

Land & Water Management –
Can we develop more science based policies?
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Water resources planning and modelling tools
for the assessment of land use change in the
Luvuvhu Catchment, South Africa
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**WATERNET 2003
Water, Science,
Technology and Policy
Convergence and Action
by all**

Land & Water Management: can we develop more science based policies?

1. **Are land and water policies based on best Science (or Myth)?**

2. **Do they address conflicting demands on the land and water resource for:**

- Water for supply
- Land for food production
- Water for irrigation schemes
- Other goods and services (e.g. timber, fisheries, environment, conservation, amenity)

and consequent sectoral conflicts (e.g. Power generation for pumping groundwater for irrigation, potential environmental damage resulting from MDG driven piped water and sanitation schemes) and relating policies – e.g. coastal?

3. **Do we need higher level of integration to integrate land and water policies (ILWRM) –Blue Revolution II ?**



Forest & Water Policy & beliefs

FRP FLOWS issues

South East Asia:

Belief in close connection between deforestation and large flood events has led to logging ban:

- Livelihood impact: ~1,000,000 people out of work
- Economic impact \$1,900,000,000 lost revenues per year

China :

Afforestation programmes being promoted (~ 80,000,000 ha) on the basis of unsound perceptions of the benefits of forests to the water environment:

- detriment to rural livelihoods,
- disadvantage to ethnic groups by “land grabbing”
- detriment to biodiversity and downstream and trans-national water flows.

India:

Belief that forests increase groundwater recharge, and focus on forestry programmes as a means of improving groundwater resources, obfuscates real issue of:

- Demand management of water resources for irrigation
- Imposing realistic charges for electricity – 2/3 of all power generated in some southern Indian states is for pumping groundwater
 - Livelihood impact: water tables > 250m, hand pumps not working, poor people have to buy water from tankers
 - Economic impact: economic and social disaster pending as increased groundwater pumping is not sustainable

Forest & Water Policy & beliefs

FRP FLOWS issues

Kenya, Africa:

Recognising that flows have reduced from Mount Kenya and appreciation that deforestation has taken place – belief that reforestation will restore flows.

- Policy to increase forest cover in Kenya from 2% to 8% within 5 years
 - No recognition of (illegal) abstractions/ diversions of flows from Mount Kenya

RSA, Africa:

Recognition that plantations and alien invaders are high consumers of water has led to new types of non- market based forest/water policy instruments: WFW, SFRA

- Livelihood impacts: not known
- Economic impacts: not known
- Water resource impacts: fairly well known

Rest of World:

Market-based policy instruments being developed, markets for watershed services:

- Based on the forest/water myths rather than science?
 - Payments often small
 - Unsustainable unless real service can be demonstrated.
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- Livelihood impacts: no evidence that poor people are benefited (Landell-Mills and Porras , 2002)
 - Economic impacts: ?

