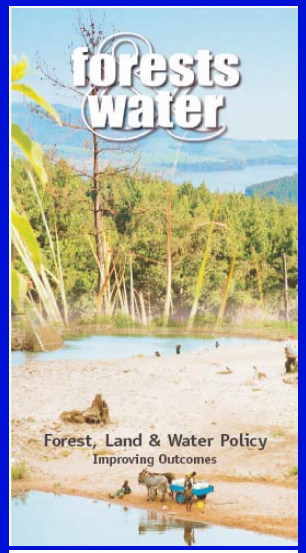
Furthering land and Water Policy – Improving Outcomes (FAWPIO)

Ian Calder

Green and Blue Water Initiative Workshop
Stockholm 9-10 June 2005



FAWPIO

Background:

DFID FRP FLOWS cluster, India, RSA, Costa Rica, Tanzania, Grenada- to improve understanding of socio-economic and biophysical impacts of forest and water interactions.

Led to realisation:

- Throughout the World many watershed development policies currently based on myths – leading to perverse outcomes including catchment closure
- Need to Bridge Research findings and Policy (BRAP) to develop evidence based policies
- Need for tools and methodologies to support BRAP and Green water focussed policies

CLUWRR Centre for Land Use and Water Resources Research

FRP
Forestry Research Programme

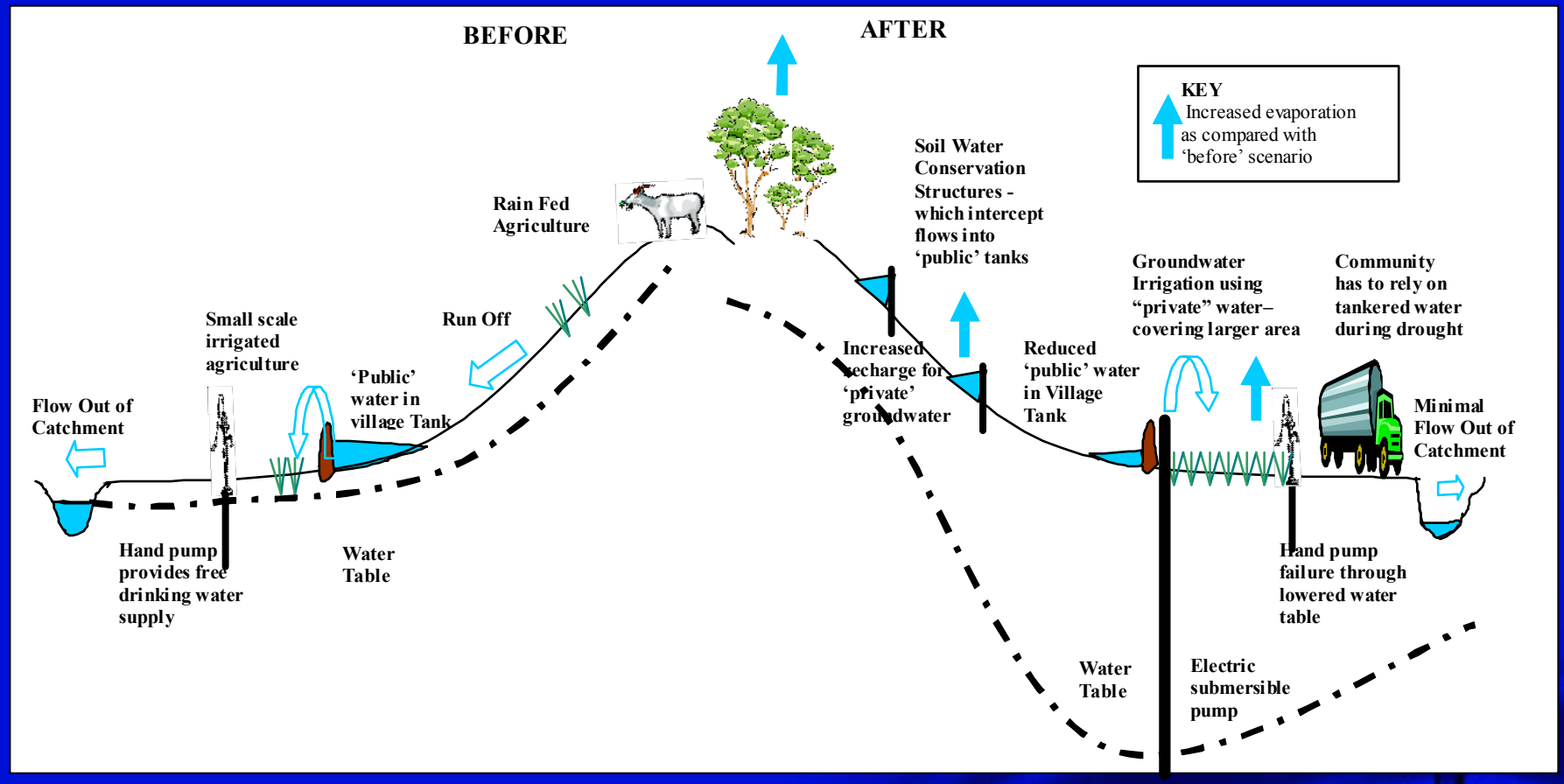
Forestry – Often still promoted on Myths

