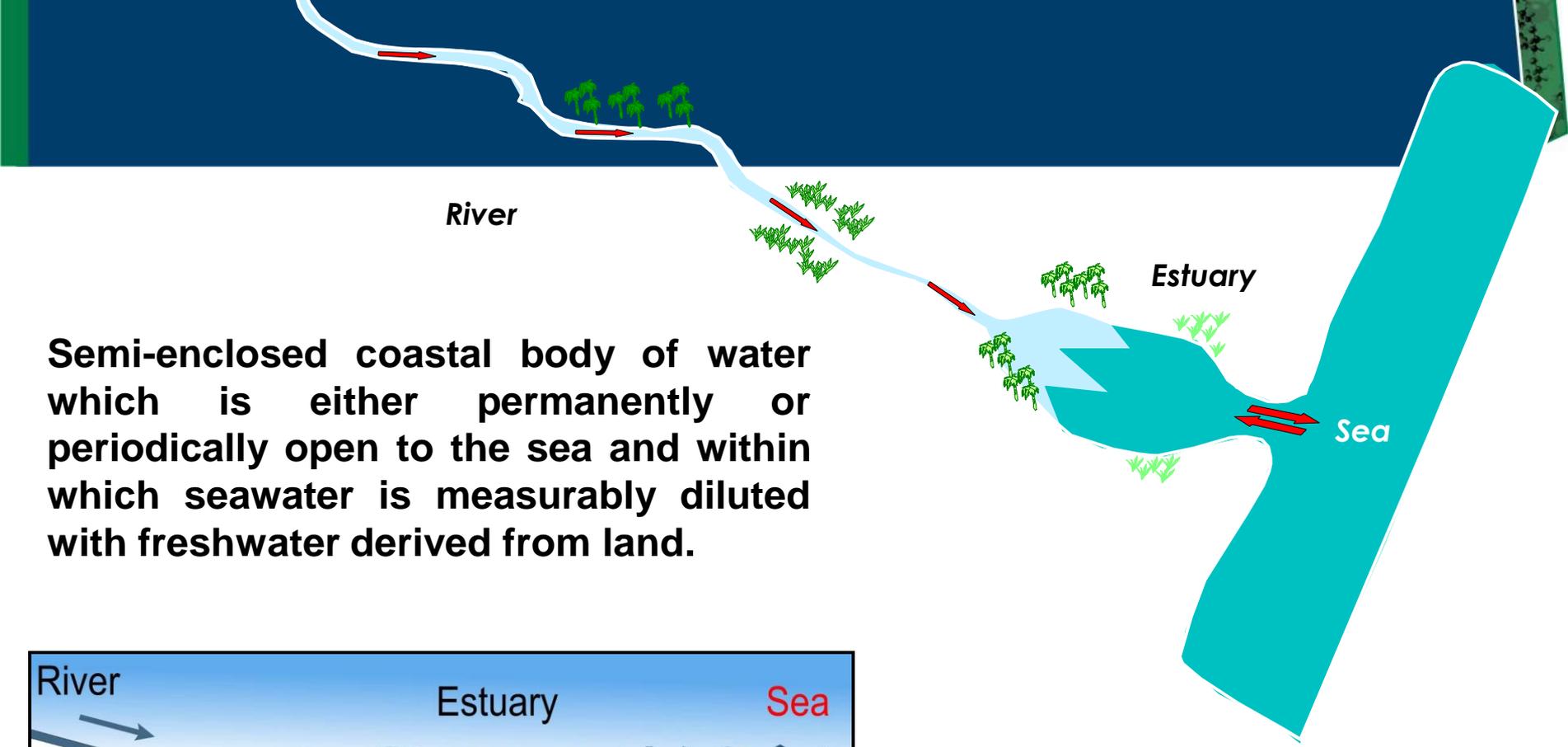


Department of Botany, Coastal & Marine Research Institute,
Sustainability Research Unit, Faculty of Science

