DETERMINATION OF WATER RESOURCE CLASSES, RESERVE AND RQOS IN THE LIMPOPO (A5-A9) CATCHMENTS & OLIFANTS (B9) CATCHMENT

PUBLIC MEETING 2 and 3
MAKHADO and POLOKWANE

FINDINGS OF THE RESERVE, WATER RESOURCE CLASSES AND RQOS

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WATER IS LIFE - SANITATION IS DIGNITY

water & sanitation
Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

2030 NDP

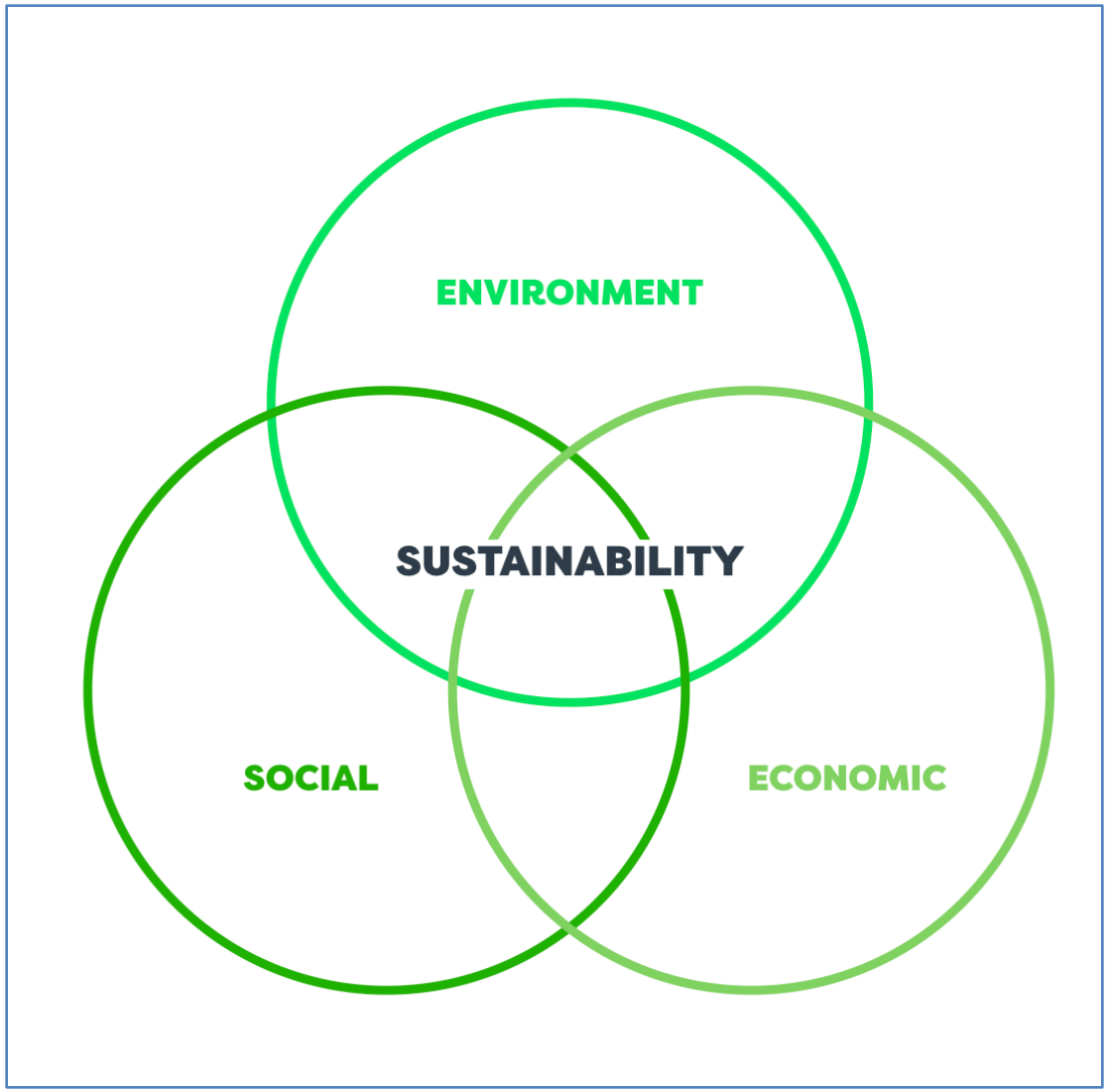
30 YEARS OF FREEDOM
South Africa 1994 - 2024

STRUCTURE OF PRESENTATION

1. Study Objectives
2. Process
3. Delineation of IUAs
4. Delineation of resource units
5. EWR & BHN
6. Classification
7. RQOs

STUDY OBJECTIVES

To ensure sustainable balance between the need to protect and utilise the water resources to meet the ecological, social and economic needs of the communities dependent on them



RESOURCE DIRECTED MEASURES

Reserve

The quantity and quality of water that must be set aside to meet two critical needs:

