

„Concept for Testing Modern Wastewater Technologies in the Eerste River Catchment“

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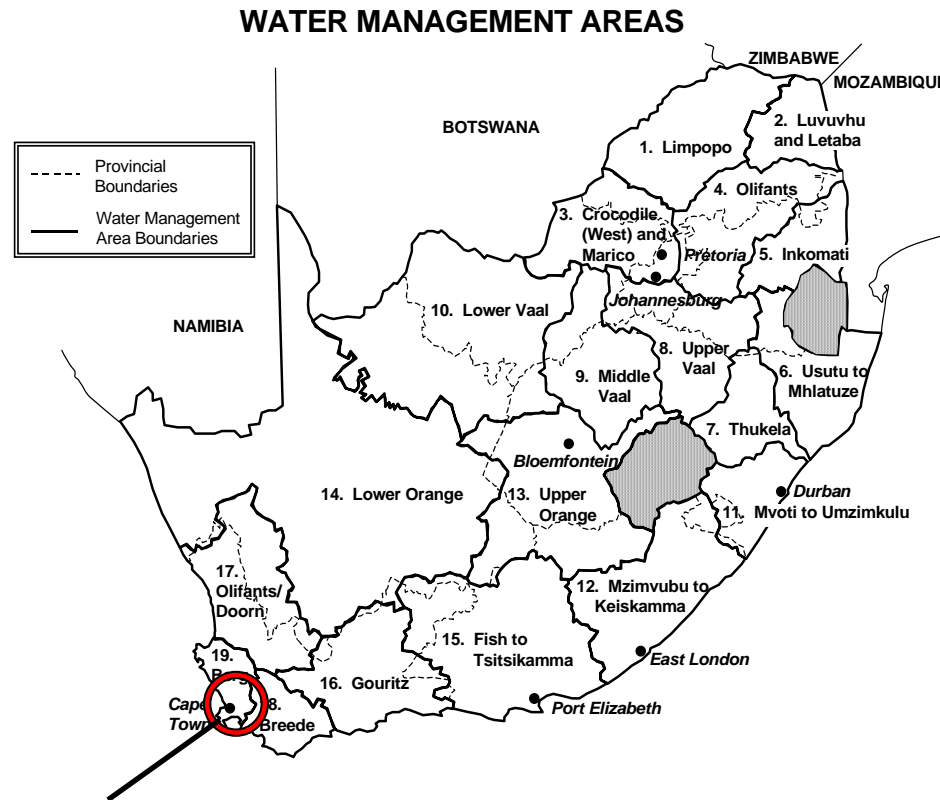


