

## Towards sustainable water resources management: bringing the Strategic Approach up-to-date

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**Abstract** In 1998, the European Commission (EC) published Guidelines for Water Resource Development Cooperation entitled “*Towards Sustainable Water Resources Management: A Strategic Approach*”. The Strategic Approach was a major contribution to translating the international consensus on integrated water resources management (IWRM) into development cooperation activities. The approach and guidance were intended for use by decision-makers in government, the private sector, civil society, and international organisations of all kinds involved in water resources management. At the time, the guidance contained in the *Strategic Approach* was at the forefront of current thinking and provided a practical means of putting IWRM theory into practice. But since its inception new perspectives and priorities have emerged which need to be considered within the Strategic Approach and guidance given. This paper reviews the *Strategic Approach* against the IWRM trends and needs that have subsequently developed, and identifies how the approach could be amended to respond to these emerging needs.

**Keywords** Water resource management · IWRM · Project Cycle Management · Guidelines

### The development of the strategic approach

The complexity of current water resource management poses many challenges. Water managers need to solve a range of interrelated water dilemmas, such as balancing water quantity and quality, flooding, drought, maintaining biodiversity and ecological functions and services, in a context where human beliefs, actions and values play a central role. Furthermore, the growing uncertainties of global climate change and the long term implications of management actions make the problems of decision-making even more

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difficult. Central to effective water management is the value of integrated solutions encapsulated in integrated water resource management (IWRM) concepts. Thus any decisions about water management policy and resource allocation need to be taken with full account of the many sectors such as finance, agriculture, industry, health, environment etc., that influence, and are influenced by, such decisions.

In 1998, HR Wallingford (UK), in collaboration with IRC Delft (The Netherlands) and OIEAU (France), led the development of the European Commission's Guidelines for Water Resource Development Cooperation entitled "*Towards Sustainable Water Resources Management: A Strategic Approach*" (European Commission 1998) (See Fig. 1).

The main purpose of the Strategic Approach was to improve the quality and effectiveness of the European Commission's development cooperation (European Commission 1998). The guidance it provided was designed to respond to the needs of country governments and other professionals working in water related development cooperation activities. It also supported the work of staff in the EC and its overseas delegations. The team worked closely with EC Policy Advisors, Delegation staff, and national development cooperation partners throughout the development of the Strategic Approach.

Although the guidelines were principally prepared for use in the context of EC development cooperation, it was also intended that they should have wider application in water-related activities, and be of general benefit to support decision-makers in government, private sector, civil society, training institutes and international organizations involved in water resources management. Evidence of the use of the guidelines gathered from interviews in 2008 found the main user categories were EC delegation staff and consultants working on preparing EC projects and recent examples included their use in supporting the preparation of a Water Sector Support Programme (WaSSP) in Samoa.

For many users, the guidelines do not present something totally new. Rather, one of its strengths is in the collation and structuring of concepts and ideas within a comprehensive framework to ensure a questioning mode of project and programme development. It is not intended as a manual and it is this flexibility that makes it particularly useful. As a consequence, the guidelines have also been used as inspiration in workshops, seminars, training courses and strategies in water resources (used by training organisations, strategy/policy development bodies)

The *Strategic Approach* was published in four languages—English, French, Portuguese and Spanish—and was also available in CD-ROM and Web-based formats (European Commission 1998).

### **Key strengths of the strategic approach**

The *Strategic Approach* is an operational framework centred on policy principles applicable at a programming and project level which reflect the wider range of issues now considered essential for effective water resource management and use. As such it encapsulates IWRM issues and approaches, and helps ensure that sectoral and sub-sectoral activities are set within a broader water management framework that is responsive to local contexts. The approach has helped to ensure the quality of project and programme preparation—focusing attention on relevance, feasibility and sustainability—as well as improving the management of projects throughout the project cycle.

The key strengths of the Strategic Approach are listed in Table 1.

