EUROPEAN COMMISSION

Community research

EUR 21719 EN

Increasing Impact of the EU's International S&T Cooperation for the Transition towards Sustainable Development

REPORT

Interested in European research?

RTD info is our quarterly magazine keeping you in touch with main developments (results, programmes, events, etc.). It is available in English, French and German. A free sample copy or free subscription can be obtained from:

European Commission
Directorate-General for Research
Information and Communication Unit
B-1049 Brussels
Fax (32-2) 29-58220
E-mail: research@cec.eu.int
Internet: http://europa.eu.int/comm/research/rtdinfo/index_en.html

EUROPEAN COMMISSION
Directorate-General for Research
Directorate N - International Scientific Cooperation
Unit 2 - Community Cooperation Activities
B-1049 Brussels
Fax: (32-2) 29-66252
E-mail: inco@cec.eu.int

EUROPEAN COMMISSION

Increasing Impact of the EU's International S&T Cooperation for the Transition towards Sustainable Development

Cornelia E. Nauen
(Editor)

in collaboration with:
Claudio Bogliotti
Norbert Fenzl
Judith Francis
John Kakule
Konstantin Kastrissianakis
Lizette Michael
Neville Reeve
Dirk Reyntjens
Vandana Shiva
Joachim H. Spangenberg

Brussels
March 2005

2005

Directorate-General for Research
International Scientific Cooperation

EUR 21719 EN

A great deal of additional information on the European Union is available on the Internet.
It can be accessed through the Europa server (http://europa.eu.int).

Cataloguing data can be found at the end of this publication.

Luxembourg: Office for Official Publications of the European Communities, 2005

ISBN 92-894-9794-7

Printed in Belgium

Printed on white chlorine-free paper

The designations employed and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of the European Commission concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of frontiers or boundaries.

Copies are available free of charge upon request from the Information Desk of the Directorate General for Research, International Scientific Cooperation, 8 Square de Meeûs, B-1049 Brussels, Belgium; e-mail: inco@cec.eu.int.

The electronic version of this brochure can be downloaded from the cordis website at http://www.cordis.lu/inco2/src/library.htm.

A great deal of information about the European Commission is moreover available on the europa website at http://europa.eu.int/comm/

For bibliographic purposes, this report should be cited as follows:

Nauen, C.E. (ed.), 2005. Increasing Impact of the EU's International S&T Cooperation for the Transition towards Sustainable Development. Luxembourg, Office for Official Publications of the European Communities, 26 p.

Preparation of this discussion paper

This discussion paper is based on two *ad hoc* expert meetings convened to reflect from the quite different perspectives of the diverse group of participants on how the Union's international S&T cooperation could be made more effective in support of the much-needed transition towards sustainable development. Additional contributions were made through continued informal exchanges in the period since the first workshop in October 2003, the second workshop in February 2004 and a small study on three water-related scientific cooperation projects in the Mediterranean. The objective of the authors is to further stimulate collective analysis and exploratory action to increase the impact – and shorten impact times - of many a collaborative quest for knowledge essential for solving societal problems.

Participants and contributors were:

Claudio **Bogliotti**, Istituto Agronomico Mediterraneo di Bari (IAMB), geologist, Italy

Norbert **Fenzl**, Centre for Advanced Amazonian Studies (NAEA), Federal University of Pará (UFPA), hydrogeologist, sustainable development, Brazil

Judith A. **Francis**, Technical Centre for Agricultural and Rural Cooperation ACP-EU (CTA), Senior Programme Coordinator S&T Strategies, Trinidad and Tobago

John **Kakule**, ACP General Secretariat, Expert in charge of S&T, physicist, Uganda

Lizette **Michael**, Centre Africain de Formation et de Recherche Administratives pour le Développement / African Training and Research Centre in Administration for Development (CAFRAD), expert in public administration capacity building, Morocco

Cornelia E. **Nauen**, EC-RTD, International Scientific Cooperation, Chair, supported by Marlene **Flageollet** and

Konstantin **Kastrissianakis**, EC-RTD, International Scientific Cooperation, intern from October 2003 to February 2004

Reeve **Neville**, EC-RTD, Evaluation Unit

Dirk **Reyntjens**, Institute for European Environmental Policy (IEEP), London, UK (now EC-DG EMPL)

Vandana **Shiva**, Director, Navdanya / Research Foundation for Science, Technology & Ecology, India

Joachim H. **Spangenberg**, Sustainable Europe Research Institute (SERI), biologist/ ecologist/ economist, Germany

For bibliographic purposes, this report should be cited as follows:

Nauen, C.E. (ed.), 2005. Increasing Impact of the EU's International S&T Cooperation for the Transition Towards Sustainable Development. Luxembourg, Office for Official Publications of the European Communities, 26 p.

Table of Content

Introduction

The EC has responded to the recommendations of the 1979 UN Conference on Science and Technology for Development by setting up a programme for Science and Technology for Development (STD) in 1983. Over the last more than 20 years this international S&T cooperation programme has evolved into a constituent part of the EC's research framework programmes (FPs) becoming 'INCO' since FP4.

International S&T cooperation throughout focused on mobilising scientific capacity in Europe and partner countries and regions foremost around solutions to basic needs such as health and public health, rational use of natural resources and environmental protection and food security. However, in variable geometry and in response to historical or regional priorities, this collaboration has also supported some work on economies in transitions, particularly in post-conflict situations or other institutional instabilities, cultural heritage, energy and knowledge policies. It has been firmly based on the principle of partnership among equals seeking mutual benefits.

The experience has shown over time, that project approaches targeting new technologies are insufficient to produce broad-based societal impact. Moreover, as a result of the paradigm shifts arising from the debates surrounding the Rio Earth Summit and Agenda 21, increasing emphasis has been placed on systems approaches and policy. In tune with the subsidiarity principle, European support to international S&T cooperation is pitched at problems of regional importance in partner countries.

Research priorities for international S&T cooperation sponsored by the Union are identified through bi-regional dialogue or through reference to commitments of the EU at international negotiations, e.g. the Kyoto Protocol, the Convention on Biological Diversity (CBD), the Millennium Development Goals (MDGs) and the Johannesburg Plan of Implementation (JPoI) adopted at the World Summit on Sustainable Development in 2002. Overall, recognition of the continuum between education, life-long learning, research and innovation as a core factor for sustainable development is rising and informing policy formulation in Europe and elsewhere.

Recently the European Commission has overseen the development of the Lisbon Strategy for the social and economic renewal of Europe, which is being energised through a number of initiatives (European Commission, 2004, 2005). The emphasis on the 'International dimension of the European Research Area' (ERA) is a response to growing importance of science, technology and innovation for the transition towards sustainable development and thus also for international relations. The latter has resulted in the generalised international opening of the 6th Research Framework Programme (its major policy instrument). The overall allocation to international S&T cooperation in FP6 has risen to 600 MEuro. The allocation is split into two parts:

- 285 MEuro for the participation of INCO partner country teams in consortia addressing thematic priorities of European or global importance with an emphasis on European interest;

- 315 MEuro for joint research and research coordination among teams from Europe and one or more INCO partner regions addressing problems in INCO countries under their specific socio-economic and environmental conditions and based on mutual interest.

