Integrated water quality management - a practical management framework

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Our premise…

Everyone is downstream

Every water user…

…is a water manager

It's time for a mindset change

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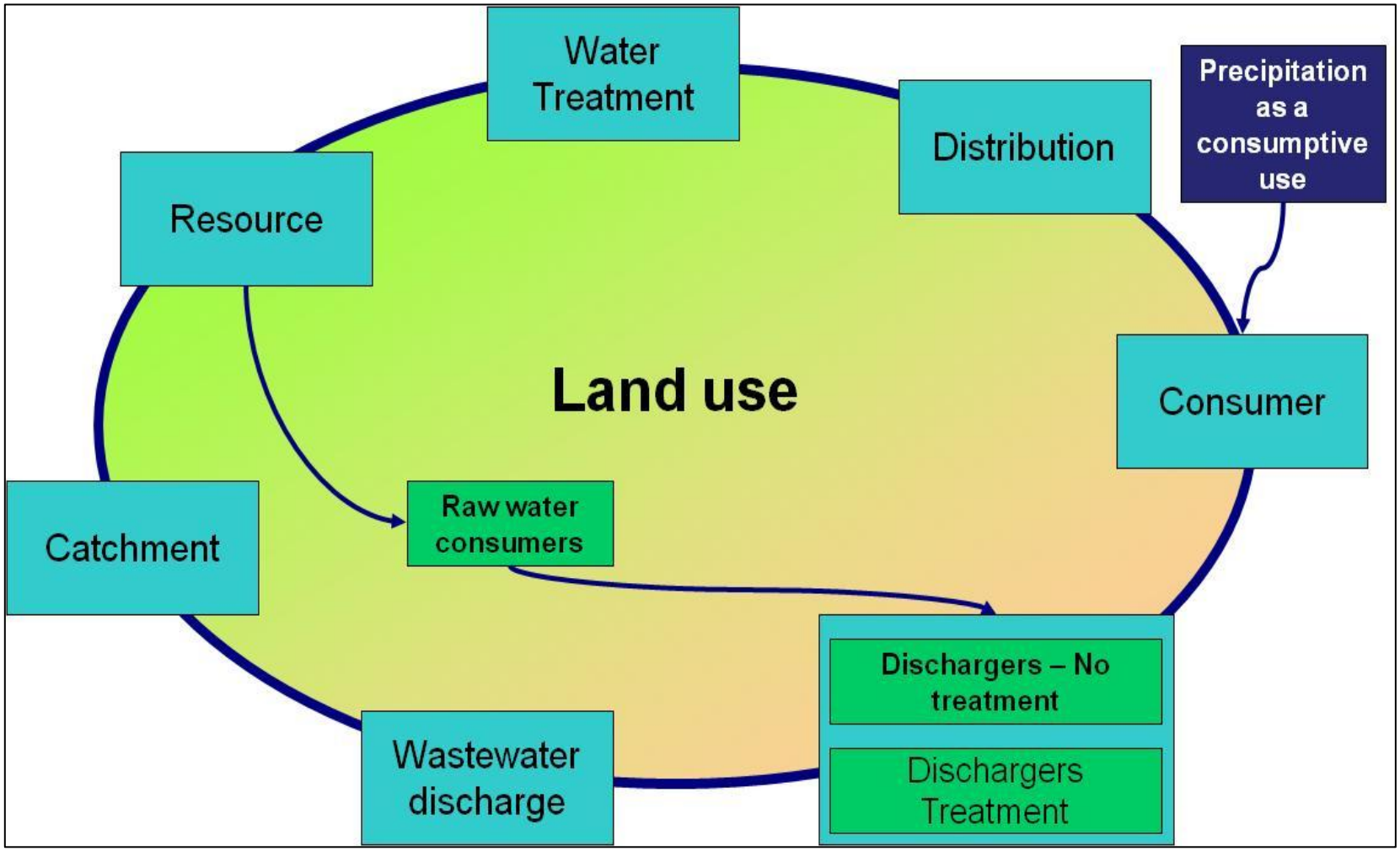
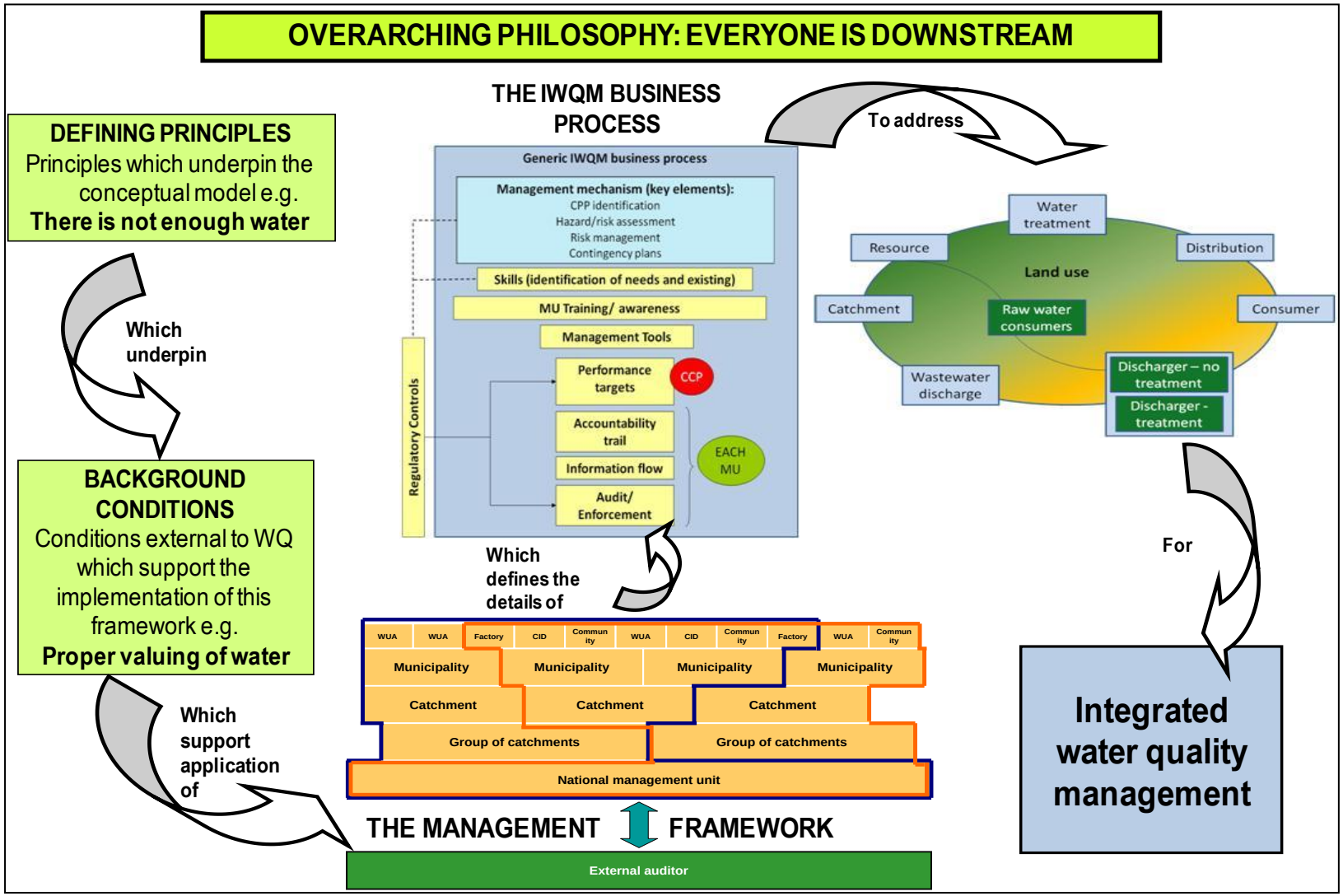
The water use cycle