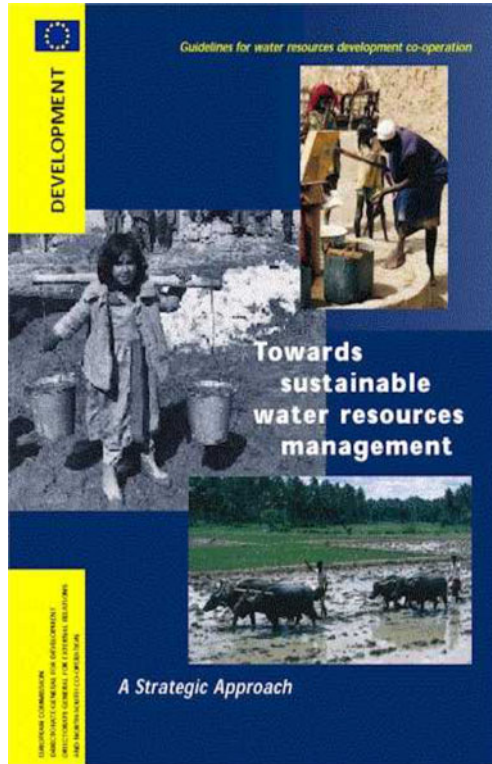
The starting-point for the guidance was the emergence of an international consensus on water resources issues. A series of international conferences during the 1990s—on water issues in their own right, and on water resources as an essential component of sustainable development and environmental protection—was accompanied by a process of academic and practitioner debate within a wide range of disciplines and professions.

It was notable that the 1987 Brundtland Commission Report on environment and development—Our Common Future—did not even consider water resources as an issue (Brundtland 1987). By the time of the 1992 UN Earth Summit at Rio de Janeiro (UNCED 1992), attitudes had begun to change, but mainly because of water quality concerns. Although water was not prominently discussed, the inclusion of a chapter on Freshwater Resources in Agenda 21, the key Summit document, did provide a catalyst for future action. In the late-1990's, integrated water resource management theory and practice emerged more prominently in international thinking. The World Bank Policy Paper on Water Resources Management, (World Bank 1993) provided a landmark statement of the Bank's policy on water, reflecting a co-ordinated view of several different strands in the Bank's operations: irrigation, watershed management, flood control and hydropower, environmental protection, and drinking water and sanitation services. The paper acknowledged problems in its past operations in these areas, causing vicious circles and unreliable services, unwillingness to pay, inadequate funding, and a further deterioration in services. Subsequently, the World Bank published a report on African water resources (World Bank 1996) outlining the challenges and opportunities for sustainable development stating that water resources management should be integrated, cross-sectoral, and based on catchment area. General guidance on approaches which integrated development and environmental objectives, (ADB 1996, UNESCAP 1997) were also emerging. This emerging consensus and the outcomes of numerous international meetings provided impetus for, and the backbone of, the Strategic Approach. (Figs. 1 and 2)

**Table 1** Key strengths of the Strategic Approach

The key strengths of the Strategic Approach include:

- Grounded in integrated water management principles which are internationally agreed and becoming widely integrated in national policies and strategies
- Provides a structured framework that helps users assimilate IWRM principles and concepts
- Incorporates the multi-dimensional aspects of good water management practice
- Focuses on all stages of project cycle management (PCM)
- Encourages sub-sectoral actors to set project development within a broad strategic water management framework
- Serves as a guideline on *good practice* rather than a 'manual' to be rigorously adhered to
- Promotes a questioning mode of project development
- Bridges the gap between policy theory and practical implementation
- Provides a tool related to a range of real-life business functions (proposal preparation, project management, scoping TOR for studies, etc.)
- Available in CD-ROM and Web-based versions
- Available in various language versions – English, French, Portuguese, and Spanish (to be completed)



**Fig. 1** Towards sustainable water resources management: a Strategic Approach (EC 1998)

The *Strategic Approach* also aimed to absorb the lessons learned from past mistakes, such as lack of integrated thinking, planning and coordination. It addressed a range of uses of water—municipal, industrial and agricultural as well as domestic needs and public health—within one strategic approach, and identified a common set of principles to guide the overall approach and its sectoral sub-sets.

