

Firm foundations for future development


 RIU

Validated RNRRS Output.

Various linked projects have been working to provide firm foundations for livelihood-improving efforts to manage forests and land in upper water catchments. Known as the FRP-FLOWS studies, the projects are providing in-country government departments in Grenada, South Africa, Tanzania, Costa Rica and India with much-needed facts and policy-guiding information. They've also been demonstrating that hydrological models like HYLUC, SWAT and ACRU really do work. Outputs from the projects include workshops for ministers and policy briefs that give decision makers key insights into payment for environmental services schemes. The projects have also developed a new dissemination tool known as EXCLAIM, as well as the so called 'Rapid Quadrant' approach—which is helping in the design of new interventions in 100 watersheds in support of two \$200-million World Bank-funded watershed development projects.

Project Ref: **FRP31:**

Topic: **4. Better Water Harvesting, Catchment Management & Environments**

Lead Organisation: **University of Newcastle, UK**

Source: **Forestry Research Programme**

Document Contents:

[Description](#), [Validation](#), [Current Situation](#), [Current Promotion](#), [Impacts On Poverty](#), [Environmental Impact](#),

Description

Research into Use

NR International
Park House
Bradbourne Lane
Aylesford
Kent
ME20 6SN
UK

Geographical regions included:

[Caribbean](#), [China](#), [Costa Rica](#), [India](#), [South Africa](#), [Tanzania](#), [Uganda](#),

Target Audiences for this content:

[Forest-dependent poor](#),

FRP31**A. Description of the research output(s)***1. Working title of output or cluster of outputs.*

FRP-FLOWS Research cluster on the management of upper water catchments (ZF0176)

2. Name of relevant RNRRS Programme(s) commissioning supporting research and also indicate other funding sources, if applicable.

Forestry Research Programme, FRP

3. Provide relevant R numbers (and/or programme development/dissemination reference numbers covering supporting research) along with the institutional partners (with individual contact persons (if appropriate)) involved in the project activities. As with the question above, this is primarily to allow for the legacy of the RNRRS to be acknowledged during the RIUP activities.

The research cluster on the management of upper water catchments comprised the following research (R) projects:

R7937 CAatchment Management and Poverty (CAMP)

Partners / Collaborators:

- CSIR-Environmentek, Republic of South Africa (RSA) - www.csir.co.za
- School of Bio-resources Engineering and Environmental Hydrology (BEEH), University of Kwa-Zulu Natal, RSA
- Ministry Agriculture, Grenada
- Sokoine University of Agriculture (SUA), Tanzania - www.suanet.ac.tz
- Centre for Ecology & Hydrology (CEH), Wallingford, UK - www.ceh.ac.uk
- Grenada Forestry Department -www.sidsnet.org
- Working for Water Programme (DWAF), South Africa - www.dwaf.pwv.gov.za/wfw
- Department of Anthropology, University of Durham, UK - www.dur.ac.uk/anthropology
- Centre for Ecology and Hydrology (CEH), Wallingford , UK

R8171 Forestry and low flows, spatial modelling and open GIS dissemination of the science perception - India

Partners / Collaborators:

- Indian Institute of Technology (IIT), New Delhi - www.iitd.ernet.in
- Winrock India International -www.winrockindia.org
- Regional Engineering College, Hamirpur, India - recham.ernet.in/info3.htm
- Resources Development Division, Regional Research Laboratory (CSIR), Bhopal, India

R8174 Socio-economic Opportunities from Upland Catchment Environmental Services: A Negotiation Support System

Partners / Collaborators:

- Environmental Economics Programme (EEP), International Institute for Environment and Development (IIED), UK.
- Centro Internacional de Política Económica (CINPE), Universidad Nacional de Costa Rica.
- Instituto Tecnológico de Costa Rica
- Winrock International India

In association with:

R7991 Hydrological impacts of converting tropical montane cloud forest to pasture, with initial reference to northern Costa Rica.

- Tropical Environmental Hydrology Programme, Faculty of Earth and Life Sciences, Vrije Universiteit (VUA), Amsterdam, the Netherlands - www.geo.vu.nl/~geomil
- Technological Institute of Costa Rica, Cartago, Costa Rica - www.itcr.ac.cr
- Remote Sensing and Geographical Information Systems Lab, Universidad Nacional de Costa Rica, Heredia, Costa Rica - www.una.ac.cr
- AmbioTEK Consultancy, c/o Dept of Geography, Kings College, London - www.kcl.ac.uk/kis/schools/hums/geog/deptres.htm
- Institute of Geography, University of Bern, Switzerland - www.giub.unibe.ch

4. Describe the RNRRS output or cluster of outputs being proposed and when was it produced? (max. 400 words). This requires a clear and concise description of the output(s) and the problem the output(s) aimed to address. Please incorporate and highlight (in bold) key words that would/could be used to select your output when held in a database.

