# Transboundary Water Management as a Regional Public Good

## Financing development – an example from the Nile Basin

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SIWI

REPORT 20

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ISBN: 978-91-975872-0-4
ISSN: 1404-2134

How to Cite: Jägerskog, A., J. Granit, A. Risberg, and W. Yu. 2007. Transboundary Water Management as a Regional Public Good. Financing Development – An Example from the Nile Basin. Report Nr. 20. SIWI, Stockholm.

Design and production by SIWI and Quadrata Design. Printing by Arkpressen, Västerås, Sweden. The printing process has been certified according to the Nordic Swan label for environmental quality. For electronic versions of this and other SIWI publications, visit www.siwi.org.

Cover photo: The White Nile, Khartoum, Sudan. Arne Hoel/World Bank

# Transboundary Water Management as a Regional Public Good

## Financing development – an example from the Nile Basin

The White Nile, Khartoum, Sudan

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This paper was prepared and published by the Stockholm International Water Institute (SIWI) with financial support from the Swedish International Development Cooperation Agency (Sida). The authors are Dr. Anders Jägerskog, SIWI, and Mr. Jakob Granit, The World Bank, with support from Mr. Anders Risberg and Mr. Winston Yu of The World Bank.



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# 1. Executive Summary

Lake Victoria at Bondo, Kenya

Photo: FAO/A. Vitale

Photo: Arne Hoel/World Bank

Cooperative transboundary management of the Nile River Basin is an important public good in itself, as well as a source of regional public goods. Evidence suggests that investment in water resources management and development holds significant opportunities for economic development in the Nile Basin. While the economic returns of large multi-purpose projects may be significant, indirect benefits and public good benefits do not necessarily translate into direct revenue streams that can sustain these investments. This has important implications for the financing of Nile projects, their financial performance and their economic justification.

This paper focuses on public goods in the context of the Nile Basin. It explores public goods as one justification for soft financing such as grant financing that complements other sources of public and private financing, thus enhancing the financial sustainability of cooperative river-basin management and development projects which provide important public goods.

**Key messages:**

1. Cooperative management of a transboundary river basin is an important public good and a source of regional public good benefits.
2. Developing and supporting transboundary river basin management are both long-term undertakings, and important catalysts for promoting economic growth and regional stability.
3. The Nile Basin is an important transboundary water body. Cooperation in the area could unlock the development and economic potential of the region and foster major win–win opportunities.
4. Shared benefits would result from cooperative action by Nile countries. However, given the economic context of these countries, both public and private financing will be needed to realise those benefits.

# 2. Introduction

Fisherman on the White Nile, Khartoum, Sudan

Photo: Arne Hoel/World Bank

## The Nile Basin Initiative

The Nile Basin Initiative (NBI) is a partnership of the states found along the course of the Nile[1]. The NBI seeks to develop the river in a cooperative manner, while sharing the substantial socioeconomic benefits it provides, and promoting regional peace and security. The Initiative began with a participatory process of dialogue that resulted in these riparian states agreeing on a shared vision to "achieve sustainable socioeconomic development through the equitable utilization of, and benefit from, the common Nile Basin water resources." It also led to the development of a Strategic Action Program that aims to translate this vision into concrete activities and projects[2].

The NBI's Strategic Action Program is made up of two complementary (sub) programmes: (i) the basinwide Shared Vision Program, designed to build confidence and capacity across the basin, and (ii) the Subsidiary Action Program, which aims to initiate concrete investments and action on the ground at sub-basin levels. The programmes are self-reinforcing. The Shared Vision Program, which focuses on building regional institutions, capacity and trust, lays the foundations for the riparian countries to unlock the development potential of the Nile. This could be realised through subsidiary action programmes and in-country projects that use the Nile's water resources sustainably. Cooperative investment-oriented programmes are currently being prepared and implemented in the Eastern Nile and the Nile Equatorial Lakes Regions.

The Victoria Nile, near Murchison Falls in northern Uganda

Photo: FAO/17389/K. Dunn

This paper focuses on public goods in the context of the Nile Basin. It explores the definition of public goods and the concept of public goods as one justification for the use of soft financing or grants in cooperative Nile projects to complement other sources of public and private finance.

# 3. Defining Public Goods

In international development circles the concept of global public goods underwent a revival at the turn of the Millennium. Increased human capacity was devoted to thinking about how the concept, and its use, might contribute to increased funding for development projects and programmes.

