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Perspectives on water and climate change adaptation

Integrated Water Resources Management and Strategic Environmental Assessment joining forces for climate proofing

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This Perspective Document is part of a series of 16 papers on «Water and Climate Change Adaptation»

'Climate change and adaptation' is a central topic on the 5th World Water Forum. It is the lead theme for the political and thematic processes, the topic of a High Level Panel session, and a focus in several documents and sessions of the regional processes.

To provide background and depth to the political process, thematic sessions and the regions, and to ensure that viewpoints of a variety of stakeholders are shared, dozens of experts were invited on a voluntary basis to provide their perspective on critical issues relating to climate change and water in the form of a Perspective Document.

Led by a consortium comprising the Co-operative Programme on Water and Climate (CPWC), the International Water Association (IWA), IUCN and the World Water Council, the initiative resulted in this series comprising 16 perspectives on water, climate change and adaptation.

Participants were invited to contribute perspectives from three categories:

1 **Hot spots** – These papers are mainly concerned with specific locations where climate change effects are felt or will be felt within the next years and where urgent action is needed within the water sector. The hotspots selected are: Mountains (number 1), Small islands (3), Arid regions (9) and 'Deltas and coastal cities' (13).

2 **Sub-sectoral perspectives** – Specific papers were prepared from a water-user perspective taking into account the impacts on the sub-sector and describing how the sub-sector can deal with the issues. The sectors selected are: Environment (2), Food (5), 'Water supply and sanitation: the urban poor' (7), Business (8), Water industry (10), Energy (12) and 'Water supply and sanitation' (14).

3 **Enabling mechanisms** – These documents provide an overview of enabling mechanisms that make adaptation possible. The mechanisms selected are: Planning (4), Governance (6), Finance (11), Engineering (15) and 'Integrated Water Resources Management (IWRM) and Strategic Environmental Assessment (SEA)' (16).

The consortium has performed an interim analysis of all Perspective Documents and has synthesized the initial results in a working paper – presenting an introduction to and summaries of the Perspective Documents and key messages resembling each of the 16 perspectives – which will be presented and discussed during the 5th World Water Forum in Istanbul. The discussions in Istanbul are expected to provide feedback and come up with sug• gestions for further development of the working paper as well as the Perspective Documents. It is expected that after the Forum all docu• ments will be revised and peer-reviewed before being published.

16 Integrated Water Resources Management and Strategic Environmental Assessment – Joining forces for climate proofing

This paper is initiated by the Co-operative Programme on Water and Climate (CPWC) and the Netherlands Commission for Environmental Assessment (MER).

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Integrated Water Resources Management and Strategic Environmental Assessment – Joining forces for climate proofing

This paper serves as an input for the thematic, regional and political processes of the 5th World Water Forum and focuses on the challenges related to water, climate change and food security. Recent publications related to the anticipated impacts of climate change on water and agriculture are comprehensive, but a global analysis of specific impacts remains limited. The paper summarizes recent food production and food security trends and provides an overview of how climate change, through impacts on global hydrology, could impact food production, and consequently food security, in some key farming systems. However, as climate change is but one of many drivers of agriculture, climate change impacts need to be appreciated in relation to specific farming systems in order to identify appropriate adaptation measures. The paper highlights key drivers and presents possible responses, emphasizing that the scope of policy response will need to be broad if water institutions are to be effective in coping with climate change.

1 Introduction

Global warming and climate change are real. The international community is concerned about the consequences of climate change for the world population, especially for particularly vulnerable groups in developing countries. The IPCC, in its 4th Assessment Report, states that a high priority should be given to increasing the capacity to adapt to climate change in ways that are synergistic with wider societal goals of sustainable development. Progress has been made in this respect. The most vulnerable countries and regions have been identified, information and experience on possible adaptation options is accumulating and capacity is being built. There is, however, a disconnect between awareness and the full coordination and integration of climate change adaptation into planning at all levels and across all sectors.

Climate change adaptation is obviously in its early stages. For example, some 33 developing countries have completed National Adaptation Programmes of Action, identifying over 300 project ideas. However, only a few have reached the GEF funding stage. Challenges are faced in terms of follow-up actions, implementation of priority projects, integration with national policy and planning frameworks, and effective stakeholder involvement. The challenge is to have adaptation integrated in the overall planning, and to define guiding principles for this integration (Dialogue on Climate Change Adaptation for Land and Water Management, not dated).

