

Does it really matter what upstream users think?

a preliminary study of perspectives and beliefs of water resources management in the Crocodile Catchment



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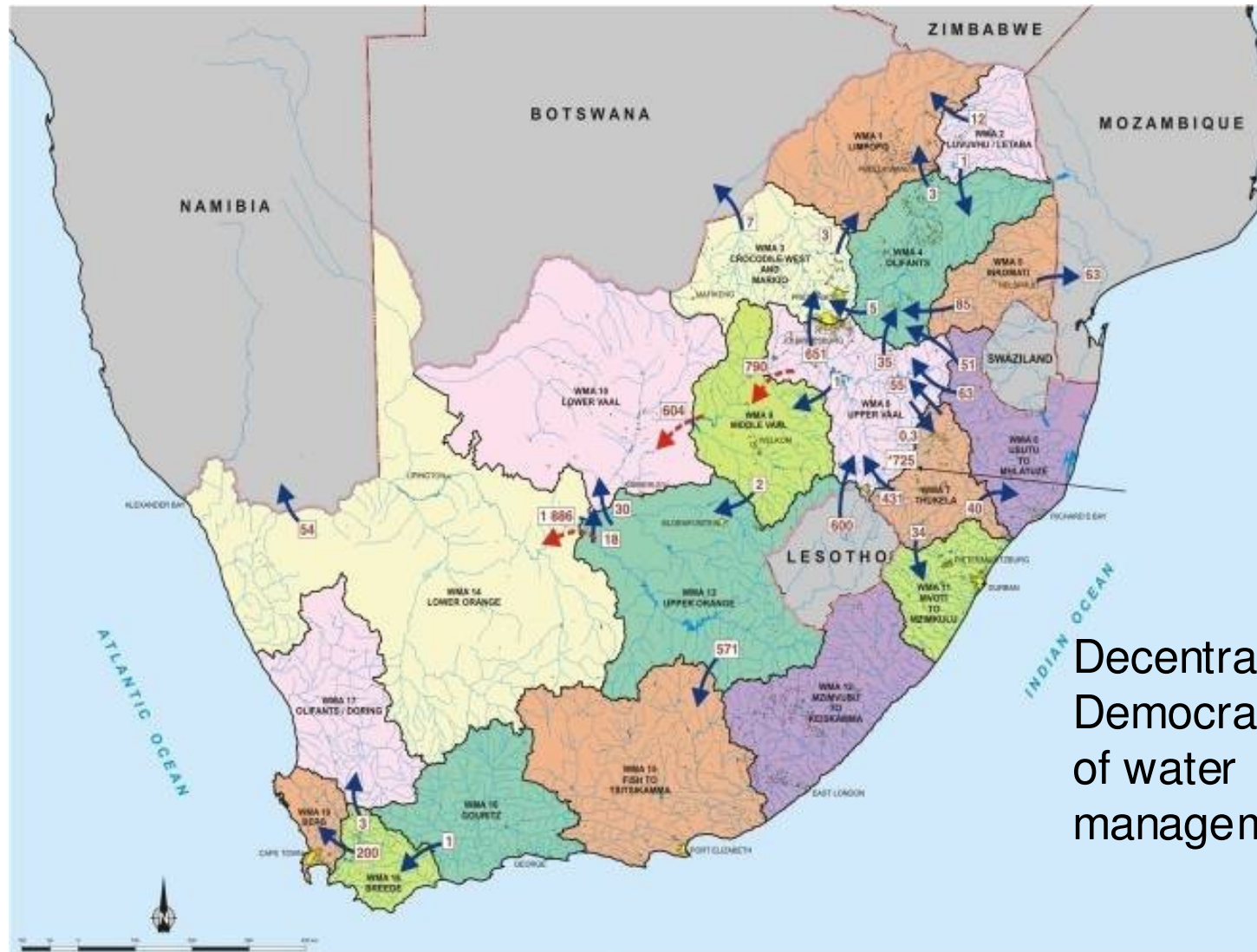
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Context.....



Decentralisation
Democratisation
of water
management



A negotiated approach



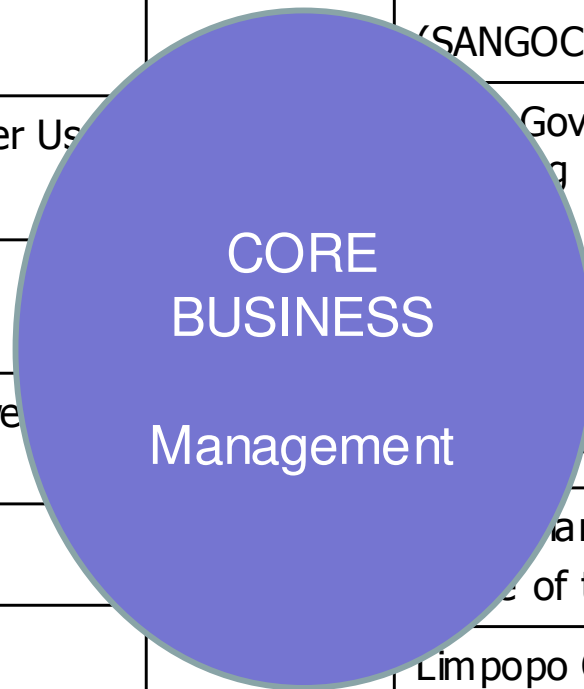
Interaction



Complex stakeholder environment

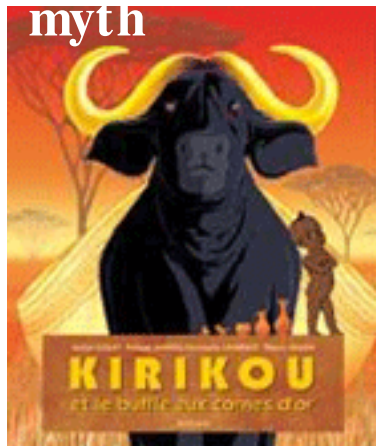
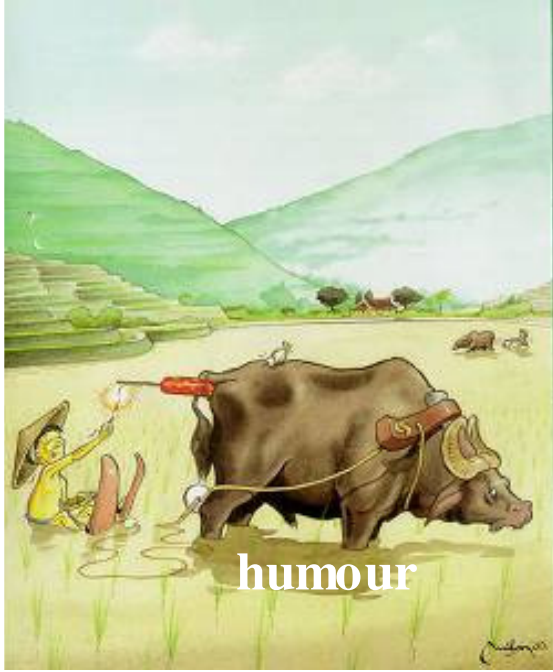
Representation on CMA
Commercial Agriculture
Existing Agriculture by HDIs (Emerging Farmers)
Potential Agriculture Water Use by HDIs
Streamflow Reduction (Forestry)
Industry, Mining and Power Generation
Tourism and Recreation
Conservation

Representation on CMA
Productive Use of water by the Poor
Civil Society (SANGOCO)
Government – Integrated
Government Water Services
Local Leaders
Minister of the Premier
Limpopo Office of the Premier



- Does everyone see the same management problem?
- Do we all have a common understanding of management tools?
- How do we know this?

