

International Waters Cooperation



Workshop on Transboundary Water Management: Orange-Senqu and Zambezi Basins

29-30 April 2014 • Johannesburg, South Africa



清華大學
Tsinghua University



RESEARCH
PROGRAM ON
Water, Land and
Ecosystems



Participants at the workshop on transboundary water management

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1.1 Introduction

The workshop was aimed to support collaboration in research and development in China and Africa on the subject of transboundary waters. The workshop is part of a larger initiative that seeks to strengthen the common understanding and cooperation between China and African countries on key issues of transboundary waters. The goal is to optimize public and private investments in water-related knowledge, institutions and infrastructure. The initial basins to be considered are the Orange-Senqu and Zambezi. The primary subjects of interest are institutions and benefit sharing across transboundary basins, development of multipurpose outcome approaches to dams, and ecosystem services, among others.

2. Objectives

2.1. Expected outcomes of workshop

1. Identify areas of interest for collaborative interventions in research and development planning between African and Chinese academic and research institutions
2. Develop a joint agenda based on increased understanding on commonly agreed, prioritized challenges in the basins and in the sub-region
3. Exchange knowledge and experiences for mutual benefit within South-South cooperation
4. Build network of resource persons and experts in key subjects

2.2. Expected outputs from the workshop

1. Actionable plans to take forward in the African sub-region and in China
2. Identified experts, partner institutions to take plans into specific actions
3. Teams for joint publications
4. Increased understanding of transboundary context both biophysical and institutional

3. Participants

IWMI convened the workshop in Johannesburg, South Africa on behalf of Tsinghua University. Participants represented the SADC water program, countries in the Orange-Senqu and Zambezi basins, as well as ZAMCOM and ORASECOM. Scientists and researchers attended from international organizations, leading regional research and academic institutions, including University of Western Cape, University of Stellenbosch and University of Witwatersrand. The Chinese delegation was comprised of representatives from the Ministry of Water Resources, Power China, Tsinghua University, Yunnan University and other research institutions. The supporting agency, DfID, also had representatives at the workshop.

4. Proceedings

4.1. Opening

4.1.1. Dr Pius Chilonda, Head of Office, IWMI - Southern Africa

Dr Chilonda welcomed participants on behalf of IWMI and IWMI Director General, Jeremy Bird. He noted the importance of the initiative as part of South-South cooperation. He also reminded the

participants of the World Bank President's statement on the future happening in China, Africa and other growing economies. Dr Chilonda briefly discussed the workshop in the context of IWMI's research on international waters and African basins, as well as the Water, Land and Ecosystems research program that IWMI is leading. He wished the participants well in the deliberations.

4.1.2. Ms. Lin Wu, DfID – China

Ms Wu welcomed participants and noted that the workshop formed part of a DfID supported collaboration between the UK and China to work together on poverty reduction in developing countries. In particular, Mr Wu noted the significant achievements made by China in reducing poverty, from which other countries can learn. The collaboration includes strengthening cooperation on international waters; the workshop should help identify opportunities for in-depth cooperation.

4.1.3. Prof Ni, Tsinghua University

In welcoming participants, Prof Ni noted that the delegation from China included a mixed group representing government, academia, and enterprises. Prof Ni explained that there are many conflicted transboundary waters in Africa. And at the same time, China's involvement in Africa is growing. The workshop is a first step in building a partnership and learning together. The focus of the workshop is the Orange and Zambezi basins, but there are many transboundary rivers in Africa. The expectation of the workshop is that it will identify areas for research and an agenda on prioritized challenges, and exchange knowledge and experience for mutual benefit. At the end of the workshop, it is hoped to have actionable plans to take forward, partners, teams for publications, and increasing understanding of transboundary issues. He gave an overview of the workshop agenda, and the initiative on transboundary waters that included study tours and capacity development. He concluded by stating that there is a long journey ahead, and this is the first step in that journey.

4.2. Presentations

A number of subjects were presented by researchers from the various institutions participating to introduce key issues in the region, and provide the basis for further, detailed discussion.