New Research Knowledge contradicts many commonly held beliefs.

Research shows forests generally:

- Evaporate more than short crops; reduce annual flows from catchments; reduce recharge to aquifers
- Mitigate small floods but not the largest, most damaging floods
- Do not increase dry season flows, often reduce dry season flows
- Do not “attract” rainfall
- Reduce erosion if natural forest – not necessarily the case for plantation forest

Excessive Watershed Interventions: Forestry, soil water conservation, irrigation, may lead to catchment closure – even at large catchment scale - Perverse outcomes

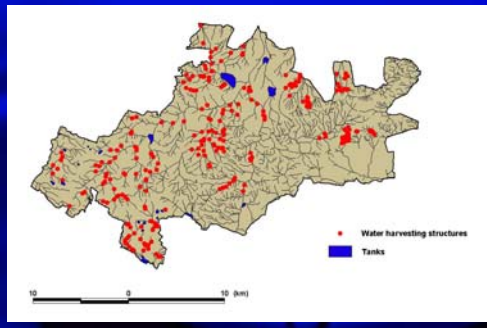


Excessive Watershed Interventions: Forestry, soil water conservation, irrigation, may lead to catchment closure – even at large catchment scale - Perverse outcomes

FAWPIO Currently working with WB and DFID watershed projects in India to improve outcomes:

- **Consider:**
  - **Sustainability and need for green water management is GREEN WATER > PRECIPITATION ?**
  - **Benefits from further Soil Water Conservation (SWC) measures – surface water management**

- **Investigate and model 'winners and losers' from SWC interventions :**
  - **Consider different 'density' of SWC and Tank cascades – Inchigeri, Mushtoor.**
  - **Modelling involves HYLUC, Bayesian network, EXCLAIM tools**
  - **Consider in the context of green water management to insure green water from forest, irrigation, supplementary irrigation, dryland agric. combination does not exceed average long term rainfall**



Sustainability and need for green water management?

Consider:

- is GREEN WATER > PRECIPITATION, E>P
- Are there surface flows Qs? (define Qs as 1 or 5 year return period flows)

Combinations indicate:

1 GW management: opportunity for increased irrigation

Benefits from further SWC

2 GW management: reduce irrigation/ forestry

Benefits from further SWC ?

3 GW management: reduce irrigation/ forestry

NO overall benefits from further SWC

4 GW management: opportunity for increased irrigation GW management:

NO overall benefits from further SWC

(1) E < P, Qs > 0	(2) E > P, Qs > 0
(4) E < P, Qs = 0	(3) E > P, Qs = 0

Many examples of SWC promoted in type 3- where E>P, No surface flows or tank spills within last 5 years!

