CLASSIFICATION OF SIGNIFICANT WATER RESOURCES IN THE THREE VAAL WATER MANAGEMENT AREAS

Agenda Item 6

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water affairs
Department:
Water Affairs
REPUBLIC OF SOUTH AFRICA

Presentation Layout

- 6.1 Description of the Classification System
- 6.2 Study Area
- 6.3 Process for the classification of water resources
- 6.4 Technical process
- 6.5 Public Participation process
- 6.6 Role of the PSC in the process
- 6.7 Integrated units of analysis & significant water resources
- 6.8 Approach to Evaluation of Scenarios
- 6.9 Next steps

Classification System (1)

- **Water Resource Classification System is:**
  - A **set of procedures for determining different classes of water resources.**
  - **Represented by a Management Class (MC).**
- **Takes into account the:**
  - **Social, economic, ecological and environmental considerations in a catchment,**
  - **to assess the costs and benefits associated with utilization versus protection of a water resource.**

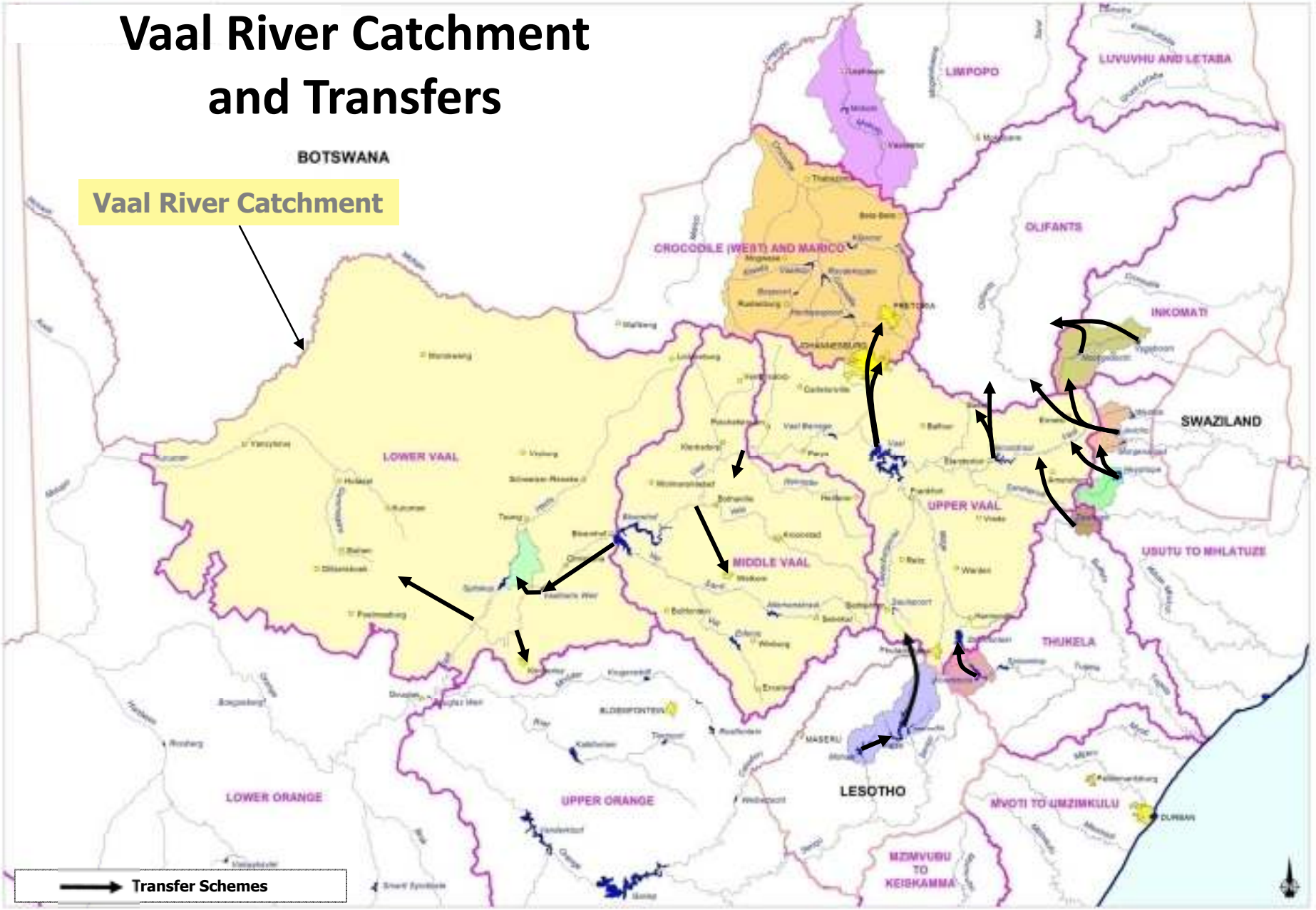
Classification System (2)

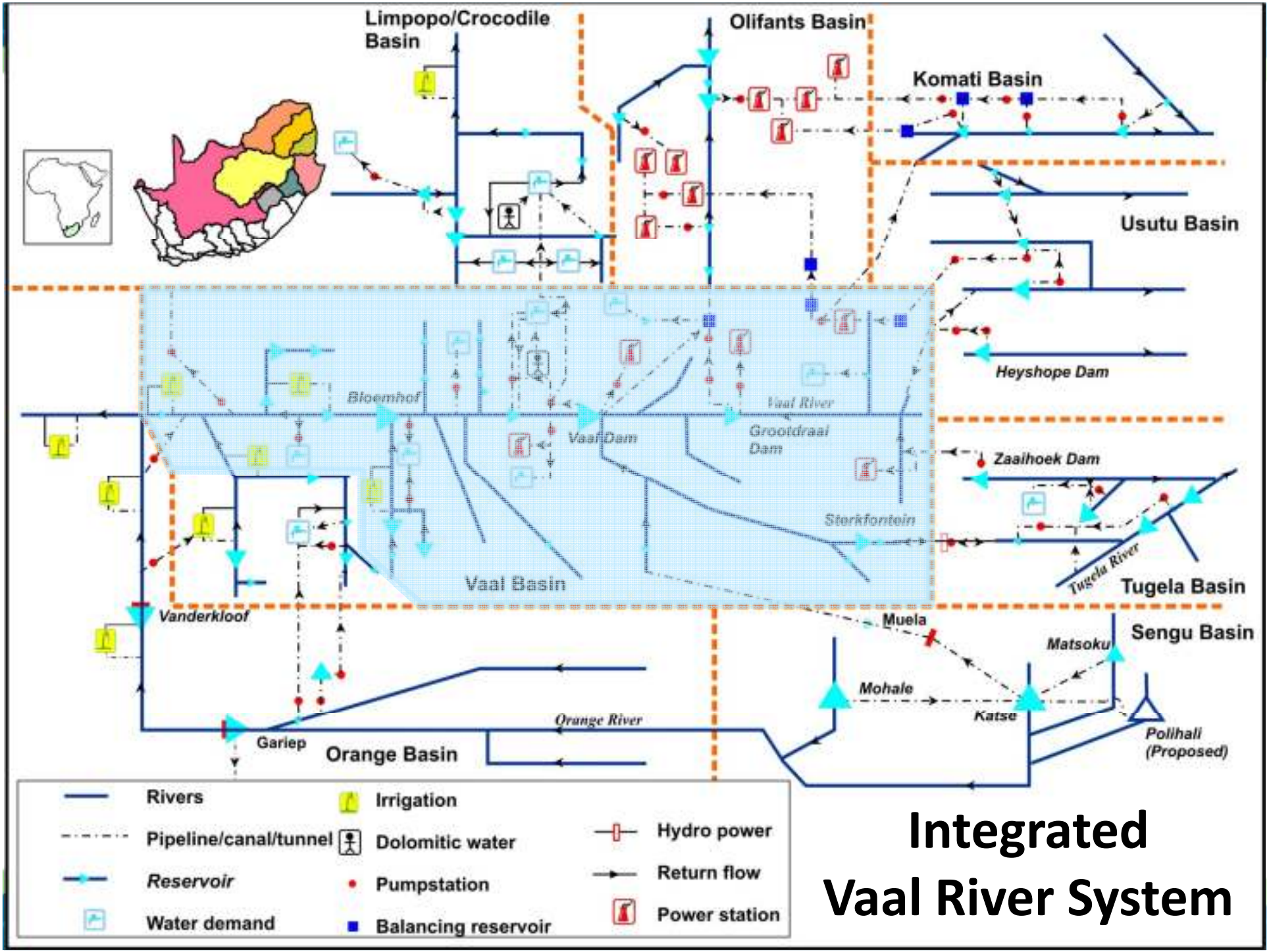
- **Management Class is representative of:**
  - Attributes that the DWA and society require of different water resources.
  - The process requires a wide range of trade offs to be assessed and evaluated at different scales.
- **The product of the process:**
  - A set of desired characteristics for each of the water resources in a given catchment.

