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# **EU-INCO water research from FP4 to FP6 (1994-2006)**

## **A CRITICAL REVIEW**

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# EU-INCO water research from FP4 to FP6 (1994-2006)

## A CRITICAL REVIEW<sup>1</sup>

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1. The review was validated by an independent mirror group (see Annex 6 to this report). The review process was supported by Dr Cornelia E. Nauen (EC, RTD)

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## Preparation of this report

This report was prepared between July 2005 and January 2006 by a panel of independent experts chaired by Pragya (Academician) Dipak Gyawali (Royal Nepal Academy of Science and Technology, Nepal. Professor John Anthony Allan (King's College London and SOAS, UK) was the rapporteur. The panel was composed of five experts from partner countries/regions and five Europeans. The panel met three times in Brussels to go through the substantive documentation about the 67 projects which formed the sample from more than 10 years of European investment into international S&T cooperation related to integrated water resources management. Projects spanned three research framework programmes (FP4 -1994-1998; FP5 – 1998-2002; FP6 – 2002-2006). The panel developed a scoring methodology to extract structured answers from the heterogeneous material, while taking into account that understanding integrated water resources management and other core concepts and subsequent requirements in framework programmes had evolved in the period under examination. The panel used the answers to a questionnaire circulated to all project consortia asking a range of questions in relation to communication between researchers and stakeholders. Information on research impact was sought. The feedback enabled a substantial part of the analysis. Panel members communicated extensively outside meetings to develop their analysis. The draft report was critically reviewed by 12 independent experts bringing very diverse perspectives to this scrutiny. Some members of the mirror group contributed particularly substantive remarks and suggestions with a view to improving the analysis and making the conclusions even more robust.

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# Executive summary

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## EU-INCO water research from FP4 to FP6 (1994-2006) – a critical review

The European Commission requested an independent panel of 10 experts from Africa, Asia, Europe, Mediterranean and Latin America to review critically information on about 67 international scientific cooperation projects related to integrated water resources management (IWRM). These projects mobilised 530 research teams and other relevant partners from Europe and associated states (252 teams) and partner countries in Africa, Asia, Eastern Europe and Central Asia, Mediterranean and Latin America (318 teams). Projects reviewed came from three successive funding cycles: 20 projects from FP4 (1994-1998 – completed projects); 34 from FP5 (1998-2002 – completed or in their final stages); 13 from FP6 (2002-2006 – just started).

The purpose of the review was not to duplicate the existing scientific peer review processes evaluating deliverables and publication, but rather to learn lessons from past investments in water research with an IWRM focus, identify strengths and weaknesses with particular emphasis on the problems of implementing IWRM principles. The panel looked at how research consortia created knowledge and communicated it to water users and policy-makers. The panel gained important insights that have made it possible to identify lessons and advice on the orientation of future research (see terms of reference in Annex 5).

The draft report of the panel has been critically reviewed by a mirror group of 12 experts from different continents and perspectives (government, private sector, civil society organisations, academia – see Annex 6).

## Key lessons from the review process

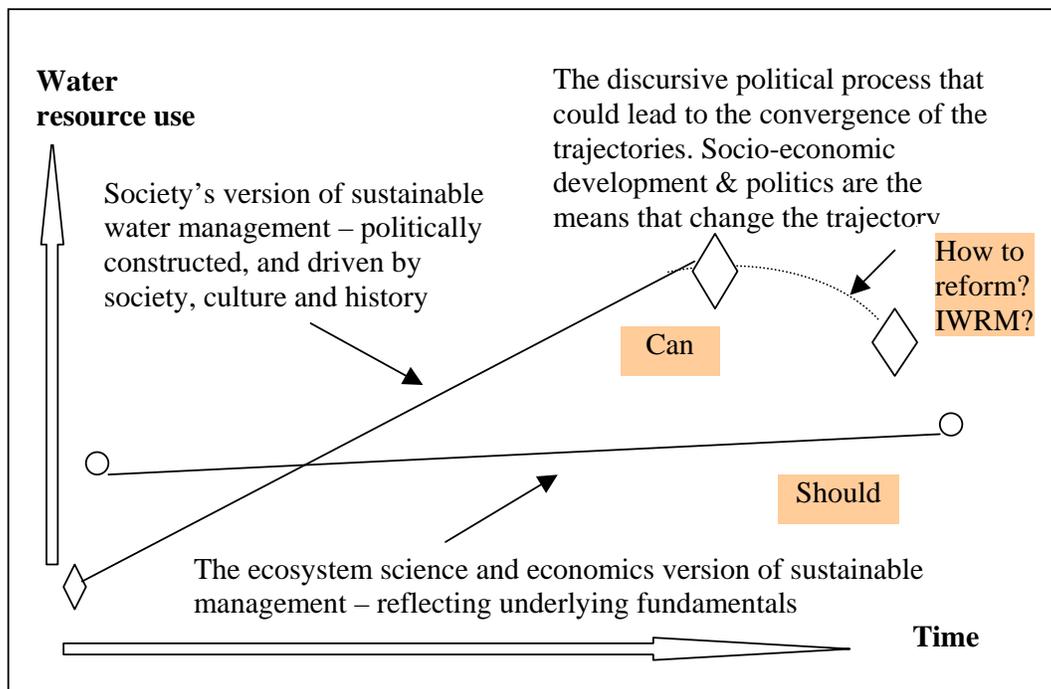
### The analytical approach of the Technical Report

The panel developed criteria and a scoring method to evaluate the orientation of the EU-INCO sponsored water research. The approach was based on three concepts:

- *First*, the notion that *sustainability* is socially constructed on the basis of three dimensions: economic, environmental and social. A *discursive political process* determines the way water is managed and the way sustainability is perceived.
- *Secondly*, there are *three social solidarities* that shape the politics of water use and management - first, the institutions in the public sector – characterised by *hierachism*, which are the dominant providers of water services and regulatory regimes, second, the *private sector* firms and local *entrepreneurs* that provide some water services and a high proportion of construction capacity, and third, the *civil movement* bodies that advocate water related *environmental and human rights ethics* and play a social audit role.
- *Thirdly, modernity theory* (see graph p.16) was used to highlight five differently inspired water-managing paradigms which have been adopted relatively widely in neo-liberal political economies, but less so in the non-industrialised or rapidly industrialising economies. The methodology proved to be very effective in identifying the levels of engagement by the scientists in the 67 EU-INCO projects in for example using and promoting the IWRM approach. The method also enabled trends in focus and engagement in the three Research Framework periods – FP4, FP5, and FP6.

### Findings on the INCO projects in successive Research Framework Programmes

- The EU INCO programme was abreast of conceptual developments in the water domain and adopted the IWRM paradigm in the late 1990s. But it did so in the rather uncritical way of most water professionals around the globe, who focus on the fundamentals of environmental and economic processes.
- The programme mobilised good quality teams in Europe and other parts of the world.
- It had tangible structuring effects on the way the science was done by achieving better integration across different disciplinary boundaries than in most national research programmes.
- The EU-ICO water research has had an impact on the level of investment in human and institutional capital in partner countries that was tangible and particularly visible, when successive projects built up trust and better appreciation of local knowledge in the consortia.
- The impact of the EU-INCO water research on the adoption of IWRM has not been evaluated definitively because the process of such adoption is embedded in very complex political processes that have not been the focus of research.
- Impact depends critically on the capability of scientific teams to communicate their sometimes unwelcome results on the one hand, but also on the willingness of actors in the water sector to engage with potentially unpleasant messages on the other (see chapter 4). The importance of communication is widely underestimated, both at levels of the programme and individual research teams in projects. Nevertheless, useful efforts in this direction have been documented, though a lot more structural measures need to be put in place to give effective communication the critical attention it deserves.



**Figure 1** Conceptualising the trajectory of water management determined by society – the upper trajectory; and the trajectory identified by ecosystem scientists and economists – the lower trajectory. Convergence - shown as X-X -is achieved by getting the science into the political processes that determine water use and policy.

- Fig. 1 illustrates the gap between the trajectory of research focused on fundamentals on the one hand and the perceptions of water managing actors in society on the other who are steeped in culture, history and other path-dependent perceptions. The challenge for future research is to make explicit efforts to bridge this gap. That would make the research more directly relevant for planning and decision making in the complex politics in which water management takes place.
- Unless the political nature of this process is acknowledged, it is difficult or even impossible to increase the impact of the science in the short to medium term. Conversely, research approaches taking as the starting point the socially constructed preferences of water management for human consumption and food security, stand better chances to bridge this gap.
- The priorities of water users are determined by the nexus of demographic drivers that shape water demand and socio-economic conditions – local and global – that limit the adaptive capacity of water management institutions. Water users and water managers are not necessarily able to recognise invisible economic processes that are effectively addressing water scarcity (for example virtual water – through trade, and more importantly the socio-economic development that underpins that trade).
- Moving forward entails the need for constructive engagement between various water actors leading to an evolved form of *constructively engaged* integrated water resources *allocation* and management (CE-IWRAM) advocated by this panel.

### **Lessons for Framework Programme 7**

The EU-INCO research outcomes have been sound and to the extent possible they have been effectively communicated. The EU-INCO water research-funding model works. It could be used by other departments of DG Research in internationalising thematic research. The way it operates gives the water related research a friendly potential interface with the work of other internationally engaged EC DGs – e.g. Environment, RELEX, Development, EuropeAid and Trade.

The following recommendations mainly refer to the enhancement of science and its relationships to *bottom-up development* and to *top-down policy*. These two aspects of the science, development, policy-nexus have been integral to the EU-INCO ‘way of life’ for two decades.

### **Recommended strategies**

Four main strategies have been identified to accelerate the pace at which local water managing practices and water-policy converge with the underlying fundamentals exposed by water science.

- Promote the constructively engaged research approach towards Integrated Water Resources and Allocation Management (CE-IWRAM)
- Align more strongly with regional IWRAM priorities
- Require that EU-INCO water research adopt the constructively engaged IWRAM approach
- Require research to continue to connect local knowledge, socio-economic development cultures and policy institutions and implementing bodies.

## **Recommended focus on substance and approach**

### *Focus*

- The research could focus on both ecosystem science and the issues mainly discussed in this report - namely how to achieve a convergence of the way water is managed in actual political economies with the principles of sustainability evident to water scientists and economists.
- Research should also focus on the systems beyond the watershed and the conventional concerns of water scientists and managers. It is in these wider systems that the major strategic solutions to water problems will be found.

### *Approach*

- Interdisciplinary research, another element of the EU-INCO 'way of life', will continue to be fundamental for effective ecosystem research and other water science. It is especially important that the research on the facilitation of socio-political change be emphasised to achieve convergence of the fundamentals exposed by science and the perceptions of water actors.
- Interdisciplinary research in a constructively engaged mode will, of necessity, also pay specific attention to strengthening human capital and implementation capacities and improve the enabling environment within Partner Countries.

### *Human capital development*

- An important initiative needed is the establishment of centres of excellence in Partner Countries devoted to interdisciplinary water science and policy. These have intrinsic value and are needed because with some honourable exceptions the higher education institutions in the US and the EU no longer provide the necessary leadership.
- The involvement of professionals and scientists in Member States, Partner Countries and especially also other the Directorates General such as RELEX, Trade, Development, EuropeAid, Environment etc. should be ensured. They already accompanied the review process. The panel welcomed the opportunity to project the concepts which underpin the analysis in this report and its recommendations. There are opportunities for further synergy.

### *Future evaluation and reviews*

Criteria measuring the *effectiveness of communication* and *impact* have to be devised and systematically implemented throughout all steps of the research and dissemination/engagement process. The cost of a system that would reveal communication and impacts are expected to be prohibitive given long impact times and the complexities of institutional development. It might thus be more realistic to develop simpler proxies, but the identification of such detail was outside the scope of the present review.

## Chapter 1 Introduction and background: who has been setting agendas and researching what?

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### *What has been reviewed and over what period?*

The purpose of this review is to evaluate the contribution of EU-INCO sponsored research on water resources management and on water services more generally.<sup>2</sup> EU-INCO is the EU's INternational S&T COoperation Programme that has formed an integral part of successive EU Research Framework Programmes (FPs). The review covered the period 1994 and 2006, broadly corresponding to FP4 through FP6. EU-INCO facilitates and supports research and related cooperative activities in partner countries<sup>3</sup> outside the EU. Water issues have been one of three main environmental research priorities throughout the review period. It was the dominant theme in scientific cooperation in the Mediterranean and pervaded research cooperation with other regions even when foci were on forestry, biodiversity, sustainable food production or health.

During the review period the EU-INCO research programme responded to pressure from the EU Parliament and from other opinion from within and outside the Commission regarding the nature and impact of EU-INCO research. The burden of this comment was that the research in Frameworks 3 and 4 had not focused sufficiently on applied science. Policy relevance had not been well expressed or developed. One of the main findings of this review is that EU-INCO water research, during FP4 (1994-1998) was not explicitly policy oriented, though emphasis was placed on systems approaches with environmental orientation. In FP5 (1998-2002) policy priorities were identified by EU-INCO. Those applying for FP6 (2002-2006) water projects were asked explicitly to address policy issues.

EU-INCO has progressively encouraged water management research to be policy aware and increasingly policy focused. This trend has influenced the technical, allocative and socio-economic shape of EU-INCO funded studies. In taking this approach EU-INCO has been

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<sup>2</sup> The introductory comments in the terms of reference – Annex 5 – indicate that staff of EU-INCO were aware that they had consciously based their ‘calls for proposals’ on the concepts of IWRM. They were also aware that there had been some evolution in the IWRM approach and problems in promoting it and in achieving its adoption. The panel has dealt with these very important dynamic issues in some detail. The IWRM approach is referred to throughout the report and it is confirmed that its operationalisation has been challenging. The panel was also asked to ‘take stock’ of the trends and approaches to water management and policy-making. The IWRM issue is a constant theme in the report and an expanded definition of IWRM is identified and explained and is central to the recommendations for the FP7 phase included in Chapter 6. The major activity required by the ToR was to evaluate the extent to which the EU-INCO sponsored water research had achieved two main goals. First the promotion and the adoption of IWRM. And secondly, the evaluation of the extent to which the results of the sponsored research had been *communicated* to water users and policy-makers as well as the extent to which the research had had an *impact*. The report is structured to address these tasks. Finally, the panel was asked on the basis of the review and evaluation to rationalise recommendations for water related research in Framework 7.

<sup>3</sup> The INCO partner countries include – those in the Eastern and Southern Mediterranean, in the Western Balkans, in Russia, Eastern Europe and Central Asia (formerly New Independent States - NIS), the ACP (Africa, Caribbean and Pacific) countries, Latin America and most countries of Asia.

moving against the main preferences of discipline-based science in higher education and research within the EU. Policy-related science is not the first choice for most water scientists in Europe. Nor are such researchers reinforced by their national science programmes and related funding processes to pursue policy-oriented research. There is evidence that EU researchers in the areas of water science consider that the applied science conditionality of EU-INCO has introduced unacceptable transaction costs.

This review process has not focused on the quality of the science. Within INCO there exists a very thorough and transparent process for such quality evaluation. First, the bids are vetted by a comprehensive peer-review process. The coordinators of the successful individual projects which receive EU funding also provide reports on progress and on final outcomes. Contributions to the peer-reviewed literature are also fully recorded. Nor has the review focused on the efficiency of managing the research. Logistical problems encountered by some research groups are, however, noted where they seem relevant to this review.

The review is mainly concerned with the *research focus and the agenda set for EU-INCO water research*. It is especially concerned with the *policy relevance* of the research as required by the Integrated Water Resources Management (IWRM) approach. EU-INCO adopted the concepts of IWRM to shape its calls for research. The reviewers have also attempted to detect trends in the EU-INCO water research approach and the extent to which the research reviewed has advanced the understanding of IWRM and its operationalisation.

### ***Who has been involved in shaping the agenda and doing the research?***

Partners in the EU-INCO water research include the following institutional and individual interests:

#### **Shaping the research agenda**

##### **Intra-EU**

***EU-INCO staff and their 'advisers'*** from other Directorates General (DGs) within the European Commission (EC), particularly those in charge of other foreign policy areas and their instruments. These bodies include DG Environment, as well as other individuals from academic and other constituents in EU Member States and Associated States, together with the Programme Committees for successive INCO programmes from FP4 through FP6.

***The EU water science epistemic groups*** involved in bids and in other liaison with EU-INCO staff. Such interaction and feedback can be advanced, interdisciplinary and high quality. It can also be partial, narrowly disciplinary in nature and without a constructive relationship with policy-making. Policy-related research – as increasingly required by EU-INCO - is however, unavoidably interdisciplinary. Research inspired by the concept of *IWRM* is also explicitly inter-disciplinary and integrated. Predictably the requirements of EU-INCO have challenged water scientists who have normally worked in the more comfortable less integrated, or non-integrated, mode.

***Review processes such as this one in the EU*** have been carried out on about 50 INCO projects addressing health systems research. Moreover, specific reviews have had a geographic focus or have assessed impact at INCO project or programme levels. In addition

broader monitoring and impact assessments regularly take place on the Research Framework Programmes as a whole.

## **Extra-EU**

### ***Partner country policy makers and science epistemic groups***

The multi-partner research required by the EU-INCO research mode motivates EU scientists and the staff of EU-INCO to liaise with partner country scientists. Increasingly, project-based research is accompanied and prioritised by bi-regional policy dialogue between Europe and partner countries in other parts of the world. Priorities are also derived from international commitments that the EU makes in UN fora. These include commitments towards the Millennium Development Goals adopted at the Millennium Summit in New York in 2000 and the Plan of Implementation adopted at the World Summit on Sustainable Development in Johannesburg, South African Republic in 2002, which gave rise to the EU Water Initiative. The consequent research has enabled relations to deepen and become increasingly extensive during the past two decades.

The EU-INCO research agenda could be seen as an element of a Northern project. The purpose of the project being to gain currency for ideas and approaches developed in the neo-liberal North while also attempting to learn about the conditions in other parts of the world and the viable solutions to be found there. The review concludes that there is strong evidence that some scientists in partner countries are evolving approaches and environmental protocols that are in advance of those of the EU. These scientists have been usefully involved in mutual learning. This is particularly interesting in view of the professed INCO concern with mutual interest and mutual benefit. Evidence of mutuality is that the water law of South Africa has come through its political evolution with a more radical and comprehensive outcome than similar processes in the EU. For example, the South African Water Law takes a more principled approach to water quantity management than the politically evolved Water Framework Directive [WFD] of the EU. At the same time the South African law derived the benefit of hard won experience from the WFD process. The problems of implementing the South African water law is providing lessons for those grappling with the introduction of their own water reforms.

### ***The international water research discourse on IWRM***

In this review the international discourse on IWRM is particularly relevant as EU-INCO initially embraced the concept of IWRM somewhat uncritically in the mid-1990s. The term was used by EU-INCO in specifying what it expected from those sponsored to research water management.

Significant attention will be given in the analysis to the evolution of the global discourse on IWRM as well as to the problems encountered in implementing IWRM. The extent to which the EU-INCO promoted a sound version of IWRM will be discussed. In addition, the important contributions made by the progressive vision and research capacity of *some* EU and partner country water scientists and social scientists will be highlighted. It will be shown that some individual scientists and laboratories were substantially in advance of the EU-INCO position on IWRM. Some were even in advance of the practices being promoted in the global discourse. But most water scientists – from the EU and partner countries - were behind the general trend.

One of the recurring problems present during the evolution of the IWRM principles and even during the writing and reviewing of this report is the use of the term management.

Management means different things to different professional groups. In Europe it tends to have a rather narrow administrative and technical meaning. In North America the footprint of the term extends to include the consideration of the policy consequences of proposed reforms. The reason this report has emphasised the need to establish a non-misleading meaning for word management in IWRM is because IWRM practitioners and water scientists have – in the past decade - generally defaulted to a narrow definition of ‘management’. This definition ignores, for example, the unavoidable politics of allocating scarce water. The default to the narrow meaning of ‘management’ by the advocates of IWRM has enabled the wide diffusion and adoption of IWRM principles. But this apparently favourable indicator is an example of how we can measure doing the wrong thing well rather than the doing right thing a little badly. Doing the right thing is normally politically stressful – especially where it means disadvantaging some water users or protecting the environmental services of water from current water using practices.

**Implementing the EU-INCO water research agenda through:**

***EU-INCO funded projects, coordinated activities and the development of science networks***

EU-INCO staff manage the research programme which is given expression via its sponsored *research projects, coordinated activities* and *specific support actions* (formerly accompanying measures). The aim is to promote high quality applied research via these modes. In addition to policy dialogue at institutional levels, *the coordinated activities* and the *specific support actions* are the principal means by which EU-INCO promotes its mission to diffuse advanced concepts and involve large numbers of scientists in partner countries. Part of this process is the establishment of platforms and networks in the partner regions to promote awareness of advances in relevant science.

***EU and Associated Countries water science institutions and their staff***

Most universities in EU member states have departments that address aspects of water science. A few of them have well-established centres of water engineering. These centres have been experiencing strong pressures to refocus their activities. The pressure has been to de-emphasise hydraulic engineering which supply manages water towards researching and teaching about the technologies that contribute to demand management. The supply management approach responds to water shortages by finding and mobilising more water. Building more storage, conveyance structures and installing pumps to lift groundwater are supply management measures. Demand management is where technologies to monitor and regulate water use are installed. But much more important are institutional reforms that provide incentives to use water less wastefully and especially to use it in activities which bring a better return to water. The shift of focus to demand management has brought with it the additional need to expand the footprint of research. For example, in a world where water scarcity is more prevalent there is an urgent need to understand the role of institutions, the nature of institutional reform and the importance of transparent and inclusive governance.

Some university water science departments and centres have been particularly responsive and have rewritten their missions, have transformed their research agendas and have dramatically reshaped their training programmes. Those EU water engineering departments that have not responded to the new water allocating and managing environment have lost funding. In some cases, staff have been dispersed or lost. The same process has been observed in the United States.

In addition to the reshaping of the scope of water management in water engineering departments there has been an increase in the capacity to research and train in the areas of

social science and water policy in EU universities. The integration required by the principles of IWRM has, however, proved to be difficult to bring about in the university sector. Modelling scientists are wedded to the requirements of their modelling science and of their reinforcing peer review processes, which tend to pull ambitious modelling scientists back from the fuzzy world of integrated interdisciplinary research. In the UK for example the national research review process is especially deterring to interdisciplinary initiatives despite lip-service paid in government statements on the need for interdisciplinary applied research. Integration is a major political challenge even in the supposedly enlightened academic world.

Water management and water policy are the result of decisions made by individual water users as well as the outcomes of discursive processes in society and institutions more generally. Decisions by individuals and institutions combine the factors of production, including the manufactured capital of engineered structures, to provide water services and to protect water in the environment. Priorities are decided in institutions via institutional processes.

These institutional processes may or may not lead to information-based policy. There is strong evidence in the water sector that the inertia of long practice, including the long established preferences of scientists, are more important in determining water policy than underlying fundamentals addressed by water science. If the fundamentals do not determine, except in the long term, when we are all dead (after Keynes), then it behoves us to understand the processes that bring about the non-information based policies that tend to be the norm. The activities of the modelling scientists need to be augmented by those deploying the interpretive approaches of social science. (See Annex 1 Research approaches - for an overview of the different approaches to inquiry of modelling science, interpretive science and of activist science.) Most scientists are not even aware of the diverse water research landscape with its different approaches. They often do not respect the approaches of the scientists with a different research tradition. These are certainly not propitious conditions for the achievement of integrated research never mind integrated water resources management.

230 EU partners (115 university and 115 non-university), 22 Associated state (13 university and 9 non-university) and 318 Third Country partners (106 university and 212 non-university) have been involved in EU-INCO funded water research – 1994-2006. Most of the research projects have (or had) coordinators from departments in EU universities. However, the preliminary evaluation process, which assesses the balance within the research consortium of EU and partner country participation, gives strong preference to those projects where scientists from partner countries will be closely involved in managing the research. This outcome is partly achieved by ensuring that a proper proportion of the work packages are managed by scientists from partner countries. The participation of *Small and Medium Enterprises* and *non-governmental actors* is also encouraged. There were also 22 partners from countries associated with the framework programmes (13 from universities and 9 from non-university partners).

### ***Third Country water science institutions and their staff***

The mission of EU-INCO is to increase the capacity of associated state and third country universities and research bodies to research the management of water according to the principles of IWRM. The intent is to reach as large a number as possible of active water scientists and stakeholders and involve them in *research projects, coordination activities and specific support actions*. They have gained experience in conducting international level

research and in managing integrated interdisciplinary research through coordinating a proportion of the work packages in most projects.

The scientists in partner countries face all of the resistance to interdisciplinary and integrated working relations as their fellow scientists in EU universities and research institutes. Partner country scientists have the additional stress of being less well-funded and operating in institutional environments with high transaction costs that reduce efficiency. Without such initiatives as the EU-INCO water research activities their exposure to international research would be even less rich.

The exchanges are not one way. The EU-INCO formula ensures that there are opportunities to share hard won research experience in both directions. There is strong evidence that fundamental insights have been identified and essential principles deployed successfully through partner country science.

### **Leading edge water governance examples**

A major example of high quality partner country original science was triggered by the window of opportunity created by the national political transformation in South Africa. Radical constitutional reform occurred in 1994, followed by a comprehensive, country-wide stakeholder engagement process that culminated in a new water law. These and other social and political changes in turn generated an unprecedented level of focused enquiry in the water sector. They have also spawned an extraordinary number of integrated, water-related, research initiatives on institutions, public participation and decision-making processes. Scientists of all stripes – modellers, ecologists, interpretive social scientists and scientists from the water sector and beyond - have had to respond to and cope with the priorities defined by the urgent needs of society. The priorities are palpable; the politics unavoidable. The option to remain un-involved in a comfortable core of familiar disciplinary science has simply not been possible. This version of *constructively engaged* integrated water resources management incorporated all components of the hydrological cycle and all levels of stakeholders, thereby defining the way that South African water problems have been addressed during the precise period of this review.

EU-INCO has funded a number of research projects in South and southern Africa. Contributions by partner country scientists have helped to ensure that the current dynamic of South African water science has gained a high profile regionally and internationally. Amongst other local- and national-scale benefits, this co-operation has contributed to parallel processes of water law reform in southern African countries and helped to improve the management of shared (transboundary) river basins across the region.

Applied water management research in South Asia has also played a very important role in advancing our understanding of *constructively engaged IWRM*. The groups of interdisciplinary water research scientists coordinated by SACIwater and ISET [Boulder & South Asia] have made globally significant contributions by demonstrating the importance of the *constructively engaged* version of *integrated water resources management*. They have also researched deeply into the adaptive water managing strategies of communities in flood prone and drought prone regions. Their contributions are especially significant in confirming the role of economic processes beyond the watershed (SACIwaters, 2002).

### **An example of high impact research**

EU-INCO has also registered success in research projects in Cuba. The experience of Cuban health services provision in political economies enduring constrained institutional and investment capacities has proved to be of immense utility when communicated beyond the Cuban science and development communities. The dominant research agenda setting and implementation process is strongly influenced by the social agenda and, in combination with heavy investment in education, has generated tangible benefits [Giles, 2005].

It is estimated that 106 of the 318 partners from INCO target countries involved in the 67 projects were from departments in universities. They have gained experience in conducting international level research and in managing integrated interdisciplinary research through coordinating a proportion of the work packages in most projects. Interestingly, there was stronger participation in consortia from outside universities in INCO partner countries - ranging from government departments to farmer associations.

