Economic Evaluation of the Impact of Restoration in the Kromme River System

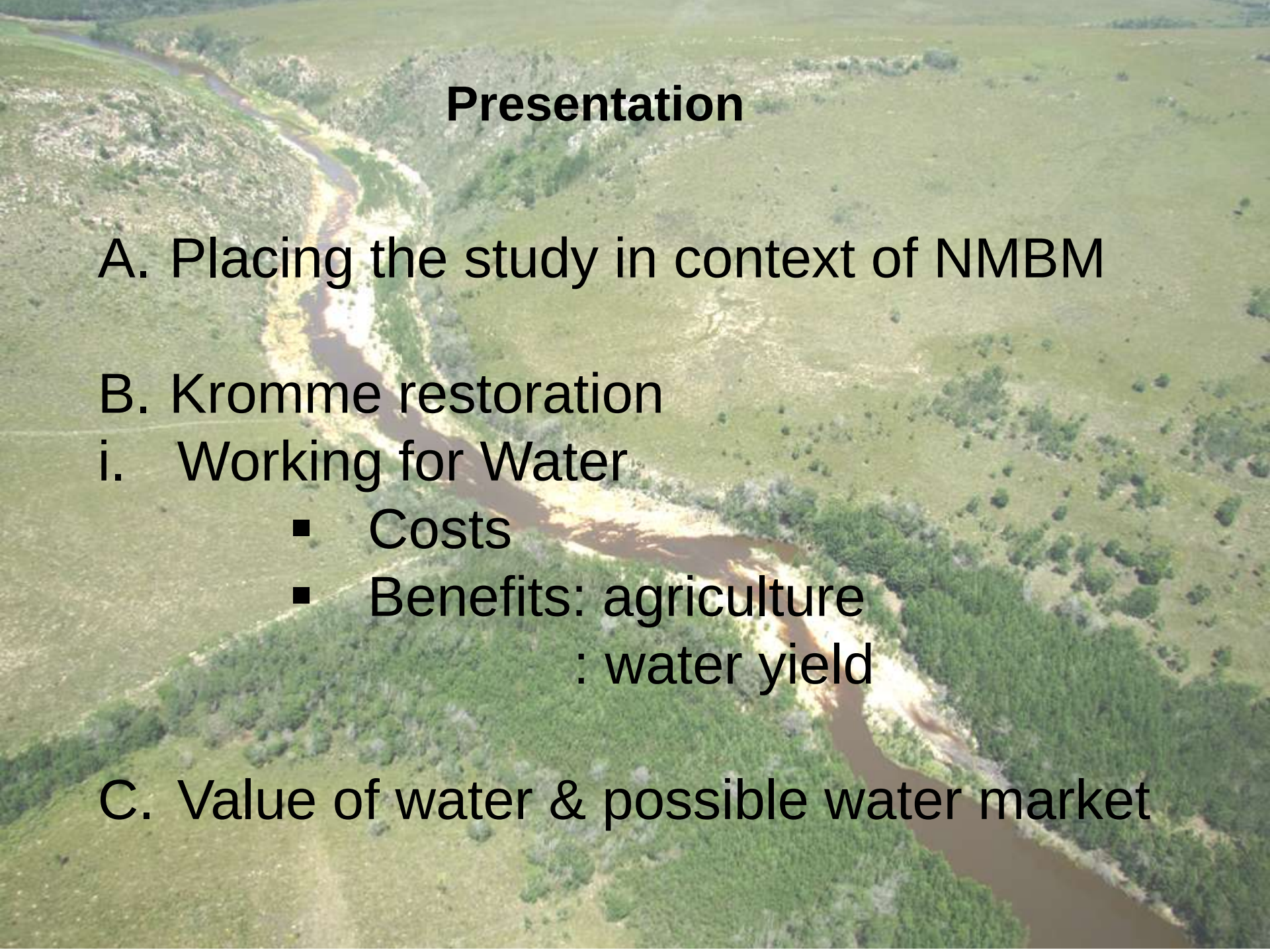
Katie Gull

RESEARCH QUESTIONS

1. Is restoration in the Upper Kromme Catchment economically viable?

2. Should restoration be considered as a possible augmentation scheme for the NMBM?

3. What is the agricultural value of water in the Kromme? Is there a potential for a market for water between NMBM and the farmers?