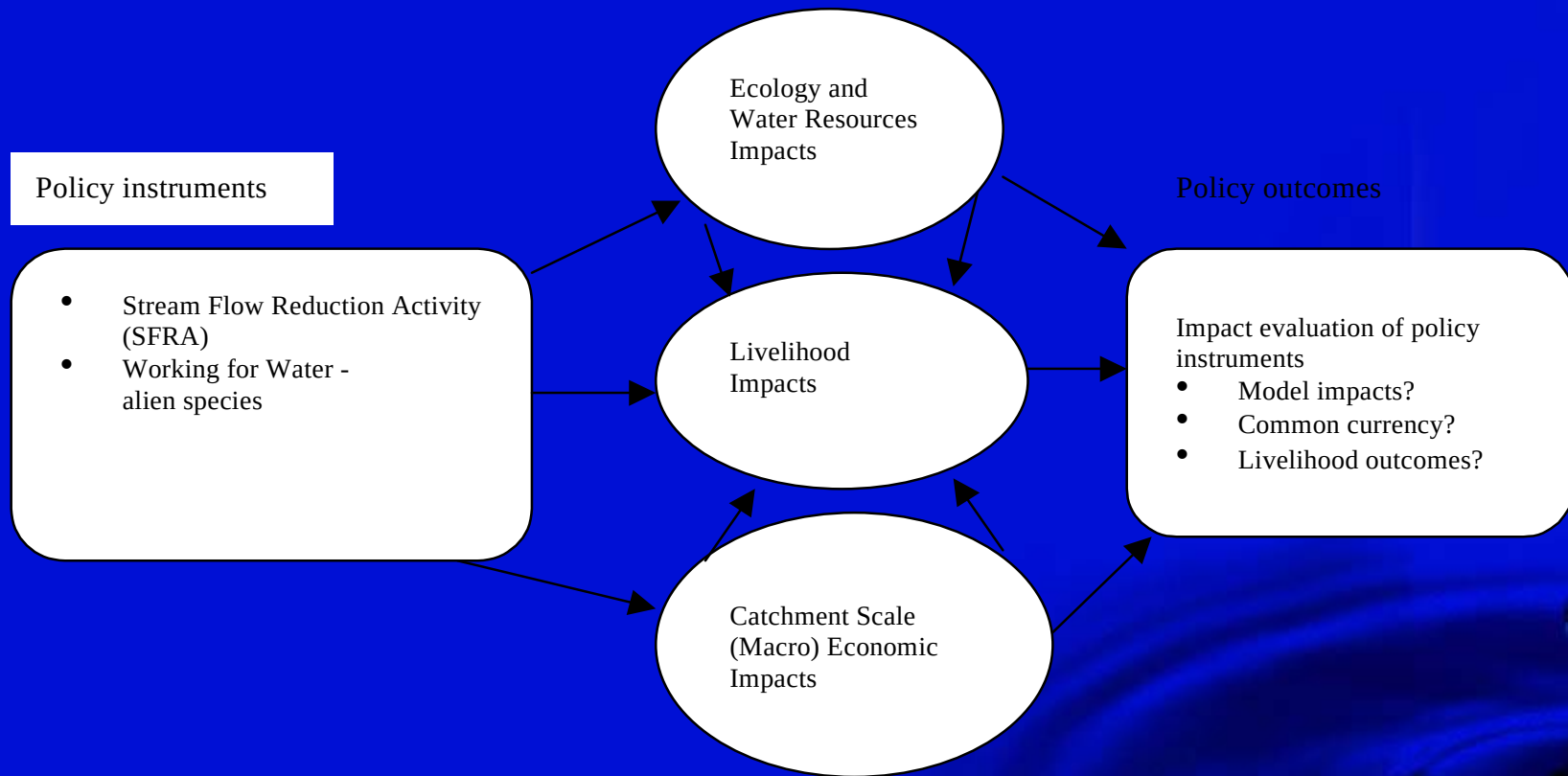
RSA, catchment Management and Poverty

RSA government:

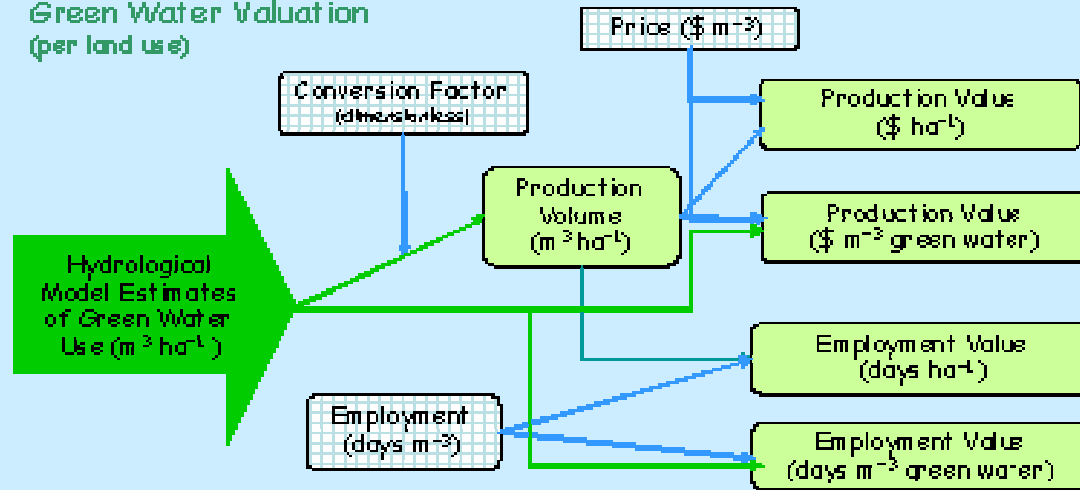
- ◆ Recognises downstream water resource impacts of fast growing commercial plantations and “escaping” plantation trees.
- ◆ Funds Working for Water Programme for eradicating alien invaders -water resource, ecological, poverty alleviation benefits.
- ◆ How to devise policy instruments which satisfy IWRM (water resource, basin economics and conservation) and Livelihoods?
- ◆ Project is evaluating water resource Impacts of land use change in blue water/green water framework