It has been necessary to refer to the above interested parties throughout the analysis. These parties can be summarised as:

#### **Agenda shaping**

Intra-EU

*EU-INCO staff and their 'advisers' in other DGs and EU Member States*

*The EU water science epistemic groups*

*Review processes such as this one*

Extra-EU

*Policy dialogue between Europe and other regions of the World, including in UN fora*

*Partner country water science epistemic groups*

*The international water research discourse on IWRM*

#### **Research and networking activities**

*EU water science institutions and their staff*

*Associated States and Third Country water science institutions and their staff.*

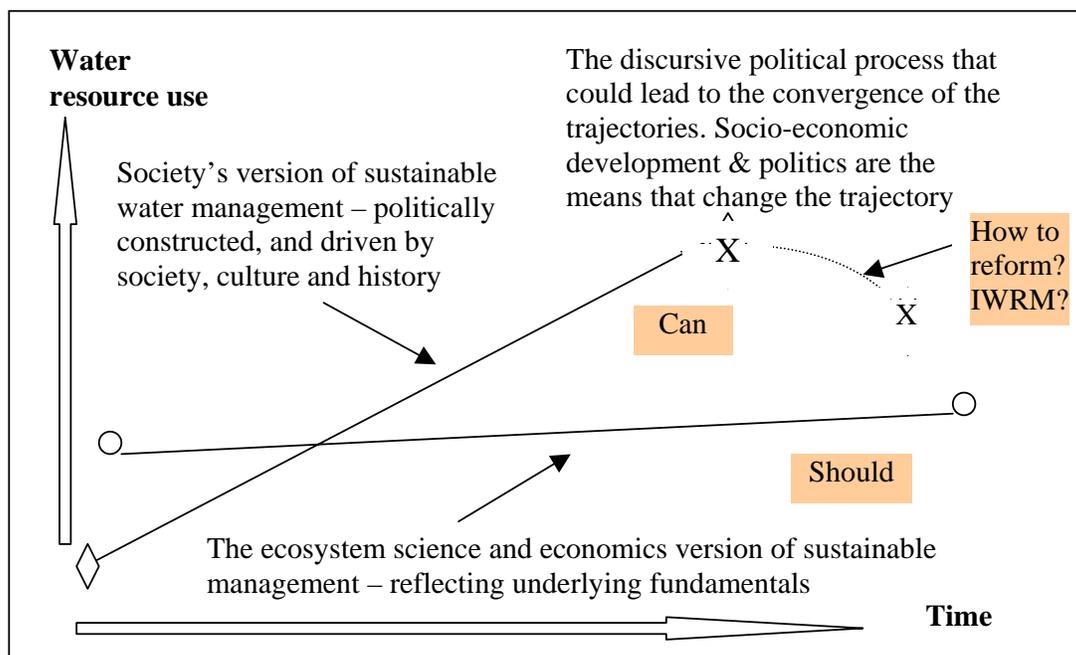
### ***The international water science context and the challenges of integration***

This review examines the extent to which EU-INCO water research activities and outcomes have reflected the progressive ideas in international currency on water management during the decade of the review. It will be shown that the EU-INCO contribution in advancing policy-related research on water management has been significant. EU-INCO has played a positive role in steering international research by European and partner country scientists into the domain of water policy as required by the IWRM approach. In this mission EU-INCO has been assisted by the scientific leadership of a number of progressive EU institutions. It has also been able to mobilise the progressive water and engineering science and relevant social science in partner countries. The progressive leadership of these EU and partner scientists has been at the cutting edge of the international discourse on water policy reform.

The international IWRM discourse has been, and remains, contentious. Water policy reform is a very challenging process impacting long established water-intensive livelihoods. Water

policy reform is especially contentious where the water demand of the existing society and economy has begun to exceed local water resources. In these new contentious circumstances a wide range of new institutional capacities are needed to cope with unfamiliar ideas, new priorities voiced by society and by activists speaking for the environment.

Integrating these new knowledge requirements and the simultaneous contention of water users requires integration. *Integration is intensely political* as is *the re-allocation of water resources*. Social engagement is required in order to adjust water demand to limited local water resources (See Figure 1). It is normal for the re-allocative policy reforms to be avoided, with negative consequences - normally on the environmental services provided by water. It is also common for water users, water policy-makers and water scientists to ignore solutions that are not part of their experience.



**Fig. 1.1** Conceptualising the trajectory of water management determined by society – the upper trajectory. And the trajectory identified by ecosystem scientists and economists – the lower trajectory. Convergence - shown as X-X - is achieved by getting the science into the political processes that determine use and policy.

Figure 1.1 conceptualises the challenge facing those sponsoring and carrying out applied research on water resources management. Water scientists and water resources economists can identify a *sustainable* water resource managing approach that satisfies their environmental and economic ideals. Actual water management can be very different. A new sustainability paradigm based on ecosystem and economic principles – represented by the X - X element of the upper trajectory - has to contend with long established and deeply preferred beliefs about what is sustainable.

If scientists have new knowledge that if taken into account could enhance the environmental services of water and its economically efficient use they have to acquire new skills of communication. They must learn how to engage in political processes. The communication

of unwelcome new ideas that would nevertheless enhance the collective good requires constructive engagement.

Another problem for those engaged in water science and for those water users, water managers, water professionals and most modelling scientists, expect to find all solutions to water problems in the water sector. This review of the role of EU-INCO in water research is being conducted at a particular moment in the international discourse on how best to manage water. The importance of the 'problemshed' beyond the watershed has been around as a concept for about two decades and the concept of virtual water for a decade. These ideas are beginning to be recognised as highlighting different, non-water sector, solutions. But their adoption in practice is at the beginning of such diffusion processes and there are still many trenchant critics of the concepts who will continue to slow their adoption on a broader front.

### ***Concluding comment***

The context in which EU-INCO has sponsored its water science for the past decade has been dynamic. The IWRM approach, adopted by EU-INCO, has evolved during the decade and gained wide but generally uncritical adoption. The EU-INCO role in diffusing the IWRM approach to water allocation and management has been responsible. But, like the water using and water research community world-wide, EU-INCO has not pushed its sponsored researchers to achieve the necessary understanding of the social and political to engage effectively in policy reform. It will be shown in the chapters where the *effectiveness of the communication* of research results and of *impact* of the research are analysed that this inadequate level of understanding impaired satisfactory *communication* and *impact*.

More than one member of the Mirror Group pointed out that water scientists and water professionals were being given an unfair share of the *communication* burden. Water users and policy-makers should also be prepared to be receptive to the underlying fundamentals of water science and the economics of water. The panel understands this positionality but felt that the water science community and those who research the economics of water need to be reminded that there is a duty to communicate despite predictable unreceptive politics. There is little point in doing the right thing well if it cannot be communicated. As a result the importance of local knowledge is emphasised throughout the report. Not just local knowledge on water managing techniques. The panel suggest that even more important is local knowledge on what new desirable initiatives and reforms are politically feasible and why.

## **Chapter 2 The evolving emphases of research in the water sector and beyond and their place in the review**

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### ***The challenge of reviewing a complex and dynamic process: some theory***

The panel conducting the review recognised that the diverse readership of this report would come from many institutional backgrounds and many different sciences and diverse practice. The members of the panel were particularly aware that the concept of Integrated Water Resources Management (IWRM), though widely diffused since the mid-1990s, has been subject to much critical comment. Despite its substantial patrons – the World Water Council (WWC), The Global Water Partnership (GWP), EU-INCO, and most bilateral donor agencies, the widespread uncritical acceptance IWRM has attracted well-founded criticism (Allan, 2005; Biswas *et al.*, 2005; Gyawali, 2003; Mollinga *et al.*, 2004). One dimension of the criticism is that IWRM has been difficult - even impossible - to operationalise (Biswas *et al.*, 2005). Such criticism could, however, be levelled at many pragmatically developed institutions - such as neo-liberal democracy. Certainly it is true of law and especially of water law and its international cousin, customary international water law. The other source of criticism is from those who show that IWRM, as defined by its patrons, does not help water managers understand or grasp the reason for the difficulty of operationalising the approach (Allan, 2005; Gyawali, 2003).

The position taken by the panel was not that IWRM could not be operationalised. It takes the second position that IWRM has not been adequately defined; IWRM has been too narrowly defined. The widely quoted GWP definition is an example<sup>4</sup>. Unfortunately, the proponents of IWRM in the international arena – The World Water Council (WWC), Global Water Partnership (GWP), the World Bank (WB), the EU, and many bi-lateral donor agencies - have taken advantage of this narrow, incomplete and unchallenging definition to ease its diffusion and adoption. There is no space here to discuss whether this has been a conscious pragmatic tactic or an uninformed and uncritical strategy. Whatever the reason for the narrow definition, the outcome has been that a misleading approach has been promoted and widely adopted. It is like promoting the high-minded regulation of big city traffic congestion without emphasising that the implementation will be a very rough political ride at *all* stages.

The way IWRM has been defined enables water scientists and water professionals to sign up to the concept believing that it roughly approximates to what they have been doing already; often for a very long time. Long established national water managing ministries, employing sometimes over 100,000 staff, have presumed that IWRM accords with their normal practices. Higher education institutes re-label their existing graduate programmes and print the new titles in their prospectuses as IWRM relevant, without changing the content.

These practices are possible because IWRM is assumed by such scientists, practitioners and educators, to be driven by technical and economic fundamentals, enriched by a measure of increased environmental awareness. The problem with the international IWRM discourse,

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<sup>4</sup> The Global Water Partnership (GWP) definition is:

“IWRM is a process which promotes the coordinated development and management of water, land, and related resources, in order to maximise the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems” (2000).

and its regional expressions, is that it has ignored the political dimension, although the notion of governance and related politics has been gaining a place (Rogers and Hall, 2003).

The panel debated at length how to handle the terms of reference of the review. The review overall has been limited to only 13 days of meetings so 'at length' means over two days. A report was required that analysed first, the extent to which EU and partner country researchers had adopted the IWRM approach. Secondly, the task was to evaluate the extent to which the researchers had – via their research - promoted the adoption of integrated water resources management and had diffused the concept.

The panel recognised that the result of water professionals grappling with the concept of IWRM - put in place at the end of the 1990s – has been to highlight the need for the amplification of its definition. The amplification was required to make IWRM relevant and more operational. A review of a number of concepts central to IWRM was also needed. For this report it was also necessary to define some essential concepts – 'sustainability', 'integrated', 'management', 'the maximisation of economic and social welfare'. Both the panel and the readers of the report needed such clarification.

These amplifications and the conceptual foundations of the study and its methodology are available in a *Background Papers No 1*.<sup>5</sup> The first background paper provides the theoretical basis of the analytical position taken by the panel. The discussion in the first background paper engages constructively with the current discourse on IWRM. On the basis of the wide international experience of the panel members the *critical positionality* adopted is at the cutting edge of the international IWRM discourse.

### ***Panel responses: focus and methods***

In brief the panel has adopted the perspective captured in the following statements. The concepts and arguments are developed more fully in *Background Paper No 1*. A summary is presented below of the main ideas that have been woven into the review approach:

#### **Sustainability**

- 1 Sustainability has three dimensions – social sustainability, economic sustainability and environmental sustainability. Political processes mediate the interests of those concerned with the three dimensions. Sustainability has three dynamic dimensions plus the mediation of a fourth dynamic political process.<sup>6</sup>

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<sup>5</sup> EU-INCO, 2005. The context of international EU-INCO Science and Technology cooperation projects addressing integrated water resources management, *Background Papers No. 1* of the Review of EU-INCO sponsored research on water – 1994-2006, Brussels: EU-INCO. <http://europa.eu.int/comm/research/water-initiative>

<sup>6</sup> A number of the Mirror Group reviewers pointed out that sustainability has a vast literature that defies summarisation. The panel is aware of the history of the term and especially of its role in water science and water allocation and management. Part of the confusion surrounding sustainability in the water sector is that water scientists and water users have different assumptions about the term sustainability. Water scientists and economists base their analysis on underlying fundamentals which often lead them to recommend precautionary 'red-lines' in order to achieve their rationalised sustainability. These fundamentals are important but do not determine water-using practice and the politics that keep such practices in place. Water users, water policy-makers and most water professionals have adopted a definition of sustainability that is shaped by the priorities of society and

- 2 Sustainability is a political construct. A society evolves its definition of sustainability according to its contemporary social, economic and environmental priorities. These priorities change with time and are mainly determined by discursive political processes in which observed science has normally played a minor role.
- 3 A different sustainability is defined by water scientists and economists. They can identify underlying fundamentals and red-lines beyond which waters should not be over-drawn or polluted and costs of delivery not recovered. Arguments based on these fundamentals have to take their chance in the water policy-making discourses which are shaped by long established power relations. It is possible to model sustainability in the water science domain. So far it has not been possible to model sustainability in the more important discursive domain of policy-making. Figure 1.1 illustrates the difference between the two sustainability perspectives and the role of water scientists and economists in achieving the convergence that they deem to be necessary.

### **Politics and discourse: constructive engagement and risk vis-à-vis IWRM**

*Integration* is political. Getting scientists and professionals from different fields to work together is intensely political and often unsatisfactory. Integrating the competing interests of water scientists, water professionals, of water consumers is very political indeed.

*Management* is also political in that within the apparently rational implementation of a reform agenda there will be the need to *re-allocate* water between existing users. This is increasingly the case in a world where water scarcity has become the norm. IWRM would be a safer term if it were to be *IWRAM*: integrated water resources *allocation* and management.

The major players in the political processes that determine a society's definition of sustainability and water policy can be identified by *cultural theory* (Thompson, 1988). The capability to manage water and, more importantly, to reform the way water is managed reside in two social solidarities with different approaches to, for example, economic and environmental values as well as to risk – first in the *hierarchical institutions* of government. For example, national water ministries and local government bodies provide *public sector finance, management and governance*. The second solidarity is the *private sector*, which uses the tools of the *market* to provide water services. A third solidarity is also of particular importance in the water sector as it is *civil movement activists* who provide a voice for the impoverished consumers and the environment. *Civil movements* – *NGOs*, unions and by their mobilisation of civil society bodies – have had a very significant impact on how the value of water has changed in the past three decades as well as on how entitlements should, and can be, achieved.

The importance of engaging the above perspectives or approaches in developing water allocation and management policies can be illustrated by considering how each social solidarity deals with *risk*. *Government departments* assume they can *manage risk*. The *private sector* tends to be *risk taking* – at least with respect to the interests of society and the protection of the water services of water. The third solidarity, sometimes identified as *ethicists*, is characterised by its adoption of principled positions. It *advocates risk avoiding*

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the maintenance of existing livelihoods that use large volumes of water. Figure 1.1 (p.12) illustrates how these two contending definitions of sustainability influence actual trajectories of water use which contrast with the economically and environmentally secure trajectory recommended by water scientists.

approaches. It is important to note that the third solidarity can only deploy *voice*. The other two solidarities can deploy a wider range of instruments. Governments can tax, subsidise, legislate, regulate and provide employment and a welfare state. The private sector can provide services via markets and other contractual arrangements. It can also provide employment and promote its interests via various forms of advertising.

The purpose of identifying these social solidarities is to establish their relevance to a sound and possibly an operational IWRM approach. To be operational and effective IWRM has to be *constructively engaged*. That is, IWRM practice must involve inputs from all three social solidarities and must also be gender sensitive. The panel has coined the term Constructively Engaged Integrated Water Resources Allocation and Management – CE-IWRAM.<sup>7</sup>

### **Phases of recognising and adopting IWRM and CE-IWRAM**

The review has required a methodology that could cope with the dynamic co-evolving circumstances of diverse water managing contexts. Water management and CE-IWRAM can take place in *humid* or *arid* environments, in economies *well endowed with freshwater and/or soil water* or not. They can also take place in *pre-modern* political economies with *little adaptive capacity* or in *late modern* political economies, which have the *adaptive capacity* to cope with water scarcity and with any other factor endowment deficits.

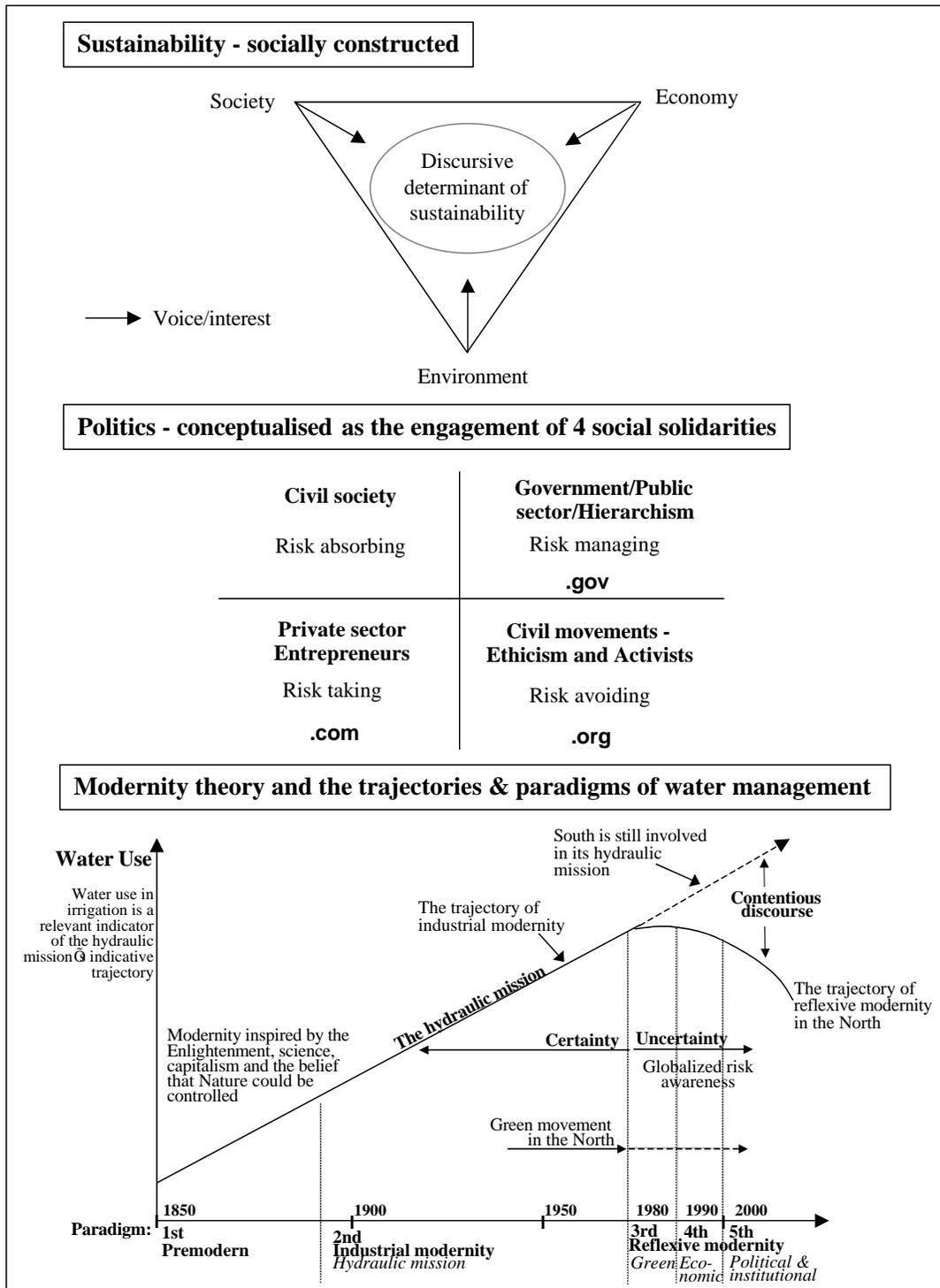
*Dynamic research focus.* The panel devoted intense discussion to the problem of evaluating a changing research community responding to changing ideas and research approaches evolving internationally. The agenda for research set by EU-INCO also changed during the decade. It was necessary to develop methodologies sensitive to the shift in diverse discursive processes at different levels. For example at the global level, at the level of EU-INCO sponsored water research and at the level of the research partnerships. Another challenge was that the IWRM approach was central to, and had inspired, the EU-INCO water research agenda. As demonstrated above EU-INCO used initially a narrow definition of IWRM though in current FP6 phase reference is made to participatory approaches together with IWRM, thus opening towards a perspective of *constructively engaged IWRAM*.

*Modernity theory* can be very useful in explaining the changing emphasis in environmental and water management policy in the Northern economies (Beck, 1992; Allan, 2001). Graphic expression<sup>8</sup> has been given to the discursive processes, which determined levels of water use in semi-arid Northern economies. After 1980, there was a shift from supply management to demand management. The 1980s decade was characterised by a green agenda. Water management changed. Freshwater tended to be put back into environment by stopping ‘unsustainable’ abstractions and withdrawals of water from the environment fell. After the pivotal Dublin Conference in 1992, the 1990s became the decade of water being seen increasingly as a commodity, with associated values, costs and prices. The privatisation of water services and water markets were discussed intensely and implemented with mixed outcomes.

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<sup>7</sup> The term *constructively engaged integrated water resources allocation and management* is the result of research and workshop liaison by research groups in South Asia, Europe and the United States. The SACIwater research group has coordinated important research in South Asia, ISET in Nepal has made additional contributions, and ISET in Boulder Colorado has coordinated other relevant innovative research. Groups in London and Bonn have also promoted the concept of *constructively engaged IWRAM*. Their research has focused on the problems of the South. The concept has not so far been adopted by most EU water scientists who focus on European water policy.

<sup>8</sup> Background Paper no 1 illustrates these trends.



**Fig. 2.1** The conceptual framework of the analysis providing the approach of the panel to evaluating the extent to which the EU-INCO water research – 1994-2006 – addressed essential themes and criteria which underpin constructively engaged IWRAM

The first decade of the twenty-first century has been dominated by concerns about *governance* and the principles of *inclusiveness* and *transparency*. This last phase is consistent with the constructively engaged IWRM identified by the panel to be the only way to deploy IWRM effectively (See *Background Paper No.1* for an elaboration of the dynamic trends outlined here). The first five years of the millennium have also seen the problems associated with politics and governance given prominence by the promoters of IWRM (Rogers and Hall, 2003; World Bank, 2005; European Commission, 2003). Members of the panel have also had first hand experience during the past year of addressing workshops where progressive members of the water science and aid communities have convened discussions on institutional reform and water politics.

### **Conceptualising constructive engagement**

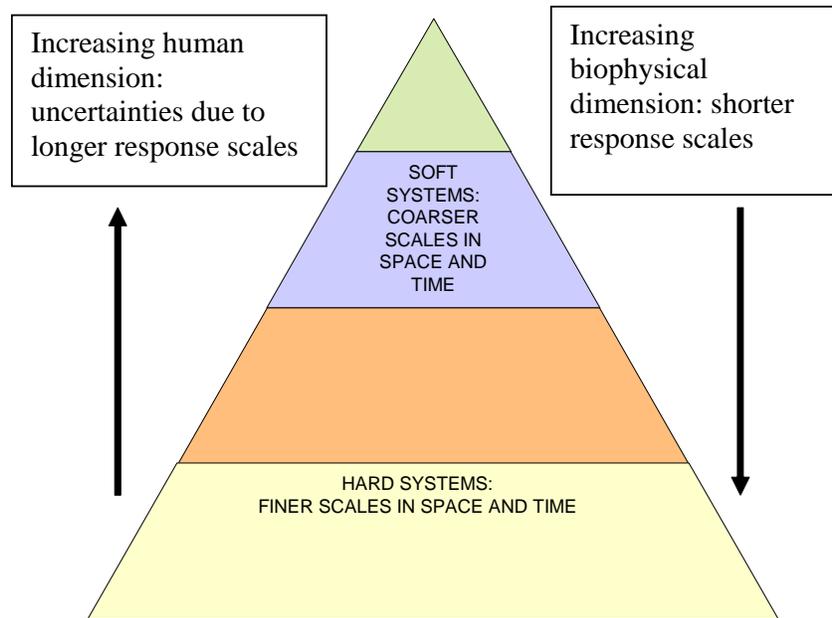
The panel judged it important to emphasise the need for water scientists and especially the readers of this report to have an understanding of what was meant by *constructive engagement*. The panel suggest throughout the analysis that the adoption of this approach represents the extra mile that needs to be travelled to ensure that IWRM is operationalised, enables communication and achieves impact within shortened time frames. Such constructive engagement offers the greatest chance of bridging the gap between the fundamentals of society and nature investigated by science and the perceptions of water actors in society, which are politically constructed and driven by culture, societal context and history (see Figure 1.1).

### **Models as media of communication as well as for analysis: modelling in support of constructively engaged IWRM**

‘The consequences of modelling are too serious to be left to modellers alone.... ‘

The panel felt it was necessary to identify a role for models and modelling in the domain of integrated water resources allocation and management. Models and modelling - from conceptual to high resolution numerical types - are increasingly essential tools with which to address the complexity of managing water resources at ecosystem scales.

Models are by definition simplifications of the systems they simulate or the outcomes they predict. This makes it important that models are both appropriate in respect of the purposes and data needs and adequately setup and evaluated. The use of modelling in support of IWRM and water systems research requires that all participants and stakeholders have a clear understanding of the strengths and limitations of the models. Modellers should be able not only to explain the model complexity in a conceptual way but, most importantly, allow stakeholders to access and discuss both the assumptions and the uncertainties of the qualitative and quantitative outputs. These requirements apply to the most sophisticated numerical models, which ideally should be developed in conjunction with stakeholders. If this approach is followed there will be confidence in the technical quality of the modelling and its outputs. Given the complexity of natural and human systems it is often difficult to identify the key linkages that govern water system behaviour in response to either human or natural drivers. Models, through sensitivity analyses are powerful tools to focus thinking and understanding that are required to determine policy and research priorities.



**Fig. 2.3** General conceptual systems model hierarchy depicting the continuity between aggregated scales of management requirements that focus on uncertainties supported by the high resolution models that provide the process level understanding. In a top down approach, the degree of system resolution is guided by the needs of the system complexity and scales.

### **Methodology for the review of project documentation**

*Methodology of evaluation.* The theory briefly reviewed above, and elaborated in *Background Paper No1*, proved to be very useful in developing research questions and methodology with which to evaluate the 67 EU-INCO water related projects. It was decided by the panel to develop questions to determine the extent to which these research projects had been conceived with CE-IWRM relevant criteria in mind. The questions were used by panel members to interrogate documentation held in EU-INCO archives on projects from frameworks FP4, FP5 and FP6.

### **Methodology**

In summary the methodology of the evaluation was framed on the basis of the theoretical overview summarised in this chapter and elaborated in *Background Paper No 1*. The questions, which emerged from the methodological approach, aimed to determine the extent to which the projects were sensitive to:

***Sustainability***: social, economic, environmental and constructively engaged politics?

***Technical orientation***: did the projects take into account local knowledge, local society, the local economy and local environment?

***Integration***: was the approach integrated, biophysically oriented, and what was integrated?

***Narrative***: these questions aimed to determine how the research teams responded to the evolving EU-INCO approach as expressed in the FP4, FP5 and FP6 calls. Each project was evaluated against its own call criteria. Sensitivity to the *environmental services of water resources* was checked. As was whether the research focused on the *socio-economic contribution of water resources* or did it *take a comprehensive ecosystem approach*.

### ***Impact and Communication***

The review addressed two other priority issues that form a major proportion of this technical report. The reason for referring to *communication* and *impact* here is that they emerged as a logical focus of critical enquiry and they were judged to be addressable by the method of enquiry and analysis adopted.

***Effective results of communication***: The projects were interrogated on whether the research results were widely and effectively *communicated* to *policy-makers*, the *technical community*, to *local water users and managers*, to the *education sector* and to the *private sector*.

***The impact of the research***: was evaluated in line with INCO mandates: on *capacity building*, on the *advancement of CE-IWRAM* via *innovative knowledge generation and its use to support solving problems*. The extent to which *leadership* was *balanced* between EU and partner country members was also noted.