4.2.1 Current situation in (Southern) African international waters

Mike Muller, Professor, University of Witwatersrand, and National Planning Commissioner, R.S.A.

Prof Muller's presentation began with acknowledging the strong foundation of cooperation between South Africa and China, but also the need to be critical. The main points of the presentation led to five conclusions related to transboundary water in the region. First, physical water scarcity is not a major constraint; most countries in the region do not use all the water they could. The issue is lack of infrastructure development by countries with inadequate financial resources. China is playing an important role in infrastructure development and it needs to be made to work better. Second, sharing rivers has not been a constraint or cause of major conflict. There are many examples of cooperation, such as on the Komati. Basin organizations are not always the best vehicles; ad-hoc cooperation rather than formal river basin organizations is often more successful. Third, donor policies hinder development; donor focus has been on conservation above development and that has been incorporated into aid conditionalities. Fourth, African countries must take responsibility for leading development, based on their own needs. Fifth, China has an important role, given their part

in infrastructure development. As such, they need to be aware of the context and help to avoid mistakes.

4.2.2. Transboundary water management for food, energy, environmental security in Africa: Selected issues

Dr Jonathan Lautze, Researcher, IWMI-Southern Africa

Dr Lautze's presentation looked at key issues in transboundary water management, particularly focusing on food, energy and environment. He noted key issues related to water availability and sustainability, such as water scarcity and stress, rainfall variability, and storage methods to address variability. He also provided an overview of the focus on transboundary waters and the importance; large scale development and increased water use leads to a need for institutions that can facilitate sharing water, coping with the impact of variability and cooperating on sustainability. African transboundary agreements are strong on paper, but there needs to be a distinction between the formal and actual practice. This also leads to a need to understand the incentives: what motivates countries to cooperate. Two initial incentives identified relate to reducing risk and increasing capacity so that countries are able to understand the issues and engage. He concluded that transboundary institutions are a good entry point for interventions, such as strengthening capacity and facilitating cooperation. Dr Lautze highlighted the need to support institutional development and strengthening as a means for improved cooperation.

4.2.3. Trans-boundary rivers between China and neighboring countries

Jiwei Chen, Department of International Cooperation, Ministry of Water Resources, People's Republic of China

Mr Chen provided an overview of the Chinese experience with transboundary waters and the current context. He began by highlighting the climate change risks and the need for strong cooperation as a result. He stated that there has been effective cooperation between China and its neighbours; China has 13 border and 3 neighbor countries with water flowing outward across or along Chinese borders. Particularly relevant to Africa, he discussed the water in under-developed areas of China with transport issues and low access to food. Hydropower has been identified as the only way for the people in those areas to benefit from development. China has adhered to the following principles: putting people first, equality and reasonability, balancing development and protection, and cooperating with neighboring countries. At the same time, they also consider the ecology and environment, and seek to have no negative impact on neighboring countries. China has numerous examples of successful cooperation on transboundary waters with various cooperation mechanisms. Mr Chen explained the example of China's cooperation with the Mekong River Commission; hydropower development and reservoirs had a positive impact for residents on the lower levels. Many examples were given of 'ad hoc' institutions for cooperation, such as technical cooperation, provision of information from China to neighbors, and training for neighbor countries. He concluded by saying that China has taken steps to make transboundary rivers "the river of peace, the river of cooperation and the river of friendship between China and the relevant countries."

4.2.4. Climate Resilience Infrastructure Development Facility: Support to infrastructure development in SADC

Dr Charles Reeve, Climate Resilience Infrastructure Development Facility, UK Department for International Development

Dr Reeve first provided an overview of Climate Resilience Infrastructure Development Facility (CRIDF), which is DFID's new infrastructure support programme in southern Africa; water-related infrastructure in SADC Countries and climate resilience for the poor. The three main roles of CRIDF are: preparations for small-scale infrastructure development, facilitating access to finance, and supporting stakeholders around infrastructure development in the Southern Africa Development Community (SADC). He then provided an overview of SADC; 15 transboundary basins hold 70% of water, rainfall varies widely, and only 5% of water is used. The focus of CRIDF in Zambezi has been small-scale storage and irrigation projects, including natural storage, and introducing the 'water, food, and energy' nexus in policy. In the Orange basin, the issues are making available resources stretch further, and equitable sharing of the saved water. The Orange provides 80% of power in the SADC, so it is significant for energy. Dr Reeve also discussed CRIDF's work in virtual water, which looks at trades within the region around water development for food production (e.g. irrigation development) and energy (hydropower).

