water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

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The Determination of Resource Quality Objectives for estuaries in the Berg WMA

TTG 2

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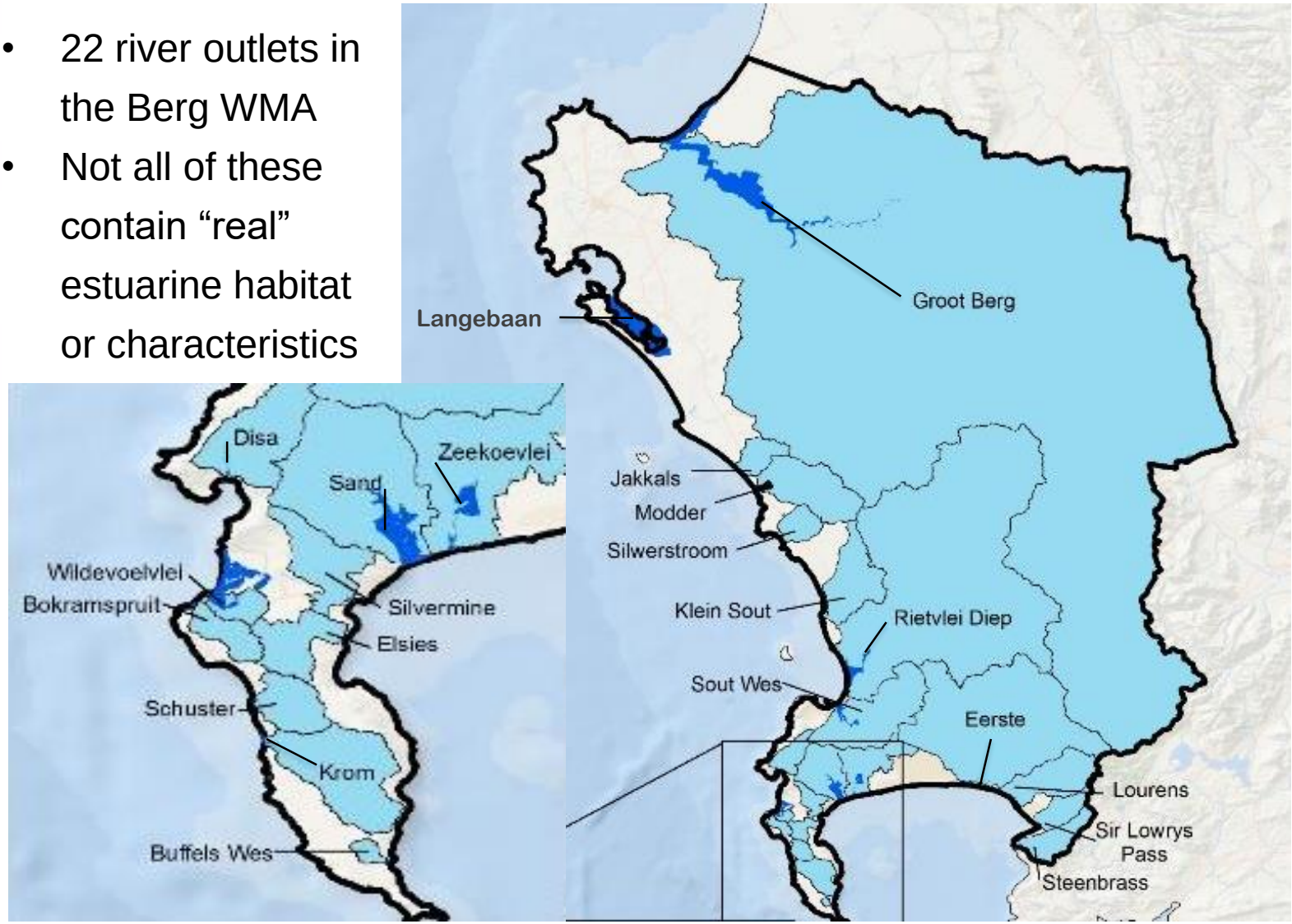
Venue: El Lions Venue, West Coast Road (R304), Dassenberg