- In addition, the international part of the Marie Curie researcher mobility scheme is open for scientific exchange in both directions, for non-Europeans to do research for some time in Europe and for Europeans to carry out research in other parts of the world.

As a result of continued monitoring of scientific relations with other parts of the world and the internationalisation of science and the knowledge labour market, the importance of an enabling policy environment is recognised as of ever increasing importance when it comes to reaping the benefits of the S&T investment in Europe and elsewhere. With weak policies influencing basic and higher education and innovation, the ability to make use of research results and translate them into organisational, process or product improvements is also expected to be weak.

According to e.g. official estimates of the CGIAR (Consultative Group of International Agriculture Research) in 1999, of the more than US$ 3 billion invested during the previous 10 years in agricultural research through its research centres, 40% were destined to Africa. As a result of underdeveloped linkages with national research systems and policy, the CGIAR estimates that the impact of that investment is low.

Many questions arise from such past experience and its interpretation, but it is useful to focus first on the following questions:

1. WHAT is IMPACT and what determines impact?

2. HOW can we improve the interface between science and technology (S&T) and society?

3. WHAT is required to increase the impact of international cooperation projects?

4. HOW can we increase the participation and involvement of the political, societal and political stakeholders as one of the approaches to increasing impact?

Impact is particularly examined from the perspective of strengthening S&T capacity of partner countries and contributing knowledge that helps solve societal problems in their specific context.

The policy/programme context of international scientific cooperation will be explored in the last part of this discussion paper.

Factors bearing on societal impact of science – Initial inputs

In an initial brainstorming of findings and experiences emphasis was put on ‘bottom-up’ perspectives and their implications to the way societies organise their learning and innovation processes with an implicit emphasis on the transition towards sustainable development which underpins research cooperation of the INCO type based on the principle of mutual interest and benefit. Only a small selection out of the rich material presented is cited here to outline the boundaries of the analyses.

Joachim H. Spangenberg:

1. Participation of social actors in research undertakings is hard to keep alive over a longer time-period, because they need to see a tangible benefit for themselves from participation. Perceptions and roles of social actors and scientists differ a lot in that process, as the benefits they can expect differ as well. In this context some skepticism is in order on the kind of foresight that essentially extrapolates current trends, as past exercises have often proven wrong and systematic analysis shows that this is indeed to some extent inevitable. Mention is also made of an EEA study suitably entitled “Late lessons from early warning” (European Environment Agency, 2001) which shows that political action to scientific findings may be delayed by between 30 and 150 years.

2. Theoretical **concepts** of policy impacts may be very attractive, but reality checks often cast doubt on the assumed harmony between scientists’ ethical attitudes and practical imperatives, e.g. when a project coordinator submits a proposal: How do I package what I want to do such that the Commission thinks that what I do is what they want me to do? Would less ambitious demands for connecting research with policy goals permit more realistic, down-to-earth promises better suitable for evaluation? Or should projects become more ambitious in meeting policy goals and thus some form of societal demand? In this light, one might ask: What is the definition of success in such a process? For a start, we need to start to make our definitions more accurate. For example: is competition excluding cooperation? Social actors’ expertise and scientists’ competence are not necessarily “in line”. Why do some concepts get accepted and others not?

3. **Exclusion by inclusion**: Participation is *en vogue* in many programmes. However, every inclusion of some group into the decision making process implies that those not involved are more excluded than beforehand. Thus, those not capable of using the mechanisms of participation offered are deprived of the (limited) opportunity for influence

they had beforehand, be it through elections or other formal procedures. This refers to electronic communication and web based participation as well as to round-tables and other discourse-oriented settings, which are specific to a certain communication culture, neither shared internationally nor by all members of European societies (in fact, about 1/3 is believed not to share this attitude). In the end, opening up decision making processes might also diminish the relevance of formal democratic mechanisms, at least when no compensatory measures are foreseen for those who cannot respond to a specific kind of inclusion offer.

4. To **deepen the impact** of science in society, we need to look at the motivation of the various players from their point of view. As long as science does not provide the means to meet the ends societal stakeholders have defined, the impact will be limited. Science as a social system is but one amongst many – albeit a crucial one - and cannot alone set the standards as to which kind of knowledge is relevant. Furthermore, the knowledge society implies that there is knowledge within the society, not only within the scientific system. Science is not well prepared to integrate these different but equally important kinds of knowledge.

5. Do not be over-optimistic regarding the importance of the expected research results in each case or project. We need to understand that society is a moving target and a knowledge product, which might have had an impact in society by the time the project was designed could be rather irrelevant by the time it is completed. However, over time, the accumulation of many individual research efforts does lead to qualitatively new understanding. Moreover, making negative results known is also important by way of eliminating false hypotheses and discourage policies based upon them.

6. We need to realize that we live in a largely unpredictable world where we have to live with **uncertainty**. Thus we should not look for simple causalities, as identifying them may be often impossible or - in the best case - impracticable due to the efforts needed. We should instead look for plausible probabilities as a basis for project and programme evaluation. If no impact is detected, we should look at the problem, which was to be solved and ask: what has changed, what other impact factors have been at work? Given this dynamic development of projects, it was overdue that projects are permitted to be more dynamic regarding their objectives as is now the case under FP6. The need for relevant research questions requires the participation of social actors in the definition of the research questions, because stakeholders are experts on relevance. The moving target character makes them essential throughout the project. However, the composition of such social actors may change over time at different phases of the project cycle, as appropriate. Such a process obliges the scientists to explain: (a) what is the importance of the research? (b) why is it important? (c) what effect, what impact do we expect?

7. Good projects should have an **impact hypothesis establishing a**

plausibility, which can be assessed by evaluators. The impact hypothesis suggests what impact is plausibly expected and how it is assumed to be achieved, thus reducing hyperbole in many proposals (Baur *et al*., 2001). If a project generates results without any social impact, this has to be considered as a falsification of the impact hypothesis, and thus as a scientific way of institutional learning for the programme as a whole.

8. **Institutional learning** is a process to be perceived as reliable when the partners care about the content and process. This institutional learning is achieved by networking, workshops, post-workshops activities, train-the-trainers activities, etc.

9. An example from a DG Environment research project: 29 assessments in European countries to implement sustainable development programmes resulted in great interest in different countries from Norway to Cyprus and from Ireland to Ukraine and the Baltic. Eventually, however, the results were implemented to a very different degree for a variety of site-specific reasons. **If the demand is not sufficiently organised and articulated, capacity to use research results is low**. This is why lifelong learning is so necessary for politicians and other social actors: sustainable development issues are complex, which should not be oversimplified and dealing with them competently requires willingness and aptitude to engage with a range of knowledge systems.

10. **Questions** to ask are: Has the political discourse impacted science? Has the discourse changed? Has anybody funded parallel research on the same problems to scientifically test hypotheses? We need to distinguish between conventional science and sustainability science. Has there been any rise in sustainability science acknowledgement in research systems?

Claudio Bogliotti:

1. The major challenge of international scientific cooperation is to **maintain communication** with the key social actors. The advanced technologies like the internet do not necessarily enhance information, as it is overcrowded with useless material. Anybody may experience this situation when seeking consistent information e.g. about water – a key theme for food security, health outcomes and sustainability in general.