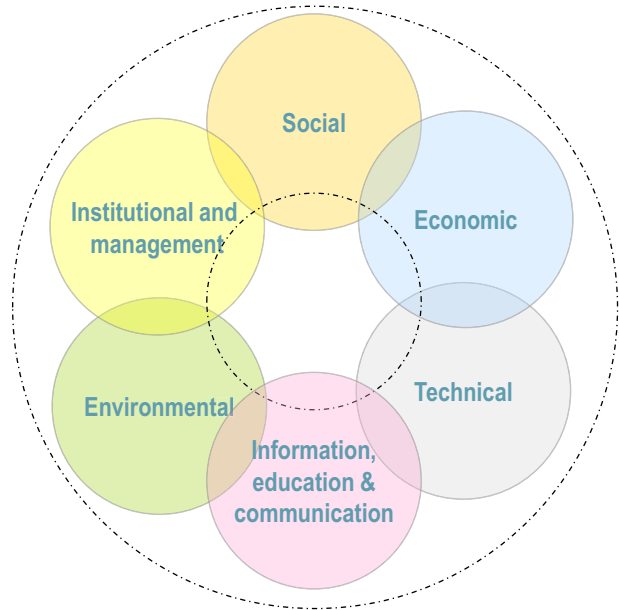
### Application of the strategic approach

The *Strategic Approach* was centred on four key elements:

- the definition and sub-grouping of water management principles;
- a focus on specific water management functions and sub-sectoral activities;
- application at all phases of the project cycle; and
- checklists of questions and potential responses to ensure key issues were addressed at each stage of the project cycle.

The core principles established by international consensus during the 1990's provided an underpinning basis for water-related policy but they were relatively remote from

**Fig. 2** Sub-principles as the bedrock for the Strategic Approach



practitioner realities and offered little guidance for resolving the dilemmas and difficulties contained in their practical implementation. For example, the Dublin Principles (Dublin Statement 1992) stated that “water development should be based on a participatory approach involving users, planners and policy makers at all levels” but the practical difficulties in putting this into practice were immense. However, there was growing agreement on issues such as the adoption of the river basin as a planning unit, the consideration of environmental water needs, the balancing of supply and demand approaches, the importance of participatory processes, and the need for non-technical measures to sit alongside technical interventions.

Therefore, as part of the development of the *Strategic Approach*, and to aid intellectual management of the new dimensions of water-related policy, the guidance contained in the Strategic Approach presented sub-sets of policy principles applicable at the programming and project level (see Fig. 2). These are as follows:

- institutional and management principles;
- social principles;
- economic and financial principles;
- environmental principles;
- information, education and communications principles;
- technological principles.

These headings reflect the wider range of issues now considered essential for effective water resources management. They provide a framework within which water-related policy can be addressed in an organised fashion. Although grouped, the principles are cross-cutting and universal, applicable to all types and aspects of water-related activities. The principles underpinned the Strategic Approach and aided clear thinking about objectives and actions.

The programming framework in which the principles are applied are broadly clustered into four *Focus Areas*:

- Water resources assessment and management (WRAP);
- Basic water supply and sanitation services (BWSS),
- Municipal water and wastewater services (MWWS)
- Agricultural water use and management (AWUM)

The application of the strategic approach takes place at different stages of the project cycle as described in the *Project Cycle Management (PCM)* model used for EC development co-operation (European Commission 2001). Central to PCM is the idea of managing a process, rather than contributing to a one-off event, and the application of the Strategic Approach aims to address all stages of the project cycle.

Ultimately, the application of the approach aimed to ensure that IWRM principles and sustainability issues were identified and catered for in decisions at all stages of the project cycle, see Fig. 3.