Conflicting views?



WWF

hunter

local society



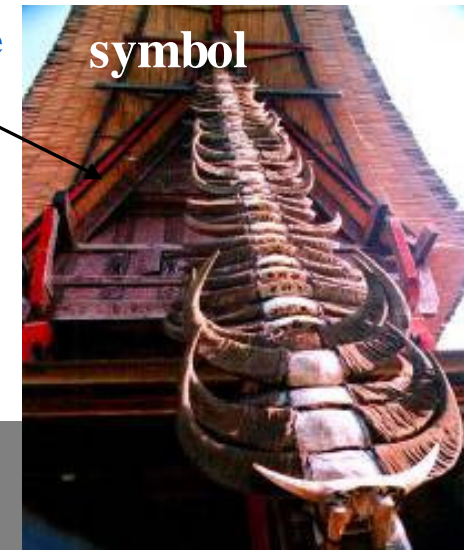
village

The case of the buffalo

symbol

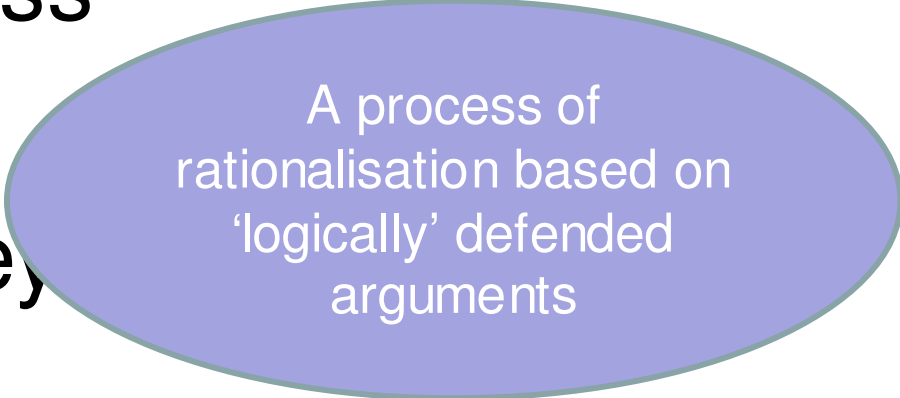
family

farmer




Multiple stakeholder environments:

- Positions: what they want from the negotiation process
- Interests: why they



A process of rationalisation based on 'logically' defended arguments

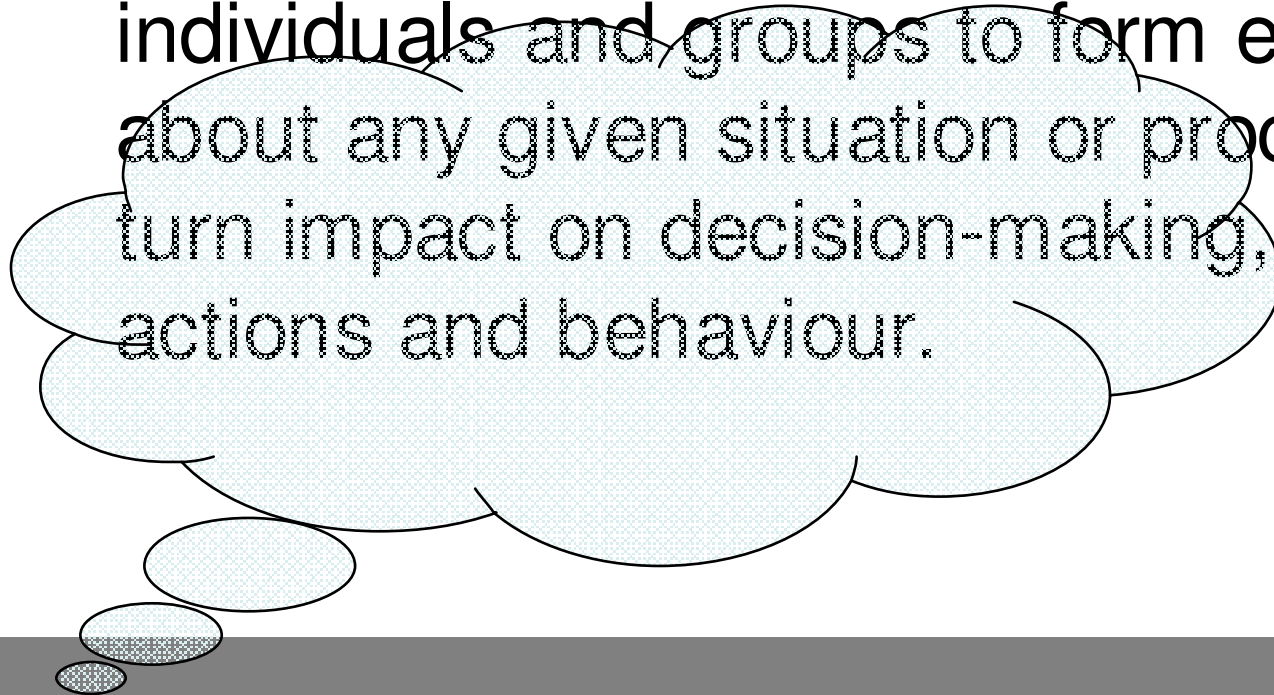


The most likely site for the emergence of sustainability discourse

Enter 'mental models'?

What are mental models?

'Mental models' are **dynamic 'constructions'** that people hold as to how the world works. Such mental constructions are proposed to enable individuals and groups to form explanations about any given situation or process, which in turn impact on decision-making, management actions and behaviour.



Mental models concept use in other settings

- Management
 - fit of organisational culture and mission (e.g. Senge)
- Engineering/operations research
 - team understanding processes
- Health
 - factors in transmission of HIV/AIDS
 - factors in reducing cigarette smoking (e.g. Johnson-Laird)
- Resource management
 - Sharing understanding of a resource amongst extension staff and landowners (Abel & Ross 1999)

So, does it really matter what upstream users think? –



Figure 25: Municipal and District Boundaries in the IWMA

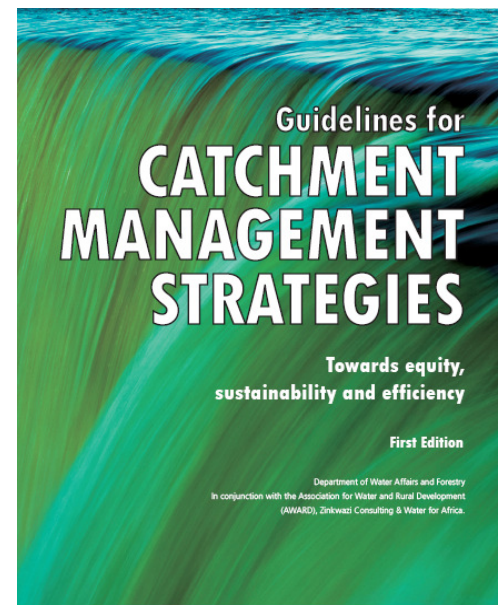
**A. Foundational information
for the CMS**

