A red bishop Euplectes orix, *a common resident in South African wetlands.* WWF-Canon / Chris Marais

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Introduction

A river, though, has so many things to say that it is hard to know what it says to each of us.
– Norman Maclean, *A River Runs Through It*

Around 2000 BC, two city-states concluded a treaty to settle conflicts over the water in the Tigris River. Four thousand years later, stakeholders in river basins around the world are still struggling to effectively manage finite water resources to meet basic human needs and support agriculture, industry, and commerce. Four millennia of population growth and technological advance have only compounded the problem.

In the 21st century, dams and reservoirs have bent the mightiest rivers to our purposes, leaving few large basins untouched. Massive canal and pumping projects have straightened rivers and changed their courses, disrupting natural cycles of flooding, reducing flows, draining wetlands, cutting rivers off from their floodplains, and inundating riparian habitats. At the same time, land uses such as urban development and agriculture draw massive amounts of water out of river systems, returning runoff laden with pollution and eroded soil. Unsustainable timber harvesting often threatens the forests that nurture the fragile headwater areas where rivers are born. All this is conspiring to unravel the ecological functioning of the world's river basins, in effect destroying the very systems that gather and convey fresh water for human use.

As devastating as the potential impact on human communities may be, the natural world will suffer as greatly. Freshwater ecosystems contain less than 0.01 per cent of the Earth's water, but account for a much larger percentage of global biodiversity. Approximately 12 per cent of all animals live in fresh water, including 40 per cent of the world's fishes; freshwater fishes alone account for 25 per cent of all living vertebrate species. Habitats adjacent to rivers and lakes, and dependent on them for their viability, are equally important. Wetlands are vital habitats for countless species and serve as spawning grounds and nurseries for some of the world's most important fisheries. Riparian habitats – forests and grasslands found along the banks of rivers and lakes – are among the most important for terrestrial animals and plants. For example, in the south-western United States, 80 per cent of vertebrate wildlife species spend at least half their life in riparian habitats. Of the 1,200 species on the US endangered species list, half depend on rivers and streams for their survival.

The global freshwater crisis is already upon us. More than one billion people worldwide do not have access to clean freshwater. Over two billion do not have adequate sanitation services and the annual death toll from water-borne diseases is estimated at three million. Flooding and drought, often brought on by poor management of river basins, claim thousands of lives and cause billions of dollars of damage to economies and communities. Ecosystems and biodiversity are faring poorly as well. Fifty per cent of wetland habitats worldwide have been destroyed or heavily altered. Dams and other hard infrastructure have dramatically altered the amount, timing, quality, sediment content and temperature of flows in most major rivers, wreaking havoc on their natural functioning. Scientists generally acknowledge that species dependent on freshwater ecosystems are the world's most endangered group of flora and fauna.

Projections of trends into the future do not brighten the picture. Currently 54 per cent of accessible runoff is appropriated by humans. Barring some dramatic changes, by 2050 at least one in four people are predicted to live in countries affected by chronic or recurring shortages of freshwater. Predictions regarding freshwater biodiversity impacts over that time-frame vary from the disastrous to the apocalyptic.

Yet, despite all these dire statistics and predictions, there exist practical solutions that can address the problems of water supply and quality, and that can conserve and restore freshwater ecosystems. Rapidly growing knowledge about how water moves through the environment and

technological advances in water management are providing tools to meet and potentially overcome the global water crisis. In fact, science tells us that there is enough fresh water in the world to meet present needs and accommodate growing populations. The challenge is to protect the sources of fresh water and manage its use in a manner that is both equitable and ecologically sustainable.

Examples of tools that exist or are being developed to protect and better manage freshwater resources include:

- protected areas to safeguard sites such as headwaters and wetlands that contribute to maintaining water quality and quantity
- forestry practices that are compatible with protection of freshwater resources
- sustainable agriculture that takes advantage of local conditions, uses less water and is not so dependent on chemical pesticides and fertilizers
- improved performance of water intensive industries
- innovations in the design of shipping so that fewer alterations to natural river channels are required for commercial navigation
- dam and reservoir operations that mimic natural flow regimes
- new technologies that reduce water consumption by sanitation and energy production processes
- restoration techniques to re-establish valuable natural functions in heavily degraded freshwater systems.