2. The Lisbon Strategy focuses strongly on EU competitiveness in relation to the US, Japan and Korea and not on **synergy** with developing countries and emerging economies like China, India, Brazil, South Africa, but also Nigeria, Senegal and others. Do we need a new definition or understanding of the continuum between competition and cooperation?

3. If we want to search for better impacts we need to determine at which level we have to look for indicators. Using a **logframe** approach may help structure the discussion and increase clarity of

objectives, means and hypothesis to be met (Bogliotti & Spangenberg, in prep.).

4. The transition towards sustainable development depends also on how the EU imperatives of sustainability (i.e.: competitiveness, cohesion, ecosystem protection, improving knowledge and governance in an interconnected world etc.) are framed in research project design and assessment. A large number of projects are funded and implemented every year in the Research Framework Programme. But are all these projects co-axially aligned in the same direction and orientation given by the key concept and ethics of sustainable development? Are they linked to each other by a common interpretation of ethical paths towards sustainability? It is difficult to answer this question, because many funded best-practice projects are well pursued at a certain community level but disregarded at other levels or by other communities of the same level. Orienting research projects towards sustainable development requires a suitable methodology to develop well-framed projects across a large diversity of variables and perspectives.

5. The diversity and often chaotic use of these variables and the subjective perceptions of the concept of sustainable development imply difficulties in deciding which among the possible early-stage project schemes is oriented towards sustainability and whether these schemes align with a common "ethical" interpretation of sustainability and are likely to produce real impact.

Cornelia E. Nauen:

1. By way of an example of how an international science-based cooperation has been built to provide global **public knowledge goods** for a level playing field in access to basic knowledge needed for the transition towards sustainable development, we can look at an electronic archive on all fish in the world called FishBase (www.fishbase.org). It now covers 28,800 known fish species with their valid and synonym scientific names, >200,000 local names in >300 languages, distributions, biology, physiology and many other fields of information relevant to managers, conservationists, anglers, aquarium hobbyists, industry, students and a very wide range of other citizens. It organises scattered knowledge from currently about 35,000 publications and allows analyses 'on the fly' via the internet. It currently attracts about 11 million hits/month from about 400,000 users. This rather impressive use of science-based information is slowly showing wider impact in society and has influenced several global or regional exercises in documenting biodiversity, modelling ecosystems and introducing notions e.g. of sustainable aquarium trade (a $5 billion/year business). It is influential in science as ascertained by > 650 citations.

2. How to **make research results more policy relevant**? For example, after analysis of almost 1000 pages of a report of the International Council for the Exploration of the Sea (ICES), based on indicators for size at maturity and optimum biomass production contained in FishBase, advice has been extracted that would allow to set management performance indicators which can be monitored involving even a wider public. A short paper summarising the approach was later published in a thematically oriented journal (Froese, 2004) and the same indicators are now being used for a more bottom-up approach to fisheries management in the Philippines supported through a bilateral development project, though not yet in Europe. FishBase has also laid the foundations for 'transformational' communication of science to the public through cartographic presentations as one way of increasing the spectrum of perceptions (Nauen, *in press*), thus increasing the chances of connecting scientific knowledge with people's life stories (Elvin, 1997).

3. This begs the question: How can we become more organised about communicating science to citizens on a broader front, be more responsive to other knowledge fabrics and help shorten the acceptance time of new approaches in the face of extended human life cycles and still underdeveloped 'lifelong learning'? Bringing diversity of perspectives to the task seems to be one of the most effective approaches as eloquently illustrated by Surowiecki (2004), something international cooperation is inherently predisposed to, but which can be pursued in a more explicit and organised way.

4. Another question: Should we spend more resources on **gap analysis** rather than spending on research 'as such' as a way to increase social added value of public research spending? This also implies directing more effort towards organising existing, but scattered research results and other knowledge so as to enhance accumulation effects through time and space (Pauly, 2001), a basic approach now very common in many fields of science as diverse as palaeontology, medicine and climate research and considered crucial for innovation (Dantas, 2005). An associated concern would be to devise structured ways to be on the outlook for unintended consequences – see the CFC and synthetic pesticide stories (European Environment Agency, 2001; Osborn *et al.*, 1995). Unintended consequences are not confined to threats. Indeed it can be argued that much of the true value of research and technology oriented towards a specific purpose accrues on a broader, unanticipated front. Fishbase is an excellent case in point. Initially intended to support the work of government resource managers, its very wide use in many different additional contexts much exceeds the original target.

Lizette Michael:

CAFRAD, as an organisation promoting the professionalisation of public service with particular emphasis on Africa, has demand for clearly articulated and targeted research, particularly as mind-sets are influenced by pre-scientific societies in many places.

1. In many knowledge-intensive processes, we may be confronted with the fact that results achieved do not correspond to initial objectives. Efficiency can be increased by adoption of better planning and feedback loops. But this is only part of the issue. **Effectiveness** could be increased by **changing attitudes** and enforcement, which may be achievable only over longer time-frames. More sensitive leaders and stakeholder participation are expected to be critical to that process.

2. Some training programmes for trainers in anglo/franco/arab-speaking African countries did not generate the expected outcomes, presumably because of a policy or institutional environment unconducive to the sort of change encouraged by the training.

3. While some local public administrations also in Africa have started collaborating with Initiatives such as Local Agenda21 (ICLEI) to explore how they can contribute to making development more sustainable, those involved with CAFRAD do not yet generally see science and research as a resource for their own work as there are preciously few examples of 'packaging' research results in ways that make the relevance to public administrations more directly visible.

Norbert Fenzl:

1. The potential impacts of S&T on policies are important in several Latin American countries, not only in Brazil. There is a certain disposition of social actors, especially politicians, to listen to scientists. The problem is rather that scientists find it difficult to break their knowledge down to their needs and the time scale. Example: the governor of the Brazilian state of Pará asked the NAEA (Institute for Advanced Amazonian Studies) to develop concrete political guidelines for his 4-year political and economic plan. However, the scientists were not able to provide a practical action plan on short notice and there was no institutional mechanism in place to develop such a plan in a wider participatory fashion.

2. The NAEA has a PhD programme – Sustainable Development for the Humid Tropics – which tries to develop methods and activities for capacity building to bridge exactly that gap.

3. In the cooperation programmes from so-called developed countries and the resulting projects, it can be observed that decolonisation is a still on-going process and not yet completed in

that insufficient attention is paid to the perspective of developing countries or emerging economies with processes driven predominantly by the model of the developed country(ies).

4. That creates a situation where motivations of cooperation are not always clear. Once motivations and needs (the real interests) of all the involved actors and partners in a cooperation programme are identified synergies between these different interests can be more readily created. Constructing collaboration around such synergies is a major factor to increase the impact of the projects. Example: Common exploration of biodiversity. A fair sharing the responsibilities and the economic results of biotech research is a necessary basis for a successful cooperation. A more complete list of negative effects of cooperation not based on firm partnership principles are listed by Oldham (2005).

