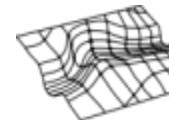


GROUNDWATER/SEAWATER INTERACTION ALONG THE SOUTH AFRICAN SOUTHERN COAST AND ITS EFFECTS ON ECOSYSTEMS AND SUSTAINABLE WATER RESOURCE MANAGEMENT

Project partners / team



Sponsored by



Federal Ministry
of Education
and Research

FKZ: 02WSP1306D



Deutscher Akademischer Austausch Dienst
German Academic Exchange Service

Funding period

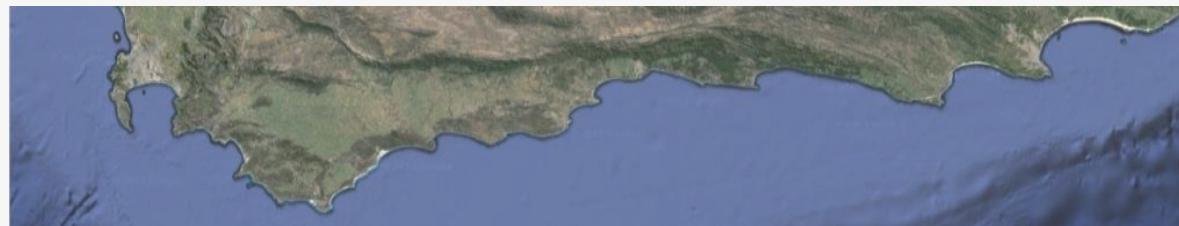
08/2013 – 07/2016

Subproject 4: Effects of land use

A framework to assess and map the potential effects of land use on groundwater and submarine groundwater discharge along the southern coast, South Africa: Linking Groundwater and Ecosystem Services

Hanlie Malherbe

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HYDROLOGICAL ECOSYSTEM SERVICES



Provisioning services

Regulating services

Supporting services

Cultural services

(Millenium Ecosystem Assessment. 2005)