WRCS defines three water resource classes

- **Class I water resource is one which is minimally used & the overall** ecological condition of that water resource is minimally altered from its pre-development condition.
- **Class II water resource is one which is moderately used & the** overall ecological condition of that water resource is moderately altered from its predevelopment condition.
- **Class III water resource is one which is heavily used and the overall** ecological condition of that water resource is significantly altered from its predevelopment condition.
- **The recommended MC requires approval by the Minister or a delegated authority.**

Vaal River Catchment and Transfers




Limpopo/Crocodile Basin
Olifants Basin
Komati Basin
Usutu Basin
Heyshope Dam
Bloemhof
Vaal River
Vaal Dam
Grootdraai Dam
Zaaihoek Dam
Sterkfontein
Tugela River
Tugela Basin
Vaal Basin
Vanderkloof
Muela
Sengu Basin
Matsoku
Mohale
Katse
Polihali (Proposed)
Orange River
Gariep
Orange Basin
Rivers
Pipeline/canal/tunnel
Reservoir
Water demand
Irrigation
Dolomitic water
Pumpstation
Balancing reservoir
Hydro power
Return flow
Power station
Integrated Vaal River System

Process for the classification of water resources

Seven Step Classification Process

1: Delineate units of analysis and describe the status quo

2: Link value and condition

3: Quantify Ecological Water Requirements and changes in non-water quality Ecosystem Goods, Services and Attributes

4: Set Ecological Sustainability Base Configuration scenario and establish starter configurations

5: Evaluate scenarios within the Integrated Water Resource Management process

6: Evaluate scenarios with stakeholders

7: Gazette class configuration

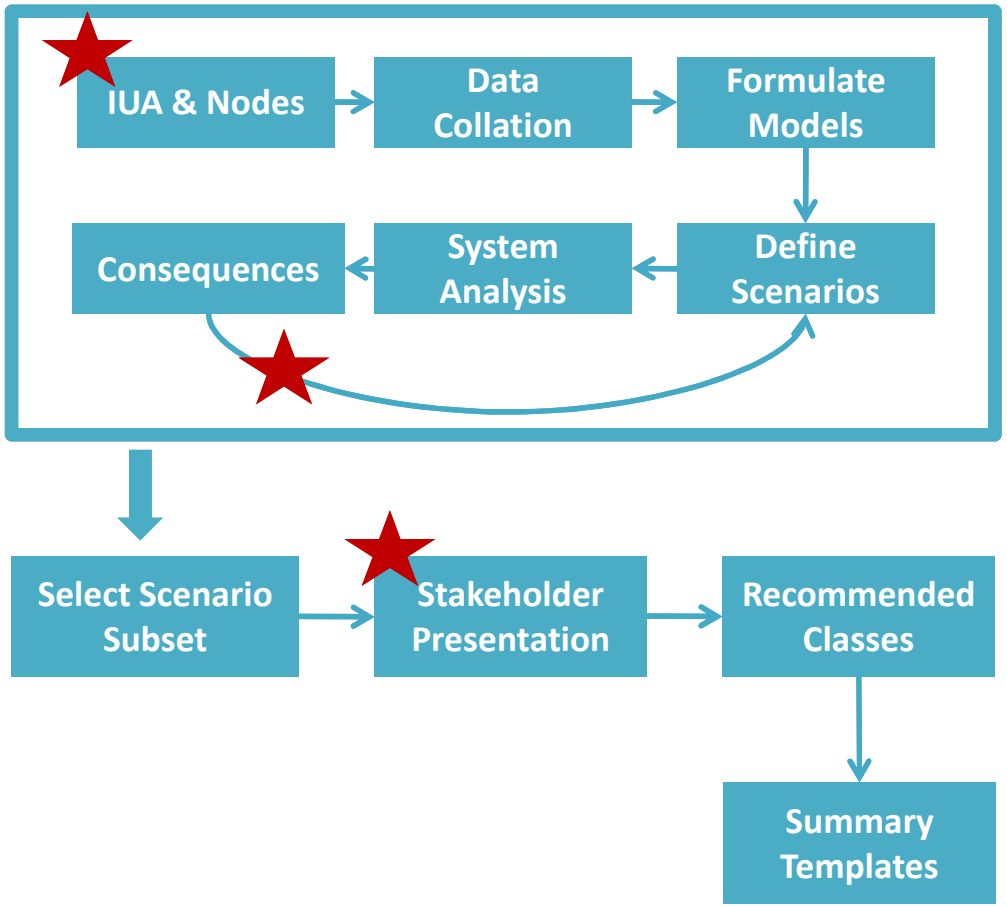
Study Team

- Water for Africa eFlow: Delana Louw
- Zitholele: Andre Joubert
- Conningarth Economists : William Mullens
- Nomad Consulting: Greg Huggens
- WRP: Susan Swart
- Koekemoer Aquatic Services : Shael Koekemoer
- DMM: Darius Mnguni
- Hydrosol: Bennie Haasbroek
- Specialists

Study Tasks

- Task 1: Project inception
- Task 2: Water resource information and data gathering
- Task 3: Determination of the Management Class
- Task 4: Communication and liaison
- Task 5: Capacity Building
- Task 6: Study Management and co-ordination

Study Procedure



Task 1: Project inception

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Task 3: Determination of the Management Class

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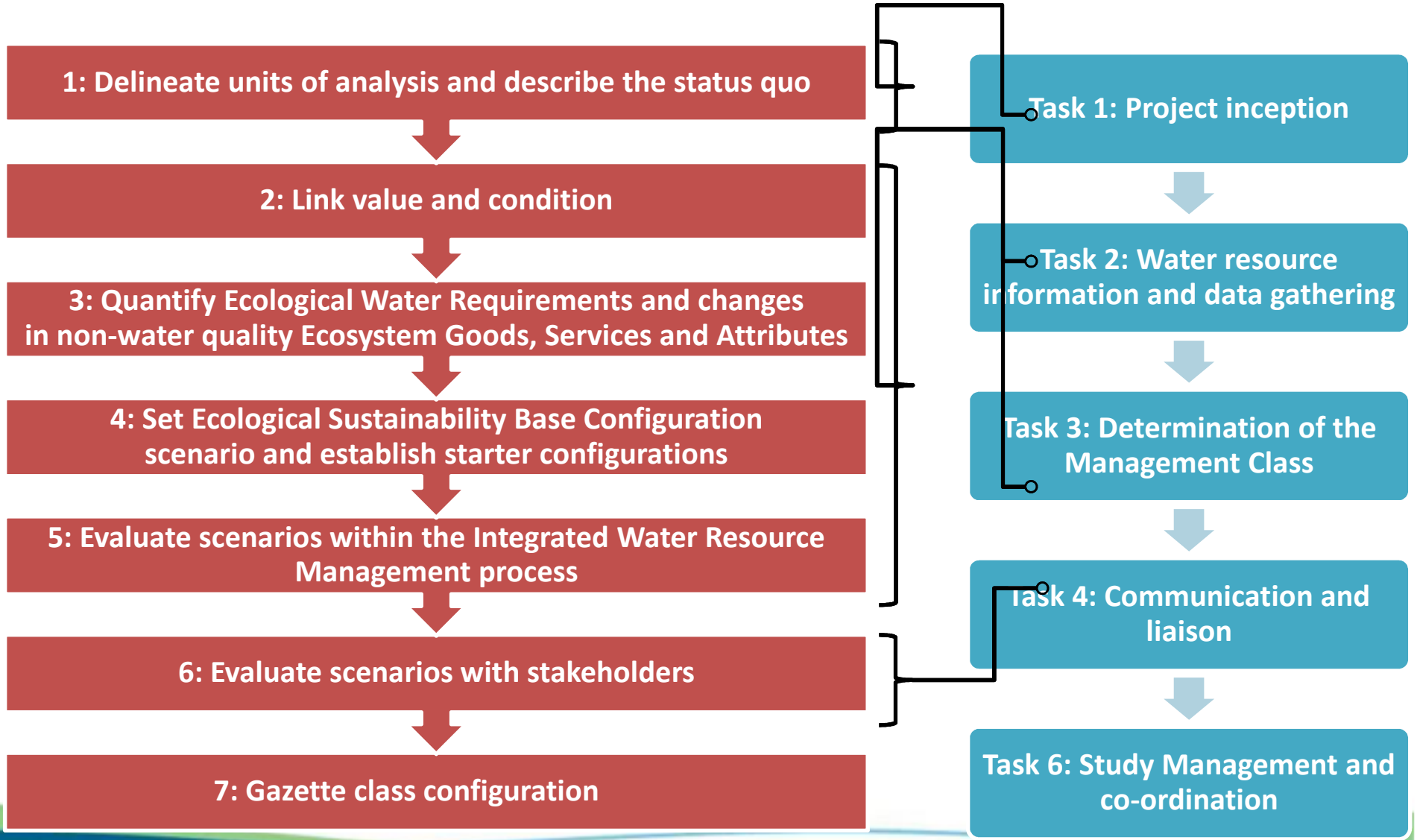
Task 6: Study Management and co-ordination