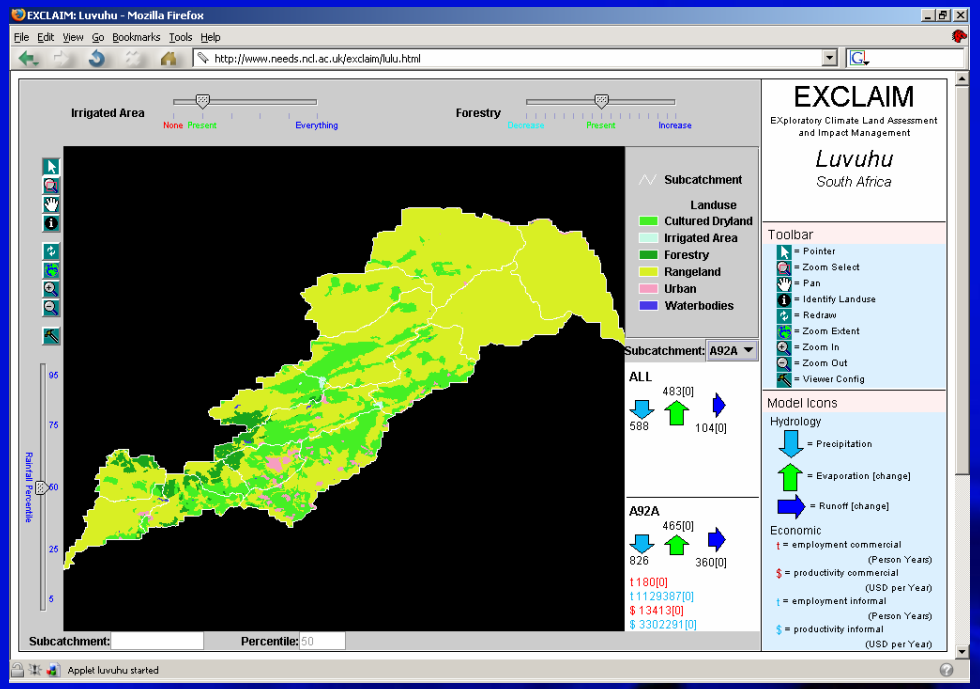
Modelling winners and losers

- **Bayesian Networks – HYLUC: investigate upstream/ downstream benefits of SWC measures within SWC-Tank cascades.**