The aim of the project cluster was to provide a sound basis for incentives for forest and land management in upper water catchments, to improve local livelihoods and to meet needs of downstream users.

Key outputs produced under FRP-FLOWS cluster:

- i) Better knowledge of the **bio-physical** and **socio-economic** impacts of changing land use on a notional altitudinal gradient from the cloud forests of Costa Rica to the semi-arid zone of India.
- ii) Validation of the HYLUC, SWAT and ACRU hydrological models in partner countries and development of the EXCLAIM dissemination tool and 'Quadrant' methodologies to assist **sustainable catchment management**.
- iii) Green/Blue water policy briefs which are influencing DWAF policies in South Africa.
- iv) Policy briefs for Costa Rica (R7991/R8174) which highlight some of the previous misconceptions on which past **payment for environmental services** schemes have been based and introduce caution in relation to assumptions about the necessary poverty alleviation benefits of such schemes.
- v) Workshops with ministers in Karnataka, MP and HP in India which are influencing policy in relation to **watershed management**.
- vi) Dissemination of research findings through journal papers and populist books including 'From the mountain to the tap' and 'Blue Revolution' which, through coverage in more than 50 national newspapers

and radio programmes and interviews, is leading to a major revision of land and water policy and watershed policy by national governments and donors (including the World Bank) and the creation of a new IUFRO task force on Forest and Water Interactions (Prof. Ian Calder to lead).

Key outputs proposed under the Furthering land And Water Policy –Improving Outcomes (FAWPIO- RIUP) programme, which will aim to introduce more **evidence based, sustainable** (with a demand management focus rather than increased provision of supply) and **equitable land management policies**, are:

- i) **Green/Blue ILWRM management tools piloted and tested** in partner countries (Initially India, China, RSA)
- ii) **Green/Blue ILWRM management tools further refined** using pilot outcomes in partner countries (In RSA this could involve integration of the Allocation Equity and Quadrant approaches)
- iii) **Bridging Research and Policy (BRAP)** activities including sharing knowledge and experiences of management tools and methodologies and policy instruments between African and Asian partner countries which may lead to revision and better planning of large scale afforestation schemes (e.g. 31,000,000 ha SLCP in China and possible 21,000,000 jatropha schemes in India),
- iv) **International Dissemination** (based also on results of piloting) of Green/Blue ILWRM management approach to national governments, donor and international organisations: World Bank, DFID, Aga Khan Foundation, WWF, IUFRO, UNFCCC, EU; also through Electronic Journal: Land Use and Water Resources Research.

5. What is the type of output(s) being described here?

Please tick one or more of the following options.

Product	Technology	Service	Process or Methodology	Policy	Other Please specify
				X	

6. What is the main commodity (ies) upon which the output(s) focussed? Could this output be applied to other commodities, if so, please comment

Water, sustainable agriculture and forestry production

7. What production system(s) does/could the output(s) focus upon?

Please tick one or more of the following options. Leave blank if not applicable

Semi-Arid	High potential	Hillsides	Forest-Agriculture	Peri-urban	Land water	Tropical moist forest	Cross-cutting
					X		X

8. What farming system(s) does the output(s) focus upon?

Please tick one or more of the following options (see Annex B for definitions).

Leave blank if not applicable

Smallholder rainfed humid	Irrigated	Wetland rice based	Smallholder rainfed highland	Smallholder rainfed dry/cold	Dualistic	Coastal artisanal fishing
X	x		x	x		

9. How could value be added to the output or additional constraints faced by poor people addressed by clustering this output with research outputs from other sources (RNRRS and non RNRRS)? (max. 300 words). Please specify what other outputs your output(s) could be clustered. At this point you should make reference to the circulated list of RNRRS outputs for which proformas are currently being prepared.

Improved land and water policies, benefiting all sectors and particularly the rural and landless poor, can best be achieved through building on a number of research outputs. The proposed FAWPIO RIUP programme will pilot, take forward, disseminate and help implement, important research findings obtained from decades of research carried out under DFID FRP, KAR and NRSP.