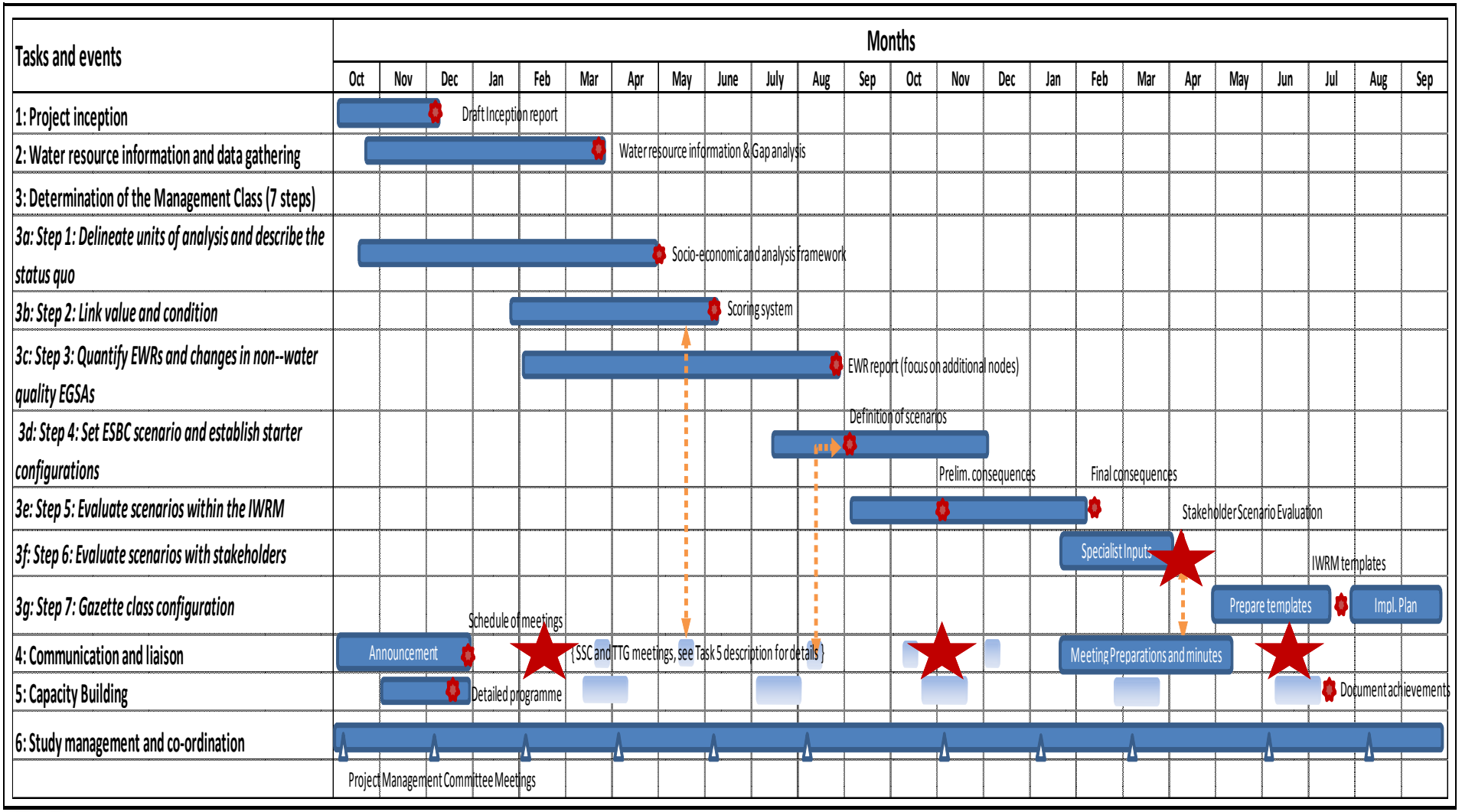
Task 5: Capacity Building

IUA = Integrated Units of Analysis

WRCS / Study Tasks



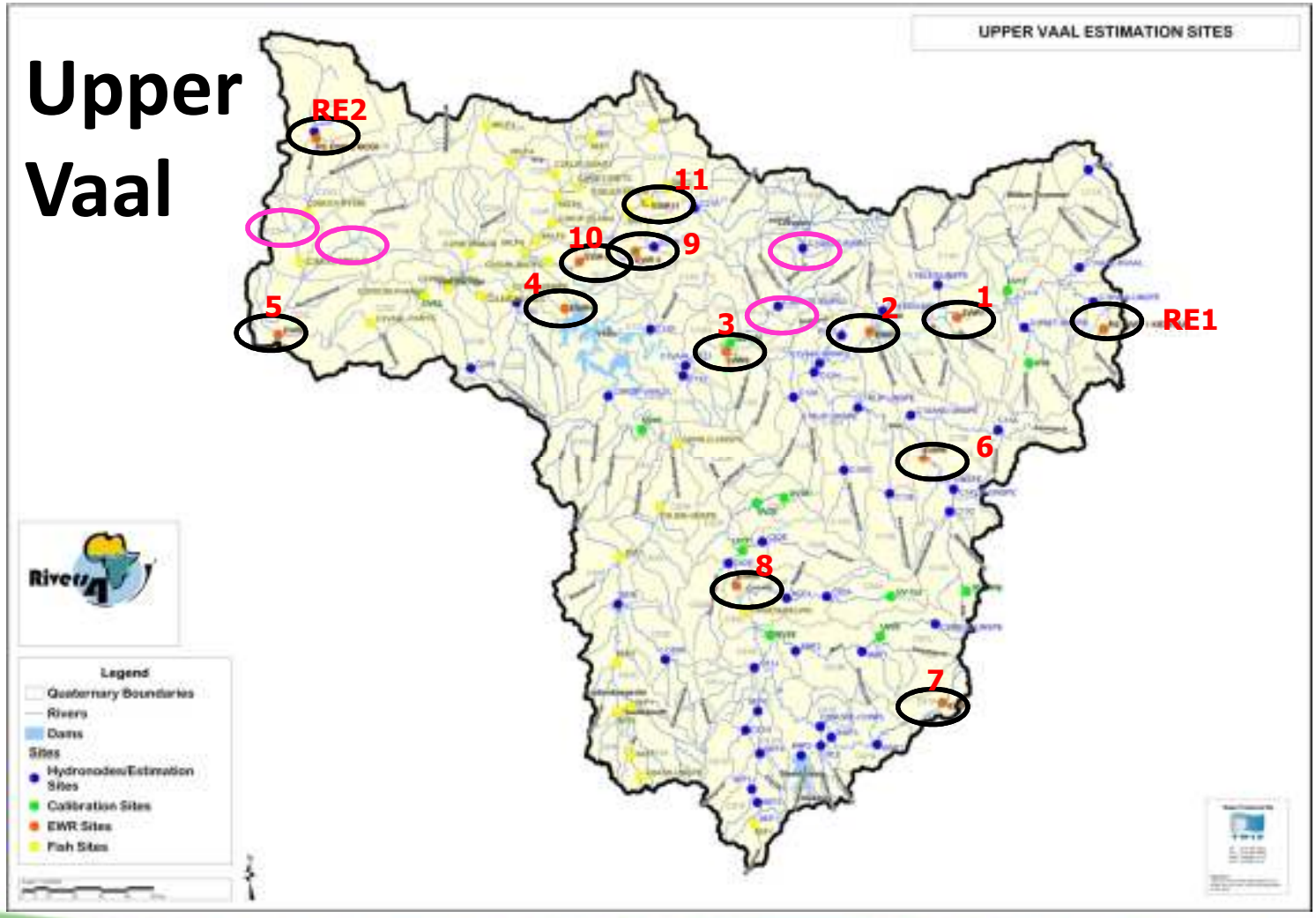
Task Schedule



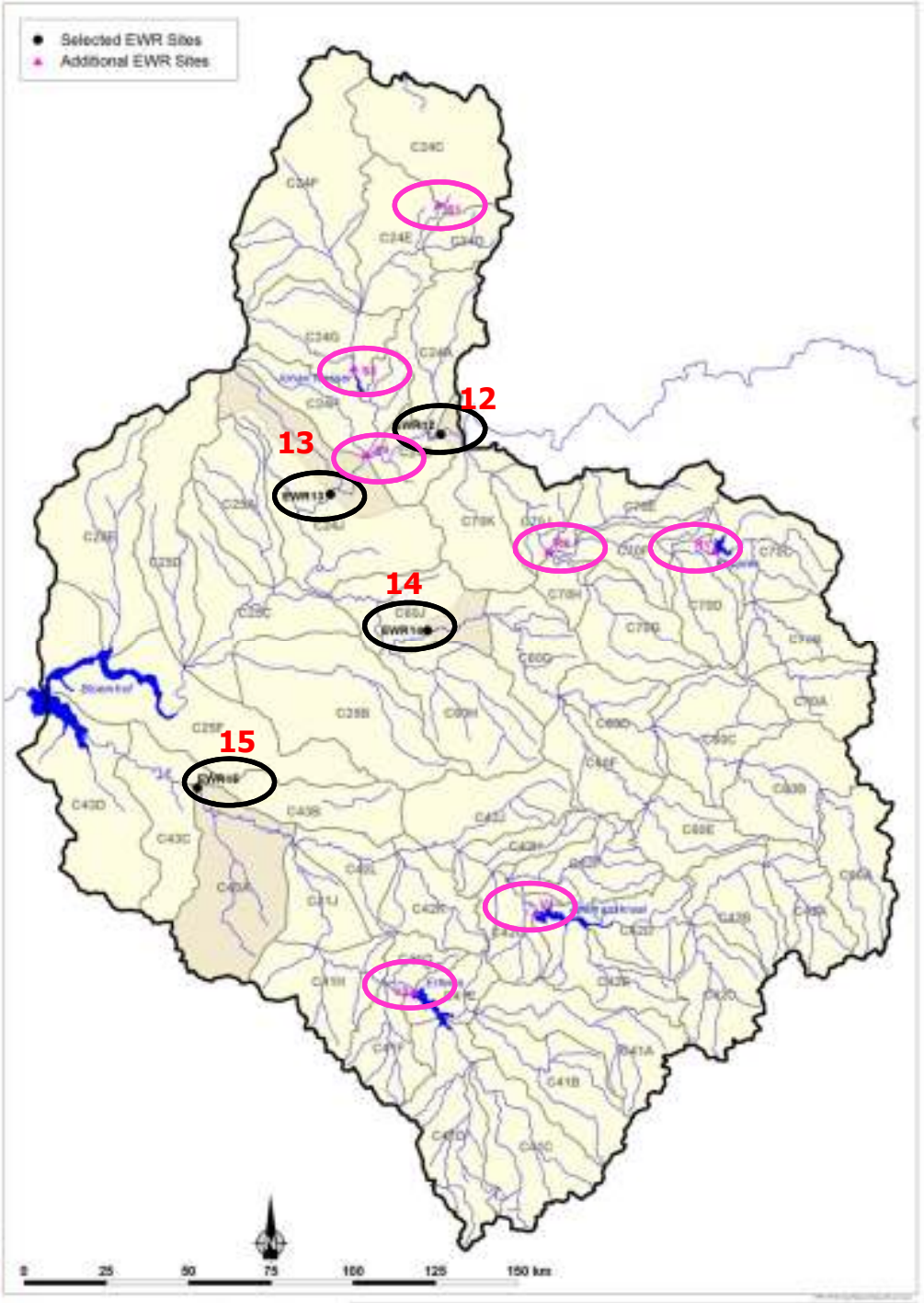
Notes: EWR = Ecological Water Requirement