- Basic Human Needs
- Ecological Needs

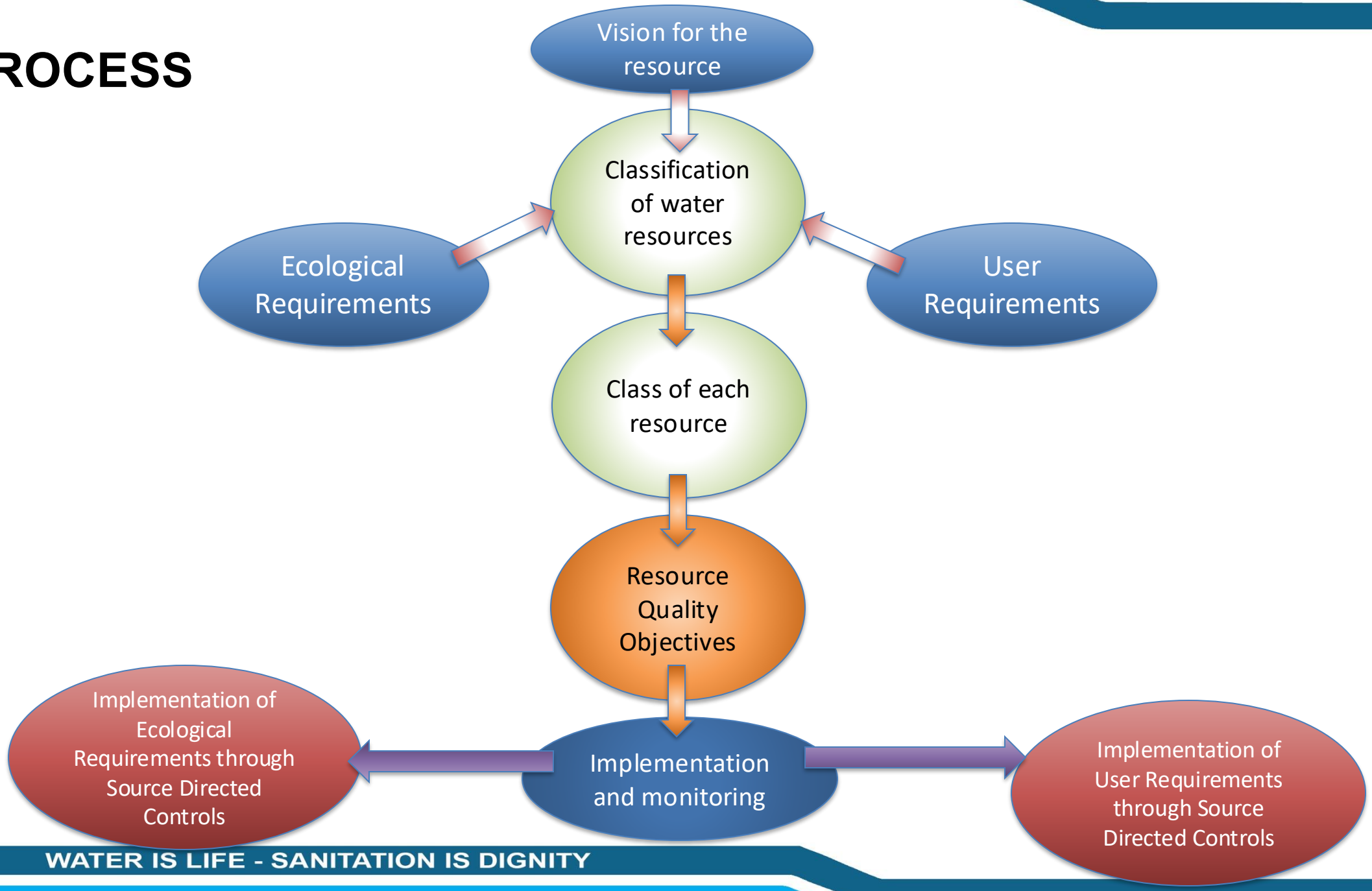
Classification

Process of defining a class of a water resource based on their desired characteristics. Involves stakeholder engagement to evaluate the ecological, social and economic trade-offs of choosing a particular water resource class.

Resource Quality Objectives

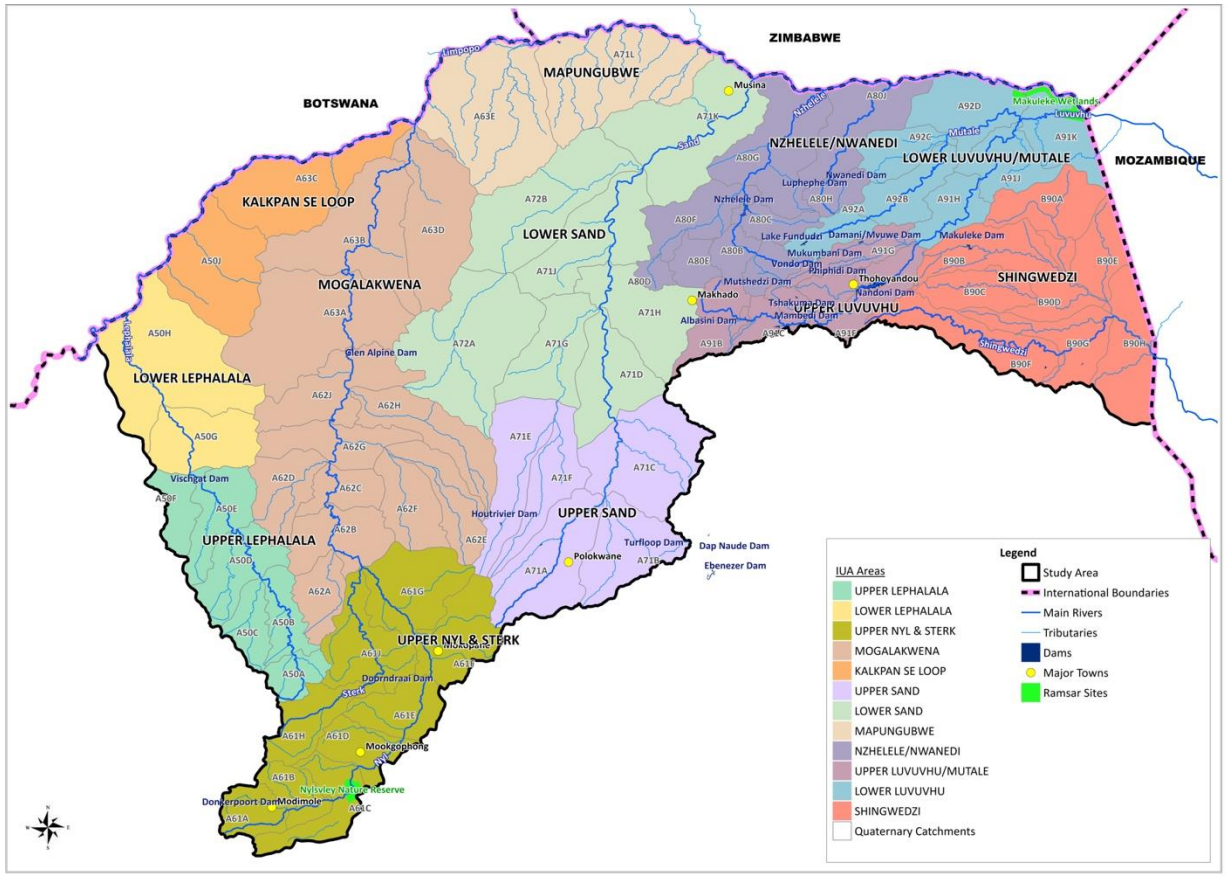
Resource Quality Objectives (RQOs) are directly linked to the Class of a water resource. Once the Class of a water resource is determined, RQOs are set to ensure the resource meets the objectives of that Class. RQOs establish clear targets for maintaining or improving the quality and characteristics of water resources, ensuring they meet the needs of current and future generations.