enviroWater

20. – 22. February 2006
Stellenbosch, South Africa



Location of the Catchment



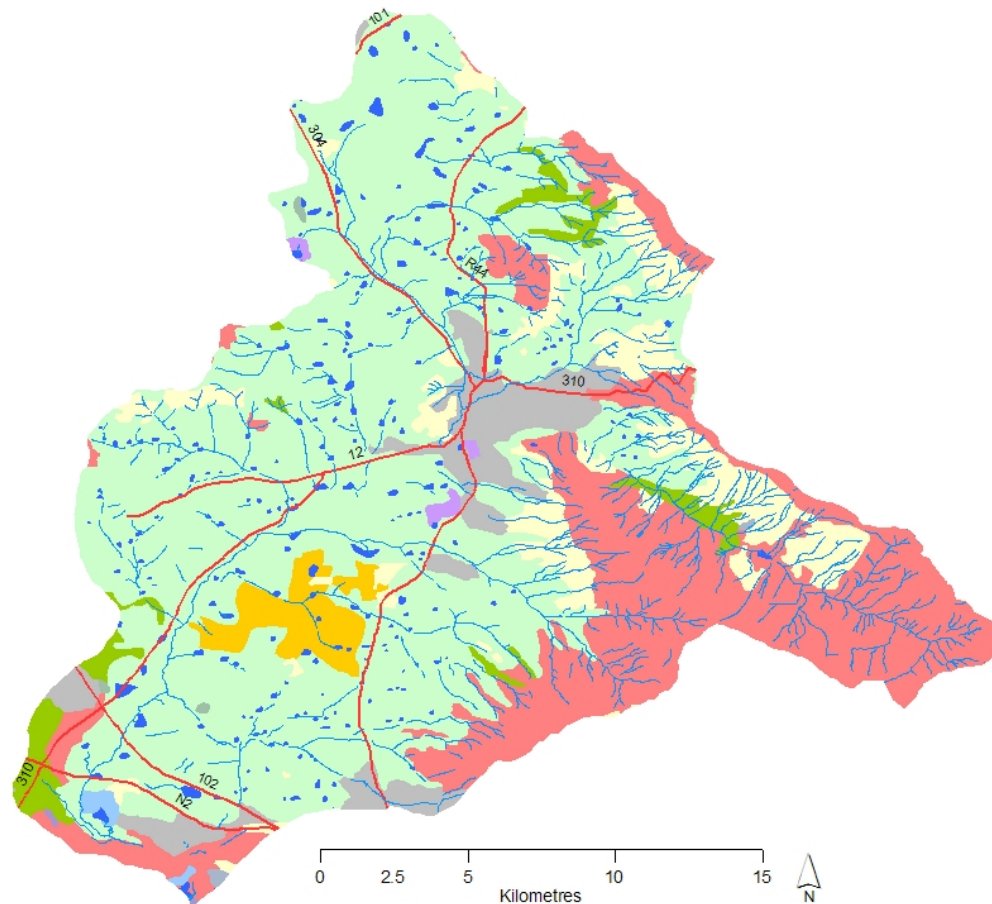
Eerste River catchment



- **Range of approximately 420 km²**
- **Agricultural imprinting, in particular vineyards**
- **Urban area covers about 10% of the total sector**
- **Most important settlement: Town of Stellenbosch including the bordering communities and the vineyards**
- **Social hotspots: informal settlements**
- **Man-made (anthropogenic) load of Eerste River system**
- **Eerste River most important freshwater resource**