EGSAs = Ecosystem Goods, Services and Attributes ESBC = Ecological Sustainability Base Configuration IWRM = Integrated Water Resource Management

Technical Process

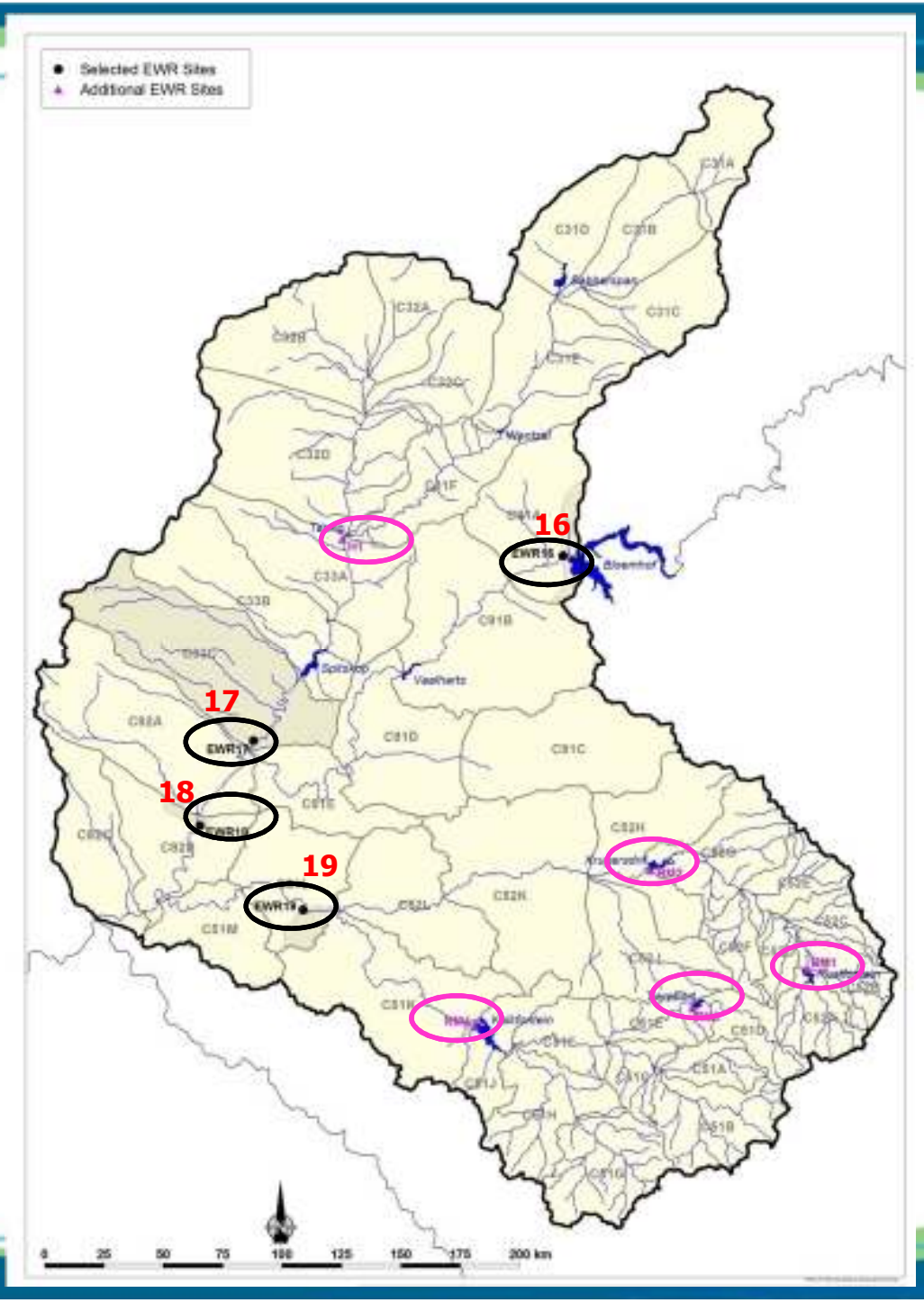
Information from Comprehensive Reserve Determination Study