PROCESS


Vision for the resource
Classification of water resources
Ecological Requirements
User Requirements
Class of each resource
Resource Quality Objectives
Implementation and monitoring
Implementation of Ecological Requirements through Source Directed Controls
Implementation of User Requirements through Source Directed Controls

DESCRIBE THE STATUS QUO AND DELINEATE THE STUDY AREA INTO IUAs

- Delineated Integrated Units of Analysis (IUAs)
- Establish broad-scale spatial units for assessing the socio-economic and ecological implications of different catchment configuration scenarios.
- IUAs combine socio-economic zones and watershed boundaries, allowing for ecological information to be provided at a finer scale and reporting socio-economic impacts at a broader scale.
- Each represent a homogenous area which requires its own specification of the Water Resource Class.
- 12 IUAs defined



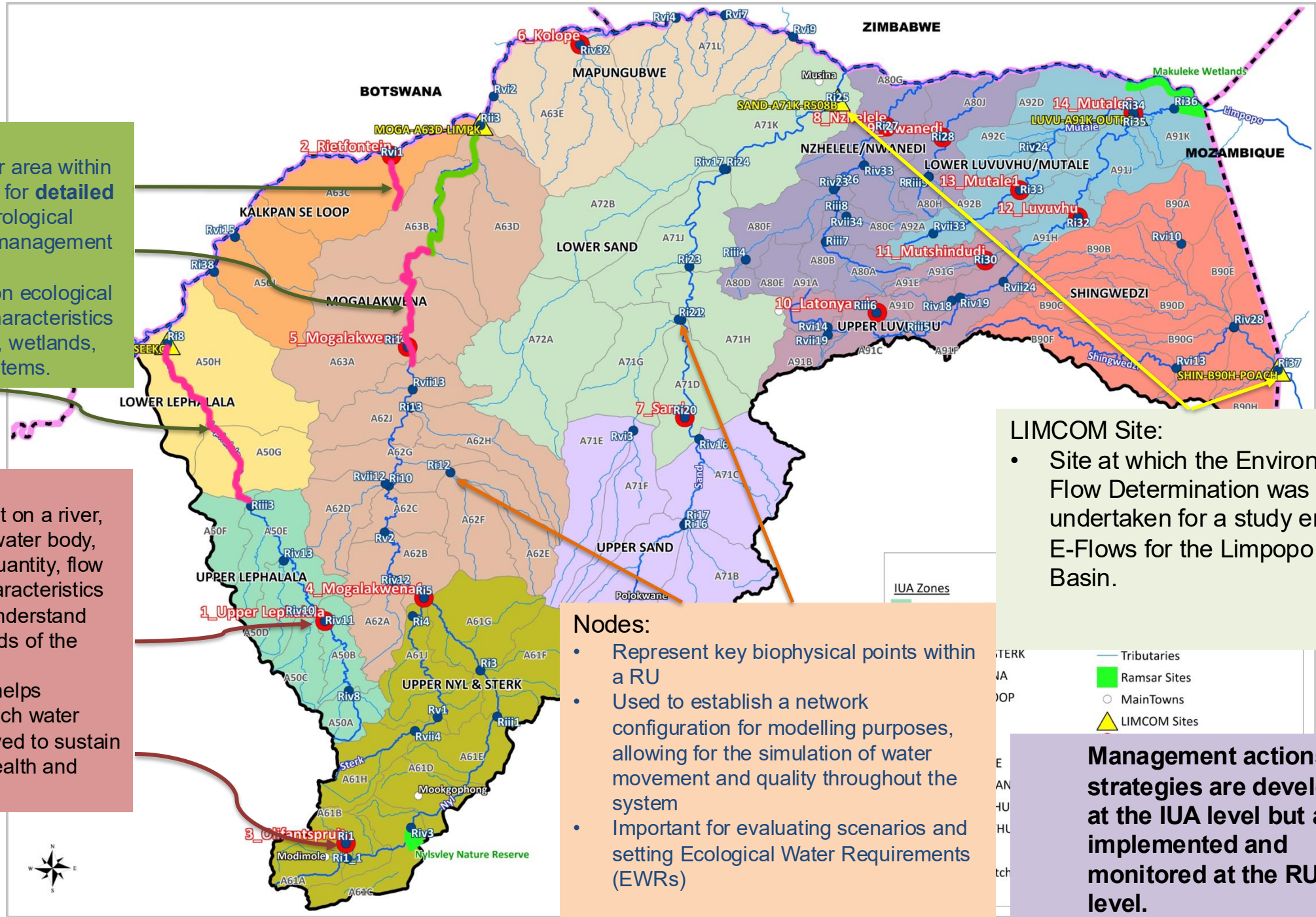
DEFINITIONS

Resource Units:

- Defined segment or area within an IUA that is used for **detailed** ecological and hydrological assessments and management actions
- Delineated based on ecological and hydrological characteristics
- Segments of rivers, wetlands, or groundwater systems.

EWR Site:

- It is a specific point on a river, wetland, or other water body, where the water quantity, flow rate, and other characteristics are assessed to understand the ecological needs of the area.
- This assessment helps determine how much water needs to be reserved to sustain the ecosystems health and functionality.



LIMCOM Site:

- Site at which the Environmental Flow Determination was undertaken for a study entitled E-Flows for the Limpopo River Basin.