5. The INCO calls suggest sensitivity to human rights, sustainable development, environmental issues, and combat of poverty. These may be very important and “good requirements”, but often do not correspond to the political decisions of even more influential components of EU governments at a global economic level (the last Cancún Conference may be a case in point). Such discrepancies induce a certain “suspicious” feeling about the real intentions and motivations of the call.

6. Also, when research is close to commercial exploitation, the balance between cooperation and competition may need to be better defined and safeguards built in, particularly if some participants are scientifically weaker than others. However, even among large industrial companies, cooperation on some aspects coexists with competition on others.

What does international cooperation mean for 'public investors' and the S&T community in a knowledge society?

Several topics need to be discussed with the interests of various players considered among the central issues for exploring current impact conditions of publicly funded international S&T cooperation with emphasis on supporting the transition towards sustainable development and future opportunities:

- The **interests** (motivations, needs, etc.) **of public administrations** investing in research: spheres of interest, delegation or sharing of responsibilities, political interests, investments in future economic ties, competitiveness, diversification of international relations, delivery on political commitments;

- What are the **interests of the S&T community**: enriching views and experience through cross-cultural cooperation, contribution to knowledge about global and local problems, positioning research centres/teams in the face of globalisation, labour markets, trace career tracks for scientists etc.

- The **conditions for developing a "shared" knowledge base**: sharing understanding, speaking or developing "common language", recognising legitimate interests, recognising the diversity of knowledge built in networks of networks, underpinning mutual benefits by transparency, developing trust. Given the advanced decline of ecosystems around the world demonstrated by the Millennium Assessment in March 2005, sharing scientifically validated knowledge is of particular, even critical, importance. Particularly for countries with limited science and technology capacity, collaboration with others is now recognised as the single most important way to advance towards realisation of social and economic objectives (Oldham, 2005; Barnet, 2005).

- **Building a knowledge-society** does not mean a monopoly of science; as society has a wide range of different "ways of knowing", though sustaining the human population can be barely imagined without science and technology. A redefinition of what knowledge in this context means may be warranted. Consilience (mutual compatibility) of different disciplines and ways of knowing (Wilson, 1998) is required so that information and knowledge can serve as the basis for consensus-seeking, not conflict. Lowering the access barriers to knowledge for all citizens is an overriding need, but remains a major challenge.

The **key condition to increase the impact of international S&T cooperation** on societal processes is that the knowledge produced is taken note of, perceived as relevant, and believed to be reliable. These conditions are only fulfilled, if the source of information is considered trustworthy, scientifically competent and capable of identifying the most relevant information, and to deliver it effectively. This requires

1. **Confidence**

   Transparency, openness of motives and actions, accountability, dialogue and communication;

2. **Competence**

   Factual relevance, quality of information and knowledge recognised by others (social actors in society), mutual recognition among scientists, credible products, meeting societies' needs;

3. **Capability**

   Elements to be considered are: (i) Knowledge, which is not only factually, but also politically relevant. The more people believe in someone (something), the more the impact of action or attitudes based on that confidence will increase to the point where it may become self-fulfilling prophecy. (ii) Ability to support the process. (iii) Installed capacity of hardware, software, and infrastructure for networking.

All three criteria need to be concomitantly met to create impact within the respective society, but, similarly, to engage other scientific institutions and have an impact in the scientific system.

In the course of the debate, these factors have been disaggregated into sub-issues as highlighted below. These may serve e.g. to assess the current profile and thus the impact potential of a research institution. The key question for research cooperation is then, whether or not the projects funded help to improve this profile, thus making it more probable that the output of the research will be actively used by the respective society, thus creating some form of societal impact.

For this purpose it was considered useful to summarise the "usual" set of measures included in projects under the 5th Research Framework Programme (FP5 – 1998-2002) in view of addressing/ generating impact as follows:

1. Extending bi-regional discourse, platforms / fundraising
2. Creating networks of competent partners
3. Defining a desirable scientific innovation /activities /results
4. Reviewing of information, data in order to build a knowledge base
5. Allocating responsibilities according to perceived responsibilities, competences, responsibilities
6. Planning individual continuous plans /information dissemination
7. Research proceeding information /data
8. Involving peers and social actors to create ownership
9. Giving meaning to data /interpretation / contextualisation / creating narratives around research results
10. Harmonisation (methodology, standards)
11. Dissemination of research
    - regarding methodology
    - data
    - interpreted data
    - encouraging action
12. Training PhDs
13. Exchange visits
14. Gender concern/female participation
15. Websites

16. Books/ e-mail lists

Comparing these measures to the needs and to the impact conditions identified above is the basis for discussing break-off points between ‘business as usual’ and taking adequate action to generate such impact in a plausible way.

By implication, this supposes a wider definition of research to incorporate active concern for enabling the uptake of research results blurring somewhat the interface to education/learning and innovation.

Moreover, a study on the impact of health care research suggests that efforts in producing information material with clear actionable ‘take home messages’ for different target groups, often combining knowledge from more than one specific research study has been found a useful means to transfer knowledge from the research environment to decision makers, practitioners, service providers or the general public. The study also shows that in the case of Canada, a large percentage of research institutions allocate considerable resources for the production of such messages, on a diversity of delivery routes and particular on ‘the messenger’, who must be trusted by the target audience. Finally, many organisations have found it necessary to associate representatives of the target audience with the preparation of the messages as well as with certain stages of the research itself (Lavis *et al*., 2003). Such outreach touches on the three key factors of trust (messenger), the relevance (‘message’) and the communication (‘how’) identified here in a broader trans-sectoral context. It is now more widely understood that all have to be in place for action outside/beyond the research environment, though attention to the full range has remained largely outside the remit of conventional research.

In other words, all processes need systematic attention: knowledge production, its transfer to and between social actors and the context in which societal use of scientific knowledge generates a maximum of benefits. The different ways in which scientific knowledge gets then used in the respective contexts, is yet another aspect of impact requiring separate analysis.

Table 1. Setting the ‘usual’ project approach against impact conditions

A. Impact conditions in society	B. Impact conditions in science	Project ‘business as usual’
I. Confidence	***I. Confidence***	***Activities***
I. 1. Transparency in actions and motives (1, 8)	I. 1. Trustworthiness	8. Involving peers and stakeholders to create ownership
I. 2. Trustworthiness of persons, social competence	I. 2. Sharing intellectual property (IP) / sharing knowledge (13)	13. Exchange visits
I. 3. Establish dialogues (1)	I. 3. Sharing responsibilities (5)	1. Extending bi-regional platforms / fund raising
II. Competence / Capacity (product)	***II. Competence / Capacity (product)***	***Activities***
II. 1. Recognised by society	II. 1. Mutually recognised (5, 13)	5. Allocating responsibilities according to perceived responsibilities, competences, responsibilities 13. Exchange visits
II. 2. Factually relevant (14)	II. 2. Adding to research networks (2)	2. Creating networks of competent partners
II. 3. Meeting Society’s knowledge needs (9) Creating narratives around research results	II. 3. Factually relevant (3, 9, 14)	3. Defining a desirable scientific innovation /activities /results 9. Giving meaning to data / interpretation / contextualisation 14. Gender concern/female participation
II. 4. Credible products	II. 4. Creating protected IP (to keep knowledge in the public domain)	Develop socially accepted and oriented innovation/technology.
	II. 5. Planning / management capacity building (6, 12). Preventive planning for mitigation of system perturbation.	6. Planning individual continuous plans /information dissemination 12. Training PhDs