6.4 Vision

B. WRM strategies

C. Facilitating strategies

D. Integration strategy



A collection of
strategies for
IWRM

Based on
collaboration
around a
shared vision

**A. Foundational information
for the CMS**

Catchment description

6.4 Vision

**Resource
protection**

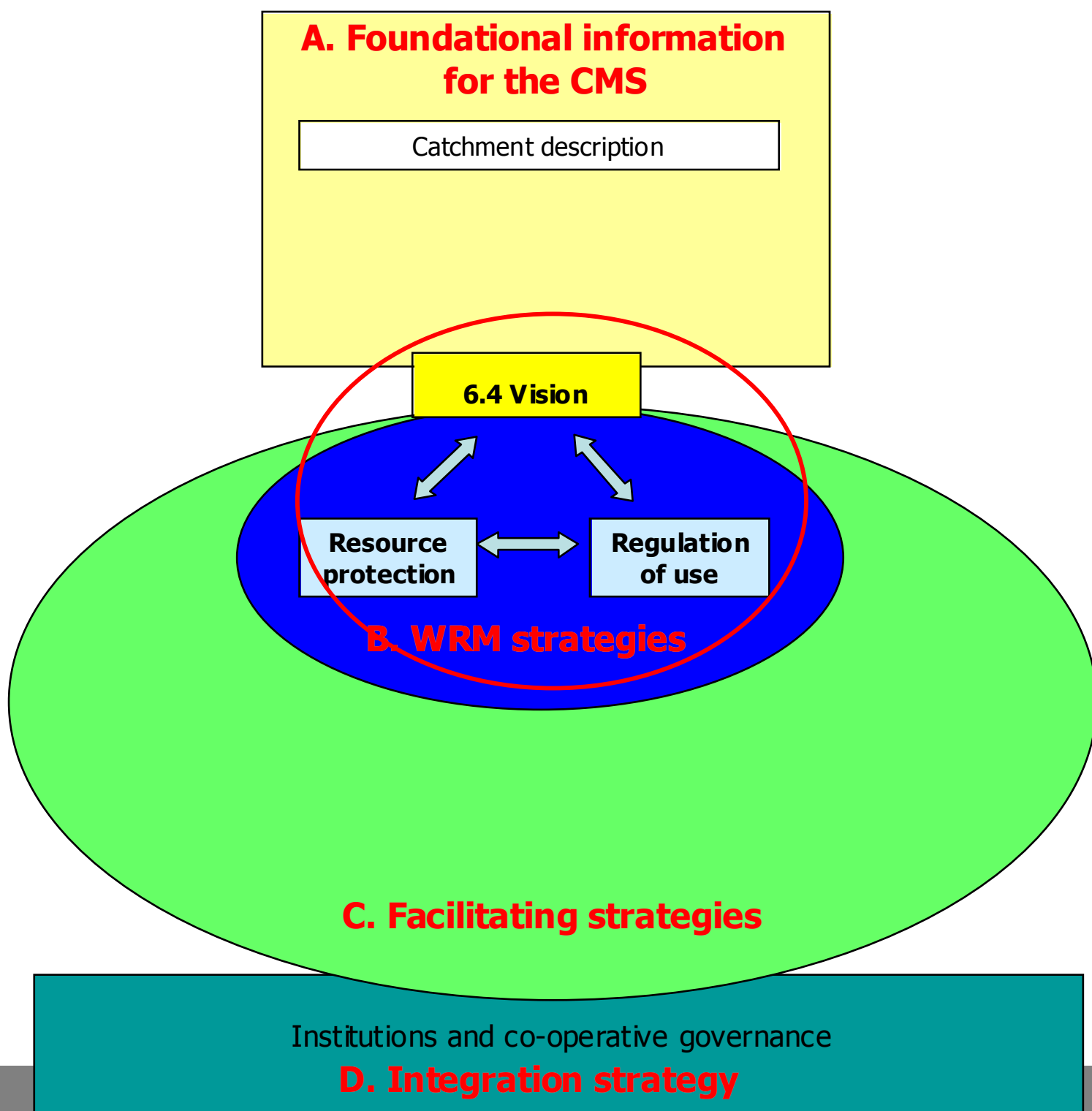
**Regulation
of use**

B. WRM strategies

C. Facilitating strategies

Institutions and co-operative governance

D. Integration strategy

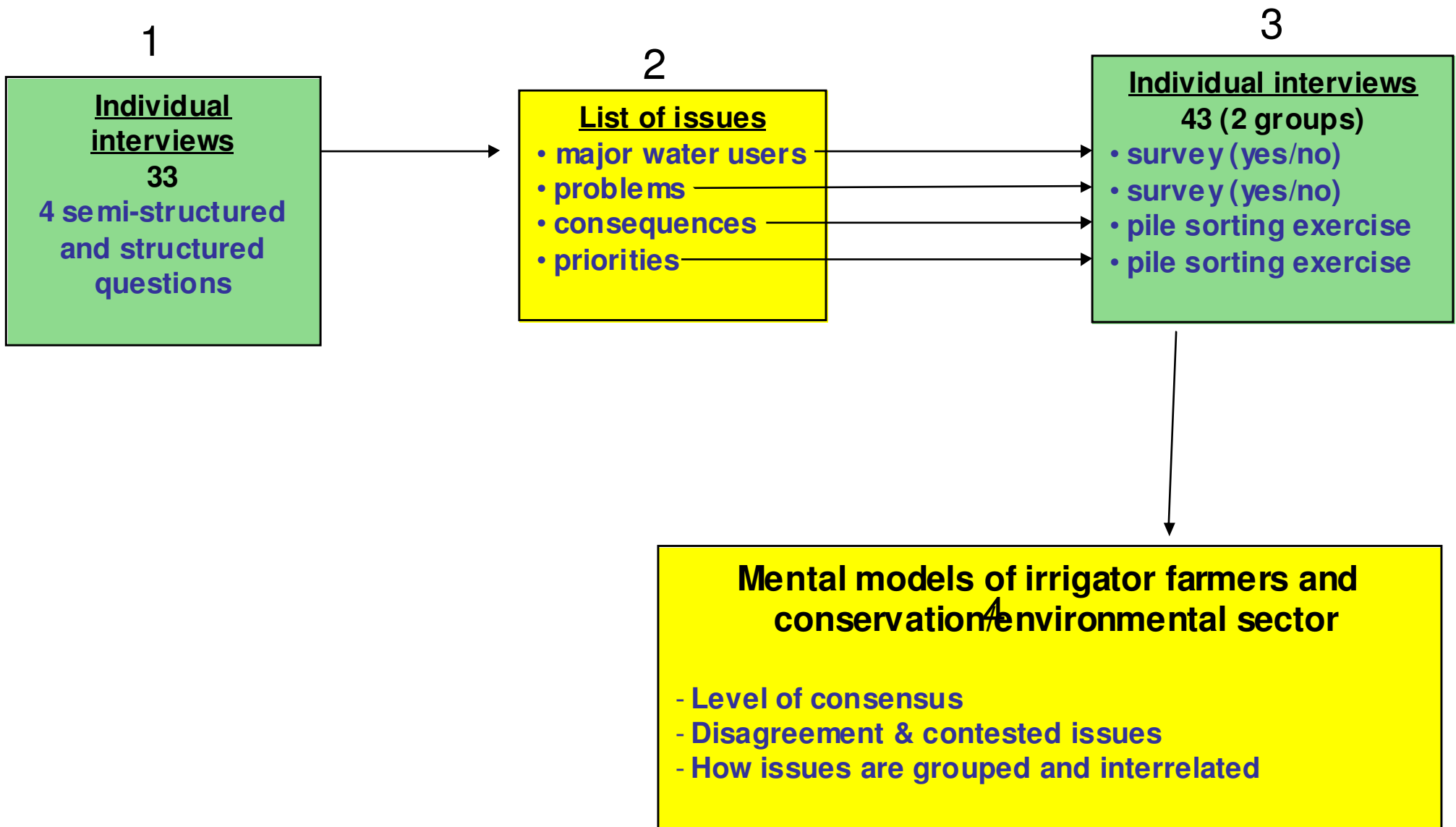


Two methodologies tested

METHOD 1: Consensus analysis

METHOD 2: ARDI