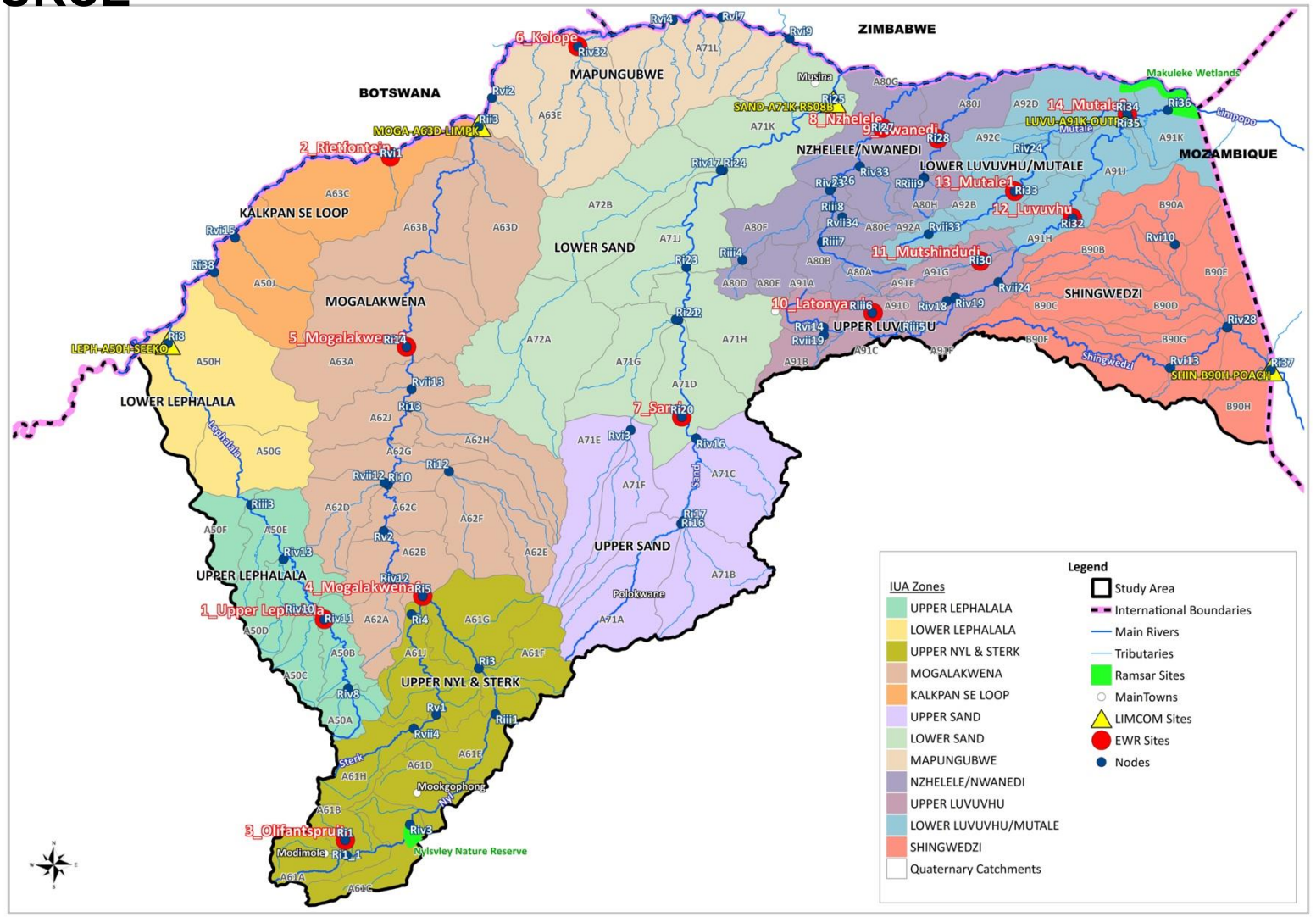
Nodes:

- Represent key biophysical points within a RU
- Used to establish a network configuration for modelling purposes, allowing for the simulation of water movement and quality throughout the system
- Important for evaluating scenarios and setting Ecological Water Requirements (EWRs)

Management actions and strategies are developed at the IUA level but are implemented and monitored at the RU level.

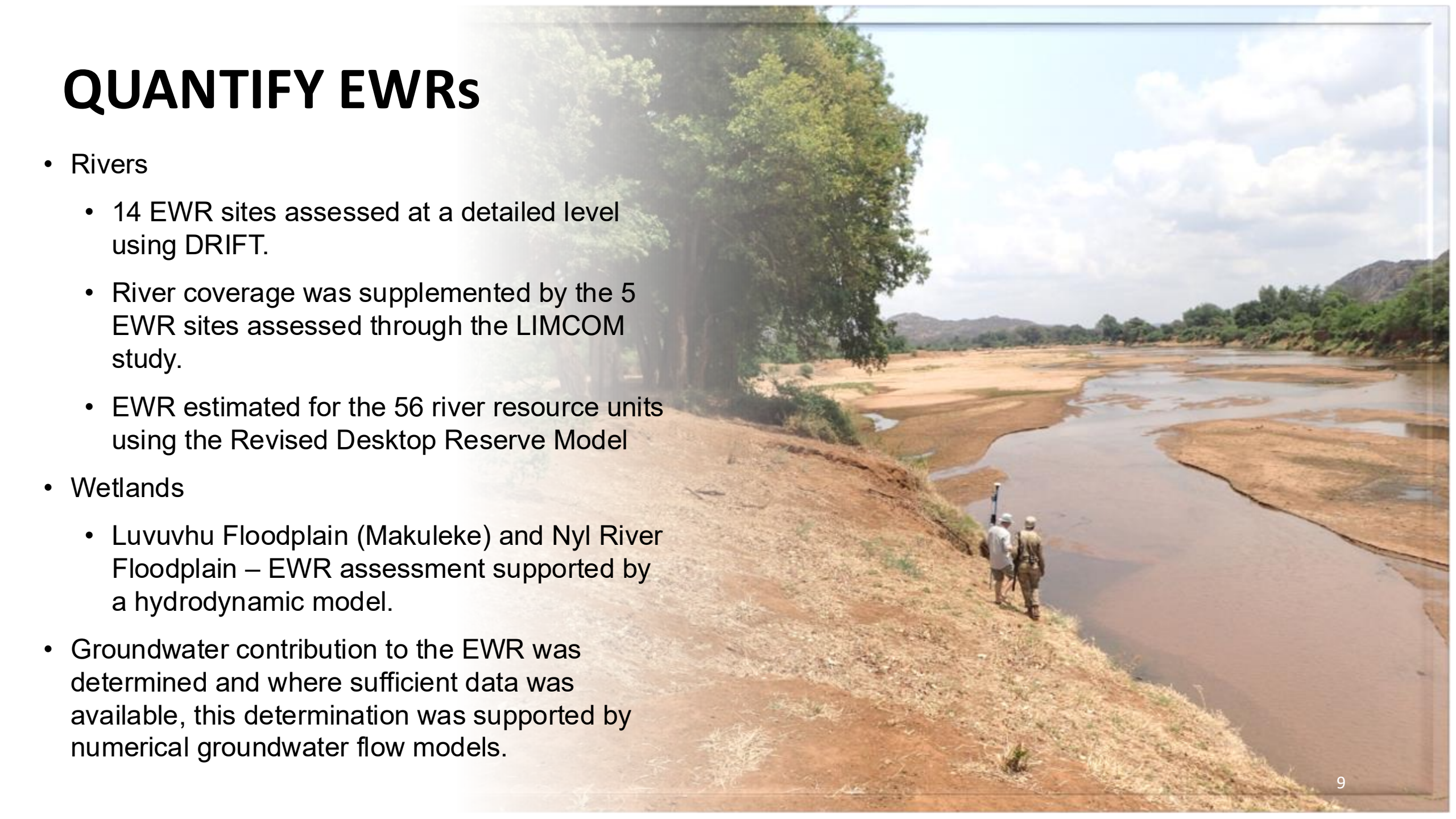
DELINEATE AND PRIORITISE RESOURCE UNITS (RU) AND STUDY SITES

- Delineation of the study area into resource units were undertaken for the rivers, wetlands and groundwater.
    - Facilitate effective management – break down the water resources into discrete manageable units, primarily from an ecological perspective.
- Prioritised significant water resources (rivers, wetlands and groundwater)
- 75 river resource units were identified across the study area.
- Prioritised 14 river resource units for detailed EWR assessment
- Prioritised 11 wetlands for higher confidence assessment of the PES, EI and ES. 2 Ramsar sites for EWR assessment



QUANTIFY EWRs

- Rivers
  - 14 EWR sites assessed at a detailed level using DRIFT.
  - River coverage was supplemented by the 5 EWR sites assessed through the LIMCOM study.
  - EWR estimated for the 56 river resource units using the Revised Desktop Reserve Model
- Wetlands
  - Luvuvhu Floodplain (Makuleke) and Nyl River Floodplain – EWR assessment supported by a hydrodynamic model.
- Groundwater contribution to the EWR was determined and where sufficient data was available, this determination was supported by numerical groundwater flow models.