Yet none of these tools will be effective in isolation. Indeed, if one solution is pursued while other issues or sectors are ignored, the effects are at best strictly localized and at worst temporary and ultimately futile. Integrated river basin management (IRBM) provides the framework in which the full range of tools and approaches can come into play, with multiple sectors working together, rather than at cross-purposes, to manage and conserve freshwater resources sustainably and equitably.

Integrated River Basin Management defined

Integrated river basin management (IRBM) is the process of coordinating conservation, management and development of water, land and related resources across sectors within a given river basin, in order to maximize the economic and social benefits derived from water resources in an equitable manner while preserving and, where necessary, restoring freshwater ecosystems. (Adapted from Integrated Water Resources Management, Global Water Partnership Technical Advisory Committee Background Papers, No. 4, 2000.)

IRBM rests on the principle that naturally functioning river basin ecosystems, including accompanying wetland and groundwater systems, are the source of freshwater. Therefore, management of river basins must include maintaining ecosystem functioning as a paramount goal. This 'ecosystem approach' is a central tenet of the Convention on Biological Diversity. River basins are dynamic over space and time, and any single management intervention has implications for the system as a whole.

The seven key elements to a successful IRBM initiative are:

- A long-term **vision** for the river basin, agreed to by all the major stakeholders
- **Integration** of policies, decisions and costs across sectoral interests such as industry, agriculture, urban development, navigation, fisheries management and conservation, including through poverty reduction strategies
- Strategic **decision-making at the river basin scale**, which guides actions at sub-basin or local levels

- Effective **timing**, taking advantage of opportunities as they arise while working within a strategic framework
- Active **participation** by all relevant stakeholders in well-informed and transparent planning and decision-making
- Adequate investment by governments, the private sector, and civil society organizations in **capacity** for river basin planning and participation processes
- A solid foundation of **knowledge** of the river basin and the natural and socio-economic forces that influence it.

WWF believes that IRBM is the most promising vehicle for employing the tools necessary to meet and overcome the global water crisis. The organization is committed to facilitating IRBM processes in major river basins around the world, with an emphasis on biodiverse and transboundary basins, where the challenges to integrated management are often greatest. WWF's freshwater ecoregion1 sourcebook outlines a method for prioritizing actions needed to conserve biodiversity within each river basin (see 'Publications', page 12).

WWF and numerous partner organizations have launched conservation field projects, or in many cases adapted existing projects, to demonstrate key aspects of IRBM in many countries around the world. The 'lessons learnt' from these projects reflect a broad range of geographical, socio-economic and cultural factors, and are based on findings and conclusions over a period of time.

In this book, WWF presents case studies of 14 projects from its river basin programme portfolio. Though all have produced substantial outputs, none of them presents a complete, functioning IRBM process because few, if any, such cases exist as yet. IRBM is, after all, a very new discipline that requires time to plan and begin implementing, let alone to reach the stage of maturity when tangible, on-the-ground benefits are seen at basin-wide level. Instead, each case study demonstrates the use of one or more particular approaches, tools or processes intended to promote and catalyse wider IRBM schemes within the respective basin. Not all of the projects are at the same stage. Some, such as the Danube and Everglades, reflect long-term engagement of WWF and its partners over a decade or more, and in these can be seen the promise of basin-wide achievements. Others are working their way towards the river basin scale, perhaps having started out as smaller site-specific or issue-specific projects.