The integrated water quality model



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Defining principles

- Water must be properly valued (there is not enough water);
- Institutions responsible for managing water must be accountable for water quality;
- Water quantity and water quality are inextricably linked;
- The Polluter Pays Principle must be applied to the true cost of water pollution;
- Short-term economic gain at the cost of increasingly deteriorating water quality is not acceptable; and
- Everyone should have access to water quality information (not data).





Background conditions

Conditions **external to water quality which support the implementation of the framework** and therefore indirectly impact on water quality:

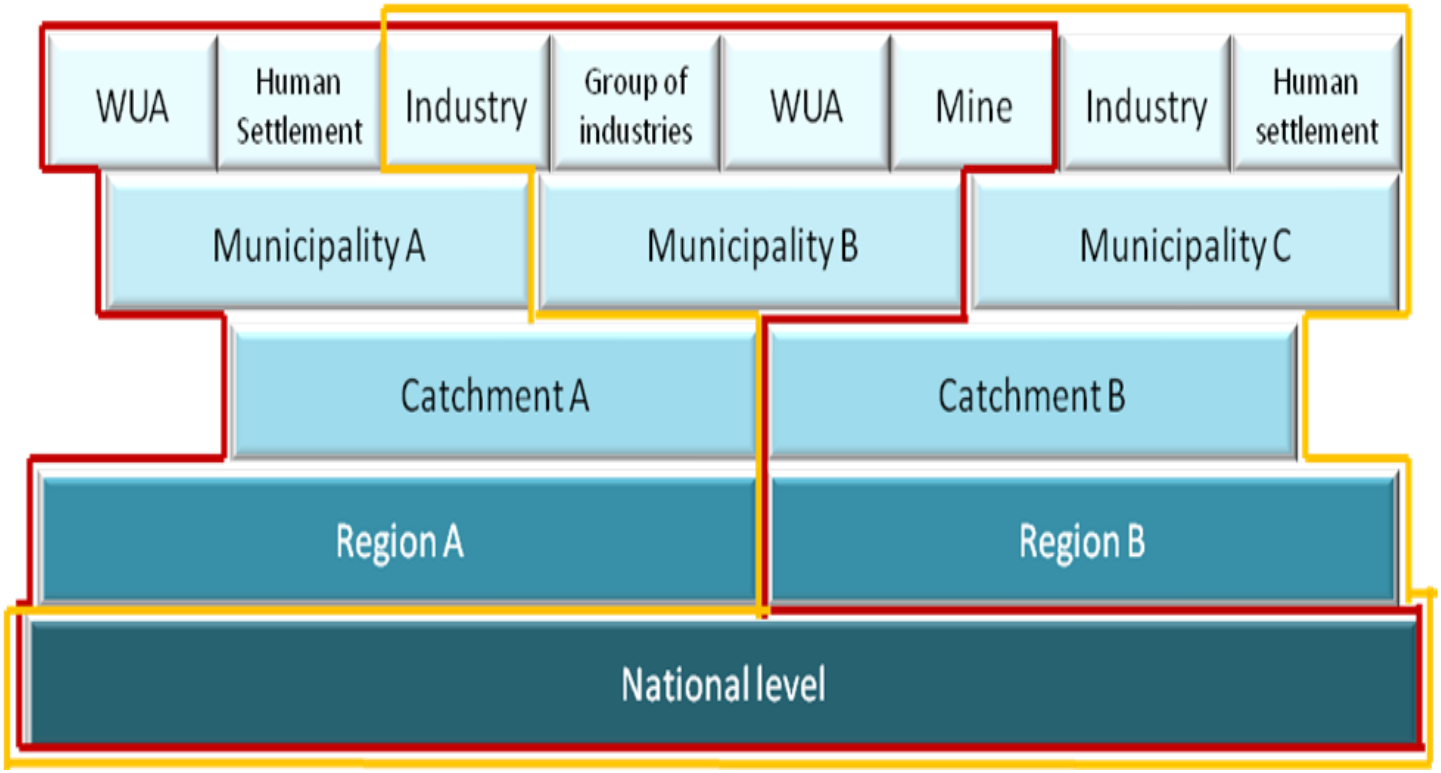
- The ***value of water*** (including wastewater) incorporating issues such as cost-benefit incentives and recycling initiatives;
- ***Management systems and tools*** such as RHP;
- ***Communication*** between management units and also public access to information;
- ***Accountability*** including aspects such as the implementation of the polluter pays principle, enforcement mechanisms and the implementation of a government watchdog;;
- ***Education*** across the board on water issues;
- ***Effective strategic planning*** at various levels;
- ***Funding;***
- Understanding the final Catchment Management structure within the current 19 Water Management Areas in South Africa and how it relates to ***roles and responsibilities***; and
- ***Research.***