More specifically the intellectual basis of FAWPIO and the core linkages are derived from outputs and associations with the following key projects:

- FRP, ZF0176 cluster of projects on forest and water interactions,
- KAR: WHIRL
- TC projects: India (KAWAD, APRLP, WORLP)
- Donor programmes providing support to DWAF including the DFID Water and Forestry Support Programme (WFSP).

Of particular relevance is the 'Allocation Equity' mechanism developed under WFSP and 'Green Water' policy instruments developed under R7937 in consultation/collaboration with DWAF. These instruments contribute to and add value to the FAWPIO methodologies. The FAWPIO programme will also build on the GEF funded Hai Basin 'ET Management' project in China (essentially an ongoing example of a Green Water policy instrument in action) and links with the Chinese Academy of Forestry established through the IUFRO task force on Forest and water interactions. (Prof. Shirong Liu, Vice President of the Chinese Academy of Forestry and Deputy Task Force leader).

The FAWPIO programme may benefit from linkages with other RIUP clusters and this possibility will be investigated as and when these clusters become known.

Synergies will also accrue through linkages and dissemination routes provided by other non- DFID funded initiatives:

- The IUFRO task force on forest and water interactions,
- The SEI-SIWI Green-Blue Initiative
- The EU funded RE- Impact project which will be developing an impact assessment framework (societal, biodiversity, water resource) associated with energy plantations in China, India, South Africa and Uganda.

Validation

B. Validation of the research output(s)

10. How were the output(s) validated and who validated them?

Please provide brief description of method(s) used and consider application, replication, adaptation and/or adoption in the context of any partner organisation and user groups involved. In addressing the “who” component detail which group(s) did the validation e.g. end users, intermediary organisation, government department, aid organisation, private company etc... This section should also be used to detail, if applicable, to which social group, gender, income category the validation was applied and any increases in productivity observed during validation (max. 500 words).

How were the outputs validated?

The more generic outputs from the FRP-FLOWS cluster of projects (country specific outputs are given under question 12) comprising:

- Better knowledge of the bio-physical and socio-economic impacts of changing land use and forest cover leading to more evidenced based policies for watershed management and payments for environmental services;
- Improved validation of hydrological models;
- Development of land and water management methodologies (including the EXCLAIM dissemination tool and ‘Quadrant’ methodologies);
- Green/Blue water policy briefs which are influencing DWAF policies in South Africa;
- Policy briefs for Costa Rica which (in conjunction with outputs from R7991) highlight some of the past misconceptions on which past payment for environmental services schemes have been based and introduce caution in relation to assumptions about the necessary poverty alleviation benefits of such schemes;
- Policy developments in Grenada leading to benefits to upland farmers;

have international relevance and have been validated in the sense that the outputs can be shown to have contributed to new policy developments of national governments, international organisations and bilateral and international donor organisations. Furthermore there is a continuing and growing interest in these outputs as evidenced by requests for invitations for keynote addresses and invited papers and publications and follow-on research programmes.

Who has validated?

Within Country

Within the partner countries FRP-FLOWS outputs (methodologies, tools, policy recommendations) have been presented, discussed and ‘validated’ at key events including:

National Workshops, meetings with Ministers/ Principal Secretaries

- Himachal Pradesh - 'Towards Implementing Environmentally Sustainable Water Policy for Himachal Pradesh', 28 August, 2004. Attended by Shri Virbhadra Singh, the Chief Minister of HP, and Thakur Kaul Singh, Irrigation and Public Health Minister HP, and more than 100 participants connected with watershed and water resources development. The meeting produced a number of consensual recommendations for action in HP (R8171 Policy Brief 3).
- Madhya Pradesh – 'Towards Implementing Sustainable Watershed Management Strategy for Madhya Pradesh, 6-7 February 2006. Attended by the Chief Minister, Shivraj Singh Chouhan, the Minister for Panchayat and Rural Development, the Secretary for Panchayat and Rural Development, Shri Narendra Singh Tomar, the Chairman of the Central Groundwater Board and more than 300 other participants.
- Karnataka, KAWAD Conference, Bangalore, India, 21-22 Jan 2003
- Karnataka, - Government of Karnataka, Watershed Development Project: 'National Workshop on Priorities for watershed management in India' as part of Sujala Watershed Project. 22-23 May 2006, Attended by Minister for Agriculture Bandeppa Kashempur, and Mr S Parthasarathy, Chairman, National Commission for Watersheds in India.
- South Africa – 'Invasive Alien Species'. Symposium on Policies and Implementation. Kirstenbosch Botanical Gardens, Cape Town. 22-24 February 2000

11. *Where and when have the output(s) been validated?*

Please indicate the places(s) and country(ies), any particular social group targeted and also indicate in which production system and farming system, using the options provided in questions 7 and 8 respectively, above (max 300 words).