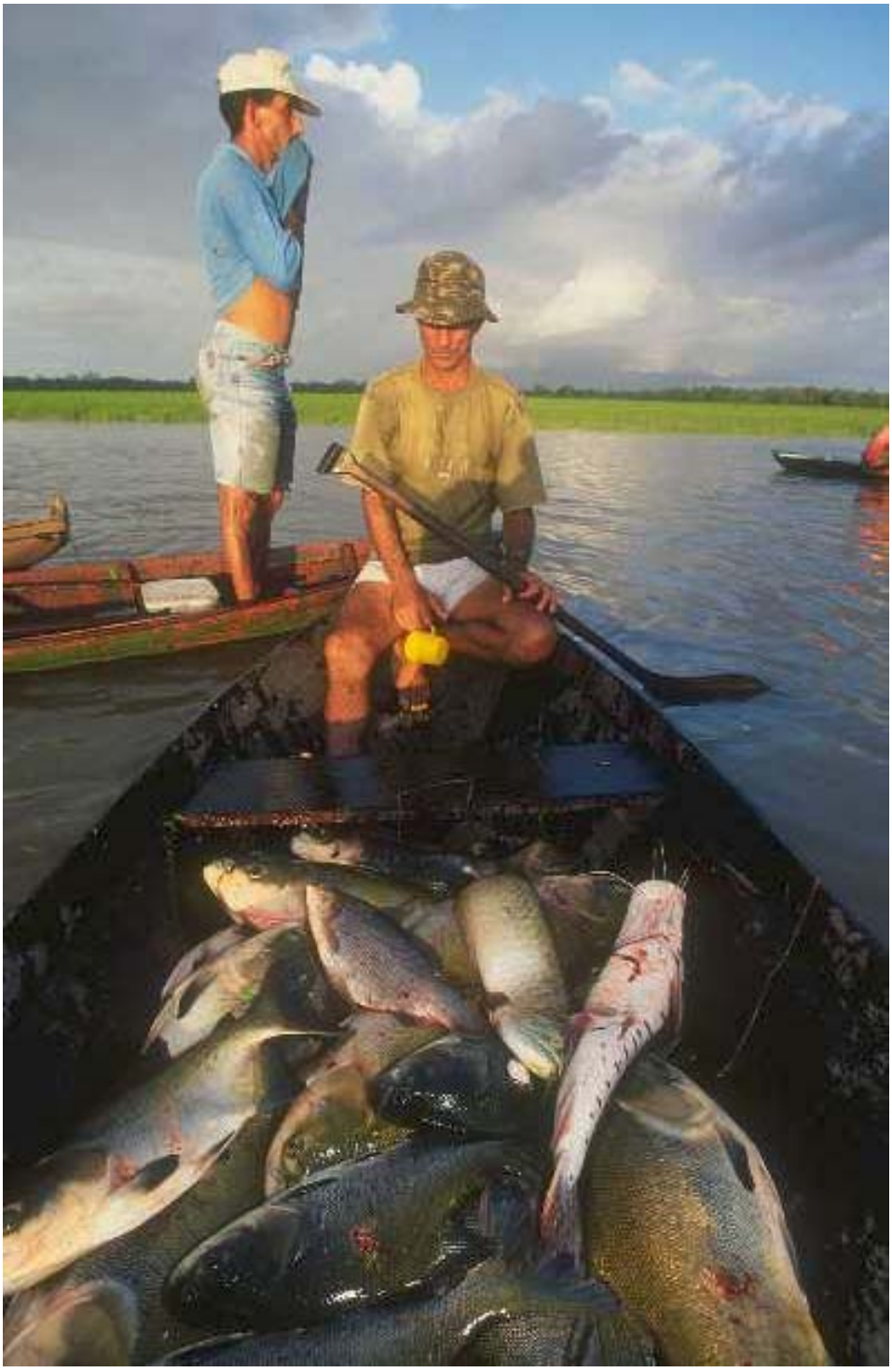
WWF offers these case studies as food for thought and as experiences from which others may learn and benefit. We do not claim to have all the answers, nor do we in any way claim that this book represents a definitive text on IRBM. There is still much to be learned, and WWF is one of many global actors striving to do so. We hope, however, that this book will provide some guidance, stimulate some ideas, and spur some action to make IRBM a reality in more basins in more parts of the world.

Each of the 14 case studies presented here from river basins across the world follows a standard format, including:

- a summary of basin characteristics
- the role of WWF and its partners
- the conservation method demonstrated
- the resources devoted
- a chronology
- lessons learnt.

The lessons learnt from individual basins have been aggregated and synthesized in the next section, to draw general lessons that can be of value in most places, under most circumstances.

Fishermen with a catch of fish from the 'Varzea' (seasonally flooded forest), close to the community of São Miguel, near Santarem, Para, Brazil. WWF-Canon / Edward Parker



Case study synthesis

Drawing on the 14 individual case studies, this section highlights lessons learnt that are relevant for IRBM initiatives at a wider level. In each instance a 'headline' lesson learnt is followed by bullet points containing further information. In square brackets at the end of each bullet point is a listing of the case studies that contributed most strongly to the lesson concerned. Readers should turn to those case studies for greater detail and specific examples.