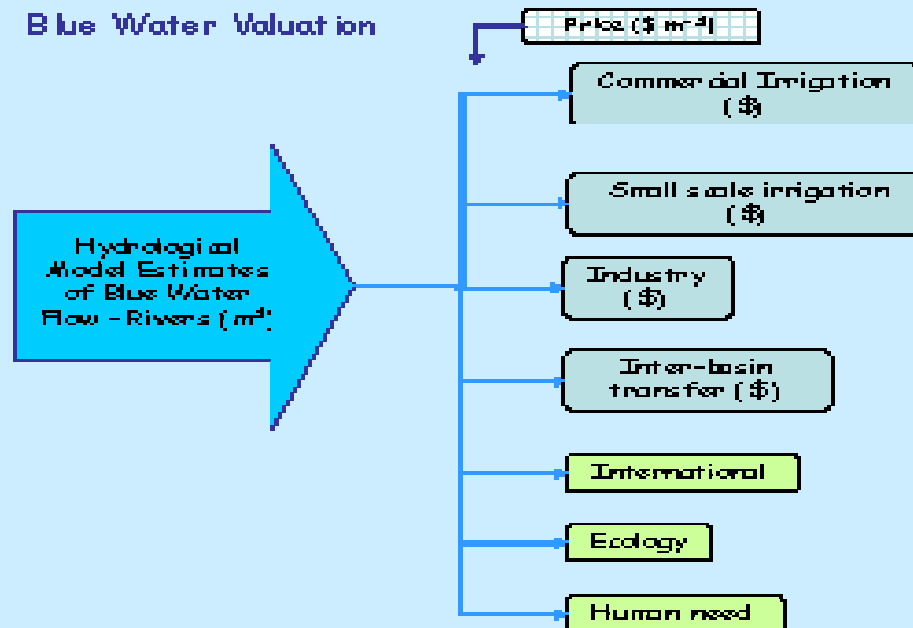
Livelihood and economic impacts are being evaluated within the Blue Water/ Green Water Framework.