The evaluation of effective communication and impact proved to be elusive goals. It is only necessary here to say that it proved impossible to provide crisply focused comment. There were two reasons. First, the processes of policy reform and changes in water managing practice take decades and the projects were carried out over periods of four years or less. Secondly, EU-INCO had not required that milestones and criteria be identified against which to measure *communication effectiveness* and *impact*.

### ***Concluding comment***

The review has proved to be more of a peer review process than a tight evaluation on behalf of EU-INCO of whether the researchers achieved nominated benchmarks. The review is as much of the EU-INCO and its positionality as of the positionality of the research teams. The review also took place soon after the completion of another EU impact assessment programme. This programme compared the strategic positioning of INCO with international S&T cooperation by other countries or organisations and analysed evidence on stakeholder expectations inside and outside the EC and EU. The report from this other study showed that EU-INCO had a sound record in innovative research and that the EU-INCO model was well conceived (TEP, 2005). The TEP report suggested that the EU-INCO brand was not easily identifiable. The panel authoring this report disagree. They judge the EU-INCO approach and style to be identifiable and effective. They also commend the skilled and sensitive coordination by EU-INCO staff dealing with water research. The personal and intellectual engagement with project coordinators was very professional indeed. The continuity, that is the length of time EU-INCO staff have been coordinating specific areas of research, provides important evidence of the utility of constructive engagement without the disruptions of changes of staff. The record of continuity of constructive engagement of the EU-INCO water research activity is rare and of very great importance.

Impact assessments have also been made of the overall *INCO Programme under the Fifth Framework Programme* of which the water activities were a part. In this context an on-line survey programme was organised over a two month period with the aim of targeting the full spectrum of stakeholder groups, including project coordinators, National Contact Points, Programme Committee Members, expert evaluators and relevant EU Delegation staff outside of the DG Research (TEP, 2005).

The purpose of this chapter has been to provide a conceptual framework that introduces ideas that could assist water scientists and professionals with very diverse concerns in reading the report. The major intent has been to help those who focus on underlying fundamentals to recognise the dominant political processes that shape water use and mis-use. It is suggested that water scientists and professionals need to project their knowledge into the political processes that shape the way water is managed. They must learn how to communicate successfully via *constructively engaged IWRM* as conceptualised in Figure 2.1. The burden is not just that of water scientists and professionals. But they have a privileged potential place in promoting CE-IWRM.

### **Chapter 3: Results of the evaluation by the panel of the archived project documentation: FP4 – FP6 (1994 – 2006)**

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#### ***Introduction***

The purpose of this chapter is to synthesise the results of the interrogation of the documentation of 67 EU-INCO research projects<sup>9</sup> reviewed by the ten-member panel. The questions identified and summarised in Chapter 2 above were framed to determine whether the researchers organised their projects to address and promote IWRM. The work of the EU-INCO sponsored researchers was compared with a conceptualised IWRM benchmark namely the *constructively engaged IWRAM approach*. The questions answered by the panel were derived from this definition of IWRM.

A relative scale was used to score each category in the sense that the reference point to assess each call was the same call's terms of reference. This meant that any changes in the scores between calls were "real" in the sense that they were not a reflection of the advancing nature of the terms of reference. So, for example, a project that addressed the economic context of sustainability in FP4 would have scored higher than an equivalent treatment in FP5 where it was a requirement.

It should also be noted that the statistical treatment of the data was deliberately limited to the assessment needs of the review. The thresholds were the categories of inadequate (< 1), adequate (~ 1.5) and good (> 2). The trends were used if they took a particular category from one threshold to another. The standard deviations (expressed as a % of the average) were used to test the coherence of the average values.

The standard deviation statistics have been presented because they provided evidence of useful trends during the review period. The statistics showed that in almost all cases the research consortia improved the convergence of their activities on good practice. For example they gave increasing attention to environmental, social, economic and political factors relating to sustainability. The statistics also revealed where the level of attention being given was judged by the review panel to be less effective. The panel recognises that there are difficulties with the use of standard deviation statistics on ordinal ranked data. This is because of uncertainty in relation to the magnitude of the intervals. The condition that should be met is that the centre points of all the categories should be equidistant. The assumption in this study is that this is so.<sup>10</sup>

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<sup>9</sup> Of the 67 projects three were found to be not exclusively water related but in most of these cases the research was in aiming to answer questions of comparative relevance to the water research. It was decided to include these projects especially as some of them were very well conceived projects and well executed. Their approaches and their outcomes tended to confirm an idea discussed by the panel a number of times, namely that research by water scientists and by professionals in the water sector had not been, and had not become, progressive in areas of governance and in deploying social and environmental sensitivity.

<sup>10</sup> The panel thanks the reviewer who drew attention to the need for clarification.

The data were interpreted in two levels of aggregation:

- *Level 1 – reflects the data aggregated to the level of each of the six themes of the analytical framework (see Figure 3.1a & b)*
- *Level 2- reflects the data aggregated to the level of each of the questions within each of the 6 themes (see Figs. 3.2a & b – 3.5a & b and Figs 4.2a & b and Figs 5.2a & b) referred to in this analysis as criteria or components*

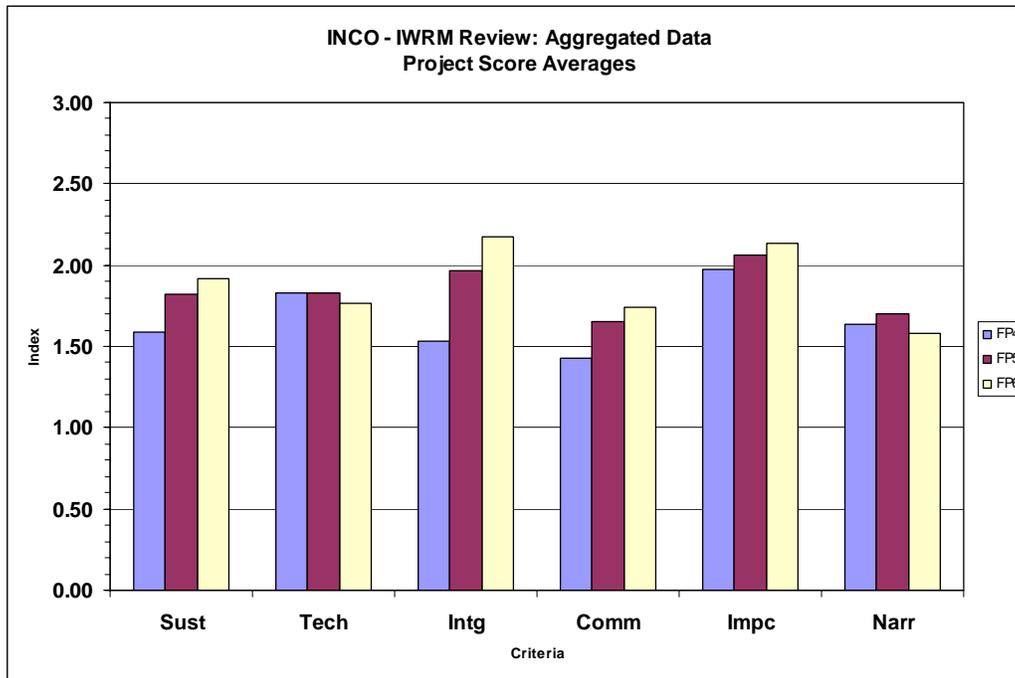
The goal of this process was not to rate the individual projects but to aggregate the project scores from each call and derive an integrated performance / impact index. Assessment of trends over time could then be made by comparing the aggregated scores from each successive call. The scoring of the individual projects was undertaken using a relative scale which was normalised to the criteria for each call. This meant that any trends would reflect real changes rather than simply being call driven. The importance of this normalised approach was that it enabled the review to assess the extent to which project portfolios within each call led, accompanied or lagged the global trends in IWRM as reflect by the scope of calls. In this method of analysis a project that addressed socio-economic issues in FP4 would have scored higher than the same in FP6 where it was a requirement.

***Level 1 Synthesis: aggregated scores for six themes used to assess the 67 projects during the three research frameworks - FP4, FP5 and FP6 – 1994-2006***

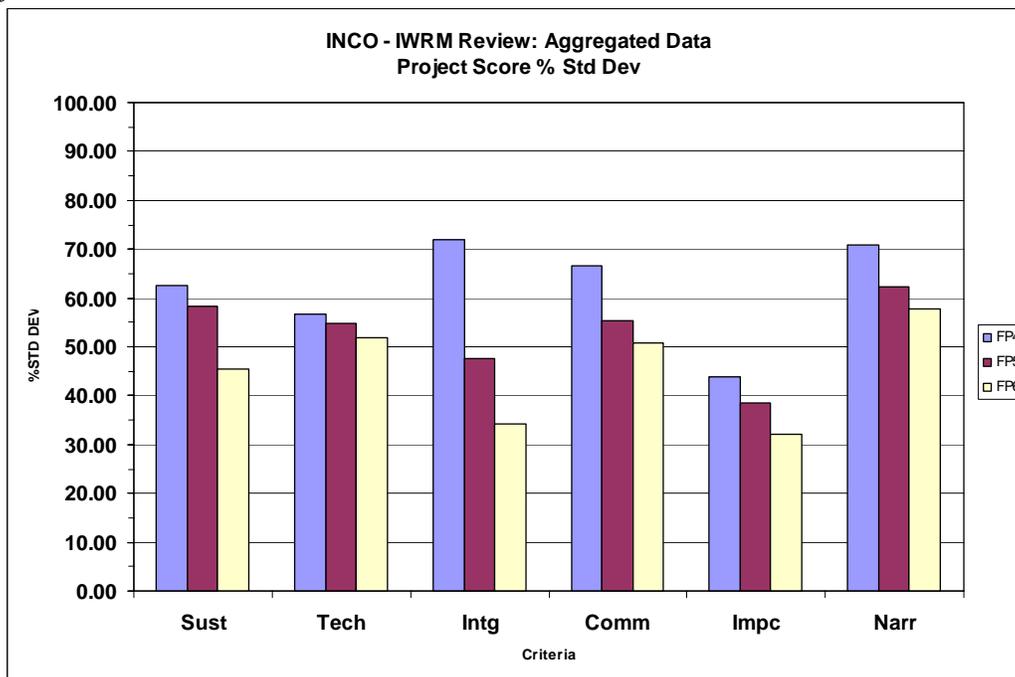
Broadly, the data show that across the three framework programmes Level 1 aggregated scores for the *all* the themes were at least satisfactory (score > 1.5). The highest impact themes were *Integration*, which also showed the strongest upward trend from average in FP4 to good (score > 2) in FP6, and *Impact* (Fig. 3.1a). Both passed the 2 threshold score in FP6. The weakest themes were *communication* and *narrative* – narrative here refers to the trajectory of the adoption of evolving IWRM principles by EU-INCO sponsored researchers and trends in the level of constructive engagement with IWRM principles.

The standard deviations of the scores – a measure of the spread of the scores on each theme - shows a remarkably robust trend of decreasing magnitude across all themes over the sampling period (FP4 – FP6) (Fig. 3.1b). As far as this review is concerned the reduction in standard deviation is a very useful indicator of the impact of the EU-INCO research policy on water research by EU and Partner Country researchers. The increase in focus is particularly significant for the integration theme where it halved over the period. A low standard deviation implies a greater coherence around average scores. The best outcome for EU-INCO in relation to its impact on the direction and IWRM relevance is a combined increase in the average score and a decrease in the standard deviation of the scores.

The *sustainability* and *technical context* were marginally above adequate across all three FP strategies. The marginally above average performance of the *technical* theme does not reflect the quality of the science but rather the extent to which local knowledge, ecological and socio-economic contexts were taken into consideration by the researchers. Recognition that these issues were important was a valuable indicator of whether the research teams had taken IWRM principles into account.



**Fig 3.1a** The aggregated average scores on the six main indicators (themes) examined by the panel in reading documentation to evaluate the performance of 67 EU-INCO water research projects



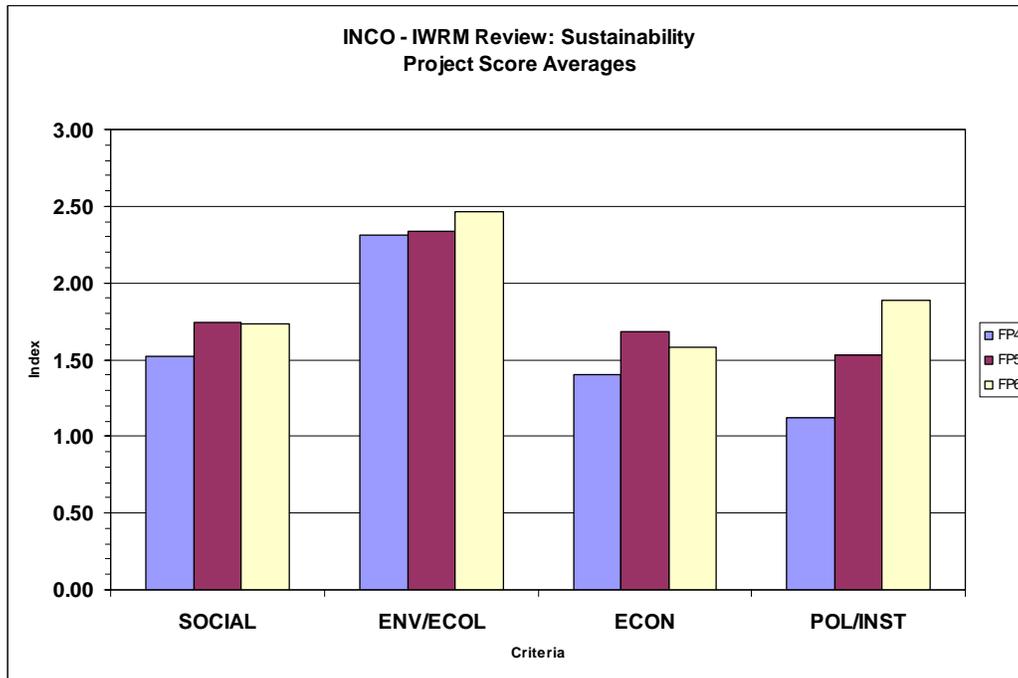
**Fig. 3.1b** The standard deviation data reflecting the scatter of results of the FP4, FP5 and FP6 scores on the six main indicators of research performance of EU-INCO water research as shown in Figure 3.1a above

**Level 2 Synthesis:** aggregated scores for two out of the six themes used to assess the 67 projects during the three research framework periods - FP4, FP5 and FP6 – 1994-2006. Showing details of how the researchers scored with respect to the sub-themes of Integration and Technical Context

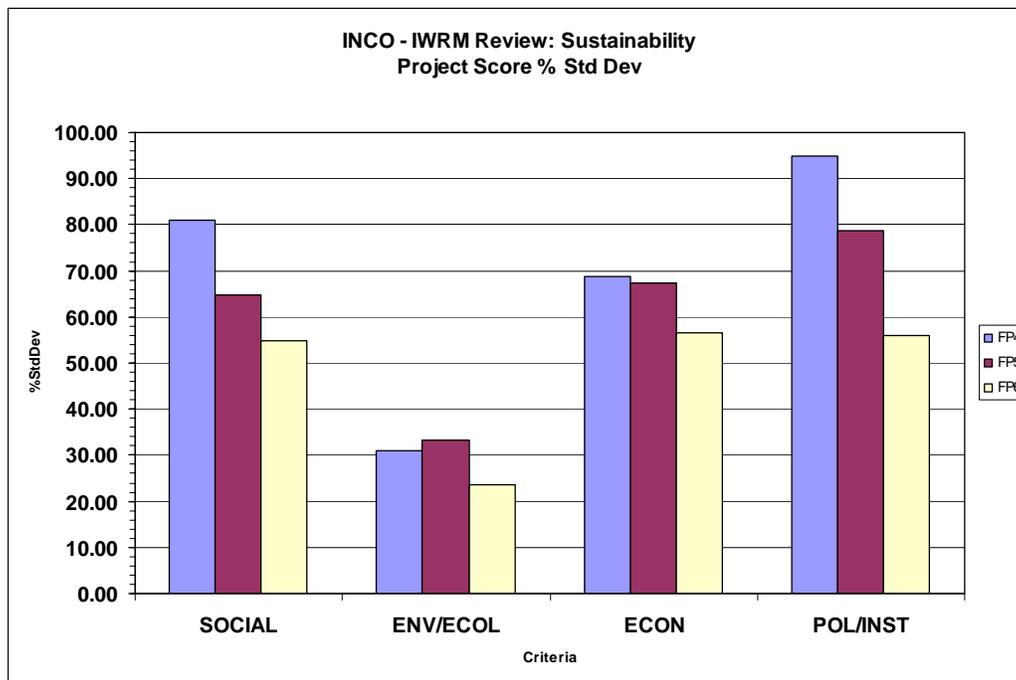
Individual themes/indicators are discussed next to provide evidence of the extent to which the EU-INCO sponsored researchers took into account the essential criteria that characterised the themes – sustainability, technical context, integration and narrative. Communication and impact will be analysed in Chapters 4 and 5 respectively.

### Sustainability

The theme of sustainability was investigated using average scores and the standard deviations of these scores for the four criteria. The performance of the researchers against the four criteria of sustainability would show the extent to which researchers had engaged with interests and voices that must be taken into account for the deployment of a *sustainable* IWRM research approach.



**Fig. 3.2a** The aggregated average scores on the four criteria examined by the panel in reading documentation to evaluate the effectiveness of 67 FP4, FP5 and FP6 EU-INCO water research projects in handling the theme of *sustainability*



**Fig. 3.2b** The standard deviation data reflecting the scatter of results of the FP4, FP5 and FP6 scores on the four criteria of research performance of EU-INCO water research as shown in Figure 3.2a above

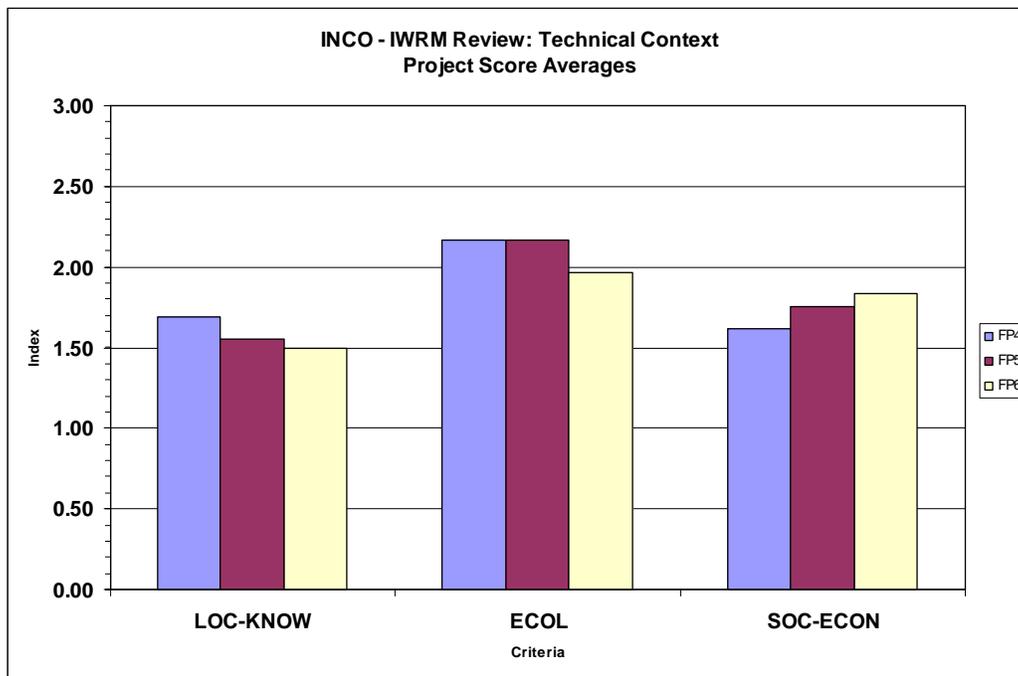
The criteria used to investigate the theme were social sustainability (including gender), economic sustainability, environmental sustainability and the discursive processes that mediated the interaction of the voices articulating these three criteria – see Fig. 3.2a and 3.2b. The diagrams show, as expected, that the environmental/ecological principle of sustainability was the most effective contributor to the performance of the overall theme. These high scores were expected because water scientists as well as social scientists working on water issues, have responded to the successful campaigns of the environmental movement since the 1960s. These ideas were well established even by the 1980s. Water scientists have willingly provided science to reinforce the green message in the water sector. This component of sustainability was also characterised by the lowest standard deviation (23% – 33%) (Fig. 3.2b) which suggests that this emphasis was coherent across all the framework phases. The high coherence also reflects a mature phase of the adoption of environmental priorities by all parts of the water science community.

Clearly the water science community has not yet come to terms with the sustainable criteria relevant to understanding how societies and the economy work. Again these scores were not a surprise. There is much anecdotal evidence that the water science community is not yet comfortable in its handling of the socio-political and economic aspects of sustainability. The lowest performing components - for the criteria of social, economic and political sustainability - were also characterised by high, and decreasing, standard deviations. Interestingly the decrease in the standard deviation of the economics component is not as strong as the social and political (Fig. 3.2b) which suggests that the effectiveness of the way the projects are dealing with the economic issues across the calls showed a persistent spread in scores.

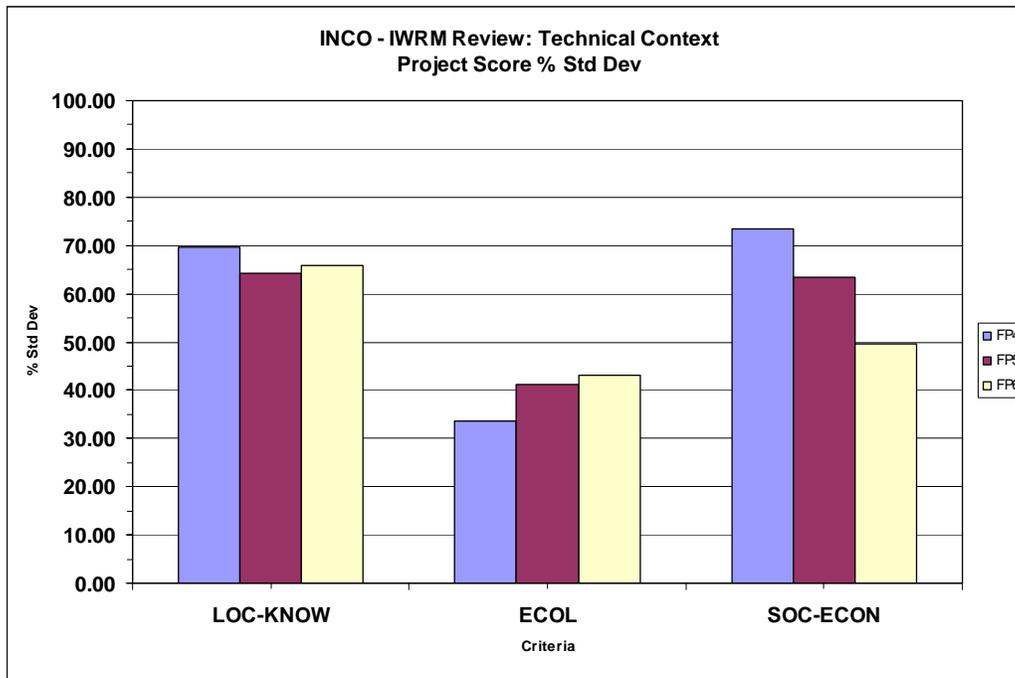
The general conclusion is that there is a need for a coherent strategy to deal with sustainability comprehensively. A balance is needed on the way the four criteria are addressed by researchers. A core strength of the constructive engagement approach advocated in this report is that it draws attention to the criteria that must be addressed. The environmental/ecological criteria of the comprehensive approach to sustainability should continue to enjoy the emphasis evident in FP6 research. But the emphasis given to the other criteria must also be emphasised and increased.

### Technical Context

The purpose of this element of the review was to determine the extent to which researchers had taken into account local knowledge, the ecological context of their study and the socio-economic circumstances of the research projects, Figures 3.3a and 3.3b shows the performance of the researchers on the technical context. A high but static score is evident for the extent to which the *ecological context* was addressed. There were average performances for the *local knowledge* and *socio-economic* criteria. Weak trends in the scores are apparent in the *local knowledge* and *socio-economic* components but they are not likely to be significant and suggest that the researchers remained indifferent and insensitive to these over the entire period of the review. The decreasing standard deviation on the *socio-economic context* suggests a more coherent response but weak nevertheless. The slight weakening of the scores on the *ecological context* is a possible concern because it suggests that an increasing emphasis in human dimensions occurs at a cost for the emphasis given to the biophysical domain. This evidence of a lack of balance in consideration given to the three criteria raises the need to think about the role of constructive engagement in ways to ensure that the responses to calls not only reflect awareness of this concern and that they also show explicitly how the problem will be dealt with.



**Fig. 3.3a** The aggregated average scores on the three criteria examined by the panel in reading documentation to evaluate the effectiveness of 67 FP4, FP5 and FP6 EU-INCO water research projects in handling the theme of *technical context*



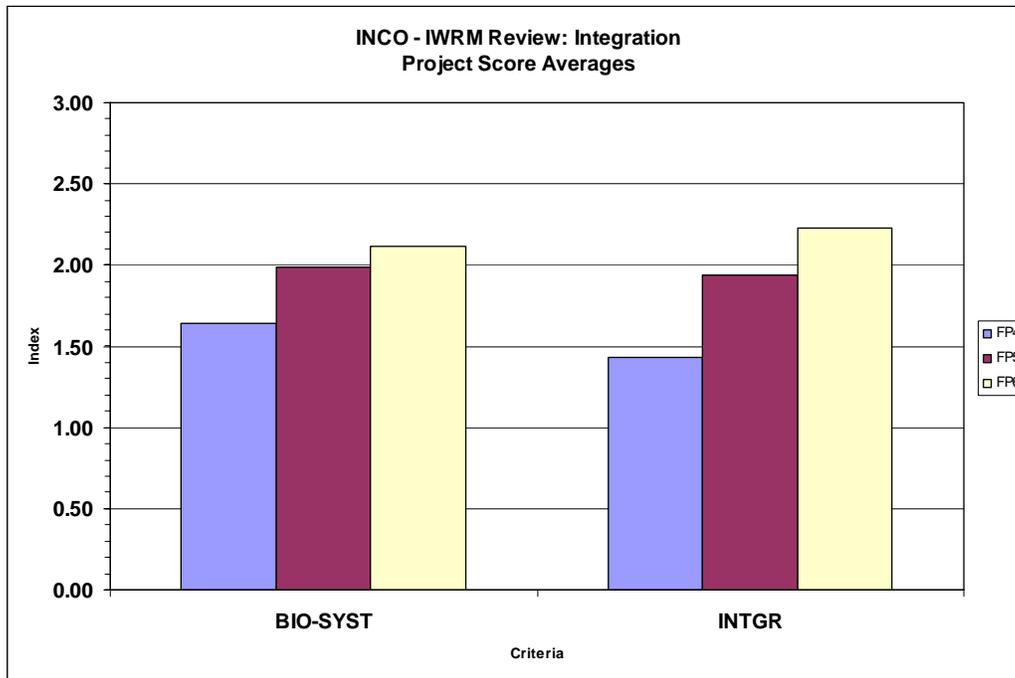
**Fig. 3.3b** The standard deviation data reflecting the scatter of results of the FP4, FP5 and FP6 scores on the three criteria of research performance of EU-INCO water research as shown in Figure 3.3a above

### Integration

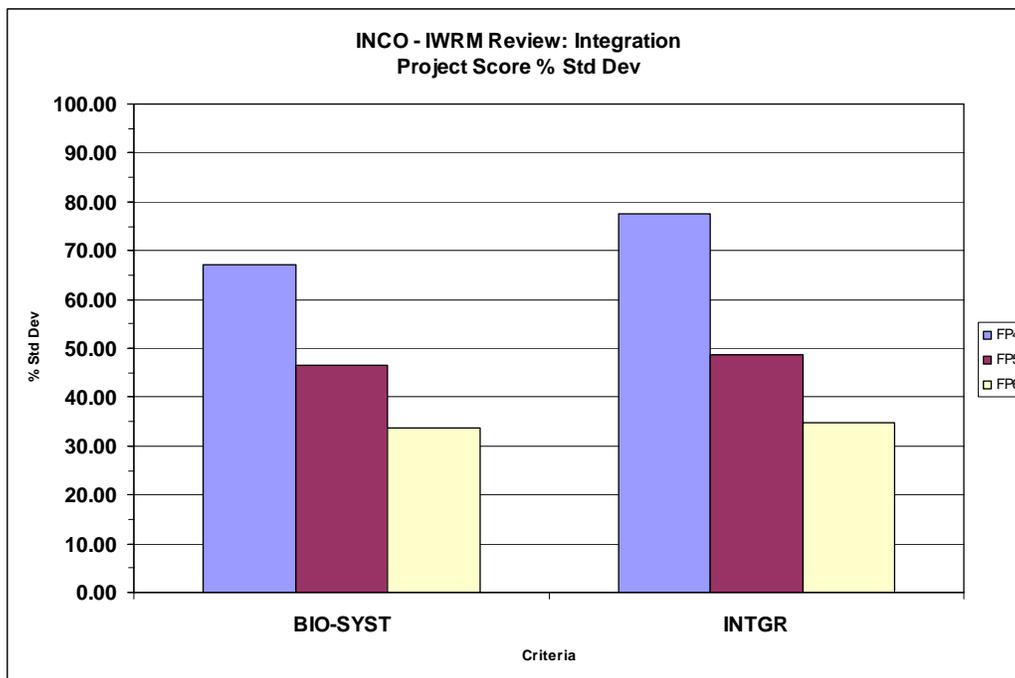
The *integration* theme aimed to determine the extent to which researchers adopted an integrated approach in their projects. The results are illustrated in Figures 3.4a and 3.4b. Two criteria were used to determine the nature and quality of the ways that researchers adopted a *biophysical system approach* and an *integrated*. Integrated here is used in the sense of including a widely defined science spectrum embracing water science as well as socio-economic and policy sciences.