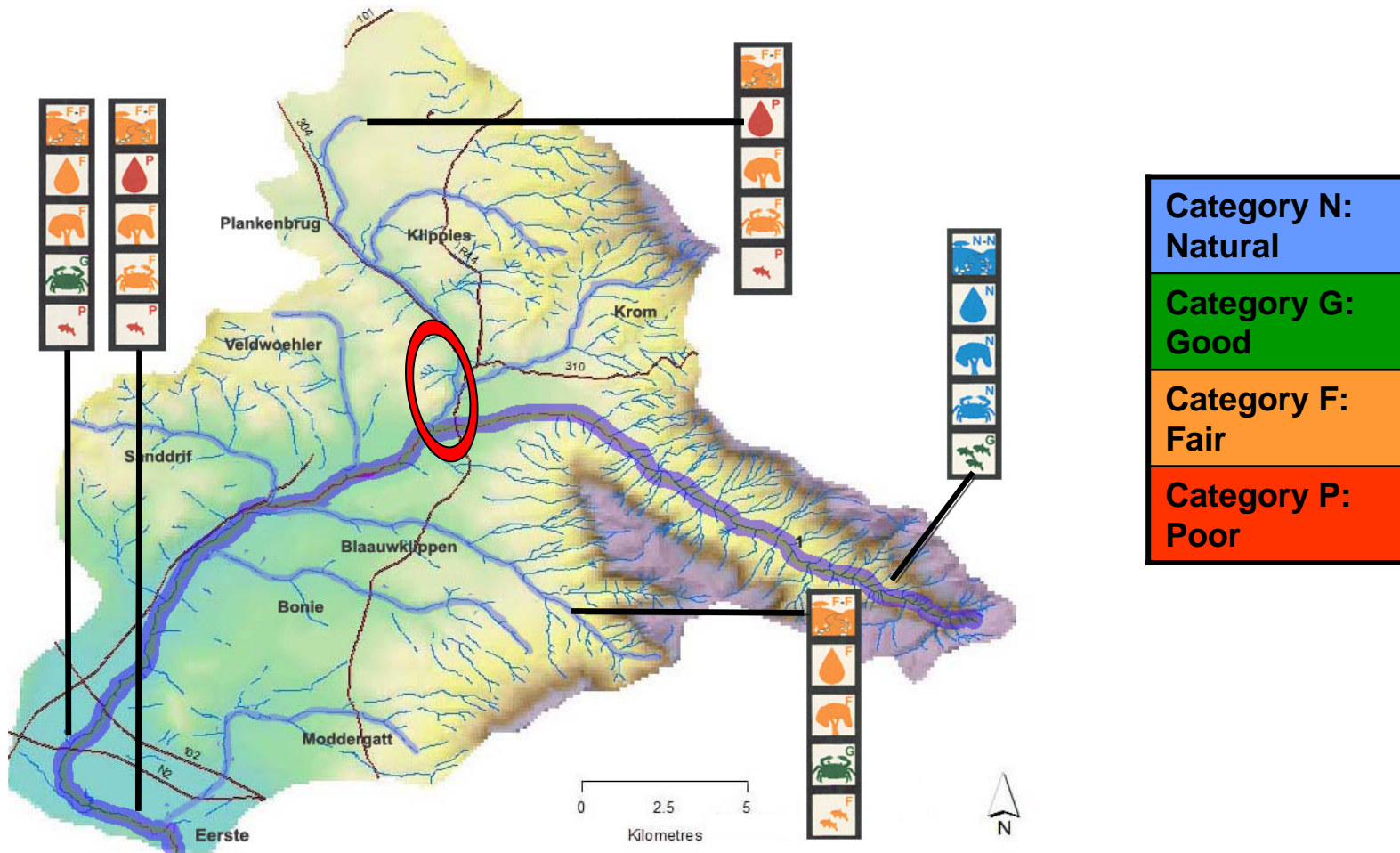
Vegetation of the Catchment



-  Cultivated: permanent irrigated
-  Cultivated: temporary irrigated
-  Forest plantations
-  Grassland
-  Scrubland and low Fynbos
-  Thicket and Bushland (etc.)
-  Urban areas
-  Waterbodies
-  Wetlands



Ecological State of the River System



Kayamandi – Hot spots



- **Sanitation infrastructure**
 - **Improper wastewater and fecal disposal**
 - **Permanent run-off of excrement and wastewater**
- **Condition of sanitation**
 - **Public toilets**
 - **Bad condition**
 - **Vandalism**
 - **Defects not reported**
 - **Large distances**



Contamination of the River System



- **Domestic Wastewater**
 - **Direct contamination by emptying the chamber pots and using the river as a toilet**
 - **Indirect contamination by runoff following rainfalls**
- **Agriculture**
 - **Pesticide and nutrient runoffs by agriculture**
 - **No monitoring programme established yet**
 - **Capacity of WWTP for many substances unknown**



Concept for Testing Modern Wastewater Technologies

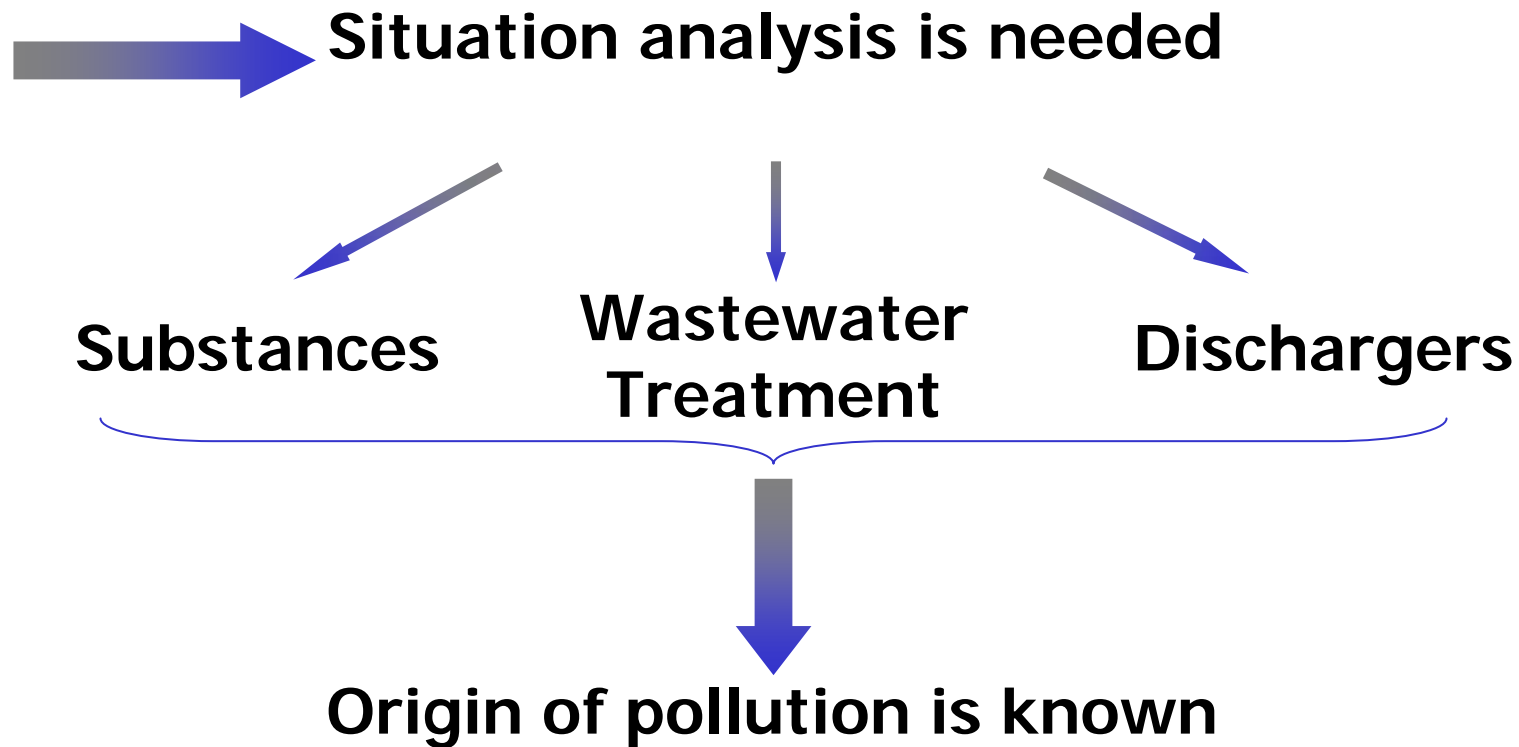
Bilateral Cooperation – Research Program