A 'public good' is an economic concept, which is 'non-rivalrous' with regard to consumption and 'non-excludable'. This simply means that its use does not produce rivalry (because one person benefiting from the public good does not diminish the benefits available to others), and that it is not possible to prevent non-payers gaining access to the resource.

People often refer to a lighthouse when explaining the concept of a public good. The use of a lighthouse by one ship does not exclude other ships from using it at the same or at another time, and ships cannot be prevented from using it – thus it is non-rivalrous and non-excludable. Other examples include international vaccination programs, the protection of key environmental resources, mitigation of climate change, world cultural heritage, financial stability and international justice.

Some uses of water are examples of public goods (e.g. recreation, aesthetics, biodiversity, flood risk reduction, and water quality improvements), as these goods and services benefit all and the consumption of water to produce them does not diminish the amount available. In today's inter-dependent world, national development activities are not designed to produce international public goods that benefit people outside the country. In order to compensate for this deficiency, it is argued that such global public goods could be provided through a multilateral approach.

Farmer in Egypt

Photo: Ray Witlin/World Bank

Transport in Egypt

Photo: Ray Witlin/World Bank

The International Task Force on Global Public Goods describes international public goods as goods that address issues that: (i) are deemed to be important to both the developed and developing countries that make up the international community; (ii) typically cannot, or will not, be adequately addressed by individual countries or entities acting alone, and, in such cases (iii) are best addressed collectively on a multilateral basis.[3]

Global public goods (GPGs) have played a major part in the many efforts made over the last decade to reverse the downward trends observed in overseas development assistance (ODA). Many established development organisations feel that GPGs provide a new rationale for development assistance and an opportunity to mobilise extra resources. In a study commissioned by the Swedish Ministry for Foreign Affairs *(Financing and Providing Global Public Goods)*[4] the authors identified four broad categories of financing mechanism that could be used to strengthen the investments made in public goods:

- The creation of markets, or the charging of taxes, fees or levies aimed at the consumer or producer of goods that are harmful to the public good.
- Private sources – which could be created by companies imposing internal charges, for example, or through contributions from individuals.
- National and international financial institution (IFI) sources – through transfers of various kinds.
- Partnerships – which would involve a range of different levels and actors, including public–private alliances.[5]

The study concluded that there is no 'one size fits all' model for the financing and provision of public goods. Instead, the financing mechanisms used must be chosen using a case-by-case approach.

## Transboundary Water and International Public Goods[6]

As pressure on water resources increases, in terms of both the quality and quantity of water needed, water resources systems are being driven to the edge of their natural limits. As a result, consumers are having to rely more on water infrastructure and water management – not only to meet daily requirements, but also to provide security against extreme and variable hydrological events (droughts and floods).

In many developing countries water infrastructure, river basins and watersheds have been neglected. Such

underinvestment has had an impact on economic growth that is often underestimated. There is growing recognition that there is an urgent need to increase the amount of finance provided to infrastructure in order to promote water resources management and development and related public goods. Efficient transboundary water management, including efforts that address sediment control problems and ensure the well-being of the ecosystem, will contribute to the protection of public goods such as lakes and rivers. A comprehensive approach to these water management problems is needed in order to achieve the Millennium Development Goals (MDGs), many of which are dependent on access to adequate water resources.

It used to be argued that water that crosses boundaries would be a source of conflict if not war. However, more recent research has shown that parties that share a water resource actually tend to find ways to cooperate in mutually beneficial ways. In fact, transboundary water resources that are cooperatively managed can make a significant contribution to global and regional peace and stability and to sustainable economic growth.

Promoting cooperation on transboundary river basins is to a large extent process-related. Such processes include building collaborative structures and institutions, at both the national and regional levels, building capacity in the multi-sector use of water, and building trust amongst the riparian states. Promoting cooperation is a long-term and resource-intensive process. Process financing is often needed to secure, deepen and improve water-related collaboration in transboundary basins where the parties display only low levels of cooperation in other areas.

However, establishing institutions for the management of an internationally shared river basin requires long-term support and persistence. Countries (supported by donors) should aim to build lasting institutions that are stable and that have well-defined tasks. If this can be achieved the process of cooperation is made easier and transaction costs are kept low (Jägerskog, 2003 and Nicol et al., 2000).