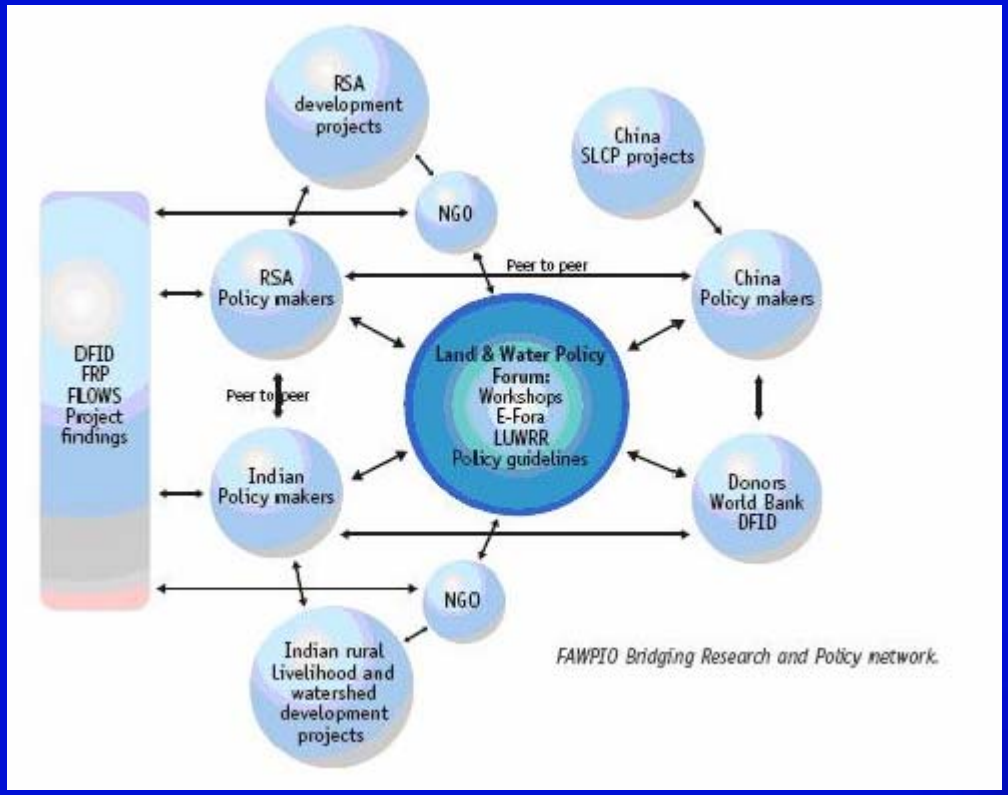
- **EXCLAIM**

  EXploratory Climate Land Assessment and Impact Management

  Model and demonstrate impacts on :
  Green and Blue flows,
  Connectivity,
  Sustainability



Programme Outputs: BRAP networks

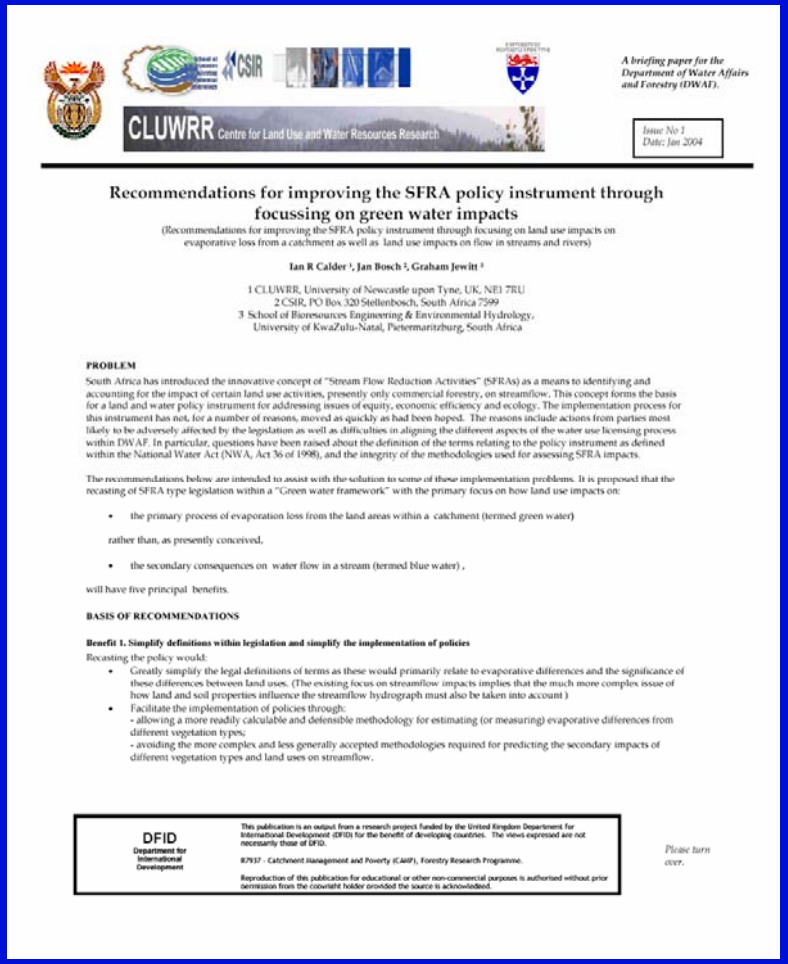


BRAP (Bridging Research And Policy) Networks will:

- incorporate advocacy and promotion techniques-Policy Briefs,
- connect and disseminate new knowledge of the biophysical and socio-economic outcomes of land and water interventions to policy makers
- use peer-to-peer networking of policymakers
- support interactive workshops and innovative media approaches including e-fora and electronic journals, e.g. Land Use and
- Water Resources Research (www.luwrr.com hosted by Venus Internet).