Green Water Valuation (per land use)



Blue Water Valuation



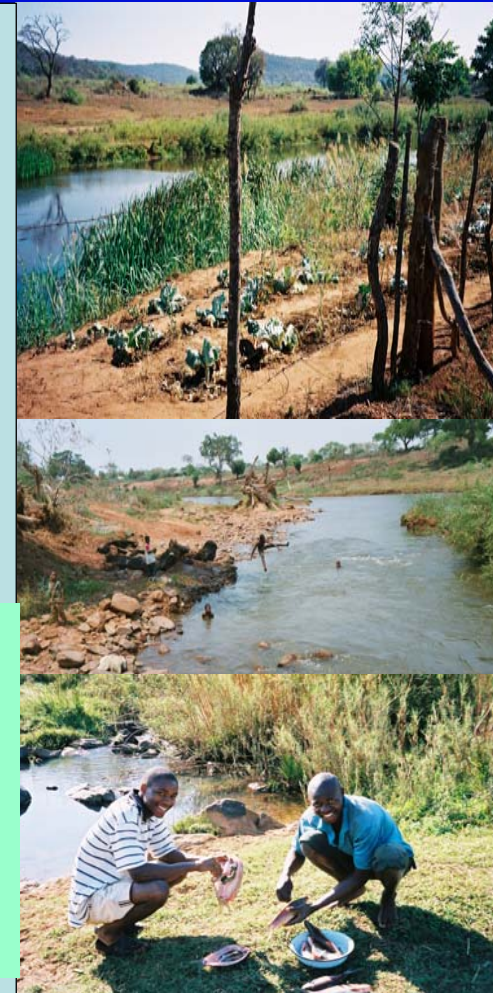
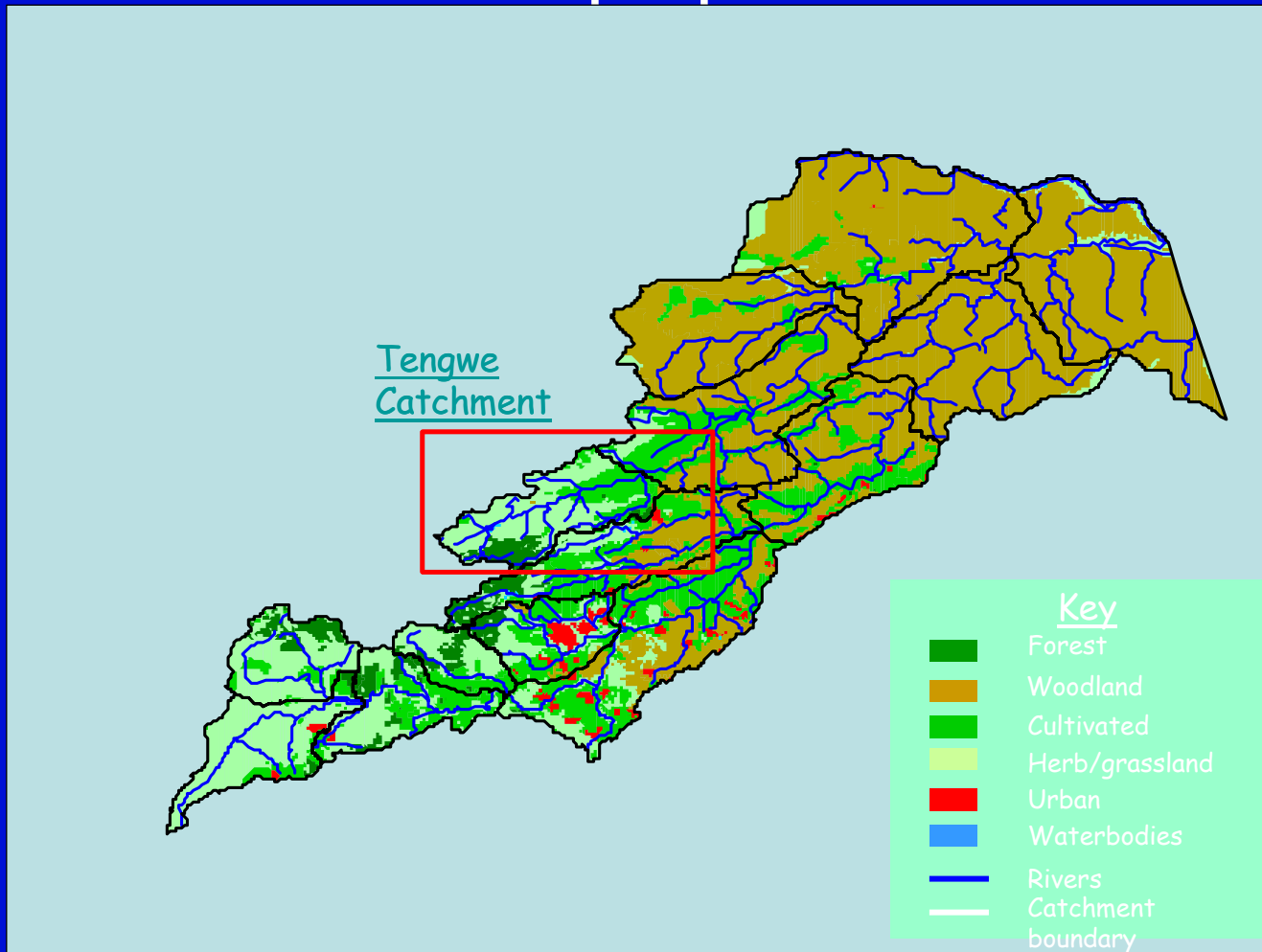
“Blue Water” and “Green Water”