A key message provided by the Global Water Partnership (GWP, 2007) is that, if our global energy habits are the focus for mitigation, the way we use and manage our water must become the focus for adaptation. It is generally agreed that the supply of and demand for water resources will be substantially affected by climate change. The recent Intergovernmental Panel on Climate Change Report (IPCC, 2007) puts it in different wording: "water is in the eye of the climate management storm".

In this paper two mechanisms, available to support the integration of climate change adaptation in overall (water resources) planning, will be discussed: Integrated Water Resources Management (IWRM) and Strategic Environmental Assessment (SEA). Strengths and weaknesses are discussed. The complementary nature of both mechanisms is highlighted, considering the need for a more effective approach to the incorporation of climate adaptation in (water resources) planning.

2 Climate change and the water sector

Global warming and related climate changes are increasingly better understood and there is growing consensus on their likely scale. It is also clear that, irrespective of the scale of mitigation measures,

adaptation measures are necessary. This implies an integrated approach to climate change that embraces both mitigation, which addresses the drivers of climate change, and adaptation, which considers the measures necessary to accommodate such changes. Ultimately, adaptation is an exercise in damage limitation and deals with the symptoms of a problem that can be cured only through mitigation (OECD-DAC, in prep.).

Urgency is provided by the expectation that relatively small temperature changes of a few degrees Centigrade will see average river flows and water availability increase by 10–40% in some regions while, in others, they will decrease by 10–30%. An important message is that changes in climate will be amplified in the water environment (GWP, 2007).

An overarching message is that the best way for countries to build the capacity to adapt to climate change will be to improve their ability to cope with today's climate variability. Adaptation to seasonal and inter-annual time scales will be critical in adapting to the impacts of longer term climate change as well. In other words, improving the way we use and manage our water today will make it easier to address the challenges of tomorrow.

Better water management will thus be essential to adapt to climate-induced changes in water resources. A combination of 'hard' infrastructural and 'soft' institutional measures is needed. The future resilience (or vulnerability) of human communities to climate change related impacts will depend on their success. The Global Water Partnership (GWP, 2007) suggests that Integrated Water Resources Management provides the best approach to manage the impact of climate change on water. In this paper it is argued that by joining forces with SEA, IWRM will more effectively achieve its objectives.

3 Integrated Water Resources Management

Integrated Water Resources Management (IWRM) has been the accepted management paradigm for efficient, equitable and sustainable management of water resource since the early 1990s. The development and sustainable use of water resources requires the allocation of these scarce resources among competing human activities. This implies decision-making in complex situations, often with conflicting interests. Careful planning and analysis are required to support such decisions, taking into account technical, economical and environmental aspects in a specific social, cultural and institutional context. Intensive and timely consultation of all stakeholders is of utmost importance.

IWRM is an approach to support decision-making in such complex situations. It is defined as a process which promotes the coordinated development and management of water, land and related resources in the river basin in order to maximize the resultant economic and social welfare in an equitable manner, without compromising the sustainability of vital ecosystems.

As such, IWRM has to deal with all natural resources, not only water but also soils, surface water and groundwater, water quantity, quality as well as water ecological aspects. Next to the natural resource system the socio-economic system, the people living in the area, their water using activities and related economic, social and cultural aspects have to be dealt with. Finally, the administrative and institutional (control) system is of importance.

Generally, water resource management uses both an analytical framework, explicitly identifying the components and different steps in the analysis process, and a computational framework, establishing a capacity for data processing and quantitative comparison of alternatives. Based on scenarios for climate change, demography, economic development and spatial planning, projections of the water demand for irrigation, drinking water supply, industrial water supply and environmental requirements are made. Hydro-meteorological data (measured data and results from hydrological analyses, taking into account climate change scenarios) are used to establish the availability of water as well as its spatial distribution and variation over time. Next, projected future demands are checked against projected available future resources with a river basin simulation model. In case of imbalance, water resources management strategies (logical and/or promising combinations of structural and non-structural measures, allocation rules and water sharing options) are designed to improve the situation. Finally, the performance of the strategies, in terms of impacts on the water resources system, the socio-economic system and the environment, is assessed.

While there are no set IWRM 'rules', the approach is founded on the Dublin principles, which assert that: (i) fresh water is a finite resource; (ii) a

participatory approach is needed in water planning and management; (iii) women play a central part in the provision, management and safeguarding of water; and (iv) water is an economic good. It seeks to ensure that water is used to advance a country's social and economic development goals in ways that do not compromise the sustainability of vital ecosystems or jeopardize the ability of future generations to meet their water needs (GWP, 2004).