Middle Vaal


Selected EWR Sites
Additional EWR Sites
12
13
14
15
0
25
50
75
100
125
150 km

Lower Vaal


Selected EWR Sites
Additional EWR Sites
16
17
18
19
EWR16
EWR17
EWR18
EWR19
0 25 50 75 100 125 150 175 200 km

SUMMARY OF ECOLOGICAL CONSEQUENCES

Consequence	Symbol
Recommended Ecological Class	√
Present Ecological State , Lower than REC	PES
Below PES and REC	X

Obs. = Observed at sites
Rel. = Released from dams

(1) =Full Utilisation Scenario

Scenario definition						
Development Level:>		2008	2020	2020	2008(1)	2008(1)
EWR operating rule:>		Rel.	Obs.	Rel.	Obs.	Rel.
EWR Site / River / Position						
1 (Vaal)	U/S Grootdraai	√	√	√	√	√
2 (Vaal)	D/S Grootdraai	X	√	√	√	X
3 (Vaal)	U/S Vaal Dam	√	√	√	√	√
4 (Vaal)	D/S Vaal Dam	PES	PES	PES	PES	PES
5 (Vaal)	D/S Vaal Barrage	PES	√	√	PES	PES
6	Klip	√	√	√	√	√
8	Wilge	√	X	X	X	X
9	Suiker	√	√	√	PES	√
10	Suiker	√	X	X	√	√
11	Blesbok	PES	X	X	PES	PES
12 (Vaal)	U/S Schoonspruit	√	√	√	√	√
13 (Vaal)	U/S Bloemhof Dam	√	√	√	√	√
14	Vals	√	X	√	√	√
15	Vet	√	√	√	√	√
16 (Vaal)	D/S Bloemhof Dam	√	√	√	√	√
17	Harts	√	√	√	√	√
18 (Vaal)	D/S Harts	√	√	√	√	√
19	Riet	√	√	√	√	√

Socio-Economic Consequences

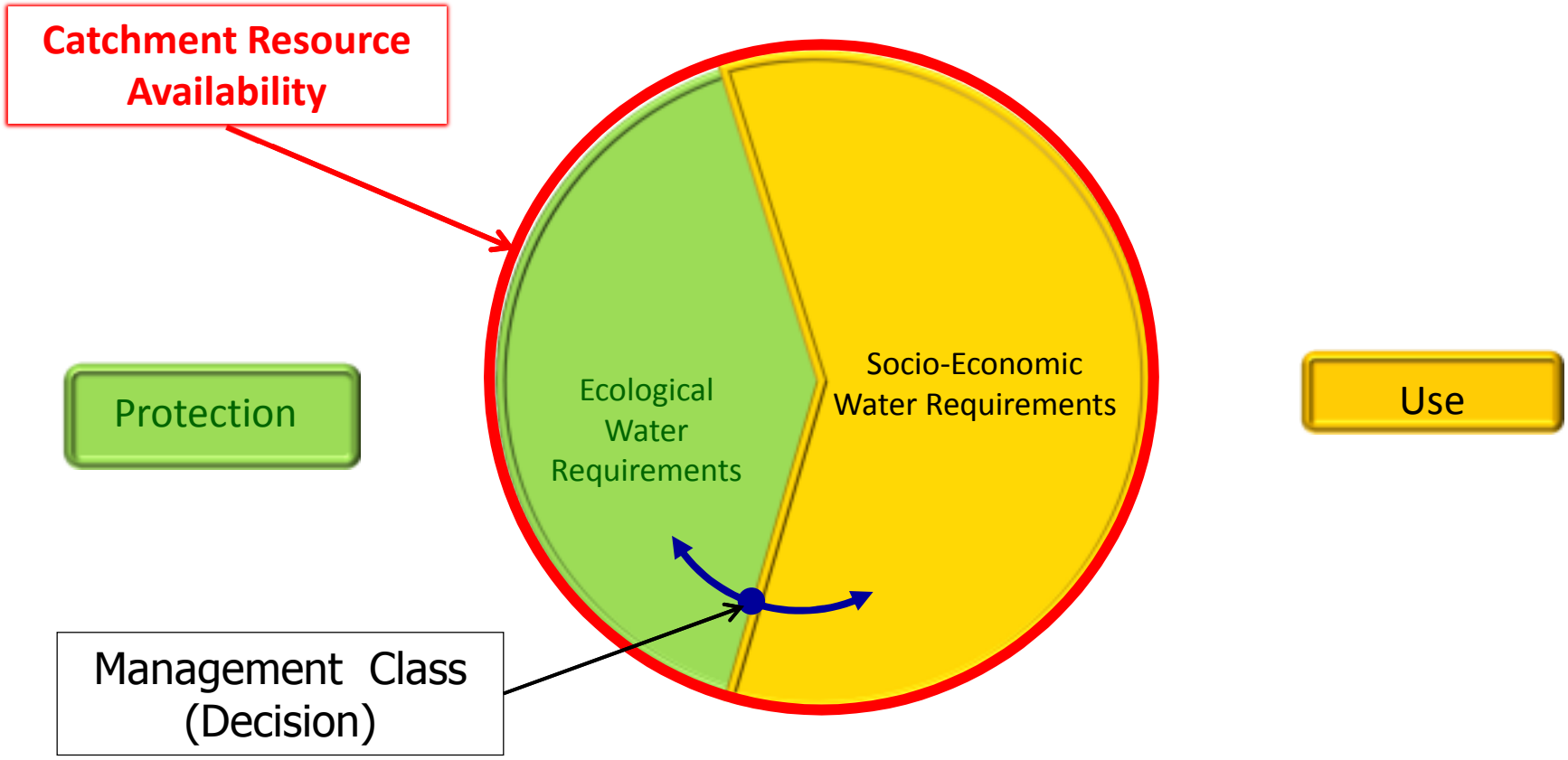
- Vaal River Main Stem: Only additional cost of transfer to Vaal River Eastern Subsystem
- Substantial impact on users in Vals, Vet, Sand catchments (with scaled EWR downstream of dams)
- Minor implication u/s of Grootdraai Dam