Outline

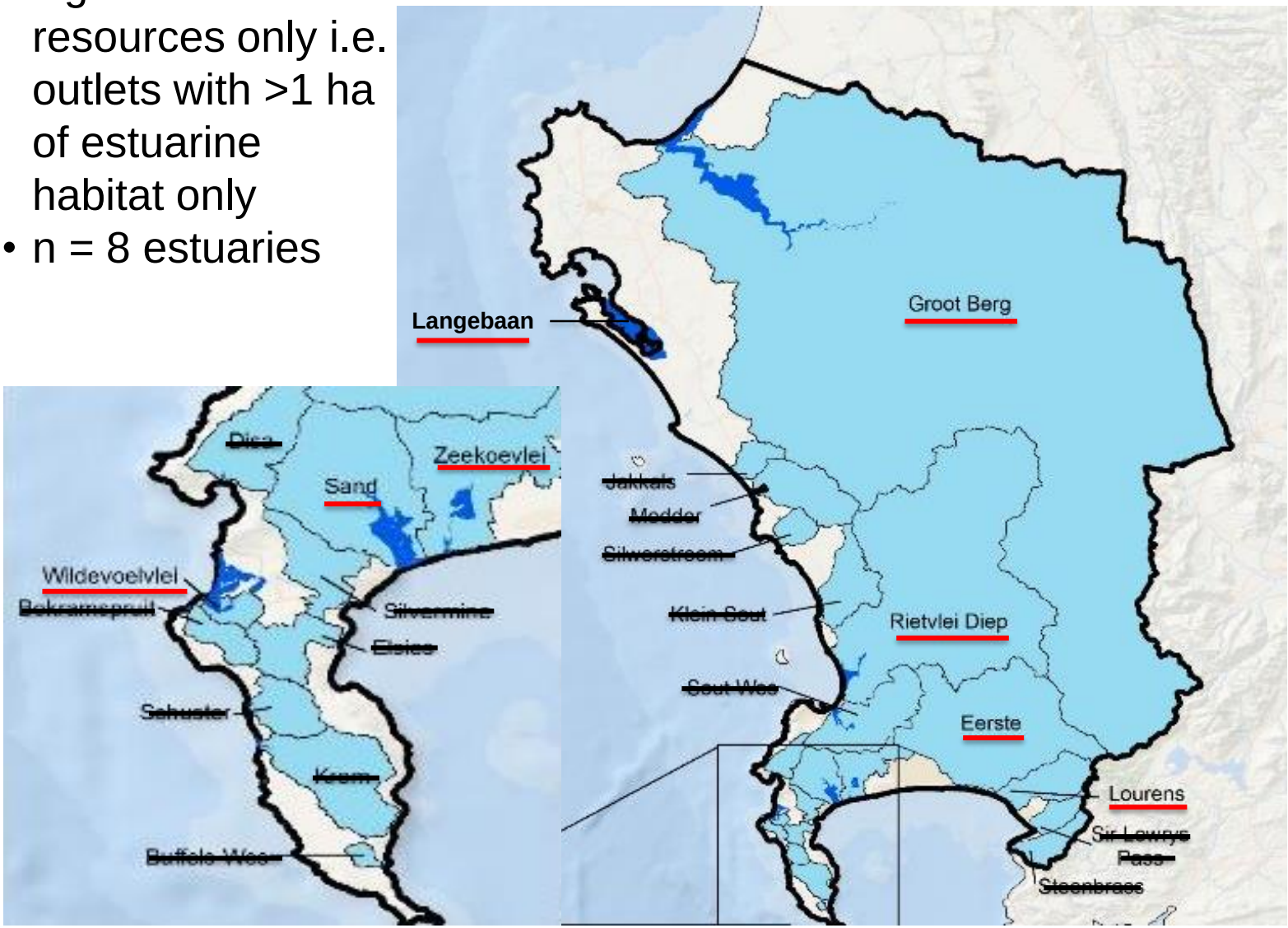
1. Estuaries in the Berg WMA
2. Prioritisation of estuaries for RQO development
3. Selection of indicators for monitoring
4. Numerical RQOs and narrative limits (examples)

Estuaries in the Berg WMA

- 22 river outlets in the Berg WMA
- Not all of these contain “real” estuarine habitat or characteristics



- Classification of significant water resources only i.e. outlets with >1 ha of estuarine habitat only
- n = 8 estuaries



Prioritisation of estuaries for RQO development

- Priority estuaries were identified using two approaches:
  - Estuary Importance Score (EIS) which is incorporated in the EWR methods for estuaries (initially completed in 2002 for all estuaries in SA, updated in numerous times thereafter)
    - ➢ Conservation importance only
  - Resource Unit Prioritisation Tool (RUPT), published by DWA (2011)
    - ➢ Socio-economic & conservation importance

Estuary Importance Score (EIS)

Criterion	Score (e.g.)	Weight
Size		15
Zonal Type Rarity		10
Habitat Diversity		25
Biodiversity Importance		25
Functional Importance		25
ESTUARY IMPORTANCE SCORE = Weighted Mean	0-100	

Importance score	Description
81 – 100	Highly important
61 – 80	Important
0 – 60	Of low to average importance