III. Capability / Infrastructure (process)	***III. Capacity/ Infrastructure***	***Activities***
III. 1. Making oneself understood (6, 11, 15)	III. 1. Making oneself understood to peers (6, 8, 11, 15)	6. Planning individual continuous plans /information dissemination 8. Involving peers and stakeholders to create ownership 11. Dissemination of research 15. Websites
III. 2. Self-fulfilling prophecies	III. 2. Ability to resonate in community (3, 6) Collective ability of co-decision to determine the future (ability to build democratic (co-decision) processes using sustainability principles and values as reference.	3. Defining a desirable scientific innovation /activities /results 6. Planning individual continuous plans /information dissemination 11. Emphasizing action (doing).
III. 3. Ability to support process – infrastructure (8, 10, 15)	III. 3. Harmonisation of research agenda (3, 10, 11, 13)	3. Defining a desirable scientific innovation /activities /results 10. Harmonisation (methodology, standards) 11. Dissemination of research 13. Exchange visits
	III. 4. R&D networks with SMEs and other actors supporting social and technological innovation (incl. those involved in education and life-long learning)	Determine socially shared knowledge to enhance innovation(mostly use existing knowledge in new ways)
	III. 5. Responsible, appropriate knowledge management	Develop institutional mechanisms to ensure equity of access to knowledge and lower access barriers for citizens
	III. 6. Creation of comprehensive knowledge (4, 7, 9, 13, 15)	4. Reviewing of information, data in order to build a knowledge base 7. Research proceeding information /data 9. Giving meaning to data /interpretation / contextualisation 13. Exchange visits 15. Websites (demand and not-project driven e-knowledge/ information)
Factors creating impact potential, which do not have an obvious match in 'ordinary' project activities are shaded. Some others, such as bi-regional discourses and dialogues, giving meaning to data and creating narratives around research results have great potential to create or enhance impact, but may not be sufficiently developed in 'ordinary' projects to realise their full potential.		

As a matter of fact, integrating the list with the columns in the table gives clear evidence, that neither are all measures generally foreseen in project planning adequate for the purpose of enhancing its impact, nor are all key conditions for improved impact covered by measures routinely envisaged in research projects. In other words: there was a systemic deficit in addressing the topics, which was an obstacle to creating enhanced impact of research results, especially in the shorter term.

This table does not only illustrate that there are deficits, it also permits to identify priorities for improvements.

In FP6 (2002-2006) under the influence of these considerations small adjustments have been made in the requested format for project proposals in international scientific cooperation (INCO), namely in relation to requesting plausible and testable impact hypotheses. This was intended to encourage more careful thought about how impact could be plausibly generated, e.g. through closer association with relevant social actors at different stages of the activity cycle (not only towards the end) and otherwise addressing the identified ‘missing links’.

It is desirable to take these factors even more into account in the preparations and implementation of FP7 if the impact of research processes is to be improved.

Finally, the list of *societal* criteria is the one from which indicators for project impact potentials can be derived *ex ante*, not the internal criteria and indicators used by the scientific community (which have their own merits, but serve different purposes).

Monitoring and evaluating the real impacts can then be based (at the project level) on validating *the impact hypothesis*, and the results of this assessment can be used to validate the impact potential criteria.

This prepared the way for some initial discussion on

- What do we do to achieve purposes/characteristics, impact opportunities in the shorter term and long-term potential?
- What could be suitably aggregated indicators of achieved project purpose, which can be collected and shared cheaply.

Among such aggregated indicators the following may be tentatively listed:

- **AI – Confidence building**: how often has the institution/project partner been entrusted with coordination, management? Have project results been requested by others (political and economic decision makers at various levels)?
- **AII – Competence**: How often are the researchers invited to parliament, (political, economic) meetings or hearings involving civil society? How much funding does an institution raise from various sources? Hits/visitors on websites?
- **AIII – Capabilities**: Number of citations in press or other media, use of research results in investment planning e.g. of regional development banks, parliament minutes, legislation comments, requested consultancies.

There are thus opportunities to increase project impact through judicious planning and implementation putting explicit emphasis on involvement of social actors from the design stage and on the interfaces to education and innovation. All of these are now part of the evaluation process in FP6, examining whether such cross-cutting issues have been taken adequately into account, though no formal points are assigned.

Within the context of project level evaluation at the present time, it is not (yet) feasible to cover the full range of enabling conditions that would provide greater assurance of social impact. However, the emphasis on ‘plausible impact’ introduced, among others, as a result of the *ad hoc* group’s discussions signals encouragement to incorporate more resources within the project concept and implementation for participatory forms of research and for ‘dissemination’ as the natural conclusion from the empirical evidence not only arising out of the European Union’s own international S&T cooperation, but increasingly recognised by others as well (KFPE, 1998; Dantas, 2005).

Highlights from three Mediterranean water research projects

The following section summarises initial findings of **K. Kastrissianakis** from an analysis of questionnaires and direct interaction with project coordinators of three international water research projects in the Mediterranean carried out following the first workshop.

The analysis focused on four different perspectives to uncover the pertinence of actual or potential activities that could help overcoming some obstacles to impact.

- Consortium formation, duration and effectiveness;
- Networks of partners beyond the consortium and beyond the science system;
- Research results write-up and dissemination; record keeping;
- Efficiency of tools used towards reaching the socio-economic targets.

WADI - **WA**ter supply watershe**D** planning and management: An **I**ntegrated approach (http://www.ercim.org/wadi/). This **research project** mobilises teams from northern and southern Mediterreanean countries and is developing an integrated information system devoted to computer assisted watershed planning and management to meet water demand requirements, for operational use by engineers and decision makers. This system will provide tools capable to process data and handle all the other computational aspects through mathematical models, optimisation schemes and visualization through GIS techniques and viewer tools. End user requirements are taken into account and there is some involvement.

MedAqua II - The INCO Project Cluster for Water Application Projects in the South Mediterranean Countries (http://www.medaqua.org/default.htm) was an **accompanying measure** to strengthen synergies and cross-fertilisation among past and present projects in the South Mediterranean water projects through (i) a web-based catalogue of projects www.MedAqua.org containing a short description with the expected and achieved results; and (b) a joint conference in early 2004 in Amman following the success of the first Amman 2001 Conference.

WASAMED - A platform for effective Mediterranean communication and debate on water saving in agriculture (http://wasamed.iamb.it/). This **coordination action** mobilises a large number of scientific teams, agriculture and environment administrations and farmers' and water users organisations from almost all Mediterranean countries with a focus on joint learning through confronting diverse experiences. The ambition to create a body of common understanding is structured around the website acting as a repository of experience and support for dialogue and five workshops spread between 2003 and 2006 providing opportunities for in-depth discussion of subsets of themes.

The three projects are each of a different nature, which translates into different strengths and limitations concerning the degree and nature of impact beyond the researchers and others directly involved.