The outputs have been validated (in the sense that the outputs can be shown to have contributed to new policy developments of national governments, international organisations and bilateral and international donor organisations) through dialogue at a number of international meetings and workshops:

International meetings

- Marcus Wallenberg Prize Symposium: Water, Forests and People Stockholm, Sweden, September 27, 2002
- SIWI water week Keynote address, 2003
- FAO international workshops "Preparing the Next Generation of Watershed Management Programmes" :
 - FAO/ICIMOD, Kathmandu, Nepal 11-13th Sept 2003
 - FAO/ICRAF, Nairobi, October 2003
 - FAO International Conference: Integrated Watershed Management: Water Resources for the Future, Porto Cervo, Sassari, Sardinia, Italy, 22 - 24 October 2003

(The FRP-FLOWS research outputs were given extensive coverage in the FAO Forestry paper 150: The new generation of watershed management programmes and projects <http://www.fao.org/docrep/009/a0644e/a0644e00.htm>)

- COFO - Committee on Forestry (FAO), Rome, 10-14 March 2003
- Katoomba group meeting, 2003
- Marcus Wallenberg Prize Symposium, 2002
- International Expert meeting on Forests and Water, Shiga, Japan, 20 - 22 November 2002
- World Bank Watershed Management Workshop, Washington DC, Feb, 2005
- Chinese Academy of Forestry, IUFRO – ‘Forest and Water in a changing Environment’ Beijing China, 8-10 August 2006
- International Congress on Cultivated Forests Planted Forests and Sustainable Development 3-7 October, Bilbao, Spain
- Science for Nature Symposium, Washington, DC, October 31 - November 1, 2006

Current Situation

C. *Current situation*

12. *How and by whom are the outputs currently being used? Please give a brief description (max. 250 words).*

The outputs (improved understanding of the biophysical and socioeconomic impacts of land use change and improved policies for land and water management) are currently being taken up by in-country government departments through various mechanisms:

- A ‘green water’ policy instrument to contribute to the implementation of the Streamflow Reduction Activities (SFRA) policy – **DWAF, South Africa**
- Greater understanding of livelihood responses and opportunities in relation to improved water supplies above the Human Needs Reserve and ‘Schedule 1 uses’ – **DWAF, South Africa**
- A socio-economic evaluation of the Working for Water programme contributing to a comprehensive internal review process – **WfW, South Africa**
- Development of an innovative land care mechanism for poor upper catchment farmers funded by reduced downstream water treatment costs- **Government of Grenada**
- Implementation of an environmental fund linking downstream users (tourism, industry) of improved flow regimes to upstream management - **Government of Grenada**
- The National water policy review was influenced and informed by the insights developed by R7937 in collaboration with South African policy partners- **Government of Tanzania**
- A more evidence-based understanding of the opportunities and constraints of payments for environmental services as a poverty reduction strategy – **Government of Costa Rica**
- Promotion and advocacy of new knowledge of the bio-physical processes which determine

how forests and other land use influences seasonal flows – **State governments -India**

- Greater understanding of institutional perceptions and constraints relating to the role of forests and water in watershed management and impacts on the poor - **State governments - India**

*13. **Where** are the outputs currently being used? As with Question 11 please indicate place(s) and countries where the outputs are being used (max. 250 words).*

Together with in-country users (see above) the outputs are also being used, considered or debated by many other government departments, international organisations, academic organisation and donor funded development projects throughout the world. Of particular note are the following:

Donor funded development projects

- The Government of Karnataka is to use the 'Rapid Quadrant' approach to assist with the design of new interventions on 100 watersheds in support of two (each \$200,000,000) watershed development projects funded by the World Bank.
- The EU funded RE-Impact project will make use of EXCLAIM and Quadrant methodologies as part of an impact assessment methodology being developed for proposed energy plantations in Uganda, South Africa, India and China.
- Discussions have been held with Government departments in Orissa, Himachal Pradesh and Madhya Pradesh to take forward and include FRP-FLOWS outputs within Rural Livelihood Projects.