Sustainable management of transboundary water resources is in itself a regional public good (although it will also contribute to the achievement of private goods). By jointly managing a river, for example,

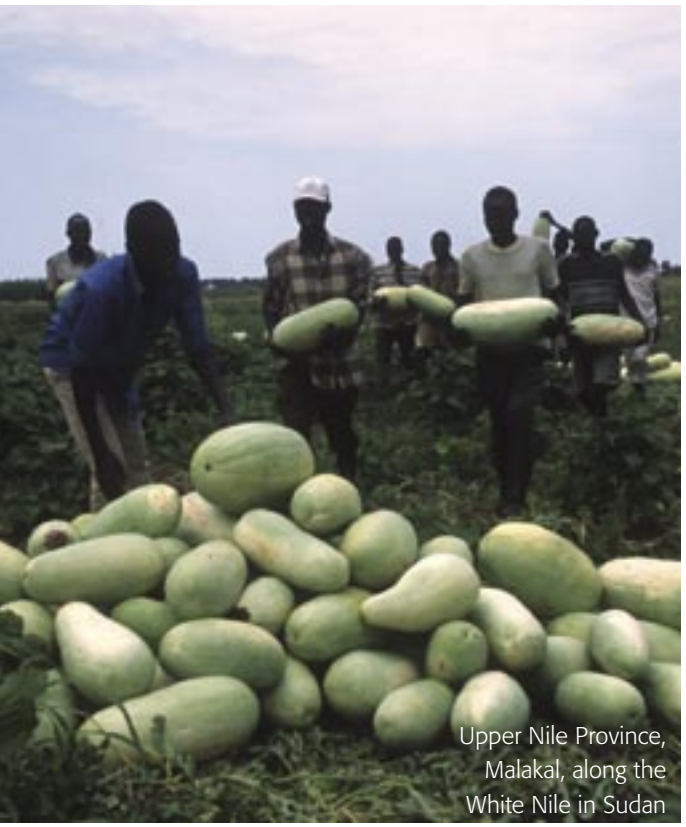
Photo: European Space Agency (ESA)

The Nile Basin

riparian countries can generate public goods such as flood and drought protection, increased biodiversity and better conservation, improved water quality, and even peace and regional stability. Not all of the public goods mentioned above, however, will necessarily be regional in nature. Care must also be taken when managing transboundary water resources, in order to avoid the generation of public 'bads'.

The existence of externalities within a river basin is an important justification for promoting transboundary water management. An externality occurs when "the activities of one person affect the welfare production functions or other people who have no direct control over those activities" (Dorfman and Dorfman 1993). James (2005) points out that externalities occur in transboundary water management due to (i) hydrological linkages between upstream and downstream use of natural resources, and (ii) socioeconomic linkages across property boundaries and common land.

Since the activities within a transboundary watershed often distribute local and external costs and benefits unevenly between states, regions and people, the potential for conflict exists in a shared basin. Moreover, the externalities in a watershed produce an inefficient situation, in that the full costs of economic activity (such as pollution which moves downstream) are not recognised by individual consumers or by producers and the resulting outcome is less optimal for society. By promoting cooperative management, such damaging externalities can be minimised.



Upper Nile Province, Malakal, along the White Nile in Sudan

Photo: FAO/24560/A. Proto

There are positive examples of third-party involvement in the provision of regional public goods through the promotion of transboundary water cooperation. During the development of cooperative structures between India and Pakistan on the Indus River, for example, the World Bank invested both human resources and funds in order to help the parties involved to agree on the Indus Treaty (Kirmani and Le Moigne, 1997). The sustained cooperation that occurred as a result, even during violent conflicts, is arguably a major regional benefit and a public good.

Today about USD 70–80 billion is spent annually in developing countries on water management, water infrastructure and water supply and sanitation. Around 10–15% of this funding comes from the donor community. The majority, however, is still provided by the domestic and private sectors. Of the funds provided by donors, around 4% were spent on public goods in 1980. This figure had increased to about 10% in 2000. However, little of this is spent on regional public goods according to Nicol et al. (2000). The pattern of spending on both national and international public goods varies widely among different donors.

The best case scenario would involve the riparian states themselves carrying the bulk of the cost incurred when managing transboundary institutions. In reality, however, many are simply not in a position to do that. The international donor community has attempted to address this issue through regional programmes addressing public goods such as the Global Environment Facility (GEF). Since its inception in 1992, the GEF has allocated close to half a billion dollars in grants related to transboundary bodies of water, implementing projects through its multilateral partners (UNDP, UNEP and the World Bank).