Key Technical Methods

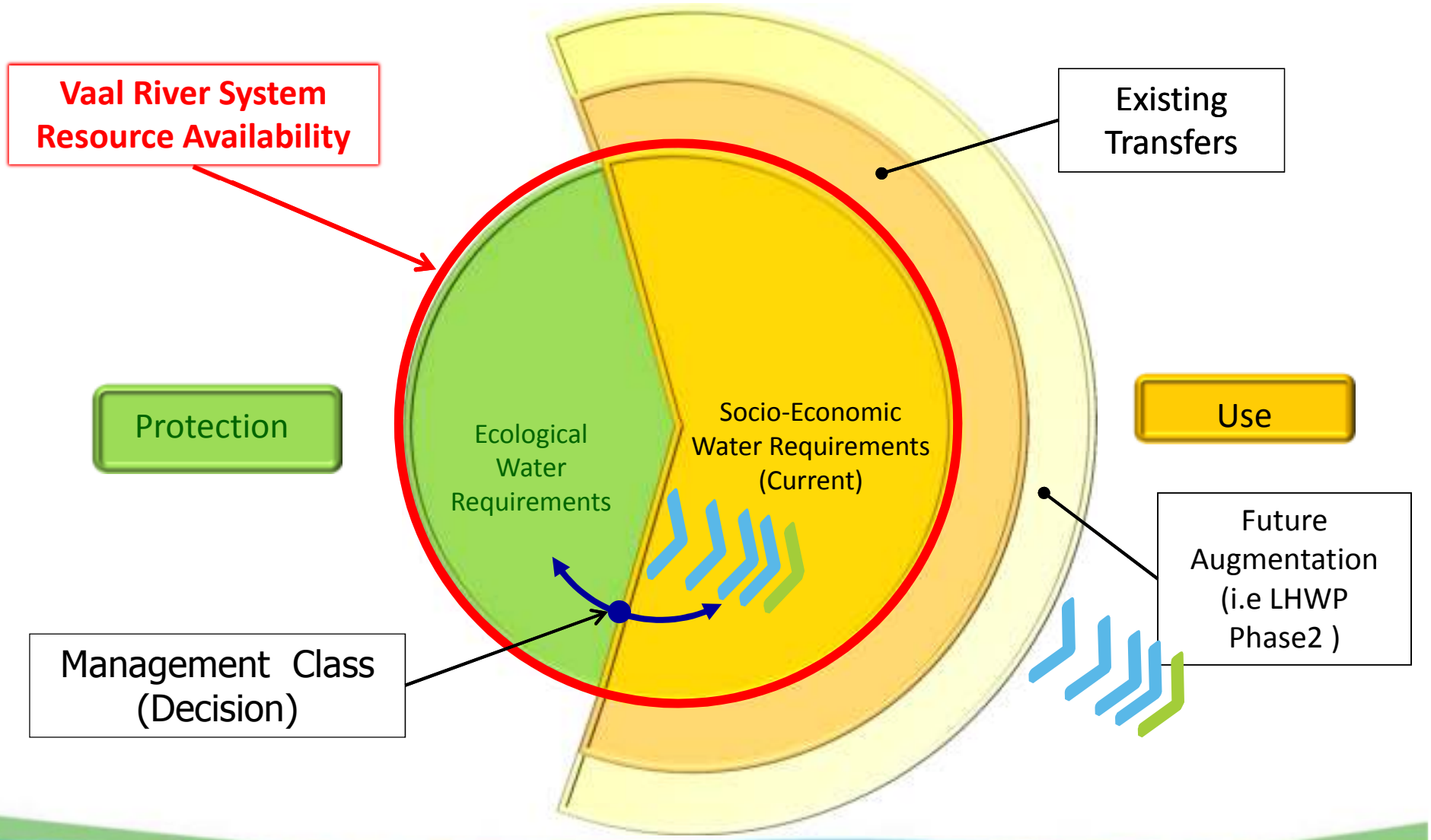
- **EWR node Extrapolation:** (Principles for a process to estimate and extrapolate Ecological Flow Requirements, WRC No. KV 210/08)
- **Socio-Economic Assessment:**
  - IVRS: Implication on augmentation and transfer costs
  - Catchments: “Severe Economic Prejudice”
- **Water Availability: Apply Water Resource Planning Model**
  - Integrated system analysis
  - Incorporate management strategies