A series of *checklists* were used to encourage users to adopt a questioning mode of project development. The checklists provide examples of questions or issues that may be posed at each stage of the project cycle, for each focus area, and gave examples of possible responses. It was anticipated that the issues identified, and the possible responses described, would lead the user to pursue the most appropriate line of enquiry, and to perceive problems as soluble if all permutations of possible responses were systematically explored.

## The Project Cycle: Major Documents and Decisions

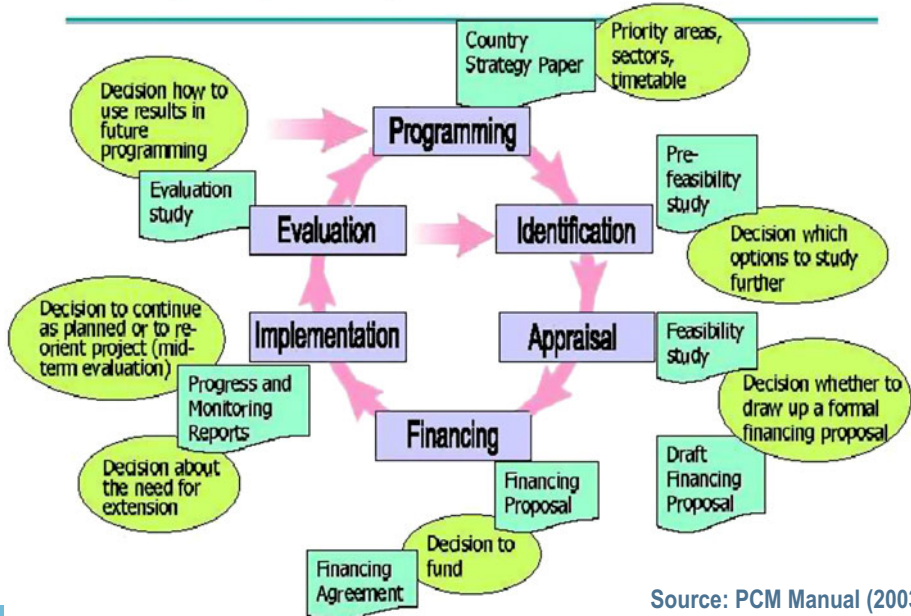


Fig. 3 Project cycle management and the decision-making process

The checklists encapsulated all the sub-principle categories, although in some parts of the PCM process the problem issues and possible responses were similar for all Focus Areas, as shown schematically in Fig. 4.

Users needed to bear in mind at all times that this was not a manual; and the checklists were not meant to be exhaustive, but to act as pointers. The whole emphasis of the guidance contained in the Strategic Approach was to avoid prescription, and instead to facilitate a questioning mode of project development, in which sensitivity to changing trends, local variety of economic, social and environmental circumstance, and especially the input derived from stakeholder and user participation, can be reflected.

*Aids to programming and project development* were also provided as supplementary material to the checklists. They mainly consisted of different types of studies and methodologies to be used to build up the information and knowledge base at different stages of the project cycle, including standard terms of reference for typical water related studies.

### The strategic approach as a capacity building tool

The hybrid nature of the guidelines has been demonstrated by their use as a tool to help build capacity. The guidance contained in the Strategic Approach has been used extensively as a centrepiece in workshops, seminars, and training courses to increase awareness of strategic approaches to water resources development and management and as a tool to build capacity in IWRM principles and practice.

