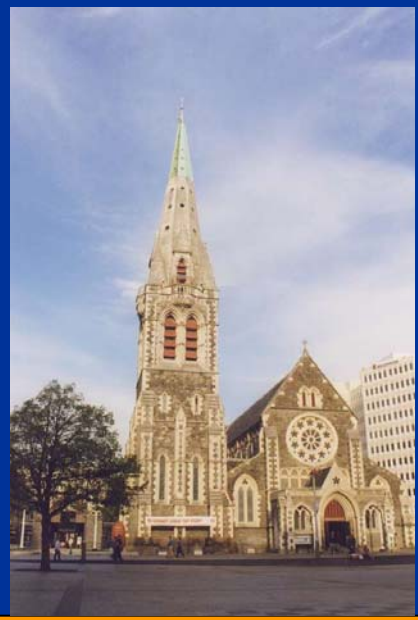
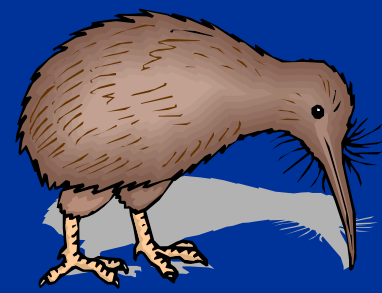
nz landcare trust
ngā matapopore
whenua

HELP South Pacific SYMPOSIUM 2005



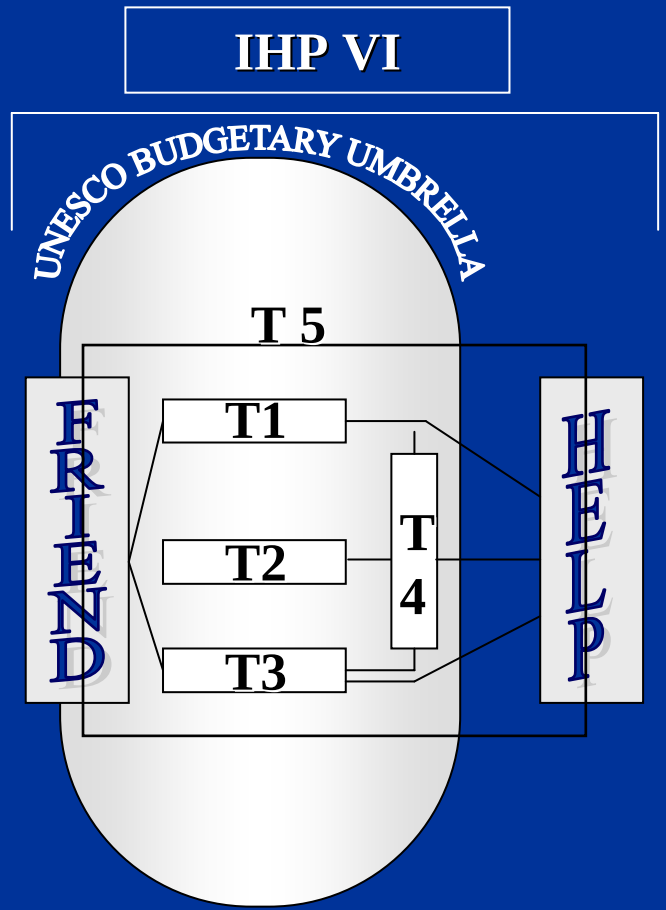


Hydrology for the Environment, Life and Policy

http://www.unesco.org/water/ihp/help

To deliver social, economic and environmental benefit to stakeholders through sustainable and appropriate use of water by directing hydrological science towards improved integrated catchment management basins

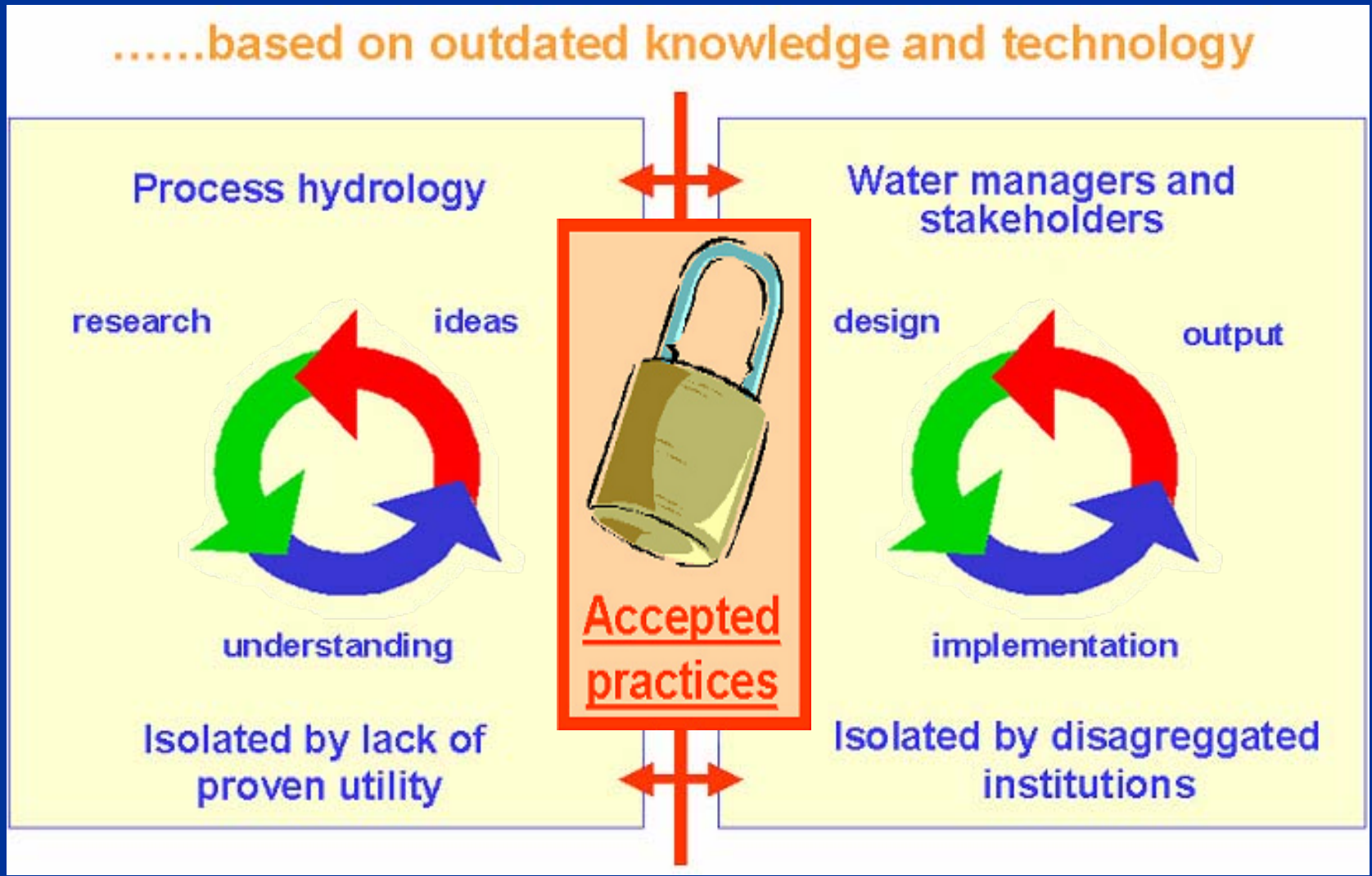
Real people	Real catchments	Real answers



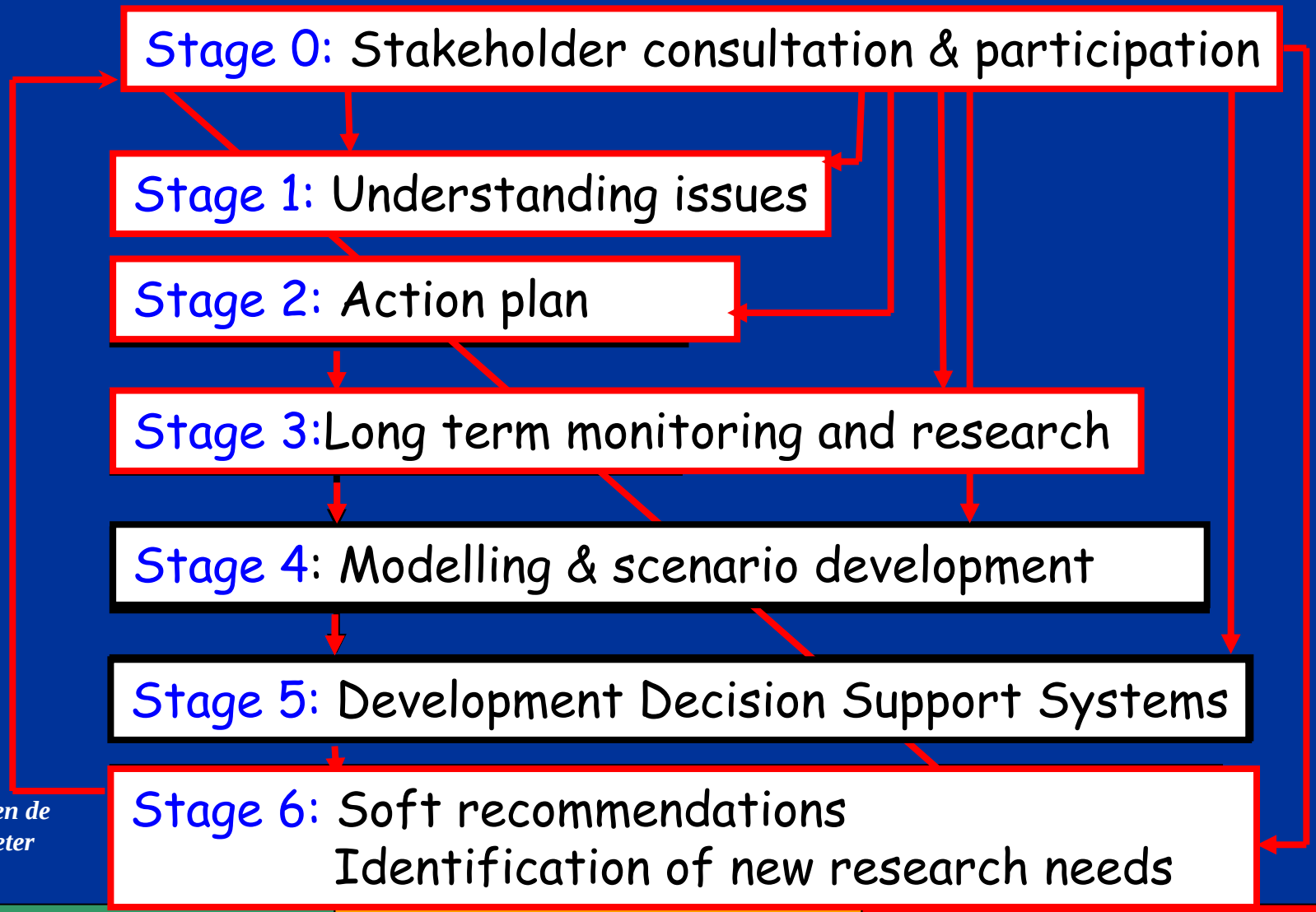
HELP is an integral cross cutting activity of the UNESCO International Hydrological Programme