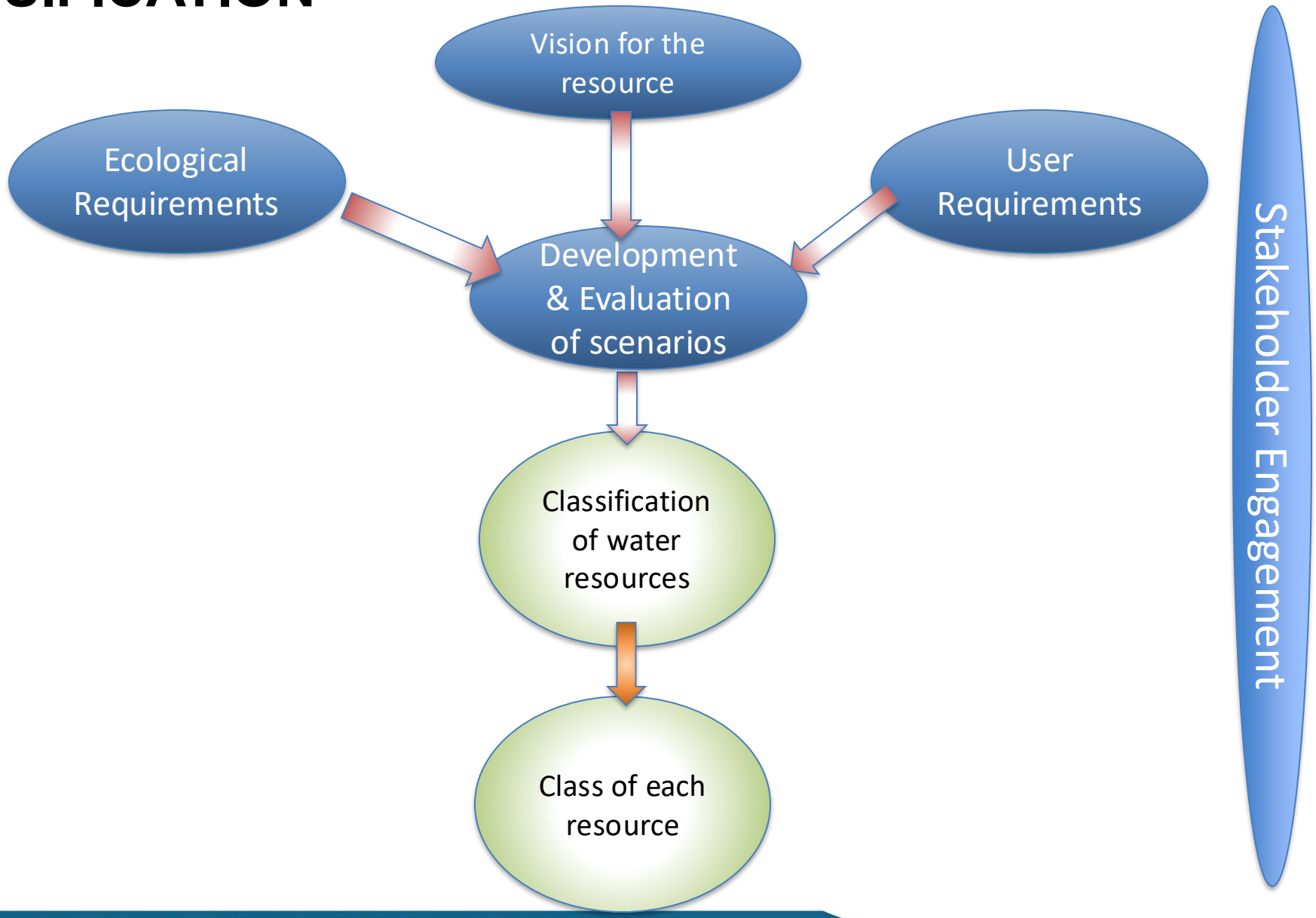


QUANTIFY BHN

Basic Human Needs

- Quantify BHN requirements for the study area population who rely directly on surface or groundwater ecosystems for their basic water needs, i.e., their water is not delivered to houses, yards or community standpipes from service provisioners
- Daily allowance (per person per day)
  - 25 litres