supply of clean water

water cycle

support of healthy habitats

recreation



Linking Groundwater with Ecosystem Services

Provisioning Ecosystem Service
Supporting Ecosystem Service

Coastal Groundwater
Coastal Marine & Estuarine Water



18°0'0"E

19°0'0"E

20°0'0"E

21°0'0"E

22°0'0"E

23°0'0"E

33°0'0"S

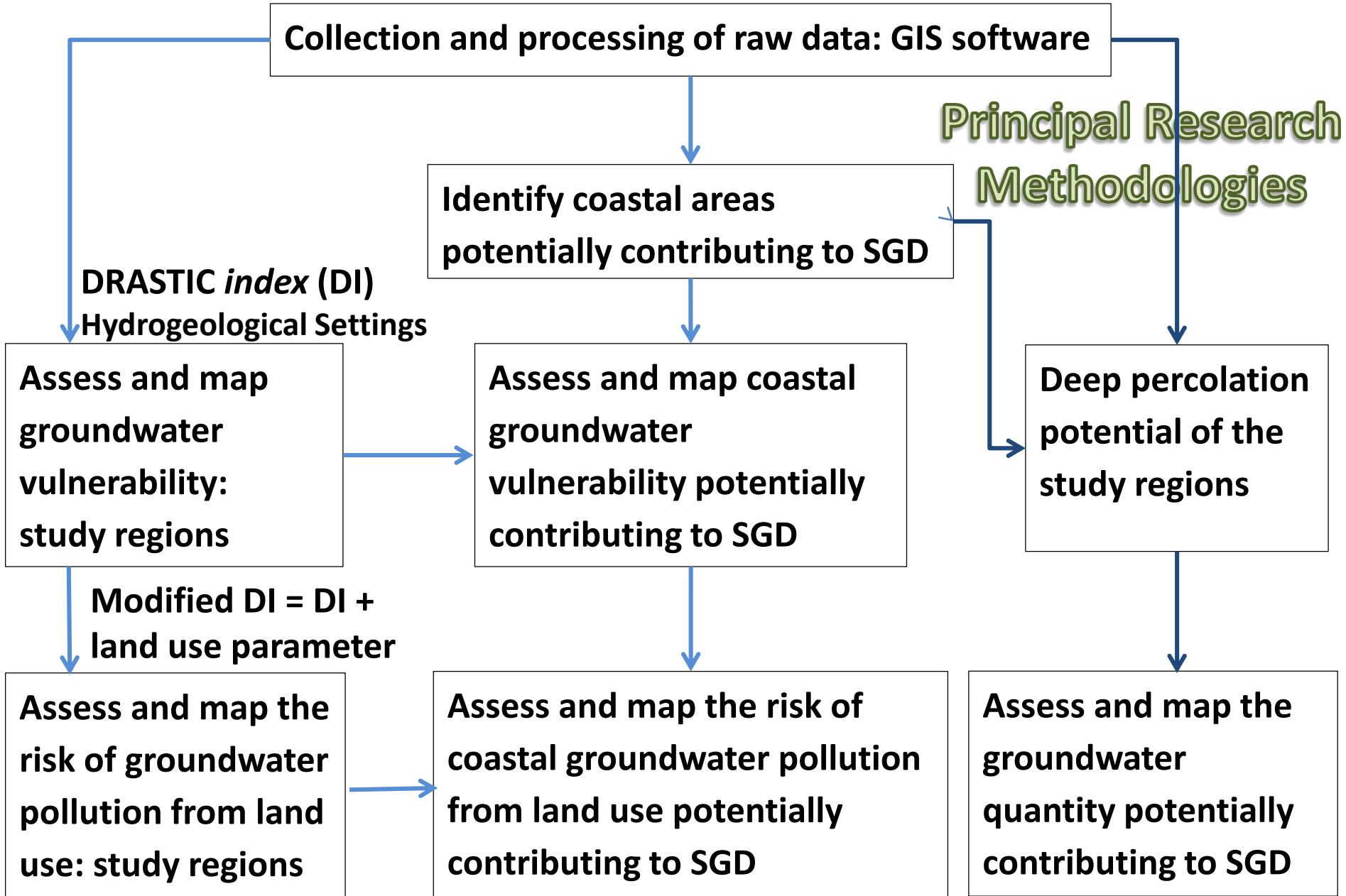
34°0'0"S

35°0'0"S



Study Regions





Delineation of areas potentially contributing to SGD

Sandy soils (>80%) of the coastal areas from the Harmonized World Soil Database (HWSD) was used as an indicator for sandy aquifers

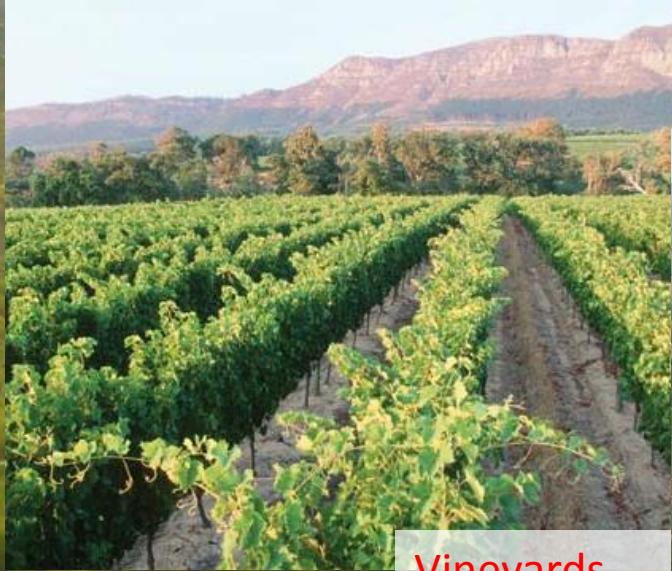
Identify catchments of the sandy aquifers not discharging into major river networks