International Organisations

- The International Union of Forest Research Organisations (IUFRO), recognising the importance of the issues raised in the DFID booklet 'From the Mountain to the Tap' and the Earthscan book 'Blue Revolution', has commissioned an international task force on forest and water interactions (Ian Calder to lead).
- Research outputs included in the CGIAR 'Comprehensive Assessment of Water Management in Agriculture' prepared by IWMI.
- Research outputs contributed to the FAO initiative: The Next Generation of Watershed Management Initiative and Sassari Declaration.
- Research included within the SEI and SIWI Green Blue Initiative.
- Research outputs and EXCLAIM tool included in the Asia Regional Biodiversity Conservation

Program, Winrock-USAID.

14. What is the scale of current use? Indicating how quickly use was established and whether usage is still spreading (max 250 words).

To date perhaps the most significant and largest scale example of FRP-FLOWS outputs influencing policy (and an external donor, the World Bank) which has resulted in changes 'on the ground', is in relation to the incorporation of FAWPIO methodologies and the Quadrant approach within two \$200,000,000 watershed development projects underway in Karnataka, funded by the World Bank.

The FRP-FLOWS outputs have also contributed to greater discussion and consideration of Payments for Environmental Services mechanisms by many projects and organisations including RUPES, IIED and the Government of Costa Rica, to ensure that the mechanisms are grounded in an evidence based understanding of the relationship between forests and water flows.

Discussion are also currently underway with other Indian watershed development projects in MP and Orissa, in India and the Hai basin project in China and with USAID funded projects in Vietnam.

What is hindering take-up is the present shortage of piloted examples of the FRP-FLOWS methodologies in action within development projects in different parts of the world.

15. In your experience what programmes, platforms, policy, institutional structures exist that have assisted with the promotion and/or adoption of the output(s) proposed here and in terms of capacity strengthening what do you see as the key facts of success? (max 350 words).

The key programmes, platforms, policy, institutional structures that have assisted with the promotion and/or adoption of the outputs include:

- FRP Management and contacts with international organisations and through fostering synergies with other FRP projects including the IIED watersheds project
- The close links of some research partners with government departments and with policy developments. In RSA Jan Bosch, counterpart and collaborator under CAMP (R7937) was instrumental and a part author of the National Water Act and the 'Stream Flow reduction Activity' policy instrument and was active in the development/promotion of Green and Blue water concepts and the Green and Blue water policy brief within DWAF.
- The high research status and profile of IIT Delhi as a research partner under R8171 which has gained entry and credibility within the highest levels of national and state governments within India.
- Interest, acceptance and promotion by the World Bank of FRP-FLOWS methodologies both internationally and through invitations to link FRP- FLOWS research with ongoing World Bank watershed development projects in Karnataka.

- Interest, acceptance and promotion by the World Bank of FRP-FLOWS methodologies both internationally and through invitations to link FRP-FLOWS research with World Bank programmes in connection with proposals to afforest the Panama Canal Watershed (presented at the World Bank , Watershed Management Workshop, Washington DC, Feb 2005)
- The electronic journal: Land Use and Water Resources research, with more than 3000 registered readers worldwide
- Recent links with IUFRO through the International Task Force
- Recent, high level, links with the Chinese Academy of Forestry
- Links with Waternet (for the SADC region)
- Links with SEI-SIWI and through SIWI Water week meetings and Keynote presentations
- Recent requests for presentation of FRP-FLOWS findings at the Kathryn Fuller meeting organised by WWF, The Nature Conservancy and Stanford University
- Media, letters articles in Economist, Washington Post, New Scientist, radio programmes and interviews together with reports in more than 50 national newspapers following the DFID FRP publication of 'From the mountain to the tap'.

Current Promotion

D. Current promotion/uptake pathways

16. Where is promotion currently taking place? Please indicate for each country specified detail what promotion is taking place, by whom and indicate the scale of current promotion (max 200 words).

Promotion and development of the FRP-FLOWS outputs is ongoing in all the original FRP-FLOWS partner countries and has been extended, through links with other partner organisations, throughout the world.