Theme 1 (T1)	*Global Changes and Water Resources*
Theme 2 (T2)	*Integrated Watershed and Aquifer Dynamics*
Theme 3 (T3)	*Land Habitat Hydrology*
Theme 4 (T4)	*Water and Society*
Theme 5 (T5)	*Water Education and Training*

"Paradigm Lock"



Breaking the vicious cycle in integrated project management



From Carmen de Jong with Peter Herbertson

HELP

1-8 June 1994,

Honiara,

Solomon Islands

Proceedings of UNESCO/SOPAC/UNDDSMS Workshop

Pacific Water Sector Planning, Research and Training

SOPAC
South Pacific Applied Geoscience Commission

UNESCO
United Nations Educational, Scientific and Cultural Organization

International Hydrological Programme

UN/DDSMS

Project 1 **<u>Catchment study on a high volcanic island to:</u>**

- Collect baseline water balance data for watershed management
- Evaluate impacts of different land use practices (e.g. deforestation and mining) on water quality and quantity;
- Preferred Location: Solomon Islands;
- Alternative Location: Western Samoa

Project 2 **<u>Water management study of a freshawater lens on a low lying coral island to:</u>**

- Collect baseline water balance data
- Quantify the interception and evapotranspiration components;
- Assess groundwater recharge from water balance and groundwater table movement data
- Preferred Location: Kiribati;
- Alternative Location: Tuvalu

Project 3 **Groundwater pollution transport study to:**

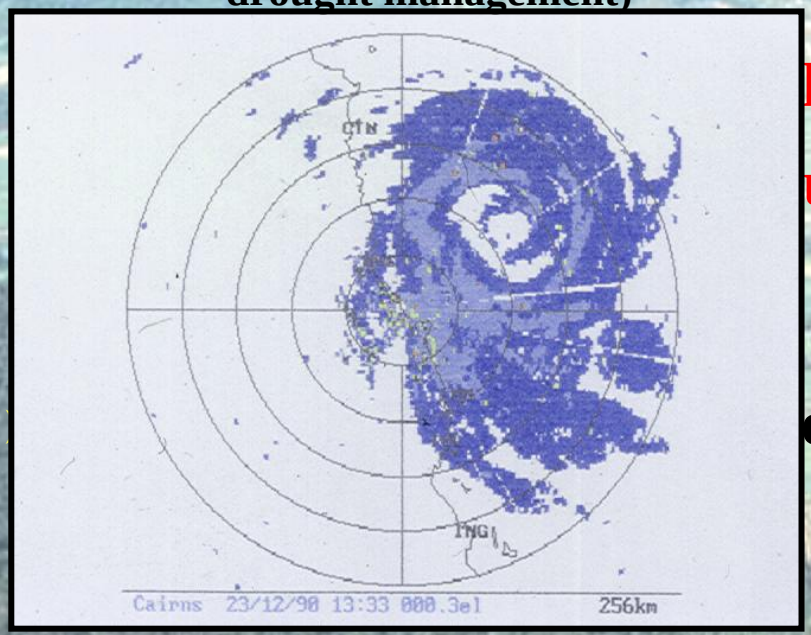
- Investigate the linkage between water supply and sanitation/waste disposal sites;
- Develop guidelines for use by islands and aid donors for appropriate sitting and spacing between water supply and sanitation/waste disposal sites;
- Preferred Location: Tonga;
- Alternative Location: Niue

Policy Issues

- Impacts of climate variability and change on water resources *
- Water use in providing food for a growing population.

*Note: includes water-related disaster prevention and mitigation (flood control and drought management)

potential conflicts.



An experimental catchment framework for studying important and locally appropriate hydrological processes

- Key areas of scientific research –
  - Hydrological variability and change
  - Biophysical processes that control movement of water between different elements of the landscape
  - **Hydro-chemical pathways and processes controlling the fate and transport of pollutants**
  - Contribute toward the development and application of global models and remote sensing

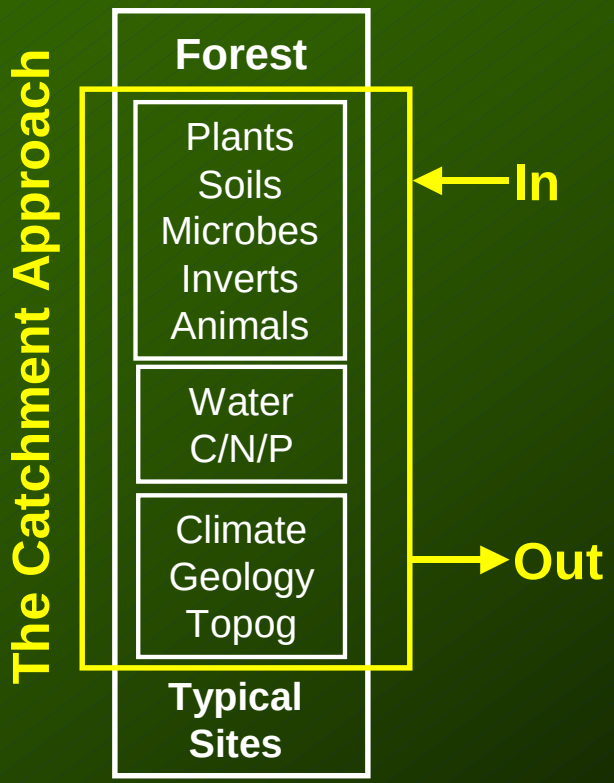
Examples of scientific issues to be addressed

- Status of modeling has surpassed field testing
- Experimental hydrology focused on microscale
- Limited number of field experiments to address process hydrology at mesoscale
- Need for a paradigm shift towards a cross-disciplinary approach is required between surface water-groundwater-freshwater biology/ecohydrology.
- Water quality – process hydrology linkage
- Need to filter human impacts from climate variability on the hydrology of landscapes
- Interannual – long-term experimental hydrology data sets to address extremes
- Impacts of declining support for long-term monitoring