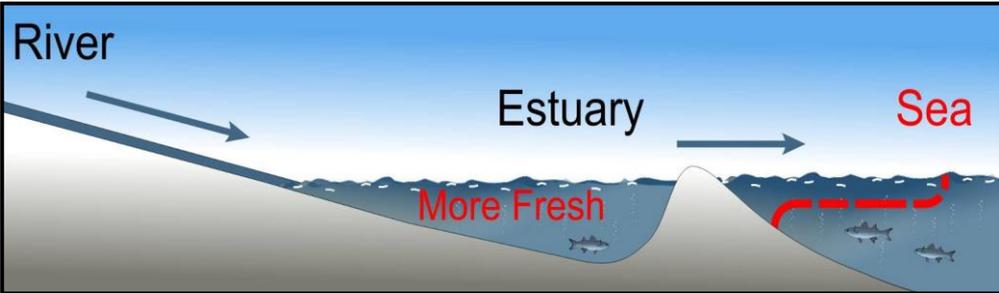
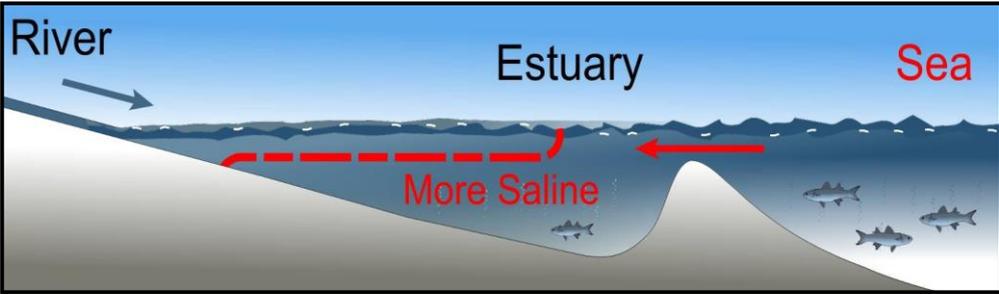
Linking science, policy & management

Estuaries & Shallow Water Ecosystem Projects

Janine Adams (janine.adams@nmmu.ac.za)



Semi-enclosed coastal body of water which is either permanently or periodically open to the sea and within which seawater is measurably diluted with freshwater derived from land.



PRESSURES

- Land-use & infrastructure development
- Water quality and quantity
- Exploitation of living resources



Engagement categories

- Professional / Discipline based service profession
- Teaching & Learning
- Research & Scholarship



Engagement beneficiaries & target groups

Local government : Nelson Mandela Metro, Kouga, eThekweni

Provincial government : DEDEA

National government : DEA, DW&S

**Conservation authorities :
SANParks, CapeNature, Eastern Cape Parks, Ezemvelo KZN Wildlife**

Public, Learners



PARTNERS



- **Internal** Botany, Zoology, CMR
- **External** CSIR, South African Institute for Aquatic Biodiversity, South African Environmental Observatory Network, UKZN, Rhodes, Oceanographic Research Institute, Institute for Natural Resources, CapeNature, isiMangaliso Wetland Park Authority, South African National Biodiversity Institute
- **Funders** Water Research Commission, National Research Foundation
- **Networks**
 - FETwater (Further Education & Training in the water sector)
 - SANCOR (South African Network for Coastal and Oceanographic Research)
 - Consortium for Estuarine Research & Management
promoting wise management through joint participation in directed research, training and technology transfer



PROJECT EXAMPLES

- **Nelson Mandela Bay Metro** – water quality monitoring and management of the Swartkops River and Estuary.
- **Ezemvelo KZN Wildlife** – conservation and management of St Lucia Estuary, a World Heritage site.
- **SANParks** – Sundays Estuary and Algoa Bay as a Marine Protected Area
- **SAEON (South African Environmental Observatory Network)** – long term monitoring of Eastern Cape estuaries.
- **South African National Biodiversity Institute** – research and management of the invasive grass *Spartina alterniflora* in the Great Brak Estuary.
- **North-West University, University of Johannesburg, University of Cape Town, Water Research Commission** – development of course work Masters in environmental water requirements.