Some specific examples include:

R7937 CAttachment Management and Poverty (CAMP)

- CSIR-Environmentek, South Africa – Quadrant and EXCLAIM methodologies will be used in conjunction with Bio-Energy assessment programmes in South Africa;
- School of Bio-resources Engineering and Environmental Hydrology (BEEH), University of Kwa-Zulu Natal, RSA - developing Green water policy instruments and using the EXCLAIM tool as part of undergraduate

teaching;

- DWAF, South Africa - promoting green water policy instruments as part of the Water Allocation Reform process;

R8171 Forestry and low flows, spatial modelling and open GIS dissemination of the science perception

- Indian Institute of Technology (IIT), New Delhi – applying FRP-FLOWS methodologies in Rural Livelihoods projects in Orissa and Madhya Pradesh;
- Winrock India International – Applying FRP-FLOWS methodologies for the assessment of the societal impacts of jatropha, bio-energy plantations in India;

R8174 Socio-economic Opportunities from Upland Catchment Environmental Services: A Negotiation Support System

- Environmental Economics Programme, International Institute for Environment and Development - applying new knowledge gained under R8174 to PES projects worldwide

17. What are the current barriers preventing or slowing the adoption of the output(s)? Cover here institutional issues, those relating to policy, marketing, infrastructure, social exclusion etc. (max 200 words).

The current barriers preventing the swift adoption of FRP-FLOWS research outputs, in terms of new knowledge, methodologies, tools and proposed policy instruments, into national and international policies can be considered within the context of the ODI RAPID Framework.

Barriers currently exist in all of the four areas of the framework:

- **Context: Politics and Institutions** – Political contestation, institutional pressures and vested interests dominate watershed management policies in all partner countries and throughout the world. The ‘sanctioned discourse’ in relation to the benefits accruing from, and the success of, current watershed policies is evident amongst most actors, including government departments, NGO and donors. This needs to change if new methodologies and policies are to be adopted.
- **Evidence: Approach and Credibility** - In many partner countries both the motives and credibility of the donors and donor funded researchers will be regarded with suspicion until improvements can be shown ‘on the ground’.
- **Links: Influence and Legitimacy** – In some partner countries there are poor links between the research community and policymakers.
- **External Influences** - In many cases external donors are unwilling to consider the evidence which indicates that a major revision of watershed policies are required if more pro-poor benefits are to be achieved.

18. What changes are needed to remove/reduce these barriers to adoption? This section could be used to identify perceived capacity related issues (max 200 words).

To remove/reduce the barriers to the adoption of FRP-FLOWS outputs requires further efforts in all four areas of

the RAPID frameworks:

- **Context: Politics and Institutions** – We have carried out studies to understand the political structures/ processes, institutional pressures, prevailing concepts and beliefs in relation to catchment management and the narratives on which they are based – and the difference between the public and science perceptions in both India and Costa Rica.
- **Evidence: Approach and Credibility** - A major effort is required to demonstrate at the pilot scale that FRP-FLOWS methodologies focussed on the long term sustainability of the resource will achieve more equitable (in terms of water allocation) and more pro-poor outcomes together with environmental, and water resource (catchment closure avoidance) benefits in water related development projects, rural livelihood projects and watershed development projects in India, China and South Africa.
- **Links: Influence and Legitimacy** – the IUFRO task force on Forest and Water Interactions and the ‘free to user’ web based journal: Land Use and Water Resources Research will be powerful mechanism for disseminating FRP-FLOWS outputs and the results of pilot studies.
- **External Influences** - Continued efforts will be necessary to influence international donors.

19. What lessons have you learnt about the best ways to get the outputs used by the largest number of poor people? (max 300 words).

To effectively get research outputs, in terms of new knowledge, methodologies, tools and proposed policy instruments, incorporated into national and international policies **to benefit the largest number of poor people** requires a systematic understanding of what, when, why and how research outputs can feed into development policies.

The FRP-FLOWS projects have worked with the ODI’s Research and Policy in Development (RAPID) programme, and have adopted the RAPID framework as a mechanism for understanding and improving research-policy links.

The FRP-FLOWS projects have aimed to understand/target activities in each of the four RAPID framework areas which are needed for successful adoption of research into policy:

- **Context: Politics and Institutions** – We have carried out studies to understand the political structures/ processes, institutional pressures, prevailing concepts and beliefs in relation to catchment management and the narratives on which they are based – and the difference between the public and science perceptions in both India and Costa Rica.
- **Evidence: Approach and Credibility** - To ensure credibility of the science we have aimed to publish research findings and new methodologies in respected Scientific Journals.
- **Links: Influence and Legitimacy** – We have endeavoured to develop links between policy makers and

researchers in each of the partner countries and to use other mechanisms, the IUFRO task force on Forest and Water Interactions and the 'free to user' web based journal: Land Use and Water Resources Research with more than 3000 registered readers worldwide, as further mechanism to connect researchers and policymakers.