IWRM is not just about managing physical resources; it is also about reforming human systems to enable people – women as well as men – to benefit from those resources. For policy-making and planning, taking an IWRM approach requires that:

- Policies and priorities take water resources implications into account, including the two-way relationship between macro-economic policies and water development, management, and use;
- There is cross-sectoral integration in policy development;
- Stakeholders are given a voice in water planning and management, with particular attention to securing the participation of women and the poor;
- Water-related decisions made at local and river basin levels are in-line with, or at least do not conflict with, the achievement of broader national objectives;
- Water planning and strategies are integrated into broader social, economic, and environmental goals.

The benefits of IWRM arise from the process as much as from the end product. The increased understanding arising from sectors working together, the gathering and sharing of knowledge and information during the study, and the consideration of catchment-wide uses and impacts and the debates about alternative options themselves result in benefits for water resources management.

Strengths and weaknesses of IWRM

IWRM is a well-developed and highly-structured approach, supported by computational frameworks capable of providing quantitative information on dynamic systems, and capable of working on the basis of alternative scenarios.

IWRM is able to cope with the multi-functionality of water its many uses and users, addressing the issues from a biophysical, socio-economic and institutional systems perspective.

In practice, however, the benefits that can be obtained from an IWRM approach are often not exploited to the full. For example, in World Bank client nations with weak environmental policies or laws, environmental considerations in IWRM play little role in decisions about water allocation, water quality management, source protection, or the protection of water dependent ecosystems (World Bank, 2007). IWRM itself is not embedded in any legal procedures and consequently cannot be 'enforced'.

Similarly, in practice the intention of creating a participatory, multi-stakeholder process is usually not implemented to its full extent. Consequently, the potential benefits of such as approach do not always materialise.

Even though IWRM looks beyond sector boundaries, its implementation is limited by sector boundaries. Sectors outside the water sector may be totally ignorant of the principles of IWRM. For example, energy supply, tourism, or agriculture all have to adapt to potential water stress or water-related hazards as a result of climate change. Yet, there are few mechanisms to get a foothold for IWRM in these sectors (OECD-DAC, in press).

4 Strategic Environmental Assessment

The World Bank (2007) argued, based on a literature review analysis of ten global case studies, an in-depth pilot study at a country level and review of four national and state water resources policies, that IWRM has, at best, been implemented in a disjointed way in developing countries. According to this study, Strategic Environmental Assessment (SEA) offers an additional planning tool for introducing environmental considerations into water resources management.

The principle behind environmental assessment is deceptively simple: it directs decision-makers to 'look before they leap'. An environmental assessment should bring into focus what the likely environmental (and related social) effects of a project or plan could be, before decisions on that project or plan are made. When there is a clear insight into the consequences and stakeholders' visions on those, decision-makers are in a better position to direct development into a more sustainable course.

Of course, decision-makers do not direct development on their own. Most plans or projects concern a range of actors, from government to the business sector and the public arena. For this reason, environmental assessment does not merely provide information, but brings the various parties together to discuss this information. It provides a process for them to come to a shared understanding of the possible effects, and to determine what this knowledge should mean for the plan or project at hand.

In general, environmental assessment is centred around four core values:

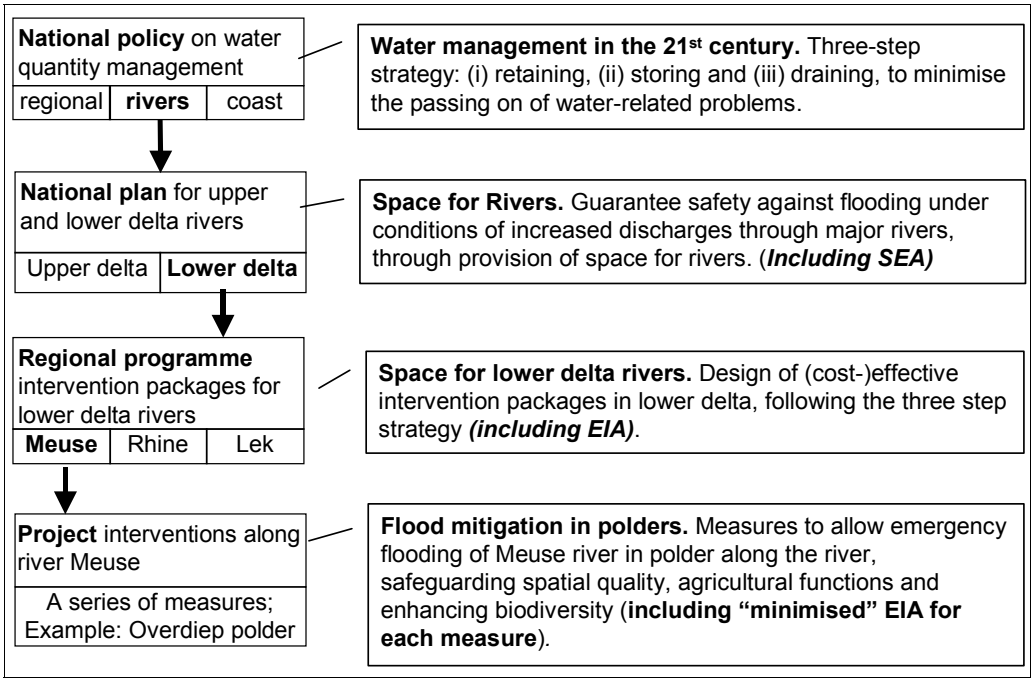
- Good quality information, geared towards the decision-makers needs;
- A participatory approach in which stakeholders can bring their concerns forward during the assessment and planning process;
- Transparency in decision-making based on publicly available information;
- An institutional framework, which is capable of performing the necessary tasks, both in the assessment process and in the implementation plan.

Since its early beginnings in the 1960s, the field of environmental assessment has expanded, both in scope and in application. Practitioners now recognize two levels of environmental assessment: Environmental Impact Assessment (EIA) that is applied at the level of individual projects, and Strategic Environmental Assessment (SEA) which is applied to plans, programmes and policies.

By 1997, over 100 countries had a legally-embedded EIA system in place. Practice with EIA showed that cumulative and large-scale effects could not be addressed adequately at the project level. Furthermore, it was realized that many relevant planning decisions have usually already been taken at higher strategic levels before a project can be conceived. This severely limits the potential range of alternative solutions, so a new instrument was needed to assess such effects at the appropriate strategic level: that of policies, plans and programmes.

In the 1980s a distinct SEA practice was gaining momentum. Canada, New Zealand and the Netherlands were among the first countries to develop a regulatory basis for SEA (Dalal-Clayton & Sadler, 2005). In the 1990s many more developed countries and some developing countries embedded SEA into regulation. A very recent expansion of the application of SEA is the European Union SEA directive, which came into effect in 2006 (European Council, 2001). All 25 EU Member States are now faced with the legal obligation to apply SEA to plans and programmes.

Box 1: Hierarchy of policies, plans and programmes: an example from the Netherlands.



Box 2 – **SEA and the water sector**

The UNECE Protocol on SEA, adopted by the Parties to the Espoo Convention (1979) on Environmental Impact Assessment in a Transboundary Context, requires that contracting countries conduct domestic and transboundary SEAs during the elaboration of programmes and plans in a number of sectors, including water management. These include dams, inter-basin transfers, wastewater treatment plants, irrigation schemes, and groundwater abstractions.

The EU Directive on Strategic Environmental Assessment requires that all plans and programmes that are likely to have an effect on water need to be assessed with an SEA closely related to the EU Water Framework Directive. It contains many IWRM principles including managing water quantity and quality for surface and groundwater, treating water as having an economic value, and enhancing consultation and participation. Its key requirement is the production of river basin management plans by all EU Member States.

The South African Department of Water Affairs and Forestry (DWAF) considered SEA as a tool for use in catchment management and planning when it became clear that a wider frame of information was needed by decision-makers with the introduction of the National Water Act 1998. Although SEA was not subsequently used as a specific approach in other catchments, the ideas behind SEA have been influential in guiding IWRM in other catchments.

A SEA pilot study in the Palar Basin in India proved to be a successful method for developing a framework for IWRM, and the SEA process is being extended to other sub-catchments in Tamil Nadu State, India.

The 2004 Tanzanian Environment Management Act 2004 identifies water developments as one of four types of developments where an SEA is specifically required at a pre-project stage.