4.2.5. Transboundary water management and development, SADC

Dr Kenneth M. Msibi, SADC Secretariat

Dr Msibi began by explaining that SADC has projects that are regional, but development actually happens in member states. Some projects have regional implications: joint implementation is required; countries benefit unevenly from a project developed in one country; special purpose projects seek to provide targeted benefits to ensure balance in the region; joint planning is required/basin level planning (such as on climate change); regional initiatives. SADC takes a program approach, and looks at where it can add value. Dr Msibi also noted that they work on variable geometry: countries should not be held back at the expense of others, but they should be allowed to move forward more rapidly and the other countries can learn from their experiences. They allow for flexibility and adaptability. SADC supports the establishment and strengthening of river basin organizations, and facilitates and coordinates projects identification. SADC can act as a more objective facilitator when countries cannot agree on their respective roles. They also support capacity development for infrastructure development, assist project preparation up to the financing phase, facilitating the establishment of PPDF and support resource mobilization. Dr Msibi noted that water infrastructure is priority in the region; the political will is there. Most projects are at concept stage and need resources to get to the bankability stage. He gave examples of priority projects as a hydropower project in the Democratic Republic of Congo, phase 2 of the Lesotho Highlands project, Batoka Gorge hydropower development and Songwe River Basin development, among others.

4.2.6. Challenges and opportunities: Water management and development in the Zambezi River Basin

John Metzger, Senior Adviser, Zambezi Watercourse Commission (Harare, Zimbabwe)

Mr Metzger began with an overview of the Zambezi River basin, which covers 8 countries, more than 30 million people, and dual economies with disparity in levels of economic development. There is a

highly varied rainfall pattern across the basin. The basin is also home to World Heritage and RAMSAR sites. While climate change impacts appear likely, there is uncertainty on how much it will cause loss in GDPs. Mr Metzger then outlined a number of challenges for the basin. A primary issue is the lack of significant infrastructure development and the lack of coordination of the development that has or is taking place with negative effects on development, productivity, environmental systems and climate change. He highlighted the opportunities, such as evidence of political will, economic demand, existing institutional structures, plans for infrastructure development and a legal framework for cooperation. Among the opportunities is that important studies have already been done and the benefits of interventions are better understood by the actors; investments valued at USD 16 b have been identified for the next few years. In addition to hydropower and irrigation, other opportunities include navigation, fisheries, water supply, mining and tourism, as well as environmental management and disaster risk reduction. In regard to the river basin institutions, Mr Metzger noted that it has a traditional top down structure, but there is an on-going stakeholder consultation process and platforms for sharing information, and a planning process underway for a strategic plan on integrated water resource management. The various opportunities and current investments can be leveraged. The next step is to operationalize ZAMCOM, which is being established in Harare, Zimbabwe.

4.2.7. Transboundary water cooperation in the Orange Senqu River Basin

Lenka Thamae, Executive Secretary, Orange-Senqu River Commission (ORASECOM)

Mr Thamae began the presentation with an overview of the Orange-Senqu River basin. He noted the following about the basin: basin area is 1 million sq km, rainfall varies from 1800mm in Lesotho highlands to 45mm at River mouth at the Atlantic, there are four basin states, and the population is around 19 million. The basin also includes RAMSAR sites. A number of challenges face the basin: large scale industrial waste, commercial agribusiness, negative farming practices, changes in flow regime/siltation with negative impacts on the ecology. The basin also experiences significant water stress. In addition, countries vary by capacity level, levels of development, access to capital. Mr Thamae provided an overview of the institutional structure of the Commission. He then noted that they have established common understanding on key issues and a basin wide IWRM plan. He concluded with areas of progress on cooperation and greater understanding of the basin. In the Orange Senqu basin where options for new infrastructure are limited focus on optimising operation efficiency including joint operation of infrastructure and WC/DM are key. His points for reflection covered a focus on optimizing efficiency and conservation, the need for operational and monitoring systems (governance and field level) that are complementary function to individual State structures, exploring innovative partnerships and continuing to leverage funding for priority programmatic areas, and alignment of planning time horizons by states within the basin.