Both criteria exhibited strong upward trends in the average scores and corresponding decreases in the standard deviations. These trends suggest a robust shift towards an integrated system approach to IWRM research over the period under review. The relatively high scores and low standard deviations in FP6 indicate that the science community was using the opportunity given by the calls to advance the principles of integration. There was significant evidence in the documentation that approaches in advance of that which was expected from the calls were being deployed.

EU-INCO can take satisfaction from both the trends in the adoption of the integrated approach reflected in the scores on the two criteria. The trends in the standard deviations reinforce the improving position by showing that a increasing proportion of the research community was adopting the demanding integrated approach.



**Fig. 3.4a** The aggregated average scores on the two criteria examined by the panel in reading documentation to evaluate the effectiveness of 67 FP4, FP5 and FP6 EU-INCO water research projects in handling the theme of *integration*



**Fig. 3.4b** The standard deviation data reflecting the scatter of results of the FP4, FP5 and FP6 scores on the two criteria of research performance of EU-INCO water research as shown in Figure 3.4a above

## **Narrative**

The term narrative was adopted to conceptualise the trajectory of the adoption of evolving IWRM principles by EU-INCO sponsored researchers and trends in the level of constructive engagement with IWRM principles.

The ways that researchers had engaged with and adopted IWRM principles was assessed in terms of four criteria: first, in relation to the trajectories that conform to the predictions of modernity theory as applied to the water sector – see Chapter 2 and Background Paper 1. The second criterion was *awareness of the environmental services of water*. The third was the extent to which there was a balance in the emphasis given to a *water resource management* versus an *ecosystem* focus; the fourth criterion was the extent to which the *cultural and historical* contexts were taken into account.

The scores on these four criteria reflect that over all three call periods the portfolio of projects consistently reflected a progressive position in that researchers were on average ahead of the EU-INCO calls with respect to both modernity theory paradigms and awareness of the environmental services of water (Fig. 3.5a). This high awareness was supported by a correspondingly low standard deviations (Fig. 3.5b).

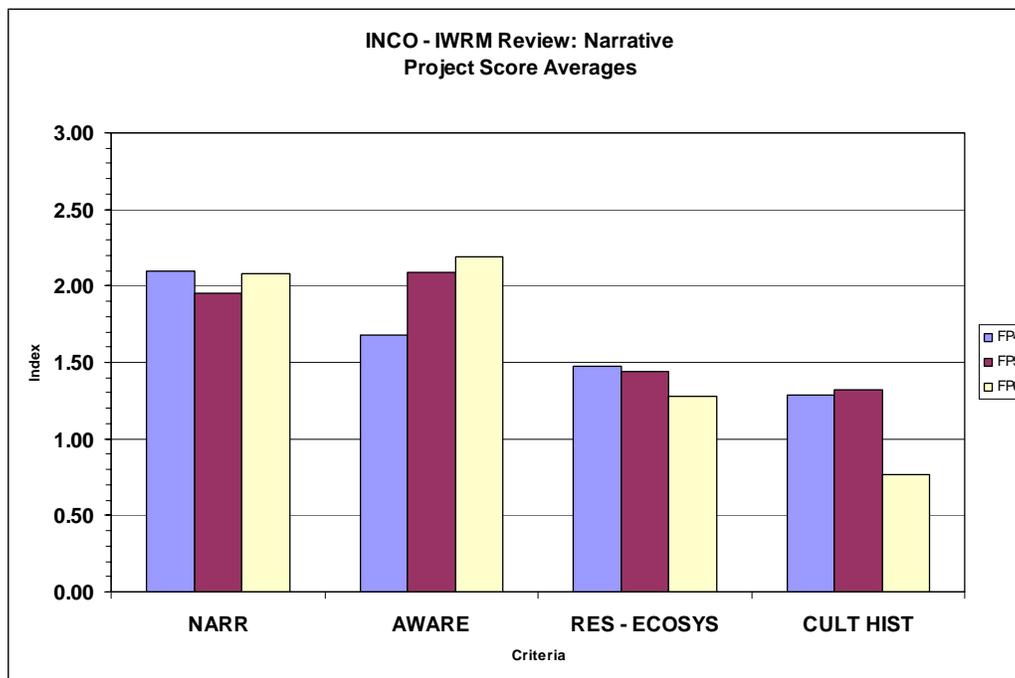
The relatively low score for the water resource management versus an ecosystem emphasis implies that throughout the period the emphasis remained consistently focused on resource based approaches. The trend indicates that this tendency increased. However, the standard deviation data suggests that this is not likely to be significant as there was a large spread in the standard deviation results for the projects in all of the framework periods for both the approaches captured by the concepts of modernity and of the ecosystem approach. These results were unexpected because EU-INCO had asked for progressively more explicit consideration of *IWRM principles* and *ecosystem approaches*.

The importance of these issues – especially in terms of the outcomes of the 2002 World Summit in Johannesburg - suggests that *IWRM principles need to continue to be addressed and the ecosystem approach needs to be specifically addressed in future calls*.

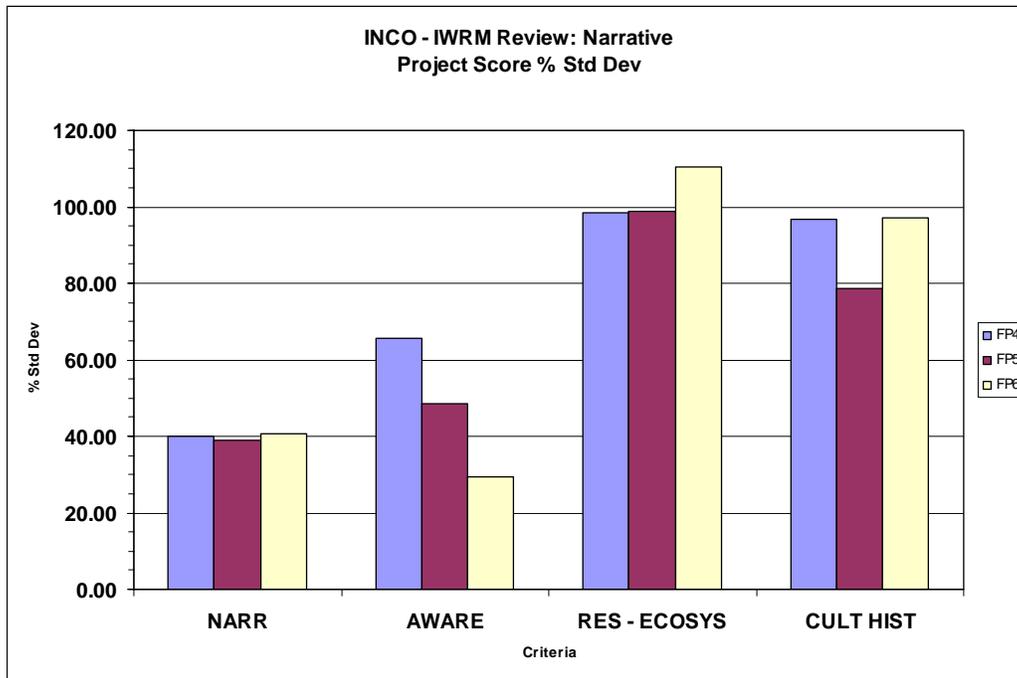
Awareness of the cultural and historical context of the projects was consistently low and if anything showed a decreasing trend towards FP6. The low score was reinforced by the wide scatter of the standard deviation results. An awareness of the historical and cultural context can be a critical success factor in the adoption of the IWRM as well as on the impact of the research. These contexts are especially important in trans-boundary water systems associated with long standing disputes and different value systems. These values can be based on long held belief systems on water ecosystems. **Awareness of cultural and historical contexts should make an explicit contribution to future research proposals.** Such research would have enhanced chances of success and impact as well as increasing the value of the science.

### Lack of awareness is a problem

It was evident that the EU scientists making the bids were usually much more interested in the techniques of decision support (DSS) and the use of geographical information systems (GIS) than in relating their research to water policy. A number of proposals were rejected because of their lack of policy focus. That the proposals had been expensively prepared but on the basis of a misreading of the call is an interesting indicator of the mindsets of the proposing scientists. Their assumptions were that the DSS and GIS techniques had some automatic relevance to water management and especially to integrated water management. Because DSS and GIS integrate information from diverse sources the users of these support techniques believed they had comprehended and addressed IWRM. As argued above, integration involves the constructive engagement of water users, water professionals, water scientists and activists. Not just information about them. Allocation and management of water – that is water policy and implementation - involve assessments of political feasibility and not just raw statistics about volumes, values and the variability of supplies and qualities of water.



**Fig. 3.5a** The aggregated average scores on the four criteria examined by the panel in reading documentation to evaluate the effectiveness of 67 FP4, FP5 and FP6 EU-INCO water research projects in handling the theme of *impact*



**Fig. 3.5b** The standard deviation data reflecting the scatter of results of the FP4, FP5 and FP6 scores on the three criteria of research performance of EU-INCO water research as shown in Figure 3.7a above

### *Concluding comment*

The systematic reading of the EU-INCO project documentation proved to be very much more useful than the panel expected when developing its evaluative methodology. The panel members were more comfortable with an approach that emphasised what *should* be present in the research and its impacts, than on what *was* present. It was this preference that required the initial brainstorming to identify a conceptual approach that would *first*, capture the dynamic context in which the research had been and was being carried out. The *second* requirement was that the method should show the extent to which the researchers had come to terms with the social and political processes that constructed the definition of *sustainability* underpinning actual water use and water policy-making. The *third* requirement of the method was that it could cope with the existence of different water managing trajectories based on different definitions of sustainability – see Figure 1.1 (Page 12: The *fourth* requirement was that the method would highlight the need for awareness of the special level of engagement needed if the science inspired version of sustainability was to bring about reform – illustrated by the X – X part of the trajectory in Figure 1.1.

## Chapter 4 The effectiveness of communication

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*'There are none so deaf as those who do not want to hear.'*

Anon. Scottish saying

### *Challenges for the communicators: some ideas*

Communication involves a number of players. Those with information to communicate and those who are the targets of the communication. Those who communicate in the domain of water science believe they have high quality information to communicate of some relevance to water users and policy-makers. The analysis in this chapter is not primarily concerned with the quality of the science, nor its relevance. The purpose of evaluating communication here is to provide an impression of how effectively the EU-INCO sponsored water researchers were committed to communicating the results of their research.

Communication is not a neutral process. It is a discursive social process. There are many obvious impediments to effective communication. At the same time media used to communicate can change rapidly. The mode of face-to-face communication transforms at the pace at which people learn each others' languages and adopt new mindsets. In modes where the medium is technologically dependent then the reach of new information can change very rapidly indeed as the diffusion of the transistor radio, television, CD, the internet, the world-wide web and the mobile phone demonstrate. All the researchers involved in EU-INCO water research projects carried out between 1994 and 2006 showed themselves to be very adept in the dissemination of information via new communication technologies. They did not show the same level of adaptation in the face-to-face modes. This is not surprising in that the idea that scientists should learn a different language register to communicate their science to policy-makers and the general public scarcely figures amongst the priorities of higher education.

The quality of the science, or even the potential effectiveness of the new communication technologies have little purchase on the effectiveness of communication. The message is of minor importance. The receptivity of the receiving mindset, individual and communal, is determining. Engaging constructively with the mindsets of water users, water managers and the water policy community is the key factor determining the effectiveness of communication. In practice EU-INCO asks researchers to communicate ambitiously without recognising that the culture of water science has not yet evolved a capacity to engage in the necessary constructiveness or give the process appropriate priority. Workshops, seminars, reports and refereed publications are effectively delivered but these are not enough. In practice the panel concludes that the researchers have a good and in many cases a very good record indeed in providing the normal deliverables of science.

Receiving mindsets determine the extent to which influential groups get to hear about new knowledge. Secondly, they determine the extent to which they actually listen to the message. Thirdly, they determine whether information is understood and fourthly, whether the consequences of new knowledge are assimilated. Those who vote the EU-INCO budget as well as EU-INCO staff who manage it want to be able to register evidence of the fourth outcome. There seems to be an assumption that those communicating water research findings do not have to navigate a process as thoroughly politicised as the institutions of the

European Union. The environmental and water scientists who were drawn into the politicised process of developing the EU Water Framework Directive learned, or should have learned, a great deal about the complexity of such politicised processes. And especially about the politically determined compromises that get incorporated into the co-evolved legislation and regulation. There is much conversational and workshop evidence that many did not.

If the mindsets of the target audience and the receptivity of that audience are not understood then it will not be possible to evaluate the effectiveness of attempts by scientists to communicate. Understanding the impediments to communication and the probability of hearing and adopting messages from water science are necessary points of departure if there is to be evaluation against ‘measured’ indicators identifying effective communication and impacts.

**Table 4.1** The feasibility of effective communication highlighting the neglected institutional space on the right of the diagram where mindsets operate in highly politicised domains.

<p style="text-align: center;"><b><i>Communication intent</i></b></p> <p>Research outcomes &gt;&gt; committed communication &gt;&gt;</p> <p>Research outcomes .&gt;&gt; committed communication &gt;&gt;</p> <p>Research outcomes &gt;&gt; committed communication &gt;&gt;</p>	<p style="text-align: center;"><b><i>Feasibility of communication – three contexts</i></b></p> <p>&gt;&gt; <b>Deaf mindset = <u>no communication</u></b></p> <p>&gt;&gt; <b>Unreceptive mindset = <u>some communication</u></b></p> <p>&gt;&gt; <b>Receptive mindset = <u>effective communication</u></b></p>
<p style="text-align: center;"><b><i>Research domain communication challenges</i></b></p> <p>The communication challenges include the potential cross –sterilisation of interdisciplinary research.</p> <p>But the level of politicisation is low compared with the domain – on the right - into which the research results are communicated to achieve <b>impact</b>.</p>	<p style="text-align: center;"><b><i>Challenges in communicating with target groups</i></b></p> <p>Engaging constructively with the highly politicised water using, water allocating/ managing and water policy community.</p> <p>Water users include the private sector as well as those providing and using public water services. Civil movements are also key players.</p>

Table 4.1 has been constructed to highlight the difference between communication intent on the part of those engaged in research and sponsoring it and the feasibility of communicating with target groups. Neither the researchers who have completed, or are completing, the 67 FP4, FP5 and FP6 EU-INCO sponsored water research projects, nor EU-INCO staff, nor the panel members who have completed this review have significant understanding of the circumstances identified on the right hand side of Table 4.1. These unknown circumstances have determined the effectiveness of the communication of research results.

Yet the *feasibility of communication* is nowhere identified as an important research context or an element of the research itself. This lack is true of the calls for research and of the

research reported. The project documentation did reveal that researchers had encountered problems that could only be attributed to mindset issues. These were reported with the usual incomprehension of those focusing on underlying fundamentals. These narrowly focused researchers do not understand where the observed science stands in relation to abstract power relations intrinsic to politicised communication. Politics are regarded as constraining. But this perspective is just an example of a constraint being in the eye of the beholder. One stakeholder's constraint is another's very existence.

The encouragement by EU-INCO of 'participation' and 'inclusion' as necessary elements of the IWRM approach were, and remain, well intentioned but uncritical moves by an under-informed research sponsor of its researchers. [One can be very politically literate about one's immediate political domain without being savvy about that which one is researching or sponsoring.] But these moves fall short of the constructively engaged IWRAM approach advocated by the panel authoring this report. Constructively engaged research and constructively engaged communication requires a willingness to understand the belief systems of those involved in managing and allocating water resources. The information and beliefs in this abstract domain are always more powerful than the observed science which scientists wish to report and disseminate. Marx noted the dominance of the 'abstract' over the 'concrete' 150 years ago. It is remarkable that scientists hunting the truths of their economic and environmental fundamentals have chosen generally to ignore the determinants of institutional behaviour, which they seek to influence.

The role of mindsets is emphasised by the laureate [institutional] economist Douglass C. North (2005) in his review of the processes of economic change. He provides a suite of insights in the following paragraph. They capture contexts where new knowledge has to contend with belief systems biased by self-interest and institutional inertia:

'We tend to get it wrong when the accumulated experiences and beliefs derived from the past do not provide a correct guide to future decision-making. There are two reasons. The set of mental models, categories, and classifications of the neural networks that have evolved in our belief system through which the new evidence gets filtered have no existing patterns that can correctly assess the new evidence. And in cases where conflicting beliefs have evolved, the dominant organizations (and their entrepreneurs) may view the necessary changes as a threat to their survival. To the degree that the entrepreneurs of such organizations control decision-making they can thwart the necessary changes. The first of these factors stems from our not correctly comprehending what is happening to us; the second, from an inability to make the necessary institutional adjustments.'

(North, 2005:117)

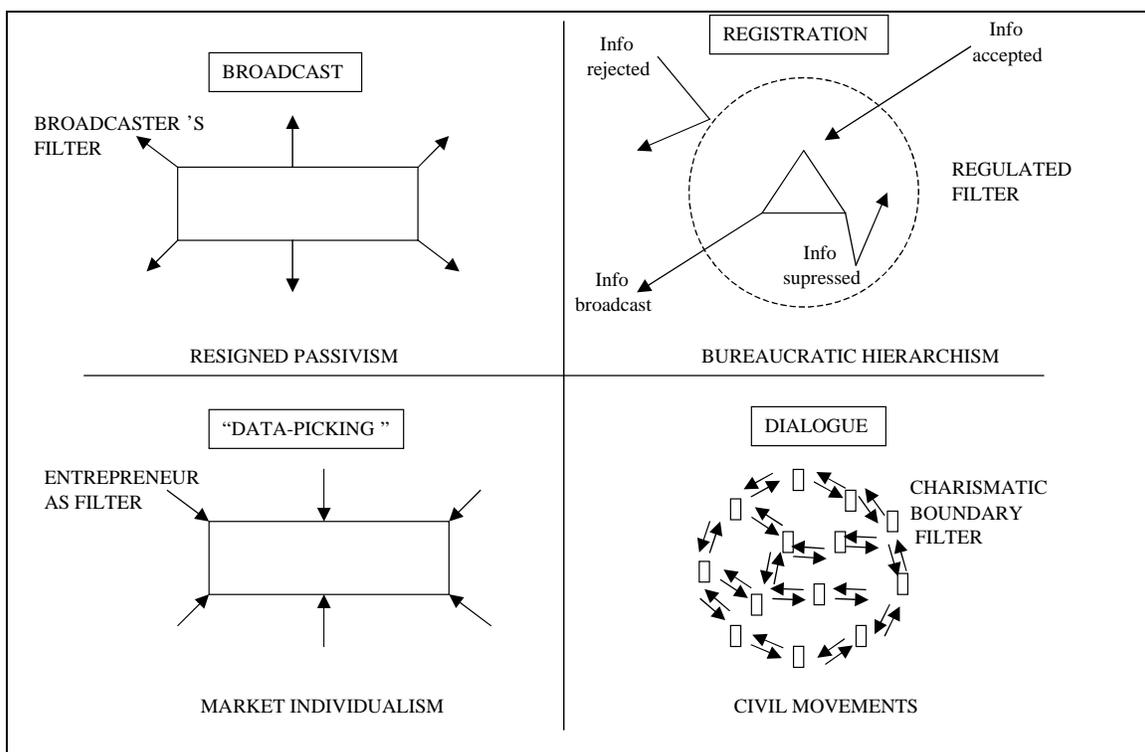
These insights of North highlight the complexities of which those communicating new water science need to be aware. The intent of this section of this chapter has been to steer the expectations of the readers of this report. The purpose has been to encourage a realistic awareness of the factors that determine effective communication of science findings and their potential impacts. There follows a brief review of some other structural and temporal conditions. These additional concepts help to understand the feasibility of evaluating the effectiveness of communication and impacts. Responding to the concept of the political feasibility of communication will be very important with respect EU-INCO FP7 calls and what they require from researchers.

## *Structural and temporal issues*

The panel devoted high priority to recognising the dynamic nature of the water sector itself, of water science and of the discourses evolving in water science and water managing communities. The foundation concepts of *sustainability*, *constructive engagement* and the differing institutional and economic circumstances of the EU political economies and of Partner Countries were identified in Chapter 2 and in Background Paper 1. The different trajectories of water policy reform – global, EU-INCO and in the sponsored science - were related helpfully to *modernity theory* – where the roles of certainty/uncertainty, risk and risk awareness and reflexivity inform analysis.

### **Structural issues**

In brief the structural issues relevant to communication relate to the concepts of *sustainability* and *constructive engagement*. The questions answered by the panel as they reviewed the 67 EU-INCO sponsored water research projects were framed to ensure that the ways that researchers had addressed these two underlying structures could be identified. Evidence of addressing the three dimensions of sustainability – *social*, *economic* and *environmental* – was checked. Just as important was evidence of an awareness of the *discursive processes* that determined *the socially constructed definition of sustainability* shaping the water using and managing circumstances being researched.



**Fig. 4.1** Information filters. Social solidarities assimilate or reject information according to whether it enhances or damages their social solidarity. They therefore come with their built in “social filters”, which, if not acknowledged as having their own idiosyncrasies, can lead to the dialogue of the deaf. Source: after Thompson (2000, 2004).

The water managing sector was conceived as having *four social solidarities* - *civil society, the public sector, civil movements* and the *private sector*. These social solidarities cope with processes of communication in different ways. Figure 4.1 illustrates these different strategies.

It is argued by the panel that neither EU-INCO nor the water researchers sponsored by them had in mind the different social solidarities, the ways they approached the acquisition of knowledge and their expectations, nor the preferences and perceptions of utility in acquiring new knowledge.

It is clear that the water policy terrain is impacted by the three active social solidarities – *bureaucratic hierarchism, market individualism* and *activist (social and environmental) enclavism*. All three constantly attempt to win over the passive masses (often the voters in democracies, but a fatalized populace in authoritarian regimes) to their respective strategies. *Markets* argue for the *efficiency* of their innovative schemes, *activists* rail *against the inequities* in existing or proposed projects, while *governments* try to *manage* a balance with fairness in procedures.

This plurality of strategic perspectives is reflected in the communication strategies adopted by the different social solidarities (Figure c1). Since the passive masses do not strategize but are strategized upon by the other three, the strategy they have visited on them is “*broadcasting*”, where they merely receive what is broadcast to them. The strategy of *market individualism* is “*data picking*” where information is picked or gleaned from whatever source, including from EU-INCO sponsored water science to innovate and to operate services at a profit. The *civil movements*, which are of an egalitarian nature, that is simultaneously critical, believe in “*dialogue*”, which can, however, quickly turn into an impossible cacophony. Here, the charismatic gate-keepers, who maintain the group boundary of a pure “us” versus the impure “them”, quickly become the filter, accepting or rejecting information. Finally, *the bureaucratic hierarchy* follows a strategy of *information “registration”* that it uses prescribed procedures to allow different ranks in the structure to accept or divulge information. In effect, the regulations function as *filters that accept or reject information* (viz. North 2005:117). The vibrant debates in the water arena in the period of the last two decades of reflexive modernity amply highlight the nature of the data filters in each of the social solidarities.

Such a plural perspective on data diffusion and filtering is fundamental to an understanding of the nature of the impacts of communication. The plural perspective is also useful in understanding how information is processed into a strategy. Awareness of the ways that the four social solidarities operate will also help in knowing how different entities managing and strategising water policy can accept new knowledge, as well as their different responses to water research findings.

Too often the INCO-funded research projects have relied on a passive “broadcast” mode. If the results are to have a greater impact, the information must reach the right level of *government*. New information must also be able to penetrate the *civil movements* in ways that initiate dialogue. And *markets* must find it easy to pick out aspects that enable innovative solutions.

If the research activity can address the issue at hand (high dams, water privatization, water conservation, etc.) to draw the three active solidarities into a new phase of dialogue, a

constructive engagement will emerge. Otherwise, alas, the impasse of rigid positions will continue with no benefits to anyone.

### **Temporal and discursive issues**

The concepts, which helped the panel in coping with the unavoidable dynamics associated with discursive issues, were those derived from *modernity theory*. This theory has been evolved in the neo-liberal economies of Europe and North America. For the water sectors of these economies there was shift after about 1980 from the *hydraulic mission of industrial modernity* to the reflexive modes recognising in sequence - first, the interests of the *water environment*, secondly, the *economic value of water* and thirdly, the need for the *constructively engaged approach involving inclusiveness and participation*.

The main challenge, which this approach highlights is the difference between the dominant mindset of science in the neo-liberal economies of industrialised countries and the mindsets prevalent in the EU-INCO partner economies. There is much evidence that partner country governments and water users are still inspired by a hydraulic mission approach to water resources mostly rejected by water policy-makers in neo-liberal economies. The EU-INCO country researchers are for the most part reflexive in their understanding of the environmental and economic value of water. Water scientists in partner countries are aware of the concerns of the risk aware reflexive scientists from the EU. But for them projecting these new priorities into the social solidarities of partner countries is challenging as it requires a personally hazardous level of constructive engagement.

It is not being argued here that the direction of innovative ideas is only one way. There is considerable evidence that partner country scientists, legislators and water managers are identifying technical and institutional solutions based on local innovation. For example the South African Water Law in its institutional, regulatory, commercial and environmental dimensions is very advanced. Likewise the thinking on the optimisation of power generation, water resources management for irrigation, for environmental services and for the interests of local water users is very advanced in South Asia.