- ◆ What is the role of ‘blue’ and ‘green’ water in rural livelihoods?
- ◆ What is the role of land use change in this regard?
- ◆ Role of land use sensitive hydrological models.
- ◆ Two land use sensitive hydrological models
 - ACRU Agrohydrological modelling system (Schulze, 1995)
 - HYLUC (Calder, 2003)
- ◆ Two tier dissemination tool

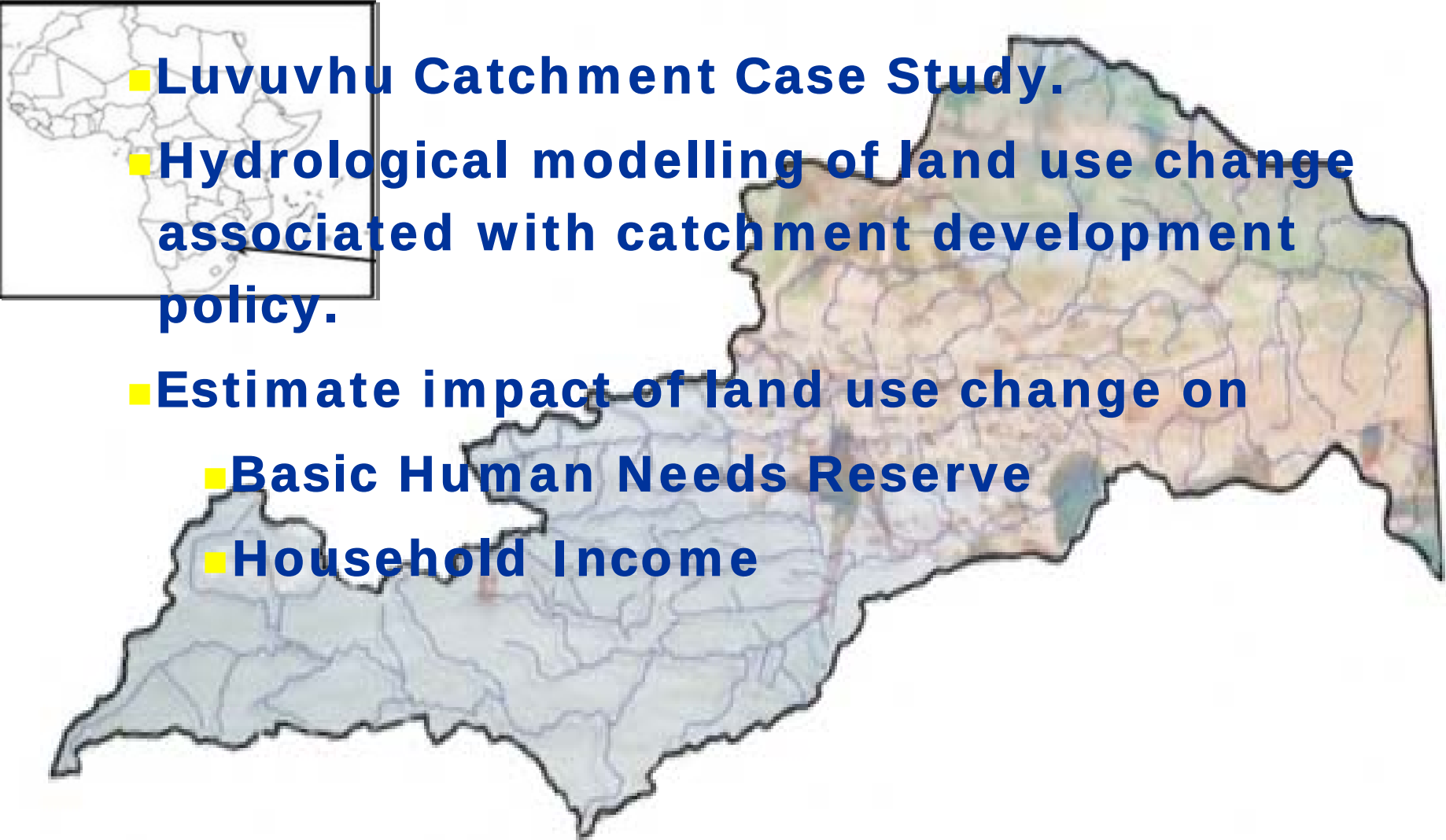


Luvuvhu catchment land use

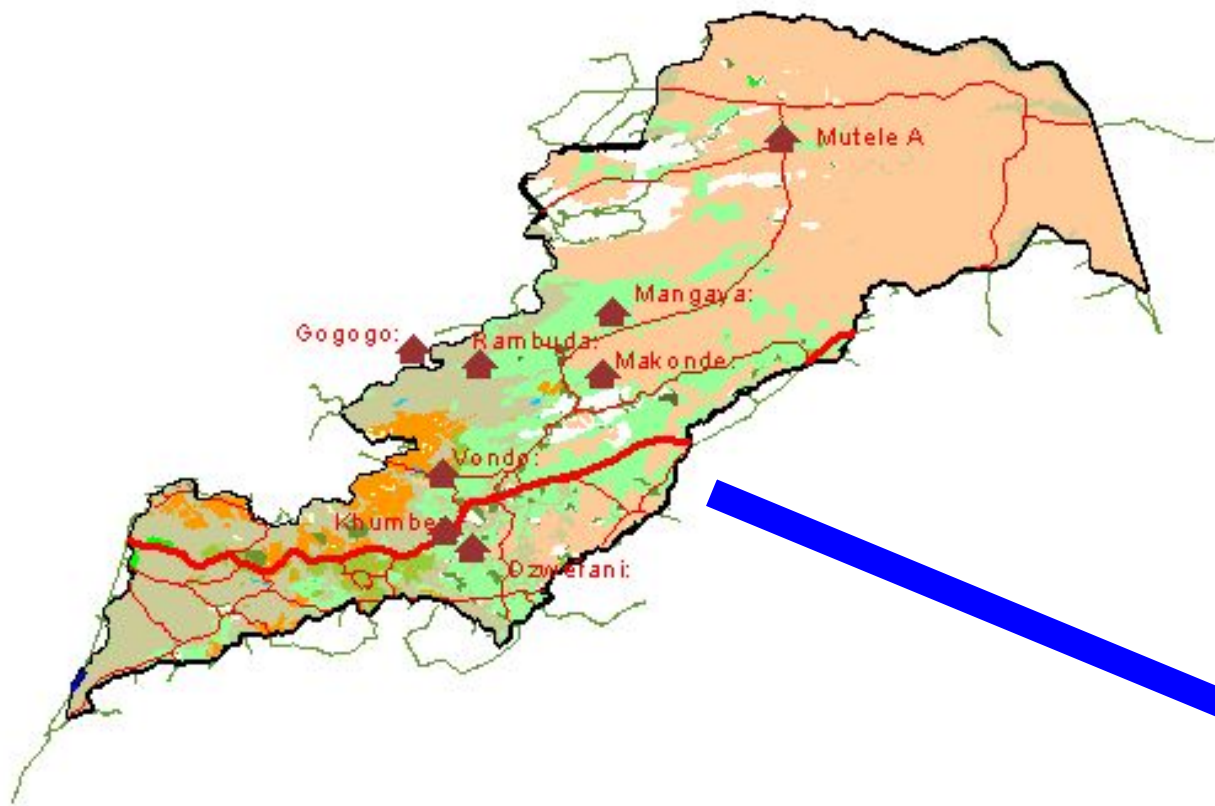
Limpopo Province



Catchment Management and Poverty Alleviation (CAMP)

