam Turbine (1 MW_e)



Some of our Key Accomplishments

- Residue challenge resolved at two sawmills (after closure of the Coega pellet plant).
- Profitable deployment of capital.
- Satisfied customers enjoying long-term cost savings (minimum 15% per year against historic baseline).
- 100,000 tons of avoided CO₂ emission to date (5 years)

Some of our Key Challenges

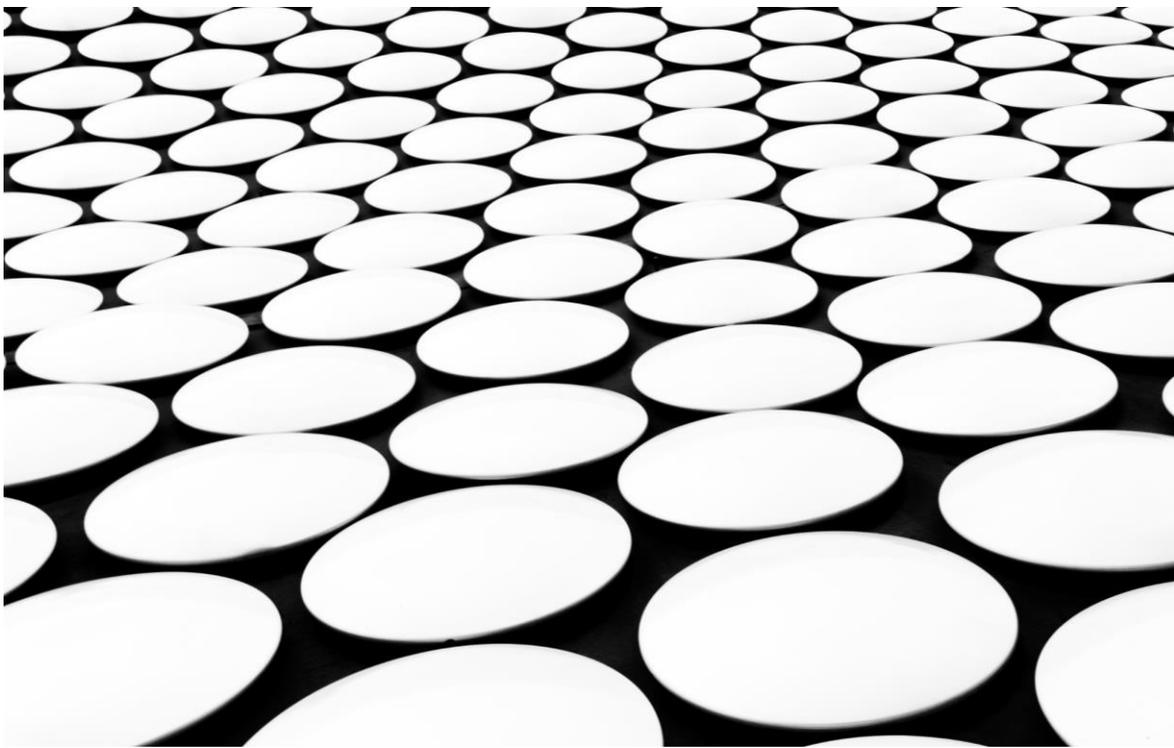
- **Steam:** lack of commitment by industry to shift away from coal
- **Power:** challenges in exporting surplus power at reasonable tariffs
- **Pellets:** EIA time-frame of 24 months for new plant
- **Charcoal:** competing against primitive, low-cost unsustainable technologies, deployed in dodgy geographies

What is a “Good Project”?

- Engage with motivated counterparties when developing new projects (preferably the owner, and preferably not corporates with layer-upon-layer of built-in resistance)
- Supply and off-take committed through long-term contracts
- Proven technology
- Positive impact story
- Acceptable risk-reward profile
- (Exposure to hard currency earnings would be nice!)

Conclusion

- The AIP resource is substantial and could complement traditional forest industry residues.
- The key challenge is long-term sustainability since the goal is eradication!
- Our view is that combining the two makes most sense.
- Our conclusion to date is that there is unfortunately too much money chasing too few good projects!



GARDEN ROUTE WASTE & BIOMASS BENEFICIATION CONFERENCE - NEXT STEPS

12 AUGUST 2021

NEXT STEPS

- Distribution of presentations to attendees
- Request attendees to contact / email presenters direct for more detailed information
- Attendees are invited to register as a stakeholder to participate in the Development of a Strategic Framework and Action Plan for the Invasive Biomass Economy in South Africa and more specifically the Garden Route
- Development of a new brand of SMME is a critical component that will elevate our biomass value chain beyond supply and demand towards a more restorative economic model
- Further investigations in terms of alternative energy crops to supplement Biomass to ensure sustainability
- Further feasibility studies in terms of using rail and sea to transport waste and biomass
 - Collaboration between Transnet, District and local Municipalities and any private sector entity interested in the future of our green Garden Route as part of the Green Cape initiative

NEXT STEPS

- Cluster formation:
 - Task team to investigate and work on cluster concept
 - Engagement with stakeholders
 - Creation of an industry body
- Industrial symbiosis
 - Evaluate technology options.
 - Engaged with Technology, Treatment & Processing providers.
 - Logistic analysis and identification of collaboration opportunities.
 - Implementing suitable solutions
- Attendees can potentially work together on a business case – on the call there are a few companies that can assist in putting this opportunity together
 - Find, identify and implement the “Good Projects”