Identify special coastal areas too flat to contribute to catchments

Identify the coastal special areas of the sandy aquifers

Coastal areas potentially contributing to SGD

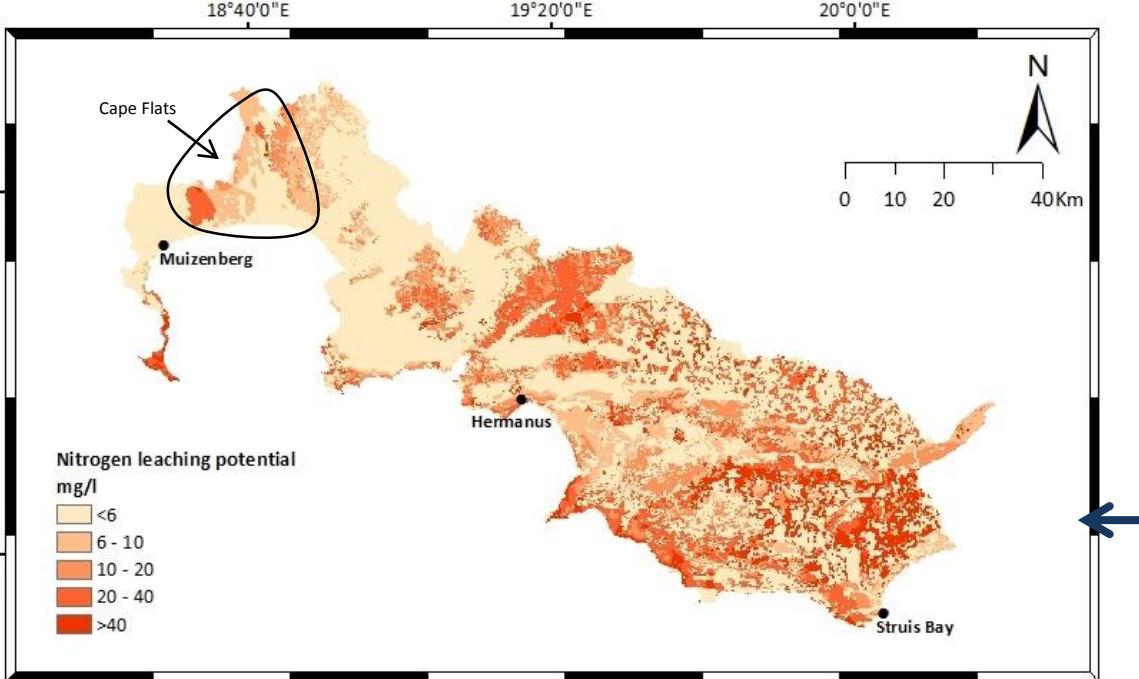
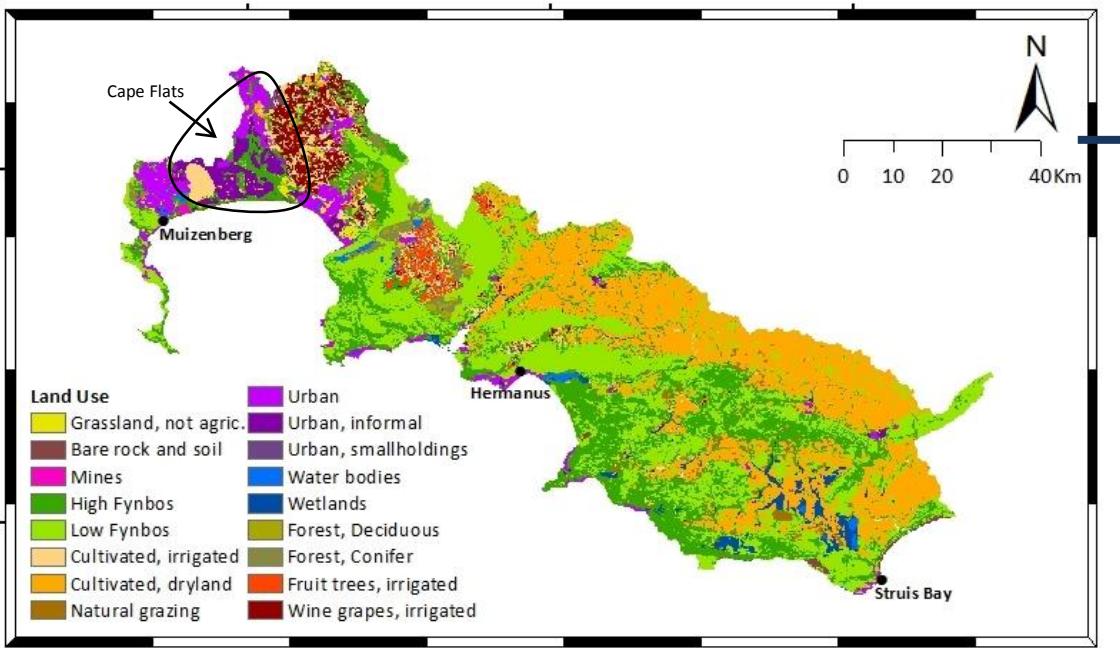
Sources - land pressures