Greenwater Policy Brief (2004)

leading to CSIR research proposal[1] to develop support methodologies and GIS tools (FAWPIO-CLUWRR as partners)



CLUWRR Centre for Land Use and Water Resources Research

A briefing paper for the Department of Water Affairs and Forestry (DWAF).

Issue No 1
Date: Jan 2004

Recommendations for improving the SFRA policy instrument through focussing on green water impacts

(Recommendations for improving the SFRA policy instrument through focusing on land use impacts on evaporative loss from a catchment as well as land use impacts on flow in streams and rivers)

Ian R Calder [1], Jan Bosch [2], Graham Jewitt [3]

1 CLUWRR, University of Newcastle upon Tyne, UK, NE1 7RU
2 CSIR, PO Box 320 Stellenbosch, South Africa 7599
3 School of Bioresources Engineering & Environmental Hydrology, University of KwaZulu-Natal, Pietermaritzburg, South Africa

PROBLEM

South Africa has introduced the innovative concept of "Stream Flow Reduction Activities" (SFRAs) as a means to identifying and accounting for the impact of certain land use activities, presently only commercial forestry, on streamflow. This concept forms the basis for a land and water policy instrument for addressing issues of equity, economic efficiency and ecology. The implementation process for this instrument has not, for a number of reasons, moved as quickly as had been hoped. The reasons include actions from parties most likely to be adversely affected by the legislation as well as difficulties in aligning the different aspects of the water use licensing process within DWAF. In particular, questions have been raised about the definition of the terms relating to the policy instrument as defined within the National Water Act (NWA, Act 36 of 1998), and the integrity of the methodologies used for assessing SFRA impacts.

The recommendations below are intended to assist with the solution to some of these implementation problems. It is proposed that the recasting of SFRA type legislation within a "Green water framework" with the primary focus on how land use impacts on:

- the primary process of evaporation loss from the land areas within a catchment (termed green water)

rather than, as presently conceived,

- the secondary consequences on water flow in a stream (termed blue water) ,

will have five principal benefits.

BASIS OF RECOMMENDATIONS

Benefit 1. Simplify definitions within legislation and simplify the implementation of policies

Recasting the policy would:

- Greatly simplify the legal definitions of terms as these would primarily relate to evaporative differences and the significance of these differences between land uses. (The existing focus on streamflow impacts implies that the much more complex issue of how land and soil properties influence the streamflow hydrograph must also be taken into account)
- Facilitate the implementation of policies through:
  - allowing a more readily calculable and defensible methodology for estimating (or measuring) evaporative differences from different vegetation types;
  - avoiding the more complex and less generally accepted methodologies required for predicting the secondary impacts of different vegetation types and land uses on streamflow.

DFID Department for International Development

This publication is an output from a research project funded by the United Kingdom Department for International Development (DFID) for the benefit of developing countries. The views expressed are not necessarily those of DFID.

R7937 - Catchment Management and Poverty (CAMP), Forestry Research Programme.

Please turn over.

Benefit 2. Highlight the importance of evaporative (green water) loss from a catchment and help to clarify the different functions of land use as they affect the water resource.

Recasting the SFRA with a focus on green water impacts would:

- Highlight the importance of evaporative loss as determined by land use within a catchment, (water that is effectively "lost" to the catchment and can never reappear in the stream);
  and help
- distinguish this "water loss" function from the "streamflow regulation" function of land use.

Although from theoretical considerations different types of land use (through, for example, differences in soil properties) might be expected to have different "regulatory" functions on seasonal streamflow, in practice the magnitude of these effects is usually insufficient to allow easy quantification, or even detection, without the use of very detailed measurement and analytical techniques.
Whether of not it can be proved that improvements to streamflow regulation are significant and beneficial for a particular land use it is argued that this function should not be confused with the evaporative "water loss" function. The regulatory function is replaceable or substitutable by other interventions such as the construction of reservoirs or check dams, but no intervention can replace the water which has been evaporated and lost from the catchment.