The order in which the lessons are listed is only significant in that an attempt has been made to present them in a logical sequence. They are not given in order of priority, since judgements about prioritization need to be made on a case-by-case basis by local people and their institutions as they evolve, and there is no miracle 'one size fits all' recipe applicable to every river basin. Nevertheless, it is hoped that this summary will serve as a useful checklist and planning tool for those embarking on new IRBM initiatives, and as a framework for assessing the progress of existing projects.

Lesson 1
Long-term investment is needed

- River basin-scale objectives cannot be tackled seriously within the scope of a typical three- or five-year project. IRBM requires long-term financial and 'technical' investment [Danube, Loire, Yangtze].
- It also takes time to build sufficient trust and levels of understanding among stakeholders (see also Lesson 3) before implementation of IRBM activities can begin. Building the capacity of civil society organizations, developing sustainable livelihoods with local peoples, leveraging resources and implementing sustainable economic measures are critical [Gwydir, Kafue Flats, La Cocha, Lake Chad, São João].
- A long-term management framework, such as a river basin commission or authority, is required to provide the stability needed for IRBM to succeed [Danube, Lake Chad, Prespa].
- It is important not to generate unreasonably high expectations of quick results among partners and stakeholders who may become anxious and/or disillusioned if progress is slower than expected [São João].

Lesson 2
River basin management requires an integrated, holistic and strategic approach, based on a clear vision and agreement on the values – natural, social, and economic – to be conserved and the sustainable livelihoods needed by the people of the basin

- The aim of IRBM is to sustain and improve livelihoods and preserve biodiversity by conserving the ecosystems that support both. Ways must be found, through partnerships and engagement, to address the social, economic and political stressors that threaten ecological sustainability. This means integrating strategies that may be familiar to conservationists with strategies that are unfamiliar, such as those for poverty reduction in developing countries. Large-scale conservation of watersheds, ecosystems, or whole ecoregions will eventually require the involvement of a broad range of stakeholders and integration of social, economic and environmental measures [Everglades].

- It is vital to identify and promote the long-term economic and social benefits of environmental protection and to incorporate this concept into planning and decision-making [Kinabatangan]. Good governance, gender equity, human health, economic and socio-cultural development are important incentives for local communities to engage in conservation, and also contribute to the sustainability of river basin management initiatives [Kafue Flats, La Cocha].

- While it is important for those involved in the river basin planning process to share a common long-term vision, it must also be recognized that different stakeholders will have different and sometimes conflicting expectations, and that complete consensus may not be achievable. However, there should be sufficient agreement over priorities to ensure that scarce resources are used effectively. This can be achieved through a step-by-step process of identifying the basin values to be conserved, setting environmental targets, and establishing the actions needed to meet those targets. For example, these might relate to water quality [Great Barrier Reef], flow volumes and timing [Everglades, Gwydir, Kafue Flats, Working for Wetlands] or land use [Kinabatangan, Yangtze].

Lesson 3
Biodiversity may have to take a back seat

- While the ultimate objective of conservation organizations is the safeguarding of biodiversity through sustainable use of natural resources, biodiversity is unlikely to be at the forefront of concerns of many stakeholders in a river basin. In order to engage effectively, conservationists have to seek and promote solutions that provide socio-economic benefits first and foremost, with ecological benefits being an important, but secondary, element. Integrating wetland rehabilitation and habitat protection with poverty reduction, sustainable development and water resource management, and ensuring the necessary buy-in from government, industry, agriculture, and communities, is likely to bring far greater success than pursuit of a 'traditional' conservation agenda. This is an issue common to all regions and not developing countries alone [La Cocha, Prespa, Working for Wetlands, Yangtze].

Lesson 4
It is important to work at different levels simultaneously

- Stimulating effective basin management means that it is necessary to work simultaneously at multiple levels – for example, field/site level, national level and basin level (the latter including cooperation with the basin authority, where one exists, regional donors, and policy drivers). At the same time, multiple approaches are required, ranging from policy work to public awareness, and from field projects to lobbying of decision-makers [Danube, Great Barrier Reef, Loire, Yangtze].