The Netherlands Commission for Environment Assessment has summarized experiences with valuation of ecosystem services in SEA (Slootweg & Van Beukering, 2008). Of 20 cases, 10 were water sector related, showing that SEAs have successfully promoted IWRM.

It is important to point out that SEA is not EIA, because it is necessarily different in nature. At project level, decision-making is about a concrete set of activities. EIA then concentrates on the activity-effects relationship. EIA very often is a responsibility for private sector investors. In practise the focus often lies on the mitigation of negative impacts. EIA is organized in an internationally accepted procedure, following a legally embedded series of steps.

As EIA aims at better projects, SEA aims at better strategies, ranging from legislation and countrywide development policies to more concrete sector and spatial plans. Strategic decision-making is less about concrete impacts but more about identifying, assessing and comparing the different ways in which a policy, plan or programme can achieve its objectives. Planning usually is a government responsibility. The more changeable and politically charged development of a plan or policy is less easily structured. Ideally, SEA is applied at each planning tier, and higher-level SEAs inform those at a lower strategic level so that there is no overlap in the assessments. See Box 1 for a water sector example of tiered planning and the position of environmental assessment in this process.

In 2002, the International Association for Impact Assessment published SEA performance criteria (IAIA, 2002). In 2006, the SEA Task Force of the OECD Development Assistance Committee brought together a wide range of SEA experience to draft SEA guidance. The diverse group adopted a definition of SEA, which states that SEA is "a family of tools that identifies and addresses the environmental consequences and stakeholder concerns in the development of policies, plans, programmes and other high level initiatives" (OECD, 2006). This definition makes clear that SEA is not one single tool. SEA can, moreover, be considered as a procedural framework, for which the right tools have to be selected, depending on the sector for which it is applied, the level of decision-making, and the information needs at that level.

Consequently, there is no 'one-size-fits-all' approach. SEA needs to be applied flexibly and even when SEA is captured in a formal procedure in legislation (e.g. the SEA Directive of the European Union) there will still be great differences in how the SEA activities are undertaken, when and with whom. However, there is general agreement about the

activities that make up an SEA process (OECD, 2006). There is a logical sequence to these activities, but logic is certainly not the only, nor necessarily the dominant, principle governing a given planning process. Realistically then, the activities outlined here may take more or less effort, may follow each other sequentially or not, and some may be repeated or combined.

- First phase – creating transparency and joint objective setting.
  - Announce the start of the SEA and assure that relevant stakeholders are aware that the process is starting;
  - Bring stakeholders to develop a shared vision on (environmental) problems, objectives, and alternative actions to achieve these;
  - Check in cooperation with all agencies whether objectives of the new policy or plan are in line with those in existing policies, including environmental objectives (consistency analysis).
- Second phase – technical assessment.
  - Make clear terms of reference for the technical assessment, based on the results of stakeholder consultation and consistency analysis;
  - Carry out a proper assessment, document its results and make these accessible for all;
  - Organize effective quality assurance of both SEA information and process.
- Third phase – use information in decision-making.
  - Bring stakeholders together to discuss results and make recommendation to decision-makers;
  - Make sure any final decision is motivated in writing in light of the assessment results.
- Fourth phase: Post-decision monitoring and evaluation.
  - Monitor the implementation of the adopted policy or plan, and discuss the need for follow-up action.

Strengths and weaknesses of SEA

A planning exercise can be characterized by three elements: (legal) procedure, process and content. From a procedural point of view, SEA is rapidly becoming a strong, internationally acknowledged, legally embedded tool, with clearly demarcated roles and responsibilities. Regulations ask for an assessment of new plans and programmes, and sometimes also policies, that potentially have environmental and related social consequences when implemented. This provides a formalized foothold for SEA to influence the planning process, referred to as entry points for SEA (see Table 1).

Even though the SEA process is not as strictly defined in legal procedures as the EIA process, there is a common understanding of what good SEA practice is. Transparency and stakeholder participation are core values, supported by an increasing evidence base of good practices.

Table 1: Entry points for government-led SEAs (OECD-DAC, 2006).

Lead authorities	Focus area
National government and cross-sector ministries (e.g. Departments of Finance / Planning)	National-level strategies
	Policy reforms, budget allocations and financial mechanisms
Sector or line ministries (e.g. Mining, Health or Agriculture)	Sector specific policies, plans or programmes, e.g. energy or health sector reform
	Infrastructure investments plans and programmes
Sub-national, regional and local governments	Spatial development plans and programmes
International/ transboundary agencies	Cross-border or multi country plans and investment programmes

Nevertheless, SEA is relatively new and practice shows that many government authorities are still struggling with the level of transparency and participation they are prepared to accept. The level of stakeholder involvement is not always practised at project level EIA (where regulations usually are more strict).