Benefit 3. Help to identify the value of a land use and whether the land use is a beneficial user of water in the public interest (NWA, Section 27: aim is to "promote the sustainable, beneficial use of water in the public interest")

The "Green water framework" may help identify the value of a particular land use in terms of the goods and services provided and thereby help resolve the question of whether a particular land use is making "beneficial use of water in the public interest". This could be achieved through both assessing and comparing the social, ecological and economic benefits of the land use on an area basis with the benefits expressed on the basis of green water use (Hassan *et. al.*, 2002). The "Green water framework" allows this evaluation and comparison with respect to the new "green water" indicators:

- Social - "Jobs per drop"
- Ecological - (indicator required for overall ecological value expressed per unit of green water)
- Economic - "Dollars per drop"

(These indicators are incorporated in the "Integrative tool and dissemination methodologies" developed in CAMP)

Benefit 4. Simplify the development of compensation/incentive mechanisms based on water use (subject to beneficial use)

The "green water" framework would provide a logic for making transfer payments (or these could be regarded as evaporation or green water offset payments) from

- "excess water users", (land uses with water use greater than that from the indigenous vegetation type as defined by Acocks (1988)) e.g. forests,
  to
- "water provider" land uses geared to good quantity and quality water provision if these land uses are deemed to "promote the sustainable, beneficial use of water in the public interest" .

Benefit 5. Introduce the concept of "water providing" land uses which would allow more options for meeting the ecological Reserve requirement– particularly in situations when a catchment is presently not meeting, or in danger of not meeting, the Reserve requirement.

When a catchment is presently not meeting, or in danger of not meeting, the ecological and human Reserve requirement the "Green water framework" would allow various options:

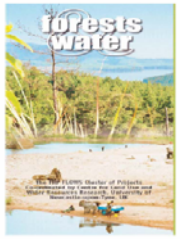
- The existing (but perhaps this should be regarded as the "last choice") option of removing the licences from registered users, together with the additional (new benefit 5) options of,
- Removing or encouraging the removal of high water using land uses through the development and application of appropriate policy instruments. The existing "Working for Water" programme is just such an instrument - aimed at the removal of invasive alien plants which are unproductive users of water and not considered a land use in the "public interest",
- Creating and encouraging more "water providing" land uses, within a catchment through incentive mechanisms, subject to these land uses being deemed in the "public interest". (The term incentive rather than compensation is used here as it does not imply that any particular landowner is disadvantaged and therefore entitled to payments.)

These "water providing" land uses or "land uses evaporating less than the baseline Acocks indigenous vegetation baseline" could be seen as a way of "offsetting" water use of high evaporative uses within a catchment.

WIDER RELEVANCE

More generally, and in a world context, the use of the "Green water framework" would also:

1. Focus attention directly on the issue of whether a land use should, or should not, be regarded as a high consumer of water. In some countries the traditional mythology that forests are necessarily always good for the water environment, and that forests are "providers" of water, still persists.
2. Assist with the wider policy debate on meeting the world's "hidden food gap" (Falkenmark, 2003), and from where the water is to come to meet the crop requirements (whether irrigated or not) to support the food demands of a growing world population.