EWR=Ecological Water Requirements
IVRS=Integrated Vaal River System

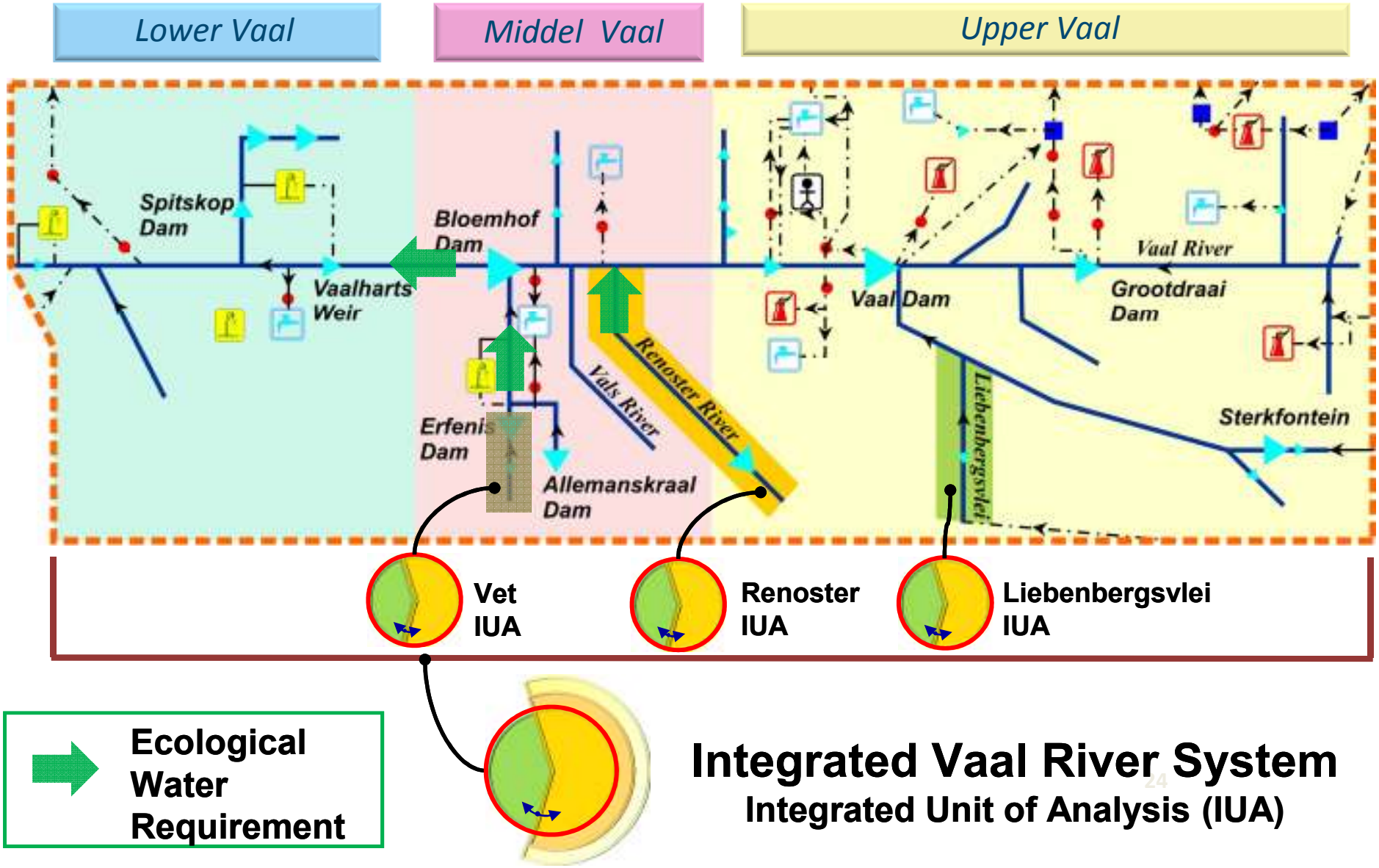
Catchment Analysis



Integrated Vaal River System Analysis



Scenario Integration



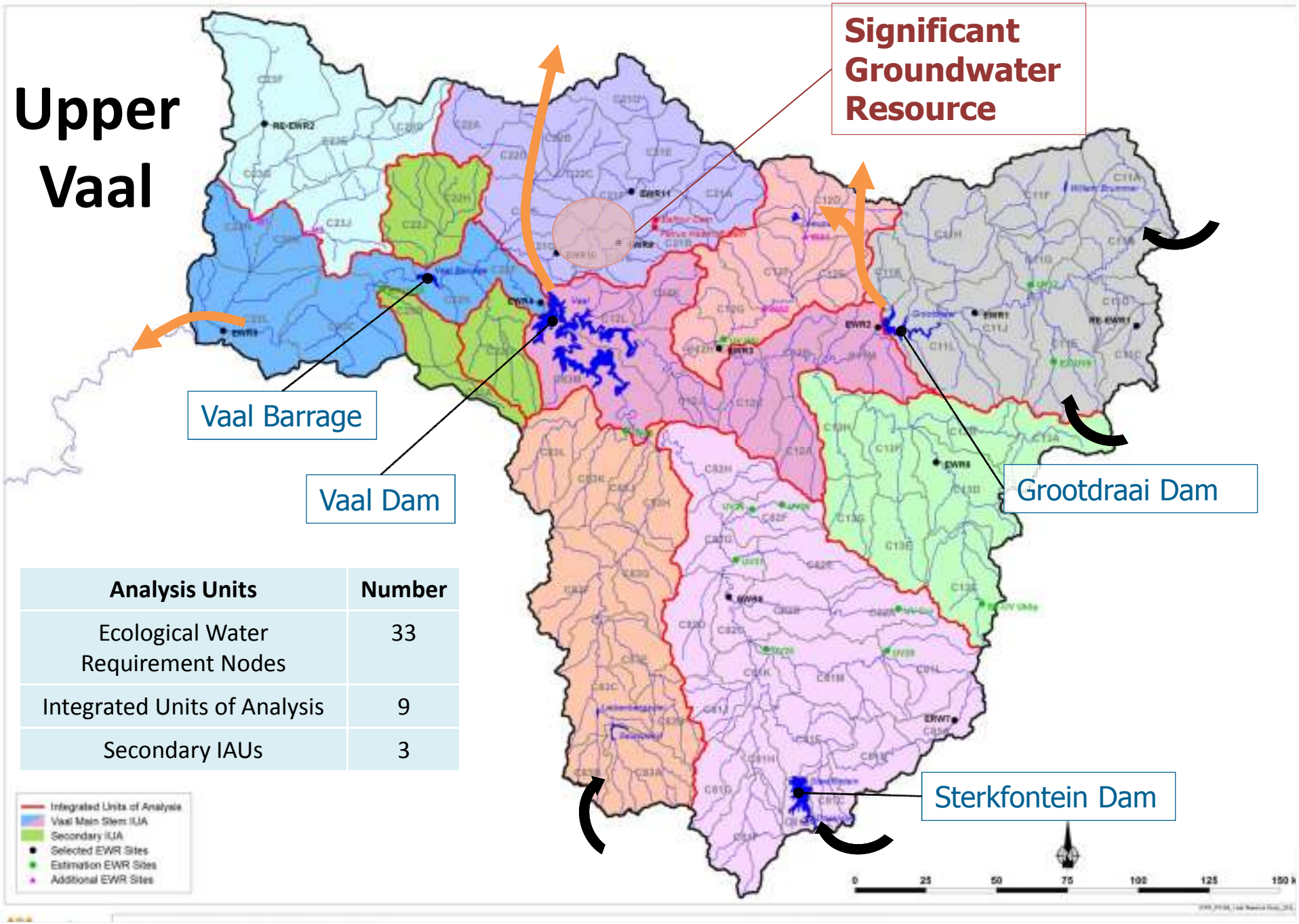
PUBLIC PARTICIPATION PROCESS

Integrated Units of Analysis
and
Significant Water Resources

Rational for IUA definition

- Existing hydrological resource network configuration and resolution
- Location of significant water resource infrastructure
- Distinctive functions of the catchments in context of the larger system
- Available budget for refinement of the existing network and undertaking scenario analysis of each IUA

Upper Vaal

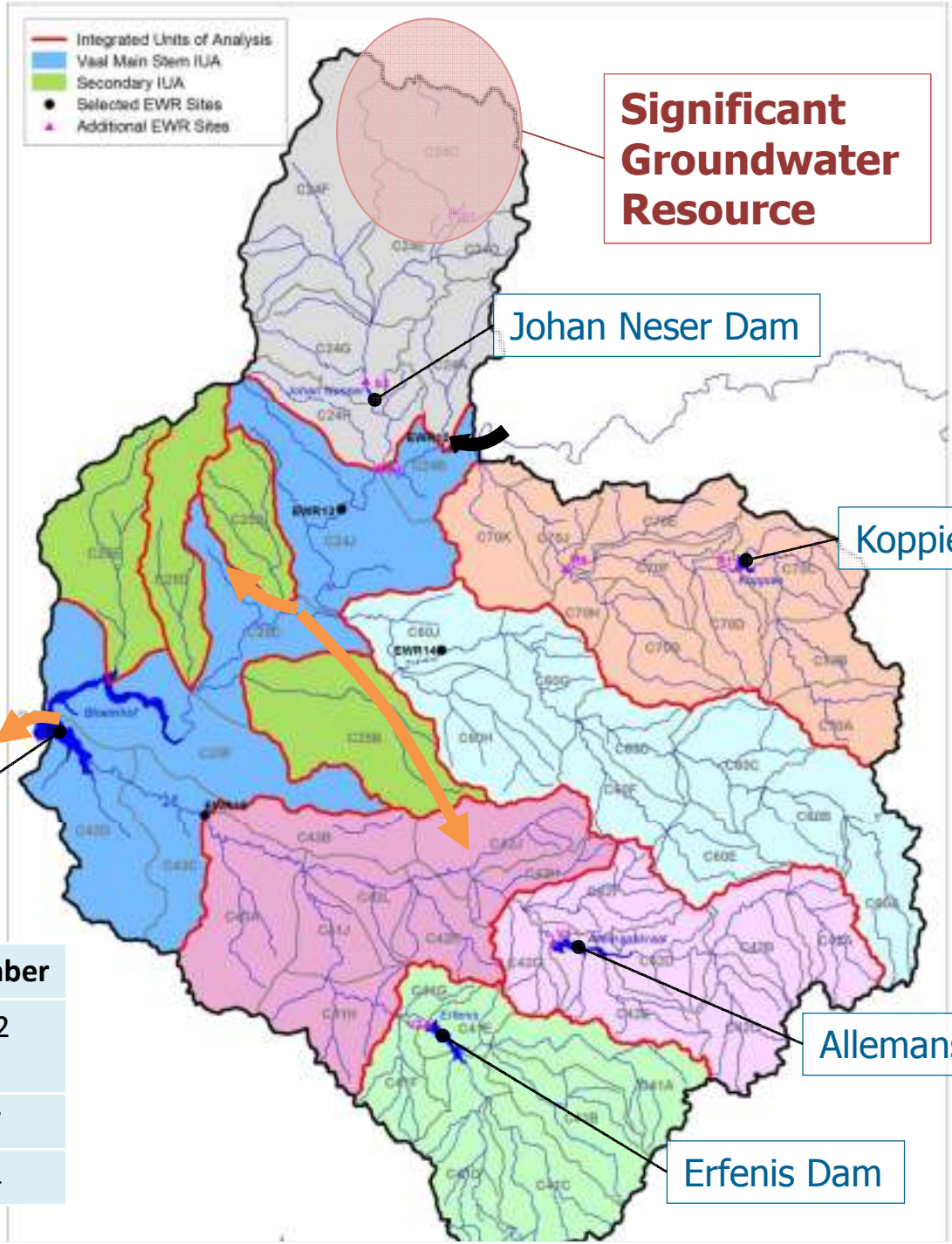


Analysis Units	Number
Ecological Water Requirement Nodes	33
Integrated Units of Analysis	9
Secondary IAUs	3

Propose IUAs: Upper Vaal

- Upper Vaal (Grootdraai Dam)
- Klip River (Free State)
- Wilge River
- Liebenbergvlei River
- Waterval River
- Vaal River Incremental (U/S and D/ Vaal Dam)
- Blesbok/Suikerbosrand/Klip (GP) rivers
- Mooi River / Loopspruit River