CLASSIFICATION



SCENARIOS

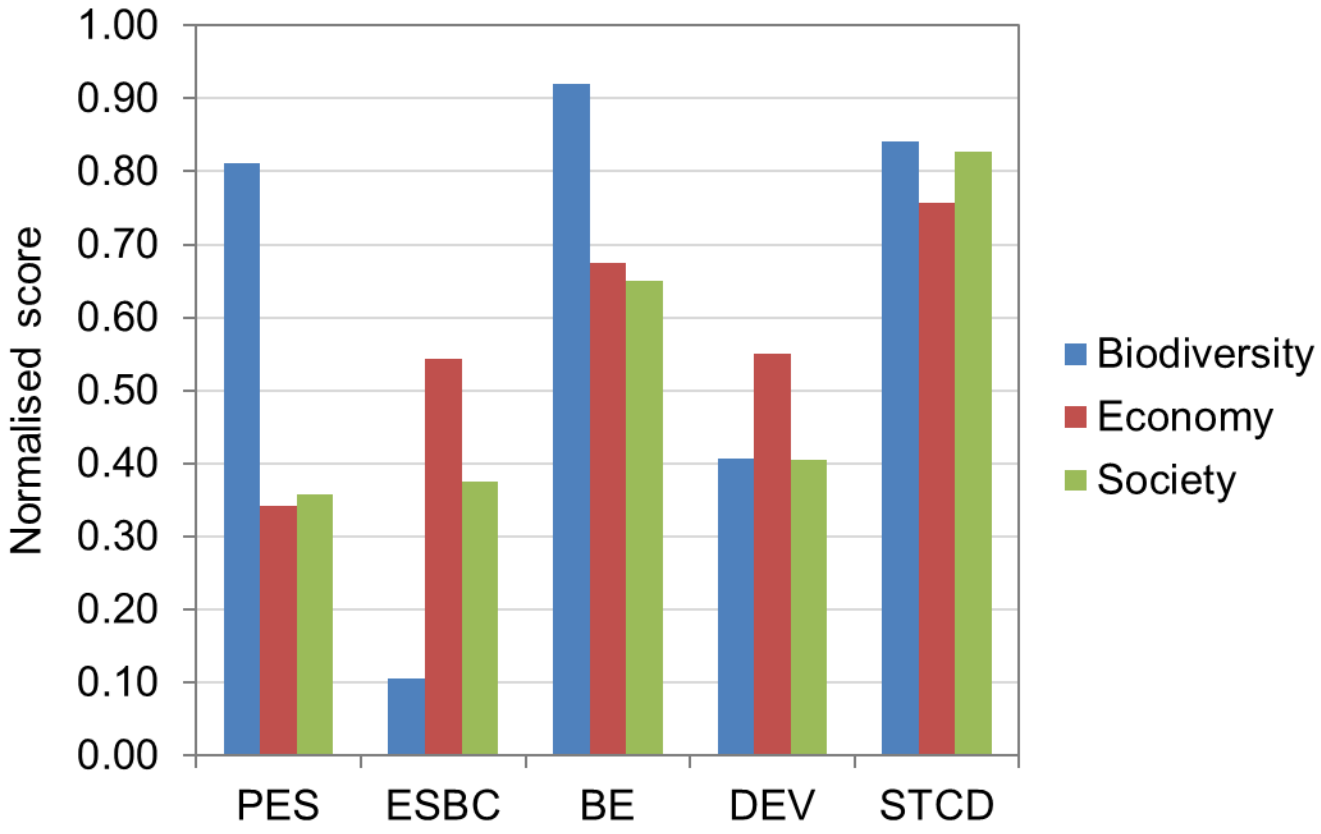
#	Scenario	Abbreviation	Description for river and wetland systems	Description for groundwater
1	Maintain Present Ecological Status	PES	River and wetland systems are maintained in their most recently assessed condition, or where currently in an E or F, improved to a D as far as possible.	Current groundwater index (i.e., groundwater contribution to baseflow, BHN and current groundwater abstraction)
2	Ecological Bottom Line	ESBC	The maximum volume of water is made available for abstraction from the system for economic activities, with the proviso that all water resources are just maintained in a D category (i.e. the "ecological bottom line") where possible. This can also be seen as a "constrained" development scenario.	Current groundwater uses plus allocable groundwater abstraction (i.e., groundwater contribution to baseflow, BHN and current groundwater abstraction + allocable groundwater) SI of 65 to 85%
3	Biodiversity Economy	BE	Rivers are maintained in their best attainable state (BAS) to maximise the possibilities of developing a sustainable biodiversity economy founded on a strong conservation outcome. In this scenario, ecosystem health is prioritised by limiting any further demands on water resources and by increasing health where feasible.	Current groundwater uses while over-exploited catchments were reduced to a SI of below 95%.
4	Unconstrained Development	DEV	Water demands for all future planned or potential developments are met as far as possible, without any limit on ecological conditions (i.e., they can be worse than a D category).	Current groundwater uses plus additional exploitation of groundwater (i.e., groundwater contribution to baseflow, BHN and current groundwater abstraction plus additional groundwater potential). SI of 75% for areas with low to moderate groundwater potential. SI of 85% with moderate groundwater potential.
5	Spatially-targeted Conservation and Development	STCD	Areas of high conservation value are protected by meeting RECs (including at LIMCOM sites), while other areas allow up to maximum sustainable use of water, within the constraint of min D category.	Similar to the DEV scenario, consideration is given to high-priority ecological areas. Such groundwater development in these IUAs is limited to an SI of 50% or up to 60% with limited priority catchments.

EVALUATION AND COMPARISON OF SCENARIOS

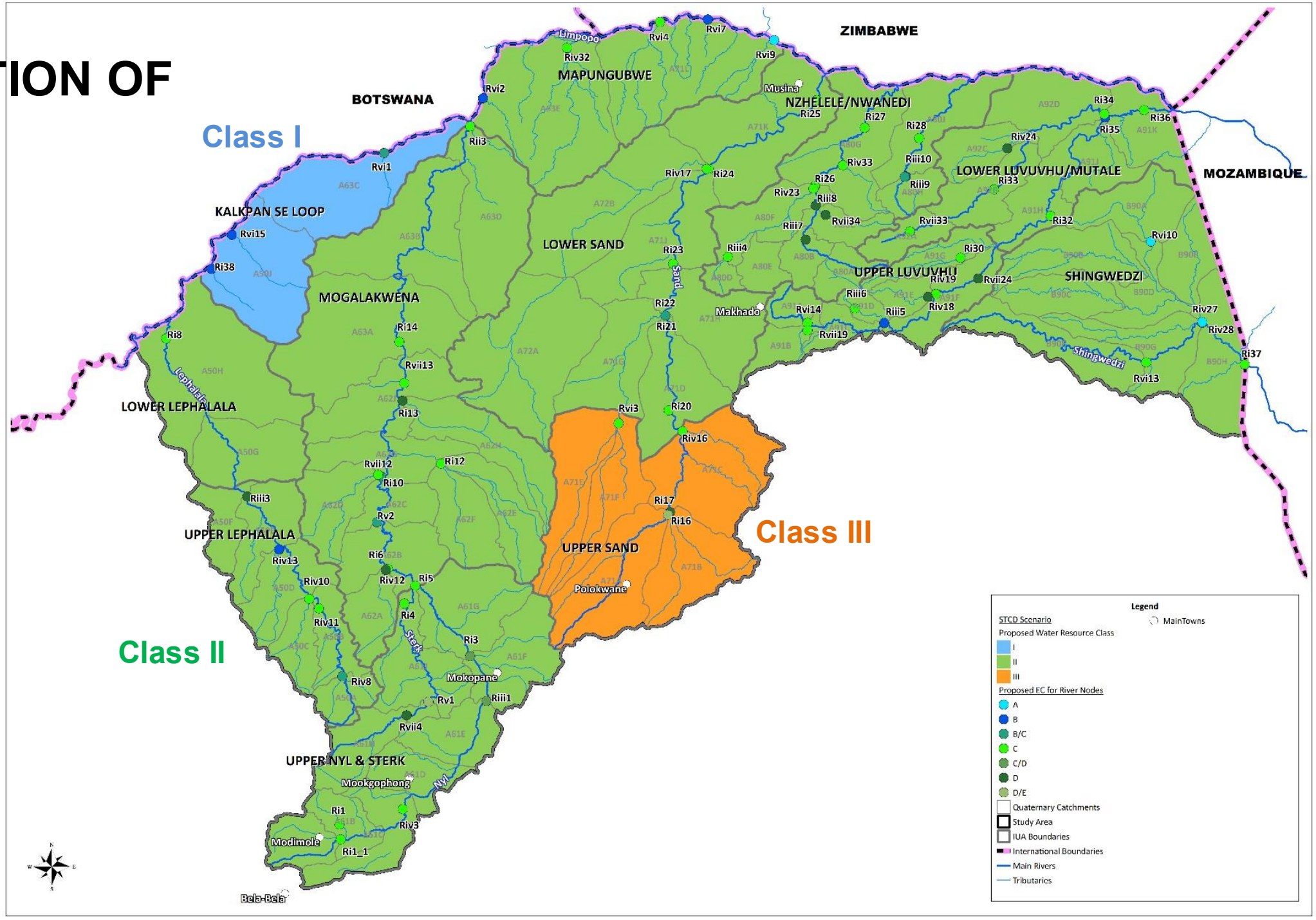
- Evaluate river flow and health
  - Created a model (Balancing Tool) in MSExcel with macros to run and view scenarios
  - Is a water balance model using volumes
  - Is interactive…by changing flow at any site, one can view how the flows and condition of that and downstream sites change
- Evaluated biodiversity, ecosystem services, society and the economy
- Comparison of the scenarios through multi-criteria analysis