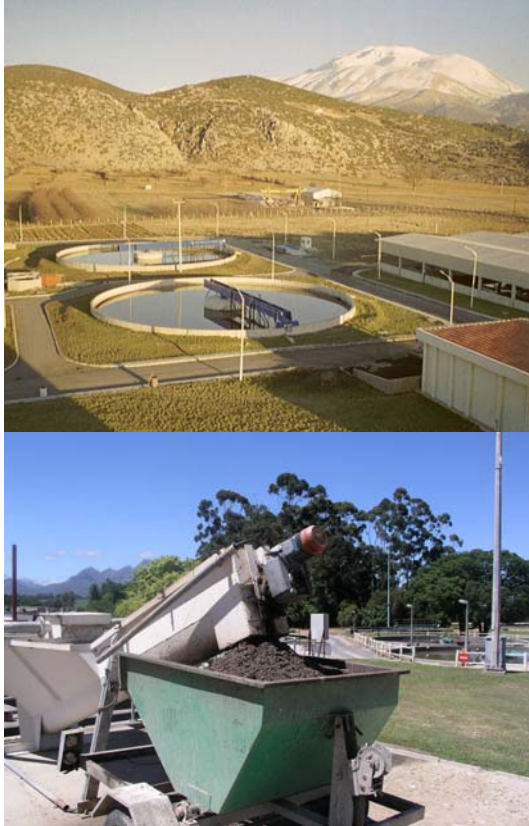
- **Situation analysis in regards to relevant hazardous substances**
- **“Screening”**: investigation of water-relevant substances in the influent and effluent of the central WWTP in Stellenbosch
- **Development of an appropriate chemical analysis program**
- **Design, building, and operation of a transportable pilot WWTP**



- **Water properties and ingredients are not known**
- **Lack of knowledge of the behaviour in the treatment process**



Investigation of Hazardous Substances in the Influent and Effluent of WWTPs



- Pre-Screening
 - Choice of relevant substances
 - Detection of the substances in the influent and effluent of the WWTP
 - Calculation of the total elimination
- Mass flow balancing
 - Samples of each treatment step
 - Calculation of the elimination of each treatment step
 - Samples of process water and sludge
- Improvement
 - Optimizing of the biological treatment
 - New technologies – Laboratory scale and pilot plant



Design, Building and operation of a Pilot Plant



- **Requirements**
 - **Transportable dimensions**
 - **Minimum volume flow required**
 - **Continuous operation**
 - **Solid and robust**
 - **Variable application**



- **Optimisation of the biological treatment, o. g.**
 - **Variation of sludge age / retention time**
 - **Influence of sand filtration**
 - **Membrane Bioreactor**

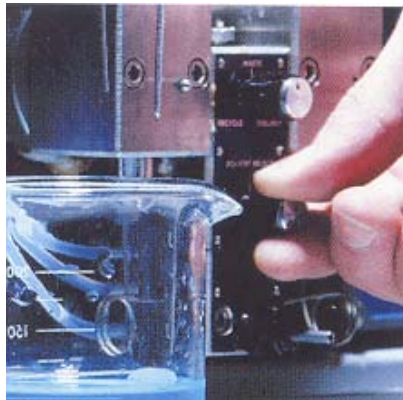
- **Tail-End Technologies, o. g.**
 - **Ozonisation**
 - **H₂O₂**
 - **Adsorption**



Development of an Appropriate Chemical Analysis Program



- Relevant substances
 - Pathogens
 - Pesticides
 - Personal care products
 - Other organic trace compounds



- Requirements
 - Low limits of quantification
 - Demanding matrix
 - High-grade analytical methods
 - Skilled and trained staff



**Thank you very much
for your attention**