EIS Results

ESTUARY (West to East)	Plant	Invert	Fish	Bird	Biodiversity	Size	Habitat	Zonal Type Rarity	Importance Score*	Rank
Berg (Groot)	90	80	100	100	97.5	100	100	90	98.4	3
Rietvlei/Diep	100	80	80	100	96.0	100	10	60	72.5	55
Houtbaai	60	10	10	10	42.5	10	50	90	36.1	176
Wildevoëlvlei	100	30	30	100	86.0	80	90	60	82.0	29
Bokramspruit	10	10	10	40	29.5	10	10	60	19.9	233
Schuster	10	10	10	10	10.0	10	10	60	15.0	246
Krom	100	10	10	10	68.5	10	10	60	29.6	204
Silvermine	90	10	20	10	63.5	30	50	10	41.4	255
Sand	70	80	80	100	91.5	90	70	10	77.4	45
Eerste	50	10	30	80	64.5	40	40	10	43.1	149
Lourens	60	10	20	60	51.5	30	30	10	33.4	189
Sir Lowry's Pass	90	10	20	10	63.5	20	20	10	29.9	202
Steenbras	10	30	20	10	17.5	20	10	20	16.9	240

- **Langebaan, Zeekoevlei have not been evaluated using the EIS**

Resource Unit Prioritisation Tool (RUPT)

1. Provision of cultural services to society
2. Provision of supporting livelihoods of significant vulnerable communities
3. Importance in meeting strategic requirements and international obligations
4. Provision of supporting and regulating services
5. Contributing to the economy (GDP and job creation) in the catchment (e.g. commercial agriculture, industrial abstractions and bulk abstractions by water authorities)
6. Level of threat posed to users
7. EIS category
8. Present ecological status
9. Priority in provincial / fine scale aquatic biodiversity plans
10. Level of threat posed to ecological components of the estuary
11. Estuaries with PES lower than a D Category or lower than the accepted gazetted category
12. Availability of EWR site data or other monitoring data (RHP, DWS gauging weirs etc.)
13. Accessibility of resource unit for monitoring
14. Safety risk associated with monitoring RUs.

RUPT Results

	Berg (Groot)	Paternosterbaai	Langebaan	Dwars (Noord)	Dwars (Suid)	Modder	Jacobsbaai	Loerbaai	Bok	Silwerstroom	Springfontein	Sout (Suid)	Rietvlei/ Diep	Sout (Wes)
Position in IUA	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Concern for users	0.25	0.00	0.25	0.00	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.13
Concern for environment	0.23	0.00	0.19	0.00	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.13
Management and practical considerations	0.25	0.06	0.13	0.06	0.06	0.20	0.06	0.00	0.00	0.06	0.00	0.06	0.25	0.18
Total Prioritization Score	**0.98**	**0.31**	**0.81**	**0.31**	**0.31**	**0.70**	**0.31**	**0.25**	**0.25**	**0.31**	**0.25**	**0.31**	**0.98**	**0.68**
Priority Rating	**1.0**	**0.3**	**0.8**	**0.3**	**0.3**	**0.6**	**0.3**	**0.3**	**0.3**	**0.3**	**0.3**	**0.3**	**1.0**	**0.6**

	Hout baai	Wildevöel vlei	Bokram spruit	Schuster	Krom	Buffels Wes	Elsies	Silver mine	Sand	Zeekoe	Eerste	Lourens	Sir Lowry's Pass	Steen bras
Position in IUA	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Concern for users	0.10	0.13	0.10	0.04	0.02	0.02	0.10	0.10	0.23	0.10	0.21	0.10	0.09	0.09
Concern for environment	0.06	0.11	0.06	0.00	0.00	0.00	0.06	0.11	0.19	0.15	0.19	0.19	0.08	0.13
Management and practical considerations	0.23	0.23	0.23	0.07	0.05	0.17	0.23	0.23	0.25	0.22	0.21	0.25	0.08	0.07
Total Prioritization Score	**0.64**	**0.71**	**0.64**	**0.36**	**0.32**	**0.44**	**0.64**	**0.69**	**0.91**	**0.72**	**0.86**	**0.79**	**0.50**	**0.54**
Priority Rating	**0.6**	**0.7**	**0.6**	**0.4**	**0.3**	**0.5**	**0.6**	**0.6**	**0.9**	**0.7**	**0.9**	**0.8**	**0.5**	**0.5**