OVERALL RANKING OF SCENARIOS

- Trade-offs are clear
- Socio-economic gains are highest under the STCD scenario with a small gain in biodiversity when compared to PES



CONSIDERATION OF THE STCD



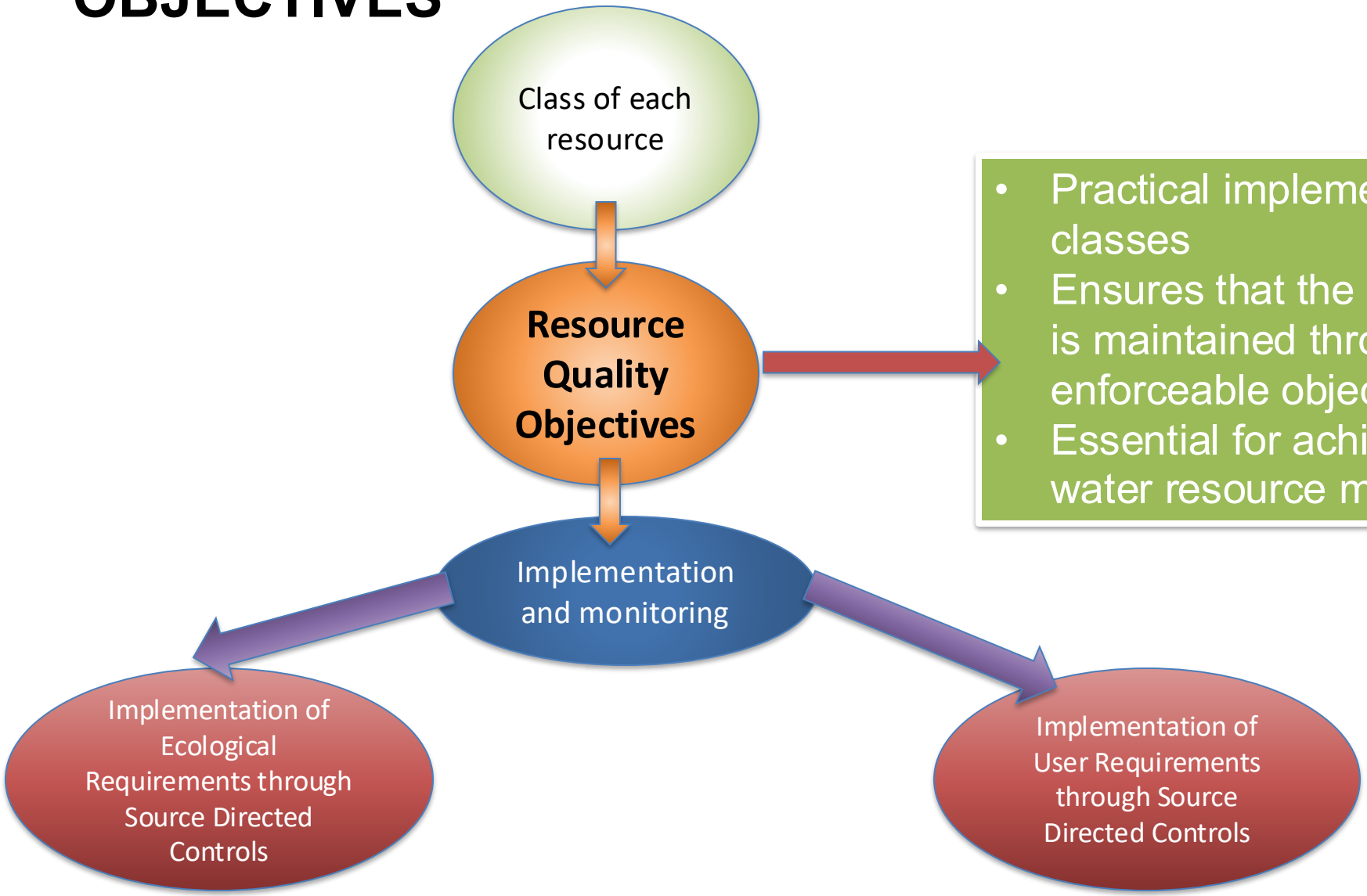
UNDERSTANDING THE TERMS:

- **PES (Present Ecological State)**: The current condition of the water resource.
- **REC (Recommended Ecological Category)**: The condition that should ideally be maintained or achieved.
- **TEC (Target Ecological Category)**: The **minimum condition** that must be achieved and maintained.