ONGOING COLLABORATIVE THEMES

Department of Environmental Affairs : Oceans & Coasts

- Estuary management
- Integrated Coastal Management Act

Department of Environmental Affairs : SANBI

- Estuary conservation & biodiversity protection plans
- National Biodiversity Act

Department of Water & Sanitation

- Ecological water requirements of estuaries
- National Water Act

What led to the establishment / initiation of your project?

ECOLOGICAL WATER REQUIREMENTS

(water quantity & quality requirements of estuaries)

- Information requirements for the implementation of resource directed measures for estuaries focusing on KZN systems (WRC K5/1247) – CERM’s “Amazon Project” (2001-2003)
- Studies on the river-estuary interface region of selected Eastern Cape estuaries (WRC 756/1/03) (2003)
- Development of Resource Monitoring procedures for estuaries (WRC K5/1308) (2001-2003)
- Freshwater requirements of intermittently open Cape estuaries (WRC K5/1581/0/1) (2006-2008)



ECOLOGICAL WATER REQUIREMENTS : REPORTS

Collective scientific learning incorporated into DWS: “Method for determination of Ecological Water Requirements in Estuaries” *regularly updated since 1999...*

WATER RESOURCE PROTECTION AND
ASSESSMENT POLICY IMPLEMENTATION PROCESS

Resource directed measures for protection of
water resource:

Methodology for the Determination of the
Ecological Water Requirements for Estuaries

(referred to as preliminary Ecological Reserve)

Department of Water Affairs and Forestry
South Africa



Version 2

May 2004
(amended 2008)

WATER RESOURCE PROTECTION AND ASSESSMENT POLICY
IMPLEMENTATION PROCESS

Resource directed measures for protection of water resources:

Methods for the Determination of the
Ecological Reserve for Estuaries



Department of Water Affairs
South Africa

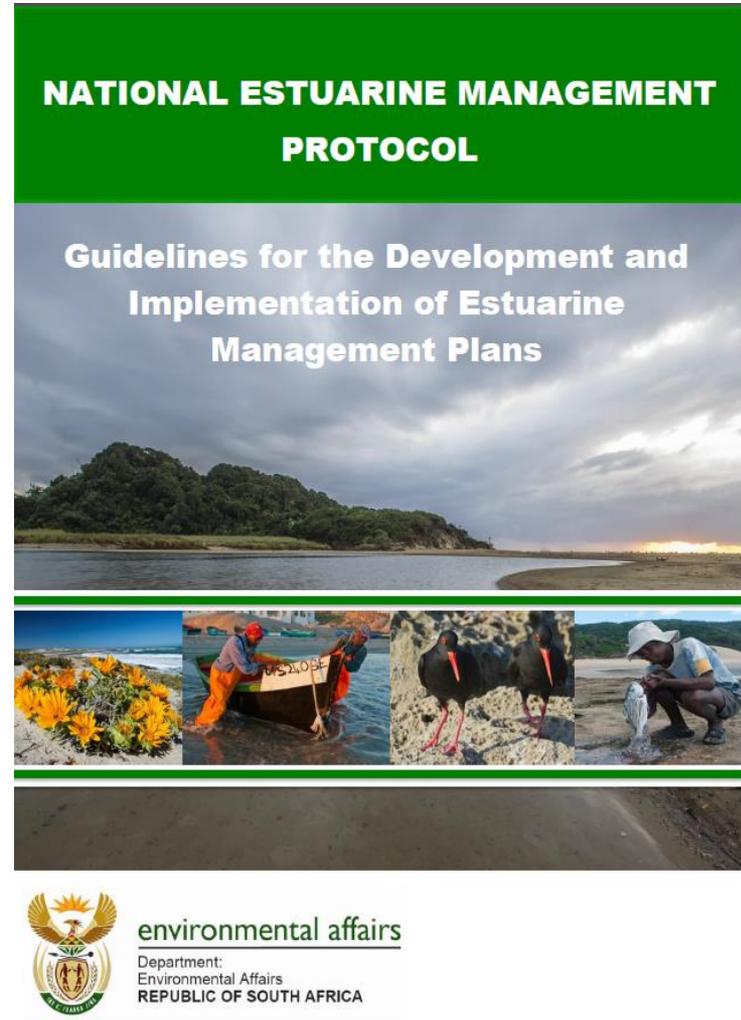
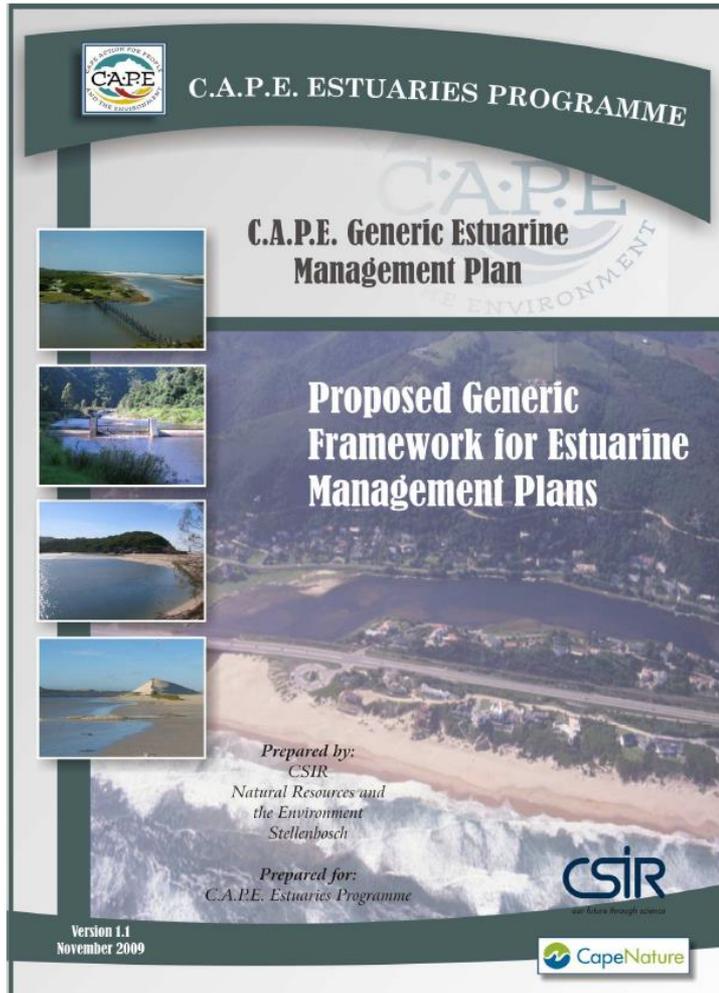
Version 3