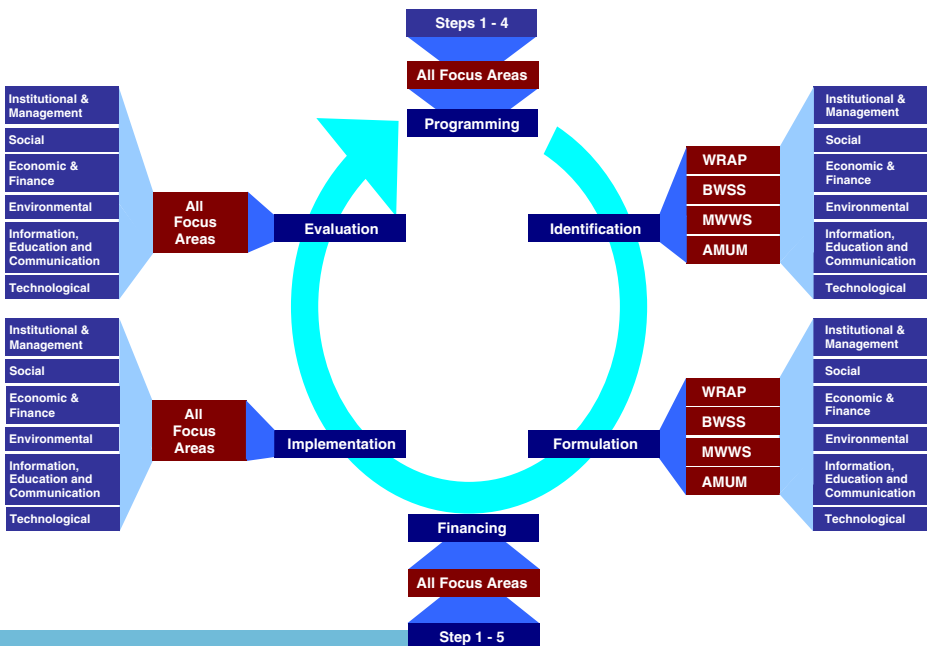


Fig. 4 PCM and the checklist approach



Working with regional training centres in Africa and elsewhere, the approach was transferred to a network of trainers and training centres to raise awareness of the approach, to facilitate its adaptation to local needs and contexts, and to ensure wider dissemination among practising water professionals. In Africa, the training institutes included Network for water & Sanitation International (NETWAS/Eastern Africa), National Community Water & Sanitation Training Institute (NCWSTI/Southern Africa), and Centre de Formation Continue (EIER-ETSHER/West Africa). Further training centre links were also established in Asia, Latin America and Mediterranean (ALAMED) regions.

The overall aims of this work were to broaden and enhance the regional training centres' ability to deliver IWRM training, and to use the training centres as nodal points to further encourage dissemination and uptake of knowledge among an ever widening range of water professionals. Under funding from the EC and DFID, the capacity building programme directly benefited approximately 400 persons from about 40 countries.

The training centres have subsequently used the guidelines in a range of instances, such as training material for short (and long) courses, for awareness raising material, and in MSc courses.

### Revisiting the strategic approach

At the time of their publication in the late-1990's, the guidance contained in the Strategic Approach was at the forefront of current thinking and a practical means of putting IWRM theory into practice. But the water world never remains static and new perspectives and priorities have emerged since their inception. Many of the issues addressed by the guidance remain valid but it is necessary and important to revisit the approach and to assess whether to re-shape the guidance to meet today's emerging IWRM challenges and trends, and whether the aids to programming and project development provide examples that meet up-to-date guidance on good practice.

#### Key aspects to strengthen

A plethora of national, regional and international meetings that have been convened since 1998. The Second World Water Forum in The Hague in March 2000 provided a major impetus for IWRM (GWP 2000) and was a catalyst for many subsequent meetings and declarations focused on achieving the Millennium Development Goals (MDGs). Updated information on the international consensus and outcomes of the latest international water conferences and more links to organizations such as UNWater that have gained prominence since 1998 are therefore of relevance.

Conditions for good water governance are essential to sustainable water management (GWP 2003) and need to be given greater prominence in the guidance. Participation, accountability, inclusiveness, transparency and responsiveness are necessary for achieving economic, social and environmental outcomes. Such governance involves consistent management, cohesive policies, transparent processes and the protection of rights for the appropriate use and protection of water. It requires the presence of transparency and accountability from all the formal and informal organisations associated with water management: governments, private sector, non-governmental organisations, and all other civil-society related groups



Since the 1990s, there has been a greater focus on poverty reduction and the role of Poverty Reduction Strategy Plans (PRSPs) in moving the water agenda forward. Similarly, there has been a significant shift toward Sector-wide Approaches (SWAp) to improve the efficiency and effectiveness of development aid (EC 2003). There is an opportunity to provide more explanation of the SWAp concept, how this operates in practice, and the implications on institutional and management arrangements.