In the case of WADI, naturally the emphasis is on new scientific knowledge and capacity building through investment in young scientists by enabling southern Mediterranean PhD students to participate. In a number of situations other institutional and capacity creation effects are visible through the intensive use of the research tools such as GIS (geographical information system) on specific watersheds within and beyond the directly involved teams. But the relatively high degree of skills required for active involvement in the actual manipulation of the system limits the scope for direct use by non-specialists. The degree to which this can realistically be opened to other social actors during the lifetime of this still on-going project is difficult to assess, though a useful step into opening new ways of thinking about the planning at watershed level is apparent with emphasis on the physical parameters and efforts to capture at least some of the socio-economic features.

In the case of the other two projects, the emphasis on coordination and exchange targets a complementary mode of learning focused on breadth rather than depth and draws on networks of professional contacts which existed in most cases before the projects started. In the case of the accompanying measure the interaction and networking was limited in time and mostly confined to the conference itself, while they can develop over a longer period of four years in the case of the coordination action. However, continued maintenance of the web-based project database containing summary information about 58 water research projects in the Mediterranean between 1997 and 2006, providing contact points and links to project websites to many of these to facilitate access to more information on the projects and the relevant expertise in various countries concerned is a useful service to the public at large, which continues to be used well after the formal end of the AM.

In the WASAMED coordination action with its heavy emphasis on web support, ease of access to the technology and language are arising as a particular challenge. Many researchers from the region find that formal communication of research results in English and French creates barriers to Arabic or Berber speakers. The need for communication across different language and cultural realms represents a particular challenge to developing more shared understanding as the concepts and '*a priori*' assumptions made by different social actors and different scientific disciplines are not necessarily the same (see also Eco, 2003). Moreover, while efforts at outreach through websites are noteworthy, cheap and reliable internet access can not be taken for granted throughout.

Accepting that full inclusiveness remains elusive at project level, some useful effects are being noted by lowering access barriers to information and knowledge elsewhere and stimulating broader-based confrontation of concepts and solutions. Societal impact of this useful potential is hard to quantify, but project communication events (workshops, seminars, conferences) are set up in such a way as to enable participation and active involvement of citizens in *ad-hoc* panels/sessions, where scientific discourse and interrogations are shared in order to increase uptake.

Initial considerations on impact at programme/policy levels

The impact of individual projects can be much enhanced by explicit attention to the factors identified above, but will of necessity remain limited unless their effects are amplified as a result of enabling policies and their effective implementation. Examining what such conditions could be and whether and to which degree they are achieved is the focus of this section. "In the future, the ability of countries to access, comprehend, select, adapt, and use scientific and technological knowledge will increasingly be the determinant of material well being and quality of life" (Watson *et al*., 2003).

Programme and policy levels of international S&T cooperation are explored from several perspectives, namely of

a. the macro-context at global level, e.g. in the context of decisions and the Plan of Implementation (JpoI) adopted at the 2002 World Summit on Sustainable Development;

b. various European policies with an international dimension;

c. research, education and innovation policies in partner countries and regions.

Ad a. Already in the run-up of the WSSD, science and technology have received increased attention. Not the least, the African, Caribbean and Pacific (ACP) Ministers of Science and Technology adopted their Cape Town Plan of Action on Research for Sustainable Development in July 2002 (ACP Council of Ministers, 2002) with a view to engage the EU more strongly in their efforts to build capacity in this arena. The chapter on means to implement the JPoI is eloquent on promoting the research capacity building, appropriate technology transfer and scientific and technological cooperation, putting S&T right at the heart of the transition towards sustainable development together with trade, debt relief and focus on health and natural resources.

Scientific cooperation within and across regions has been an important mechanism - as also reflected in growing numbers of scientific publications by authors from different countries – to build political trust much beyond the research community itself. One case in point is the way in which International S&T Cooperation opened the way for eastern neighbours of the European Union to become candidates and ultimately members. Another is associated with the relations between the Union and the Group of 77 in the context of the Convention on Biological Diversity (CBD) and the Cartagena Protocol on Bio-Safety, reflecting extensive biotech S&T cooperation between the parties.

This illustrates the importance of combinations of informal and formal types of cooperation, with informal networks operating against the backdrop of a positive policy environment being particularly important.

Without a minimal infrastructure ranging from electricity supply, communication systems, at least basic banking facilities to functioning universities and engineering capabilities, countries or regions find it difficult to reap all the benefits from S&T cooperation.

Thus, there continues to be a gap between this recognition and its translation into large-scale programmes, though some progress is being made in Unesco, in global ocean observation, various arenas of bilateral and multi-lateral science cooperation and other suitable contexts. It should be expected that pressure will be mounting to invest in more harmonised ways both in the capacity building and actual research collaborations towards closing the gap.

Ad b. Likewise, various European policies such as the Action Plan for Sustainable Development, the Water Framework Directive, work on the ratification of the Kyoto and the Convention on Biological Diversity and the Cartagena Protocol on Biosafety together with commitments to contribute the Monterrey Consensus and the implementation of the Doha Declaration in conjunction with development cooperation policies and last, but not least, several Communications by the Commission on science and technology and particularly international scientific cooperation between 1997 and 2003 represent a framework conducive for mobilising the knowledge fabrics of partner regions and the EU. The research framework programmes are the principal means to implement the policies, though, increasingly, emphasis is also put on coordinating research policies and thrusts of EU Member States (ERA-Nets) in selected priority areas, such as the recent case of an ERA-Net on international science cooperation on water issues.

Since the late 90s policy dialogue with many countries or groups of countries belonging to the groups of developing countries, emerging economies or economies in transition and industrialised countries was taken up in an increasingly structured way. Starting initially with bilateral S&T cooperation agreements with countries wishing to coordinate their research policies with the Union (http://europa.eu.int/comm/research/iscp/index_en.cfm?page=Cooperation%20Agreements&type=other), wider S&T dialogues became a feature of e.g. the Asia-Europe Meetings (ASEM) initiated by the current Director General of the WTO, Supachai Panitchpakdi, or the equivalent with Latin America and the Caribbean (ALCUE). As part of the Barcelona Process, S&T dialogue with Mediterranean Partner Countries is institutionalised since many years in the form of Mediterranean Coordination (MOCO). Such frameworks often have bi-annual meetings of heads of state or government, ministerial meetings and various forms of cooperation at more technical levels.

To make such multi-stakeholder dialogue a standing feature, platforms with a thematic focus to promote S&T cooperation and offshoots into education, innovation and investment have been set up e.g. for health with Latin America, aquaculture and water in the ASEM context. They offer a range of formal and even more informal possibilities for cooperation, coordination and building of trust. “The consolidation of the European Research Area in years to come will create a vast intellectual, scientific and cultural space which the European Union is willing to share with other countries for the benefit of global sustainable and equitable development…" (European Commission, 2002).

Over the last 20 years, some 40,000 researchers from all partner countries have been mobilised together with their European peers in joint research and research coordination, mostly with a focus on meeting basic needs attuned to their regional specificities in health and health care systems, sustainabale food production, processing and conservation, sustainable use of natural resources and environmental risk management, energy policy and knowledge policies.

European level policies and the specific efforts towards international S&T cooperation have pioneered new types of international relations based on mutual interest and benefit. But more decisive steps towards implementation on a much broader front and with deeper engagement with a wider range of European and partner institutions are required to shorten impact times and engendering more structural effects.