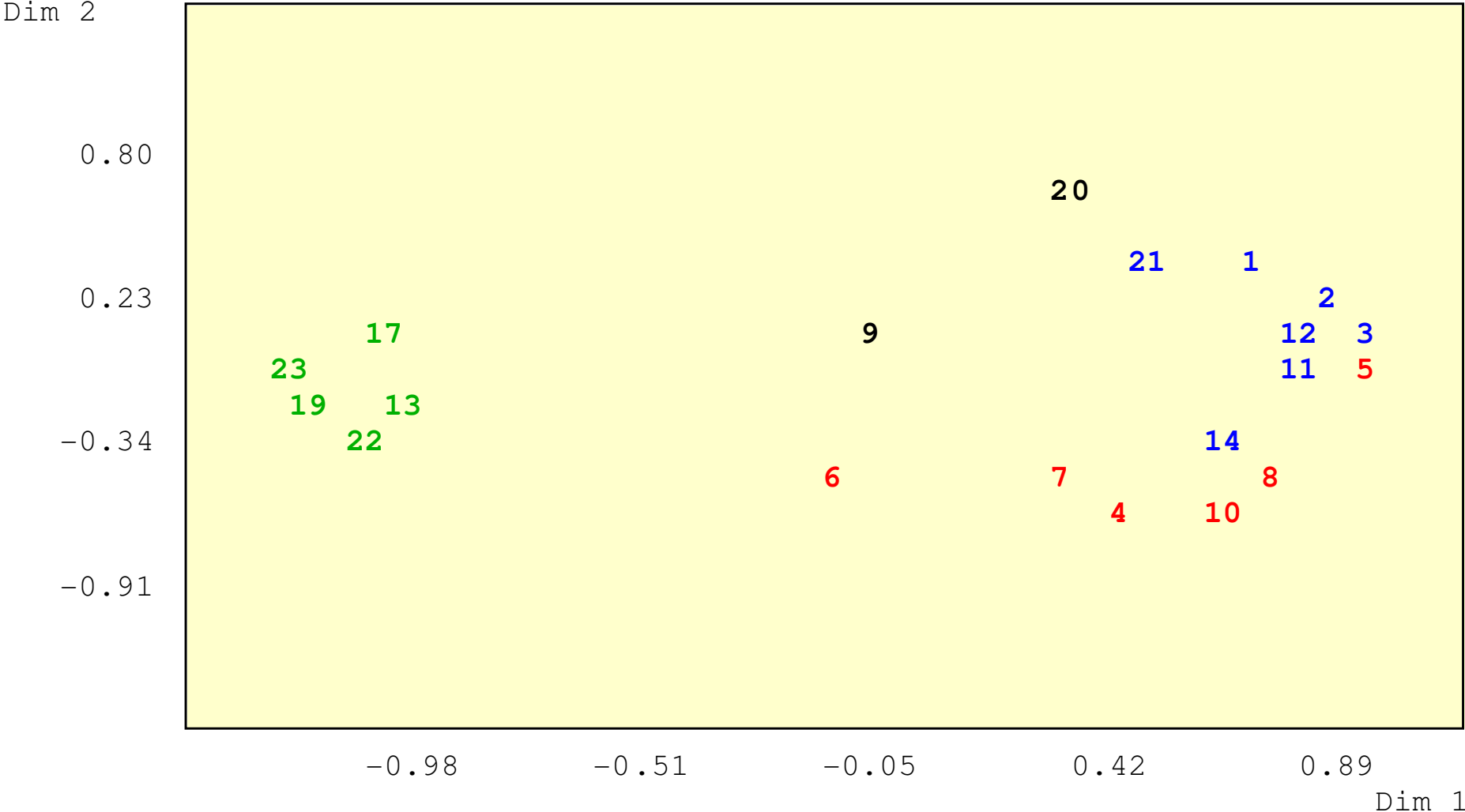
Consensus analysis



Consequences if Croc River stops flowing

	ISSUES	FREQUENCY	PERCENTAGE
1	BIODIVERSITY	10	30
2	WHOLE ECONOMY	8	24
3	ANIMALS	6	18
4	MOZAMBICANS	6	18
5	TOURISM	5	15
6	DOMESTIC USERS	5	15
7	EVERYONE	5	15
8	ECOSYSTEM	5	15
9	FISH	4	12
10	PEOPLE DOWNSTREAM	4	12
11	COMMERCIAL FARMERS	4	12
12	RURAL POPULATION	4	12
13	PLANTS	4	12
14	LESS WATER	3	9
15	UNEMPLOYMENT	3	9
16	KRUGER PARK	3	9
17	LESS AGRICULTURE	3	9
18	INDUSTRIES	2	6
19	RIVER	2	6
20	SEDIMENTS	2	6
21	INTERNTL OBLIGATION	2	6
22	DEATH	2	6
23	SOCIAL INSTABILITY	2	6