4.2.8. Built and natural infrastructure management

Dr Xueliang Cai, Research, IWMI-Southern Africa

The natural infrastructure, i.e., wetlands and forests, can be included in planning and operations along with man-made infrastructure. We need to understand what the relationship might be between both natural and built infrastructure, and ecosystems. Dr Cai noted that in the Zambezi, there are numerous wetlands. Research has suggested that without the wetlands, there is greater variability, with results such as more frequent and intense floods and droughts. In addition, forests

have also been found to reduce flood peaks; forests cover 70% of the Zambezi basin. For reasons such as these, it is important to consider the impact of changes within the ecosystem for built infrastructure, such as dams.

4.2.9. Environmental conservation and ecosystem services in river basins

Guy Broucke, International Union for Conservation of Nature, Pretoria, South Africa

Mr Broucke began by saying that IUCN is the oldest international NGO on conservation. He then went on to say that terms such as integrated and sustainable are used everywhere in development, but are often abused. He related this to IWRM, which is really about more integrated water management. He suggested thinking in terms of the ecosystem; while you can remove some components, you cannot take the ecosystem out of the picture. Ecosystems services are important to understand; these are the goods from the ecosystem that most human beings rely on. But generally, we are not doing well on ecosystems services. We need to maintain ecosystems services; communicate, raise awareness, integrate the management of land, water and ecosystems. Mr Broucke presented a number of principles: society may choose to put ecosystem services as key; it is decentralized; consider the external affects; look at the potential value of ecosystem services; setting limits is important because that tells you the thresholds beyond which change is irreversible; there should be a long-term approach. Finally, he discussed a number of tools for river basin organizations and payment for environmental systems. Mr Broucke finally highlighted that there are challenges in the establishment and operations of effective basin organizations; the basin may not be an adequate platform to manage resources, nothing can be done without the governments.

4.3. Questions and discussion on presentations

1. RBOs and power

- River commissions were meant to provide a platform that promoted equality; Inequality within and between different basin organizations.
- China has major river commissions responsible for planning; some commissions are more powerful, related to the amount of water, level of water scarcity. Those commissions with less water/higher scarcity have more incentive to exercise their power.
- Many bi-lateral discussions side-step the formal commissions and river basin organizations.

2. Experiences with river commissions and RBOs for China

- China is not part of the Mekong River Commission. But China has a lot of power in negotiations with the MRC.
- Dialogue/consultation process in river commissions in China is complex. It includes local people, but it is difficult; not always clear who represents farmers, business, etc. The commissions discuss research results with scientists; in the process of research, researchers engage and discuss with people and different stakeholders at different levels.

3. Capacity development

- Important; could be focus for the RBOs, e.g. capacity to gather, generate, share information.
- Gathering/sharing of information in southern Africa RBOs has been contentious, countries do not trust each other's data, e.g. asked for water meters on both sides of a border, which even skewed the data collected.

4. Sovereignty issues and donor interventions

- Issue in Africa, e.g. environmental standards donors impose via conditions on loans/grants.

- Treaties. European treaties and African treaties are quite similar, but the result is different across the cases. Maybe treaties need to be adapted to the conditions of African countries.
- IWRM has been driven largely from outside Africa. China is also introducing/adopting IWRM. This might be an area to compare experiences with the introduction and implementation.

5. **Need for more interaction and cooperation between RBOs in Africa**

- Overlap of countries across RBOs, but there is limited interaction.
- There has been some cooperation between different RBOs. SADC facilitated a workshop for sharing experiences across RBOs in the sub-region.
- Need for more structured platform for collective; there is an African Network of Basin Organizations (ANBO) and interest in strengthening it as technical arm of the African Ministerial Council on Water.