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- **Luvuvhu Catchment Case Study.**
 - **Hydrological modelling of land use change associated with catchment development policy.**
 - **Estimate impact of land use change on**
 - **Basic Human Needs Reserve**
 - **Household Income**

Catchment Management and Poverty Alleviation (*CAMP*) Luvuvhu Watershed, Limpopo Province, RSA



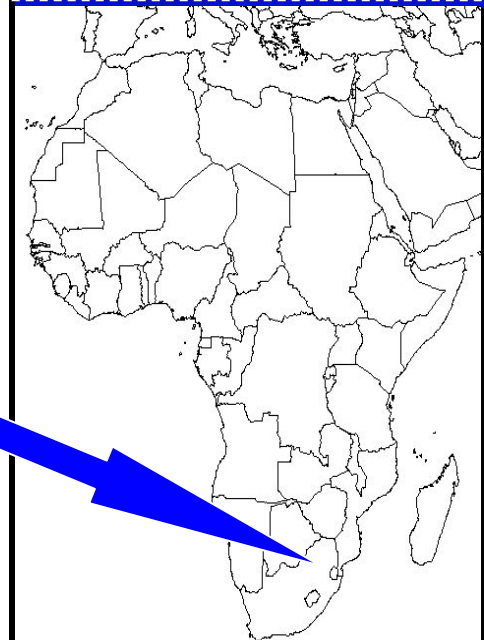
MAP 608 mm

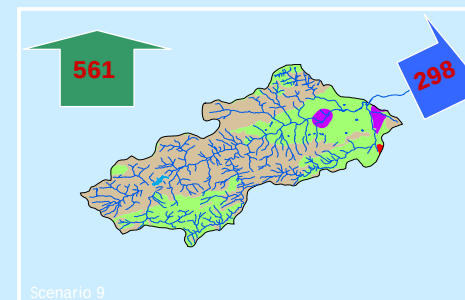
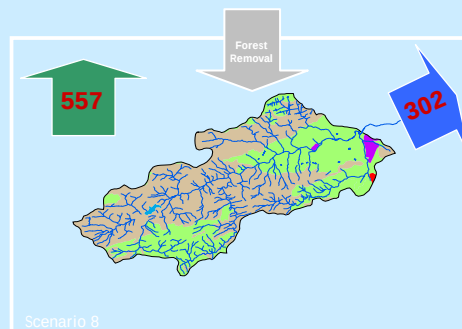
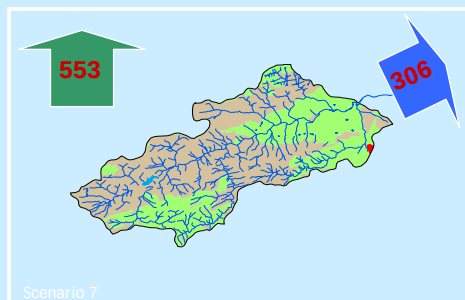
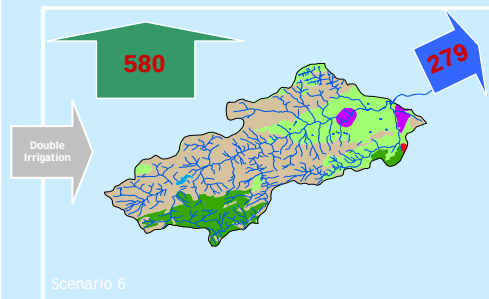
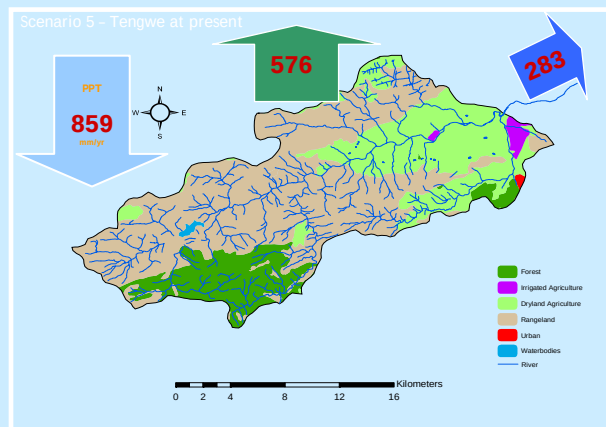
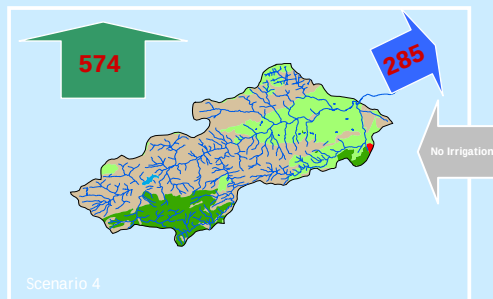
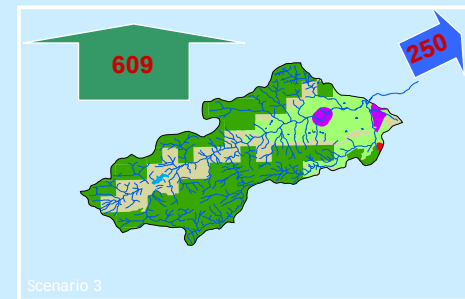
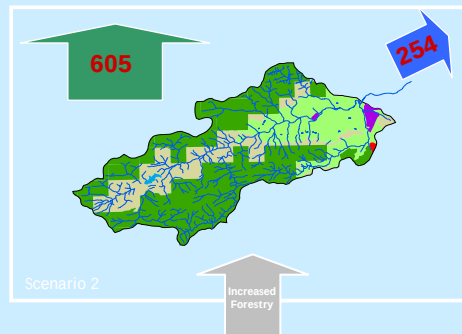
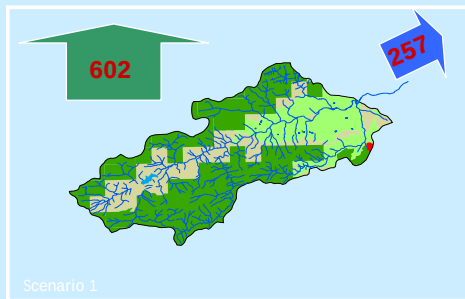
MAE 1,678 mm