With the general opening of FP6 to international cooperation the political will was signalled to go beyond the well-proven framework of international scientific cooperation for meeting basic development needs. However, implementation was so far only partially successful. The preparations for FP7 offer opportunities to learn the lessons. The generalised references to international cooperation in almost all major components of the initial FP7 proposal (European Commission, 2005a) could open opportunities to connect specific European concerns with those of partners in other parts of the world and thus spell out possibilities to work together on the increasing number of themes of mutual interest. The degree to which this will succeed hinges, among others, on improved articulation of demand on all sides and practical implementation conditions backed up by widest possible information of researchers and research managers inside and outside the Union.

Ad c. More than 100 countries have engaged in various forms of scientific cooperation and capacity building with the EU, foremost developing and emerging economies in the middle-income bracket with an existing research infrastructure. Few developing countries in the low-income bracket below annual *per capita* income of <1000 Euro have strong policies of investing in people in the entire spectrum from education, research and innovation. According to latest UN estimates they are the least prepared to take advantage of progress in science and technology or prevent any risks associated with such advances. As the ACP Declaration referred to earlier shows, there is a drive towards change, though it should be expected to take time before this translates into fully articulated national knowledge policies with the effective instruments and funding in place to ensure implementation in the entire continuum of education, learning, knowledge creation, use and social and technological innovation. Innovation systems are still underdeveloped but investing in intermediation between the production of new knowledge and use of what exists offers the highest short-term benefits (Dantas, 2005). Moreover, there is now greater recognition that innovation is an iterative process of many small steps made on a broad front and involving selection by societies over long time periods according to social acceptability and economic viability (Bruland, 2001), inviting new thinking on what might be appropriate for developing countries.

Middle-income countries tend to have dual economies with well-connected elites with advanced research capabilities in several areas of particular interest to them, while large segments of the population are somewhat disconnected and continue struggling with problems otherwise typical of developing countries. As the Japanese example shows, however, suitable knowledge policies and their implementation (in this case early high literacy rates) are not necessarily the result of economic development, but rather its precursor (Sen, 1999).

Investing in people and their institutions, particularly in a period of major transformations taking place in societies around the world, is one of the tenets of international scientific cooperation based on mutual interest and benefits and grounded in partnership principles.

Distance learning is an innovative way to address weaknesses in infrastructure and building capacity in regions unlikely to develop a fully-fledged university system in the near future. Several INCO activities already support such strategies putting emphasis on public knowledge repositories on the web to cost-effective content delivery. More systematic approaches would be needed to make broader inroads, such as illustrated by the Indian and South African programmes for distance learning.

What seems to be relevant across the board

Contrary to most other goods, knowledge does not get consumed and is not governed by scarcity. Quite the opposite, the more it is shared, the more it becomes and the more it becomes useful. As Drucker (2003) observes, it is not subject to the same economic principles as goods and services in short supply and thus requires entirely different approaches making cooperation a particularly attractive course of action.

The more this basic observation informs exploration of such forms of knowledge-based cooperation with particular attention to knowledge in the public domain, the greater the benefits in store for partners involved and well beyond. The more enabling policies create the space and opportunities for practical experience to be gained in this arena, the better the wide array of possible uses in different socio-economic and ecological contexts. It is on the strength of this insight that scientific cooperation is set in formal agreements, e.g. between Brazil and India, between China and India.

Accepting the largely unpredictable nature of value of new knowledge to social actors outside the directly involved research teams and the often unexpected uses to which new scientific findings are put in addition to the originally intended purpose (see the case of FishBase above), the European Union's international S&T cooperation has consistently invested in people and their institutions for learning, research and social and technological innovation.

Giving partners a greater stake in the European knowledge landscape and participating actively in the programmes of institutions and countries elsewhere in the world will further amplify the mutual benefits arising from the past 20 years of experience.

Conclusion

The starting point for this brief analysis was the question how to increase societal impact of the European Union's international scientific cooperation in the desirable and necessary transition towards sustainable development. Impact was analysed with emphasis on increasing S&T capacity in partner countries of the Union's international scientific and technological cooperation and contributing knowledge that helps solve societal problems with emphasis on the specific context of partner countries.

In refining what impact is, which factors determine it and which ones can best be acted upon and how, three parameters emerged as particularly important for determining impact at project level: (i) trust of peers and social actors in scientists, (ii) the perceived relevance of social actors of the research thrust and (iii) communication capability conveying an ability to listen and convey both the process of research and its results in understandable and credible ways.

Trust is perhaps the single most important factor to enable scientific partnerships based on mutual respect and benefit. Partnerships provide a critical link between internationally agreed sustainable development goals and the on-the-ground ideas, efforts and scientific and other resources of governments, civil society, academia and the private sector.

Governments alone cannot solve the world's problems. So, mobilising different social actors - the more risk-inclined private sector together with usually risk-averse civil society groups and the best available science, can fill gaps and niches that official development aid, traditional diplomacy or trade alone can not.

Such investment in human and institutional capital benefits partners in developing countries, emerging economies and the Union equally. The process of scientific and technological cooperation for sustainable development addresses all aspects of the knowledge generation and use process, covering the virtuous triangle from research to innovation and education / life-long learning. The potential impact on the 'operating system' of developing and emerging economies is far-reaching. This gives international scientific cooperation a long-term geopolitical dimension and provides a much enhanced role for scientific knowledge and the ability to use such knowledge in problem solving and as an engine of growth and source of employment in todays highly interconnected world.

While attention to the impact parameters from the conception phase of a research collaboration enhances plausible impact both in shortening impact times and magnitude, further analysis showed clearly the limits of potential achievement of individual projects working in isolation.

Larger-scale societal impact depends heavily on an enabling policy environment that recognises the strategic importance of science in international relations and in national policies of each country. This needs to translate into minimum infrastructure for research, organisation of demand for knowledge and its uptake and upstream and downstream linkages to education and innovation.

It also needs to be understood that impact at such scales takes time to materialise and is usually the result of a mosaic of iterative steps taken on several fronts. Evidence shows, however, that such time scales are compressible when suitable policies are in place and acted upon. These need to comprise a combination of investment in people and institutions on a long-term basis carefully avoiding stop-and-go situations which are destructive for social and institutional capital. Policy mixes adapted to the respective specific conditions and interests need to be endorsed and implemented both by the European Union and its partners in other parts of the world to be effective.

Further development and dynamic implementation of European international S&T strategies and their connectivity with other relevant policy areas, together with the explicit S&T and innovation policies of partner countries, are a prior condition for reaping the full benefits of scientific cooperation based on mutual interest.

Further reading

ACP Council of Ministers, 2002. Cape Town Plan of Action (on Research for Sustainable Development). *ACP/84/048/02 Final*, 8 p. http://knowledge.cta.int/en/content/view/full/305

Barnet, A., 2005. Reducing poverty needs and 'innovation system' approach. Science and Development Network, http://www.scidev.net/dossiers/ 4 April 2005

Baur, H., M. Bosch, S. Krall, T. Kuby, A. Lobb-Rabe, P.T. Schuetz & A. Springer-Heinze, 2001. Establishing plausibility in impact assessments. Eschborn, Gesellschaft fuer Technische Zusammenarbeit mbH (GTZ), 19 p. (mimeo)

Bogliotti, C. & J.H. Spangenberg, 2005. A conceptual device for framing sustainability in project development and evaluation. *WIT Transactions on Ecology and the Environment*, 84:347-357.