Presentation

A. Placing the study in context of NMBM

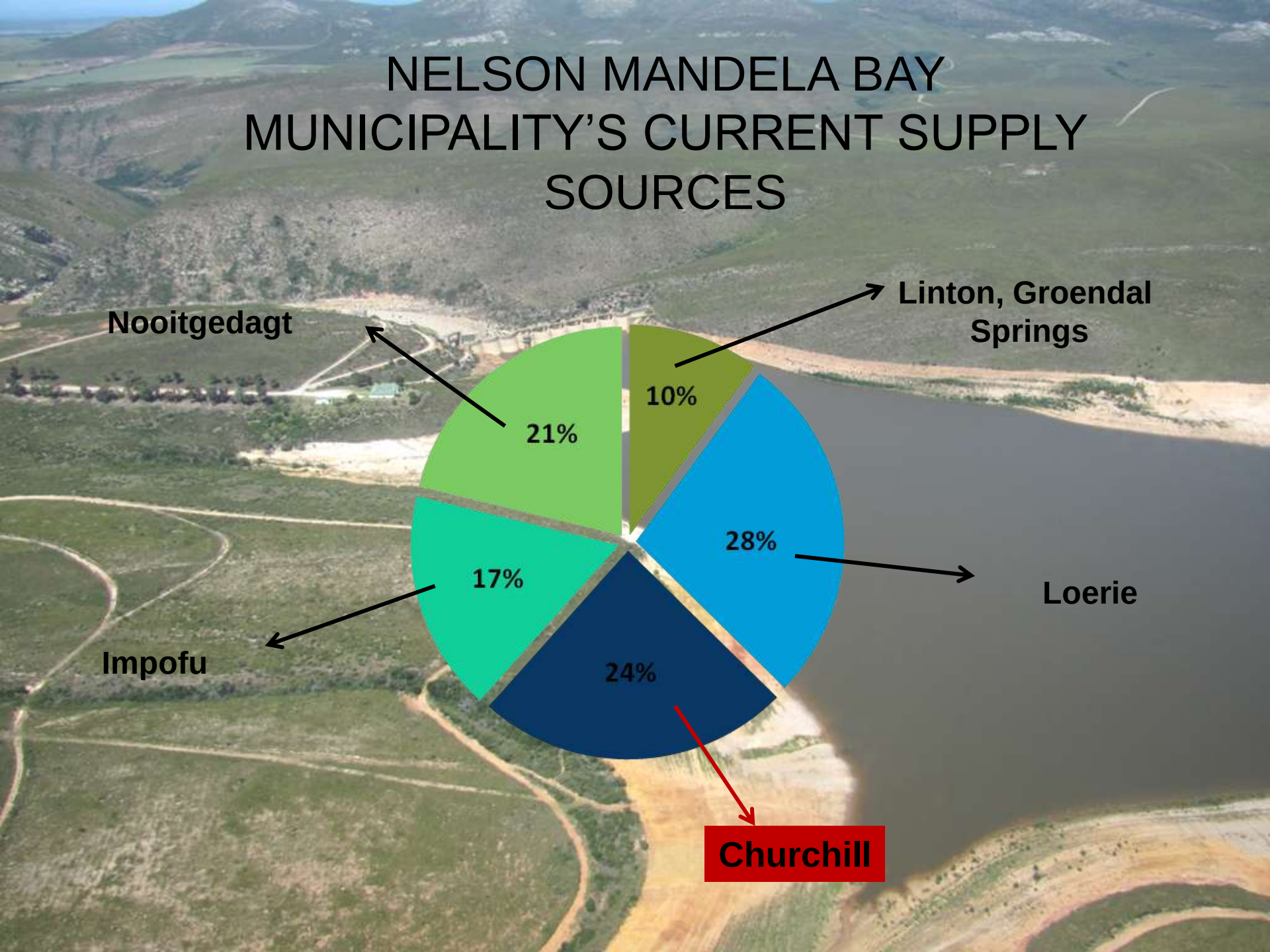
B. Kromme restoration

i. Working for Water

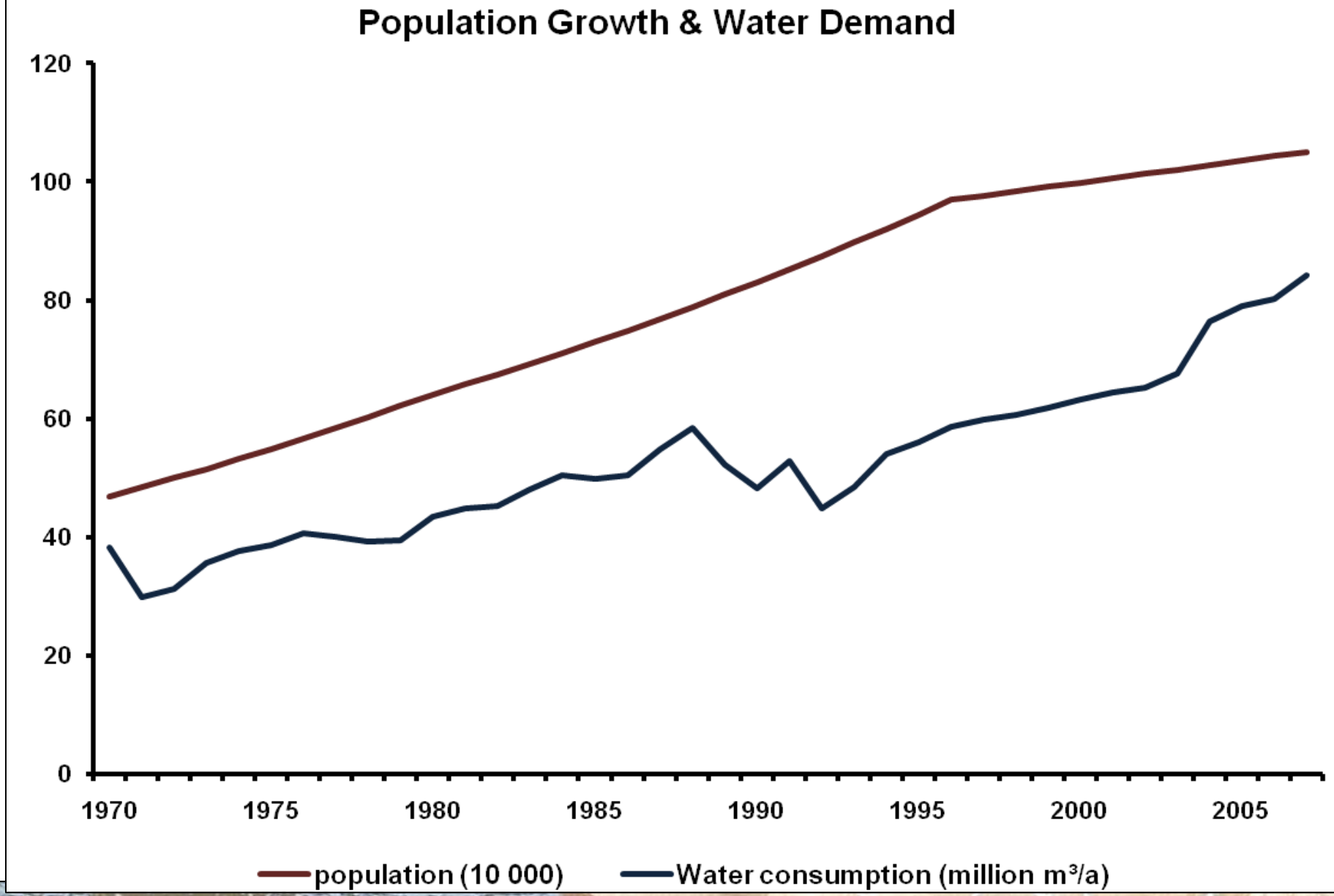
- Costs
- Benefits: agriculture
  : water yield