*Risk-based, adaptive approaches to water management* have been advocated by the NeWater project (NeWater 2009; Willows and Connell 2003) based on the hypothesis that IWRM cannot be realized unless current water management regimes undergo a transition towards more adaptive water management. Adaptive management can be defined as a systematic process for improving management policies and practices by learning from the outcomes of implemented management strategies. The idea of adaptive management has been discussed in ecosystem management for quite some time. It is based on the recognition that the ability to predict future key drivers that influence an ecosystem, system behaviour and responses, is inherently limited. The approach encapsulates an element of learning within the process to enable uncertainties to be managed and adapted to during the different steps in any iterative policy cycle, embracing assessment, policy development, implementation and monitoring.

*The consequences of climate change* for water-related sectors could be severe. It is likely that ongoing climate change will lead to situations and extremes that have not been faced before, and thus new technical measures and management strategies will have to be implemented to avoid undesirable impacts on water resources and communities dependent on them (DFID 2008a; DFID 2008b; ERM 2007). This is especially important given the inherent uncertainty in projected climate change. What remains clear is a continuing need for an interdisciplinary approach that is flexible enough to allow proactive changes in water management plans to plan for, and adapt to, future climate change impacts. This was an area that was under-represented in the guidance and one that should certainly be addressed within the Strategic Approach framework.

Four sub-sector Focus Areas were selected in the original guidance—water resource planning (as an overarching theme), municipal water and wastewater management, agricultural water use management, and basic water supply and sanitation. The guidance acknowledged the close link between *water and energy* but did not expand this into a Focus Area in its own right. Given the importance of water in sustainable energy provision this could be reconsidered.

Within the four current Focus Areas, *sanitation* is a subset of the basic water supply and sanitation area. This belies its critical importance both in the achievement of many of the Millennium Development Goals (MDGs) and as a direct target for sanitation provision (DFID 2008c). A greater focus on sanitation services should therefore be considered.

### Key choices for updating the strategic approach

There are some key choices that have to be made in deciding the direction an updating strategy takes. The main options (see Table 2) are:

- Should the guidelines serve as an aid management, or provide a more general sector purpose?
- If mainly an aid management tool, then how specific to the EC should the guidelines be or should they attempt to serve other donors?
- If mainly a general sector tool, then how broad or how focused should the general sector description be?

The guidelines usefully served a hybrid purpose—as an aid management tool and as a general sector guide—and indeed both aims do help to reinforce each other. Much water sector development is supported externally, so effective management of aid is a very important aspect of sector performance. Similarly, aid management of the water sector has many aspects which are specific to the sector and where sector specific guidelines serve a useful purpose.

Thus the recommended option is to continue to adopt a hybrid purpose with equal weight on the guidelines being an aid management tool and being a general sector guide—as it is in the existing guidelines. The danger with the hybrid solution is