### ***Problems of indicators and milestones***

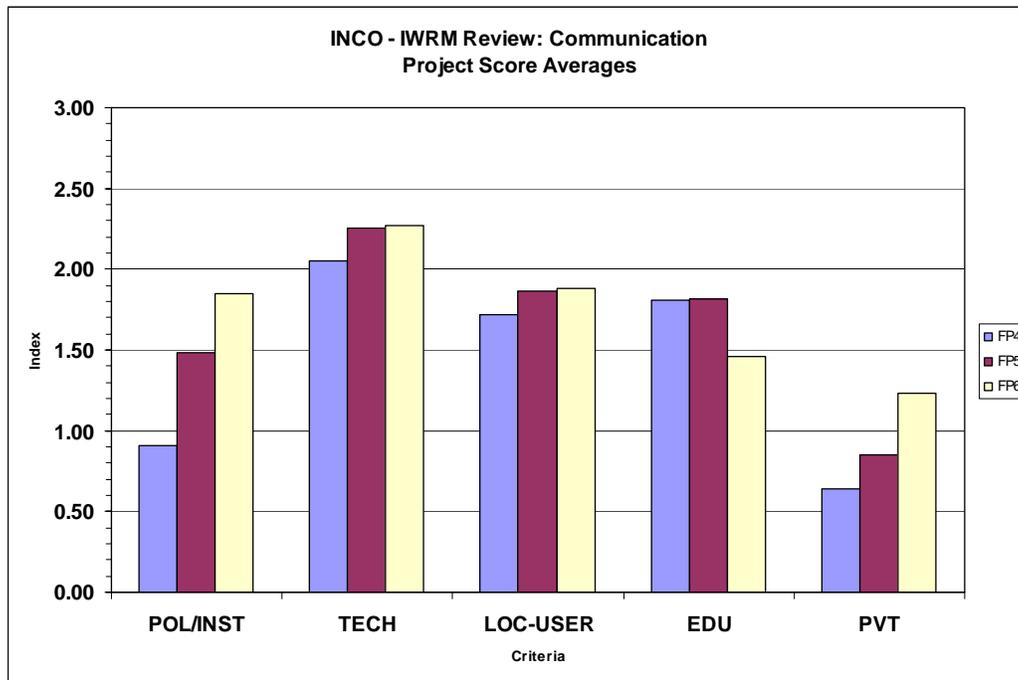
The EU-INCO water research since 1994 has not been based on a systematic understanding of the structure and dynamics of the water using and managing sector such as provided above. This absence of understanding makes the evaluation of communication and impact difficult. Such absence makes it impossible *ex post* to import indicators of the effectiveness of communication. Questions such as the following have not been asked in a systematic way. Communication about priorities such as – social sustainability, economic sustainability and environmental sustainability? Or with whom – with which social solidarity? And with what type of enabling context? They were very partially addressed through bi-regional dialogues at programme level beginning in FP5 and started to be tackled in FP6 through the systematic introduction of cross-cutting questions in the evaluation process. There has been a follow-up reporting system e.g. on engagement with actors outside the research community. Such questions could be the basis of a more systematic approach to the evaluation of communication and of impact in the FP7 phase of water science and related research.

## Results of the review of project documentation

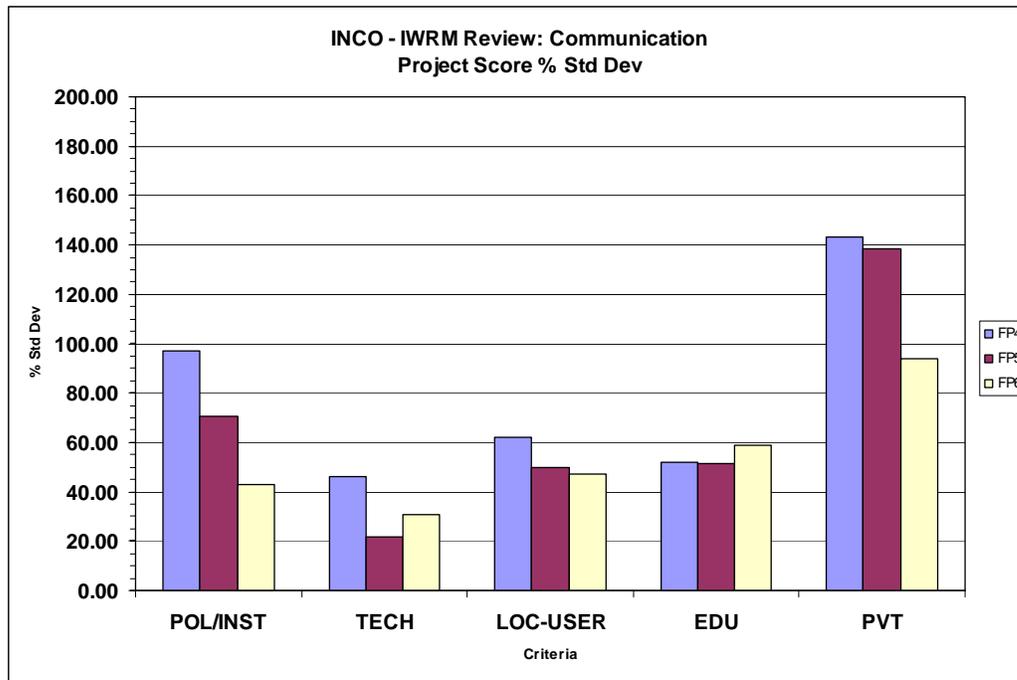
In practice the best the panel could do was to adopt an *ex post* retrospective evaluation of the communication of the FP4, FP5 and FP6 EU-INCO based on project documentation. The panel members were aware that the evaluation of communication based on the reading of the documentation of 67 projects would be indicative but not reliable. Determining the effectiveness of communication would require research projects as elaborate as those, which the researchers had contracted to carry out.

The reading of the project documentation showed that the researchers generally devoted responsible concern to communication but they did not have adequate budgets to promote a higher level of communication. Also there is no formal procedure for systematic reporting on the nature and effectiveness of communication of EU-INCO water projects. This review has stimulated a higher level of interaction with project convenors than at any stage in the past. But the procedures to monitor and improve communication has inevitably been limited as it has not been funded.

The communication theme was addressed with respect to five target communities. First, those involved in reform processes and in relevant policy-making institutions, including those in the water sector. Secondly, those in the technical domain of water resource management and in the delivery of water supply and sanitation, Thirdly, local water users. Fourthly, scientists and students in higher education and secondary education. Fifthly, communication of research results to those working in the private sector to provide water services as well as those using private water services.



**Fig. 4.2a** The aggregated average scores on the five criteria examined by the panel in reading documentation to evaluate the effectiveness of 67 FP4, FP5 and FP6 EU-INCO water research projects in handling the theme of *communication*



**Fig. 4.2b** The standard deviation data reflecting the scatter of results of the FP4, FP5 and FP6 scores on the three criteria of research performance of EU-INCO water research as shown in Figure 4.2a above

The trends shown by the scores on the five criteria show that as expected the most consistent communication effort was directed at the technical scientific community. The very low standard deviations for FP4, FP5 and FP6 indicate that this was a robust and coherent outcome for most projects across all three Framework periods.

The lowest scores were on the criteria relating to the political - that is the institutional and policy domain - and to the private sector (PVT). Communications with these two sectors do, however, show strong upward trends from very low bases in FP4. Problems of communicating with the private sector is also indicated by the relatively high standard deviations. The trend in this criterion was favourable between FP4 and FP6. The *political and policy domain* and the *private sector* are particularly important if secure and sustainable water managing outcomes are to be achieved.

Gender issues have not been explicitly addressed in FP4. Gender was mentioned in the work programmes of FP5, but as it was mentioned only in the general introductions and was not an explicit evaluation criterion so that this dimension was only very gradually being recognised. Gender refers to the social roles of men and women, which tend to be quite distinct across different cultures and affects the way men and women relate to water.

In FP6, gender was more specifically mentioned in the work programmes and became also part of the cross-sectional part of the evaluation process, though not translating automatically into the formal marking system. In FP6, gender has become the subject of programme review processes and every project has to report on the way it addresses gender as part of the

standard reporting requirements. Starting with FP5 a number of projects have explicitly addressed gender issues, with a small number specifically focussing on this dimension. Many research teams still confuse ‘women in research’ with gender. Links to some ‘engendered’ projects are provided on the research website of the EU Water Initiative: <http://europa.eu.int/comm/research/water-initiative>.

Communication in the domain of *education* was shown to be effective. As was communication with *local users*. Again the low standard deviations indicate a strong coherence.

It is therefore important that FP7 water related research highlights these gaps and guides research proposals to make explicit provision to address them. As was the case in the context of sustainability, it is **essential** that improved communications with socio-economic groups does not come at a cost to the science devoted to ecological and environmental issues.

The panel had substantial additional evidence about experiences from outside the EU-INCO projects, which could have been used for comparative purposes, but was left out here to keep the report concise. Such additional material will continue to be made available on the research website of the EU Water Initiative at <http://europa.eu.int/comm/research/water-initiative>.

### ***Conclusion – the inadequacy of the broadcast mode of communication***

This review of the *effectiveness of the communication* of the EU-INCO sponsored water science has defaulted to making suggestions on how future evaluation could be carried out with methods requiring researchers to build in communication issues into their bids and the achievement of communication into the conduct of the projects.

As far as the performance of the EU-INCO water research since 1994 is concerned the coordinators and research teams have attended to the norms of science communication – with technical reports, refereed publications, workshops and conferences. This is the usual *broadcast* mode where it is assumed that responsible scientists will respond to and assimilate new ideas. Use of other communication modes and modulating the presentation of the message in accounting for the needs of water actors was not systematic.

This *broadcast* mode has not been sufficient to cope with the *filtering* deployed by government institutions, the selective *picking* of the private sector, nor the *diverse filters* deployed by the *charismatic activists* prevalent in civil movements. These strategies determine the political feasibility of the approaches of would-be communicators.

It was necessary for economists to invent economics, and a wide range of soft indicators – for example GDP - in order that they could provide perspective on fundamentals. Such conceptual achievements do not help much in understanding societies that for the most part ignore such fundamentals. Environmentalists are engaged in a similar process of inventing conceptual frameworks that might provide measurable indicators to provide signals of changing environmental conditions.

This is the conceptual domain to which EU-INCO mobilises EU and Partner Country scientists to make a contribution to science and society. It is arguable that the ecologists have an easier modelling and measuring challenge than social scientists, who address the

impossible complexity of socio-economic systems. But the unwillingness of societies to be shaped by economic models and derived indicators should be a powerful lesson. It should also be a warning to institutions such as EU-INCO. They would like to have trusted [and sadly unaffordable] systems of evaluating the communication of, and the impact of, water science. But as yet there appears to have been inadequate consideration of evaluative procedures which researchers could adopt and whether they would be affordable or effective.

### ***Concluding comments***

The panel could only provide an impression of the effectiveness of the communication of EU-INCO sponsored water science. The reading of project documentation revealed that the project coordinators and their research teams took a responsible approach to communicating their results. But they had limited resources to communicate effectively outside their well-established modes of workshops, training seminars, conferences, technical reports, websites and refereed articles. An equivalent infrastructure to facilitate communication beyond the science community does not exist.

If the DG Research needs more concrete evidence of communication it will be necessary to establish such a communication infrastructure. In addition it will be necessary to identify measurable indicators of effective communication. Or at least necessary to mount a study to determine if such indicators could be operationally feasible, affordable and cost effective in providing valid evaluation of communication effectiveness,

Very useful information on the communication of the results of EU-INCO water research was derived from the comments solicited from project coordinators. Their comments confirmed the commitment of the researchers to communicate as effectively and as widely as possible. Many of the coordinators drew attention to the problems of communicating without a much more substantial budget.

In an extended version of the Annex to this chapter, which can be consulted at the research website of the EU WI <http://europa.eu.int/comm/research/water-initiative>, a number of the project coordinators reports have been edited and included. A sample of responses is included below to facilitate consultation. The questions which they were asked to answer are shown in Annex 4 to this Technical Report.

## Project Coordinators comments relevant to communication

**MECO - Mediterranean co-ordination and dissemination of land conservation management to combat desertification**

**FP4-IC18-CT98-0270**

**<http://www.meco.unifi.it/>**

**MEDCORE – From river catchment areas to the sea: a comparative and integrated approach to the ecology of the Mediterranean coastal zone for sustainable management**

**FP5-ICA3-CT-2002-10003**

**<http://www.medcore.unifi.it/>**

**WADI - WATER supply watershed planning and management: an Integrated approach**

**FP6-INCO-CT-2005-015226**

**[www.wadi.unifi.it/](http://www.wadi.unifi.it/)**

The three projects were overlapping and their success points to the utility of research carried out over longer periods than the normal EU framework mode. The purpose of MECO was to analyse the elements and the links among elements as well as the services of coastal ecosystems. Another purpose was to enhance the competence for integrated management of coastal areas across the Mediterranean. The sites were in Italy (Maremma, southern Tuscany); Spain (Segura river mouth and El Hondo lagoon, Valencia region); Malta (remaining pocket beaches in Malta and Gozo); Egypt (Rosetta Nile branch, Abu Quir Bay and Lake Maryut); Tunisia (Kneiss Islands; north-western coast at Tabarka-Zouara) and Morocco (north-western Mediterranean coast at Smir lagoon and Oued Laou river basin and mouth).

### **Communication**

The MECO manual entitled *Baseline research for the integrated sustainable management of Mediterranean sensitive coastal ecosystems. A manual for coastal managers, scientists and all those studying coastal processes and management in the Mediterranean*, was printed and distributed as a CD.

Other media were used to promote the findings of all three projects.

### **Connections between traditionally and culturally embedded knowledge and technological research findings**

The studies on agro-biodiversity and on the traditional use of alimentary and medicinal plants have many potential connections with scientific and technological research. But there is also the risk that natural resources could be economically exploited without advantage for the local population. Our economic survey on prices of valuable natural products at their source highlighted dramatic differences with respect to European market prices. In the Moroccan Rif, sacred woods and sources offered unique examples of the utility of pristine environments, and the conservation of these places and traditions would also benefit science.

### **Take up by managers, policy makers, educators**

*We have the impression that managers and policy makers do not care much of local populations, insofar these are demographically limited (500-1000 persons). Their needs, rights and skills are generally ignored. During our projects in Tunisia, we have observed that the rural population which was deprived of their houses and fields as a consequence of the construction of a dam, was simply paid with new houses at the periphery of a town, irrespective of their rural origin.*

*On the other hand, educators, who interact directly with the local population, are interested in information about the locality, the environment and the cultural traditions. Any information about the locality is appreciated by them, and they are ready to transfer it to the scholars. Educators always ask for informative material. At Tabarka (Tunisia) a NGO for rural development has offered facilities to disseminate information locally.*

### **Contribution to capacity building legacy**

We developed quantitative methods to estimate biodiversity at different levels of integration (ecosystems, populations, organisms and genes) as well as methods for ecological modeling. We also trained students,

young researchers and environmental managers, both in Europe and in the Mediterranean partner countries, to use these techniques. *However whether these methods will be permanently transferred is doubtful.*

A major legacy from our projects, is a capacity to carry out multidisciplinary and interdisciplinary interactions, as well as to take an informed interest in international cooperation. All these ideas and approaches were shared with our students.

During the MECO project researchers participated in the development of management plans for the Tunisian and Moroccan sites, in strict collaboration with environmental managers, who participated in the project as partners or subcontractors. Researchers of different disciplines and from different countries were asked to fill in SWOT (Strength/Weakness/Opportunities/Threats) tables for the study sites, according to their expertise. The derive information was synthesised and used in the management plans for the sites. Programmes to monitor management developed by the project were included in these plans.

One outcome of the MECO Project was that tourist resort, on a dune system at Zouara (north-western Tunisia), was blocked by the APAL and the environmental impact reduced. Participation by public sector environmental managers and policy makers (in Tunisia, the Minister of the Environment) to the general project meetings, held in each Mediterranean partner certainly raised awareness of IWRM issues.

#### **Longer-term institutional cooperation**

Our Euro-Mediterranean network was established in 1998 and is still cooperating in more and more ambitious projects. We feel that we can trust in each other and cooperate. In the first project – MECO - the flow of information was mainly internal within the network of ecological scientists. ‘Integration’ between socio-economists and biologists, and between researchers and managers was not fluent. The MEDCORE project gave attention to the flow of interdisciplinary information including beyond the project. The WADI project aims at establishing an exchange of information with local stakeholders, and possibly with stakeholders at higher - national and international - levels. *Political difficulties may impede the communication.* [Note by panel: this last comment is an example of the realities of *constructive engagement* and the perception of researchers on the role of politics – namely, that they be suffered rather than understood.]

#### **Enduring legacy of the project (political, social, economic, scientific, and connections to traditional knowledge)**

Informal discussions on environmental issues were made with the local population and stakeholders during the field research to explain the reason of our presence. Language and cultural translations were made by the local researchers. From these exchanges we received inputs that were very useful for the development our studies.

A local elementary school was contacted at Nefza (north-western Tunisia, near the study site of Zouara), and dissemination to the scholars was organised by a group of Tunisian and Italian students. About eighty scholars and their teachers were taken by bus to the nearby beach, and a whole day was spent with a programme of environmental education focused on the beach-dune system. Questionnaires were given to the children before and after the dissemination activity to verify the accuracy of the information gathered. These are being analysed.

#### **Local, 'grass-root' experience that would be valuable as case material for the WWF4 discussions**

The presence of women researchers facilitated the contacts with local women. In the occasion of hydro-geological risks due to heavy rains at a mountain site in north-western Tunisia, the technicians and researchers of our group were directly contacted for advice by local families.

During the MEDCORE project we adopted the ‘work-together’ approach at study sites to optimize efforts in field research. During these field meetings, which were conducted under the responsibility of the local partners, international and multidisciplinary teams of about 40 persons organised their field research at a study site at the same time. Naturally this effort gave high visibility to the project, firstly at a national level, as we had to ask the Ministries of Interior, of Environment, of Education, of Defence (in Tunisia the locality was at the border with Algeria) for special permits to conduct field research; secondly at a local level, as local authorities, both civil and military, had to be informed of our presence and the aims of the research; thirdly within the local population, as we lived and interacted with them during the field research. At Oued Laou, in the Moroccan Rif, we interacted at different levels with the inhabitants of the fisher villages and the “douar”, who expressed their interest in our activities, and were helpful in providing information about their life and needs. The transparency of our technical and environmental methods, and the fact that we were foreigners (not sent by the central government), helped interactions locally. Researchers from other Arabic countries were treated with confidence

as well as researchers from European Mediterranean countries. The common Mediterranean culture and behaviour facilitated interaction. In the relatively remote provinces of Morocco a gap exists between the centre and the periphery reinforced by the poor infrastructure,

Grassroots participation has associated problems. There is little discussion in the sustainable development literature on the limits and dangers of participation. Participatory exercises were conducted in Gozo (Malta), Tunisia and the Maremma (Italy) between 2003 and 2005. On the positive side, participation yielded many useful and interesting insights and invoked a sense of 'involvement' in sustainable development., But outcomes depend upon representativeness. *We found that simplified assumptions about a 'community' made to facilitate convening a stakeholder meeting can bias the process in favour of some stakeholder groups at the expense of others.*

**Recommendations arising from the experience of having (or not) impact on discourse and action outside science to be taken into account for future research (e.g. FP7)**

A major difficulty in searching impact outside science, is that generally policy makers already have their scientific and technical informants (scientists and technicians who have authority at the national level), and don't care about discourse from other sides. This generates closed loops of information. Consequences are the relationships, as described at point 8 above, of the gap between the centre and the periphery, and of the low impact of discourse and action generated by women. *This sounds very much like an exemplification of North (2005).*

The EU should encourage links between projects, and between projects and networks, and offer venues and sites where results and ideas can be presented - such as publications, website, focus meetings. In these places, national policy makers may find the opportunity to enlarge their network of informants, and therefore their capacity, outside the national level.

**RURBIFARM - Sustainable farming at the rural-urban interface  
An integrated knowledge-based approach for nutrient and water recycling in small-scale  
farming systems in peri-urban areas of China and Vietnam  
FP5 - ICA4-CT-2002-10021  
<http://www.mv.slu.se/Vv/rurbifarm/Rurbifarmmain.html>**

**Communication**

The main focus has been on small-scale vegetable production systems, and includes studies and modelling of biophysical flows as well as farmers and consumers' knowledge and perceptions of vegetable quality related to health issues, irrigation water quality, use of different types and rates of fertilisers (including chemical fertilisers and biosolids) and pesticides. The research started with a stakeholder analysis followed by documenting local knowledge of principal stakeholder groups using knowledge based systems methods. Depending on research site, the main issue is either the impact of environmental pollution on the sustainability of the agricultural production (including product quality) or the potential impact of the sometimes very intensive cropping systems, with heavy use of fertilisers and pesticides, on the external environment, mainly surface waters and groundwater, as well as on crop quality. At this stage of the project, diverse stakeholder interactions have been initiated at several of our study sites and decision support tools are being developed.

The Vietnam Environment and Sustainable Development Institute (VESDI) have been arranging local stakeholder meetings at village level involving farmers and local authorities and collaboration with the National Institute for Soils and Fertilizer (NISF) in Vietnam and the Swedish University of Agricultural Sciences (SLU). The village is located down-stream of Hanoi City and untreated wastewater is used as the only source of irrigation water being an important nutrient source but with potential hazards. The main purpose so far has been to give feed-back to the local people on a questionnaire survey, related to characterisation of farming systems and the importance of vegetable production for local livelihoods, and to present the results from studies of biophysical flows of nutrients and heavy metals in the water vegetable farming systems, including pathways and characteristics of urban wastewater. During this year stakeholder workshops are planned with different actors who are responsible for, or impacted by, wastewater management, first at different decision levels such as village, district and city and after that round table discussions will be facilitated between stakeholders at different levels. Bayesian models of farmer decision making about a) the use of contaminated irrigation water for water vegetables at a site downstream of Hanoi and b) on use of urea as a fertiliser for mustard at a site upstream of Hanoi have been constructed by NISF in collaboration with the University of Wales, Bangor

(UWB) based upon interviews with farmers. These models provide new insight into the problems of water management at contrasting sites and help to identify where effective interventions can be made.

In Thailand, Chiang Mai University (Multiple Cropping Centre), have put the main emphasis on the pesticide issue, and the development of pesticide free management practices including more diversified cropping systems and strong interactions with the local markets. They have been facilitating the interactive learning process at two levels including production as well as market arrangements ('learning by doing' and 'earning while learning'); (1) at farm/village level where the farmer field school concept (FFS) has been used, and (2) consumer-producer interactions where market strategies and meeting points (such as regular markets) have become eye-openers for both consumers and farmers/producers. In Vietnam (Hanoi), NISF are planning to use a similar concept with farmer field schools and market arrangements for 'safe vegetables' including good agricultural practices related to use of fertilisers (including solid wastes and wastewater) and pesticides.

In China, analysis of communication pathways revealed restricted flow of extension information about irrigation water management to migrant vegetable farmers in Wuxi, who are not fully recognised in the peri-urban locations where they farm. Several key problems associated with water were revealed in Nanjing and Wuxi through stakeholder analysis and survey of practice and pollutant levels in water, soil and vegetables. These included high levels of N and P in surface water and higher than recommended levels of Cd and Pb in vegetables. Specifications for three decision support tools have been drawn up to facilitate dialogue amongst stakeholders. These are as follows.

### **Connections between traditionally and culturally embedded knowledge and technological research findings**

The underlying idea behind the entire project was to start from an analysis of knowledge held by different stakeholder groups. This has been done and revealed both sophistication within the local knowledge system that is important for scientists to appreciate and gaps in local knowledge that can be addressed by research and extension. In terms of sophistication, farmers in China evaluate organic manures as much on the basis of animal diets as the type of livestock from which they are produced, and farmers in Vietnam evaluate waste water quality using combinations of the colour and smell of water and foam that forms on it that drive irrigation decisions. Consumers in Thailand, China and Vietnam share complex schemes for judging vegetable quality based upon appearance with distrust of plants that appear too pristine. Conversely, comparative analysis of knowledge in China revealed lack of appreciation amongst farmers of differences in the mode of action of different pesticides and overapplication of Urea in response to K deficiency in plants leading to excess N contamination of surface water. Farmers, consumers and traders in all three countries were unaware of heavy metal contamination.

Decision support tools are now being developed within the RURBIFARM project, that combine local and scientific knowledge. For example, farmers evaluation of the previous crop, soil type and growth of the present crop are used together with information about soil amendments to estimate nutrient status and then suggest appropriate fertilisation strategies and predict resulting yields and nutrient losses to surface water courses. These tools have been developed with local people in terms that they understand.

Comparative analysis of knowledge of different stakeholder groups (e.g. farmers, consumers and traders) has identified important disjunctions in knowledge along water and food chains and highlighted the importance of social capital, particularly relationships of trust across these groups, for promoting more sustainable and safer farming practices and ensuring that value accrues where farmers manage their systems to produce safer vegetables with less environmental contamination.

### **Take up by managers, policy makers, educators**

The first step has been to make the collaborators within the project familiar with the IWRM and other concepts in theory and practice, and now after three years we have reached a stage where we can start to implement these ideas in decision support tools, stakeholder workshops etc. It is too early to say if the ideas will be taken up by managers, policy makers, educators etc, but potential is evident. There will be variation between countries. It is likely to be more easily adopted in Thailand and Vietnam than in China due to differences in decision structure and in the way, and to what extent, scientists and local people interact. It is anticipated that formal decision support tools may play a particularly significant role in facilitating communication amongst stakeholder groups in China because they provide a structured basis for communication.

### **Contribution to capacity building legacy**

Capacity building is a very important part of the project in order to introduce and tune the methodologies being used within the different work-packages. There are five study sites spread across three countries. It is a

component of the project that all partners are very motivated and thus willing to allocate human and financial resources far beyond the original plans. We have been organising several training workshops; during the first year (2002-2003) in China and Vietnam, respectively, with participation from three or more partners at every session, and later on twice at Chiang Mai University in Thailand (2003, 2005) with participation from all partners. Senior scientists, younger research staff and students have participated in training workshops.

Asian and European MSc students have been linked to the project and they have produced theses within the RURBIFARM framework. Two PhD students in China have produced theses within the project - graduated at ISSAS, Nanjing, and one Vietnamese PhD student has worked on a thesis - enrolled at SLU.

Longer-term institutional cooperation

The collaboration has proven very fruitful with synergy within the research teams across the Asian and the European partners. RURBIFARM in late 2005 was in the last year of the 4-year project period. Prospects for longer-term institutional cooperation are favourable. Further funding is being sought. Many other research studies have been initiated as a result of this EU-INCO project.

Linkages amongst European partners have also been strengthened. Staff from UWB have lectured on both undergraduate and postgraduate courses within SLU and staff from SLU have visited UWB and given research seminars. Opportunities for further collaboration are in train.

**Enduring legacy of the project (political, social, economic, scientific, and connections to traditional knowledge)**

It is too early to say, but the project has already led to important insights about local knowledge and highlighted important environmental issues related to the use of river water in peri-urban agriculture in some of the fastest growing urban fringes in Southeast Asia.

Local, 'grass-root' experience that would be valuable as case material for the WWF4 discussions?

We have detailed documentation of the local knowledge of a range of stakeholders and have been analysing the information comparatively.

**Recommendations arising from the experience of having (or not) impact on discourse and action outside science to be taken into account for future research (e.g. FP7)**

The development of the approaches developed in this study must be backed up with accessible documentation systems. This information infrastructure would facilitate the integration of local knowledge with science. These databases are vital for effective communication about water resources and their management, for negotiating rational use of water resources and evidence based policy. [Comment by the panel: this recommendation reflects a limited understanding of the importance of understanding political contexts with respect to the feasibility of communicating and having impact.]