May 2012

CERM
Consortium for Estuarine
Research and Management

WRC
WATER RESEARCH COMMISSION

ESTUARY MANAGEMENT



ESTUARY CONSERVATION & BIODIVERSITY PROTECTION PLANS

NATIONAL BIODIVERSITY ASSESSMENT 2011



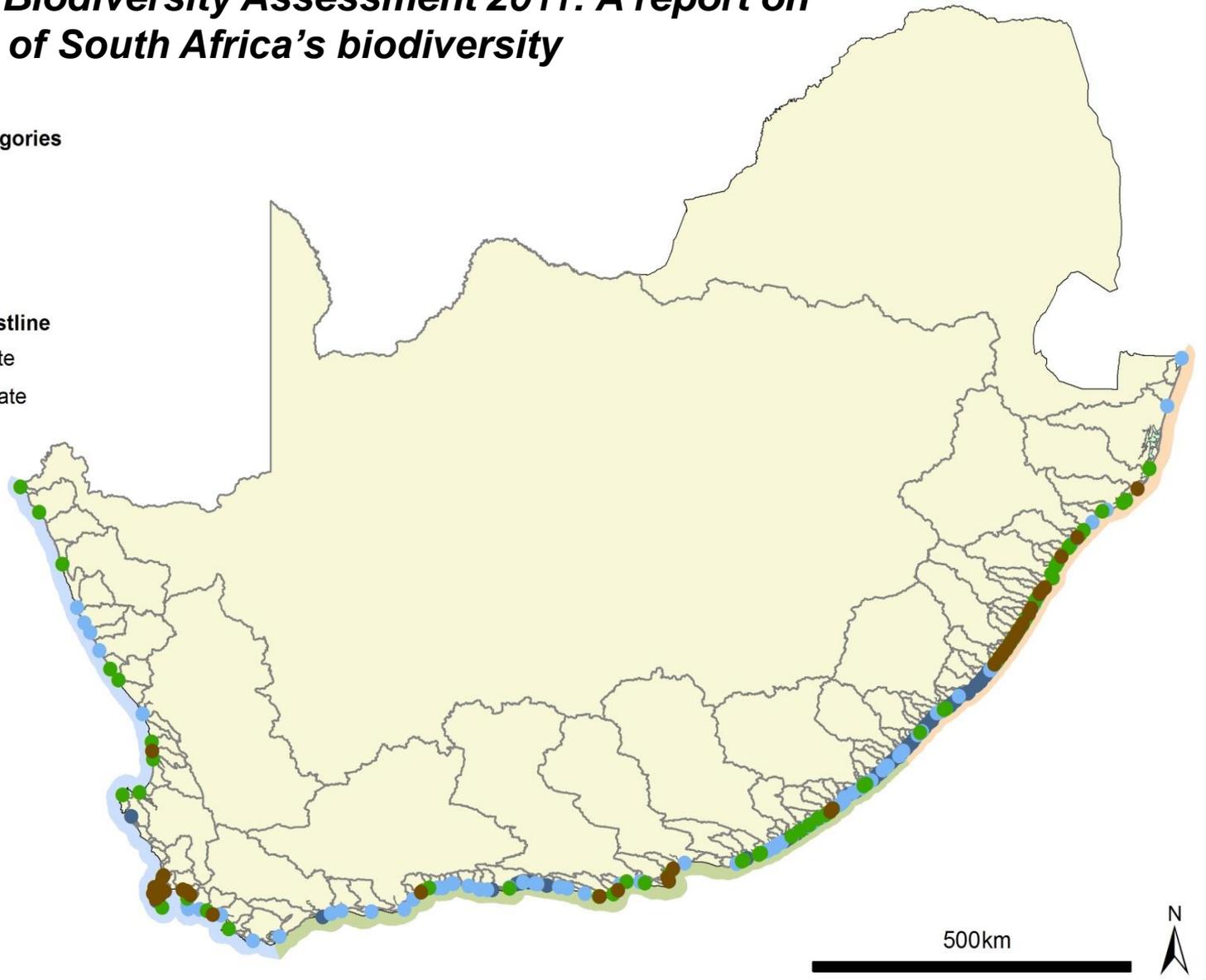
National Biodiversity Assessment 2011: A report on the state of South Africa's biodiversity

Estuary health categories

- Poor
- Fair
- Good
- Excellent

Biogeographic coastline

- Cool Temperate
- Warm Temperate
- Sub-Tropical



SHORT LEARNING PROGRAMME (2008-2015)