**Table 2** Options and implications

Options in approach	Descriptions and implications
Guideline purpose and target: To what extent will the guidelines be an aid management tool or a more general sector tool not particularly related to aid management.	<p><i>Aid management tool:</i> If the guidelines are to primarily be an aid management tool then they will need to be significantly re-written to take into account the latest thinking of the Paris Declaration and the Organisation of Development Assistance Committee (OECD/DAC) guidelines on Harmonising Donor Practices for Effective Aid Delivery.</p> <p><i>General sector guide:</i> If the guidelines are to be a general sector tool that is not related to delivery of external assistance, then many of the present features (e.g. the PCM) will need to be made more generic. Some of text will need to re-orientated to reflect an internal, governmental viewpoint at policy and programming level.</p> <p><i>Hybrid:</i> If the guidelines are to be a hybrid between an aid management tool and a general sector guide as in the present version, then the rationale will need to be explained for this dual purpose.</p>
How specific to the EC should the guidelines be (assuming that the guidelines should have an aid management or hybrid purpose)	<p><i>Highly specific EC guideline:</i> If the guidelines are to be highly specific to the EC then they should have detailed references to other EC guidelines and should be precise in using the same terminologies. They could show for example how to apply more general guidelines to the water sector.</p> <p><i>Generic guidelines for all donors:</i> If the guidelines are to be generic guidelines that will provide the detailed guidance for implementing the water sector policies of a variety of like minded donors, then the text will need to be neutral and the terminology broad enough to encompass all participating donors.</p>
Scope of material – broad or narrow around the key issues and responses generated by the main architecture (assuming that the guidelines have a general sector or hybrid purpose).	<p><i>Broad:</i> If the guidelines seek to be broad then much of the peripheral/conceptual material will need to be updated rather than linking to specialist web sites.</p> <p><i>Narrow/focused:</i> If the guidelines seek to be narrowly focused on the main issues and possible responses then the peripheral and conceptual material can largely be outsourced to other web sites to achieve automatic updating.</p>

however that in the attempt to accomplish both aims it achieves neither. But, this danger can be mitigated by careful choice of material, by ensuring that the guidelines do not become too detailed, and by not attempting to replace or repeat more detailed guidelines which can be found elsewhere.

Updating can be approached by linking to specialist web sites in each issues/responses section. The updating strategy should be to point to specialist web sites where more detailed material has already been collated and vetted for quality and accuracy. The aim should be, as far as possible, to ensure the core material of the guidelines is *enduring*, whereas the details in the specialist web sites will be open for rapid change. Since the inception of the original *Strategic Approach*, significant progress has been made on a wide range of web-based knowledge sites. For example, the GWP Toolbox initiative now provides a ready made tool-set to support IWRM initiatives and, as importantly, includes case studies that are constantly updated and revised. Links to this library of case studies and references is far more extensive than could be, or indeed should be, considered within the guidelines themselves and would considerably enhance the learning value. Further linkages to other knowledge management platforms such as IHE\_UNESCO, International Resource Center (IRC), and International Office of Water (OIEAU) could also be envisaged.

#### Capacity building, outreach & interactive web designs

The future potential users will be defined by those who are likely to get the most benefit out of using an updated guideline. Different uses and users may be anticipated to follow the pattern summarised in Table 3.

Although aimed at the working practitioner, the guidance remains of significant value as a reference tool and training material. Adapting and extending the core guideline material to incorporate illustrative and case study material to a specific country or user group would enhance its use for capacity building and training. Training versions could be adapted by the relevant training institution according to their respective needs. The guidelines could be used to help in indicating where case studies, exercises and other tools could be introduced. Once training institutions have undertaken the necessary tailoring, the material could be potentially available via web links.

Developing an interactive web-based guideline would be highly beneficial. The design should be interactive, user friendly, and support easy navigation according to end users needs. The design should allow dynamic content and indexing, and be easily exportable in other formats. A web-version including a navigation path for different categories of users, as well as for different parts of the program cycle, should be considered.

## Conclusion

The issues that IWRM approaches, and the *Strategic Approach* itself, were designed to address in the late-1990's have not gone away. However, further needs and challenges have emerged during the past decade that should be reflected in core IWRM texts and guidance. Updating the guidance in the *Strategic Approach* should include greater emphasis on the following:

- Conditions for good water governance
- Risk-based and adaptive water management approaches