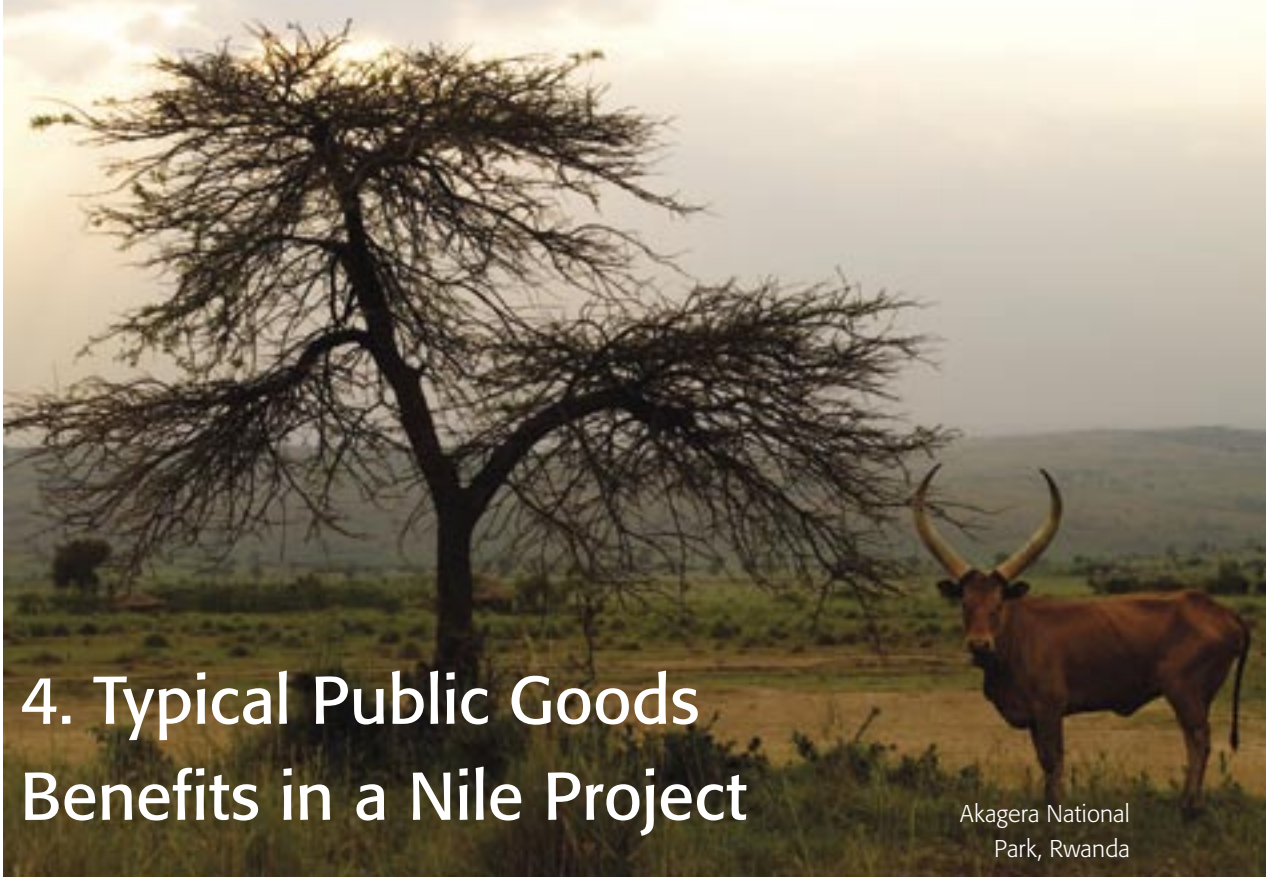


Photo: Arne Hoel/World Bank

# 4. Typical Public Goods Benefits in a Nile Project

Akagera National Park, Rwanda

Water and economic growth are inextricably linked, and water is an important input in all the productive sectors of the world's economies. Access to water is also a strong social indicator of progress. Given the fact that access to, and use and availability of, water continue to depend on infrastructure development and natural ecosystems, it is critical to have sound financing arrangements in place that can generate both commercial and non commercial benefits (some of which may be public goods).