- **External Influences** - We have made specific attempts to influence not only within country government departments but also international donors that can exert influence on catchment management and watershed development. The World Bank has been particularly receptive to the FRP-FLOW outputs in relation to the watershed development projects that it finances in India.

Impacts On Poverty

E. Impacts on poverty to date

20. Where have impact studies on poverty in relation to this output or cluster of outputs taken place? This should include any formal poverty impact studies (and it is appreciated that these will not be commonplace) and any less formal studies including any poverty mapping-type or monitoring work which allow for some analysis on impact on poverty to be made. Details of any cost-benefit analyses may also be detailed at this point. Please list studies here.

Impact studies in relation to poverty have been carried out in the following cluster projects:

ZF016 Mustoor, Karnataka, India. A socio-economic, water user typology study was carried out in conjunction with the World Bank funded Sujala watershed development project to determine who were the winners and who were the losers from watershed interventions carried out over the last 20-25 years. May – Dec 2005. Reported in: Calder IR, Gosain, A, Rama Mohan Rao MS, Batchelor C, Snehalatha Bishop E, 2006 Watershed development in India. 1. Biophysical and societal impacts. Environ Dev Sustain (in Press)

R7937 CAttachment Management and Poverty (CAMP)

Livelihoods research, following the Sustainable Livelihoods framework was conducted in the Luvuvhu catchment between September 2001 and October 2003 to understand the role of water in the livelihoods of the poor as a means to informing equitable and efficient water resource allocations and the development of pro-poor land use and water related policies in South Africa.

R8171 Forestry and low flows, spatial modelling and open GIS dissemination of the science perception - India The social impacts of watershed development was evaluated using a propensity score matching method – Dudhi watershed, Madhya Pradesh, 2005.

R8174 Socio-economic Opportunities from Upland Catchment Environmental Services: A Negotiation Support System. A livelihoods analysis was carried out in the Arenal watershed, Costa Rica to determine if payments for environmental services can contribute to poverty reduction.

21. Based on the evidence in the studies listed above, for each country detail how the poor have benefited from the application and/or adoption of the output(s) (max. 500 words):

- *What positive impacts on livelihoods have been recorded and over what time period have these impacts been observed? These impacts should be recorded against the capital assets (human, social, natural, physical and, financial) of the livelihoods framework;*
- *For whom i.e. which type of person (gender, poverty group (see glossary for definitions) has there been a positive impact;*
- *Indicate the number of people who have realised a positive impact on their livelihood;*
- *Using whatever appropriate indicator was used detail what was the average percentage increase recorded*

Various livelihoods studies have been carried out which indicate deficiencies in current land use/watershed management policies as they impact on the poor. The new FRP-FLOWS methodologies have yet to be piloted in development projects so it is too early to detect or claim poverty benefits. Results highlighted by the livelihood studies are:

ZF016 India Water user typology:

Whole Village

- Benefited from injection of cash into village economies for structural watershed interventions
- Competition for water resources has reduced reliability of domestic water supply.

Landless and resource poor households

- Benefit from wage labour for structural interventions
- Otherwise few benefits - members do not own land - unable to borrow for borewell construction.
- This group, heavily reliant on livestock, is disadvantaged because of reduced access to grazing and reduced tank inflows for watering livestock.
- Groundwater drought, failure of rainfed cropping increases pressures for migration.

Landowners and resource rich during periods of good rainfall.

- Benefit from agricultural intensification during 'boom' years before falling groundwater levels.
- Group at most risk of falling into poverty as a result of failed investments in borewell construction - farmer suicides relatively common in this group.

Land owners and resource rich at all times

- Benefit most from agricultural intensification.
- Timely investments/luck in constructing borewells has enabled consolidation of wealth and diversification out of agriculture.
- Diversification has reduced dependency on access to water.

R7937 Livelihoods research:

- An evaluation for Working for Water highlighted limited pro-poor impacts.
- Poor households may gain little benefit from improved streamflow due to lack of other assets (irrigation pumps, riparian land, livestock).