- It is important to develop a sound reputation at field/project level to gain respect and attention at a national level. On the other hand, participation in international/basin-wide processes can provide you with the necessary influence to open doors at a more local level [Danube].

- Well-planned and adequately resourced demonstration or 'model' projects can be decisive in proving that the principles of IRBM can be translated into tangible action at field level. Begin with small, practical projects to create working examples for scaling-up and replication in other river basins [Kinabatangan].

Lesson 5
Effective partnership building is an essential ingredient of IRBM and enables far more to be accomplished than by working alone

- Successful partnership building requires:
  - knowledge and understanding of the region
  - deployment of experienced staff with interpersonal and diplomatic skills
  - an open, constructive and 'modest' approach when dealing with stakeholders
  - readiness to engage in long-term partnership and project activities, including with 'non-conservation' stakeholders [Kafue Flats]
  - readiness to work with 'non-traditional' partners [e.g. Ganges]

  - readiness to assist, facilitate, catalyse and supervise, rather than to control and implement
  - readiness to involve local expertise and experience
  - readiness to assist with building the local capacity of people and organizations
  - readiness to provide concrete technical and financial support [multiple case studies], although a small number of people working catalytically with modest resources may have a significant impact [Lake Chad, Working for Wetlands].

- Organizations such as WWF can act as an 'honest broker' and/or bridge builder, attempting to identify workable solutions acceptable to stakeholders at different (e.g. local, national and international) levels [Gwydir, Lake Chad]. However, it is also important to recognize that WWF and its partners are themselves stakeholders, with their own views, prejudices and priorities. It will always be a challenge to strike the right balance between acting as both a facilitator and a stakeholder. It is also important to be aware that there is likely to be a language/terminology barrier between bureaucrats and local stakeholders, and that a crucial starting point for a would-be facilitator and catalyst is to help groups to communicate with each other.

- Circulating key documents, reports and other information widely among project partners and river basin stakeholders generates cooperation [Gwydir].

Lesson 6
Be ready to seize unexpected opportunities

- While effective IRBM ultimately requires a focused, coherent and strategic approach, organizations advocating basin-wide solutions must also be ready to seize opportunities that arise unexpectedly from the course of events. These might be due to political circumstances (e.g. change of government, introduction of a new policy or law), or the consequence of an event receiving wide media coverage, such as a serious flood or pollution incident [Yangtze, Danube, Prespa].

Lesson 7
Sustained efforts are needed to raise public awareness and to gain the support of local communities

- If the importance of taking a large ecosystem-scale approach is to register in the minds of the public, it is critical to establish some kind of recognizable identity or 'sense of place' for the region and to develop key messages about the ecosystem that resonate at all relevant levels [Everglades]. Similarly, flagship species can be an effective rallying point for local communities [Ganges, Kinabatangan, Loire, São João].

- Strategic use of the media is an essential part of getting the IRBM message across to local stakeholders, and may play a decisive role in securing their support [Ganges, Great Barrier Reef, São João].

- Before planning and implementing activities in a given river basin, it is important to understand and build confidence among the local stakeholders [Ganges, Prepsa].

- The involvement of senior community figures, religious leaders, and other opinion formers may help to engender public understanding, acceptance and implementation of river basin conservation [Ganges].

Lesson 8
River basin conservation must build on a strong informational and science base

- IRBM practitioners must invest in building the necessary informational base before planning and implementing field and/or policy interventions. This means forging partnerships with the scientific community and ensuring that arguments in favour of a given field or policy action are always supported by clear and accurate technical evidence. In several of the case studies, it is shown that WWF's credibility with politicians, local stakeholders and the media rests largely on this point [Great Barrier Reef, Ganges, Loire, Prespa].

- Information gathering should begin as early as possible and include, for example, ensuring that key stakeholder groups are accurately identified; land tenure systems, drivers influencing land management decisions, and existing official structures and processes relevant to IRBM are understood; and biodiversity values are properly assessed [Prespa]. On the other hand, it is essential that compilation of data does not become an end in itself or an obstacle to progress in other areas. This requires realistic judgement of when sufficient knowledge has been acquired for a particular purpose.