C. Value of water & possible water market

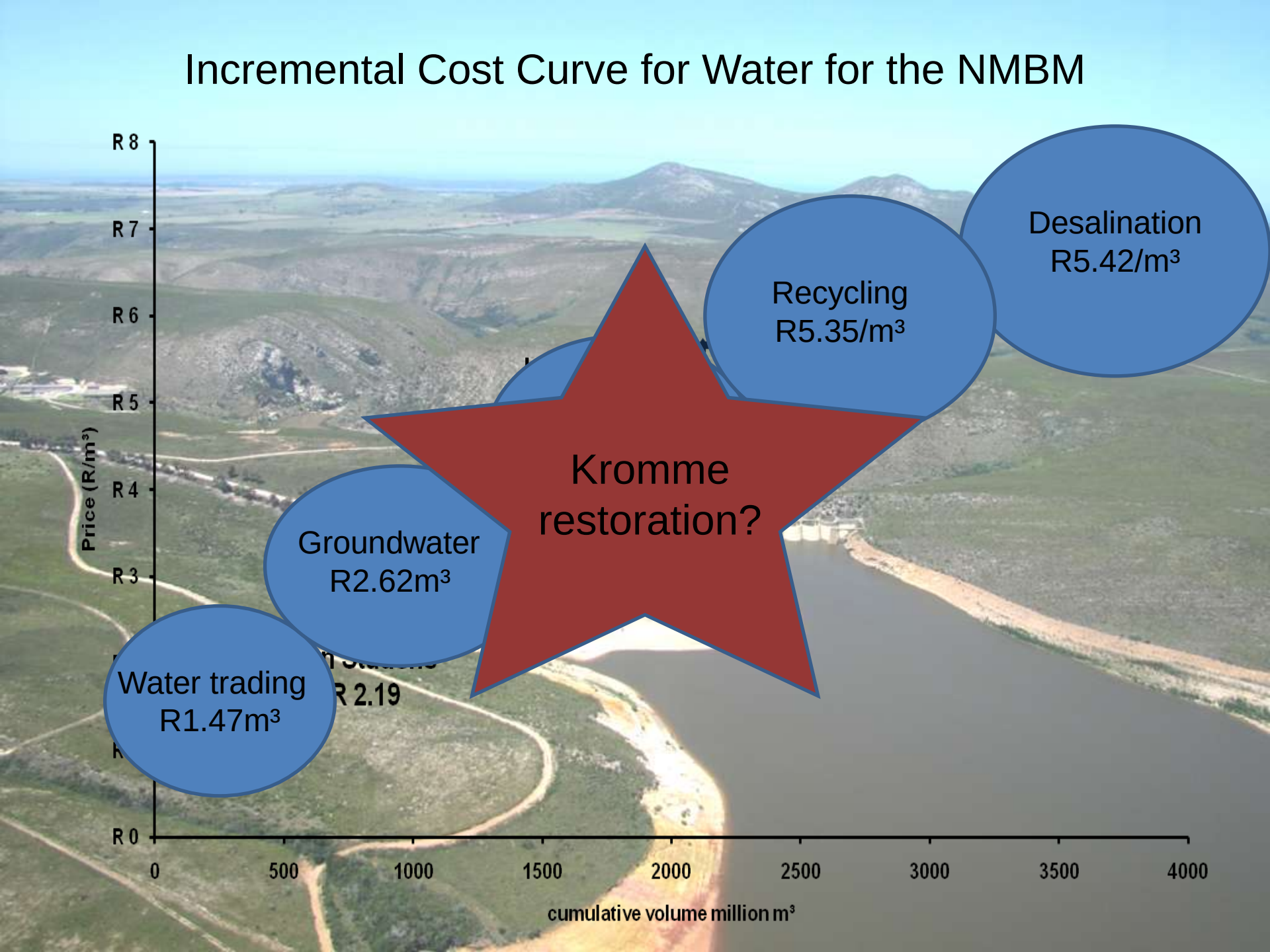
NELSON MANDELA BAY MUNICIPALITY'S CURRENT SUPPLY SOURCES



NELSON MANDELA BAY

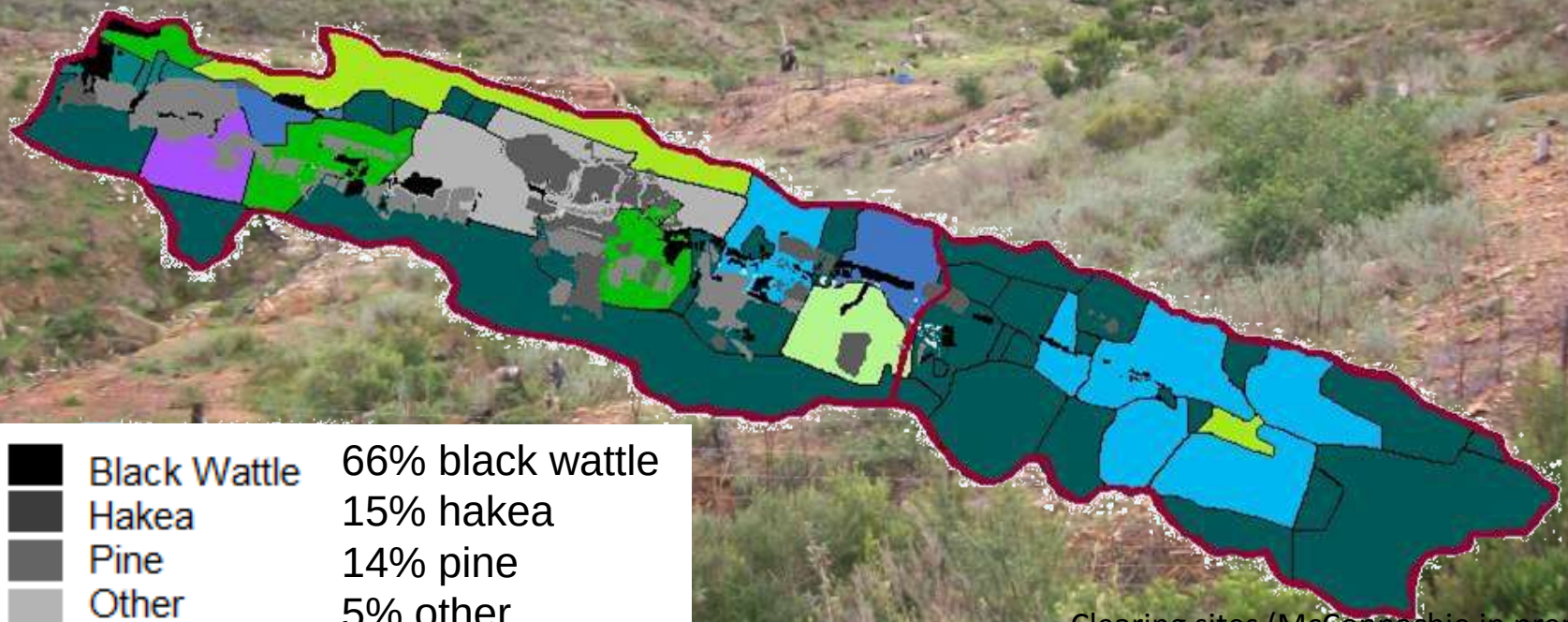


Incremental Cost Curve for Water for the NMBM



Working for Water Alien Invasive Plant Eradication Programme

1245.06 *condensed hectares* of AIP's have been cleared (2002-2010)