This is particularly true in the Nile Basin where water resources are scarce and variable, and where investment in water resources is often inadequate. Projects planned and implemented in the Nile Basin need to be made to be economically and financially sustainable. As the Nile Basin Initiative countries move forward with the identification and preparation of investment projects, efforts must be made to further address the options available for reconciling economic and financial benefits. That is, mechanisms must be identified that can be used to finance the non-revenue-generating regional and global public goods benefits associated with these investment projects. This is because these public goods will benefit all the people of the Nile Basin in the longer run, but financing them would be too costly for the individual countries.

Though the theoretical foundations for the economics of public goods were developed by Samuelson (1954), economists have only recently begun to develop methodologies that can be used to value public goods. This has generated much debate amongst economists – because difficult theoretical challenges need to be overcome when valuing goods that are not routinely bought and sold in the marketplace.

The current techniques used to value non-market goods are based upon either consumers' observed behaviour (revealed preferences) toward a marketed good with a connection to the non-marketed good of interest (e.g. 'hedonic prices') or stated preferences in surveys with respect to the non-market good (e.g. 'contingent valuation'). For water quality improvements or flood risk reduction, another technique (which calculates damage avoided) is often used. Lack of data can add to the difficulties involved in valuing public goods.[7]

A recent study of the economic benefits associated with the planned NELSAP Regional Rusumo Falls Hydroelectric and Multipurpose Project (RRFP) provides a good example of benefits in the context of a Nile Basin multipurpose infrastructure project.[8] The RRFP is a hydropower project which will produce about 60–80 MW on the shared Kagera River which is part of the Nile Basin. The project is being designed as a multipurpose project including regional power transmission infrastructure to connect to the main electric grids in Burundi, Rwanda and Western Tanzania. The project will include investment to promote the use of electricity in rural growth centres along the regional transmission lines, project area development, and investment in the environment and watersheds.

The study divided the benefits analysed into two classes:

- Power Benefits: sales of power in the Kagera basin and transmission corridor; equivalent to 'off-taker benefits'. Sales made as part of the process of rural electrification were not included.
- Multi-purpose Benefits: all other benefits obtained from dam construction. These included the following potential impacts: project area benefits, downstream benefits, transmission corridor benefits, regional benefits and extra-regional benefits. The typical public goods identified in the analysis included flood protection, management of water hyacinth, better navigation, sediment control (water quality, environmental flow issues), and regional stability.

Water distribution, Khartoum, Sudan

Photo: Arne Hoel/World Bank

The Project's economic internal rate of return (EIRR) appeared robust (at 20%) even without taking into account the multipurpose benefits outlined above. Adding them actually increased the EIRR to over 60% – adding over a billion US dollars to the project's economic value. The major value contributions (over 40% of the total) were provided by reduced dependence on imported fuel and increased regional trade as a result of greater economic and political integration. However, care must be taken when interpreting these numbers, as the methods used to quantify some of these economic benefits were subjective.

Another relevant example of the value of public good benefits is the proposed Eastern Nile Subsidiary Action Program (ENSAP) Watershed Management sub-project. This targets selected watersheds along six rivers in Ethiopia and Sudan. During a recent consultancy, a wide range of regional and global public good benefits was identified; these are summarised in Table 1[9]. For instance, for item 5 it was estimated that flood damage along the Blue Nile in Sudan (the corollary of which is the benefit of flood protection and preparedness) amounted to USD 527 million for a 1-in-100-year flood event. This translates into damage of USD 52 million per year on average (Cawood, 2005).

These estimates have wide confidence intervals, but recognise that floods can and do damage villages, local infrastructure and irrigation distribution canals, having a large impact on agricultural production and producing considerable associated losses. Thus, flood protection and preparedness are public goods and could significantly reduce national public expenditure.