Approach 1/3

The Simple Catchment Approach

The Ecosystem Approach

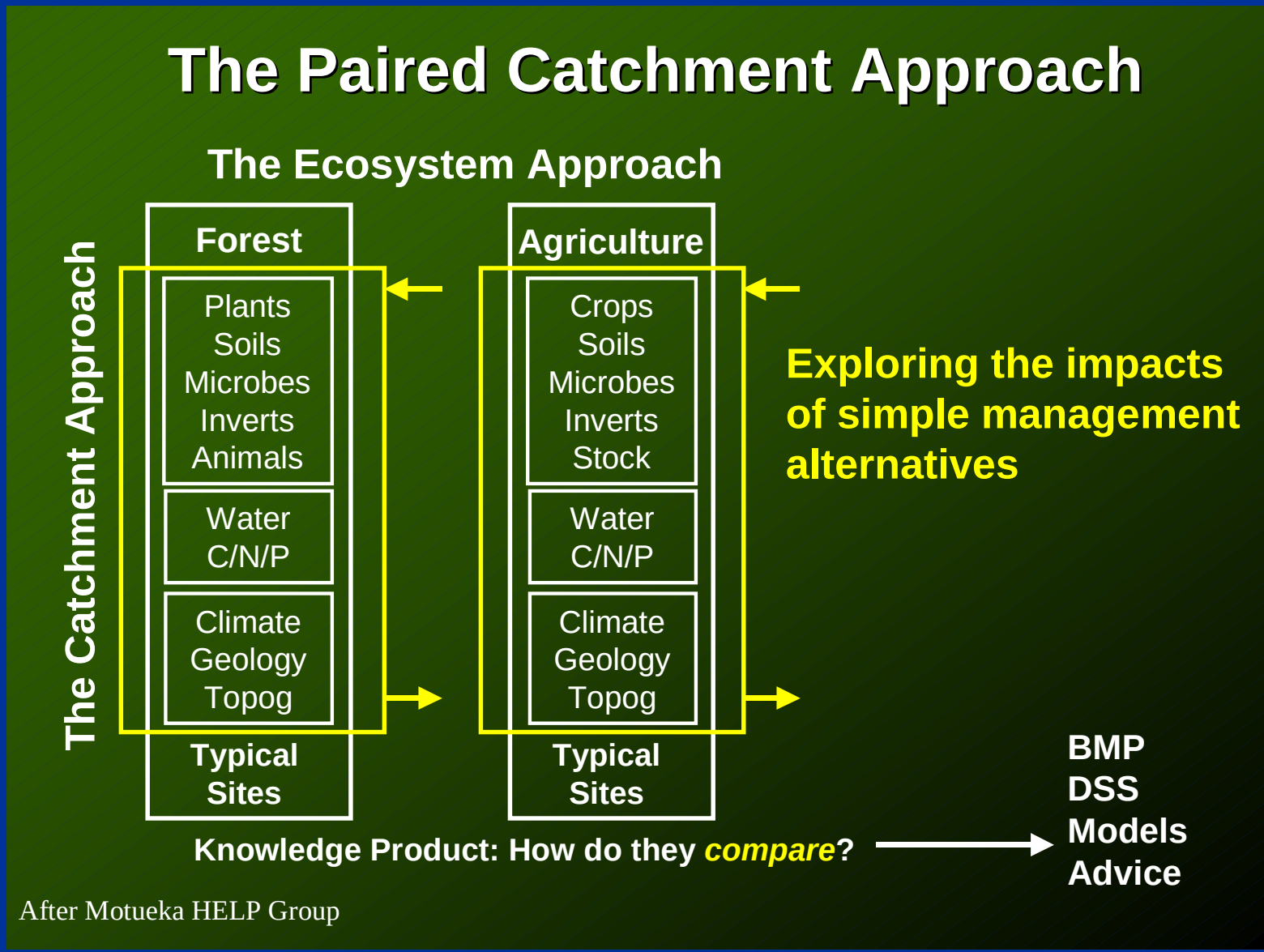


Quantifying **material pools and fluxes within homogeneous & spatially-explicit ecosystems**

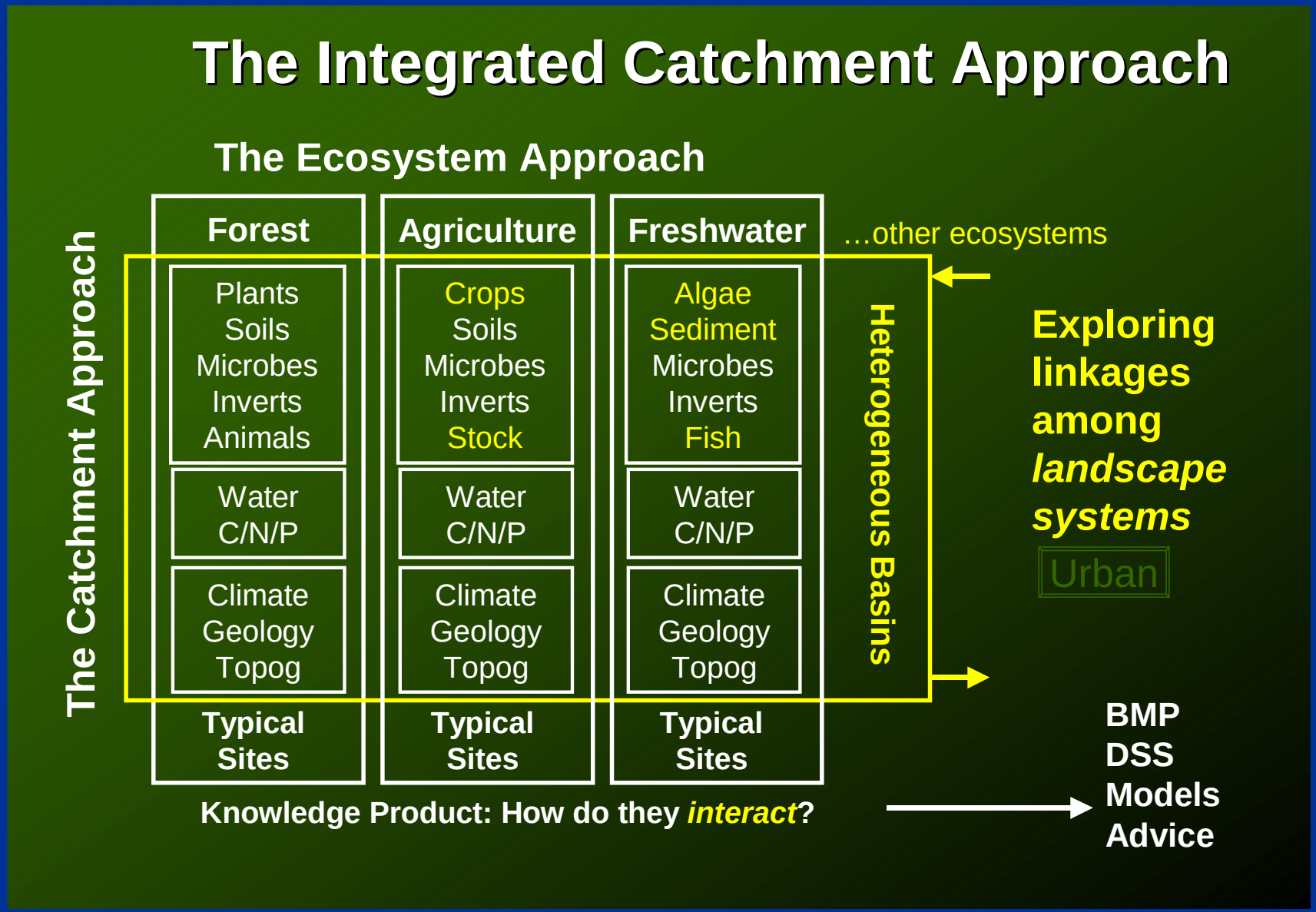
Knowledge Product: How does the *system function*? → **BMP DSS Models Advice**

After Motueka HELP Group

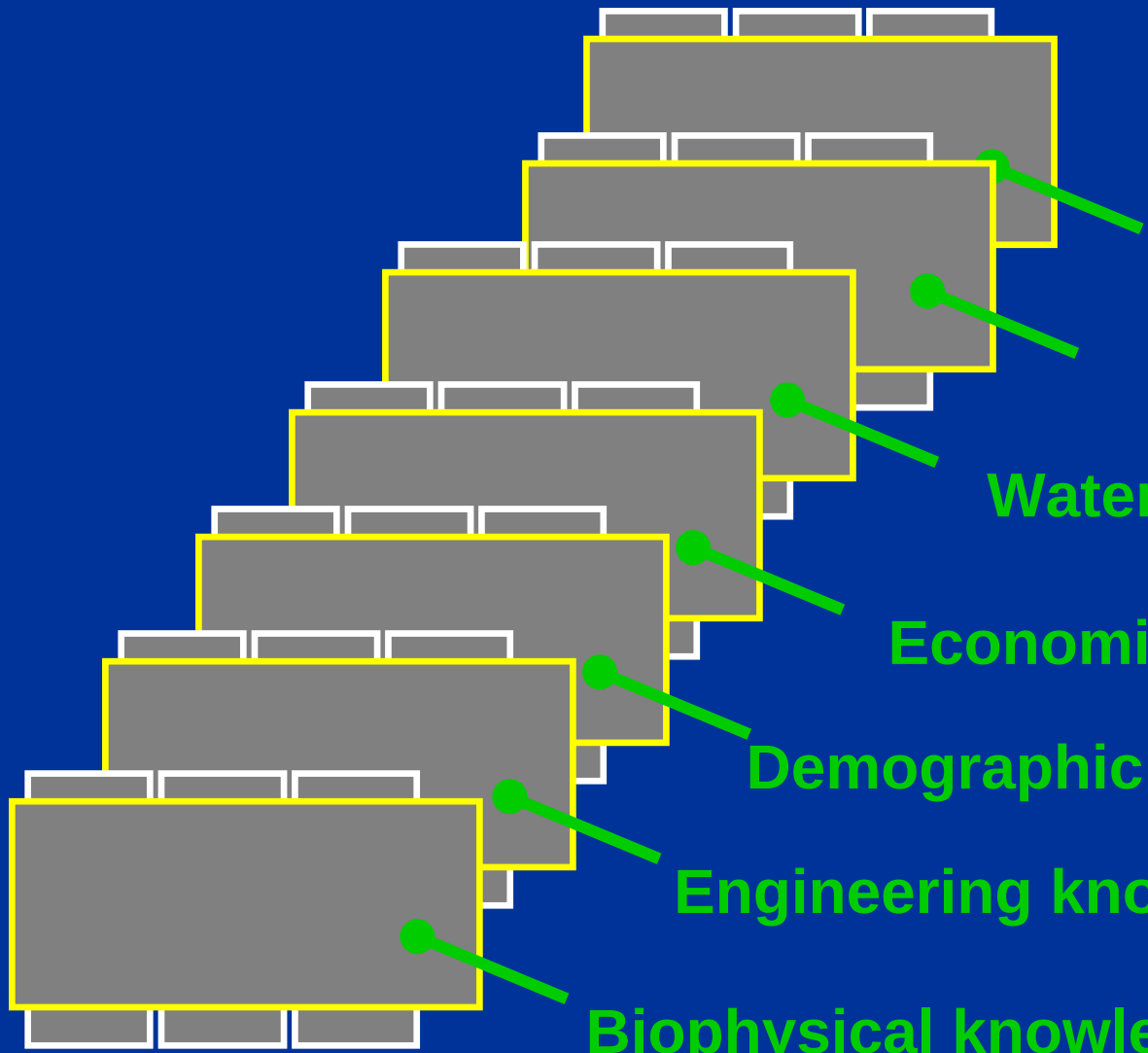
Approach 2/3


The Paired Catchment Approach
The Ecosystem Approach
The Catchment Approach
Forest
Plants
Soils
Microbes
Inverts
Animals
Water
C/N/P
Climate
Geology
Topog
Typical Sites
Agriculture
Crops
Soils
Microbes
Inverts
Stock
Water
C/N/P
Climate
Geology
Topog
Typical Sites
Exploring the impacts of simple management alternatives
Knowledge Product: How do they compare?
BMP
DSS
Models
Advice
After Motueka HELP Group