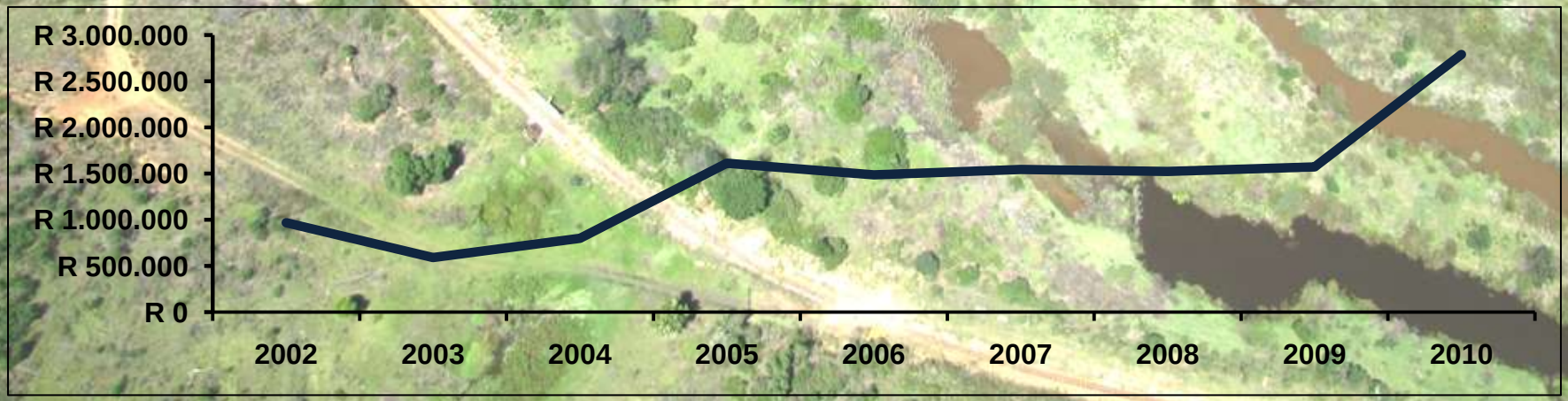


Clearing sites (McConnachie in prep)
Map: Rebelo , A(dissertation in prep)

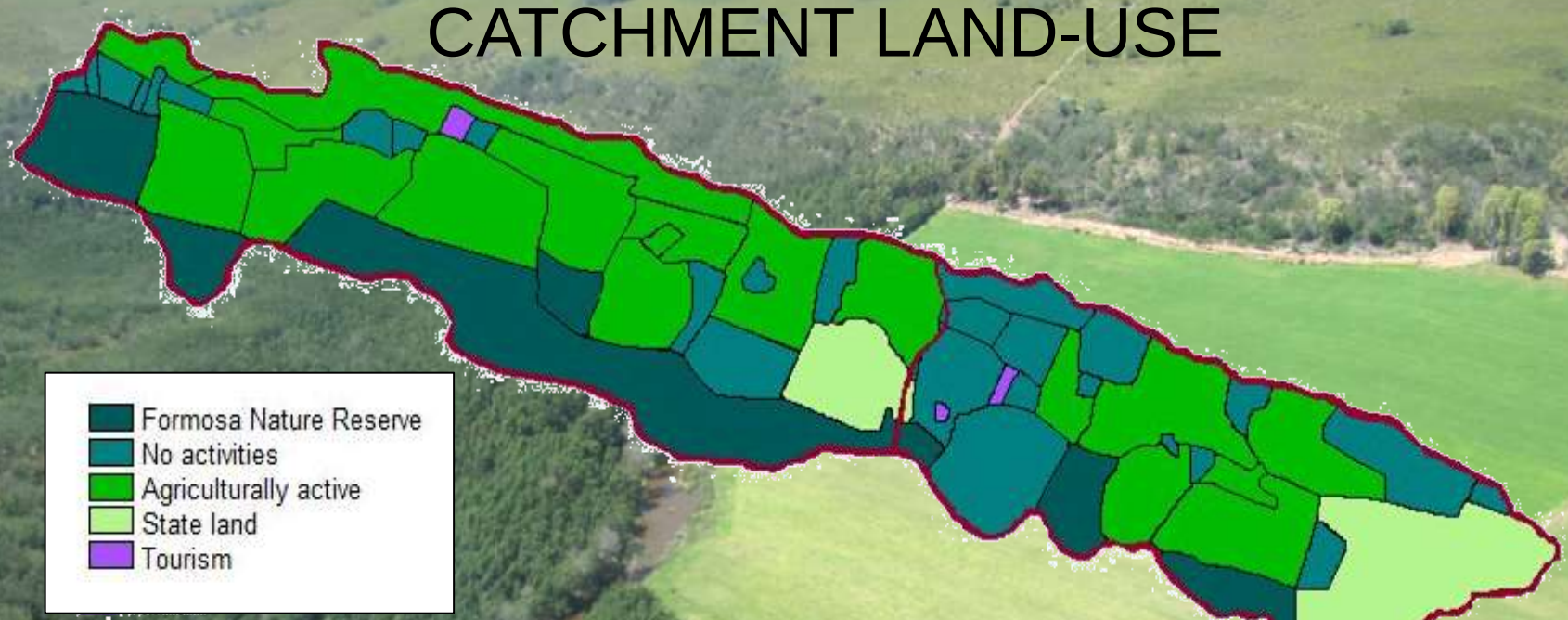
Working for Water Alien Invasive Plant Eradication Programme