| | Potential Local Benefits | Potential Regional Benefits | Potential Regional Public Good Benefits | Potential Global Public Good Benefits |
|---|---|---|---|---|
| 1 | Increased agricultural productivity and production on rainfed and irrigated land | Improved downstream irrigation potential | Preservation of biodiversity | Preservation of biodiversity |
| 2 | Increased production of timber, fuel wood, minor forest products, grasses | Improved downstream drinking water potential | Increased potential for recreational facilities | Increased potential for recreational facilities |
| 3 | Increased livestock production | | Increased potential for recreational facilities | Improved aesthetics |
| 4 | Increased income from alternative livelihood options | | Improved aesthetics | Preservation of ecosystem functioning |
| 5 | Reduced soil erosion damage | | Preservation of ecosystem functioning | Option value of watershed |
| 6 | Reduced expenditure on agricultural chemical inputs | | Prevention of increases in flood damage | Potential carbon sequestration |
| 7 | Reduced sedimentation in local water bodies | | Reduced sedimentation in downstream water bodies | |
| 8 | More water in local water bodies | | Reduced sedimentation of downstream reservoirs | |
| 9 | Reduced time, effort and costs of collecting water | | Increased life of downstream reservoirs | |
| 10 | Reduced time, effort and costs of collecting fuel wood | | Increased hydropower generation | |
| 11 | Reduced time, effort and costs of collecting fodder | | | |

Table 1. Potential benefits from the Eastern Nile Subsidiary Action Program (ENSAP) watershed management sub-project.

# 5. The Rationale for Financing Public Goods in the Nile Basin

Lack of economic infrastructure, low levels of investment, and hydrological variability are major constraints to the economies of the Nile Basin. If the countries in the Basin are to grow and achieve the United Nations' Millennium Development Goals, more financing must be provided for water resources management and development. Regional multipurpose programs that work to link river and power systems, increase electricity supplies, build reservoir capacity, improve watershed management, and enhance agricultural production, could enhance human capacity and boost economic development.

As a result of the dialogues promoted by the NBI, the riparian countries in the Nile Basin now share a vision: to "achieve sustainable socioeconomic development through the equitable utilization of, and benefit from, the common Nile Basin water resources." Considering the current status of these countries, however, significant investment will be needed to achieve this vision. NBI programs are currently preparing to make investments in the order of USD 3–5 billion. Developing and implementing these will require financing instruments and sources of finance beyond what is currently available.

The financial sustainability of these projects ultimately hinges on whether or not project sponsors attract sufficient amounts of loan and equity financing on affordable terms for those project components that deliver commercially marketable goods. They will also have to capture grant financing to monetize the economic benefits resulting from those project components that deliver non-marketable goods (such as public goods). The Nile Basin countries cannot afford to incur much more debt, and have limited access to capital markets. They must also cope with the various (competing) demands placed on scarce resources, and the fact that perceived political and commercial risks affect the status of the projects. Given the size of

The Nile at Aswan, Egypt

Photo: Quadrata

the envisioned projects, raising and structuring the finance needed for the Nile Basin projects poses a challenge to the host countries. The projects' realisation will, therefore, depend to a great extent upon their ability to raise soft financing (see Annex 1 for a table outlining financing instruments in general).

Preliminary cost–benefit analyses suggest that the economic internal rates of return of programmes and projects currently in the NBI pipeline are significant. However, while estimated economic returns are large, electricity, and to some extent irrigation, may be the only outputs to generate any solid financial returns. A significant proportion of the benefits (such as flood control, drought mitigation, watershed management and, importantly, a strengthened foundation for regional integration and development) are not readily marketable goods and therefore do not easily translate into financial revenue streams that can support projects' financial performance. However, their significant value may justify the use of grant and concessional financing to fund these benefits, thus improving the projects' financial sustainability.

The international community has a vital role to play, by providing technical assistance and grant co-financing to provide extra leverage to public and commercial financing. This report argues for donor financing to support public goods type investments, such as (i) institutional strengthening and capacity building to improve regional cooperation and stability, and (ii) investments to improve livelihoods, for example investments in watershed management and flood prevention.