SEA in itself has relatively little content. Apart from the decision whether the SEA should address biophysical consequences only, or should also include social and economic consequences (environment only versus integrated assessment), the content has to be provided by the sector specialist involved in the process. SEA provides, so to speak, the procedural umbrella under which a variety of tools have to be used.

SEA is principally 'sector-neutral'. Any plans with potential environmental or social consequences can be subjected to SEA, ranging from spatial and sector plans, to new legislation, or negotiations on an international trade agreement. .

5 SEA and IWRM: a win-win combination?

Even though SEA and IWRM originated from different professional interests, they share many concepts and characteristics. Both include the integration of environmental and social considerations into multi-sectoral decisions; both emphasize the importance of participatory and consultative approaches to decision-making; both incorporate monitoring and evaluation of outcomes; both seek to broaden the perspectives of planners beyond immediate sectoral issues; and both stress that the outcome is a product (a policy, strategy or plan) as well as a process.

One could thus question whether we are talking about the same thing, having different names. A further look at the strengths and weaknesses, however, reveals major differences of a complementary nature, grouped under four headings:

a Legal procedure

A strong asset of SEA is the increasing number of countries having legal obligation to do SEA for plans and programmes (irrespective of the sector). IWRN does not have such a legal backing. Much can be said against legal obligations. For example, many of the early adapters have done EIAs and SEAs on a voluntary basis before creating legislation. The voluntary nature guaranteed a genuine interest of participating agencies in the outcome and an intention to learn. Legal obligations without commitment create a less optimal process. Nevertheless, a legal obligation in combination with a government willing to learn from experiences does provide good opportunities to use SEA as a vehicle to convey the messages of IWRM.

Already in 1987, Ortolano et al described six drivers for good impact assessment implementation. Availability of legislation and a procedural framework is only one of these; others are judicial (effectiveness of courts), evaluative (willingness to impose sanctions if quality is considered unacceptable), instrumental (e.g. donor driven assessment), professional (capacity of professional), and public (civil society motivated and confident to respond). In other words, an 'enabling environmental' is more than only legislation.

Transboundary water plans are inherently complex, caused by different enabling environments, different levels of knowledge and skills, and varied objectives of basin countries. Transboundary SEAs can be facilitated through international legal instruments for bi-/multi-lateral cooperation between the countries (e.g. regional agreements for protection of international river courses or the Protocol on SEA to the Convention on Environmental Impact Assessment in a Transboundary Context).

Several environmental conventions have articles on the application of impact assessment and adopted guidance documents (such as the Convention on Biological Diversity, the Ramsar Convention on Wetlands of International Importance, and the Convention on Migratory Species).

***Message*: SEA is a legally established vehicle to convey the messages of IWRM.**

b Process

SEA is sometimes referred to as an organized fighting arena. Stakeholders have to make sure their interests are taken into account in government decision-making. SEA aims at bringing forward these interests in the planning and decision-making cycle, at the right moments, providing the type of information that decision-makers need. This practise of impact assessment is sometimes harsh and complex,

as stakeholders have different influence and powers, each trying to influence the process. This explains why the impact assessment community, almost obsessively, focuses on process aspects. How to guarantee that interests of all are taken into account, that decision-making is done in the most transparent manner, and that information is scientifically valid. SEA can significantly enhance the implementation of IWRM principles related to stakeholder involvement and transparency.

The concept of 'tiering' in impact assessment is linked to the nature of decision-making. Higher level decision-making creates boundaries for lower level decisions; impact assessment necessarily has to be adapted to the scope of issues and level of detail required at each tier. A significant body of practical knowledge has developed over the years on do's and don'ts in SEA. Compared to IWRM, SEA has a more structured approach with respect to process aspects and thinking in terms of the most efficient manner to influence decision-making.

***Message*: SEA is better geared toward the practical implementation of the principles it shares with IWRM (stakeholder participation and informed, transparent decision-making).**

c Contents

As explained earlier, SEA is considered to be a family of tools, where the right tools have to be selected in the light of the issues at stake. Here, IWRM undoubtedly fills a void by providing profound understanding of water-related issues, within and beyond the water sector. Where SEA provides more concrete process guidance to influence decision-making, IWRM is better equipped to provide the water-related contents.