25 year projection
140 condensed hectares per annum

Cost per ha
R6 726/ha



UPPER KROMME CATCHMENT LAND-USE

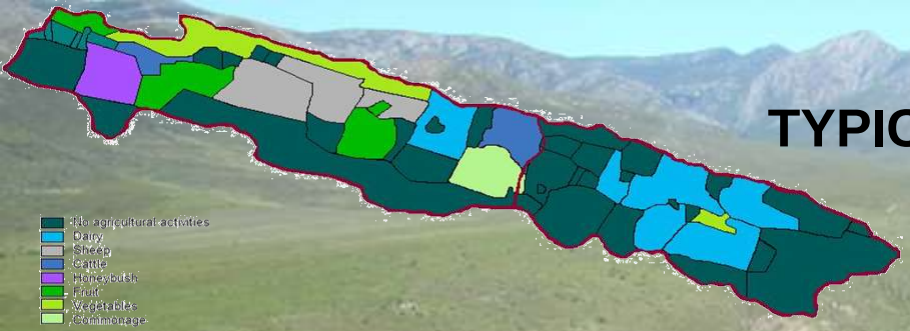


Income source	% of farms
Upper Kromme agriculture	47%
Retired	15%
Other	38%

TYPICAL FARMS

Farm type	Average size veld (ha)	Average size irrigation (ha)	Average area crops (ha)
sheep	1211	19.04	-
cattle	704	7.26	-
dairy	1098	68.04	-
honey bush	1037	40	-
vegetable	935	-	2
fruit	1101	-	24

TYPICAL FARMS

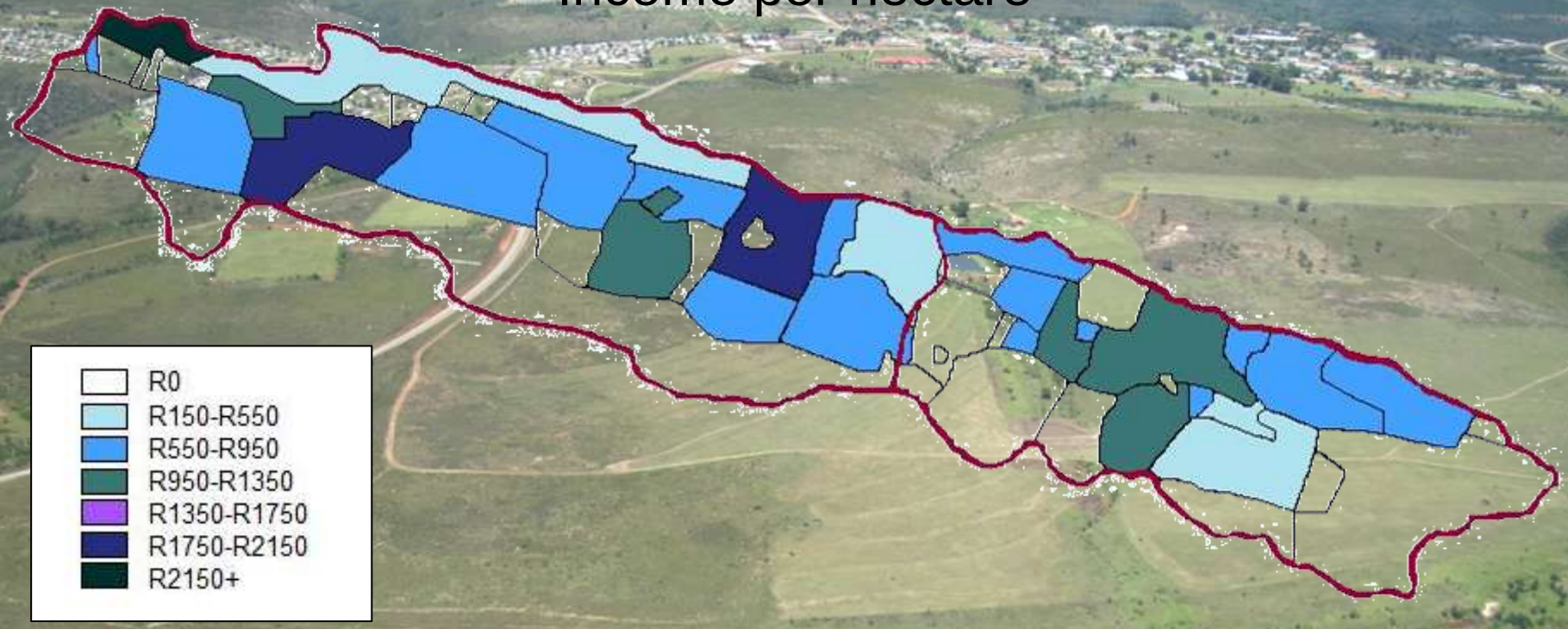


Farm type	contribution to gross income of selected enterprises (% of income)					
	sheep	*cattle*	*dairy*	*honeybush*	*vegetables*	*fruit*
sheep	81%	19%	-	-		
cattle	17%	83%	-	-		
dairy	12%	1%	87%	-		
Honey bush	-	-	-	100%		
vegetable	17%	12%	-	-	71%	-
fruit	-	20%	-	-	12%	68%