Lesson 9
River basin management must be established as a political priority

- Without support at a political level, it is impossible to convert the concept of IRBM into reality. Groups such as WWF and its partners can have an important role to play in supporting the development and implementation of government policies that are favourable for river basin management and can contribute to enhancing government capacities [Everglades, Yangtze].

- Public-private partnerships can be highly successful; governments need help from non-governmental organizations (NGOs) and vice versa. Government can be a powerful partner that can work for conservation and multiply the results of NGO efforts many times over. At the beginning this may seem impossible, but if river basin issues are presented in the right way, they can become central to government development plans [Everglades, Working for Wetlands].

- Effective management of transboundary basins requires international political agreement. International treaties (e.g. the Ramsar Convention) and basin-wide organizations (e.g. the International Commission for the Protection of the Danube River, or the Lake Chad Basin Commission) can provide the necessary institutional frameworks for reaching agreements. The potential use of Ramsar Site designations and the establishment of a river basin organization should be considered for inclusion in any international IRBM planning process [Danube, Lake Chad, Prespa]. Ramsar listing, combined with application of the Ramsar 'wise use' concept can also make a significant contribution even when the basin is wholly within the territory of one country [Gwydir].

Lesson 10
Formal protected area designations may be vital for long-term underpinning of river basin management

- Political support can be fickle and the economics of IRBM unstable. It may therefore be important that legislative protection (or alternative formal recognition, such as Ramsar Site designation) for freshwater ecosystems is sought to underpin the use of other tools and approaches [Everglades, Gwydir, La Cocha].

Lesson 11
The conservation community can catalyse and demonstrate, but effective and sustained implementation of river-basin scale solutions depends on governments, the corporate sector, civil society, communities and individuals accepting and committing to the principles of IRBM

- Conservationists must ensure the long-term viability of IRBM initiatives by building the capacity of civil society organizations, promoting cross-sectoral dialogue and policies, and leveraging resources [Everglades, Danube, Kafue Flats, Working for Wetlands].

Further information

Each case study provides the full contact details of the relevant WWF river basin project leader(s). In addition to the WWF Living Waters Programme website (www.panda.org/livingwaters), the following organizations and sources provide relevant further reading and additional links:

Organizations

Dialogue on Water, Food and Environment
www.iwmi.cgiar.org/dialogue/index.asp
European Union, including Water Framework Directive and Water Initiative
www.europa.eu.int/comm/environment/water
Global Water Partnership
www.gwpforum.org/servlet/PSP
International Network of Basin Organizations
www.inbo-news.org/riobang.htm
International Rivers Network
www.irn.org
International Water Management Institute
www.iwmi.cgiar.org
Ramsar Convention website and toolkit
www.ramsar.org
River Basin Initiative (Ramsar Convention and the Convention on Biological Diversity)
www.riverbasin.org/ev.php
Stockholm International Water Institute
www.siwi.org
United Nations Development Programme
www.undp.org/water/index.html
United Nations Environment Programme
www.unep.org/themes/freshwater
UNESCO
www.unesco.org/water
Wetlands International
www.wetlands.org
World Bank
www.worldbank.org/html/extdr/hottopics/water.htm
World Water Council
www.worldwatercouncil.org
WWF European Living Waters Programme
www.panda.org/europe/freshwater

Publications

A sourcebook for conducting biological assessments and developing biodiversity visions for ecoregion conservation. Volume II: freshwater ecoregions, by R Abell, M Thieme, E Dinerstein and D Olson. World Wildlife Fund, Washington. 2002.

Atlas of International Freshwater Agreements. United Nations Environment Programme, Nairobi. 2002.

Dam Right! An Investor's Guide to Dams. WWF International, Gland, Switzerland. 2003.

Elements of Good Practice in Integrated River Basin Management: A Practical Resource for implementing the EU Water Framework Directive. WWF European Policy Office, Brussels, Belgium. 2001.

Living Planet Report 2002. WWF International, Gland, Switzerland.

Water for People Water for Life. The United Nations World Water Development Report (2003). WWAP (World Water Assessment Programme), United Nations Educational, Scientific & Cultural Organization (UNESCO) and Berghahan Books, Barcelona. 2003.