IMPLICATIONS OF WATER RESOURCE CLASS ON THE ECOLOGICAL HEALTH AT THE RIVER EWR SITES

NO.	RIVER	EWR Site	Quaternary catchment	PES	EI	ES	REC	TEC
1	Lephalala	1_Lephalala	A50B	C	High	Very High	B/C	C
2	Lephalala	LEPH-A50H-SE	A50H	C	High	High	C	C
3	Rietfontein	2_Rietfontein	A63C	B/C	Moderate	Very Low	B/C	B/C
4	Olifantspruit	3_Olifantspruit	A61B	C	High	Very High	B/C	C
5	Mogalakwena	4_Mogalakwena	A62B	C	Moderate	Moderate	C	C
6	Mogalakwena	5_Mogalakwena	A63A	C	High	Moderate	C	C
7	Mogalakwena	MOGA-A63D-LI	A63D	C	Moderate	Moderate	C	C
8	Kolope	6_Kolope	A63E	C	Moderate	Low	B/C	C
9	Sand	7_Sand	A71D	C	Moderate	Moderate	C	C
10	Sand	SAND-A71K-R5	A71K	C	High	Moderate	C	C
11	Nzhelele	8_Nzhelele	A80G	C	High	High	C	C
12	Ńwaneḑi	9_Nwanedi	A80J	C	High	High	C	C
13	Latonyanda	10_Latonyanda	A91D	C	Moderate	Very High	C	C
14	Mutshindudi	11_Mutshindud	A91G	C	Moderate	High	C	C
15	Luvuvhu	12_Luvuvhu	A91H	C	High	High	B/C	C
16	Luvuvhu	LUVU-A91K-OU	A91K	C	Very High	High	C	B/C
17	Mutale	13_Mutale1	A92B	C	High	High	C	C
18	Mutale	14_Mutale2	A92D	C	High	High	C	B/C
19	Shingwedzi	SHIN-B90H-PO	B90H	C	High	High	B/C	C

RESOURCE QUALITY OBJECTIVES



- Practical implementation of water resource classes
- Ensures that the desired condition of a resource is maintained through measurable and enforceable objectives
- Essential for achieving sustainable and equitable water resource management.

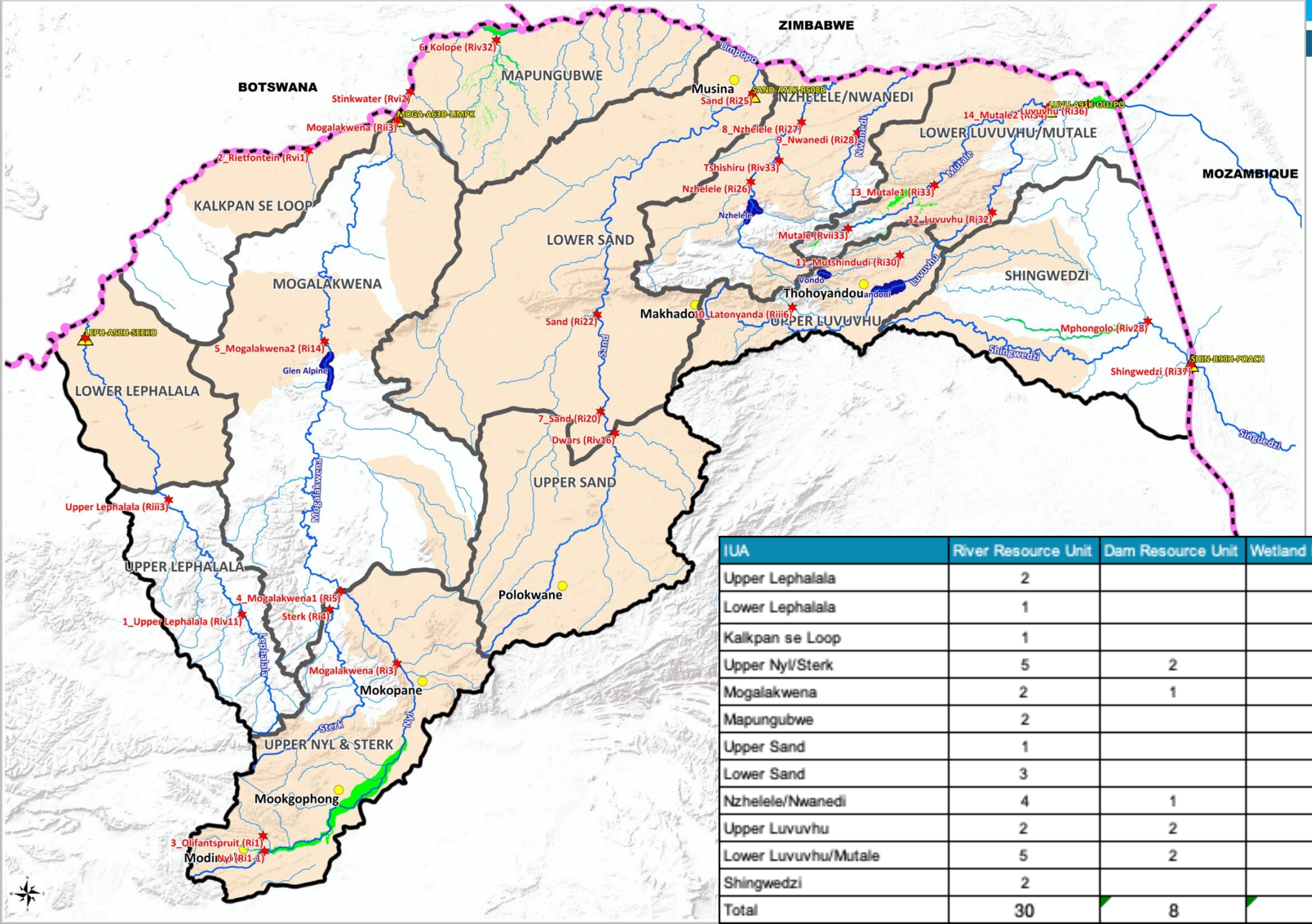
RESOURCE QUALITY OBJECTIVES

- RQOs are numerical and/or descriptive statements about the biological, chemical and physical attributes that characterise a resource for the level of protection defined by its Class;
- Depends on the extent of data available.
- The numerical RQOs will be used in monitoring, which is crucial for verifying whether the water resources meet the quality, quantity, and ecological targets set by the RQOs.
- Different level (in terms of detail) RQOs were set for Resource Units.

PRIORITISATION OF RESOURCE UNITS

Resource Units were prioritised for RQO determination based on a “concern score”:

This score is the integration of the importance of the resource unit for users & environment and the threats or risks posed to the users and faced by the ecological component of the resource unit.



IUA	River Resource Unit	Dam Resource Unit	Wetland Resource Unit	Groundwater Resource Unit
Upper Lephalala	2			
Lower Lephalala	1			2
Kalkpan se Loop	1			1
Upper Nyl/Sterk	5	2	3	3
Mogalakwena	2	1	1	2
Mapungubwe	2		2	1
Upper Sand	1			3
Lower Sand	3			2
Nzhelele/Nwanedi	4	1		3
Upper Luvuvhu	2	2		1
Lower Luvuvhu/Mutale	5	2	3	1
Shingwedzi	2		2	1
Total	30	8	11	20

THANK YOU