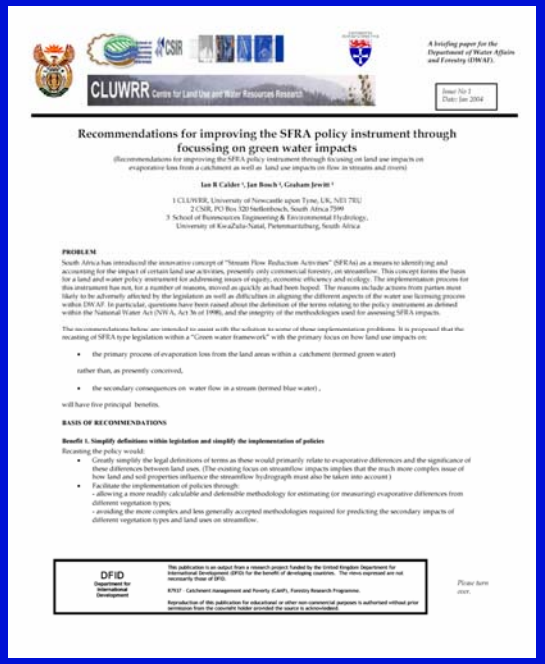
REFERENCES

Acocks, JPH. (1988). Veld types of South Africa. *Mem. Bot. Surv. S. Afr.* 57: 1-128.
Falkenmark, M. (2003). Water cycle and people: water for feeding Humanity. Land Use and Water Resources Research. Vol. 3, 1-3.4, http://www.luwrr.com/.
Hassan RM, Olbrich B and Crafford JG (2002) Measuring total economic benefits from water in plantation forestry: Application of quasi I-O framework to the Crocodile catchment in South Africa. S.Afr. For. J. 193 .

[1] Development of a new spatial GIS-based modelling system for predicting the consequences of land use change to surface and groundwater resources

Greenwater Policy Brief (2004)

leading to CSIR research proposal[1] to develop support methodologies and GIS tools (FAWPIO-CLUWRR as partners)



CLUWRR Centre for Land Use and Water Resources Research

A briefing paper for the Department of Water Affairs and Forestry (DWAF).

Issue No 1
Date: Jan 2004

Recommendations for improving the SFRA policy instrument through focussing on green water impacts

(Recommendations for improving the SFRA policy instrument through focusing on land use impacts on evaporative loss from a catchment as well as land use impacts on flow in streams and rivers)

Ian R Calder [1], Jan Bosch [2], Graham Jewitt [3]

1 CLUWRR, University of Newcastle upon Tyne, UK, NE1 7RU
2 CSIR, PO Box 320 Stellenbosch, South Africa 7599
3 School of Bioresources Engineering & Environmental Hydrology, University of KwaZulu-Natal, Pietermaritzburg, South Africa

PROBLEM

South Africa has introduced the innovative concept of "Stream Flow Reduction Activities" (SFRAs) as a means to identifying and accounting for the impact of certain land use activities, presently only commercial forestry, on streamflow. This concept forms the basis for a land and water policy instrument for addressing issues of equity, economic efficiency and ecology. The implementation process for this instrument has not, for a number of reasons, moved as quickly as had been hoped. The reasons include actions from parties most likely to be adversely affected by the legislation as well as difficulties in aligning the different aspects of the water use licensing process within DWAF. In particular, questions have been raised about the definition of the terms relating to the policy instrument as defined within the National Water Act (NWA, Act 36 of 1998), and the integrity of the methodologies used for assessing SFRA impacts.

The recommendations below are intended to assist with the solution to some of these implementation problems. It is proposed that the meaning of SFRA type legislation within a "Green water framework" with the primary focus on how land use impacts on:

- the primary process of evaporation loss from the land areas within a catchment (termed green water)

rather than, as presently conceived,

- the secondary consequences on water flow in a stream (termed blue water) ,

will have five principal benefits.

BASIS OF RECOMMENDATIONS

Benefit 1. Simplify definitions within legislation and simplify the implementation of policies

Recasting the policy would:

- Greatly simplify the legal definitions of terms as these would primarily relate to evaporative differences and the significance of these differences between land uses. (The existing focus on streamflow impacts implies that the much more complex issue of how land and soil properties influence the streamflow hydrograph must also be taken into account.)
- Facilitate the implementation of policies through:
  - allowing a more readily calculable and defensible methodology for estimating (or measuring) evaporative differences from different vegetation types;
  - avoiding the more complex and less generally accepted methodologies required for predicting the secondary impacts of different vegetation types and land uses on streamflow.