LAND-USE & ALIEN INFESTATION

ESTIMATED INCOME DISTRIBUTION

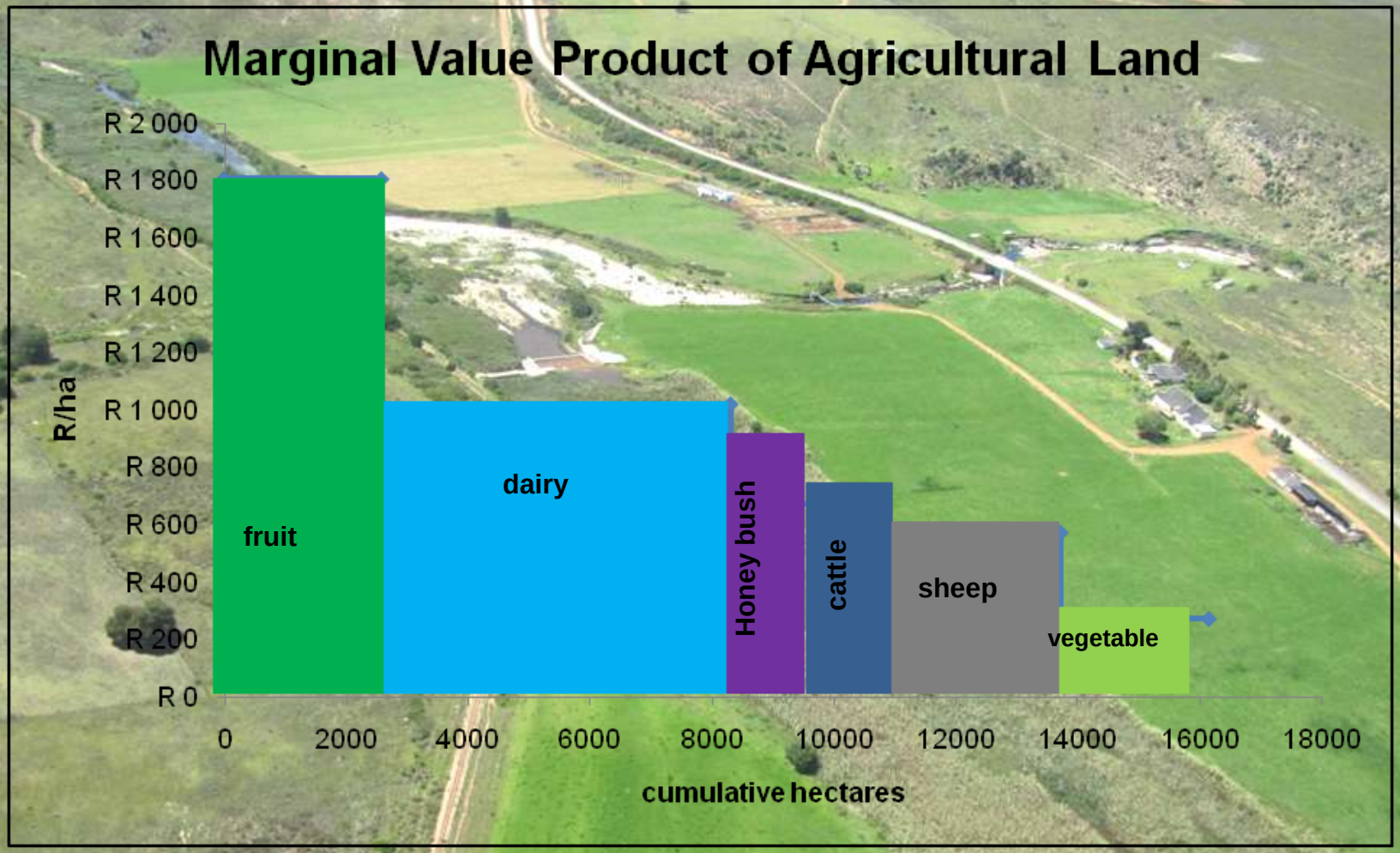
Income per hectare



enterprise	R/cow
dairy	R 3 311

enterprise	R/LSU
sheep	R 2 912
cattle	R 1 524

enterprise	R/ha
fruit	R 59 627
honeybush	R 22 220
vegetables	R 66 961



Total Value Product of Agricultural Land : R14.7million/annum

Private Agricultural benefits = R553/ha

Assuming that additional land freed up from alien clearing will be used in the same proportion as current land-use

Farm type	Average Gross Margin per hectare
vegetable	R 272.88
sheep	R 574.17
cattle	R 670.35
honey bush	R 856.76
dairy	R 1 021.77
fruit	R 1 807.18

Higher gross margins = higher incentive to clear

BUT land converted into cultivated pastures, not restored to natural state

Conflicting interests

Ecological vs. Economic

SOCIAL BENEFITS = ADDITIONAL WATER YIELD

NMBM = beneficiary

Expected Yield: 3 272 m^3/ha/annum

Social Hydrological Benefits:
R3 960/ha

ASSUME:
90% of black wattle invasion is riparian
Weighted average used to reflect **current land-use**
Yield factor of 98%
NMBM willingness to pay = opportunity cost of water (R1.21/m^3)

SOCIAL BENEFITS = ADDITIONAL WATER YIELD

If land was restored to its **natural state** – then an estimated 1450 m^3/ha/annum is expected

Social Hydrological Benefits:
R1 754/ha

Only half the story is being told -
Additional Yield is the only hydrological focus

Expected wetland benefits

1. Water Quality = decreased water treatment costs
2. Flood mitigation = avoided damage cost due to floods
3. Water regulation = improved assurance of supply for NMBM

Too soon to measure changes/improvements – findings inconclusive

1. Is WfW restoration in the Upper Kromme Catchment economically viable?

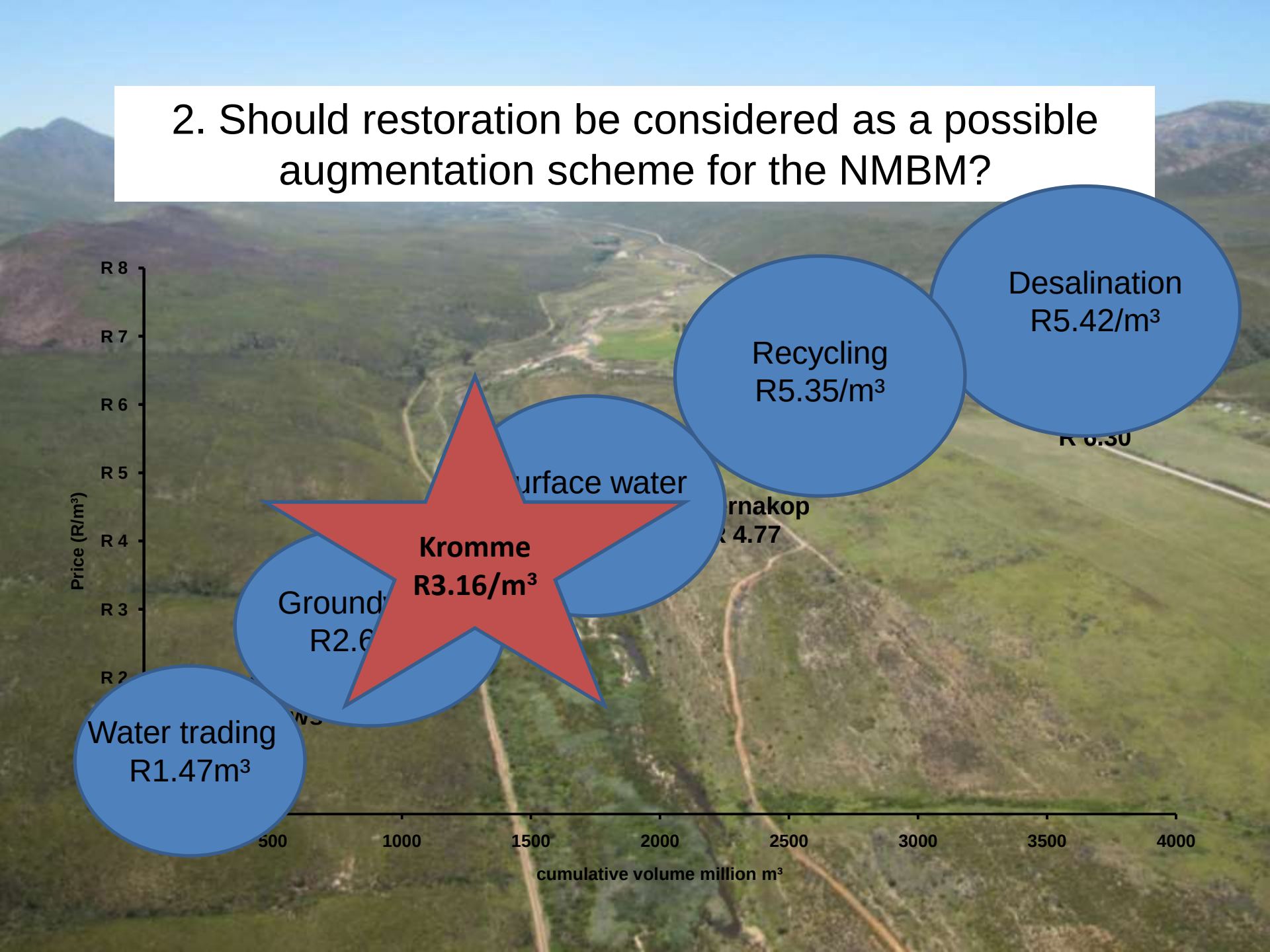
Cost Benefit Analysis:
Net Present Value at 4% interest rate