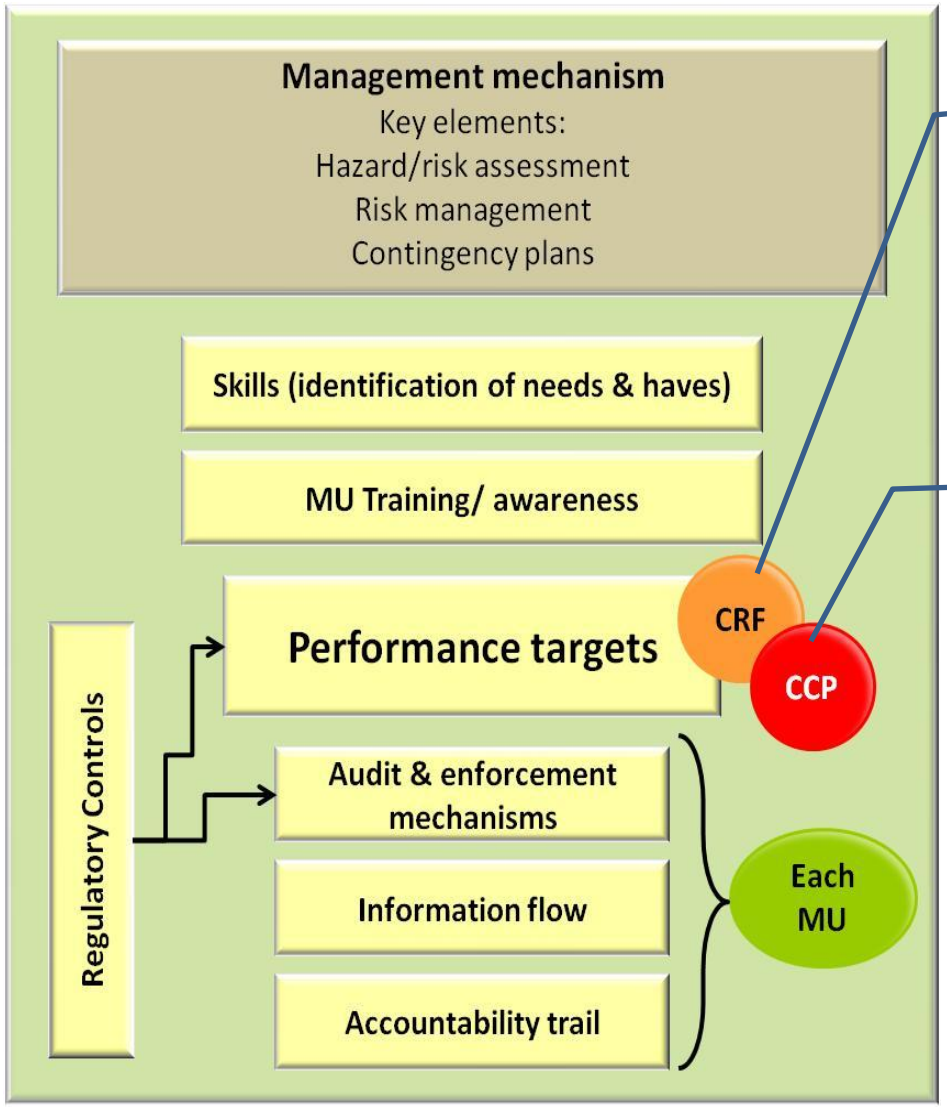


The management framework

- A ***management unit:*** a geographical area; not necessarily homogeneous or continuous; that could be managed as a unit owing to common water use characteristics or institutional responsibilities.



Generic business process



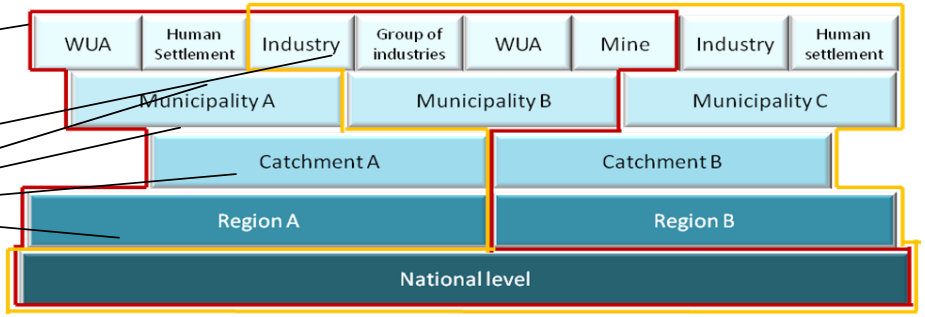
Defined as a point or process at which, if a failure occurs, the CCP performance targets will not be met.

Defined as a hazard and requires technical target measures/parameter ranges. The CCP is often defined by regulatory controls and will usually be a monitoring point (though not necessarily a water sample monitoring point).

IWQM MODEL IMPLEMENTATION FRAMEWORK

Step 1: Establish the "outer boundary"

Step 2: Identify potential management units at the various levels



Step 3: "Sign up" management units and establish *accountability*

MU Name				
MU Type	E.g. Community, Water Service Authority, Industrial area, Catchment Management Agency			
Management mechanism	***If there is an existing management mechanism (e.g. WaSP, EMS or CMS), please indicate:***			
	Management Mechanism/(s)			
CCPs / CRFs	**Refer to Table 6**			
Existing management tools	***Indicate whether any tools are currently being used to manage water quality, and if yes, what tools:***			
	Management Tool/(s)			
Regulatory Controls	***Indicate whether any tools are currently being used to manage water quality, and if yes, what tools:***			
	Regulatory Control/(s)			
Available skills:	***Give details of the people involved currently in management of water quality (of factors which may impact water quality)***			
	Personnel Name	***Position***	***Skill***	***Responsible for***
Training requirements:	***Identify where training is necessary to improve achievement of management objectives***			
	Training Type		Objective of training	
Reporting framework	***Give details of other organizations you report to and on what basis:***			
	Report name			
	Date of last report			
	Period (e.g. monthly)			
	Who is the report for			
	What is reported on			
Audit or Enforcement mechanisms	***Indicate whether your area is audited through any process (e.g. ISO 14001 audits, DWA drinking water quality audit, Blue Drop assessment):***			
	Description		***Frequency***	
Accountable person for the MU	***Name***	***Organisation***	***Contact Details***	
			Email	
			Tel	
	Signature:			

Step 4: Identify Critical Risk Factors (CRFs) and Critical Control Points (CCPs) and set performance targets

Step 5: Develop reporting lines

	Defining Critical Risk Factors and Critical Control Points		
		Critical risk factor/(s)	**Critical control point/(s)**
1	Description: What is it?		
2	Why is it a CRF/CCP? (e.g. a discharge point, or where fertilizer is being used		
3	Where is it? (Coordinate or location description - CCPs MUST have coordinates)		
4	What are its targets?		
5	Is mitigation in place? • If yes, what? • If no. what is being done to improve the situation?		

What is meant by “accountability”?

Accountability means:

- taking responsibility to manage for those targets,;
- mitigate against risks; and most importantly,
- report to other management units in the framework when targets are not going to be met because a risk factor has been triggered and the CCP is not likely to meet its requirements.

The “accountability” discussed in the context of this model is not legislative accountability , but ***voluntary accountability*** to meet the self-imposed requirements of the performance targets .