Approach 3/3


The Integrated Catchment Approach
The Ecosystem Approach
The Catchment Approach
Forest
Agriculture
Freshwater
…other ecosystems
Plants
Soils
Microbes
Inverts
Animals
Crops
Soils
Microbes
Inverts
Stock
Algae
Sediment
Microbes
Inverts
Fish
Water
C/N/P
Water
C/N/P
Water
C/N/P
Climate
Geology
Topog
Climate
Geology
Topog
Climate
Geology
Topog
Heterogeneous Basins
Exploring linkages among landscape systems
Urban
Typical Sites
Typical Sites
Typical Sites
Knowledge Product: How do they interact?
BMP
DSS
Models
Advice

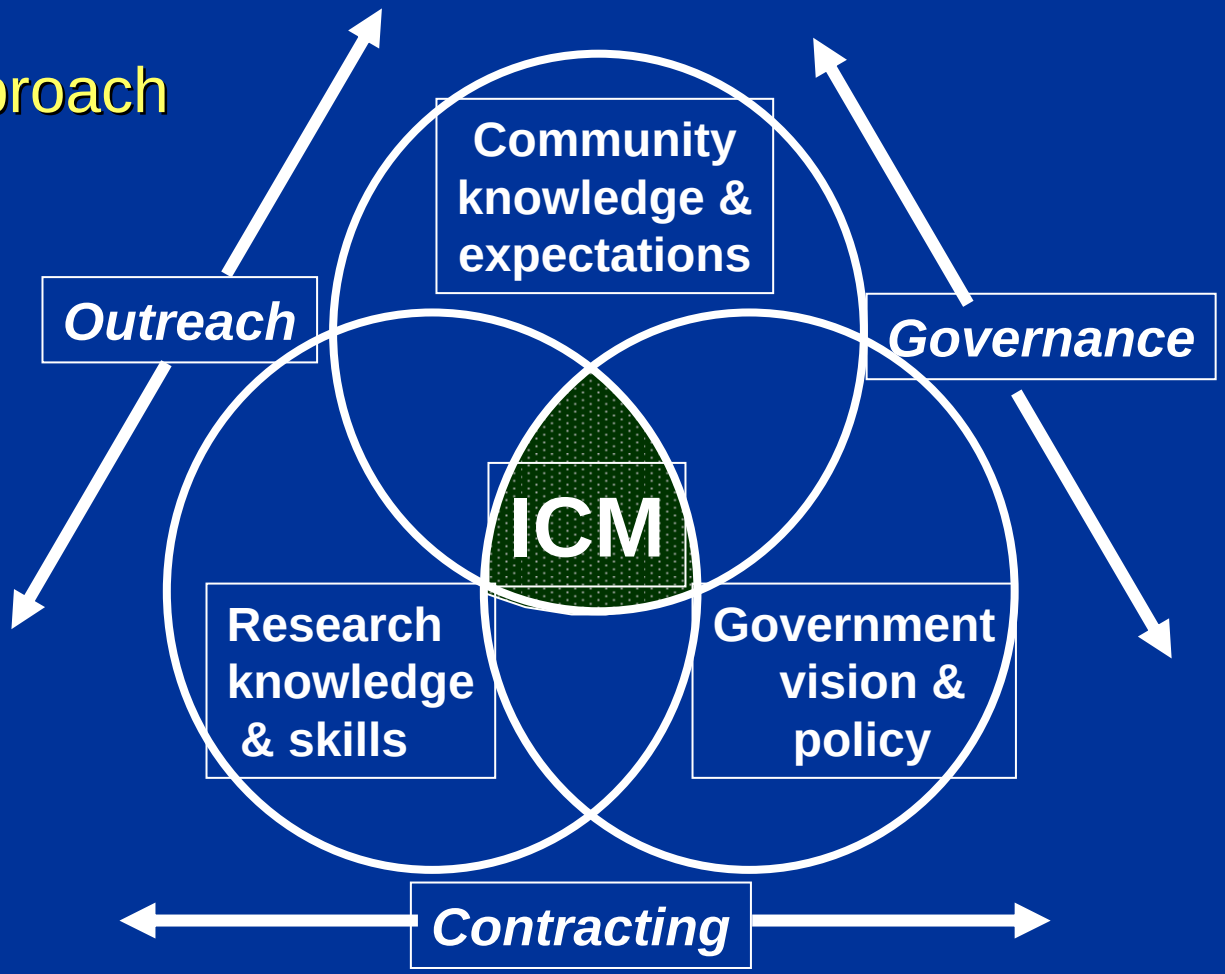
ICM has multiple dimensions



Modified from Motueka HELP group

Integrated Catchment Management

- a partnership approach



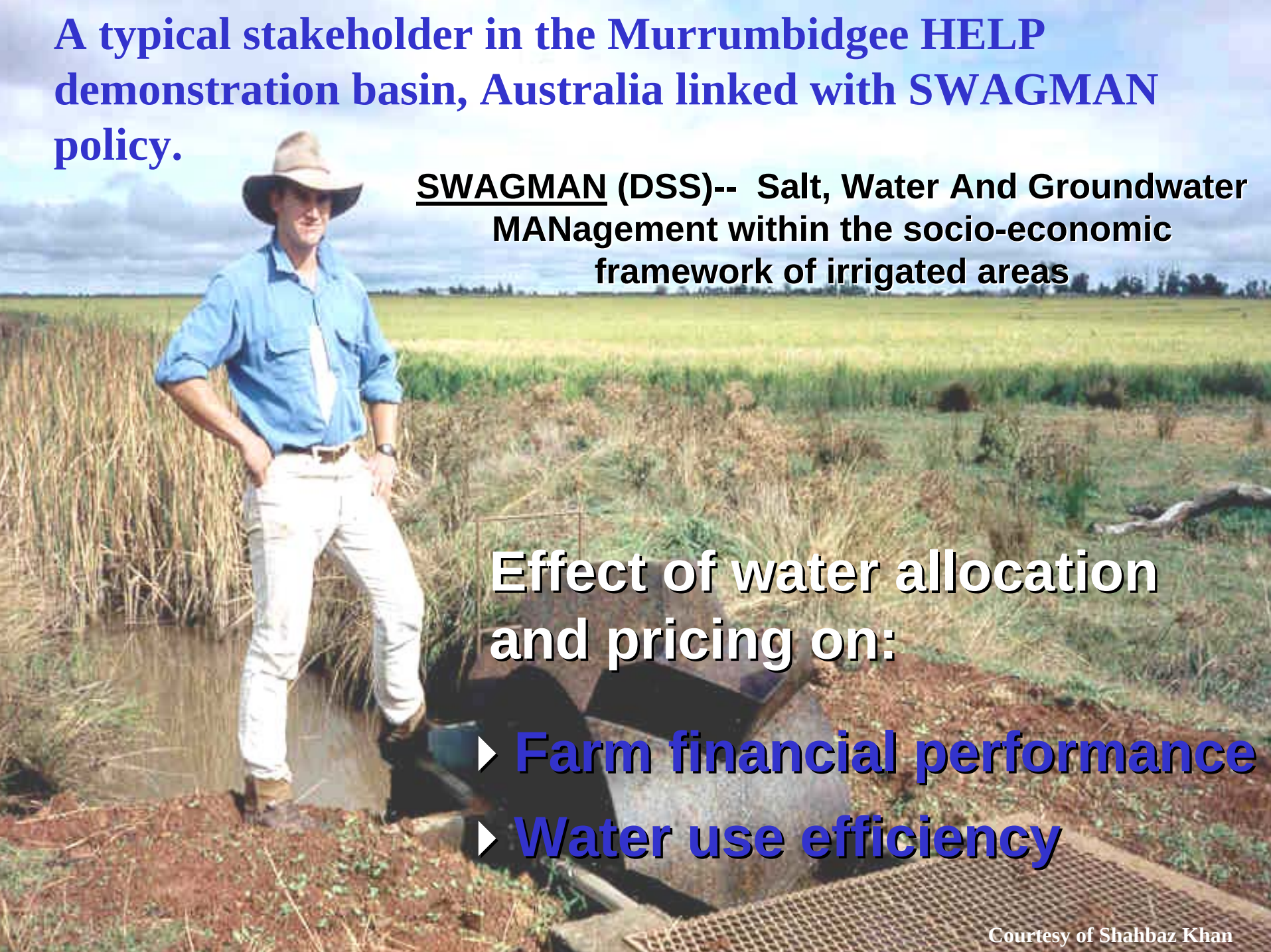
After Motueka HELP group

The HELP Process

Two major steps:

- A comprehensive assessment of what we know now (physical, socio-economic, legal, cultural baseline information).
  Iteration between stakeholders and scientists to determine research plan.
- Implementation of research in collaboration between scientists, managers and stakeholders

A typical stakeholder in the Murrumbidgee HELP demonstration basin, Australia linked with SWAGMAN policy.