- Water resource allocation to small-scale irrigation schemes increases inequalities between households at the community and catchment scale.
- High economic returns are generated by 'water-rich' farmers who can irrigate.
- Female-headed households have inequitable access to irrigation.
- Rural households are unlikely to use increases in the Basic Human Needs Reserve for productive purposes until associated constraints are relaxed, i.e. market demand, credit, elite capture and capacity.

R8171 A propensity score matching method showed the following impacts of watershed development (Dudhi):

- Kharif farmers - no income benefit, lowest income quartile reporting a small loss.
- Rabi crop income gains have benefited bottom and top income quartiles.
- With only 14% of the watershed irrigated, income benefits are uneven and captured by few poor households.

R8174 The study raised a number of dangers in relation to PES programmes in Costa Rica:

- Creation of market distortion that promotes land speculation.
- Land evictions of the poor as wealthier elites are provided with incentives to gain control of land resources.
- Where small farmers hold land only through squatters' rights the lack of legal documents of tenure makes it difficult to enter into PES agreements and increases vulnerability to land forfeiture.
- The poor are more often located in the lower rather than upper parts of the catchment
- Environmental services perceptions are currently often based on misconceptions rather than science.

Environmental Impact

H. Environmental impact

24. What are the direct and indirect environmental benefits related to the output(s) and their outcome(s)? (max 300 words)

This could include direct benefits from the application of the technology or policy action with local governments or multinational agencies to create environmentally sound policies or programmes. Any supporting and appropriate evidence can be provided in the form of an annex.

Environmental benefits include: improved environmental flows, avoidance of catchment closure, climate mitigation through reduced use of fossil fuels in electric power generation for pumping groundwater.

Present land and water developmental policies are generally aimed at maximising production or pro-poor benefits and have often paid less attention to the impacts changing land use may have on water availability, environmental flows and the impacts on downstream users. In arid areas, where water is already scarce, this can not only have profound impacts on more vulnerable groups but land use changes can result in rivers drying out completely for long periods and significant impacts on the functioning of aquatic ecosystems.

In some southern Indian States it has been estimated that as much as one half of all the electricity generated is

being used for pumping groundwater, from ever greater depths, for irrigation purposes. More sustainable land and water policies which regulate the abstraction of groundwater would potentially enable a huge reduction in the consumption of electricity and a corresponding reduction in the use of fossil fuels.

FAWPIO will work towards more sustainable and more environmentally responsive water policies. The potential magnitude of the environmental problems associated with present land and water policies are exemplified by the Hai basin in China.

The Hai basin is one of the 7 largest river basins in China containing 10% of China's population, including Beijing and Tianjin and is one of the most important food-producing zones. It is currently experiencing major problems with water resources and pollution. Groundwater is over exploited causing declines in water table levels and subsidence of the land surface (2 meters in the Cangzhou area). The Hai is the most severely polluted river in China. Increased use of water for agriculture and industry has reduced flows to the ecologically sensitive Bohai Sea (Calder, 2005).

25. Are there any adverse environmental impacts related to the output(s) and their outcome(s)? (max 100 words)

The promotion of Integrated Land and Water Resource Management (ILWRM) policies, which aim to ensure sustainable water use, equity of allocation and ensured flows to downstream users to meet basic human needs are fully commensurate with the objectives of ensuring and maintaining environmental flows. Indeed some of the concepts underlying ILWRM were driven by environmental considerations. We see no adverse environmental impacts associated with the implementation of the FAWPIO programme.

26. Do the outputs increase the capacity of poor people to cope with the effects of climate change, reduce the risks of natural disasters and increase their resilience? (max 200 words)

The FAWPIO programme and the adoption of improved land and water policies will increase the capacity of poor people to cope with the effects of climate change, reduce the risks of natural disasters and increase their resilience through a number of mechanisms including:

- Increased availability of water – this will be even more beneficial if global climate change results in locally decreased average rainfall.
- Increased availability of water will be of value in maintaining water supplies in drought periods (even in the absence of climate change).
- The maintenance of flows for basic human needs and environmental flows will have resilience value in supporting both human, livestock and ecological requirements in times of natural disaster.

From Gavin Quibell, Ash Seetall (DFID –WFSP South Africa, DWAF South Africa, 20/11/2006):

“However, promoting green water use holds particular risks associated with climate change, where decreased and more variable rainfall may impact on the viability of soil water conservation measures and farm ponds. As such, we would be very interested in supporting a project looking at green water allocations in one of our pilot catchments, either the Inkomati WMA (or a portion of it), or the Mhlathuze catchment.”