EXAMPLE 1

Nitrogen leaching potential Simulation: STOFFBILANZ

Project Partner: "Gesellschaft für Angewandte Landschaftsforschung (GALF)," Dresden, Germany

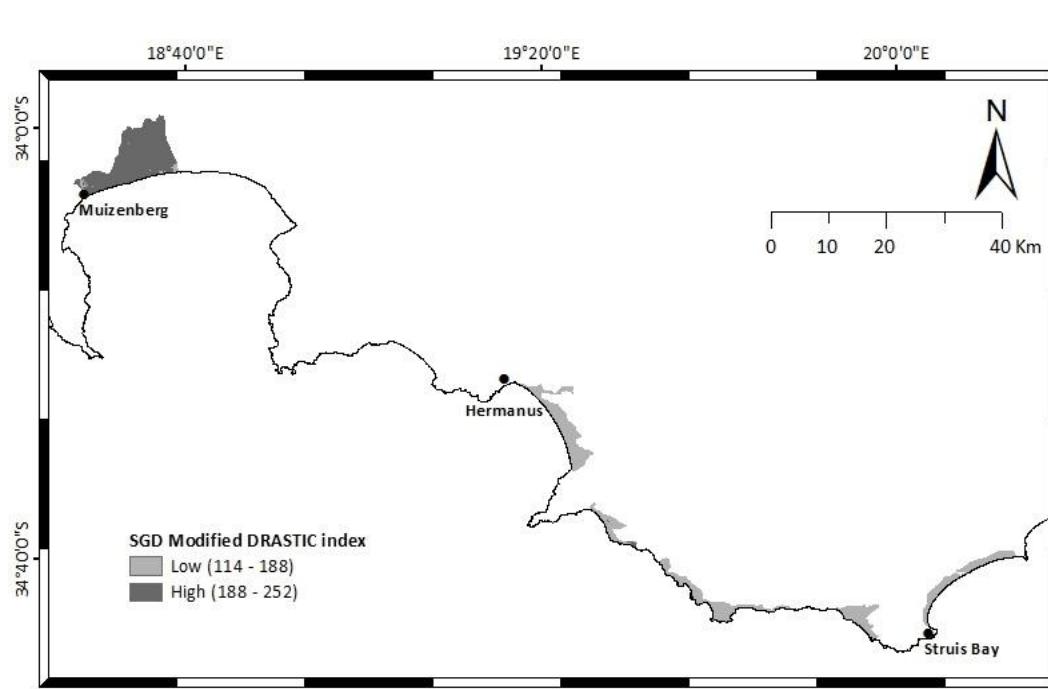


Open Source Technologies

regional scale (watershed)