Consequences if Croc River stops flowing

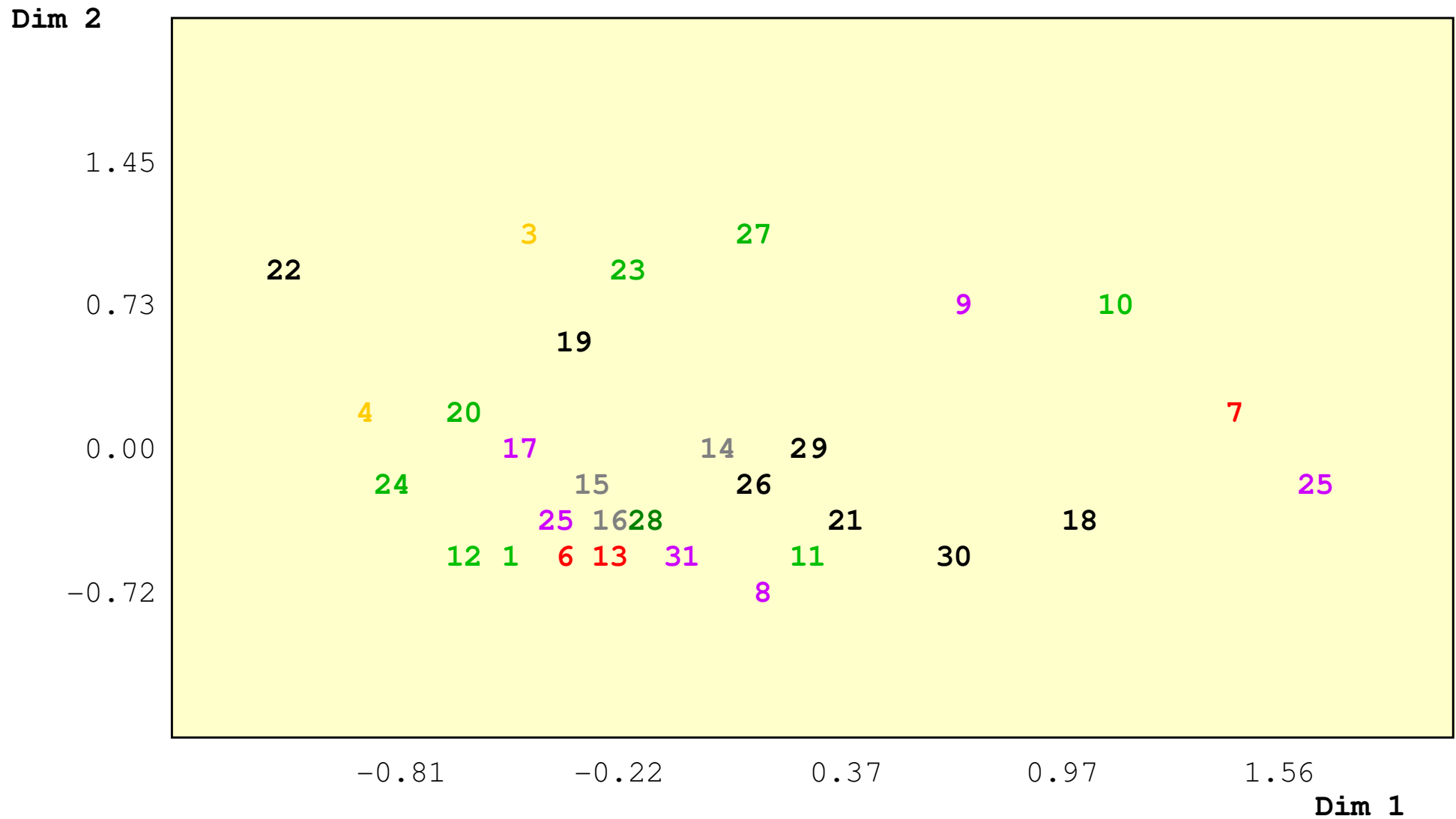


Stress in 2 dimensions is **0.100**

Factors contributing to problems with current flows in Croc River

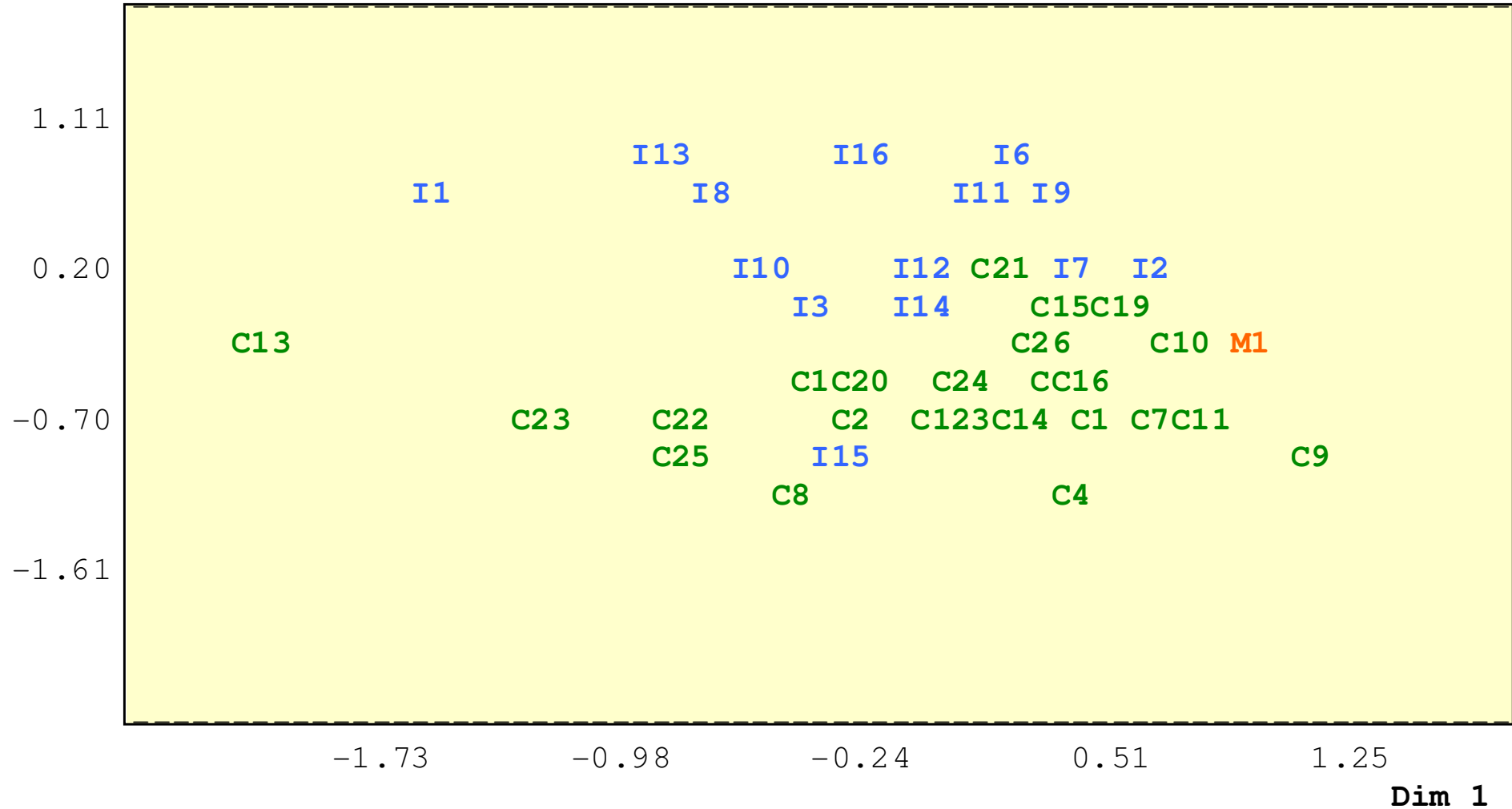
ITEM	FREQUENCY	RESP PCT
1	ILLEGAL USE	10 31
2	LOW RAINFALL	8 25
3	FORESTRY	7 22
4	COMMERCIAL AGRICULTURE	7 22
5	OVER ALLOCATION	7 22
6	KWINA DAM	6 19
7	DAMS	5 16
8	DEVELOPMENT	5 16
9	DROUGHT	5 16
10	URBAN AREAS	4 13
11	MANAGEMENT FOCUS	3 9
12	REGIONAL CAPACITY	3 9
13	GLOBAL WARMING	3 9
14	POLLUTION	3 9
15	NATIONAL CAPACITY	3 9
16	URBAN GROWTH	3 9
17	ALIEN SPECIES	2 6
18	INAPPROPRIATE CROPS	2 6
19	MINING POLLUTION	2 6
20	EVAPORATION	2 6
21	NO METERING	2 6
22	AGRIC POLLUTION	2 6
23	WASTAGE OF WATER	2 6
24	AWARENESS	2 6
25	LONG TERM PLANNING	2 6
26	RESEARCH	1 3
27	OVER ABSTRACTION	1 3
28	IRRIGATION BOARDS	1 3
29	WATER PRICING	1 3
30	ENGINEERING	1 3
31	INDUSTRIAL POLLUTION	1 3
32	GARDEN	1 3
33	PDI SUPPLY	1 3