MANAGEMENT OF ESTUARIES IN SOUTH AFRICA

Valuing our estuaries, geographic boundaries, structure & function, threats, important legislation, estuary management plans



Zinkwazi 2014



Linking science, policy & management

Estuary lateral boundary

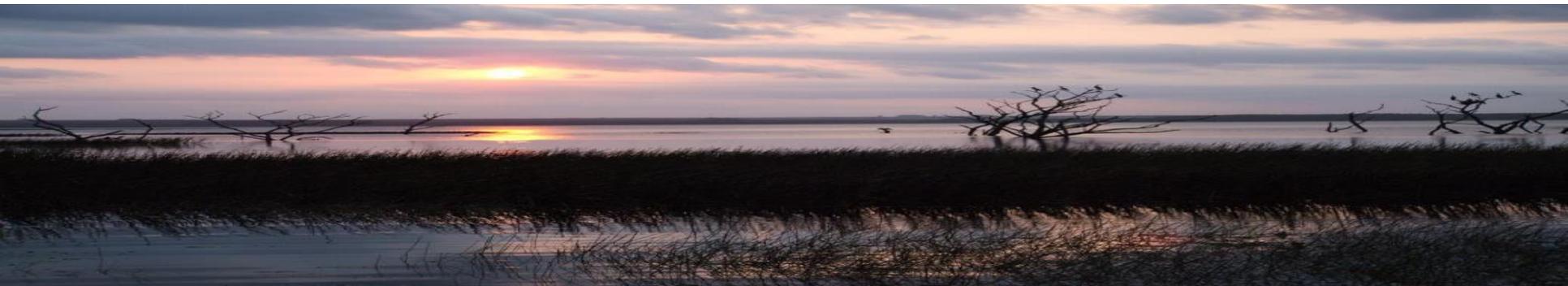
5 m contour line = estuary functional zone

- *GNR 546 Listing Notice 3, National Environmental Management Act Environmental Impact Assessment Regulations (2010) identifies the estuarine functional zone as a sensitive area*



FURTHER RESEARCH to be incorporated in 2018 National Biodiversity Assessment

- Veldkornet, DA, JB Adams, L Van Niekerk. 2015. Characteristics and landcover of estuarine boundaries: implications for the delineation of the South African estuarine functional zone. *Southern African Journal of Marine Science* (in press)
- Veldkornet, D, JB Adams and A. Potts. 2015. Where do you draw the line? Determining the transition thresholds between estuarine salt marshes and terrestrial vegetation. *South African Journal of Botany* (available digitally)



Knowledge transfer

SANBI

Biodiversity for Life



Great Brak Estuary – southern Cape –invasive *Spartina alterniflora*

Adams, JB, A Grobler, C Rowe, T Riddin, TG Bornman and DR Ayres. 2012. Plant traits and spread of the invasive salt marsh grass, *Spartina alterniflora* Loisel., in the Great Brak Estuary, South Africa. *African Journal of Marine Science* 34 (3) : 313–322.

South African National Biodiversity Institute – Invasive Species Programme

* *Chemical treatment & monitoring*



Janine Adams, Ernita van Wyk, Taryn Riddin. 2015. First record of *Spartina alterniflora* in southern Africa indicates adaptive potential of this saline grass. Biological Invasions (in press)

Taryn Riddin, Janine Adams and Ernita van Wyk. Management of the invasive estuarine grass *Spartina alterniflora* in the Great Brak Estuary, South Africa. South African Journal of Botany (under review)



BENEFITS - engagement

ORANGE RIVER MOUTH REHABILITATION

Research on the structure and function of this estuary has contributed to rehabilitation protocols as part of the activities of Working for Wetlands (Department of Environmental Affairs).



Shaw, GA, JB Adams and TG Bornman. 2008. Sediment characteristics and seed bank structure as indicators for the potential rehabilitation of the Orange River estuary salt marsh. *Journal of Arid Environments* 1097-1109.