Priority estuaries for RQO development

Estuary	EIS	RUPT	Estuary	EIS	RUPT
Berg (Groot)	X	X	Hout baai		
Paternosterbaai			Wildevöelvlei	X	X
Langebaan	-	X	Bokram spruit		
Dwars (Noord)			Schuster		
Dwars (Suid)			Krom		
Modder			Buffels Wes		
Jacobsbaai			Elsies		
Loerbaai			Silver mine		
Bok			Sand	X	X
Silwerstroom			Zeekoe	-	X
Springfontein			Eerste		X
Sout (Suid)			Lourens		X
Rietvlei/ Diep	X		Sir Lowry's Pass		
Sout (Wes)			Steen bras		

Selection of indicators for monitoring

- Indicators for priority estuaries were identified through two means:
  - RDM studies which generally include a list of indicators, and ecological specifications (Ecospecs) and Thresholds of Potential Concern (TPCs) for each indicator
  - The Resource Unit Evaluation Tool (RUEV) published by DWA (2011)

Ecospecs & TPCs from RDM studies

	Flow	Mouth condition and sedimentary processes	Water quality	Microalgae	Macrophytes (plants)	Invertebrates	Fish	Birds	Additional (non-flow related) interventions to achieve the TEC:
Berg (Groot)	✔	✔	✔	✔	✔	✔	✔	✔	✔
Langebaan	✔	✔	✔	✔	✔	✔	✔	✔	✔
Rietvlei/ Diep	✔	✔	✔	✔	✔	✔	✔	✔	✔
Wildevöelvlei	✔	✔	✔	✔	✔	✔	✔	✔	✔
Sand	✔	✔	✔	✔	✔	✔	✔	✔	✔
Zeekoe	✔	✔	✔	✔	✔	✔	✔	✔	✔
Eerste	✔	✔	✔	✔	✔	✔	✔	✔	✔
Lourens	✔	✔	✔	✔	✔	✔	✔	✔	✔

Resource Unit Evaluation Tool (RUEV)

Activities that impact on the water resource	User groups
• Afforestation	• Commercial irrigated agriculture
• Alien vegetation	• Commercial livestock production
• Artificial breaching or mouth stabilisation	• Industrial users
• Concentrated livestock operations	• International users
• Dams	• Per-urban users
• Dredging activities	• Real estate and property
• Dryland agriculture (including sugarcane & other crops)	• Recreation and ecotourism
• Industrial areas	• Rural users
• Infrastructure (including roads, powerlines etc)	• Strategic users
• Inter-basin transfers	• Urban and residential users
• Irrigated agriculture	• Water Institutions
• Livestock grazing	• Other
• Mining activities	
• Recreation and ecotourism	
• Rural Settlements practicing subsistence resource use	
• Sewage works and solid waste sites	
• Urban areas	
• Urban Informal settlements	
• Rehabilitation activities	
• Other	

Resource Unit Evaluation Tool (RUEV)

	Quantity		Hydro-dynamics		Quality							Physical habitat			Biota				
	Low Flows	High Flows (Floods)	Mouth Condition	Abiotic states	Salinity	Dissolved inorganic nitrogen	Dissolved inorganic phosphate	Water clarity	Dissolved oxygen	Toxic substances	Pathogens	Intertidal	Subtidal	Substrate type	Microalgae	Macrophytes	Invertebrates	Fish	Birds
Berg (Groot)	Y	Y	Y		Y	Y		Y	Y		Y				Y	Y	Y	Y	Y
Langebaan	Y	Y	Y		Y	Y		Y	Y		Y				Y	Y			Y
Rietvlei/ Diep	Y	Y	Y		Y	Y		Y	Y								Y	Y	Y
Wildevöelvlei	Y	Y	Y		Y	Y			Y						Y	Y	Y	Y	Y
Sand	Y	Y	Y		Y	Y		Y	Y		Y				Y	Y	Y	Y	Y
Zeekoe	Y	Y	Y		Y	Y		Y	Y		Y				Y	Y	Y	Y	Y
Eerste	Y	Y	Y		Y	Y		Y	Y		Y				Y	Y			Y
Lourens	Y	Y	Y		Y	Y		Y	Y		Y						Y	Y	Y

Estuary RQO Template

IUA	Node	Quat	REC		Current		Target	
			EC	%nMAR	PES	%nMAR	EC	%nMAR
A1-Berg estuary	Bxi1	G10M	B	57.0	C	50.0	C	57.0
TEC SPECIFICATIONS								
Flow	•							
Mouth condition and sedimentary processes	•							
Water quality	•							
Microalgae	•							
Macrophytes (plants)	•							
Invertebrates	•							
Fish	•							
Birds	•							
Additional (non-flow related) interventions to achieve the TEC:								
Source of information	DWAF (2003) Intermediate Determination of Resource Directed Measures for the Breede River Estuary							

e.g. Berg