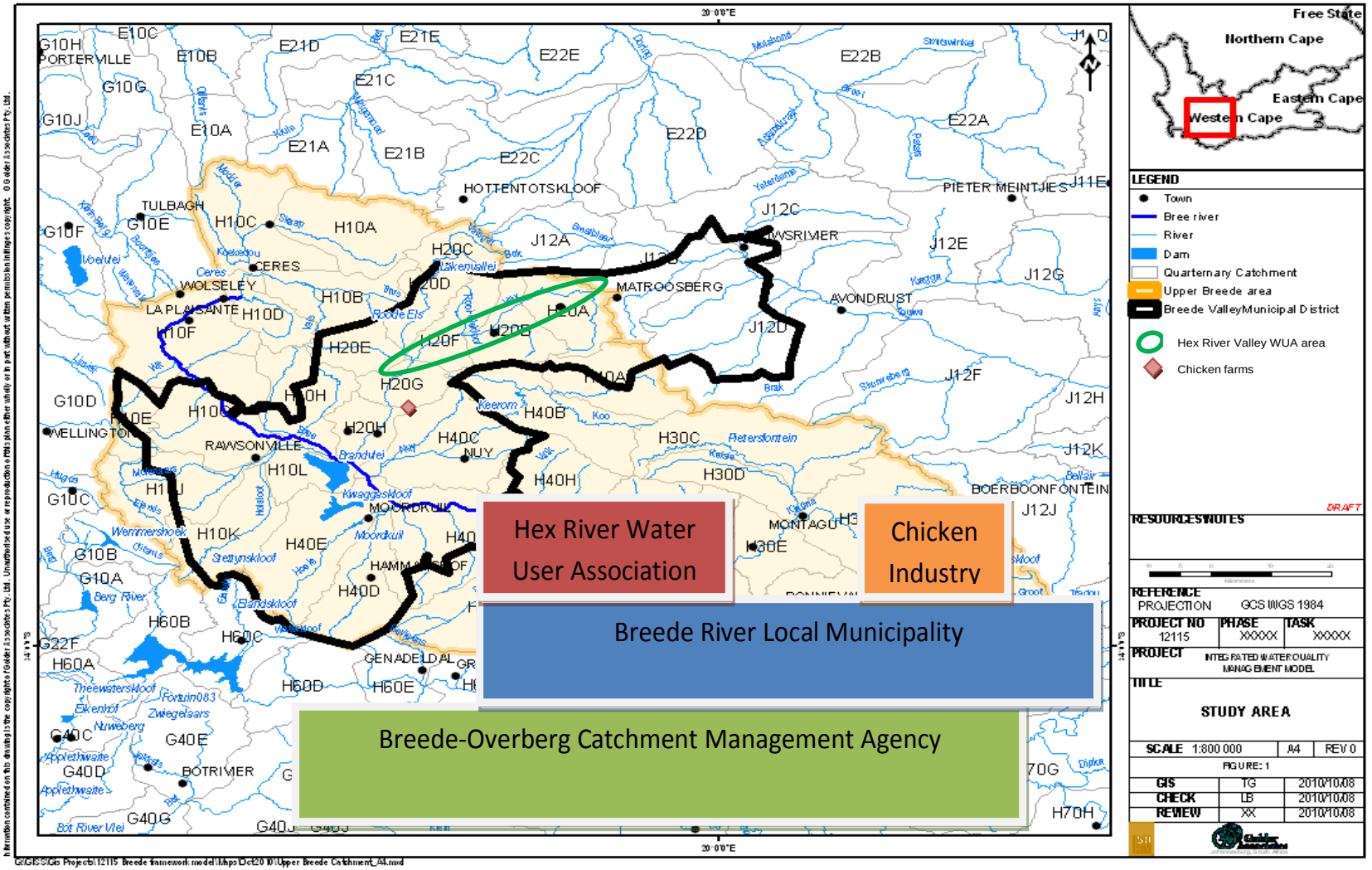
This is the critical aspect of the model, in that it confers management responsibility for water use on smaller groups who agree to be accountable for their actions with regard to the use of water.