SWAGMAN (DSS)-- Salt, Water And Groundwater MANagement within the socio-economic framework of irrigated areas

Effect of water allocation and pricing on:

- **Farm financial performance**
- **Water use efficiency**

Courtesy of Shahbaz Khan

HELP Basin Criteria

There are 5 categories of criteria:

- **Suitability of the proposing organisation and the basin for inclusion in the programme**
- **Relevance of the stated purpose to the HELP programme**
- **Adequacy and feasibility of the proposed activities**
- **Confirmation of commitment to provide resources and cooperation**
- **Contribution to promoting HELP values**

The detailed criteria are available at

http://www.unesco.org/water/ihp/help

The HELP Basins Groups

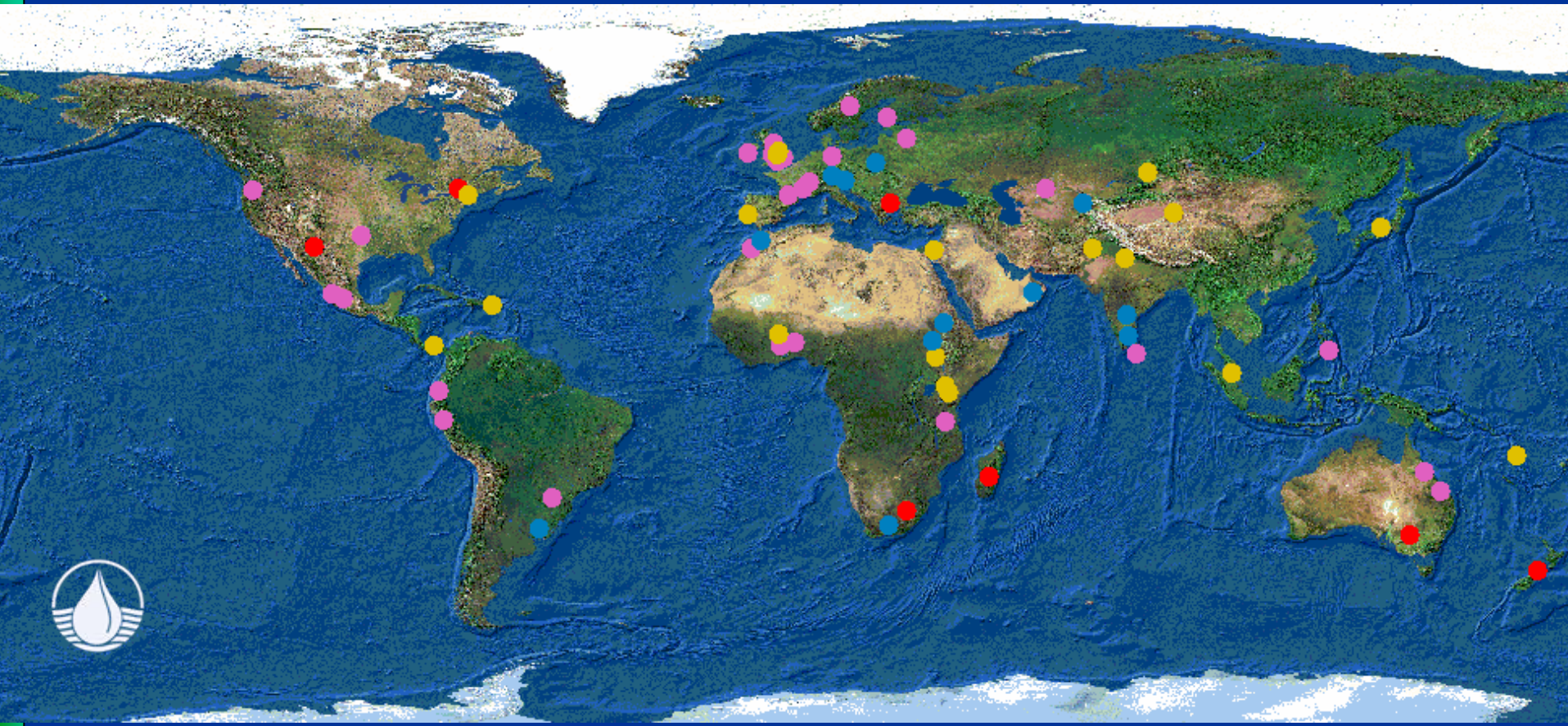
- ***Demonstration* HELP Basin:** A Demonstration HELP basin is seen as demonstrating best practice in Integrated Water Resources Management, with something to offer to other basins.

- ***Operational* HELP Basin:** An Operational HELP basin has implemented the HELP philosophy, and involved most HELP stakeholder groups in basin management.

- ***Evolving* HELP Basin:** An Evolving HELP basins plans to involve HELP stakeholder groups in basin management: it has provided clear commitment to develop a proposed catchment in accordance with HELP principles.

- ***Proposed* HELP basin:** A Proposed HELP basin will need to provide more detail of various aspects described in the nomination form; this basin has achieved initial operational activity and has begun stakeholder involvement.

HELP GLOBAL NETWORK

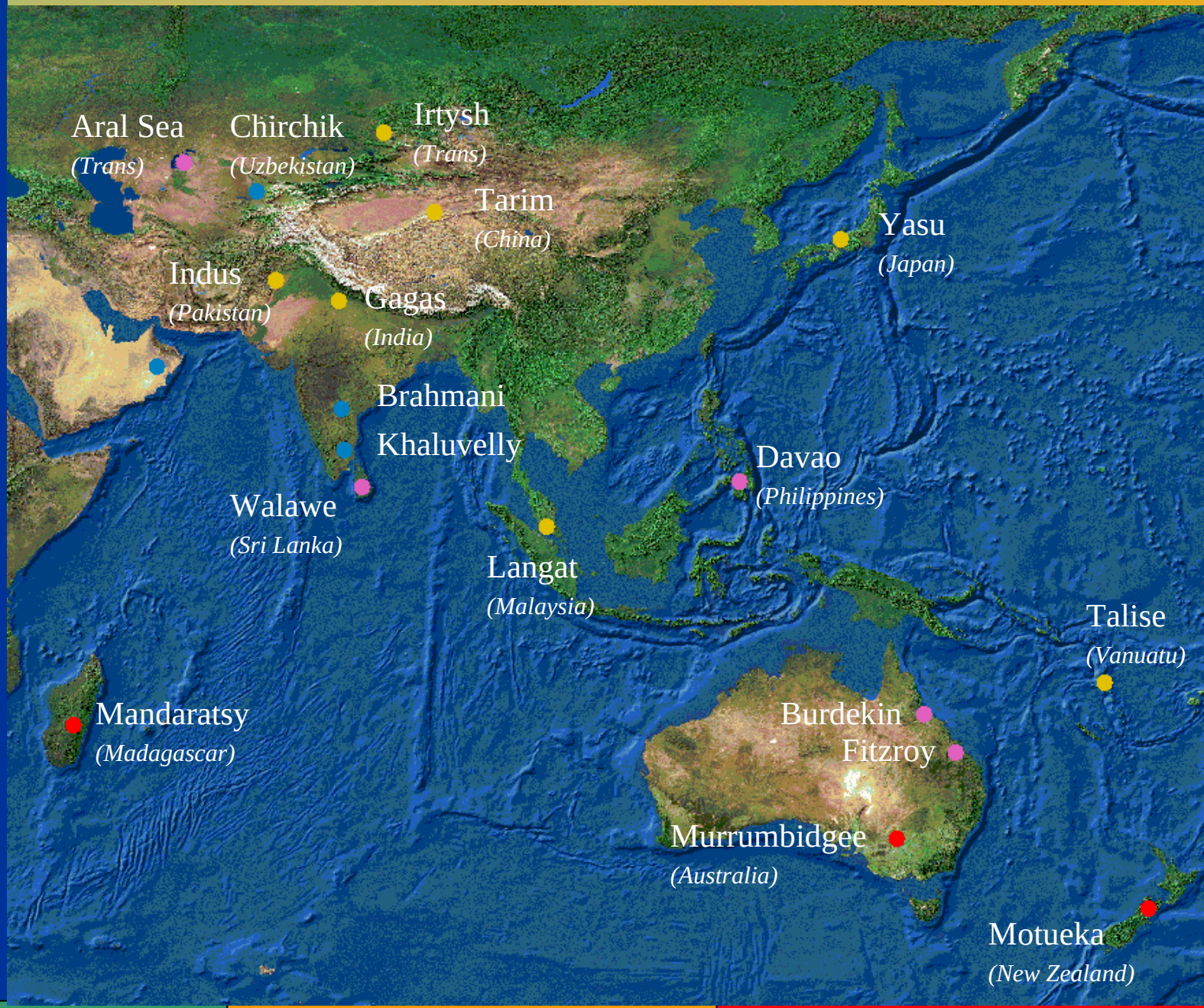


HELP

Nelson, 7-11 November 2005

Categories:

- Demonstration
- Operational
- Evolving
- Proposed



Where are we heading?
Selected Challenges for HELP (1)

- How do we dialogue with stakeholders ?
- How do we interface the water law and policy and science ?
- How do we undertake the necessary scientific research where basin scientific infrastructure is lacking ?

(Thukela HELP Basin, South Africa)

Where are we heading?
Selected Challenges for HELP (2)

- The need for a better understanding to separate the impacts of climate variability vis-à-vis man-induced impacts on the hydrological cycle ?