Problems with flows in Croc River



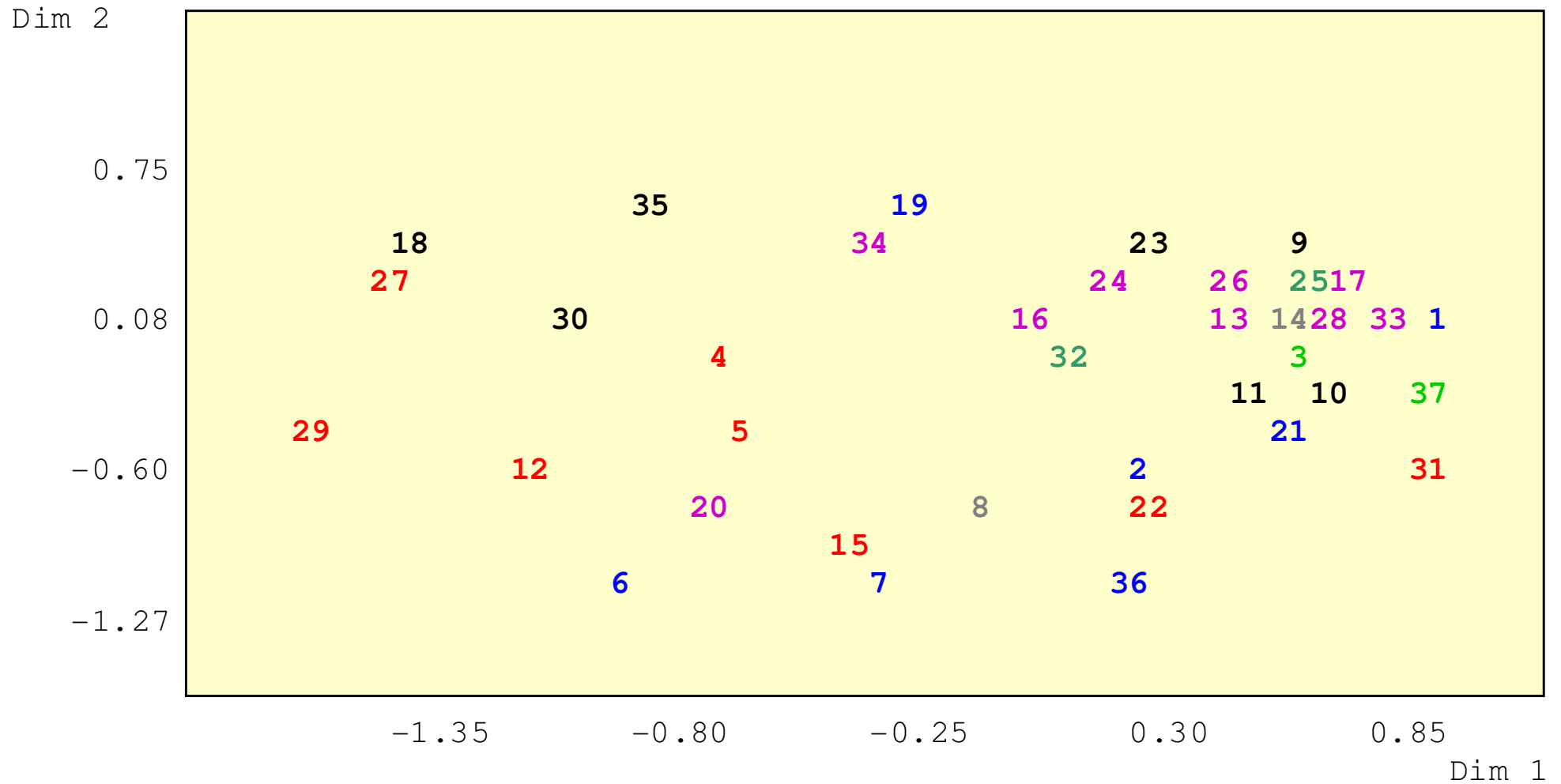
Problems with flows in Croc River

Dim 2



Stress in 2 dimensions is **0.236**

Priorities for future water use



Stress in 2 dimensions is **0.229**

Co-construction of a shared representation of a problem ...

ARDI method....

- A** = Actors/ stakeholders
- R** = Resources
- D** = Dynamics/ processes
- I** = Interaction

1. What are the main **stakeholders** that interact with the river and its' flow?
2. What are the main **resources** of the catchment in relation to water flow?
3. What are the main **processes** that drive changes in the Crocodile Catchment that affect the river flow?
4. How does each stakeholder use the resource and modify the processes?

Jointly tackling a question



Co-construction of a shared representation of issue: ARDI method
If necessary, implementing that shared representation in a computer model