5. Group discussions and presentations

5.1. Assignment

Participants were asked to form into three groups based on their interests and have discussions around those subjects. The three subject areas were:

1. Institutional issues, cooperation and shared benefits
2. Water supply, food and energy
3. Conservation and ecosystems services

The groups were each asked to discuss the following within their subject area:

- Key challenges and topics for future research
- Experiences and lessons
- Current research and development priorities
- Contributions for joint papers
- Partner institutions for future collaboration

The groups discussed the subjects for the remainder of the first day of the workshop and prepared presentations for plenary discussion for the second day.

5.2. Presentations

5.2.1. *Institutional issues, cooperation and shared benefits*

1. Key challenges and topics for future research
 - Benefit sharing mechanisms
 - How to cooperate on 'closed' rivers
 - How to invest in livelihoods of the poor who rely on the rivers
 - Capacity development
 - How to build capacity for effective river commissions and RBOs: what capacity is needed, what capacity exists, what are the gaps, how best to build the required capacity
 - Focus on one area to begin with, e.g. information/data collection and sharing
 - Explore/learn lessons from China on capitalizing on skills in the diaspora

- Comparative study on forms of cooperation; what works where for what; institutional architecture
 - Appropriateness/effectiveness of treaties and agreements
 - Learn from the Chinese experience and context
 - Understanding how to de-link from donor requirements and conditionalities
2. Partner institutions for future collaboration
- Academic Institutions in Africa and China, noting areas of expertise/Centres of Excellence:
 - RBOs, particularly on Basin to Basin Cooperation & learning; Bilateral Organisations
 - NGOs
 - National/International Research Institutions e.g. IWMI, CapNet, WaterNet, etc.
 - Others: Young Water Professionals & Scientists
 - Institutions from other sectors to ensure multidisciplinary and integrated

5.2.2. Water supply, food and energy

1. Key challenges and topics for future research
- Transboundary issues, e.g.s: information sharing; operational rules of dams; risk assessment; flooding, Water use efficiency, Sustainable waste water disposal
 - Zambezi River: optimization of irrigation, hydropower
 - Issues to look at:
 - Hydropower: renewable or not?
 - Financing, institutions, architecture
 - Climate change
 - Water quality: biggest impact at end of river, monitoring waste water disposal/plans.
 - Ways to speed up infrastructure development in Africa
 - How to value/price water to ensure water supply for all
2. Experiences and lessons
- China and African experiences in: infrastructure development, hydropower, irrigation, environmental flows, transboundary issues
 - China is already playing a role in financing & engineering; could grow & add information (monitoring, planning) & institutions (training, system operation, regulation, etc); transfer lessons from experience in China
3. Comparative study of the Zambezi and a Chinese river: irrigation, hydropower, environmental flows, infrastructure and transboundary issues
4. Partner institutions for future collaboration
- Universities and Centres of Excellence in water, e.g.s: Chinese Studies, University of Stellenbosch (also hosts WaterNet); Tsinghua University
 - IWMI
 - PowerChina, IWHR China
 - RBOs: ZAMCOM, ORASECOM
 - SADC (program on water research)
 - DfID

5.2.3. Conservation and ecosystems Services

1. Key challenges and topics for future research

- Poverty alleviation + secure development + growth.
 - Lack of transboundary compensation mechanisms.
 - Need system for monitoring, data exchange.
 - Lack of 'ecological infrastructure', e.g. riparian strips, wetlands, paddy fields.
 - Climate change/variability across time and space.
 - Uneven distribution of water given population and settlement patterns.
 - Link between water volumes, quality, surface/ground water.
 - Infrastructure implications for ecosystems, environmental flows, food security, erosion, biodiversity, etc.
2. Experiences and lessons
 - Africa: balancing development and conservations
 - China: Restoration is needed in some areas; western China has similarities to Africa
 3. Current research and development priorities: Need to take a long-term view of research, research in view of development.
 - Irrigation and food security
 - Quantification of ecosystems services
 4. Contributions for joint papers: Suggest potential for special issue of papers on SA-China experiences in transboundary water management.
 5. Partner institutions for future collaboration: all participants at workshop

6. Reflections

6.1. Reflections on the workshop and next steps, David Grey

Mr Gray presented a general overview of the African context, providing the participants with more information to bring the discussions together. He noted that much of the science on the issues is 'northern' science, but Africa is unique in terms of its position spanning the equator and how it sits between the tropical convergence zones, so much of the research done elsewhere does not apply to Africa. The conclusion is that there are big science gaps in understanding water in Africa; "policy without science is gambling".