Just to mention a few aspects, IWRM, and the underlying Dublin principles, prominently highlight the importance of having a gender-sensitive approach, emphasizing the role (and vulnerability) of women in water-related issues. This is completely ignored in the overarching SEA literature.

Defining water as an economic good greatly enhances the discussion on the valuation of water and water-related ecosystem services. This discussion is only recently being opened in the SEA community (see Slootweg & Van Beukering, 2008). More in general, the economic consequences of policies and plans have not been consistently considered by the impact assessment community.

***Message*: IWRM provides comprehensive and integrated understanding of water sector issues for SEA to inform decision-making.**

d Beyond sector boundaries

The strength of IWRM lies in its strong rooting in the water sector and its subsequent extensive theoretical and practical knowledge of water-related issues. At the same time, this sectoral basis can be a point of weakness when issues beyond the sectoral boundaries have to be addressed. This has resulted in a call to think 'out-of-the-box', meaning something like thinking beyond what is common practice within the sector.

The SEA community is totally unfamiliar with this phrase. Having to work with specialists from different disciplines and sectors is the rule in SEA. SEA provides the procedural framework; specialists have to provide the contents. During what is called the 'scoping' stage of SEA, the relevant issues are defined and specialists are identified that have to address these issues during the assessment. In SEA, every case is dealt with as new and unique, requiring individual scoping. In short, there is nothing like a box.

One of the basic characteristics of SEA is an independent review of the quality of the outcomes before the information is given to the decision-makers. This independent position of SEA, not being linked to sectoral interests, gives it a relative advantage where the interests of sectors clash.

From a climate change adaptation perspective, an SEA at national level may help to identify elements of national plans that are sensitive to – or at risk from – climate change or whose viability in the context of projected future climatic conditions is in question. At sectoral level, climate change considerations within an SEA might be used to screen strategies for sectoral reform, identifying where adaptation interventions will be required to enhance the resilience of the sector in the face of climate change, or to identify which strategies are – and which are not, – resilient under different climate change scenarios. Responsibility of such plans does not necessarily lie in the hands of the water sector. There are limited possibilities to apply

IWRM principles if the 'owners' of the plan are not familiar with it or have no affinity with it[1].

An example is provided by Poverty Reduction Strategy (PRS) processes. These have become key processes for development policy-making and planning. In these countries the PRS processes are therefore essential for climate change adaptation. Mainstreaming thus implies that climate change measures must be incorporated in the PRS framework of development policies, plans, programmes, reviews and implementation systems. SEA provides the entry point for IWRM approaches where it concerns water-related issues.

***Message*: as a sector-neutral, broadly applied instrument, SEA can insert IWRM principles beyond water sector boundaries.**

6 Conclusion

As observed earlier, climate change adaptation has strong linkages with the water sector. An Integrated Water Resources Management approach is considered the best approach to address the impacts of climate change. When implemented properly, IWRM is capable of dealing with ever-changing circumstances. Developments in society such as population growth or economic development are strong drivers of change in water demand. Most climates are characterized by seasonal, inter-annual and periodic variability. Climate change creates yet another, although complex, driver of change. Good IWRM can cope with this, by focusing on robustness and flexibility of solutions.

In everyday practice, however, IWRM is not always effective in addressing the climate change adaptation challenge. For IWRM to become more effective, various sources have suggested linking IWRM with Strategic Environmental Assessment. In this paper a quick reconnaissance of the issue has been made, leading to a number of messages that need further elaboration and discussion.

At first glance, it becomes apparent that IWRM and SEA share the same principles, but that both instruments have a complementary scope of work. Where IWRM provides in-depth sector knowledge and a comprehensive framework to develop relevant knowledge, SEA is best equipped to facilitate a process to influence decision-making. The legal backing of SEA provides the necessary entry footholds in a plan process to get the IWRM message across.

In conclusion, there is clear scope to further elaborate the added value of bringing IWRM and SEA together when discussing the implementation of climate change adaptation. Because SEA and IWRM come from different disciplinary backgrounds, there is a need to bridge their separate, but overlapping perspectives and terminologies. This paper is only a first step.

[1] The Netherlands have created the so-called 'water test' procedure. Each spatial plan has to be assessed on its consequences for water quantity management prior to implementation. In the same manner a 'climate-proof' test could be envisaged.

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