	Private benefits	Social benefits	Total Benefits	WfW Costs	Benefits-Costs	Benefit Cost Ratio
per ha	R 351	R 2 511	R 2 862	R 6 457	**-R 3 595**	**0.44**
total	R 1 212 392	R 8 685 745	R 9 898 137	R 22 329 867	**-R 12 431 730**	**0.44**

NPV < 0
BCR < 1

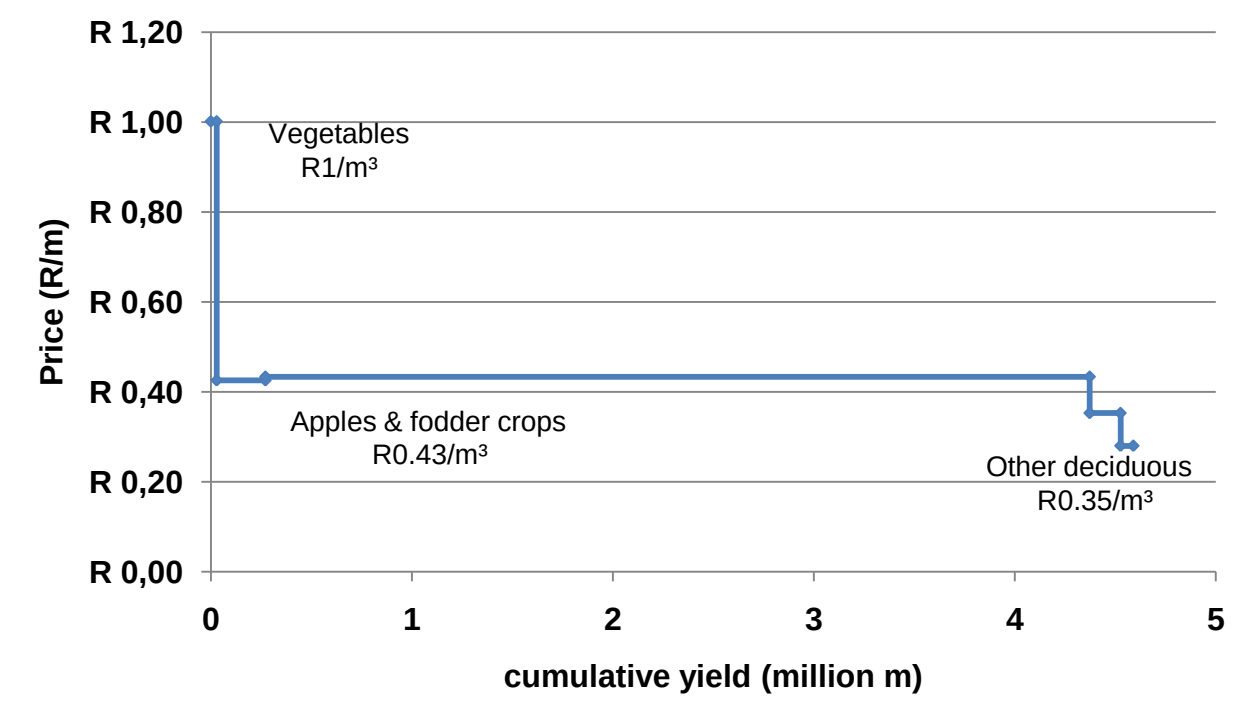
Therefore WfW restoration is **not economically viable** under these assumptions/conditions