Mr Gray then suggested that consolidating the group work and the key points is important. But he also cautioned that the participants should be conservative in making conclusions and plans until the conference is held in China at the end of 2014. In the meantime, there should be extensive conversations and communications amongst the participants and institutions. He further suggested that initial research consolidate existing research (e.g. literature review) based around the key issues raised during this workshop. The possible river basins on which to focus could be the Zambezi (existing data, researchers, etc.) and the Yangtze.

6.2. Reflections on the workshop and next steps, Prof Daming Heo

Prof Heo noted that the presentation is based on his personal views and was not discussed by the delegation from China. He noted that there is more knowledge on China and not as much on Africa. There are some shared challenges: developing countries that must balance development and conservation; monsoon-driven ecosystems subject to climate change; need for strengthening geo-cooperation and finding solutions to transboundary issues from national, to region, to global level. Also, there is high water pressure in both, with Asia being the most water stressed globally, and China having more complex transboundary issues. He proposed the new paradigm of applied

ecology research, and noted a number of issues for more research: climate change and human activities that are driving rapid change; water quality issues; water supply and lack of water security. Prof Heo proposed that one of the big challenges of transboundary water is how to allocate and use water equitably, and with downstream countries. He further noted that there are important issues around sharing, e.g. as cooperative mechanisms, integrated management and development, river health (dams, fish) and eco-risk management, as well as irrigation. While the context is diverse, both regions share common interests in knowledge and technology sharing, capacity development (education, training) and exchanges and workshops. He suggested areas for cooperation as follows:

- Patterns and change trends on rivers
- Climate change and the responses
- Multi-scale effects of ecological change on rivers
- Impacts of dams, e.g. river fragmentation, water courses, ecosystem processes, transboundary and other changes in the river
- Maintaining river health
- Regional development equity (value in international rivers laws)
- Transboundary environmental compensation mechanisms

7. Closing of workshop

7.1. Synthesis of workshop, Dr Timothy Williams, Africa Regional Director, IWMI

The African Union declared 2014 the year of agriculture and food security. Climate change and variability are important in their effect on food and energy production in Africa. In addition, the IWMI water scarcity map makes the point that there is abundant water in Africa, but a lack of investment in infrastructure and the institutions to fully exploit the water. Other issues include understanding the long-term impact on the environment, salinity, sedimentation, etc., if every country in a basin has the right do and goes ahead to develop water resources within their countries as they see fit to respond to food and energy needs. Dr Williams noted that we now have an opportunity to put together a research program to address these issues. He then reminded the participants that most researchers want to further knowledge, but that others in the workshop also need to be able to go back and support decision-makers with evidence to make better decisions on transboundary waters. Research needs to take both a medium- and long-term perspective, which looks at immediate activities on the most pressing issues and long-term concerns of the environment from misuse or missed opportunities from not exploiting good opportunities. Dr Williams concluded by suggesting that participants start at a modest scale; carefully choose activities under research for river basins. He offered IWMI's expertise and global research position to contribute to that research.

7.2. Prof Ni, Tsinghua University

Prof Ni offered his thanks to the workshop participants and the organizers for their roles in the workshop. Prof Ni reiterated the importance of this workshop in the context of Knowledge Exchanges on International Rivers (KEIW) project funded by DfID. He mentioned steps forward to consolidate workshop and subsequent field visit findings, the preparation for next international conference scheduled at the beginning of next year and possible way of carrying forward for research collaborations.

Annex: Participant list

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