Middle Vaal

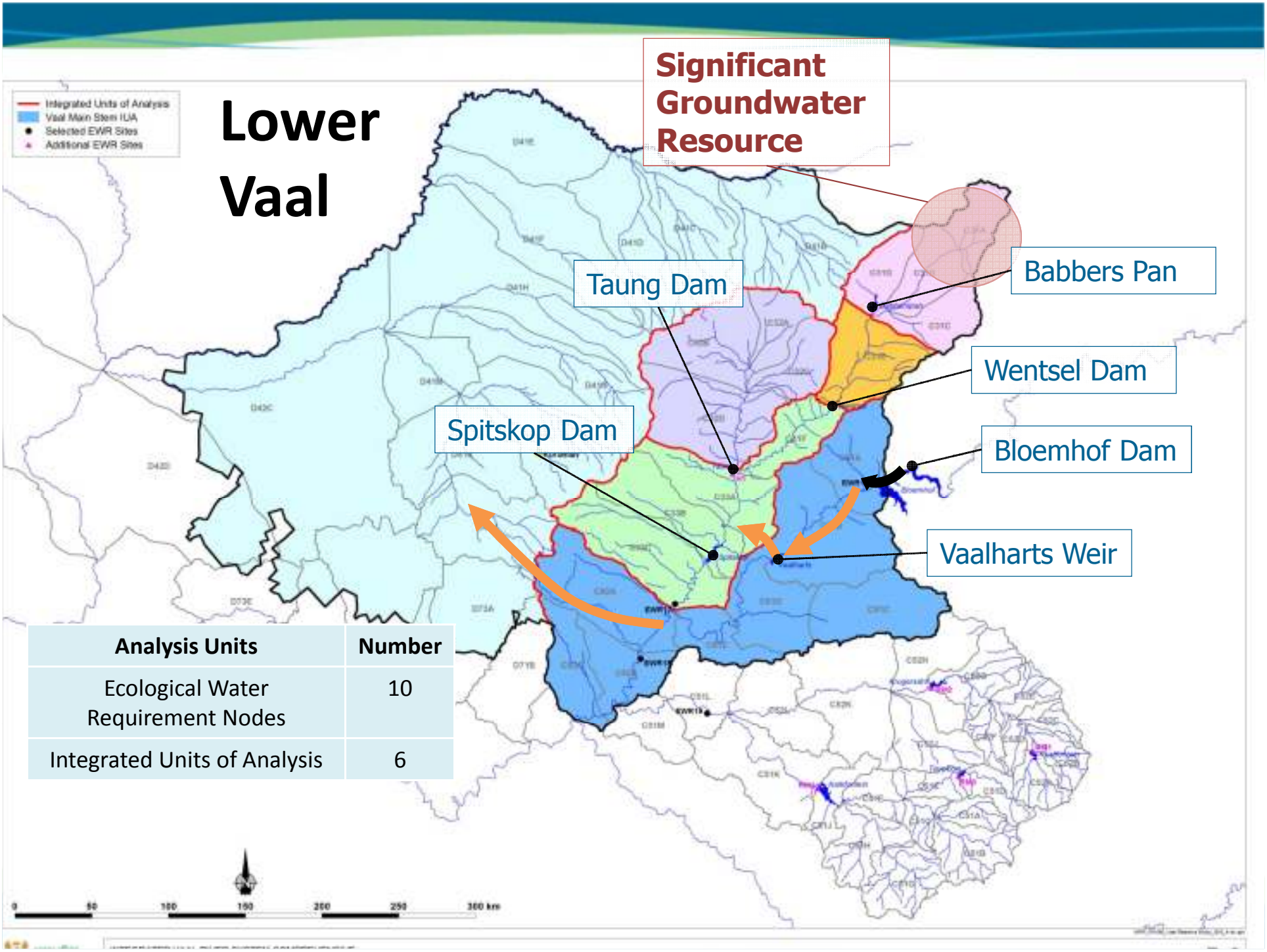


Analysis Units	Number
Ecological Water Requirement Nodes	12
Integrated Units of Analysis	7
Secondary IAUs	4

Propose IUAs: Middle Vaal

- Schoonspruit River
- Renoster River
- Vals River
- Sand River
- Vet River
- Lower Vet River
- Vaal River Upstream of Bloemhof Dam

Lower Vaal

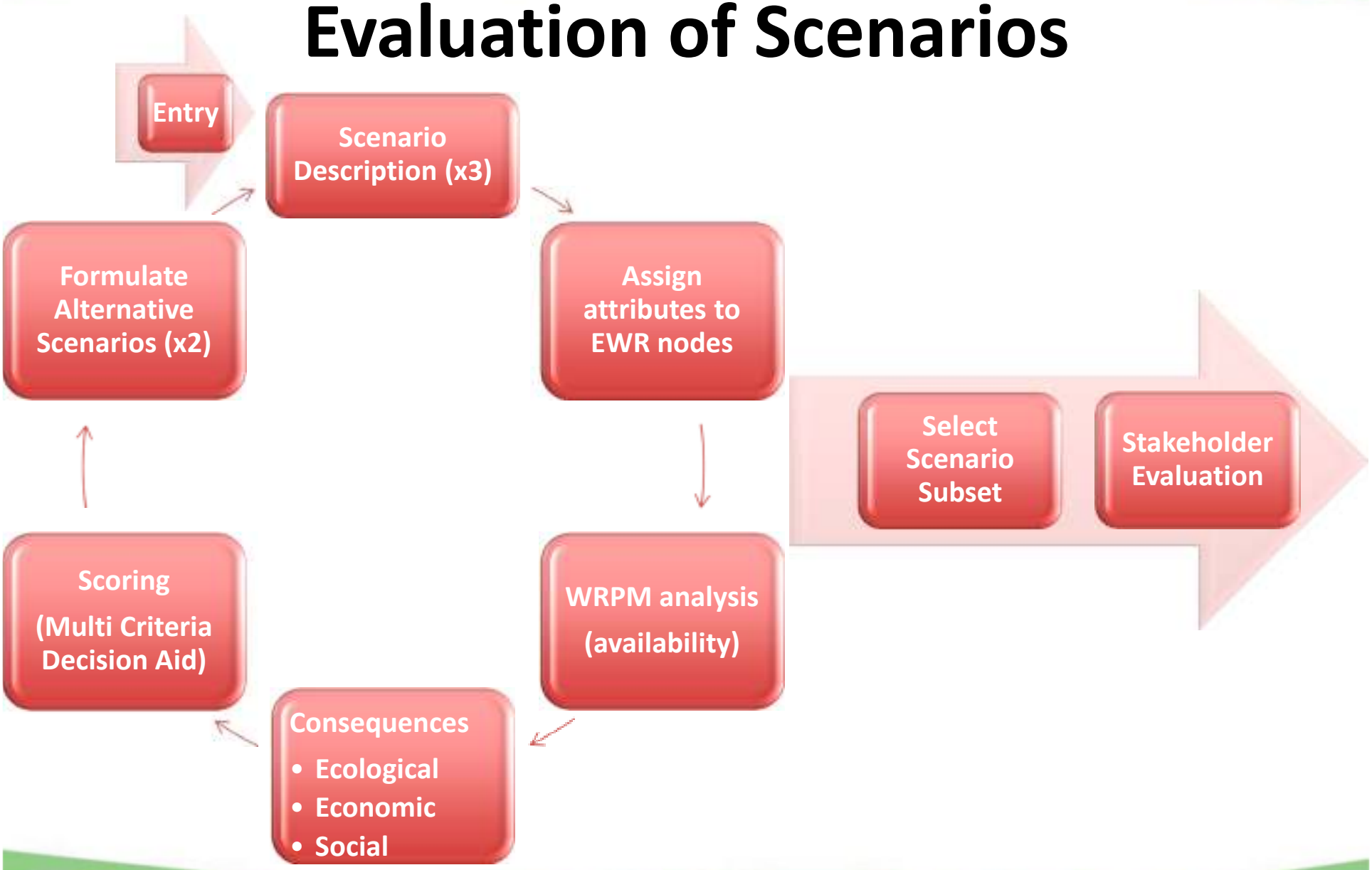


Analysis Units	Number
Ecological Water Requirement Nodes	10
Integrated Units of Analysis	6

Propose IUAs: Lower Vaal

- Upper Harts River
- Middle Harts River
- Dry Harts River (Tributary)
- Lower Harts River
- Molopo River
- Vaal River Downstream of Bloemhof Dam

Evaluation of Scenarios



Next Steps

- Technical Work
  - Detail evaluation and interpretation of information
  - Extrapolation, Socio-economic status for IAUs, Refinement of WRPM network
- Formulate Multi-Criteria Decision Aid System
  - Social, Economic, Ecological criteria
- Integration with Reconciliation Strategy Maintenance Study and other processes

Questions for clarification?
Thank You