**RESMANMED Resource management in karstic areas of the coastal regions of the Mediterranean, (1997-2000)**

**FP4 - ERBIC18CT970151**

**COLASU Sustainability of Mediterranean coastal lagoon ecosystems under semi-arid climate, (2002-2005)**

**FP5 - ICA3-CT-2002-10012**

<http://www.colasu.com/>

**OPTIMA Optimisation of sustainable water resources in the Mediterranean, (2004-2007)**

**FP6 - Project INCO-CT-2004-509091**

<http://www.ess.co.at/optima/>

Projects (1) and (3) are 'resource' based, while (2) is 'ecosystem' based.

Need for stakeholder involvement: a learning experience for IRMCo

Generally speaking, it can be considered that (1) enabled IRMCo to gain an in-depth experience in GIS and remote sensing, but it was felt that the project could have had more impact if the stakeholders had been actively involved throughout the project duration (and not only towards the end).

Consequently, in (2) IRMCo elaborated on a set of tasks to engage the stakeholders from the start of the project. Progress on the stakeholder-related initiatives was documented in each of the periodic and annual management reports. In particular, these initiatives included a series of one-to-one meetings with the stakeholders (particularly in case of Tunisia), but the target to organize a workshop with all stakeholders attending proved more difficult to achieve. A joint workshop with the parallel Melmarina (FP5-INCO) project on the topic of lagoons was organized in Tunis and proved most beneficial from a research point of view.

With (3), a socio-economic framework analysis has been transmitted to the Commission – which includes an analysis of the priority ranking to a ‘Water Issues Questionnaire’ as assigned by stakeholders in seven case studies. The dissemination activities foresee the organization of workshops with the stakeholders in some of the case studies. During the initial phase of this project, IRMCo elaborated on the objectives and expected results of a dissemination strategy to engage and secure the active involvement of stakeholders. (see Annex – Stakeholder Dissemination Strategy).

### **Communication**

(1) non-technical summary of the project results through newspaper articles – including a special Supplement to the Sunday Times of Malta

(1) presentation at International Conference on Karst Water Resources on the application and adaptation of the SAGE methodology. (see Scientific papers listed below). In SAGE, stakeholders perceptions are analysed according to 2 pre-defined matrices (actors-actors and actors-actions)

(2) communication (by letter) to stakeholders at the start of the project. Follow-up through a series of one-to-one meetings with stakeholders, advising on progress and to attract interest in anticipated project results. This was instrumental in guiding the research (Life Cycle Assessment – LCA) on three human activities with the active assistance of the stakeholders (organizations) directly responsible for the management of waste water stations in both Tunisia and Morocco and a fishery concern in Morocco.

(2) presentation at International Workshop on ‘Geomatics for Land and Water management: Achievements and Challenges in the Euromed context’ of IRMCo’s ‘learning curve’ to secure stakeholder involvement. (see Scientific papers listed below)

(2) Posters on Colasu project entitled ‘Utilising GIS to meet the expectations of the local community’. (see Scientific papers listed below).

(3) communication (by letter) to stakeholders identified by partners in seven case studies, introducing the research, and inviting these to respond to a ‘Water Issues Questionnaire’. (further dissemination activities, including workshops to construct ‘water management scenarios’ in active consultation with stakeholders are being planned).

### **Development or implementation of locally consistent IWRM?**

It does not appear likely that such enhancement could be achieved as a result of these (individual) research projects alone. However, research on this aspect (2) suggested that the uptake of IWRM in several of the MEDA countries has been enhanced following their signing of International Conventions and Agreements.

Each of the research projects included a ‘comparative review’ of the existing legislative framework in the Meda partner countries. While in most countries, legislation remains fragmented, the uptake of IWRM concepts has – at least in some countries – been ‘project’ driven. By the latter, we mean ‘national’ projects with a time horizon that is often of not less than five years. Faster progress would appear to have been made in those countries which introduced – and implemented – more rigid water quality control legislation, and most importantly – countries which introduced the requirement of conducting Environmental Impact Assessments. As can be expected, the EIA process offers a concrete means for direct consultation with stakeholders.

In our experience, the skills and tools that were developed through the INCO projects, enabled us to produce ‘user-friendly’ maps which provide a visual display of the project results that can be understood by a larger audience.

**Role of local and traditional knowledge with science**

(1) provided the means to document – through maps – the importance of maintaining the island’s so-called ‘rubble walls’, which are today considered as an integral part of the cultural heritage of the Island of Gozo’. Similarly, vegetation maps could be linked to traditional ‘cottage’ industries which are rapidly disappearing.

(2) does not appear applicable.

**Take up by managers, policy makers, educators**

The research outcomes contributed to the idea of developing a government subsidy scheme for farmers to restore and maintain the island’s ‘rubble walls’. This was complemented with a government training programme on the traditional ways of constructing these walls.

**Contribution to capacity building legacy**

Unlikely on the basis of these research projects alone. As an example, the training provided to PhD and MSc students in each of the research projects would not appear to offer any guaranteed contribution to a capacity building ‘legacy’.

**Longer-term institutional cooperation**

In our experience, organizations who previously undertook joint research and educational activities are often ‘better disposed’ to working as a ‘team’.

**Enduring legacy of the project (political, social, economic, scientific, and connections to traditional knowledge)**

We cannot underestimate the scientific legacy of the RESMANMED and COLASU projects which have been completed.

(1) provided very useful insights into the special vulnerability associated with karst terrains, which were the object of our contribution to further research in the framework of Cost Actions 620 and 621.

(2) explored the possible linking of the two management tools which were used, i.e. GIS and the LCA (Life Cycle Assessment – ISO 14040), and was at the basis of the development of a new approach to the LCA, in which it is recognized that the system under investigation is not an industrial process but an ecosystem. The Agence Universitaire de la Francophonie has already awarded a PhD bursary to study the impact of heavy metals and pesticides on El Meleh lagoon. This thesis will employ the LCA, adapted in Colasu to study an ecosystem rather than an industrial process, and will continue to monitor the pollution transfer within the lagoon until 2007, i.e. up to two years after the end of the Colasu project.

In our experience, the existing political and socio-economic aspects should be carefully considered and taken up as ‘constraints’ when searching for any ‘optimum’ solution. We see it as very important to invite the views and perceptions of stakeholders – not by teaching them about the efficiency of the tools that are being developed – but by learning from their experience. The target of any type of stakeholder ‘activity’ should be to create a ‘favourable atmosphere’ that is aimed at gaining the understanding and eventual acceptance of the research findings. [Comment of panel - this comment indicates an awareness of the problem of constructive engagement but not a deep engagement with it. ‘Constraints’ are reciprocal: a constraint is in the eye of the beholder.]]

**Local, ‘grass-root’ experience that would be valuable as case material for the WWF4 discussions?**

We see our experience as a ‘learning curve’ – and we consider it important to also communicate this experience to scientific ‘peers’.

**Recommendations arising from the experience of having (or not) impact on discourse and action outside science to be taken into account for future research (e.g. FP7)**

In our view, rather than a ‘recommended’ approach, it is more urgent that the scientific community accepts the importance of taking on board stakeholders and endusers – either as partners in the consortium – or by planning for concrete dissemination activities beyond the ‘science’ events.

The report also included a stakeholder dissemination strategy.

**REAL – Systems research on small groundwater retaining structures under local management in arid and semi-arid areas of East Africa  
FP5 - ICA4-CT-2002-10005**

**Communication**

To my mind, the important message from our project is that water quality in rural areas is a major challenge and that governments and agencies responsible for water supply must recognise the need to deliver clean water to the end consumer rather than to a supply point. The difficult issues associated with this are probably socio-economic rather than engineering: household water treatment of collected water is feasible, but the costs of such equipment remains high and probably exceeds the willingness-to-pay of poor rural households (our study showed a median of approx USD 10). We got this message to one government by inviting South African special adviser Professor Goldberg to visit our study site and discussed the issue with him. We have had less success in Zimbabwe and Kenya with government contact. Another route of dissemination was the attendance (by invitation) at a World Economic Forum meeting in London in early 2005, where delegates were discussing the role of PPPs in delivering W&S. There seemed to be an almost total lack of understanding of the needs of rural households and delegates from water companies and finance houses seemed to have a template of transferring northern water company models to DCs, without proper consideration of producing an integrated solution.

I believe that our findings will influence future government policy in South Africa, but less so in Zimbabwe and Kenya. This may change as a result of our end of project feedback meetings with communities and water ministry officials, to take place in late September.

**Role of local and traditional knowledge with science**

It is clear that natural springs often take on special meaning in rural communities – for example 'sacred springs' in Zimbabwe. This traditional understanding of the need for clean drinking water and hence the hygienic management of sources is now being somewhat lost by the installation of improved facilities such as boreholes and wells. Without either this embedded traditional hygiene approach or an understanding of the germ theory of disease, rural people do not easily comprehend the need for hygienic household water storage, let alone treatment. One other issue of great concern is the taste of water. Rural people seem to have a clear preference for natural waters either rivers/streams or springs. There was much criticism of borehole water being variously described as 'salty', 'bitter' etc. Anecdotally, some households seemed to be continuing to use unsafe traditional sources (where the water was 'sweet') rather than an improved, safe, source because the adults preferred the taste. As far as we can tell, there has been little research into this issue, but it is a potential barrier to widespread adoption of improved sources. Chlorination was also strongly disliked on taste grounds.

**Take up by managers, policy makers, educators**

Although we are making strenuous efforts to inform policymakers in partner countries, it is difficult to get access to them or persuade them to visit study sites. Local officials have been much better, but they rarely change policy. On an international level, we have become members of the WHO International Network to Promote Household Water Treatment and Safe Storage and this seems to be starting to influence policy in donor governments.

**Contribution to capacity building legacy**

Within the organisations in the partner countries where the research was conducted there is a much greater understanding of the links between water and health for rural areas.

**Longer-term institutional cooperation**

It may well do - we are planning more research projects together, including participation in the WHO Network's initiative to implement some large scale household water treatment projects as a demonstration of the benefits of such technologies. But no – not yet

**Enduring legacy of the project (political, social, economic, scientific, and connections to traditional knowledge)**

We need to do more analysis, but our findings seem to suggest that groundwater sources in rural areas of DCs are not as safe as is believed. We think that there may be links between the widespread adoption of pit latrines and the levels of bloody diarrhoea in under five age children, but this needs very careful investigation.

**Local, 'grass-root' experience that would be valuable as case material for the WWF4 discussions?**

No, really only anecdotal stuff as mentioned above.

**Recommendations arising from the experience of having (or not) impact on discourse and action outside science to be taken into account for future research (e.g. FP7)**

Some way needs to be found to improve the links between the research findings and the take up of these by the EC's development directorate. The latter seemed unconvinced by small scale research studies, but are unwilling to fund larger scale demonstration projects that would be needed to influence policy change. FP7 should look at how this gap can be addressed.

**WATER WEB Water resources strategies and drought alleviation  
in western Balkan agriculture  
FP6 – INCO-CT-2004-509163  
<http://www.waterweb.dk/WaterWeb.asp>**

**Communication**

**Role of local and traditional knowledge with science**

2. How have the ideas, skills and tools developed through the project enhanced the development or implementation of locally consistent IWRM?

The new deficit irrigation (DI) methods can easily be integrated in the irrigation of crops in Macedonia. The Waterweb project will facilitate the implementation of new technologies.

**Take up by managers, policy makers, educators**

Stakeholder visits to the research sites will address this issue.

Farmer stakeholders show interest for the new methods of irrigation, first of all as a new way with the possibility for better water management. Also the environmental NGOs are interested for the environmental aspects. Besides, the farmers who are members of the newly formed Water Communities are specially interested in saving water.

Trials in Portugal have been carried out in a commercial vineyard, so the information goes directly to stakeholders. ITQB give technical support on irrigation issues in vineyards to ATEVA (Association of Viticulturists from Alentejo).

**Take up by managers, policy makers, educators**

We are in permanent contact with policy makers through contacts with the representatives of the Ministries for Agriculture, Environment, Education and Science.

**Contribution to capacity building legacy**

Not yet, but we plan for sustainability by passing on expertise to permanent staff.

**Longer-term institutional cooperation**

Too early to say.

**Enduring legacy of the project (political, social, economic, scientific, and connections to traditional knowledge)**

Farm owners, who are at the same time managers, show interest, but more time is needed for evaluating the results. The Waterweb project has had multiple significance in Macedonia. The first being economic, followed by social, scientific and indirectly political. Waterweb in Macedonia has been laid some ground for a lasting cooperation between the science community, water communities, farmers and NGO's.

**Local, 'grass-root' experience that would be valuable as case material for the WWF4 discussions?**

Recommendations arising from the experience of having (or not) impact on discourse and action outside science to be taken into account for future research (e.g. FP7)

**Recommendations arising from the experience of having (or not) impact on discourse and action outside science to be taken into account for future research (e.g. FP7)**

No, not yet.

## Chapter 5 Impacts and education impacts including gender

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Norm entrepreneurs have to be politically aware, thick skinned and patient.

### *Evaluating impact*

Research *impacts* are just as difficult to evaluate as the *effectiveness of the communication* of research. There is a natural wish to identify concrete indicators where the new research knowledge can be linked to measurable change. The authors of this report believe that the way water is managed is the result of dynamic processes that are to some extent based on underlying fundamentals, especially in the longer term. But the main drivers of water using practices and water policy-making are socially constructed. The identification of underlying fundamentals does not have any automatic purchase on how water resources are allocated and managed. Change occurs if those who understand power relations make inputs to the mindsets of those who manage water locally and develop policy centrally.

In these complex circumstances understanding the process of innovation can be helpful. Innovation has five phases. These can be summarised in a general terms as illustrated in Figure 5.1. The five phases can be classified as elements in the two general processes that the panel was asked to evaluate – *communication* and *impact*.

#### *Innovation in a water resources management [IWRM] domain*

Knowing, Wanting	Having, Operating, and Operating effectively
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#### *Innovation in a regulatory domain*

Knowing, Wanting	Having, Legislating and Regulating effectively
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*The above can be conceptualised in terms of this review as communication – discussed in Chapter 4, and impact – discussed here*

<b>Communication</b>	<b>Impact</b>
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**Fig 5.1** The five phases of innovation in *water resource managing* and *regulatory* domains and their place in *communication* and achieving *impact*

In the previous chapter we looked at the institutional processes that are integral to receiving information and filtering it into, or out of, water policy and water managing discourses.

In this chapter we shall look briefly at the equally intense politics of implementing an innovation once it has gained a place in the discursive policy-making domain. It was shown in Chapter 4 that getting to know about a new idea and dealing with it is institutionally and socially problematic – as emphasised by North (2005:117). Just as problematic was the

process of getting stakeholders, constituencies, water professionals and water users to *want* a change is equally challenging.

In some ways *having*, that is *accepting and voting resources for*, a new approach – for example to re-allocate water or to meet the water needs of the environment – is associated with even more intense resistance. The *having* phase involves different people and water users gaining benefits which require the authoritative reallocation of resources. There are concrete impacts associated with re-allocation. Some water users would lose after re-allocative reforms. Even more important in *strong states* – that is those with effective governance – those implementing the reforms have to provide incentives to facilitate acceptance. Resources have to be mobilised and this mobilisation will contradict the budgetary interests of those who share the budget. Taking up a new idea is challenging. Getting another stakeholder's share of a budget normally involves an even higher order of constructive engagement. It may involve serious conflict.

In *weak states* – that is in those political economies where legislation from the centre is seriously attenuated before it reaches down into the often *strong societies* that it aims to impact – the *having* and *accepting* phase of a proposed innovation almost always fails. In *weak states* the communication with the centre of the concerns of those on whom legislation could be visited is just as attenuated in its journey to the legislators. (Migdal 1988) These two reciprocal attenuations of communication fatally impair the *having* and *accepting* phase of an innovation. Thus, *having* – or gaining - the resources to turn a good idea into a funded policy is seriously challenging. At no stage has EU-INCO, nor other equivalent agencies, made these socio-political challenges an explicit focus of research concern or of funding. There is, however, evidence that most international agencies addressing water resources and water policy reform have become aware of the determining role of politics.<sup>11</sup> Links to web-resources documenting this process and the inputs helping it develop are given at the research website of the EU Water Initiative (<http://europa.eu.int/comm/research/water-initiative>).

*Operationalising* a funded policy is also very challenging. Just as many contrary mindsets have to be confronted as the *norm entrepreneurs* encountered in bearing the new message from science in the first place. The first phase of most operationalisation is disappointing. The innovators are disappointed by the resistance to the reform. The innovation in turn has to evolve. The parable of the discursive development of the IWRM approach and the disappointment that its critics have been articulating is an example very close to home. Meanwhile the targets of the reform or the re-allocation feel that they have failed to stop the innovative process.

The first phase of incomplete *operationalisation* is always followed by another phase of renewed endeavour to make the reform stick. At the global scale the attempts to operationalise responsible resource management in the face of climate change are following a classic trajectory with the complete theatre in place – the principled angels, the differently principled pragmatists, the partial operationalisation of iconic ideas and targets and their

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<sup>11</sup> One member of the panel has been invited to present sessions on the role of politics in water management and policy reform in 2005 alone - at workshops, seminars, or conferences in Cairo, Bern, Bonn, Hohenheim, Rome, Stockholm and The Hague. Members of the panel have been invited to contribute articles, chapters or reports for planning activities of three international or bi-lateral agencies.

erosion by the unlikely coalitions of players inspired by opposing concerns. Only in politics can all the contradictions be accommodated. In the EU fifteen years of such struggle preceded the politically evolved legislation of the EU Water Framework Directive of 2000 (Kaika and Page, 2003; Page and Kaika, 2003). Since then the operationalisation of the Framework Directive has been just as discursively political and co-evolving with disappointed innovators and resentful water users and managers.

The examples of the global debate on climate change and of the EU Water Framework Directive are examples of innovations that aim at regulation. Just as water management reforms seem to fail at first, so legislation also seems to fail. Politicians take such ideas in their stride. Scientists are generally naïve in their understanding of the imperatives of political feasibility. Those developing the Water Framework Directive have been cleverly responsive to the coevolving processes. It evolved in a heavily politicised process. The WFD reflects what has proved to be politically feasible with lengthy procedures built in to ease the pain of implementation. The underlying fundamentals which inspire the water scientist are there as reminders of where the ideals of environmental *security* and *economic viability* could converge. But those who bring these estimable ideals to the public domain have not been equipped to identify what is needed to steer political economies to a secure convergence.

Science in relation to water is essentially concerned with underlying fundamentals. These fundamentals include

- first, the water resource endowment and the climate processes that determine water volumes and seasonal availability and their role in environmental services; as addressed by ecosystem science;
- secondly, the terrain and its geological composition that determine the dynamics and availability of surface, groundwater and soil water; as addressed by Earth science and hydrology and engineering science;
- thirdly, the economic value of water as determined by the cost of delivering it and installing, operating and sustaining water services; as addressed by economics.

Water is not, however, managed according to the best science in currency.

Knowledge based decision-making is as unusual in the water sector as it is in most areas of policy-making. Beliefs, mindsets (North, 2005) and interests determine the way the water managing entities use water and engage in debates about its allocation. The notion of interests is especially relevant to the identification of impact as the interests of many players in the water policy-making discourse are ideologically inspired. These ideologies filter the messages from scientists whether they convey their knowledge via models or the voices of activism.

### ***Can impact be evaluated? Getting the science right is not enough***

‘..political reaction to scientific findings may take between 30 and 150 years.’

It is widely recognised that knowledge of underlying fundamentals can take decades to become evident in policy. Keynes noted that it took ten years for some of his ideas to find their way into economic policy discourse. In the water sector there is a well documented case where the importance of gaining returns to water was introduced into the policy discourse in Israel in 1962. It was not until 1986 that policy reflected the underlying

fundamentals. The science had not suddenly improved. It had just been around for a long time. And coincidentally there were three factors that made it necessary and possible to introduce scientifically aware policy. The political will to introduce precautionary measures was suddenly possible because there was first, a severe drought, secondly, coincidental trenchant US insistence on the reform of the Israeli economy, including its water sector, and thirdly, a decade long green activist campaign, which raised public awareness of the predicament of national water resources. Possibly the most important factor was that the Israeli economy had been transformed during the nearly three decades of anxiety over water security. The economy was significantly dependent on water for agriculture in 1962. By 1986 the income from agriculture – 3% - was lost in the noise of the imprecision of GDP estimation.

Understanding the role of these other impact enabling factors is clearly just as important as getting the science right. A recent report sponsored by EU-INCO (Nauen, 2005) noted that trust, perceived relevance and ability to communicate are key prior conditions for impact. Moreover the European Environment Agency (2001) published a report entitled *Late lessons from early warnings* that showed that political reaction to scientific findings may take between 30 and 150 years. This review is being completed about seven years after FP4, as FP5 projects are ending and just as FP6 projects are getting started. It is not possible to measure the impact of a five year project on processes that span three or more decades.

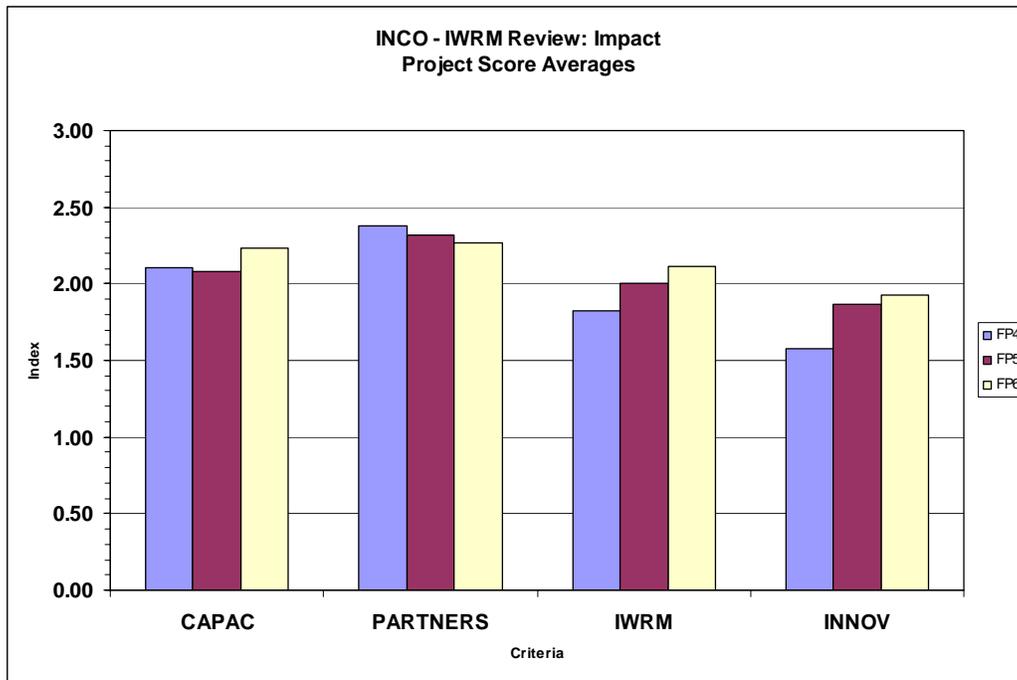
### ***Impacts evident in the project documentation read by the panel***

With an awareness that *impacts* of research, like the *communication* of research results, were difficult to evaluate, the panel looked at the documentation of 67 EU-INCO funded projects. An attempt was made during the reading of the 67 water research projects to identify evidence of the impact of the research results on water management and on IWRM in particular. The results of the reading provides a useful *impression* of the impacts of EU-INCO water research without providing comprehensive or reliable conclusions

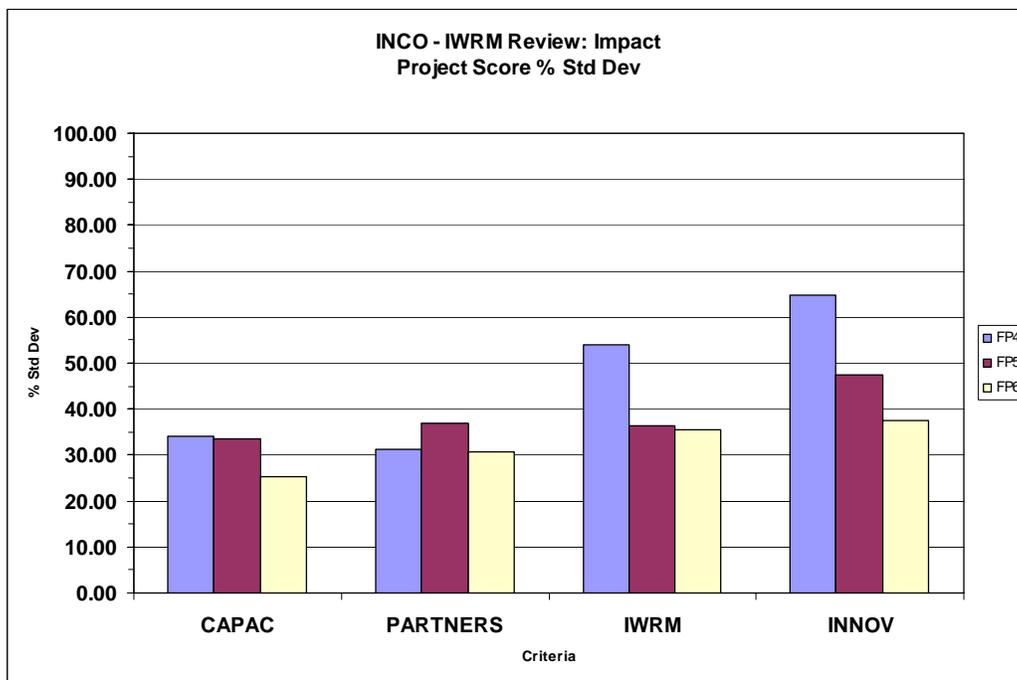
Impact was assessed in terms of four criteria – see Fig. 5.2a - namely the extent to which proposals contributed to *capacity building*; secondly, the extent to which there was a *balance* of research leadership between EU and partner countries; thirdly, whether the project contributed to *the advancement of IWRM*; and fourthly, the degree to which the impact involved *innovation*.

As measured by these criteria, *impact* was the most consistently high performing overall indicator (see Fig. 3.1a) of the FP4 to FP6 research strategies. At the more detailed level of the four impact criteria it was evident that this high performance was supported by good scores in all but the innovation criterion (Fig.5.2a). But even for this criterion the scores exhibited a strong improving trend over the period under review. These sound qualities were reinforced by a progressively improved trend in the coherence of the approach of the EU-INCO sponsored researchers. The evidence for this improvement is shown in the way researchers addressed the four criteria illustrated by the standard deviation data (Fig. 5.2b).

In addition, there is a slight, but perceptible increase of addressing gender issues in ways that enable women (and men) to better appropriate research results for their own use. This is more visible in INCO projects on linkages between water/waste/hygiene/health, not formally considered in this IWRM review.



**Fig. 5.2a** The aggregated average scores on the four criteria examined by the panel in reading documentation to evaluate the effectiveness of 67 FP4, FP5 and FP6 EU-INCO water research projects in handling the theme of *impact*



**Fig. 5.2b** The standard deviation data reflecting the scatter of results of the FP4, FP5 and FP6 scores on the four criteria of research performance of EU-INCO water research as shown in Figure 5.2a above

### *Some other relevant evaluation reports on EU-INCO activities*

EU-INCO has been diligent in its attempts to self-evaluate. It has been self-reflective as well as aware first, of the concerns of representatives of EU Member States, secondly, of the policy-making bodies of the European Commission and thirdly, of its auditing agencies. Impact assessments have been made of the overall *INCO Programme under the Fifth Framework Programme* of which the water activities are a part. In this context, an on-line survey programme was organised over a two month period with the aim of targeting the full spectrum of stakeholder groups, including project coordinators, National Contact Points, Programme Committee Members, expert evaluators, outside stakeholders and relevant EU Delegation staff posted in partner countries abroad (TEP, 2005).