(Murrumbidgee HELP Basin)

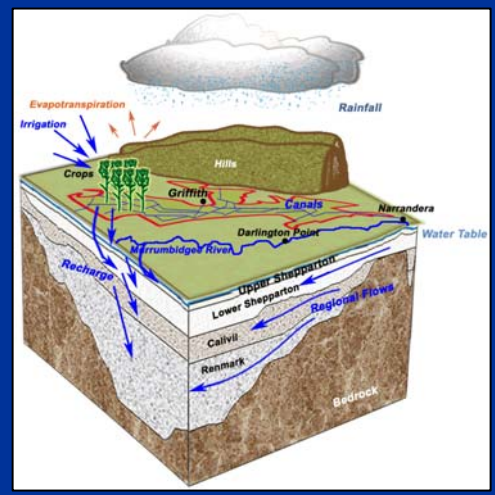
- Forests & Water. The impacts of forest conversion and afforestation-reforestation on high-low flows linked with environmental and human health (e.g. natural hazards and community water supply).
- How do we address upstream-downstream issues within IWRM from both a technical, management and policy perspective?

Where are we heading? Selected Challenges (3)

The need for a paradigm shift in scientific research to support land-water management issues

- Need to take a more cross-disciplinary, **more integrated approach** with a strong focus on lateral fluxes, (quantity and quality) where the IHP has a lot of experience.

- **Ecohydrological processes**
- **Water quality processes**
- **Extreme events (high/low flows)**
- **Surface water- groundwater interactions**



(Murrumbidgee HELP basin Conceptual model)

Note: The systematic areas of surface water, groundwater and ecohydrological components of the IHP will contribute to HELP in the field.

Example: An IHP programme for integrated, scientific activities in catchment hydrology to support HELP

- Aims : Through taking a process hydrology approach, to develop integrated, scientific activities across scales:
  - Which strengthen technical links between surface-subsurface hydrology and ecohydrology and the corresponding IHP projects (FRIEND, Groundwater, Ecohydrology) and applications of isotopes within the Isotope Hydrology programme of the IAEA.
  - Which propose state-of-art methodologies (new experimental designs and models) for integrated hydrological science which can subsequently be tested in selected HELP basins.

1st Meeting Ouputs:

Established Title:

“Integration and application of hydrological and ecological processes as a tool for sustainable water resources management and society development”

Warsaw, Poland, 3-7 July 2002

The two priorities highlighted by an expert group are:

- Water quality processes
- Hydrological and Ecological Processes connected with Extremes (Floods, Low Flows)

Water Quality Processes

- Overarching questions:
  - How do hydrological and ecological processes interact to control the transport of contaminants in catchments at different scales, I.e. what are the key controlling processes in contaminant migration in catchments at different scales?
  - What are the potential roles of isotopes techniques and new innovative methodologies in understanding processes?

Water Quality Processes

- In contrast to improved understanding in process hydrology (transfer of water quantity fluxes), less attention has been given to water quality processes research.
- Water quality (and not just water quantity) is a major part of the “water scarcity” issue in terms of denying access to a significant part of the global population to water.

The Hydrological and Ecological Processes connected with Extremes (Floods and Low Flows)

The overarching questions for high and low flows are:

- For different environments and for different hydroclimatic, antecedent conditions; at what scales does meteorology (e.g. rainfall characteristics) override land use controls on flood generation ?
- What is the sensitivity of low flows to global change (e.g. climate variability, land use change) ?

- A State-of-the-Art publication based on workshop inputs from invited experts.
- Production of a document outlining the future directions and next steps in research for testing in selected HELP basins.

UNESCO Workshop on transport and fate of diffuse contaminants in catchments with special emphasis on stable isotope applications.

GSF, Munich, Germany, November 30-December 2, 2004

GSF National Research Center for Environment and Health
in the Helmholtz Association
Institute of Groundwater Ecology
Ingolstädter Landstrasse 1
D-85764 Neuherberg

- **Relevant processes in catchment hydrology**
- **Assessment of microbial and abiotic attenuation processes on catchment scales**
- **Stable isotope fractionation to assess microbial degradation of organic contaminants**

A manager perspective…

A scientific briefing was accepted by the journal *Hydrological Processes* in September 2005 for publication.

Selection of the HELP basins to test in the field the recommendations of the meeting.

Integrating Science Workshop 2

Groundwater-surface water interactions in river corridors

Oxford, September 2005

Establishment of a new Expert Working Group

Provisional title of expert group: *Climatic variability and land cover changes impacts on flooding and low flows – at what scales?*

Technical University Vienna, Austria, 28-30 November 2005

Objectives:

- Develop the key science questions for testing in HELP basins
- Develop a five years strategy of workshops and potential publications

What has been achieved so far?

- A Pilot phase of 25 basins (2001-2004)
- A global network of 67 basins (July 2004 onwards)
- Conferences and workshops:
  - 1st HELP Int. Symposium Kalmar (Sweden) 2002
  - Dundee (Scotland, UK), Int. Conf. on Water Policy and Law interfaces with science, 2001 and 2004.
  - Expert planning group for Integrated Science 2002-2003
  - 1st Expert workshop on transport and fate of diffuse organic contaminants in catchments with special emphasis on stable isotope applications, December 2004 in GSF Munich, Germany
  - HELP Session at the 3rd WWF, “Towards Integrated Catchment Management: Increasing the Dialogue between Scientists, Policy-makers and Stakeholders”, Shiga, Japan, March 2003

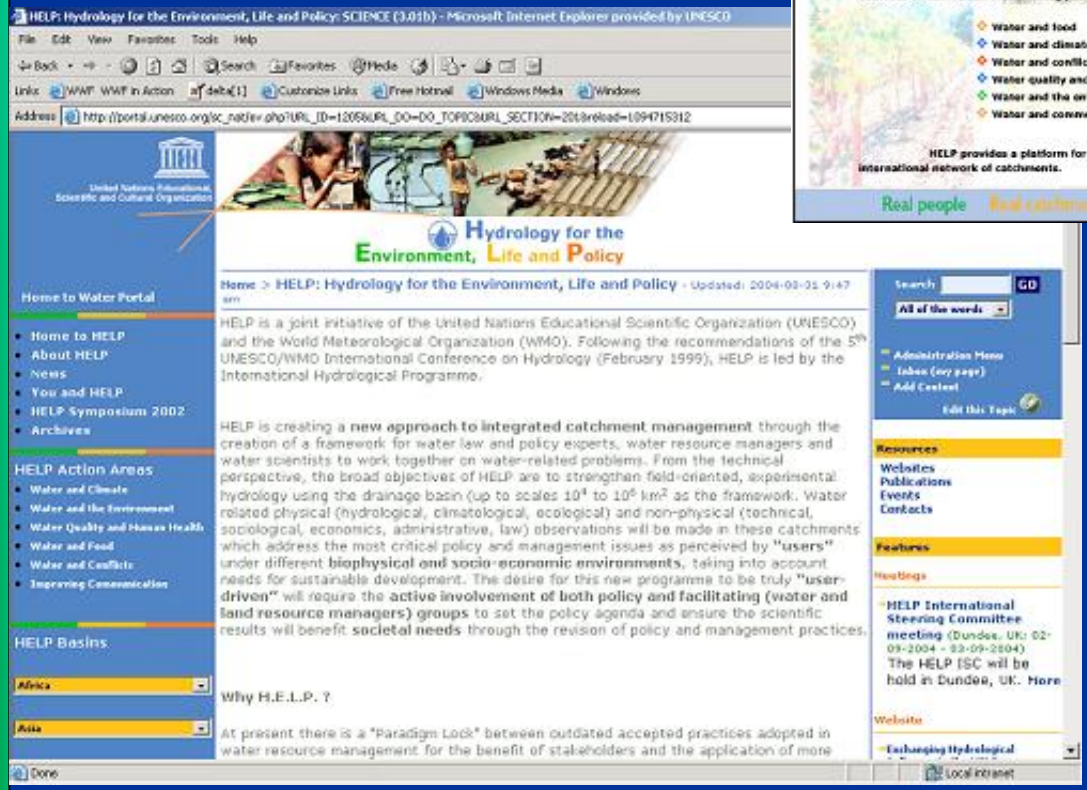
- Forest & Water (in collaboration with FAO-FORC/EOMF and CGIAR-CIFOR)

-- Impact of reforestation-afforestation of degraded lands in the Western Ghats, India. A trend detection project has been initiated linked with the Western Ghats forest hydrology project.

-- Tropical Forest Hydrology Symposium, Kuala Lumpur, July 2000

-- Shiga declaration on Forest and Water, November 2002)

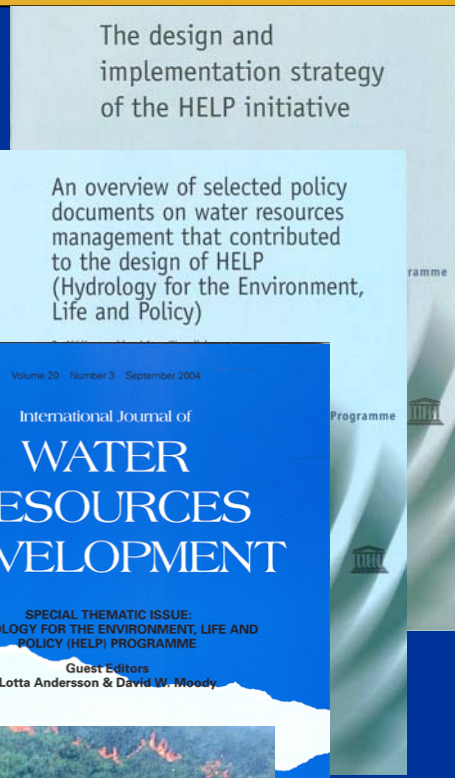
- Communication:
  - Brochure
  - Website
  - Newsletter



What has been achieved so far?