daily to annual time steps

runoff, soil erosion,
nutrients



CAPE FLATS AQUIFER

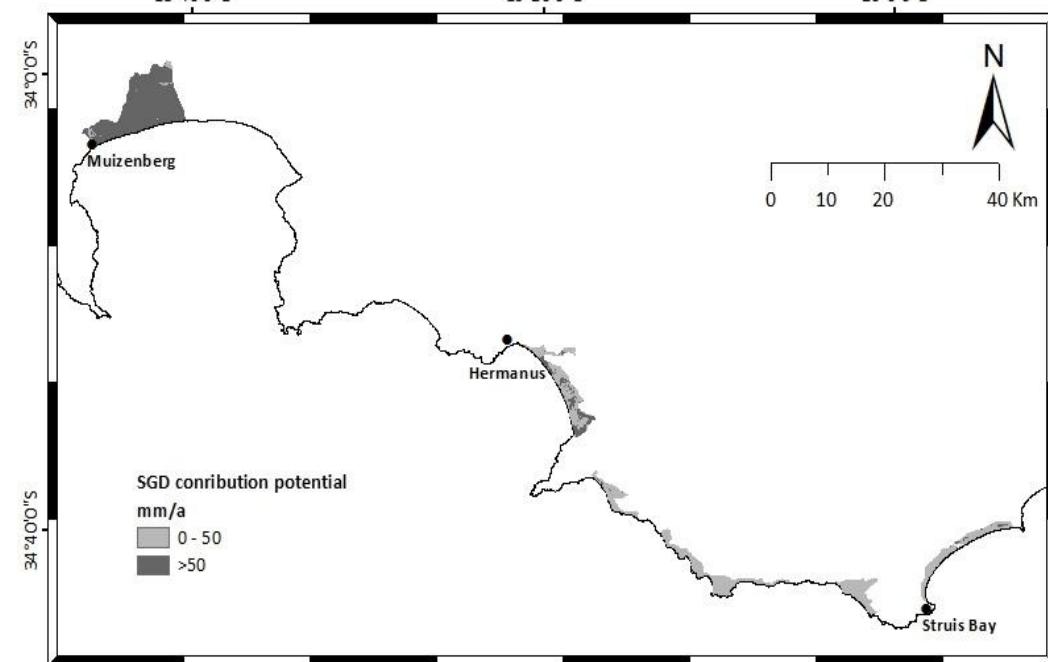
**Urbanized
Low Nitrogen Leaching
Potential: Informal vs Formal**