The findings of this report accord with the comments from the coordinators of research reviewed by the panel. Operational relations with the EU bureaucracy was challenging and demotivating even for experienced and tough EU research leaders. It has often been unfathomable and very frustrating for many Partner Country researchers. The extraordinary empathy, which EU-INCO staff exemplify in their relations with EU and Partner State researchers, understandably could not be mirrored in the domain of finance and audit. But insensitivity to the problems of Partner Country procedures has made life very difficult for many Partner Country researchers. The impacts of such stress is impossible to evaluate. It is certainly very negative. It confirms in a very graphic way how absence of concern on the part of elements of the EU bureaucracy of the unavoidable importance of having a constructive culture of communication to facilitate innovation. Social processes can be used effectively or not. When alien accounting procedures meet diverse societies the encounter is usually unrewarding. The outcome can be terminal in circumstances of perceived, or actual, asymmetrical power relations.

The evidence from this study is that the EU-INCO focus on water and the aim to promote the IWRM approach has been well conceived. The EU-INCO approach in the water sector is deficient in helping researchers project their science into the mindsets of the three important social solidarities – the public sector, the private sector and activist civil movements. There is some distance to travel before the *constructively engaged* version of integrated water resources *allocation* and management is embedded in the EU-INCO sponsored research or evident in the impacts of such research. This is true of the water research activities as well as in EU-INCO as a whole. It must be added that EU-INCO is in good company in its positionality vis-à-vis CE-IWRAM.

The TEC Report (2005) suggested that the differentiation of EU-INCO research from other international research is not clear. The impression of the panel is that the EU-INCO approach with respect to water is differentiated. It is differentiated in focus and especially in the EU-INCO model of coordinated projects with a balance of EU and Partner Country science inputs. The suggestion of the TEC consultants that further significant differentiation could be achieved by sponsoring coordinated research by Partner Country scientists was confirmed by the panel members. There was no evidence that this approach was favoured by the coordinators who replied to the questions posed by EU-INCO staff as part of the knowledge assembled to inform this report. However, no question about the possibility of future EU-INCO research by Partner States scientists only was posed. In addition all the

coordinators who replied were based in EU Member States. Only few European coordinators solicited and obtained inputs to the questionnaires from Partner Country researchers.

### ***Concluding comments***

Considering the small budget of EU-INCO the EU-INCO water research activities have had a disproportionate impact. EU-INCO is widely known as an international research sponsoring body. Its goals and its model of coordinated research is respected in Partner Countries, albeit with reservations in relation to accounting. Most important it provides a tested model for engaging in coordinated international research at a moment in history when the DG Research is wanting to steer its thematic research towards an international model.

An Annex has been assembled to this chapter (an extended version can be consulted at <http://europa.eu.int/comm/research/water-initiative>) with a number of the comments provided by project coordinators in responding to the questions circulated to them following the first panel meeting in July 2005. The questions are listed in Annex 4 to this Technical Report. The comments record useful insights on approaches to gaining impact and of achievements insofar as it was possible to comment.

Comments from project coordinators relevant to impact

**CAESAR – Project – Communication and impact**  
**Cooperative applied environmental systems research of the urban-rural interface**  
**Sustainability in water management and land use in the Havana region**  
**FP5 - ICA4-CT-2002-10019**  
**<http://www.umweltforschung-kuba.de>**

**Take up by managers, policy makers, educators**

Project results (GIS, databases etc.) were given to governmental planning institutions (see 1. and 2.). A multimedia documentation on project providing results, with an additional focus on environmental problems and local solutions, was elaborated and will be given to schools and other educational institutions to contribute to improvement of information for environmental education. As participants in the research were universities a huge amount of diploma, master- and doctoral theses were realised. The Faculty of Geography of the University of Havana won the national prize for the best applied environmental project from the Ministry of Higher Education. Managers, policy makers, educators and local leaders (and through them members of civil society) have taken up the ideas of IWRM as communicated in the CAESAR-project.

**Contribution to capacity building legacy**

Through the intensive transfer of knowledge to the relevant institutions and local collaborators (see above) the project contributed to personal capacity building. The catalogue of project recommendations included recommendations for institutional capacity building. Their development is an issue of future activities.

**Longer-term institutional cooperation**

The project led to the progressive intensification of institutional cooperation. The consortium continues work on the take-up activities (Environmental Park Río Quibú). A problem has been that the lack of funds related directly to the implementation of project results after funding from the FP for the project has finished.

Proposals for further activities will be elaborated amongst members of the CAESAR-consortium and local collaborating partners

**Enduring legacy of the project (political, social, economic, scientific, and connections to traditional knowledge)**

CAESAR achieved an improved linkage of science to society. Awareness of local problems and possibilities for their solution through integrated approaches (with international contribution) was increased. Partnerships were consolidated. Local collaborating institutions were made familiar with the IWRM concept.

**Recommendations arising from the experience of having (or not) impact on discourse and action outside science to be taken into account for future research (e.g. FP7)**

Provision of funding to improve take-up actions and the identification of concrete project results – extend project funding to enable the evaluation of project communication and impact and to give innovation related activities a more flexible character.

**CATCHMENT 2 COAST Project - Communication and impact  
Research into and modeling of the impacts of river catchment developments  
on the sustainability of coastal resources, which support urban and  
rural economies: the case of Maputo Bay - Incomati River**

**FP5 - ICA4-CT-2002-10059**  
<http://www.catchment2coast.org/>

**Take up by managers, policy makers, educators**

Not yet; but it is expected that the recommended summer river flows to maintain coastal ecosystem production will be implemented as part of the transboundary political instrument.

**Contribution to capacity building legacy**

- A graduate course in association with the UNESCO – IHE institution
- Advanced short courses for policy developers and implementers
- 4 Licenciature graduates at UEM,
- 2 MSc
- 1PhD

**Longer-term institutional cooperation**

- Southern Africa: Between South African and Mozambican Institutions
- Between CSIR – European Institutions: At least two new research cooperation projects have arisen out of this one. The approaches developed in C2C are now being used in an ecosystem projects in Northern Ireland and in China by the SA and EU partners.

**Enduring legacy of the project (political, social, economic, scientific, and connections to traditional knowledge)**

- Shared understanding of the river system based on the science
- The first major basis for the IncoMaputo Treaty.

**Local, 'grass-root' experience that would be valuable as case material for the WWF4 discussions**

- The dependence of the fisher communities on the virtual water activity, export of oranges to Europe in the river catchment.

**Recommendations arising from the experience of having (or not) impact on discourse and action outside science to be taken into account for future research (e.g. FP7)**

- a focus on using existing scientific understanding to articulate a system scale shared understanding of its dependencies as a basis to unlock the political processes

**The WERRD project and the follow up for  
OKACOM – the Okavango River Basin Water Commission  
Water and ecosystem resources in regional development: Balancing Societal Needs and  
Wants and Natural Resources Systems Sustainability in International River Basin  
Systems**

**FP5 - ICA4 CT 2001 10040.**  
See <http://www.okavangochallenge.com>  
**Communication and impact**

The WERRD Project was a very well conceived and implemented project involving the modelling of the basin hydrology and the socio-economic and livelihood activities of the region. The Okavango is an international basin. Compared with most inhabitants of the Okavango river basin, the people living in the Kavango region of Namibia have good access to grazing and fishing. But they cannot depend on these for their livelihoods because the rainfall is irregular. Drought is their single most important threat. The EU-INCO project1 disentangled the complex coping strategies these and many other threads linking water, natural resources and power in the Okavango river basin.

The WERRD research group deployed a fully developed and comprehensive mode of IWRM. They were aware that they had to look beyond water and water issues and the livelihood focus kept the research relevant and application oriented. The WERRD team avoided the tendency of IWRM to focus on inter-sectoral issues, e.g. criteria for allocation between sectors and similar. In the Okavango River Basin, as in most transboundary basins, the upstream – downstream integration (or rather co-ordination) is a highly relevant and sensitive issue, with significant political implications. In *practical terms*, the integration between land and water (use) is crucial: land use without water is not a development option. Conversely, land use in terms of vegetation and tillage has implications for water flows; “a land use decision is also a water decision”. In terms of livelihoods it is the combination of resources, rather than a single natural resource, that is of interest. “Land” unfortunately is conceptually not included in the IWRM.

#### **Take up by managers, policy makers, educators**

In the WERRD outreach material an attempt was made to bridge the gap between traditional and culturally embedded knowledge and technical and scientific perspectives.

WERRD was asked by OKACOM Commissioners to arrange training programs where development scenarios should be combined with hydrological models for the entire basin. The request came in connection with a Technical Workshop (TW) arranged in Johannesburg in November 2004. The TW was arranged in close contact with the OKACOM Commissioners and supported by Sida (Sweden). Just before the TW, there was a workshop - also in Johannesburg - where the establishment of a Secretariat for OKACOM was discussed and decisions were made. Further training sessions are proposed for OKACOM.

#### **Contribution to capacity building legacy**

An important part of the project was to look into the future and try to anticipate what might happen in terms of socioeconomic development and what would be the implications in terms of changes in water regime in the basin and particularly for the Delta (see attached proposal) It is also relevant to mention that a number of Masters students were involved in the project.

#### **Longer-term institutional cooperation**

Some of the Partners continue to collaborate and contacts between the research community and decision makers are more likely to continue on an *ad hoc* basis. As usual, a continued contact requires financial resources. The interest is certainly there.

#### **Enduring legacy of the project (political, social, economic, scientific, and connections to traditional knowledge)**

Personal contacts have been promoted in the basin. We have also developed concepts and tools, which could be useful in planning as well as in sharing concepts and development scenarios in combination with hydrological models.

#### **Local, 'grass-root' experience that would be valuable as case material for the WWF4 discussions?**

Informal meetings were arranged between researchers, decision makers and different groups of stakeholders from the three riparian countries and also representatives from donors and other relevant external interests. These activities were executed through one of the Partners involved in WERRD (AWIRU; University of Pretoria), who organised a Green Cross project in the basin on this very topic. Partners in Europe have had less opportunity to take part in these kinds of meetings. But we have developed good contact with Sida, Sweden, who has provided additional support.

#### **Recommendations arising from the experience of having (or not) impact on discourse and action outside science to be taken into account for future research (e.g. FP7)**

A special budget for training sessions, that is not only a couple of days of technical and scientific meetings. More resources for outreach.

#### **General comment**

It is not realistic to assume that a three year research project will result in tangible "end-user results" and *that they will use them* as the EU is expecting. We had the ambition to do something in that direction, but we had no arm twisting powers. And even if we had, there is a cautious attitude to people from Europe. Initiatives have to be - and should be - through people in the region. Anyway, we have made proposals for how the results of WERRD could be taken on board in planning and other discussions.

**WASAMED Project - Communication and Impact**  
**Water savings in Mediterranean Agriculture**  
**FP5 - ICA3-CT2002-10013**  
**<http://iamb.wasamed.it/>**

WASAMED: the activities of the project are centred on the implementation of a series of workshops. Each workshop include a session of technical or non-technical presentation by stakeholders, plenary discussion and working groups. Stakeholders are mainly ministries, decision makers (i.e.: water boards), NGOs, farmers (associations). They are partners of the project. Researchers have used the above events to communicate to them and to invited institutions which are not partner of the project. Up to know, four of the six workshops have been implemented. The communication is centred on the integrated management of agricultural water saving in the Mediterranean (considering local and regional level) and it has been gradually (from the first to the fourth workshop) consolidated and contextualised in the frame of sustainable development considering the integration of different technical notions (and disciplines) and the criteria of social, economic, environmental and institutional sustainability, and their inter-linkages too.

Ethical values like equity, solidarity and justice in the benefits shared as a result of water saving and reallocation has been also gradually consolidated in communication with stakeholders. The concept of water allocation efficiency is not anymore treated only by using conventional technical or economic criteria but by incorporating the above ethical values. A common frame of goals and indicators is under discussion among researchers and stakeholders, considering technical, sustainability, governance and, to some extent (more difficult), ethical values for water management.

**Usability and potential impacts of results (technical and societal impacts, barriers for using results)**

The Turkish stakeholders in south-east Anatolia, Sanliurfa, have entered dialogues on integration and sustainability in the project and these dialogues have been strengthened by links beyond the project's remit. The KISAS association (a farmer association) requested advice from the University of Adana and the GAP administration on developing measurable indicators of sustainability to be used for farm self-assessment. The consultation has been self-financed by KISAS. The involvement of local user associations and their participation in irrigation management has increased and has led to water saving and water use efficiency.

**Role of local and traditional knowledge with science**

A project work package has the following title: Participatory Water Saving Management and Water Cultural Heritage. Thus the answer is YES for water cultural heritage and for other cultural aspects.

*Cultural heritage*

Discussion on cultural heritage has been very interesting and has focused on the importance of using relict information from Roman wells and foggara to improve knowledge of climate variability and improve the capacity of assessing: extreme drought or flood risk and to reconstruct impacts on local ecosystems.

*Current traditional culture*

Embedding of local traditional culture - in agriculture - is ensured by the interaction with local farmers. Each INCO partner country has one farmer association as partner in the project. The discussion of water saving technical options are responsive to the cultural concerns of farmers. This is particularly evident when addressing themes such as models of participatory management for water saving, and the use of unconventional waters as water saving options.

**Take up by managers, policy makers, educators**

Maybe they have been taken up but, to the knowledge of the coordinator, there is no example. In my opinion, take up of ideas by managers or policy makers takes a long time and the project is not yet finished. However, attention is drawn to the fact the one deliverable of the project is the signature of a mutual agreement of understanding among the representatives of the Ministries of the INCO-MED countries to develop cooperation on the base of the criteria of sustainability (and integration)

**Contribution to capacity building legacy**

Not specifically addressed by the project. Although partners of the project, particularly the Ministries of Agriculture of Southern Mediterranean countries send officers to the premises of the coordinator for courses on "Sustainable Agriculture" and "Sustainable Planning and Research in Water Management".

**Longer-term institutional cooperation**

The partnership existed before the project was funded and the institutions involved as stakeholder were already working together. The project has certainly strengthened the institutional cooperation at the regional level. There has been an improvement of mutual consultation among the partner institutions of the different countries. However, it is difficult to say whether this cooperation will be extended to new institutions.

**Enduring legacy of the project (political, social, economic, scientific, and connections to traditional knowledge)**

I think that the scientific element is still the most enduring legacy. Building new actions in the project is still driven by our scientific goals. However, as mentioned above, we are insisting on recognising political conditions. We draw attention to the importance of project components and objectives to government officials and policy makers. Some work-packages of the project are led by partners in these institutions.

**Local, 'grass-root' experience that would be valuable as case material for the WWF4 discussions?** The Water User Associations, represented by true farmers, are active actors in the project and in the discussions, which it convenes. This is a stimulating mode of interaction.

**Recommendations arising from the experience of having (or not) impact on discourse and action outside science to be taken into account for future research (e.g. FP7)**

The partnership structure of Wasamed was certainly an inspired intuition. However, we should reinforce it with the involvement of people who have a deep involvement in policy making. Wasamed is not structured to properly facilitate such activity. Important stakeholders from outside the agricultural sector should also be included. Although promising the WEB FORUM did not work as it was planned. Few participated and the discussion was poor. We should develop a better and more friendly method of internet communication/dialogue. But there is cultural resistance in the Southern Mediterranean to the public use of this tool.

## **Chapter 6 Lessons for Framework Programme 7 (FP7)**

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### ***The science - development - policy nexus***

The challenge: converging the water managing policies determined by political processes with the fundamentals exposed by ecosystem and social science.

The research landscape and the encounters of EU-INCO activities with it are in constant flux. The EU-INCO water research initiatives are an important element of the EU-INCO brand. But the EU-INCO budget is very limited; it had only 2.5% of the total FP5 budget of the EU Research Directorate General. Of this sum less than one third was devoted to water research was. The total FP5 EU-INCO budget was only 0.1% of the investment in research of the then 15 Member states including their contributions to EU research funds. FP6 saw a reduction in allocations to the specific international S&T cooperation in the INCO mode, though overall international allocations were increased. The net result was still a reduced international water research budget in FP6.

The goals and strategies of the upcoming Framework 7 are the subjects of intense debate. There are a number of big ideas that have yet to be defined. These are briefly:

#### **Content of research**

Type and focus of research

- 1 Blue skies research – how can the EU increase its role in such research through the proposed new ‘Ideas’ Programme of FP7?
- 2 What will be the foci of the thematic research as promoted under the Cooperation Programme of FP7?

#### **Strategies and processes**

Coordination

- 3 How to ensure that the overall coordination and coherence on international S&T cooperation, as envisaged in the Capacities Programme of FP7, becomes effective across the Cooperation and Peoples programmes as well?

Internationalisation of research

- 4 How can the thematic research be internationalised with significant participation from partner countries – in that the attempts in FP6 have not been successful?
- 5 How can such internationalisation help to learn from advanced experiences in other parts of the world, without EU scientists necessarily expected to take the lead?
- 6 How can EU-INCO mode research - based on the specific conditions of partner countries and the substantial experience infunding Partner Country research - make a contribution to shaping FP7 priorities and approaches to international science in general?

#### **Impact and communication**

Human resources development

- 7 How can the significant investment in human resources through the People Programme of FP7 be harnessed to strengthen human and institutional capital, including on water research and management?

## Institutional development

8 Institutional development and the reform of water use and water policy reform.

## Modelling, networking and policy support

9 Information systems infrastructures – modelling, networks and decision support

The panel authoring this report comprised five scientists from Partner Countries and five from EU Member States. This proved to be a productive balance intellectually. But these proportions do not reflect the respective populations – the EU population is about 7% of the total Partner Country populations. On the other hand the EU and its Member States currently contribute about 55% of the world's annual international assistance funds.

In order to identify lessons for FP7 water research the panel used evidence from four main sources. First, from reading the documentation of 67 EU-INCO water research projects, which were scored on the extent to which they had addressed key themes and criteria. Secondly, it used evidence from the comments of the coordinators of the research projects. Thirdly, it used informal discussions with project coordinators and project members. Fourthly, other reports on EU-INCO activity were also consulted.

The following recommendations will mainly refer to the enhancement of science and its relationship to *bottom-up development* and *top-down policy*. These two aspects of the science-development-policy nexus have been integral to the EU-INCO 'way of life' for two decades. It is possible that this way of life could engage, or at least inform, a much larger proportion of the DG Research budget process during the FP7 period. EU-INCO water research experience reviewed in this report could also have relevance far beyond the remit of EU-INCO.

The analysis will discuss the following issues – strategies, research foci, and the development of human and institutional capital in Partner Countries and Member States. In each case challenges will be identified that will have to be taken into account in framing the FP7 programmes. The identification of these challenges has been informed by the theoretical framework elaborated in chapter 2 and in Background Paper 1. In brief, *sustainability* was defined as a dynamic social construct with *social, economic, environmental and political dimensions*. *Reform processes* with respect to water require the engagement of *four social solidarities*. The extent to which three of these - the public sector, the private sector and activist civil movements - are constructively engaged with science, in socio-economic development and in policy – will determine the pace at which policy will converge with the underlying fundamentals exposed by science – see Figure 1.1. This last convergence *is a reflection of effective of communication and impacts*.

## ***Recommended strategies***

Four main strategies have been identified to accelerate the pace at which local water managing practices and water policy could converge with the underlying fundamentals exposed by water science.

- Promote the constructively engaged IWRAM research approach
- Align more strongly with regional IWRAM priorities
- Require that EU-INCO water research adopt the constructively engaged IWRAM approach

- Require research to continue to connect local knowledge, socio-economic development cultures and policy institutions and implementing bodies

### **Challenges which in turn could be research foci.**

#### *The major lags in the perceptions and capacities of water sector institutions*

Water users, water professionals and even many water scientists and engineers are seriously under-informed about the underlying ecological & socio-economic fundamentals. For EU-INCO the big challenge for those engaged in the integrated water resources allocation and management of water (IWRAM) is the elemental-lag in awareness of about five billion people in partner countries and of their governments about the underlying ecological and economic fundamentals that could ensure *water security*. The issue is ripe for further research but the main challenge is shifting perceptions rather than honing the science. The research focus needs to be on understanding mindsets and the processes of economic change.

#### *Other lags relevant to the water sector research*

- Local awareness
- Regional awareness
- General awareness

Again addressing these lags in awareness could be the focus of water sector research.

### ***Research foci***

#### **On the major lags in perception**

Many political factors conspire to prevent water users, policy-makers and political leaders from hearing and accepting the underlying fundamentals on water resources and on the protection of the ecological services of water. Millennia of experience of using local water sources for essential livelihoods are more powerful than the unwelcome ideas of alien scientists. Declining trends in freshwater quality and its safety and in the availability of groundwater are commonly unnoticed by water users. Local users will prefer dangerously polluted water because the evidence from long communal use is that it has been safe. In addition its taste is much preferred.

In addition people everywhere - and their political leaders – do not want to depend on water and food resources from other countries. Political leaders are particularly uneasy when outside scientists point out that their water and food economies are operating beyond self-sufficiency. Denial is normal and in practice rational according to local evidence. Economically invisible and politically silent virtual water processes makes denial an easy option. *This denial is based on the assumption that the local watershed can be the only source of remedies to increasing freshwater scarcity. There is a similar blindness to the importance of a diversifying and strengthening economies.*

The aim of such research on perceptions and denial would be to shorten socio-political change processes necessary for reform. Such change processes would bring more careful and more efficient water use by identifying the conditions that would accelerate such change. The research would identify the types of constructive engagement needed to change mindsets, public opinion and behaviour. The research could focus on:

### **Local awareness of**

- the degradation of water quality and its impact on the environmental services of water and on the volume of freshwater resources available
- seawater intrusion

### **Regional awareness of**

- regional climate change - uncertainty of models

### **General awareness of**

#### *Ecological drivers*

- ecosystem complexity and linkages
- climate change
- importance of biodiversity
- absorptive capacity of inputs to agricultural productive systems – water pollution and erosion outcomes

#### *Linked drivers*

- ethical use of water
- ‘hydronic’ [coining an equivalent term to ‘organic’] production and ecologically sound use in association with high returns to water

#### *Socio-economic drivers*

- the role of socio-economic development in achieving water security - urbanisation & mega-city processes transforming economies - peri-urban zone economic and infrastructure change
- the role of women in water management and especially in its precautionary use in domestic circumstances and in educating families in sound practice
- the role of women in water research, water management and in water policy-making
- actual local coping measures - for example coping with drought and flood with temporary infrastructures, with local and long distance migration, in association with the diversification of household incomes
- trade and subsidies
- the role of virtual water
- the importance of understanding political processes

### **Challenges and contexts**

Again the main challenge is that *water users do not expect to find solutions to their water problems outside their local watersheds*. This is true at the national level and it is also true at the local level. The place where the most intense water and food supply solution-making has taken place throughout history is in urban areas. The contemporary peri-urban areas of the mega-cities of the early twenty-first century are water and food security providing phenomena. Such mega-cities often generate most of the national GDP – sometimes in a single capital city. An economy generating such high levels of income and associated livelihoods is a major element of what is needed to solve the water and food needs of millions of families. Water security – both for freshwater for drinking and domestic purposes [10% of water needs] and for water for food security [90% of water needs] - is possible for families with jobs in cities. The economy diversifying and jobs generating capacities of cities is a fundamental issue vis-à-vis water and food security.

<p>More crop per drop; more jobs per drop; more care per drop. And the greatest of these - at an early stage of socio-economic development is – more jobs per drop.</p>
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At no point is the panel suggesting that the socio-economic transforming transition of urbanisation is comfortable or without stress. Reducing the length of the stressful phase is the imperative.

The influence of women on the way water is perceived, used and disposed is widely recognised. The social impediments to influencing their water using behaviour and especially to their participation in water research and in water managing institutions are enduring problems.

### ***Interdisciplinary applied research – intrinsic and associated benefits such as human capital enhancement in Partner Countries and in EU Member States***

Interdisciplinary research is another element of the EU-INCO 'way of life'. It will continue to be fundamental for effective ecosystem research and other water science. It is especially important that research on the facilitation of socio-political change emphasised in this report as essential to achieve convergence water managing practice with the fundamentals exposed by science.

The main lesson derived from this review is that such a research focus should have the highest priority. It is also observed that an important complementary investment would be in the encouragement of centres of excellence in higher education. The universities in the United States and Europe, which used to be regarded as providing the intellectual leadership in water management and science higher education have been declining. There is an urgent need to nurture a number of centres in Partner Countries and raise their international profiles. They need to educate with a constructively engaged integrated water resources allocation and management (CE-IWRAM) vision - at first and second degree levels. They must supervise research integrating water law, the economics of water and the notion of constructive social engagement as well as the other water sciences and technologies. They need to do this as confidently as they have until now addressed hydrology and hydraulics. There is a need for scholarships to make regional centres viable and some EU-INCO water style co-ordination of Member Country and Partner Country inputs. There would be scope here for coordination of the activities of DGs Research, Aid and Development to ensure that the research culture in Partner Countries has the capacity to research on CE-IWRAM.

An associated benefit of the interdisciplinary research is its multiplication of opportunities for interactive international learning. In this EU-INCO water research is already a model for other parts of DG Research and other Directorates General associated with International affairs, aid, trade and development.

EU research and educational institutions need to be able to enhance their research capacity and that of individuals to research fundamentals as well as on how water management and allocation can move to sustainable modes via *constructive engagement*.

Servicing research scholarships and study visits to Partner Countries - not just to the US - would be a useful way of addressing this priority.

## **Challenges**

EU research institutions and those in Partner Countries tend to default to discipline preferences. They need to think more laterally about the enhancement of research capacity and recognise the high quality research being done in Partner Countries.

## ***Other intrinsic benefits from EU-INCO mode research using the CE-IWRAM approach***

The adoption of this approach will strengthen implementation capacities and improve the enabling environment within Partner Countries.

The EU-INCO mode has the potential to facilitate the involvement of professionals and scientists in Member States, Partner Countries and especially the DGs RELEX, Trade, Development, EuropeAid, Environment etc. The panel welcomed the opportunity to meet officials from most of these directorates-general during the review process and to share the concepts which underpin the analysis and evaluation in this report and its recommendations. Opportunities for further synergy were evident. Such stronger networks would enable new initiatives and reduce barriers to other relevant research.

## ***Concluding comments***

The panel wishes to convey the overall impression that the EU-INCO approach to research sponsorship as expressed in its adoption of IWRM oriented research is evolving effectively, albeit with a need to lift its inspiration to what the panel calls – *Constructively Engaged Integrated Water Resources Allocation and Management*. The focus of the EU-INCO water research has been policy-relevant. The reinforcement of applied science, of policy focused science, and of reciprocal synergies has been impressive. Resources have been provided to address the challenging issues associated with IWRM. The water managing communities and institutions as well as the water science community itself have in general responded positively. Where there has been resistance to the direction of EU-INCO sponsored research then EU-INCO can be comfortable. It has been nudging water science and water managing institutions to achieve the convergence of actual water managing trajectories towards the ideal trajectories exposed by water scientists and economists based on underlying ecological and economic fundamentals.

As yet, however, there is no consensus that those working on underlying fundamentals must recognise that their task should include learning how to communicate their science and the revealed underlying fundamentals.

Future investment for example through FP7 in water management and water policy has good potential to increase its impact by adopting more systematically the constructively engaged approach to IWRAM. Bridging the gap between research into the fundamentals and the perceptions of water users and water policy-makers should be a research focus in its own right.