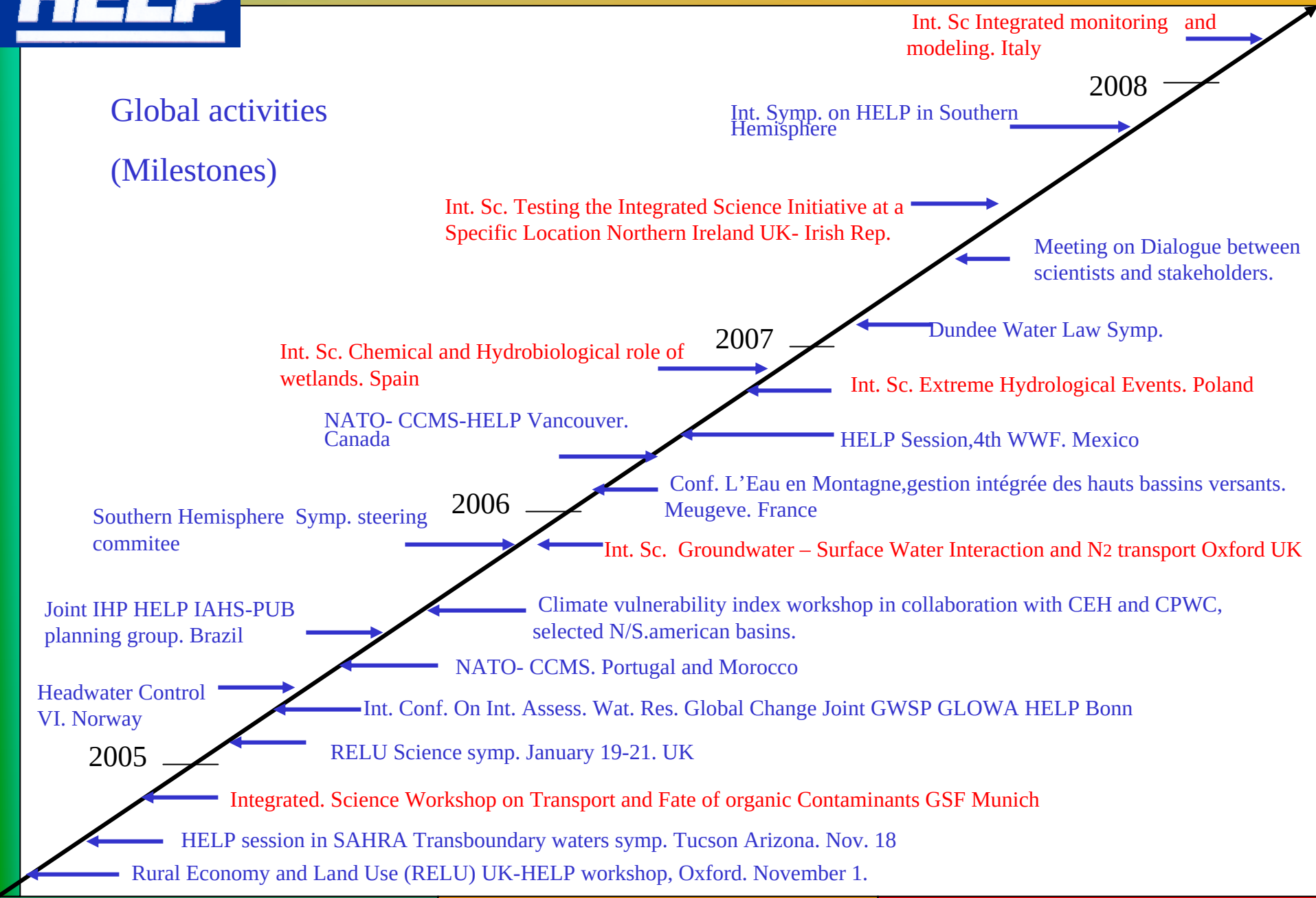
Publications:

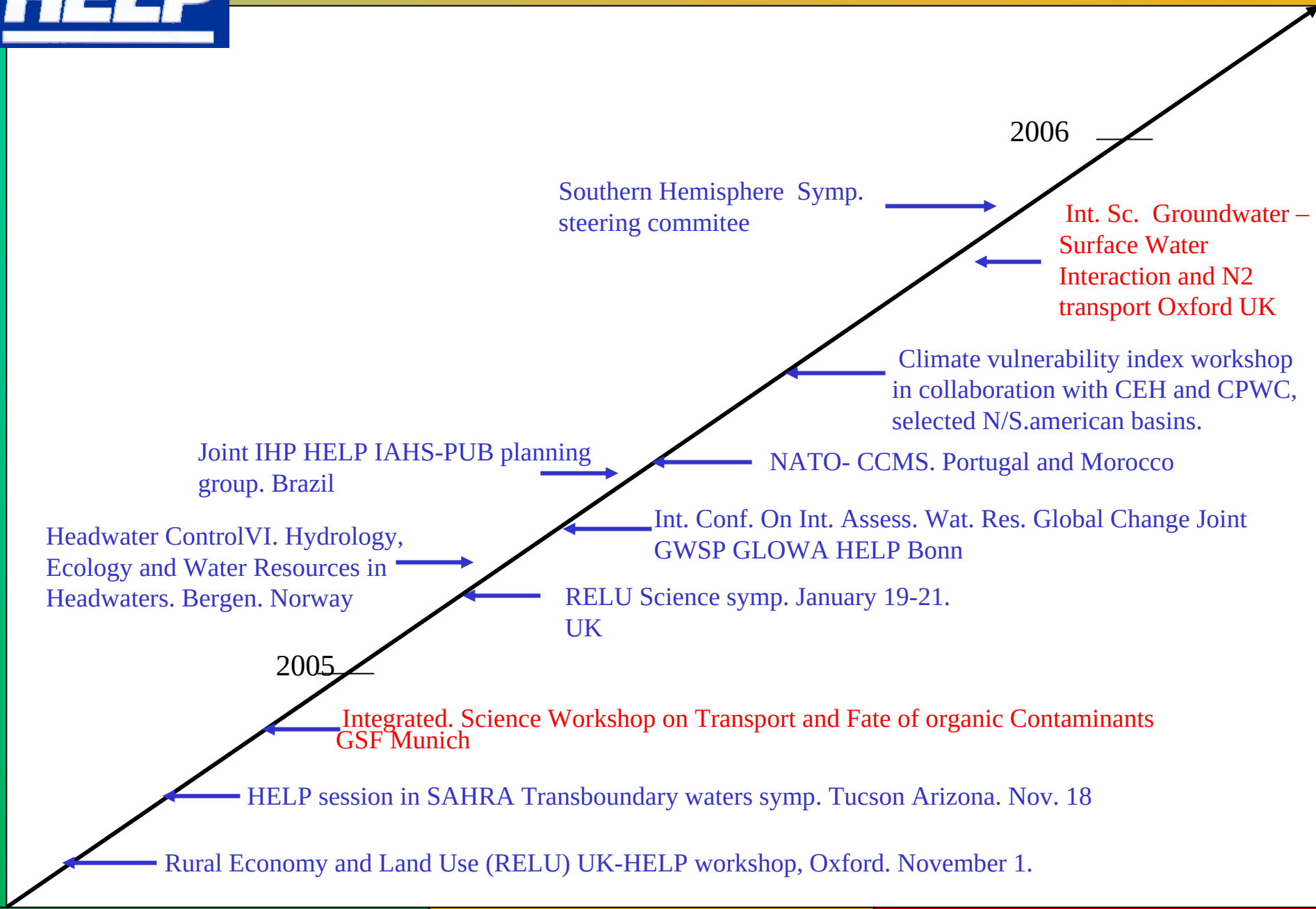
- HELP design and implementation strategy, 2001
- UNESCO IHP Series Technical Documents in Hydrology (38): 46 p. Yamaguchi, A. and Wesselink, A., 2000. An overview of selected policy documents on water resources management that contributed to the design of HELP (Hydrology for the Environment, Life and Policy).
- Article in AWRA journal, 2003
- Special Issue of the International Journal of Water Resources Development (Vol.20, no.3) September 2004
- CUP Book late 2004
- An ongoing book project based on experiences within HELP basins is scheduled to be launched in 2005 and entitled:**"The role of hydrological information in water law and policy: current practice and future potential."** published by IWA