**High Risk of Pollution Potential:
Hydrogeological Settings**

High Contribution to SGD

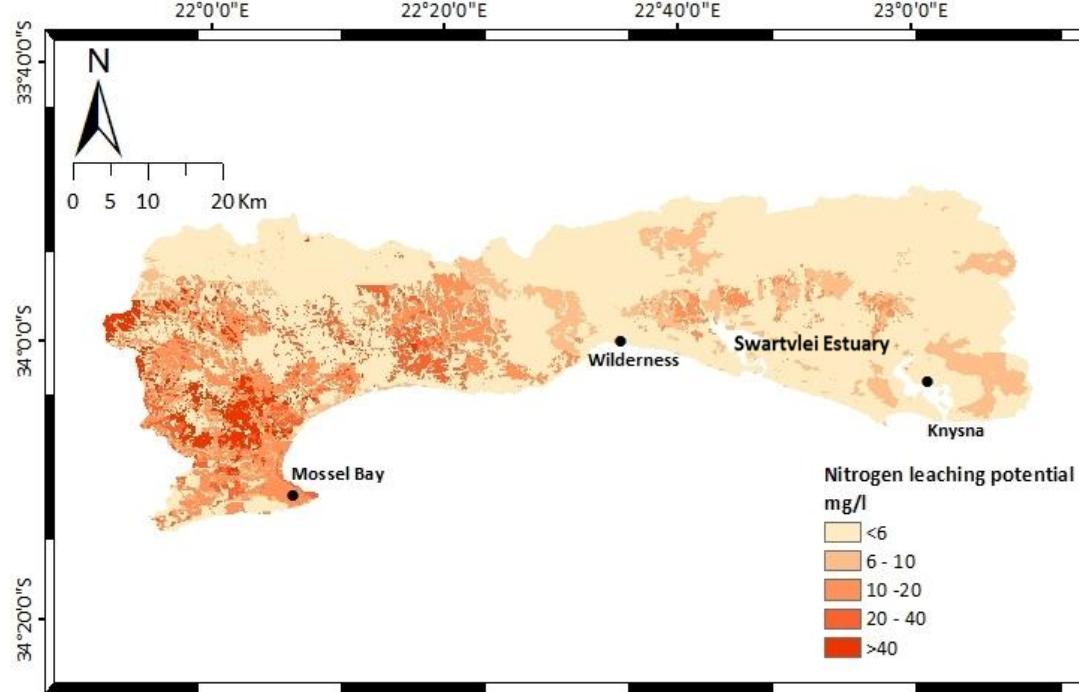
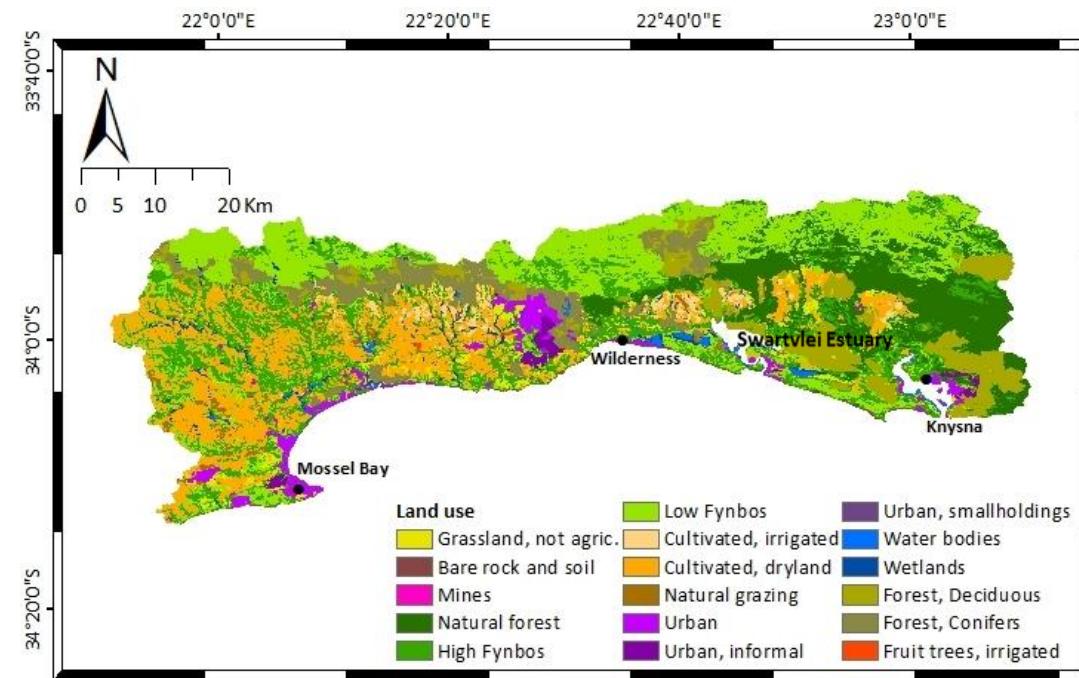
**COASTAL GROUNDWATER:
Provisioning Ecosystem Service**