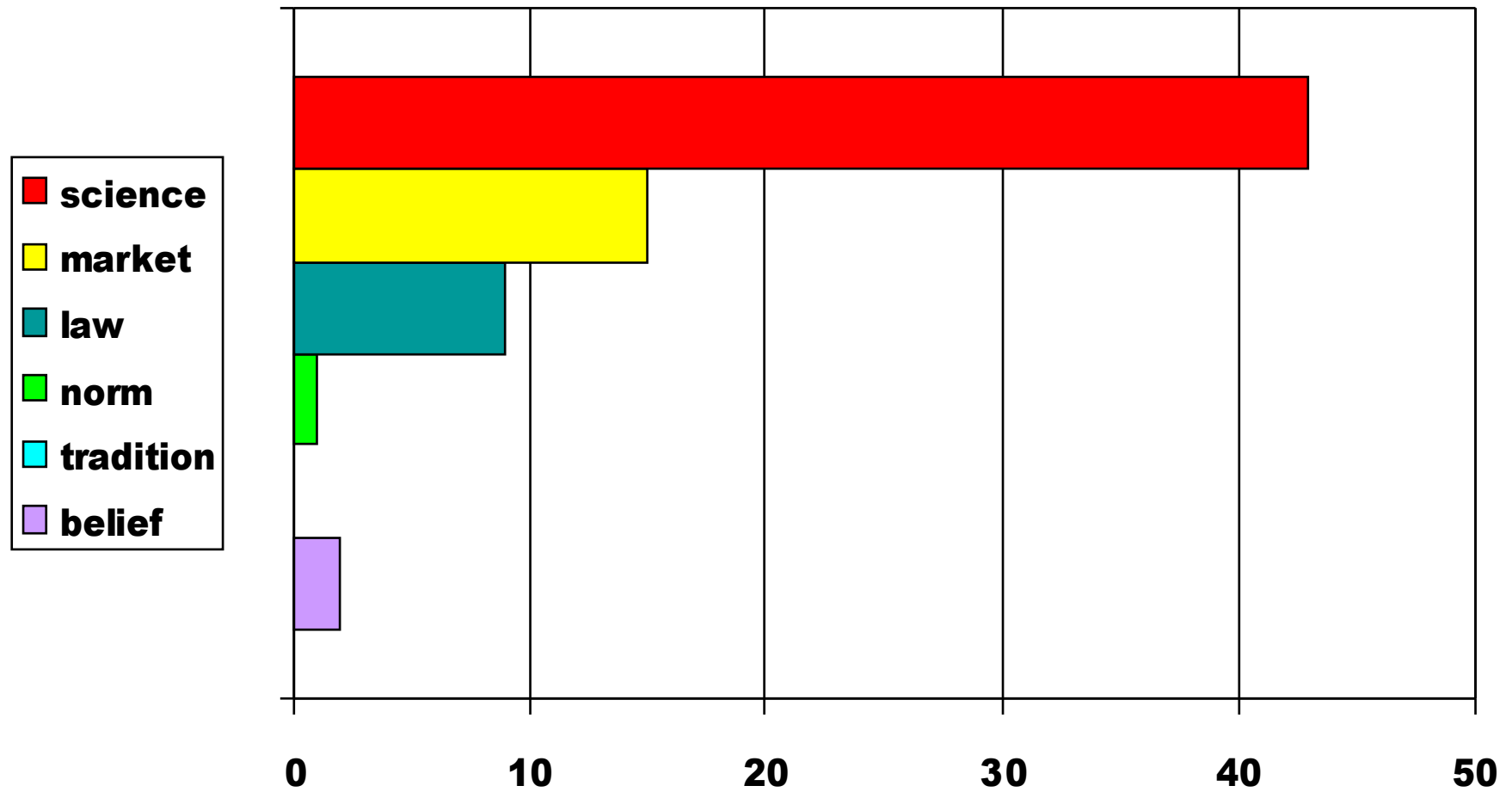
Collective visualisation of social and ecological dynamics



Collective discussion of scenarios

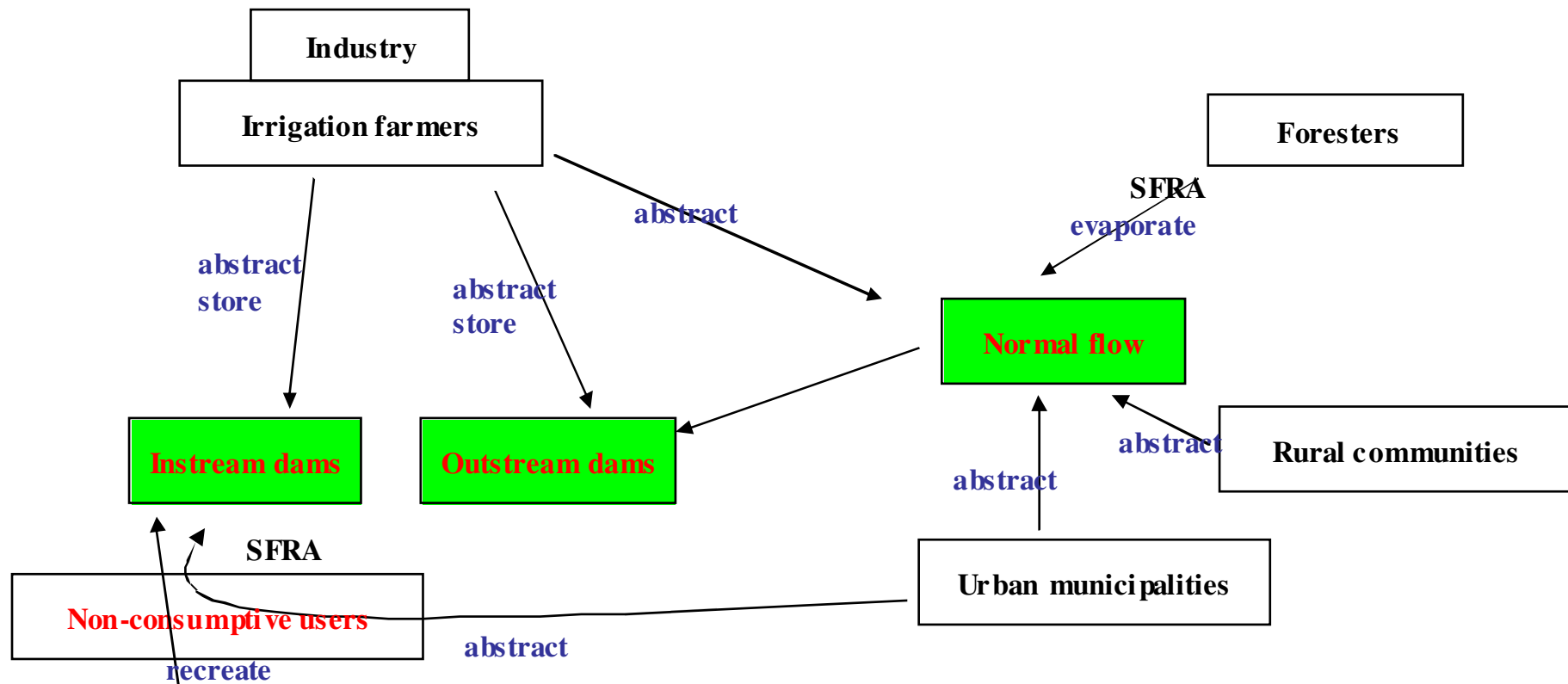
Preliminary results from the Crocodile River