MAR 519 m³

Area 5,941 km²

Pop 624,907





Tengwe Catchment

Current Land use

"Green Water Flow"

Consumptive use

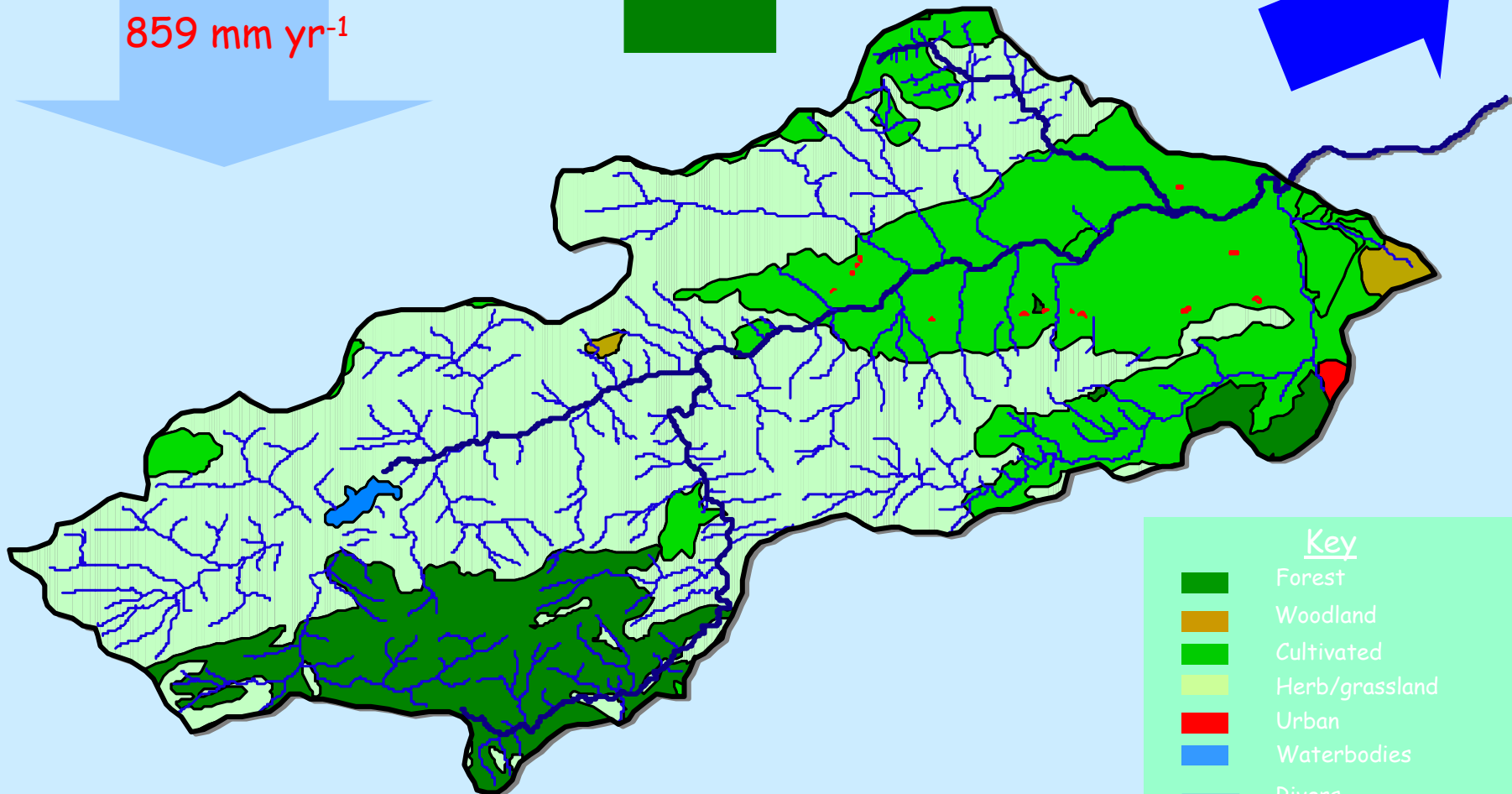
576 mm yr⁻¹

"Blue Water Flow"