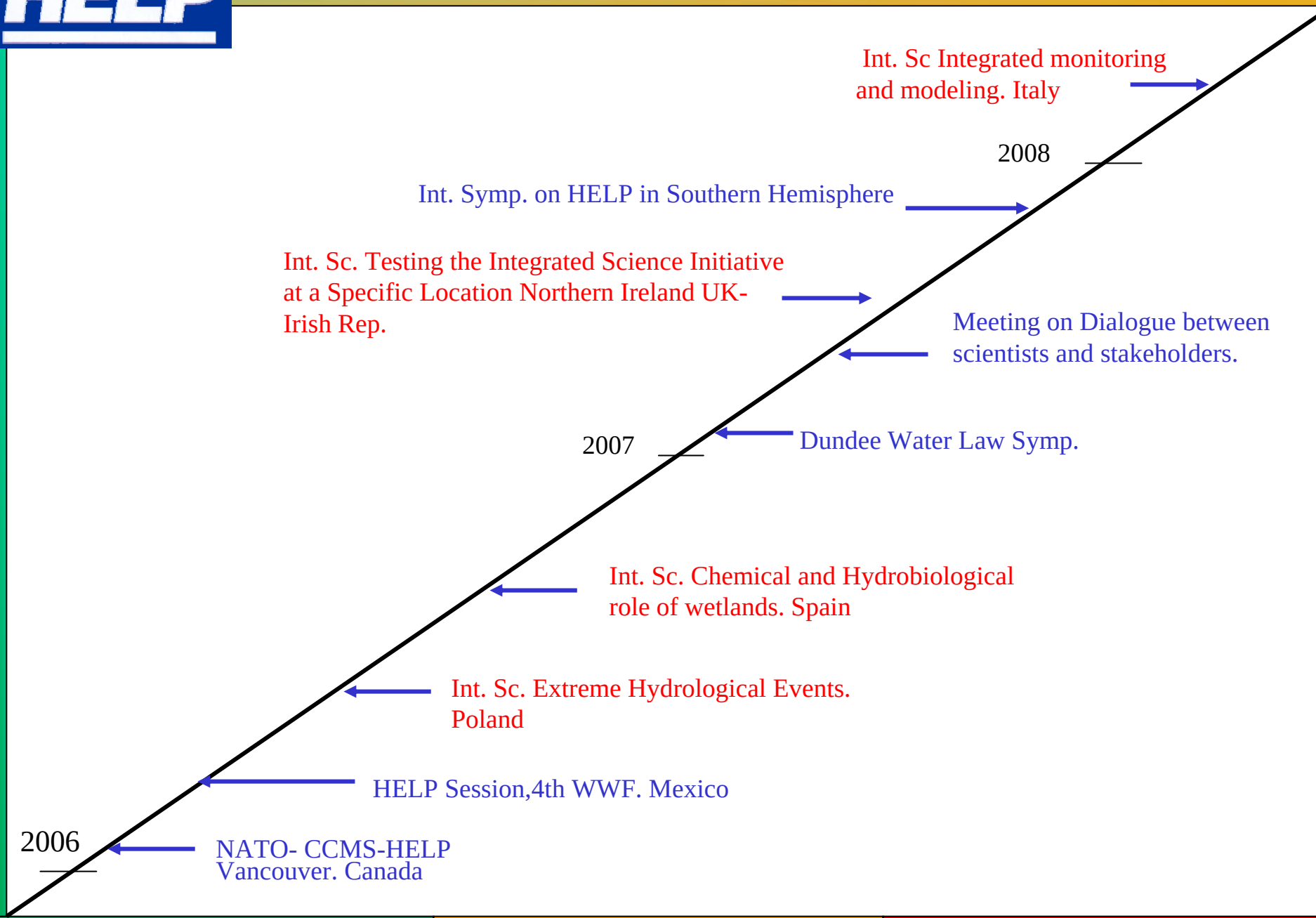


Global activities

(Milestones)




2006
Southern Hemisphere Symp. steering commitee
Int. Sc. Groundwater – Surface Water Interaction and N2 transport Oxford UK
Climate vulnerability index workshop in collaboration with CEH and CPWC, selected N/S.american basins.
Joint IHP HELP IAHS-PUB planning group. Brazil
NATO- CCMS. Portugal and Morocco
Int. Conf. On Int. Assess. Wat. Res. Global Change Joint GWSP GLOWA HELP Bonn
Headwater ControlVI. Hydrology, Ecology and Water Resources in Headwaters. Bergen. Norway
RELU Science symp. January 19-21. UK
2005
Integrated. Science Workshop on Transport and Fate of organic Contaminants GSF Munich
HELP session in SAHRA Transboundary waters symp. Tucson Arizona. Nov. 18
Rural Economy and Land Use (RELU) UK-HELP workshop, Oxford. November 1.


Int. Sc Integrated monitoring and modeling. Italy
2008
Int. Symp. on HELP in Southern Hemisphere
Int. Sc. Testing the Integrated Science Initiative at a Specific Location Northern Ireland UK-Irish Rep.
Meeting on Dialogue between scientists and stakeholders.
2007
Dundee Water Law Symp.
Int. Sc. Chemical and Hydrobiological role of wetlands. Spain
Int. Sc. Extreme Hydrological Events. Poland
HELP Session,4th WWF. Mexico
2006
NATO- CCMS-HELP Vancouver. Canada

Planned Symposium in November 2007

HELP in Action

Local Solutions to Global Water Problems - Lessons from the South.

Setting an implementation agenda

Theme 1: Action on the ground - methods and approaches.

Theme 2: New integrating science being developed under HELP

Theme 3: Connecting environment, economy, social and cultural impacts

Theme 4: Institutional and legal lessons for successful HELP implementation

Theme 5: Indicators of HELP success

Theme 6: Implementing HELP in basins with limited resources and capacity

Theme 1: Action on the ground - methods and approaches.

- **How is the HELP approach working in your basin(s)?**
- **What methods or mechanisms have been used successfully or unsuccessfully to dialogue with stakeholders in your basin(s)?**
- **How has science connected with communities in your basin?**
- What is the role of infrastructure in promoting HELP?
- What forms of engagement with the range of stakeholders were most useful, including with "voluntary" and "formal" watershed organizations.
- how has the HELP approach built new partnerships, and how has it caused key actors to move outside their sectoral/experiential comfort zone?
- If applicable, what challenges has the move towards decentralization of decision-making had on water resources management at the basin level?
- how have stakeholders been empowered through enhanced information flow?
- What methods have been best at building social capital in your basin(s) and if this has been beneficial, why?
- what system of checks and balances are in place to ensure the smooth management of your basin?

Theme 2: New integrating science being developed under HELP

- **Successful means of integrating across scientific disciplines and across scales**
- **Scaling up and scaling down surface groundwater interactions in a basin context**
- **Innovations in integrating biophysical models with social and economic aspects**
- Smart monitoring for water productivity and environmental outcomes
- Use of non-conventional data gathering and data fusions methods for capturing uncertainties for better decision making
- Use of conditioning data for deriving hydrological parameters
- Agent based modeling techniques for integrating management with actors in HELP catchments
- Use of isotopes for climatic, surface and ground water signature analysis
- Multiple use of water for improving water productivity at the basin scale
- Integrating triple bottom line reporting with hydrological analysis
- Integrating climate variability and change with risk management by different stakeholders in a watershed
- Achieving a continuum in weather and climate forecasting with extreme events

Theme 3: Connecting environment, economy, social and cultural impacts

- **How to integrate natural sciences, especially hydrological science, with market economics**
- **How to integrate natural sciences, especially hydrological science, with environmental (ecological) economics**
- **How to integrate natural sciences, especially hydrological science, with social and cultural evaluation, and build social capital**
- **How to integrate hydrological science with Land-Water management and policy**
- How to quantify impacts across these 4 dimensions
- What models or approaches are useful for integrating
- How can hydrologists and social scientists fruitfully dialogue?
- How to connect scientific disciplines? This includes within hydrology (e.g surface water-ground water-freshwater ecology-water quality processes)
- How to measure these dimensions, e.g., Genuine Progress Indicator; Quality of Life, and other tools
- Solutions for coping with inadequate information
- What science and policy approaches can address cumulative impacts of incremental development?
- Can futures and scenario modelling help?

Theme 4: Institutional and legal lessons for successful HELP implementation

- **How to interface hydrological science with Water Policy and Water Law.**
- **How can science promote conflict prevention/resolution?**
- **How can science promote good water governance?**
- **What is the role of science in implementation and compliance in shared/transboundary waters**
- How can the institutional context be best understood?
- What legislative and institutional approaches can address concerns tied to inter-basin transfers, both water transfers and migrations of populations?
- What approaches work best for preventing or resolving conflicts of use at all levels: i.e., between local users, upstream / downstream, between uses, across national and international boundaries?
- How best to effectively implement water laws and regulations
- How can a HELP approach encourage good water governance?
- What are good approaches for monitoring compliance and for effective implementation of water law and policy?

Theme 5: Indicators of HELP success

- **How can we measure the impact of HELP?**
- **What criteria make an indicator most useful in your basin(s)?**
- **What are the barriers for the application of such indicators as far as available data and user capacity are concerned?**
- How can we measure whether HELP is creating a build-up of social capital?
- How useful is the Watershed Sustainability Index approach?
- Successes and Failures with measuring progress
- How to integrate HELP components into one sound, universal and measurable index?
- How can we assess pro-active capacity in the basin?

Theme 6: Implementing HELP in basins with limited resources and capacity

- **How can HELP be implemented given limited human, technical, and/or economic resources?**
- **How can the basin be assessed quickly and efficiently?**
- **How can we utilize/complement initiatives such as IAHS-PUB (Predictions in Ungauged Basins)?**
- How can we leverage twinning and existing expertise of RCU's and other HELP basins?
- What are the roles of the private sector?
- How can low-cost and free data sources such as NASA's Land Information System (LIS) or the forthcoming South American free software center be used to provide useful tools for data-sparse basins?
- How do we get donors interested in the basin?
- How do we deal with trans-boundary issues such as surface water and groundwater?
- How useful are methods such as the "Inceptive Data Campaign" (Entekhabi et al, 1999[1]) or a short-term cooperative data collection period involving stakeholders and local users (Deutsch et al, 2004[2]) for water resource assessment as mentioned in Bonell (2004)[3]?

Project 4 **<u>Community level studies to establish and update baseline information on:</u>**

- Knowledge and attitudes of families on safe water and adequate sanitation;
- Assessment of family water utilization and sanitation practices;
- Impact on families from community water and sanitation systems;
- Preferred Location: Communities in the study locations for projects 1,2 and 3;