ways of justifying assertions

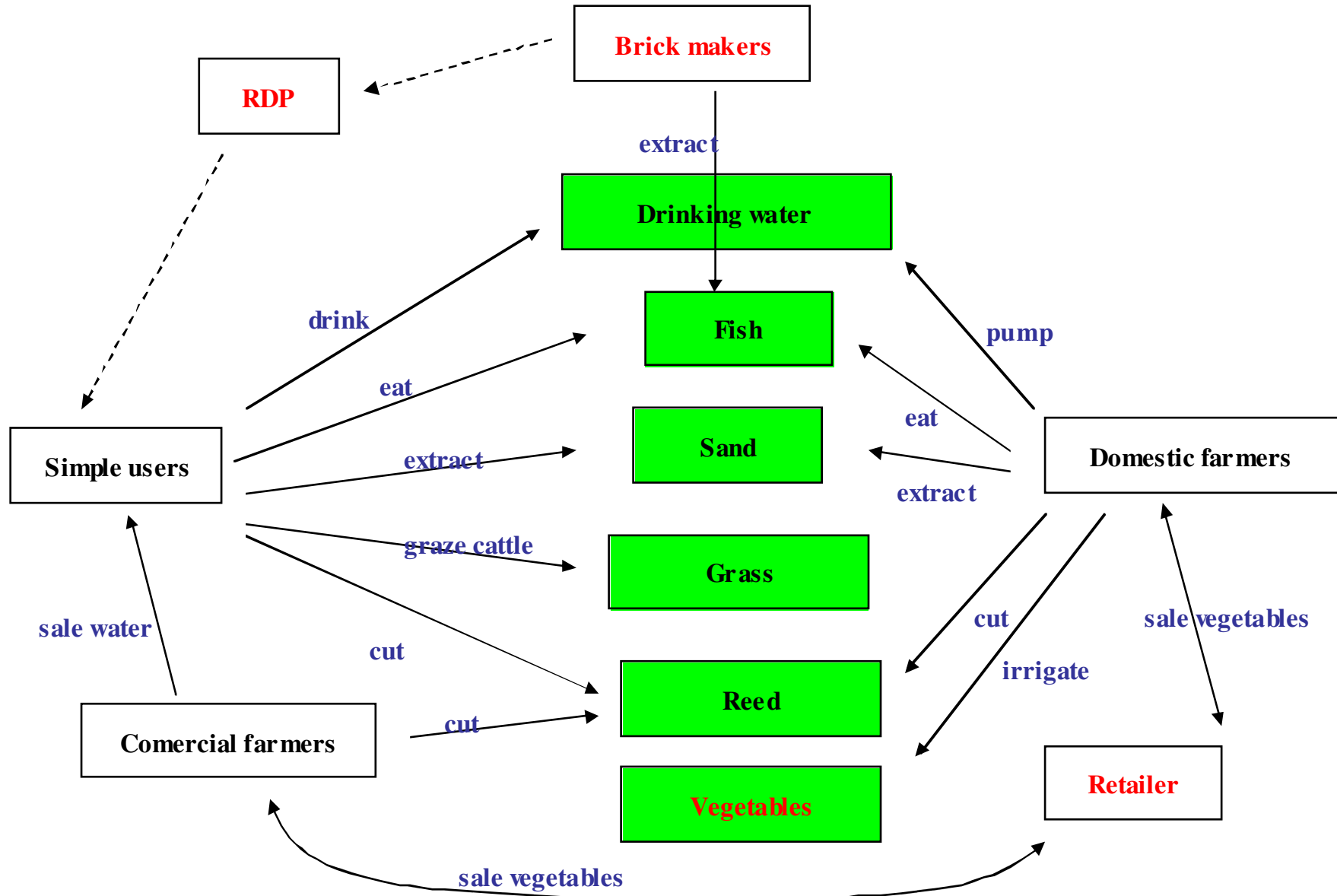


Integration: How does each stakeholder use the resource and modify the processes?

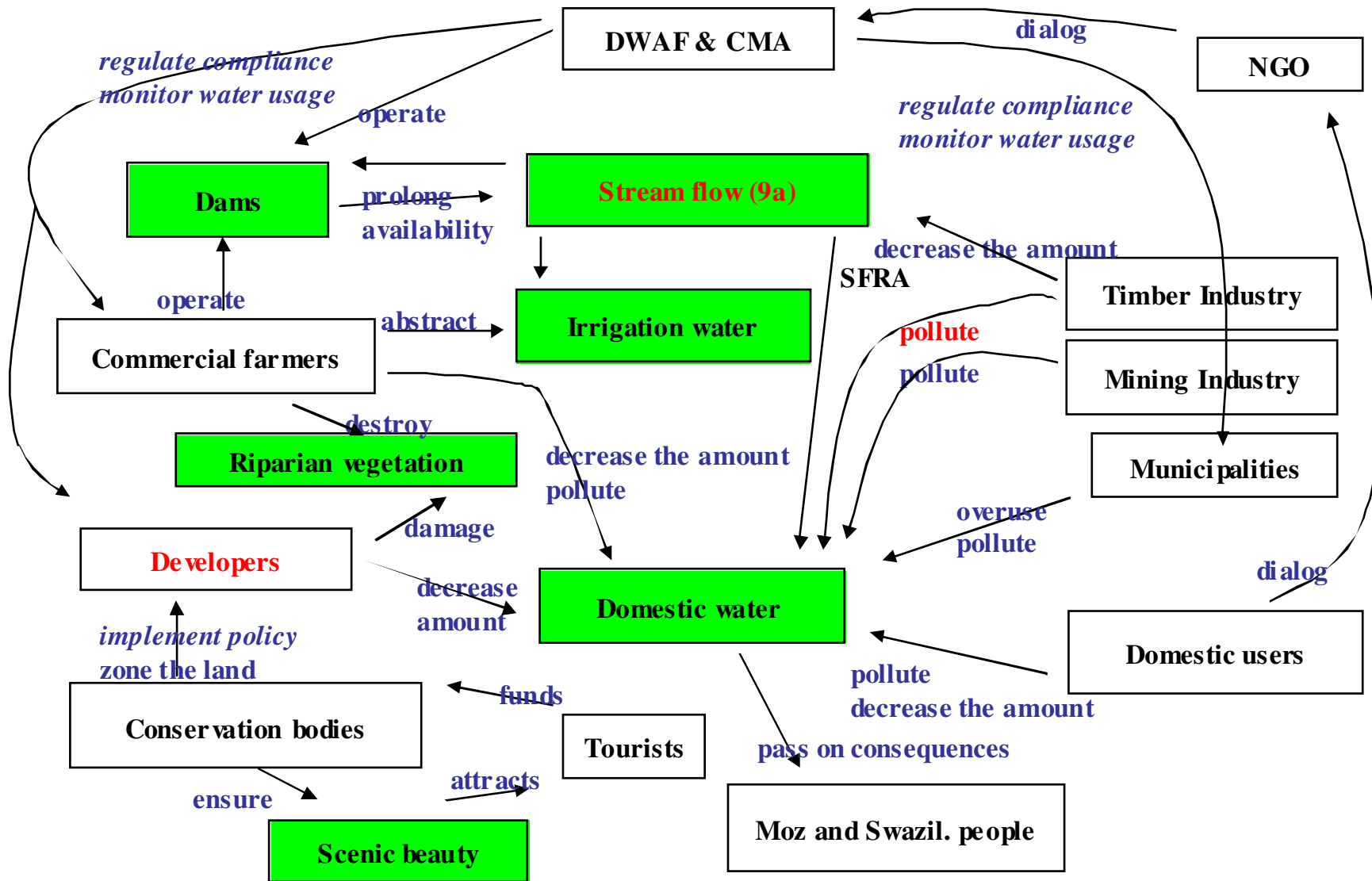
Mental model of an irrigator



Substance user



The regulator



Can...

...mental models analysis improve
natural resources management?

Possibly...

- Scoping to identify trends, themes and issues
- Network analysis to identify influence and vulnerability networks
- Consensus analysis (?) to identify specific mental models – bridges, conflicts
- Common visioning – ARDI (?) to iterate to a common understanding of the management problem

Thank you!