**Table 3** Future uses and users

Primary use	Users	
	Primary users	Other users
Improve effectiveness of development cooperation (later evolving to improving sector performance as a whole independent of development cooperation).	<ul style="list-style-type: none"> <li>• EC delegations</li> <li>• Direct recipients of EC aid</li> <li>• Consultants working for EC</li> </ul>	<ul style="list-style-type: none"> <li>• Wider donor community</li> <li>• Responsible policy and implementing agencies</li> <li>• Consultants</li> <li>• NGOs</li> </ul>
Education and training	<ul style="list-style-type: none"> <li>• Capacity building networks already exposed to the guidelines or connected to its maintenance</li> </ul>	<ul style="list-style-type: none"> <li>• Universities</li> <li>• Training providers</li> </ul>
Strategic influence on the sector (advocacy)	<ul style="list-style-type: none"> <li>• Water Knowledge management platforms</li> <li>• Development agencies</li> <li>• NGOs</li> </ul>	<ul style="list-style-type: none"> <li>• NGOs</li> <li>• Water Knowledge Management Platforms (WKMPs)</li> </ul>

- Climate change impacts and adaptation
- Water and energy security
- Sanitation

The core structure and philosophy behind the Strategic Approach remains valid but a number of enhancements have been identified that would ensure it remains up-to-date and responds to current thinking and practice. Updates should retain its focus as an aid management tool and avoid replicating or duplicating the many excellent knowledge management platforms that have emerged over the past decade or so. Developing an interactive web-based guideline would be beneficial as this would provide: easier navigation, more flexible dynamic content, and targeted links to other resources and tools.

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## References

- ADB (1996) Towards effective water policy in the Asian and Pacific region. Proceedings of the Regional Consultation Workshop, ADB, Manila, Volume 1
- Brundtland GH (1987) Our common future. The World Commission on Environment and Development, Oxford University Press, Oxford, UK ISBN: 0-19-282080-X
- DFID (2008a) DFID Research Strategy 2008-13, DFID London, UK

- DFID (2008b) DFID Research Strategy 2008-13 Working Paper on Climate Change, DFID London, UK
- DFID (2008c) DFID Water Policy Paper - Water: an increasingly precious resource sanitation: a matter of dignity, DFID London, UK ISBN: 1 86192 936 6
- Dublin Statement (1992) International Conference on Water and the Environment: Development issues for the 21st century. 26-31 January 1992, Dublin, Ireland. The Dublin Statement and Report of the conference
- ERM (2007) Climate change and water resources, Paper produced for WaterAid, ERM, London W1G 0ER
- European Commission (1998). Towards sustainable water resources management: a strategic approach. European Commission Guidelines for Water Resources Development Co-operation. ISBN: 92-828-4454-4. Office for Official EC Publications, L-2985, Luxembourg
- European Commission (2001). Manual: project cycle management. Office for Official EC Publications, L-2985, Luxembourg
- European Commission (2003). Guidelines for European Commission Support to Sector Programmes. Office for Official EC Publications, L-2985, Luxembourg
- Global Water Partnership (2000). Framework for action: towards water security. GWP Publication. Presented at the Second World Water Forum, The Hague, March 2000
- Global Water Partnership (2003) Dialogue on effective water governance: learning from the dialogues. Status report prepared for presentation at the 3rd World Water Forum in Kyoto, Japan, March 16-23, 2003
- NeWater (2009) Adaptive water management: How to cope with uncertainty. NeWater Policy Brief no. 4, NeWater Project, ESR Institute, Univ. Osnabrück, 49069, Germany
- UNCED (1992) Agenda 21, Chapter 18. Protecting the supply and quality of water resources. ISBN: 13-9789211 005097, UN Publications PO Box 190, PA 17214, USA
- UNESCAP (1997) Guidelines on water and sustainable development: principles and policy options. Economic and Social Commission for Asia and the Pacific. Water Resources Series No. 77, Bangkok, Thailand
- Willows RI, Connell RK (eds) (2003) Climate adaptation: Risk, uncertainty and decision-making. UKCIP Technical Report. UKCIP, Oxford OX12DU, UK
- World Bank (1996) African Water Resources. Challenges and Opportunities for Sustainable Development. World Bank Technical Paper No. 331. Africa Technical Department Series, Washington, USA
- World Bank (1993) A World Bank policy paper. Water Resources Management, Washington

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