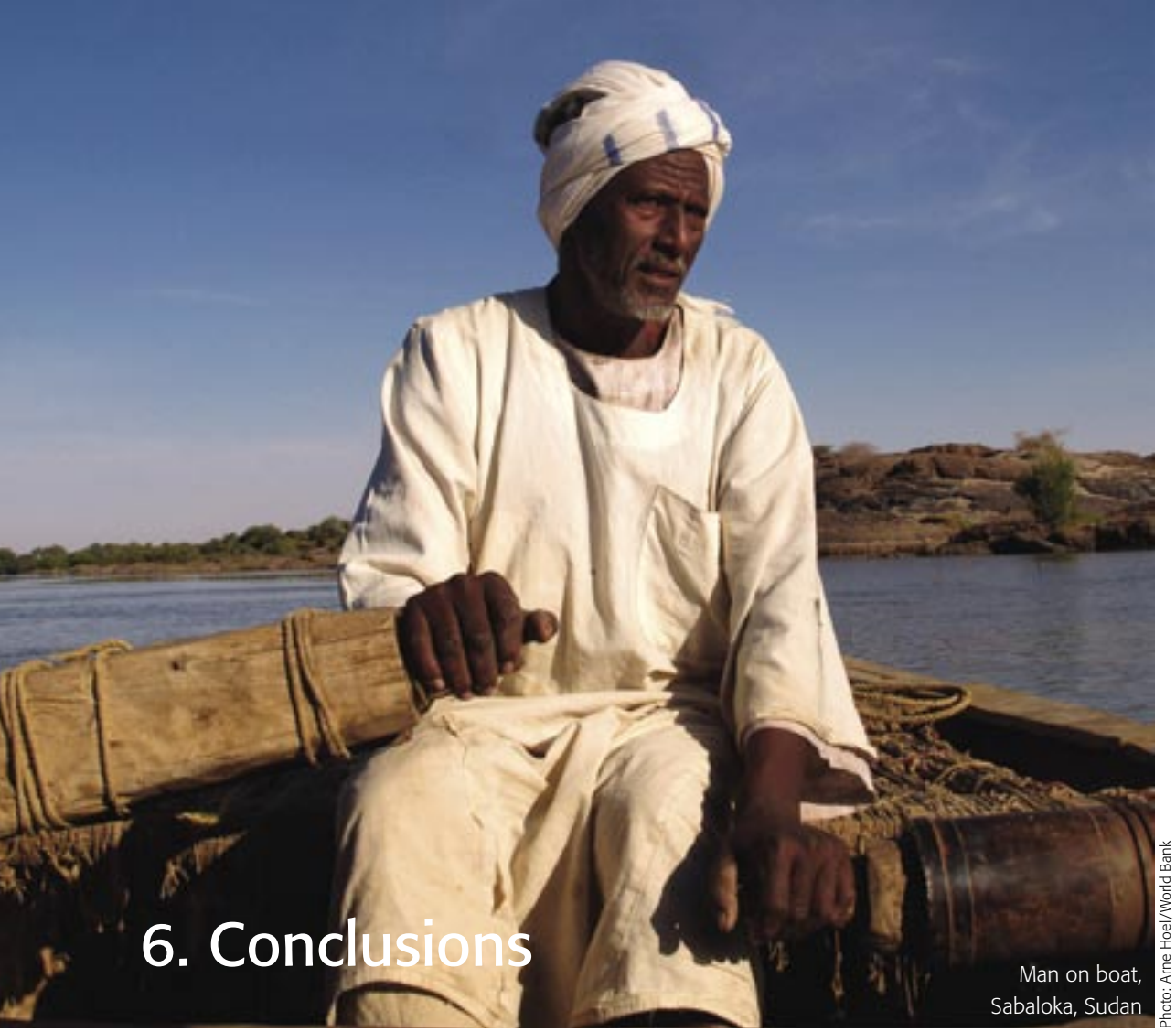
Donor-supported Trust Funds represent a way to support process management. They also contribute resources to the management of transboundary river institutions and longer term planning and programming. A Trust Fund can provide long-term financial security to programmes and institutions, making them less dependent on changes in donor priorities and disbursement. It also functions as a means of transferring control from donors to the countries themselves, thus strengthening institutions and technical capacity. Such support would help to reduce risk, leverage commercial financing, and close envisioned funding gaps, all of which would help projects to achieve the goal of sustainable financing and implementation.

Preparing multipurpose NBI projects and testing out different project models (to ensure adequate participation of stakeholders, and consideration of technical, environmental, social, economic and financial issues) are vital processes. However, a major roadblock to these processes is the difficulty inherent in obtaining concessional project-preparation resources such as grants and low-interest loans. NBI countries with limited public funds for project preparation may prioritise projects with immediate benefits (such as investment in health, education, thermal power projects, etc.). This is because they feel that this is less risky than investing large amounts in preparing complex projects (which in many cases span several countries and different sectors) which deliver public goods benefits, but will not result in poverty alleviation and economic growth for some 5 to 15 years.