**COASTAL MARINE WATER:
Supporting Ecosystem Service**



EXAMPLE 2

Nitrogen leaching potential Simulation: STOFFBILANZ



WILDERNESS - KNYSNA

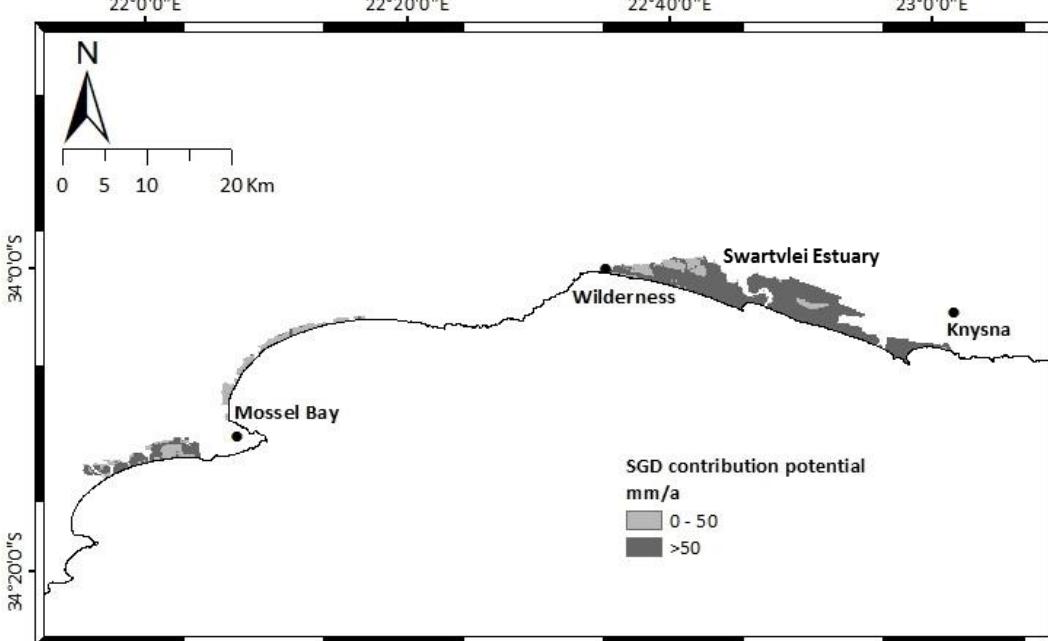
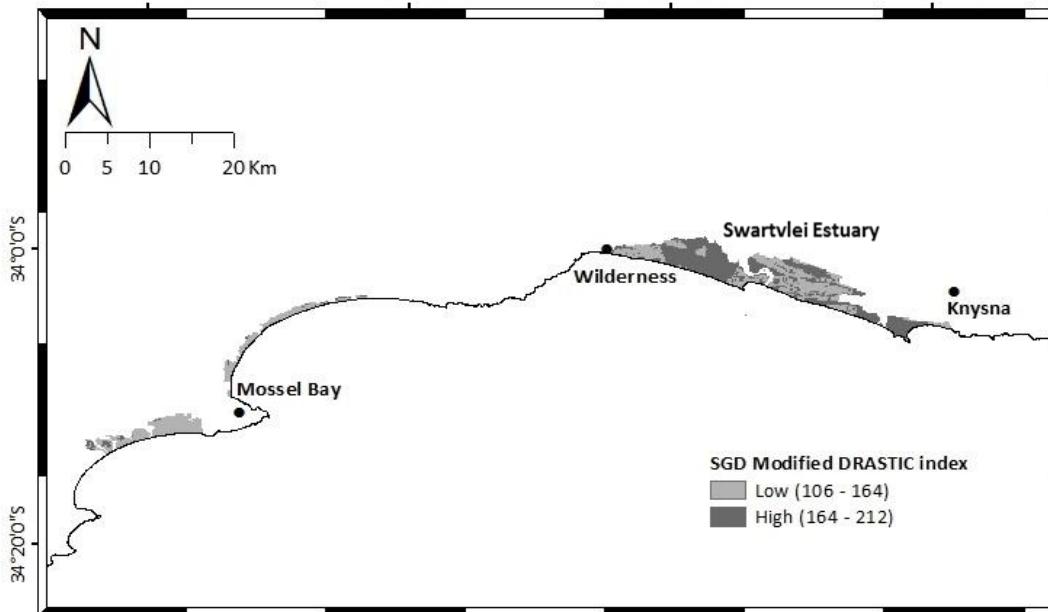
Predominantly 'Fynbos'
Low Nitrogen Leaching
Potential

High Risk of Pollution Potential:
Hydrogeological Settings

High Contribution to SGD

COASTAL GROUNDWATER:
Provisioning Ecosystem Service

COASTAL MARINE AND
ESTUARINE WATER:
Supporting Ecosystem Service



FRAMEWORK CONCLUSION

LIMITED DATA availability delivers acceptable results

Defines a **LINK** between groundwater and ecosystem services

Useful to assess and map **FUTURE LAND USE SCENARIOS**



FURTHER RESEARCH

1. Link surface water and ecosystem services

Assess and map the effects of land use activities

2. Aquatic Ecosystems: Estuaries and Coastal Marine Environment



Burkhard et al. 2011

THANK YOU FOR YOUR ATTENTION