## Chapter 7 Conclusion – see Executive Summary

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## Annex 1: Research approaches

	<b>Empirical–analytic inquiry and modelling</b>	<b>Interpretive inquiry and explanation</b>	<b>Liberatory inquiry (e.g. Participatory Action Research) &amp; change</b>
Purpose	Experimental science in search of causal explanations and laws in order to make predictions	Interpretive science in search of subjective meanings and understanding in the world of lived experience.	Liberating (Humanising) science to create movement for personal and social transformation in order to redress injustices, support peace and form democratic spaces.
Nature of reality	A unique, real, social world exists to be studied by independent observers. Recognition is given to distinct, positive facts and observable phenomena	Pluralistic and relativist (multiple realities dependent on individual's perceptions). People make purposeful acts based on their perceptions of feelings and events and so shape their realities by their behaviour.	The social world is humanly and collectively constructed with and within a historical context. People are active subjects in the world and are constantly in relationships of power: with the self, with others, with nature.
Nature of knowledge	Objective truth exists. Objectivity (detached neutrality) and value-free science is possible and desirable. Logical, deductive, rational findings. Knowledge is an end in itself.	Knowledge is a social, subjective construction. Language contextualises the meaning of data. The method used justifies the knowledge produced.	People can change their level of consciousness through learning. Objectivity does not exist. Fundamental human needs drive the process of inquiry. Holistic dimensions of knowing.
Methods	Experimental. Begins with a hypothesis. Validity and reliability are important. Defined time frame. People are 'objects' of study. Quantitative data produced. Frequently dependent on complex statistics. Theory and practice are not directly related.	Interactive, sometimes close, processes between researcher and subjects are needed to obtain meaningful data and insights into human behaviour. Qualitative data produced. Example of methods: interviews, participant observation case study, grounded theory.	Dialectic of praxis (action-reflection process) within the historical and social context. Participants are active with ownership over questions, objectives, process. Many different, often creative methods, e.g. interviews, drama, songs, PRA methods, video.
Knowledge produced	Technical instrumental	Interpretive Interactive	Critical Spiritual
Values reflected	Deterministic application: people are prepared for a given form of social life. Concerned with 'maintenance of evolutionary change of status quo'. Greater efficiency and control over behaviour and the environment.	Humanistic application: 'growth metaphor with self-actualisation of individuals within meritocratic forms of social life.	Transformative process. Belief in people's capacity to work together for equitable decision-making and fair distribution of resources. Authentic commitment over long term is needed to achieve individual and group-community empowerment.

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## Annex 2 List of Projects examined

### Framework Programme 4

	Project N°	ACRONYM	CONTRACT AMOUNT (€)	Status	Region	Title
1	<a href="#">IC15-CT-1997-00100</a>	VOLGAMAP	160.000	Completed	Eastern Europe	Ecosystems of the Volga Basin and effects on the Caspian Sea
2	<a href="#">IC15-CT-1998-00107</a>		210.000	Completed	Eastern Europe	Large system for water monitoring and sustainable management based on ground stations and satellite images
3	<a href="#">IC15-CT-1998-00138</a>	BIOTOOLS	204.900	Completed	Eastern Europe	Biological tools for a sustainable water management
4	<a href="#">IC15-CT-1998-00145</a>		210.000	Completed	Eastern Europe	Sustainable water management: application of the advanced bioremediation techniques for an efficient treatment of industrial waste waters
5	<a href="#">IC18-CT-1996-0029</a>	CASARINA	369.000	Completed	Africa	Change, stress and sustainability-aquatic ecosystems resilience in North Africa
6	<a href="#">IC18-CT-1996-0065</a>	GROFLO	606.000	Completed	Africa	Anthropologically induced changes in groundwater outflow and quality and the functioning of Eastern African near-shore ecosystems
7	<a href="#">IC18-CT-1996-0069</a>		465.000	Completed	Asia	Impact of climate variability on agro-ecosystems and water resources in drylands
8	<a href="#">IC18-CT-1996-0070</a>	The Serengeti ecological unit	400.000	Completed	Africa	Impacts of land use policy on environment, wildlife, demographic and socio-economic indicators in East African savannas
9	<a href="#">IC18-CT-1996-0080</a>		370.000	Completed	Africa	Management of aquatic vegetation in the Lower Senegal River Basin
10	<a href="#">IC18-CT-1996-0107</a>		560.000	Completed	Africa	Combining systematic and participatory approaches for developing and promoting strategies for sustainable land and water management
11	<a href="#">IC18-CT-1997-133</a>	Asian Deltas		Completed	Asia	Water management, land development and economic diversification in southeast Asian deltas
12	<a href="#">IC18-CT-1997-0134</a>		450.000	Completed	Africa	Interaction between migration, land and water management and resource exploitation in the oasis of the Maghreb
13	<a href="#">IC18-CT-1997-0139</a>	SUNRISE	670.000	Completed	Africa	Sustainable use of natural resources in rural systems of Eastern African drylands (Ethiopia, Kenya, Tanzania), strategies for environmental rehabilitation

14	<a href="#">IC18-CT-1997-0144</a>	IWRMS	892.500	Completed	Africa	The development of an innovative computer based integrated water resources management system in semiarid catchments for water resources analyses and prognostic scenario planning
15	<a href="#">IC18-CT-1997-0152</a>		398.700	Completed	Africa	Contribution to the design of enabling strategies for environmental management in growing multi-million cities: an integrated economic and environmental assessment of solid waste systems in Kenya and India
16	<a href="#">IC18-CT-1997-0158</a>		700.000	Completed	Asia	A participatory approach for soil and water conservation planning, integrating soil erosion modeling and land evaluation, to improve the sustainability of land use
17	<a href="#">IC18-CT-1997-0160</a>		600.000	Completed	Africa	Methodologies and design criteria for soil and water resources management and policy formulation in peri-urban farming systems in Southern Africa
18	<a href="#">IC18-CT-1997-0161</a>		630.000	Completed	Middle East	Developing sustainable water management in the Jordan Valley
19	<a href="#">IC18-CT-1997-0162</a>		706.000	Completed	Africa	Global change and subsistence management in Southern African resource variability, access and use in relation to rural livelihoods and welfare
20	<a href="#">IC18-CT-1997-0169</a>	DSS-DROUGHT	375.000	Completed	MED	A decision support system for mitigation of drought impacts in the Mediterranean region
			<b>8.977.100</b>			

### Framework Programme 5

	Project N°	ACRONYM	CONTRACT AMOUNT (€)	Status	Region	TITLE
1	<a href="#">ICA2-CT-2000-10018</a>	SPICE	518.774	Completed	Eastern Europe	Sustainable development of the Pechora Region in a changing environment and society
2	<a href="#">ICA2-CT-2000-10023</a>	ARAL-KUM	409.202	Completed	NIS	Desertification in the Aral Sea Region: a Study of the natural and anthropogenic impacts.
3	<a href="#">ICA2-CT-2000-10039</a>	CIRMAN-ARAL	908.265	Completed	NIS	Crop irrigation management for combating irrigation induced desertification in the Aral Sea Basin
4	<a href="#">ICA3-CT-2000-30002</a>	MedWater Policy	382.218	Completed	MED	Policy Initiative to Overcome Water Competition between the Vital Economic Sectors of Agriculture and Tourism in the Mediterranean
5	<a href="#">ICA3-CT-2000-30005</a>	CLIMED	578.500	Completed	MED	Effects of climate change variability in water availability and water management practices in Western Mediterranean.
6	<a href="#">ICA3-CT-2000-30007</a>	WADI	1.000.000	Completed	MED	Water supply watershed planning and management: an Integrated approach

7	<a href="#">ICA3-CT-2000-30008</a>	LAND WATER MED	310.000	Completed	MED	Geo-Information for sustainable management of land and water resources in the Mediterranean Region
8	<a href="#">ICA3-CT-2002-10002</a>	MEDCOAST LAND-NET	1.305.001	In progress	MED	Mediterranean co-ordination and dissemination of land conservation management to combat land degradation for the sustainable use of natural resources in the Mediterranean coastal zone
9	<a href="#">ICA3-CT-2002-10003</a>	MED CORE	1.430.000	In progress	MED	From river catchment areas to the sea: A comparative and integrated approach to the ecology of Mediterranean coastal zones for sustainable management
10	<a href="#">ICA3-CT-2002-10004</a>	SWIMED	655.717	In progress	MED	Sustainable water management in Mediterranean coastal aquifers: Recharge assessment and modeling issues
11	<a href="#">ICA3-CT-2002-10006</a>	SMART	1.104.619	In progress	MED	Sustainable management of scarce resources in the coastal zone
12	<a href="#">ICA3-CT-2002-10009</a>	MELMARINA	760.474	In progress	Africa	Monitoring and modelling coastal lagoons: making management tools for aquatic resources in North Africa
13	<a href="#">ICA3-CT-2002-10012</a>	COLASU	795.000	Completed	MED	Sustainability of Mediterranean coastal lagoon ecosystems under semi-arid climate
14	<a href="#">ICA3-CT-2002-10014</a>	WADEMED	749.601	In progress	MED	Water demand management knowledge base in the Mediterranean
15	<a href="#">ICA3-CT-2002-10019</a>	DEAD SEA	740.000	In progress	Middle East	A future for the Dead Sea Basin: Options for a more sustainable water management
16	<a href="#">ICA4-CT-2000-30018</a>	SUSTAIN WATER	299.990	Completed	Asia	Thematic Network on sustainable policies for promoting water conservation technologies and practices
17	<a href="#">ICA4-CT-2000-30024</a>	SENEGAL RIVER MANAGEMENT	280.000	Completed	Africa	Policy research to identify conditions for optimal functioning of the Senegal River Ecosystem in Mali, Mauritania and Senegal
18	<a href="#">ICA4-CT-2001-10039</a>	MANPO RIVERS	600.000	In progress	Asia	Management policies for priority water pollutants and their effects on foods and human health: general methodology and application to Chinese river basins
19	<a href="#">ICA4-CT-2001-10040</a>	WERRD	799.312	Completed	Africa	Water and ecosystem resources in regional development balancing societal needs and wants and natural resources systems sustainability in international river basin systems
20	<a href="#">ICA4-CT-2001-10041</a>	PRINWASS	749.704	In progress	Latin America	Barriers to and conditions for the involvement of private capital and enterprise in water supply and sanitation in Latin America and Africa: seeking economic, social, and environmental sustainability.
21	<a href="#">ICA4-CT-2001-10047</a>	VINVAL	799.997	In progress	Africa	Impact of changing land cover on the production and ecological functions of vegetation in inland valleys in West Africa
22	<a href="#">ICA4-CT-2001-10049</a>	HIMALAYAN DEGRADATION	892.994	In progress	Asia	An interdisciplinary approach to analyse the dynamics of forest and soil degradation and to develop sustainable agro-ecological strategies for fragile Himalayan watersheds
23	<a href="#">ICA4-CT-2001-10055</a>	IRMLA	649.997	In progress	Asia	Systems research for integrated resource management and land use analysis in South and Southeast Asia

24	<a href="#">ICA4-CT-2001-10083</a>	CLAIMS	899.791	In progress	Africa	Changes in Land Access, Institutions and Markets in West Africa
25	<a href="#">ICA4-CT-2001-10084</a>	CO-GOVERN	349.998	Completed	Africa	Promoting Common Property in Africa: Networks for influencing policy and governance of natural resources
26	<a href="#">ICA4-CT-2001-10096</a>	ECOMAN	750.000	Completed	Latin America	Decision support system for sustainable ecosystem management in Atlantic rain forest rural areas
27	<a href="#">ICA4-CT-2002-10005</a>	Rehydrating the Earth-REAL	401.000	In progress	Africa	Systems research on small groundwater retaining structures under local management in arid and semi-arid areas of East Africa
28	<a href="#">ICA4-CT-2002-10017</a>	UBENEFIT	1.100.000	In progress	Africa	Utilisation of wastewater for fuel and fodder production and environmental and social benefits in semi-arid peri-urban zones of sub-Saharan Africa.
29	<a href="#">ICA4-CT-2002-10019</a>	CAESAR	1.192.970	In progress	Latin America	Cooperative applied environmental systems research of urban-rural interface - Sustainability in water management and land use in Havana-region
30	<a href="#">ICA4-CT-2002-10021</a>	RURBIFARM	1.250.000	In progress	Asia	Sustainable farming at the rural-urban interface - An integrated knowledge-based approach for nutrient and water recycling in small-scale farming systems in peri-urban areas of China and Vietnam
31	<a href="#">ICA4-CT-2002-10059</a>	CATCHMENT 2COAST	1.195.056	In progress	Africa	Research into and modeling of the impacts of river catchment developments on the sustainability of coastal resources, wich support urban and rural economies: the case of Maputo Bay - Incomati River.
32	<a href="#">ICA4-CT-2002-10061</a>	NEGOWAT	1.098.426	In progress	Latin America	Facilitating negotiations over land and water conflicts in Latin American peri-urban upstream catchments: combining agent-based modelling with role game playing
33	<a href="#">ICA4-CT-2002-10064</a>	ECOCITE	724.089	In progress	Africa	Gestion partagée et durable des espaces agricoles et naturels à la périphérie des centres urbains - Shared and sustainable management of natural and agricultural areas surrounding urban centres
34	<a href="#">ICA4-CT-2002-50035</a>	WaGE	49.764	In progress	Africa	Making Water Governance Effective (WaGE)
			<b>25.730.459</b>			

### Framework Programme 6

	Project N°	ACRONYM	CONTRACT AMOUNT (€)	Status	Region	TITLE
1	003717	LOGO WATER	1.192.834	In progress	Africa	Towards effective involvement of local government in Integrated Water Resources Management (IWRM) in river basins of the Southern African Development Community (SADC) region
2	013424	CabriVolga	1.040.000	In progress	Eastern Europe	Cooperation Along a Big River: Institutional coordination among stakeholders for environmental risk management in the Volga Basin
3	015410	ELMAA	1.600.000	In progress	MED	Integrated water management of Mediterranean phosphate mining and local agricultural systems
4	509091	OPTIMA	1.500.000	In progress	MED	Optimisation for Sustainable Water Management
5	509112	MEDITATE	1.650.000	In progress	MED	Mediterranean Development of Innovative Technologies for integrated water management
6	509158	NOSTRUM DSS	1.010.000	In progress	MED	Network on governance, science and technology for sustainable water resource management in the Mediterranean
7	509163	WATER WEB	1.200.000	In progress	Eastern Europe	Water resource strategies and drought alleviation in Western Balkan agriculture
8	509177	TRABOREMA	1.000.000	In progress	MED	Concepts for integrated transboundary water management and sustainable socio-economic development in the cross border region of Albania, Former Yugoslav Republic of Macedonia (FYROM) and Greece
9	510739	Epic Force	1.700.000	In progress	Latin America	Evidence-based policy for integrated control of forested river catchments in extreme rainfall and snowmelt
10	516761	JAYHUN	1.040.000	In progress	Eastern Europe/ NIS	Interstate water resource risk management: towards a sustainable future for the Aral Basin
11	510897	ASEM WATERNET	1.500.000	In progress	Asia	Multi-stakeholder platform for ASEM S&T cooperation on sustainable water use
12	509160	SARIB	1.200.000	In progress	Eastern Europe	Sava River Basin: sustainable use, management and protection of resources
13	003659	ASSESS-HKH	1.330.000	In progress	Asia	Development of an assessment system to evaluate the ecological status of rivers in the Hindu Kush-Himalayan Region
			<b>15.770.000</b>			

## **Annex 3 Concepts, themes, criteria and questions used in the panel review of documentation**

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### **Concepts**

These concepts provided frameworks that guided the panel in identifying *themes* and *criteria* for the review

- Sustainability
- Constructive engagement of the social solidarities
- Modernity theory

### **IWRM Project Review Sheet – used by the panel when reading the documentation of 67 FP4, FP5 and FP6 EU-INCO water research projects – themes and criteria**

The review sheet operationalised criteria derived from the initial brainstorming by the panel to develop an analytical framework. Three concepts see above - underpinned the approach with which the panel scored the projects on the basis of reading the documentation held by EU-INCO. It was possible for the panel to ‘drill through the pile’ of documentation and other evidence in a rapid and consistent way with all of the readers having a consistent critical orientation. The review criteria do not address the quality of the science, given that there are other mechanisms in place to do that. There is the initial scientific evaluation before funding and peer review throughout and especially of publication in the scientific literature. Each project was reviewed by two panel members. When the discrepancy between scores of panel members was more than one, a verification process was put in place to ensure consistency and modification, if required. It is this conceptual ‘top down’ approach that allowed reviewers to identify gaps in the research and its approaches. A purely ‘bottom-up’ approach based on what research was carried out within the sample of projects would not have been able to deliver that the type of evaluation achieved in this report. The score sheet is reproduced below showing the themes – level 1 and the criteria – level 2:

**Project number** .....

#### **Scoring scale**

0 = not addressed; 1 = less effectively addressed;

2 = effectively addressed; 3 = very effectively addressed

In order to make the scoring robust and avoiding to spread the limited number of projects over too fine a grid with enough projects falling into the different categories scoring scales were deliberately kept down in number.

**Name of reviewer** .....

**Have the principles of sustainability been properly addressed?**

**[Theme]**

- Social (including gender) [Criterion]
- Economic [Criterion]
- Environmental [Criterion]

- Political/institutional [Criterion]

#### **Have technical solutions been context sensitive?**

- Has local knowledge been considered in the technical approach?
- Has the technical approach considered ecological conditions?
- Has the technical approach considered the socio-economic conditions?

#### **Integration**

- Did the study take a biophysical system approach?
- Did the study take an integrated approach?
- What has been integrated? (Policy) - results not used in the evaluation

#### **Communication**

- Policy makers
- Technical community
- Local users
- Education
- Private sector

#### **Impact**

- Has the project contributed to capacity building?
- Has project leadership and management been balanced between the partners?
- Has the project been effective in advancing IWRM?
- Is the project impact on IWRM based on innovative knowledge generation?

#### **Narrative**

- Has the project reflected the understanding of IWRM, as expressed in the INCO FP4, 5 and 6 work programmes?
- What was the awareness of the team of the environmental services of water?
- Has the project adopted a resource-based or an ecosystem-based approach?
- Does the project reflect an awareness of cultural and historical dimensions?

This latter set of criteria was specifically used to account for the evolving demands of INCO work programmes and to assess projects in relation to the objectives to which the researchers had responded. This means that a project showing good environmental, but no policy awareness, in FP4 would receive a higher mark than one with such characteristics in FP6.

## **Annex 4 Questions circulated to the project coordinators by EU-INCO staff on behalf of the panel**

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Dear coordinator,

The EC has entrusted a review of international research projects related to Integrated Water Resources Management (IWRM) to an international panel of renowned experts in order to assess what has been learned over the years from international S&T cooperation in relation to IWRM and how useful and effective the research has been in informing societal and technological innovation in the context of the macro-goals of sustainable development and the Millennium Development Goals (MDGs). The review is presented at the research website of the EU Water Initiative at <http://europa.eu.int/comm/research/water-initiative>. Please note that the **purpose is not to criticise individual projects** but rather to analyse any trends in understanding and joint learning on IWRM throughout 3 research framework programmes, which could be useful to many types of public interested in IWRM, not the least for the internal purposes of the project collaborations themselves.

The panel devised a conceptual approach and broad scoring methodology to be able to extract trends from the diverse written material about the projects available to it in the form of final reports (most FP4/FP5), progress reports (FP5/FP6) or technical annexes of new projects (FP6 only). That material is not very outspoken on impact beyond the research teams themselves and often under-reports on how research results are being communicated other than through scientific publications in order to ease access of citizens.

Such information would much increase the value of various written outputs from the review process intended for large audiences of water professionals, policy makers, and citizens (through technical reports, policy briefs, general public brochure) and presentations at the World Water Forum IV (WWF4) in Mexico in March 2006.

The panel will have two more working sessions - 19-21 September and 24-28 October - to complete the essence of its analysis and draft the texts which will then be vetted by a diverse external mirror group.

Therefore, the panel would much appreciate if you would be able to **provide specific information** within the next 2-3 weeks - **preferably before 19 September** - that helps answer the **following questions**:

1. What has been communicated (and how) to diverse stakeholders about integrated water resources management and associated concepts integrating knowledge in interdisciplinary ways?
2. How have the ideas, skills and tools developed through the project enhanced the development or implementation of locally consistent IWRM?
3. Has your project been able to make connections between traditional and culturally embedded knowledge and technological research findings and if so, which?
4. Have such ideas been taken up by managers, policy makers, educators? If so, please explain.
5. Has the project contributed to capacity building legacy? If so, how?

6. Has the project resulted in longer-term institutional cooperation?
7. What do you think is the most enduring legacy of the project (political, social, economic, scientific, connections to traditional knowledge)?
8. Do you have any specific local, 'grass-root' experience that would be valuable as case material for the WWF4 discussions?
9. Would you like to recommend any specific type of approach arising from the experience of having (or not) impact on discourse and action outside science to be taken into account for future research (e.g. FP7)?

### **EU Water Initiative – Research Component**

#### **Review of projects addressing integrated water resources management – Lessons to be learnt Terms of Reference**

##### **Background**

Integrated Water Resources Management (IWRM) became an influential concept over the last 10 or more years due to increasing understanding of global/climate change, ecosystem functioning, impact of water resources management on poverty and social welfare, public awareness etc.

Among others, the Global Water Partnership defines IWRM as ‘a process that promotes the coordinated development and management of water, land and related resources, in order to maximise the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.’

The different definitions of the basic concept have in common that they recognise that water’s natural and socio-economic functionalities transcend sectoral approaches to planning, intervention and management and thus also disciplinary boundaries of knowledge. The concept borrows thus heavily from the four dimensions of sustainable development, ecological/natural, social, economic and institutional that need to be addressed concomitantly, if durable solutions are to be achieved.

These principles are enshrined in the water-related objectives of the Johannesburg Plan of Implementation (JPOI), when reference is made in Art. 25 through 29 to the development of integrated water resources management and national water efficiency plans by 2005 (Art. 26). Many of these principles should be developed and applied at basin level, and in the case of ‘virtual water’, perhaps even beyond. They also imply participation of diverse social actors, if not, in principle, all citizens, in integrated water management processes. These principles and associated targets are supported by the EU Water Initiative.

Despite the highest level of political endorsement, translating IWRM in practical terms faces considerable difficulties due to potentially substantial conceptual and organisational adjustments, financial investment and capacity building it entails across the board. Collaborative research and development projects are no exception in regards to this. Adequate institutional frameworks to plan and manage the ecological, economic and social dimensions of common public goods, such as water, are either insufficiently developed or lack integration. The study, development and management of these goods do not yet systematically rise to the challenge of integrated analysis and commonly agreed proposals for action.

Conversely, in the face of a localised problem of a well-defined nature, such as a point source of water pollution, it might not be necessary and even wasteful to evoke a full set of

IWRM activities mobilising stakeholders from across the basin. Rather the point source should be attacked at local level. However, even minimal understanding of basin ecology indicates that a simple storm or flash flood may be sufficient to generate considerable impact of diffuse pollution, not to mention public health and economic effects.

### **Objectives of the review**

The Community and others have made large investments into IWRM research at full or partial river basin level both in Europe and with partners from other parts of the world. It is time to take stock of where we stand by now, what we have learnt and what are likely to be the most useful and cost-effective ways to invest in this arena at least until 2015, the target year of the JPoI and the EU Water Initiative.

The objectives of the review are to:

- Review approaches, results and impacts of collaborative research projects aiming at IWRM with emphasis on EU framework programme projects;
- Analyse the lessons learnt and the strengths and shortcomings identified during the review, with particular emphasis on barriers for implementing IWRM principles in the interfaces between creation of knowledge and its use;
- Derive argued orientations on where future investment, research and innovation efforts and policy actions are likely to have the highest impact by building on identified strengths and addressing weaknesses;

Impact can take different forms ranging from pushing the knowledge frontier and influencing education and training of future generations of teachers and scientists to helping to solve societal problems associated with water use, allocation and management. It is often difficult to attribute such impact to a single project and impact times can be quite long. This review may thus not be able to develop this point in great depth, but should address it to the extent possible.

Expected Results include

- a technical report
- a policy brief
- a brochure for wider public dissemination

in order to facilitate better structured learning processes at various levels.

### **Scope and implementation modalities**

The scope of the review covers up to 50 international collaborative research projects which have either been completed or are in an advanced stage of implementation with documentation readily available. In a parallel development, a collaborative research project (NeWater) funded as part of the thematic priority ‘Global Change and Ecosystems’ will

focus on in depth analysis of mostly European collaborative research projects. Cross-fertilisation between the two efforts will be ensured.

The review will be mostly based on desk analyses, with limited consultation of selected project partners and other stakeholders. The most significant of the collaborative research projects focused on other parts of the world are candidates for forming the basis of the review process.

The review team will be composed of recognised personalities in various fields related to IWRM, five each from Europe and from other regions of the world. If required mirror groups in other parts of the world can be convened to help scrutinise and refine the analyses and orientations. Professional, geographical/cultural and gender diversity is considered an important precondition for a solid output. At least one person with a journalistic background will also be 'embedded' in the team to facilitate the reporting.

The review team will have four to five opportunities for direct cooperation through meetings

- two meetings of one working week, up to two meetings of three working days respectively in Europe - these should enable to finish the bulk of the panel's reporting by end of 2005;
- one meeting in March 2006 at the 4<sup>th</sup> World Water Forum in Mexico to present the results and interact with Forum participants.

Details of working methodology to ensure effective and efficient organisation of the review process will be established at the very beginning by the team in agreement with the sponsors.

The panel is invited to seek interaction with a mirror group of personalities active in IWRM in different parts of the world to validate their findings and recommendations. This mirror group is to be set up at the beginning of the review process.

It is desirable that staff of different interested services of the supporting institutions, in particular the EC and the EUWI Research Group, but also interested Member States, interact with the review panel in order to support its work, but also have the opportunity to learn from the process for their own work to the extent possible. To this effect, two half day meetings at the end of the first and second one-week working meetings may be set aside for such interaction, if considered useful by all concerned.

It is intended that the team will present and discuss its reports and findings in a session at the 4<sup>th</sup> World Water Forum in March 2006 in Mexico together with the findings of the European study.

The Commission will cover a standard honorarium, travel and per diem costs for the review team as well as the publication costs.

## **Annex 6 Independent experts in the Mirror Group who provided additional views and validated the draft report**

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The IWRM Review Panel wishes to acknowledge with thanks the useful inputs made by independent members of the mirror group. While not every single comment could be acted upon, several were incorporated or led otherwise to improvements of the initial draft.

1. Prof. Peter J. **Ashton**, Principal Scientist, CSIR - Natural Resources & Environment, Pretoria, South Africa
2. Prof. Fatma Abdel Rahman **Attia**, Professor Emeritus, National Water Research Center, Ministry of Water Resources and Irrigation, Director of the Water Boards Project, Cairo, Egypt
3. Dr. Brunello **Ceccanti**, National Research Council of Italy (CNR) - The Institute of Ecosystem Studies (CNR-ISE), Pisa, Italy
4. Ms. Ulrike **Ebert**, External Affairs Manager and International Water Policy, Thames Water, UK
5. Dr. Ramaswamy R. **Iyer**, former Secretary (Water Resources), Government of India, later Research Professor (now Honorary Research Professor), Centre for Policy Research, New Delhi
6. Dr. N.Vijay **Jagannathan**, Sector Manager (Water and Environment), Middle East and North Africa Region World Bank, Washington DC
7. Dr. Luciano **Mateos**, Instituto de Agricultura Sostenible (CSIC), Córdoba, Spain
8. Dr. Jack **Moss**, Director Environment Services, SUEZ, Paris and The International Federation of Private Water Operators, Paris Office
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11. Dr. Pasquale **Steduto**, Chief of the Water Resources, Development and Management Service (Land & Water Division), Food and Agriculture Organization of the United Nations with collaborators, Rome, Italy
12. Ms. Lesha **Witmer**, Women for Water, NGO Representative in the EUWI Steering Group, The Netherlands

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