Every water user is a water manager

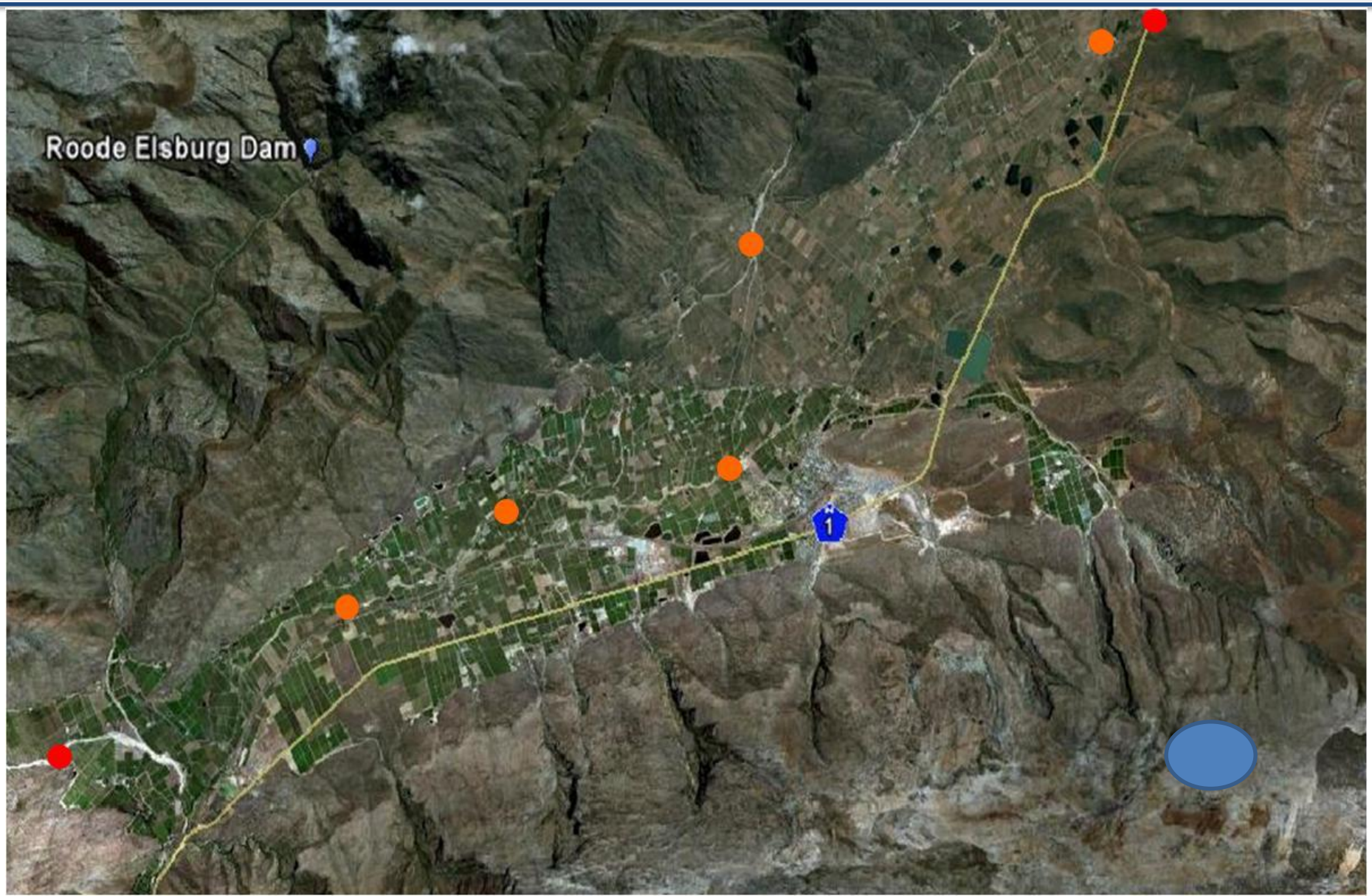




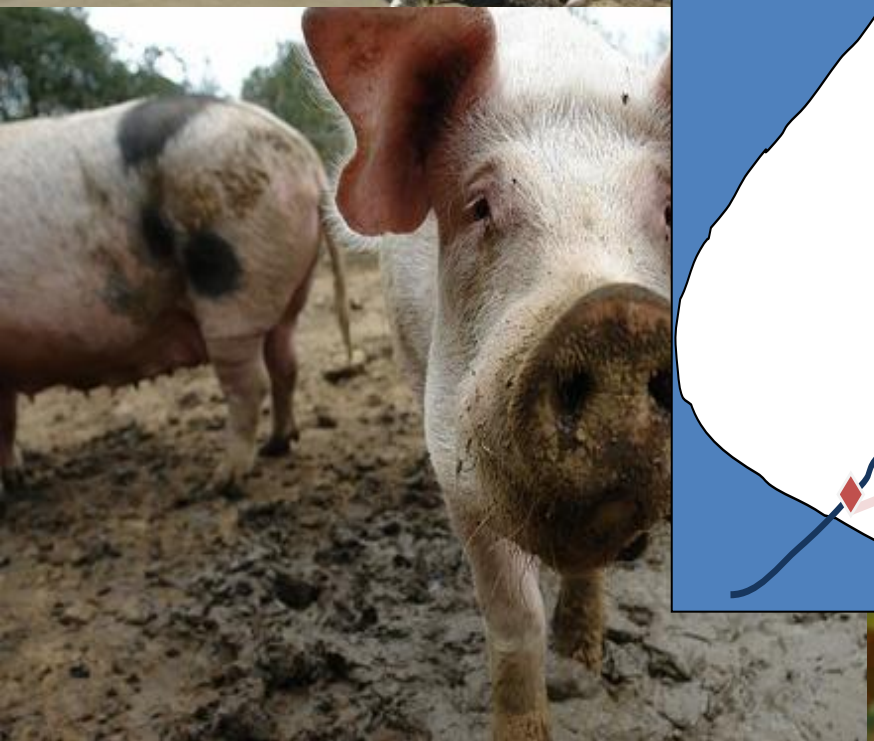
Test case implementation

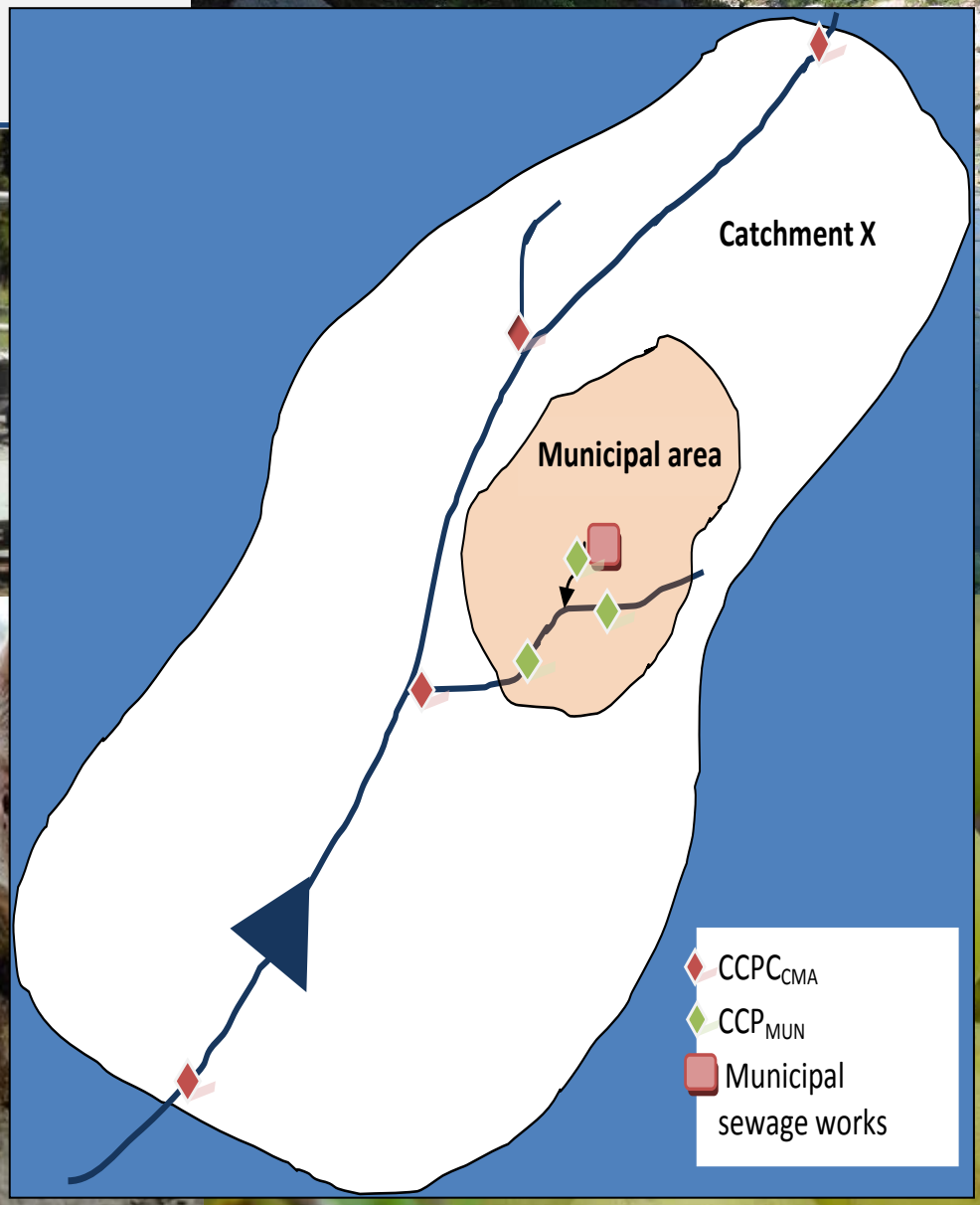


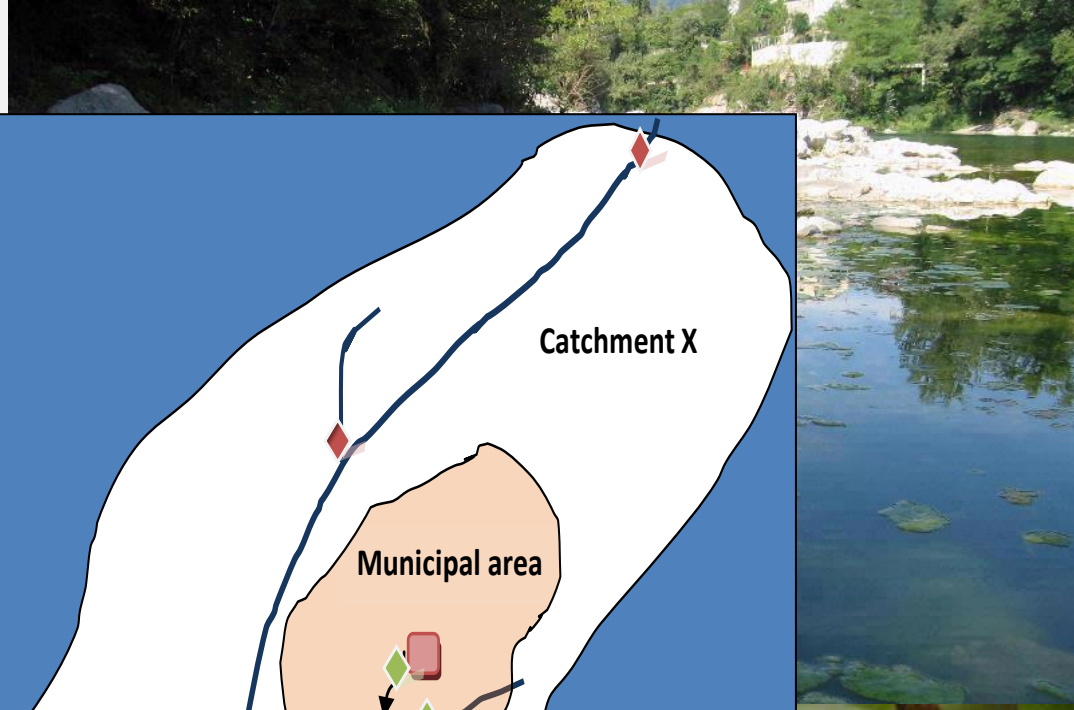
Hex River Valley example

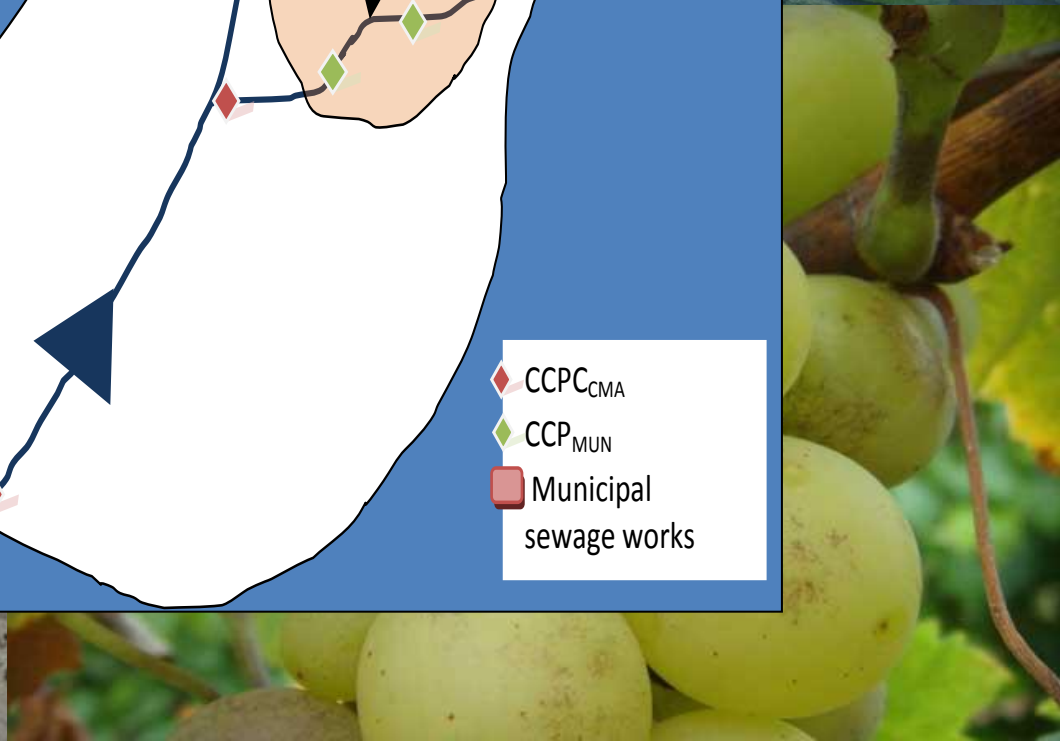


CCPs=CRFs

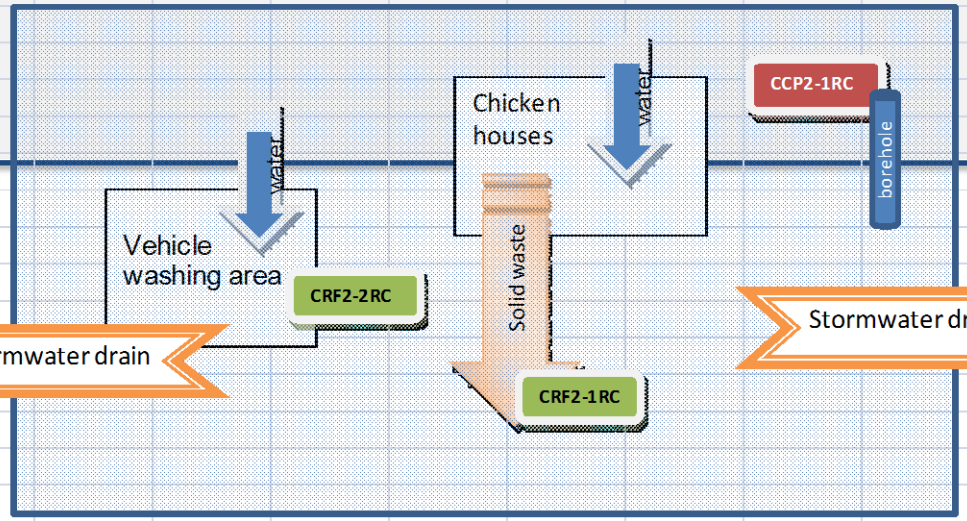


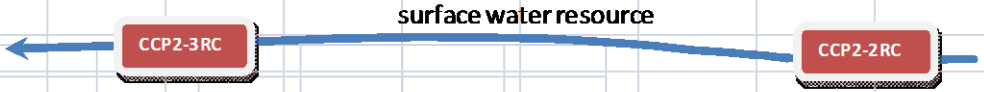

Catchment X
Municipal area
$CCPC_{CMA}$
CCP_{MUN}
Municipal sewage works

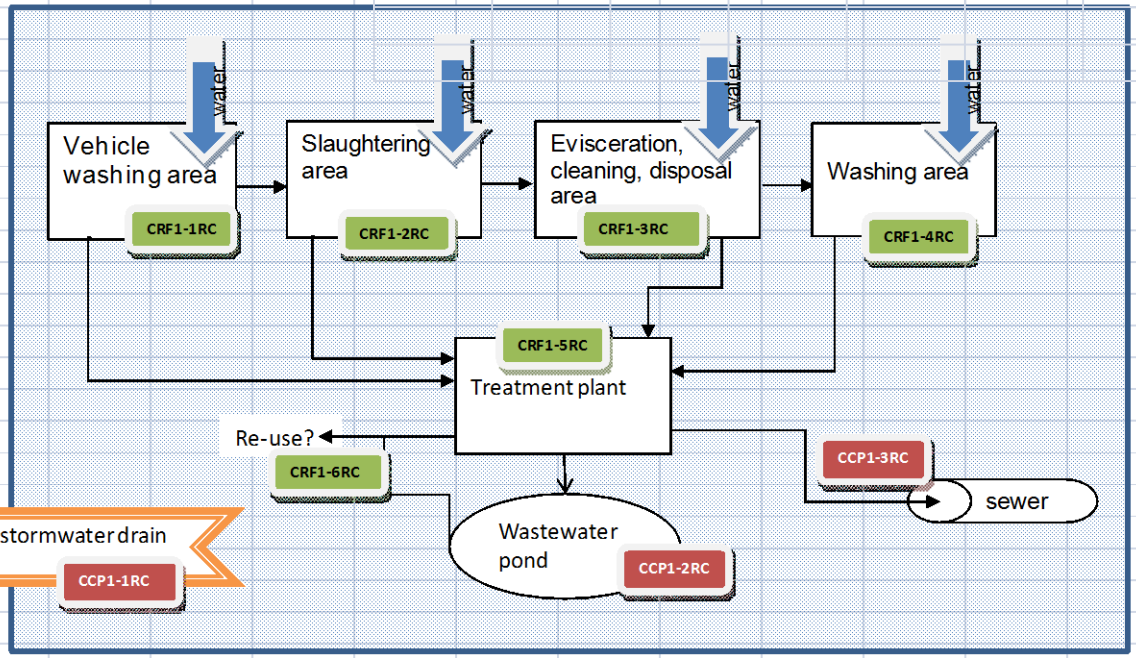