Bornman, TG and JB Adams. 2010. Response of a hypersaline salt marsh to a large flood and rainfall event along the west coast of southern Africa. *Estuarine, Coastal and Shelf Science* 1-9.



iSimangaliso
Wetland Park



GLOBAL ENVIRONMENTAL FACILITY

Analysis of alternatives to determine the most
feasible solution to the hydrological issues of the
Lake St Lucia estuarine system

NMMU Shallow Water Ecosystems Chair



2

1200 m

Image © 2013 DigitalGlobe

Google earth

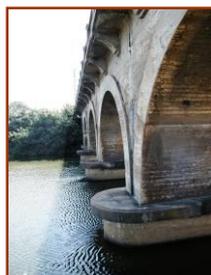
Engagement integration into the Teaching and Learning, Research and Service functions

- Undergraduates – real issues e.g. 1st year ecology and environmental management students, 3rd year modules including research projects
- Postgraduates – engagement projects provide funding, contribute to completion of degrees and publication of articles
- TRAINING & CAPACITY BUILDING



OUTPUTS – recent MSc dissertations

- Pretorius, L. 2015. Spatial and temporal variability in water quality characteristics of the Swartkops Estuary.
- Cowie, M. 2015. Environmental flows, health and importance of macrophytes in the estuaries of Water Management Area 11.
- Rautenbach, K. 2015. Present state of macrophytes and responses to management scenarios at the St Lucia and Mfolozi estuaries.



OUTPUTS – examples

- Adams, J. 2013. A review of methods and frameworks used to determine the environmental water requirements of estuaries. *Hydrological Sciences Journal* 59 (3), 1–15.
- Lemley, DA, S Taljaard, JB Adams and N Strydom. 2014. Nutrient characterisation of river inflow into the estuaries of the Gouritz Water Management Area, South Africa. *Water SA* 40: 687-698.
- Veldkornet, DA, JB Adams, L Van Niekerk. 2015. Characteristics and landcover of estuarine boundaries: implications for the delineation of the South African estuarine functional zone. *Southern African Journal of Marine Science* in press
- Cilliers, GJ and JB Adams. Development and implementation of a monitoring programme for South African estuaries. *Water SA* accepted.



OUTPUTS – multi-disciplinary, multi-institutional studies

- Whitfield, AK, Bate, GC, Adams, JB, Cowley, PD, Froneman, PW, Gama, PT, Strydom, NA, Taljaard, S, Theron, AK, Turpie, JK, van Niekerk, L and TH Wooldridge. 2012. A review of the ecology and management of temporarily open/closed estuaries in South Africa, with particular emphasis on river flow and mouth state as primary drivers of these systems. *African Journal of Marine Science* 34(2): 163–180.
- Van Niekerk L, Adams JB, Bate GC, Forbes N, Forbes A, Huizinga P, Lamberth SJ, MacKay F, Petersen C, Taljaard S, Weerts S, Whitfield AK and Wooldridge TH. 2013. Country-wide assessment of estuary health: An approach for integrating pressures and ecosystem response in a data limited environment. *Estuarine Coastal & Shelf Science* 130: 239-251.



BENEFITS OF ENGAGEMENT



- Relevant teaching, learning & research
- Capacity building
- New knowledge & transfer of knowledge
- Student interaction with variety of stakeholders & multi-disciplinary teams
- Quality students
- Networks



CHALLENGES OF ENGAGEMENT

- Choice
- Time to develop and maintain relationships
- Professional approach
 - timeous responses finance & admin, risk student projects
- Balance blue-sky & applied research
- Reporting - not one project – ongoing collaboration and interaction



INSTITUTIONAL SUPPORT

At an institutional level, what do you believe could be done to assist/enable your project/engagement activities?

- Critical mass needed, academic appointments, post-docs
- Opportunities for trans-disciplinary interaction – need strong research leadership & communication



Thank-you