DFID Department for International Development

This publication is an output from a research project funded by the United Kingdom Department for International Development (DFID) for the benefit of developing countries. The views expressed are not necessarily those of DFID.

R7617 - Catchment Management and Poverty (CAMP) - Forestry Research Programme.

Please turn over.

BENEFITS:

- simplify legal definitions,
- highlight the importance of evaporative loss,
- help identify if a land use is in the public interest,
- provide the basis for compensation payments to 'water providing' land uses
- encourage the creation of more 'water providing' land uses.

[1] Development of a new spatial GIS-based modelling system for predicting the consequences of land use change to surface and groundwater resources

FAWPIO- Current Focus

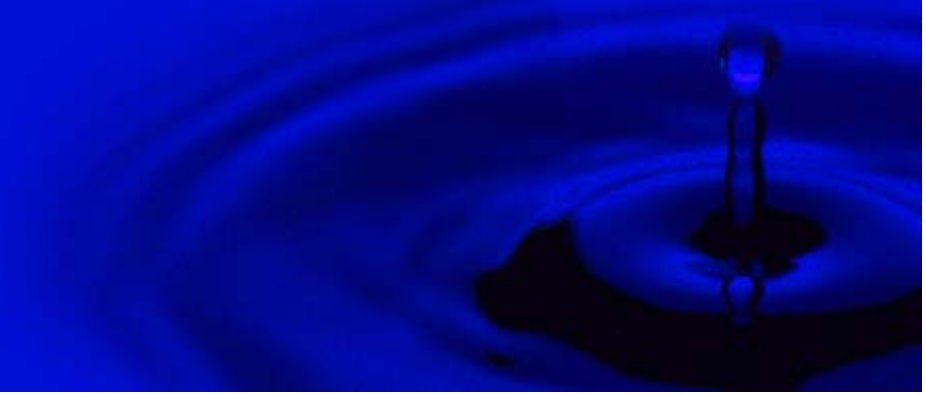
- **India**
  - KAWAD Inchigeri – Krishna basin – IWMI link
  - Mushtoor (World Bank, JSYS, Sujala) – Cauvery basin
- **RSA – Southern Africa**
  - CSIR, UKZNT, DWAF links, Oliphants- Limpopo
- **China –Vietnam**
  - links through WB and DFID projects?

GBI

Objective: Develop and operationalise a new Green and Blue water paradigm for ILWRM

<u>Overall</u> Outcomes: The Green-Blue paradigm adopted and implemented at international , national and local levels

R&D Initiative- Improve the live of poor people



GBI

***Theme 1** Advancing Integrated Green and Blue Water knowledge*

***Outcomes:** Knowledge synthesized and integrated in new ways in the context of the Green-Blue Paradigm*

Target groups:

- *Multinational, global thinking and political awareness*
- *National, Ministry level*
- *Operationalise at basin, catchment, watershed development, field level*

GBI

Theme 1 Outputs:

Methodology development:

- ***Model of Green and Blue impacts on Livelihoods –***
- ***Water vulnerability and development***
- ***Operational Planning and Dissemination Tools, methodoloogies: WEAP, EXCLAIM etc.***

GBI

***Theme 2* Integrated Freshwater Assessment and and indicators**

Outcomes:

Awareness raised at international , national and local levels of the need for and value of The Green-Blue paradigm

Target groups:

- ***Multinational, global thinking and political awareness***
- ***National, Ministry level***
- ***Basin, catchment, watershed development, field level***

GBI

Theme 2 Integrated Freshwater Assessment and and indicators

Outputs:

- *Global maps, global numbers, land cover change, at global to local scale*
- *Comprehensive freshwater assessment over time at basin scale,*
- *Reports, papers: highlight productive use of greenwater, innovations and options for land use, at local to global scales*

New Knowledge contributing to:

- *Policy briefs – targeted by Ministry/Country*
- *Guidelines: watershed development, Agricultural extension – field level, rural development*