Up-front and large-scale availability of concessional project-preparation resources would allow NBI countries to prepare complex projects according to best global practice while exploring all available financing mechanisms. This would significantly improve the investment climate, allowing both the private and public sectors to assess better prepared projects (at the prefeasibility or feasibility stages). This would reduce the risks taken by private investors, who otherwise may be reluctant to engage in complex, long-term projects.

Photo: Arne Hoel/World Bank

Sinnar Dam, Sudan



# 6. Conclusions

Man on boat, Sabaloka, Sudan

Photo: Arne Hoel/World Bank

We have reviewed the concept of public goods, both in general and specifically in relation to the management and development of the transboundary Nile River Basin. Evidence suggests that projects that invest in river-basin management, and that work to link river and power systems, increase electricity supplies, build reservoir capacities, improve watershed management, and enhance agricultural production, can also enhance human capacity and economic development in the Nile Basin. These projects can produce significant economic returns. They also produce (i) indirect benefits – such as increased economic activity in key growth areas ('growth poles'), improved transport networks, and better access to education and health care; and (ii) public-good benefits – such as flood control, drought mitigation, watershed management and regional institutions. However, these indirect and public-good benefits do not translate into direct revenue streams able to support a project's financial performance.

Exploring these non-financial benefits makes clear just how important it is to provide soft financing such as grants that will allow projects to realise such public goods. Such soft financing will enhance the financial sustainability of river-basin management projects and promote regional integration and development. Public goods provide only part of the economic rationale for soft financing of multipurpose river basin management and development projects with other quantifiable direct and indirect economic benefits further strengthening the case for investment.

| Source | Type of Instrument |
|---|---|
| **1. Bilateral instruments** | • Regular loans<br>• Soft (concessional) loans<br>• Grants for public and civil society organisations<br>• Debt relief<br>• Funds to promote private investment in developing countries<br>• Tax incentives (for firms in developed countries) |
| **2. International organisations and agencies** (UN system, regional and other international organisations) | • Regular grants (from their core budgets and trust funds)<br>• Special purpose grants |
| **3. International financial institutions**<br>a. Multilateral Development Banks (World Bank, regional and sub-regional banks, and their associated institutions) | • Regular loans<br>• Soft (concessional) loans<br>• Grants (mostly to public institutions)<br>• Risk mitigation and risk management instruments<br>• Equity participation<br>• Debt reduction<br>• Other (e.g. resource mobilisation) |
| b. IMF and regional monetary funds | • Short-term financial assistance<br>• Concessional funds<br>• Debt management and debt relief<br>• Issuing special drawing rights (SDRs; IMF)<br>• Other (e.g. trust fund management) |
| **4. Private sources**<br>a. Corporations | • Foreign direct investment (FDI)<br>• Concessions<br>• Grants, donations, social responsibility activities |
| b. Commercial and investment banks | • Loans<br>• Risk mitigation and risk management<br>• Portfolio flows<br>• Debt relief |
| c. Private foundations, not-for-profit and non-governmental institutions | • Grants and donations |
| d. Individuals | • Donations<br>• Foreign worker remittances |
| e. Global and international lotteries | • Lotteries and games of chance to fund development programmes |
| **5. International capital markets**<br>a. Bonds and other debt instruments | • Bonds and related instruments |
| b. Equity investments | • Equity investments through stock markets |
| **6. International taxes, fees and charges** | • Creating international tax arrangements<br>• User fees, charges and assessed contributions |
| **7. Market creation** | • For the provision and financing of regional and global public goods |
| **8. Global and regional partnerships** | • Special purpose official funds (international, multilateral and bilateral)<br>• Public–private funds and partnerships for specific purposes |

Annex 1. Summary list of financing instruments (adapted from Sagasti and Bezanson, 2005).

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2 Nile Council of Ministers, Policy Guidelines for the Nile River Basin Strategic Action Program, February 1999.

3 Definition from www.gpgtaskforce.org.

4 Sagasti and Bezanson (2001).

5 For a further overview see Annex 1 (adapted from Sagasti and Bezanson, 2001).

6 This section is partly based on Jägerskog and Phillips (2006).

7 Readers who are interested in a more detailed consideration of valuation are referred to Brookshire et al. (1982), Mitchell and Carson (1988), Freeman (1993), and Young (2005).

8 Manitoba Hydro International (2006).

9 James (2005).

Scene at Lake Victoria, Uganda

Photo: FAO/19325/R. Faidutti

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