283 mm yr⁻¹

Total Precipitation

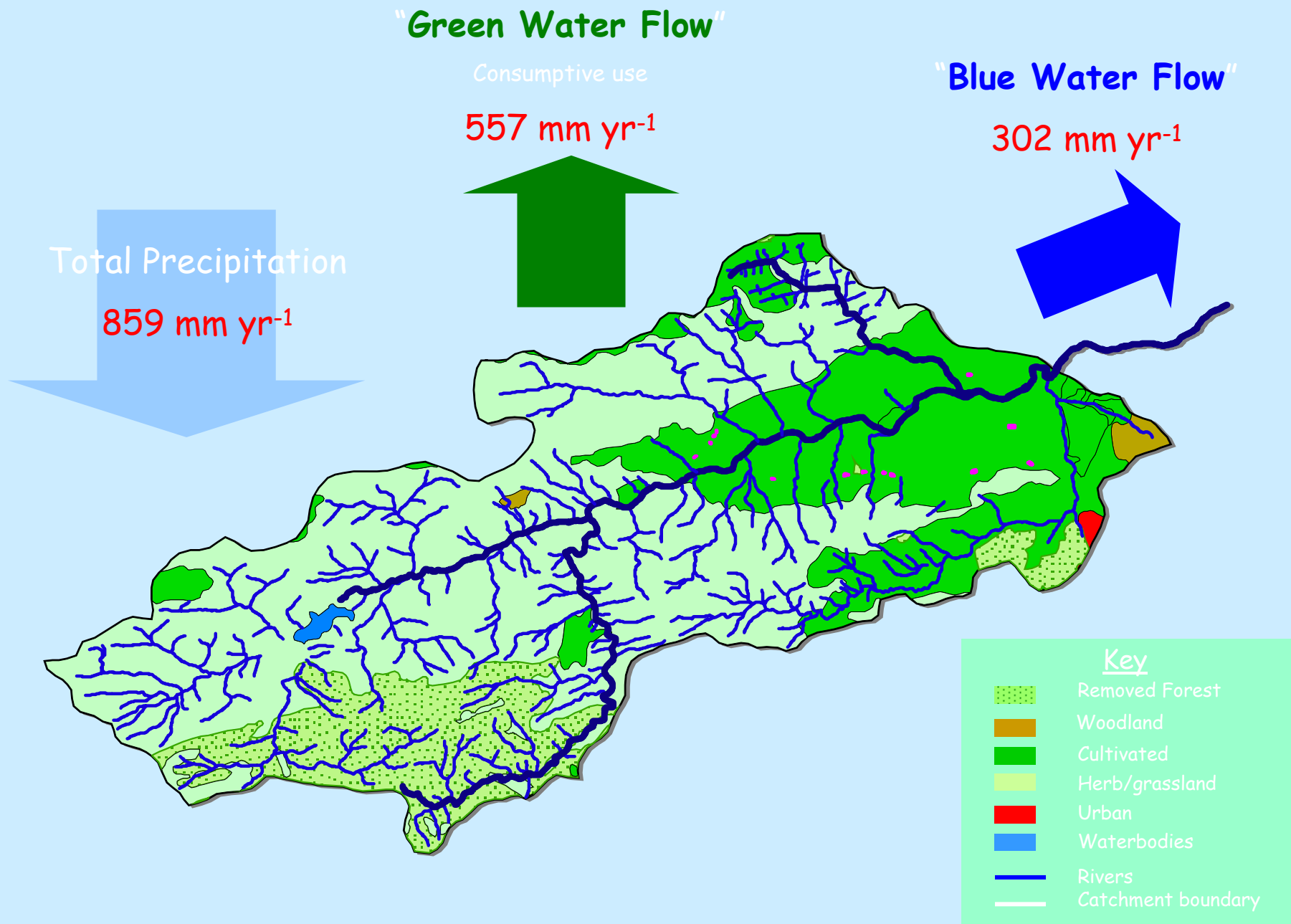
859 mm yr⁻¹



Key

- Forest
- Woodland
- Cultivated
- Herb/grassland
- Urban
- Waterbodies
- Rivers
- Catchment boundary

SCENARIO 2 - Decrease in forest cover (no forest)



SCENARIO 1 - Increase Forest Cover (land receiving >650mm yr-1)