Chicken industry







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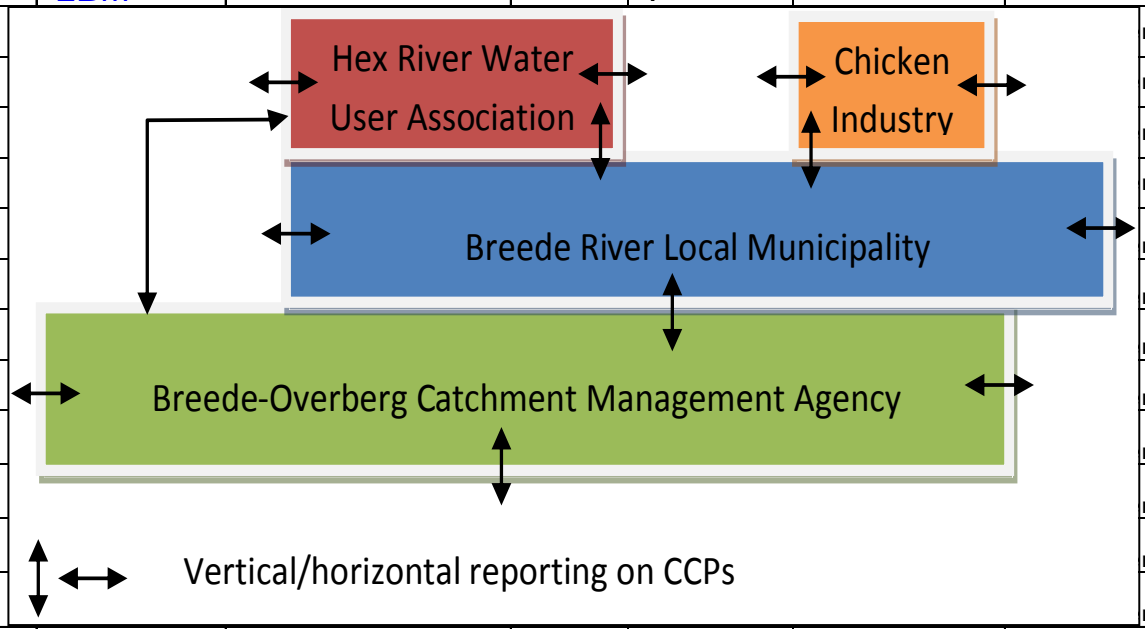
Reporting framework

Manage-ment Unit	Report to:	CCP ID	Compliance (Y/N)	If no	Reason	Mitigation	Timeframe
Breede-Overberg CMA (BOCMA)	National Government	CCP-1BO	Yes (all Y)	If no	Reason:	Mitigation:	By when:
	HVWUA	CCP-2BO	Yes (all Y)	If no	Reason:	Mitigation:	By when:
	Breede Valley Municipality						
Hex Valley WUA (HVWUA)	BOCMA	CCP-1H	Yes (Y to all)	If no	Reason:	Mitigation:	By when:
	Breede Valley Municipality	CCP-2H	Y Y	If no	Reason:	Mitigation:	By when:
Breede River Valley Municipality	BOCMA	CCP-1BM	Yes (Y to all)	If no	Reason:	Mitigation:	By when:
	HVWUA	CCP-2BM	Yes (Y to all)	If no	Reason:	Mitigation:	By when:
	Rainbow chickens						n:
							n:
							n:
							n:
							n:
							n:
							n:
Chicken Industry	Breede Valley Municipality						n:
							n:
							n:
							n:
							n:
		CCP2-3RC	Yes	If no	Reason:	Mitigation:	By when:



Implementation in the Okavango Region

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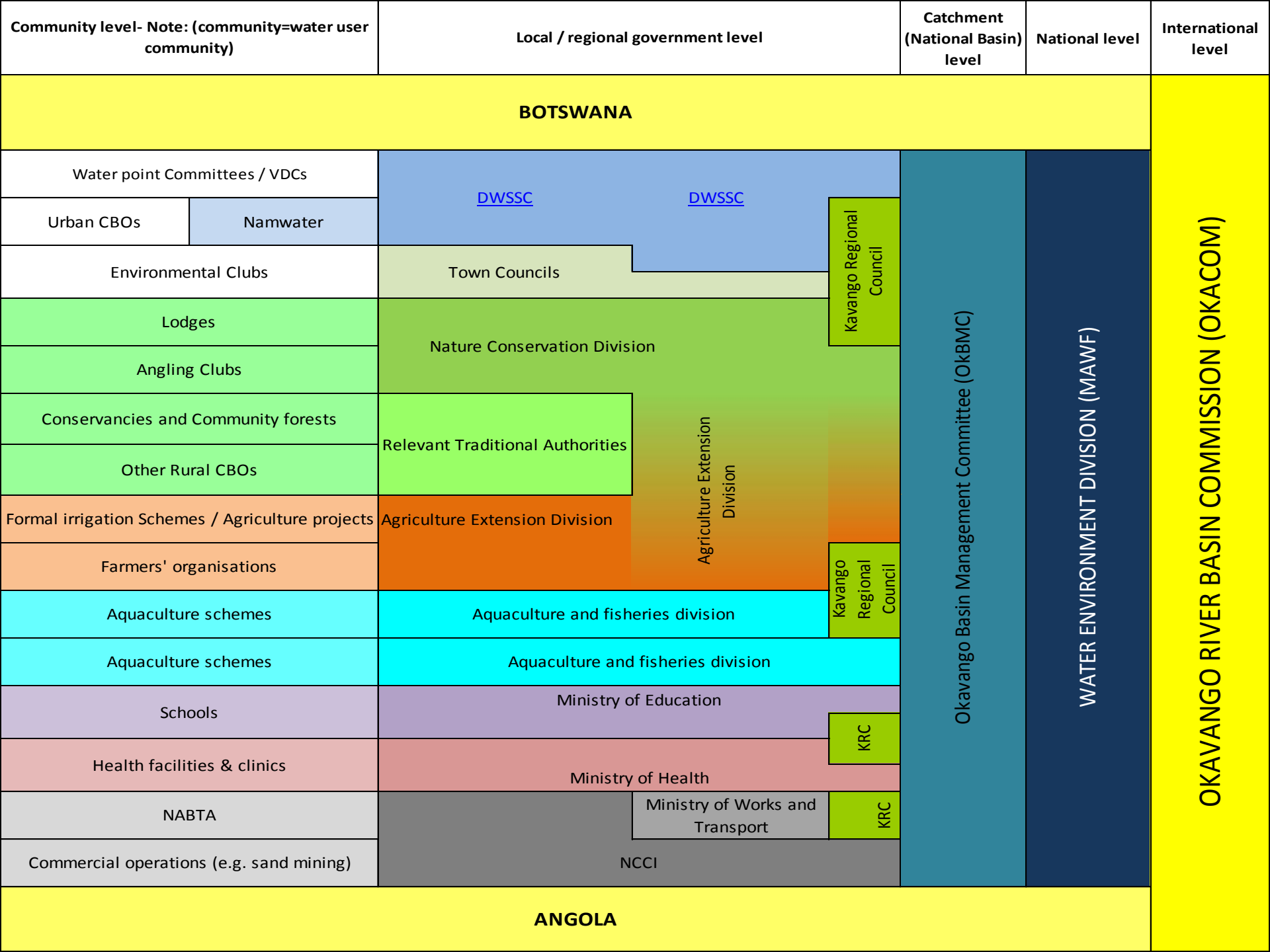
Community level- Note: (community=water user community)
Local / regional government level
Catchment (National Basin) level
National level
International level
BOTSWANA
Water point Committees / VDCs
Urban CBOs
Namwater
Environmental Clubs
Lodges
Angling Clubs
Conservancies and Community forests
Other Rural CBOs
Formal irrigation Schemes / Agriculture projects
Farmers' organisations
Aquaculture schemes
Aquaculture schemes
Schools
Health facilities & clinics
NABTA
Commercial operations (e.g. sand mining)
DWSSC
DWSSC
Town Councils
Kavango Regional Council
Nature Conservation Division
Relevant Traditional Authorities
Agriculture Extension Division
Agriculture Extension Division
Kavango Regional Council
Aquaculture and fisheries division
Aquaculture and fisheries division
Ministry of Education
KRC
Ministry of Health
Ministry of Works and Transport
KRC
NCCI
Okavango Basin Management Committee (OkBMC)
WATER ENVIRONMENT DIVISION (MAWF)
OKAVANGO RIVER BASIN COMMISSION (OKACOM)
ANGOLA

Conclusions

The IWQM management approach:

- Breaks down water management into smaller management units;
- Establishes both a horizontal and vertical reporting framework;
- Confers responsibility for water quality on significantly smaller geographical areas;
- Confers accountability to the adjoining areas (horizontal accountability) and to the next level of management (vertical accountability);
- Allows accountability for water quality to be focussed on smaller management units, rather than diffused up ever higher levels of management. In other words, by making all water users aware of their own responsibility to the protection of South Africa's water resources and accountable for the impacts that they have on the resource.





Recommendations

- Web-based system;
  - would allow all management units to report against the performance targets for their CCPs, and also on progress of mitigation being put in place. Analysis of the data, the CCP targets reports and spatial referencing will allow catchment management agencies to identify problem areas for water quality in the catchment area, on a very short-term basis (monthly reporting). Furthermore, management units that are unable to implement proposed mitigation can be easily identified and technical capacity from other management units in their area could be identified and deployed efficiently to address problem situations.
- Use of the IWQM model to support the integrated water use licensing process;
  - The use of the model to support the implementation of an IWUL will allow CCPs and CRFs to be put in place to support the achievement of the conditions of the IWUL. In this respect it will also aid in the implementation of the relevant catchment management strategies, allowing for better 'on the ground' horizontal and vertical reporting and bringing in the philosophy…









…that every water user is a water manager.

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Acknowledgements

- Water Research Commission (South Africa);
- The broader South African water sector who helped with the development of the model;
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- Jeffares & Green (Pty) Ltd