Bruland, K., 2001. Technological revolutions, innovation systems and convergence from a historical perspective. Prepared in the context of the CONVERGE project funded by DG Research (XII) under contract SOE2-CT98-2047 as part of the TSEP Programme. http://pascal.iseg.utl.pt/~converge/pdfs/(45).pdf

CTA, 2005. Knowledge for Development. http://knowledge.cta.int/

Dantas, E., 2005. The 'system of innovation' approach, and its relevance to developing countries. Science and Development Network. Policy Briefs. http://www.scidev.net/dossiers/ April 2005

Diao, X. & Y. Yanoma, 2003. Exploring dynamics in Sub-Saharan African agriculture. International Food Policy Research Institute (IFPRI), Development Strategy and Governance Division, *DSGD Discussion Paper*, 2:44 p.

Eco, U., 2000. Mouse or Rat? Translation as negotiation. London, Phoenix, 200 p.

Elvin, M., 1997. Changing stories in the Chinese world. Stanford, USA, Stanford University Press, 265 p.

European Commission, 2002. Capitalising on people and institutions. Ten years of EC scientific cooperation for the transition towards sustainability. Luxembourg, Office for Official Publications of the European Communities, 23 p. EUR 20351

European Commission, 2004. Facing the challenge. The Lisbon strategy for growth and employment. Report from the High Level Group chaired by Wim Kok. Luxembourg, Office for Official Publications of the European Communities, 51 p.

European Commission, 2005. Communication to the Spring European Council. Working together for growth and jobs. A new start for the Lisbon Strategy. European Commission, Comm(2005)24 final, 31 p.

European Commission, 2005a. Proposal for a Decision of the European Parliament and the Council concerning the seventh framework programme of the European Community for research, technological development and demonstration activities (2007 to 2013). Proposal for a Council Decision concerning the seventh framework programme of the European Atomic Energy Community (Euratom) for nuclear research and training activities (2007 to 2011). Building the Europe of Knowledge (presented by the Commission) {SEC(2005) 430, SEC(2005) 431}. European Commission, COM(2005) 119 final, 105 p.

European Environment Agency, 2001. Late lessons from early warnings: The precautionary principle from 1896 to 2000. *Environmental Issue Report* 22. Luxembourg, Office for Official Publications of the European Communities, 210 p.

Drucker, P.F., 2003. Management challenges for the 21st century. New York, Harper Business, 207 p.

Froese, R., 2004. Keep it simple: three indicators to deal with overfishing. *Fish and Fisheries*, 5:86-91.

Gaillard, J., 1999. La coopération scientifique et technique avec les pays du sud. Peut-on partager la science ? Paris, Karthala

Gardiner, R. & K. Le Goulven, 2001. Sustaining our global public goods. Towards the Earth Summit 2002. Heinrich Boell Stiftung, *Economic Briefing*, 3:15 p.

Kastrissianakis, K., 2004. Impact assessment of three water-related projects set in the Mediterranean: WADI, MedAqua and WASAMED. European Commission, Directorate General for Research, Stage Report, 27 p. (mimeo)

KFPE, 1998. Guidelines for research in partnership with developing countries. 11 Principles. Swiss Commission for Research Partnership with Developing Countries, 32 p.

Lavis, J.N. D. Robertson, J.M. Woodside, C.B. McLeod and J. Abelson, 2003. Knowledge Transfer Study Group. How can research organizations more effectively transfer research knowledge to decision makers? The Milbank Quarterly, 81(2):221-248.

Nauen, C.E., in press. Implementing the WSSD decision of restoring marine ecosystems by 2015 – Scientific information support in the public domain. *Marine Policy*.

Oldham, G., 2005. International scientific collaboration: a quick guide. Science and Development Network. http://www.scidev.net/dossiers/ Policy Briefs, April 2005.

Pauly, D., 2001. Importance of the historical dimension in policy and management of natural resource systems. pp. 5-10 In: E. Feoli & C.E. Nauen (eds.). ACP-EU Fisheries Research Initiative. Proceedings of the INCO-DEV International Workshop on Information Systems for Policy and Technical Support in Fisheries and Aquaculture. Los Banos, Philippines, 5-7 June 2000. *ACP-EU Fish.Res.Rep.*, (8)

Sen, A., 1999. Development as freedom. New York, Anchor Books, 366 p.

Spangenberg, J.H., 2003. Sustainability Science: Science must go public for Sustainable Development. Paper presented at the Frontiers 2 Conference, 12-15 February 2003, Teneriffe, Canary Islands, Spain. http://ksgnotes1.harvard.edu/BCSIA/forum.nsf/people/SpangenbergJoachimH

Surowiecki, J., 2004. The wisdom of crowds. Why the many are smarter than the few and how collective wisdom shapes business, economics, societies and nations. Little Brown, 320 p.

United Nations, 2002. Plan of Implementation of the World Summit on Sustainable Development. United Nations Department of Economics and Social Affairs, Division for Sustainable Development, 62 p. http://www.un.org/esa/sustdev/documents/docs.htm

Watson, R., M. Crawford & S. Farley, 2003. Strategic approaches to science and technology in development. The World Bank, *Policy Research Working Paper*, WPS 3026:52 p. http://www-wds.worldbank.org/servlet/WDS_IBank_Servlet?pcont=details&eid=000094946_03051404103334

Wilson, E.O., 1998. Consilience: the unity of knowledge. New York, Alfred A. Knopf, 332 p.

Nauen, C.E. (ed.)

EUR 21719 – INCREASING IMPACT OF THE EU'S INTERNATIONAL S&T COOPE

Luxembourg: Office for Official Publications of the European Communities

2005 – 26 pp. – 21.0 x 29.7 cm

ISBN 92-894-9794-7

KI-NA-21719-EN-C

The present working paper is based on two ad hoc workshops in 2003 and 2004 and continued interaction between some of the participants, but validated and endorsed by all authors. Its starting point was the question how to increase societal impact of international scientific cooperation in the transition towards sustainable development. This requires some analysis what impact is, which factors determine it, which ones can best be acted upon and how. Impact is assessed with emphasis on increasing S&T capacity in partner countries of the Union's international scientific and technological cooperation and contributing knowledge that helps solve societal problems with emphasis on the specific context of partner countries.

Three parameters emerged as particularly important for determining impact at project level: (i) trust, (ii) perceived relevance and (iii) communication capability. Further analysis showed clearly the limits of potential achievement of individual projects though internalising attention to the three parameters is very likely to increase impact.

Larger societal impact depends heavily on an enabling policy environment that translates into (i) minimum infrastructure for research, (ii) organises demand for knowledge and its uptake and (iii) upstream and downstream linkages to education and innovation. It is understood that impact at such scales takes time to materialise, but time scales are compressible when suitable policies are in place and enforced not only by the European Union but particularly by its partners in other parts of the world.

Publications Office
Publications.eu.int

ISBN 92-894-9794-7
9 789289 497947