2. Should restoration be considered as a possible augmentation scheme for the NMBM?



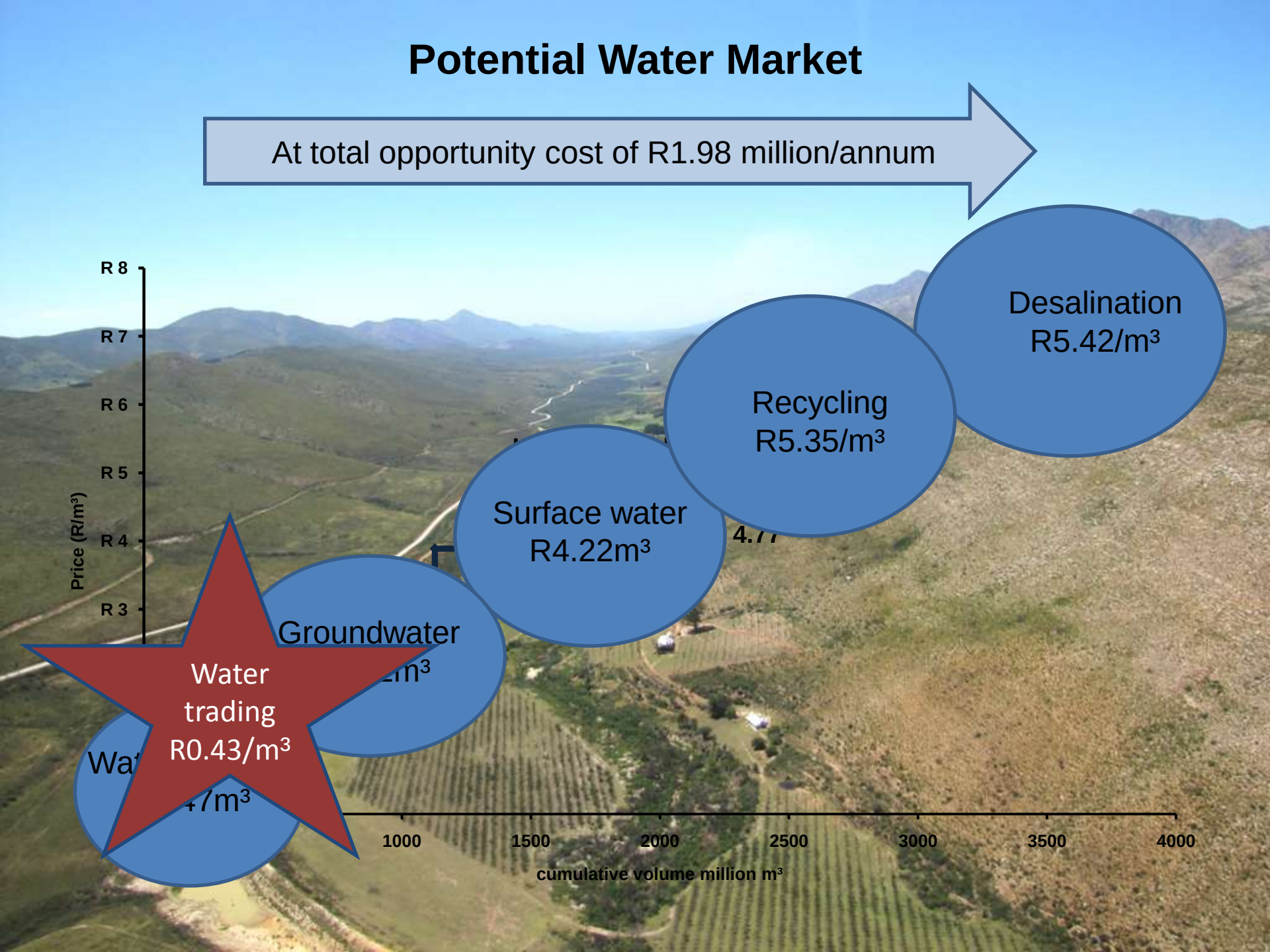
3. What is the agricultural value of water in the Kromme? Is there a potential for a market for water between NMBM and the farmers?

A crude demand curve for water in the Kromme is constructed – showing individual crop's **net returns per cubic metre of water** = the upper limit of willingness to pay = value of water



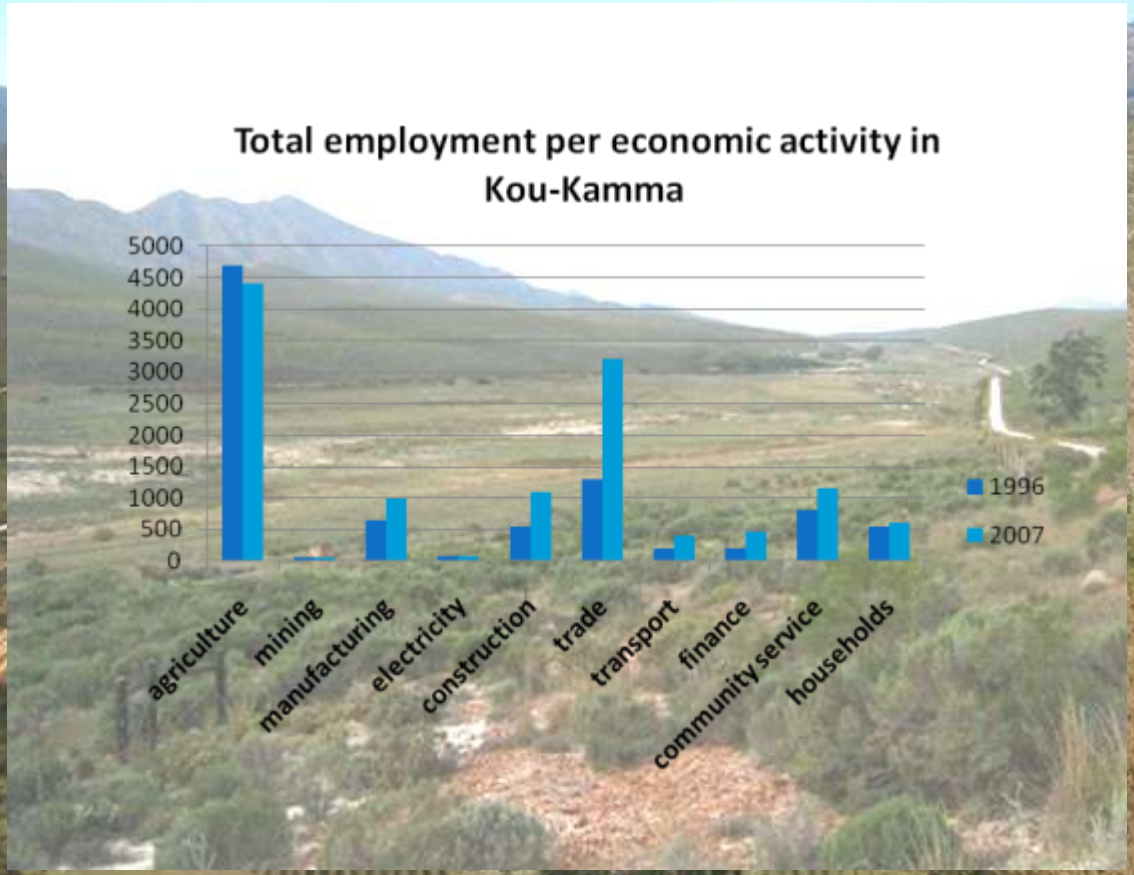
Potential Water Market

At total opportunity cost of R1.98 million/annum



More research needs to be done to explore water markets

The spillover effects have not been quantified – impact on secondary industries, employment etc & therefore this estimated cost will undervalue the true cost



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