

TRANSBOUNDARY COLLABORATIVE LEARNING: CASE STUDY IN THE OKAVANGO RIVER BASIN

COMPREHENSIVE ASSESSMENT PROJECT REPORT

DRAFT

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ACRONYMS

ACADIR	Association for the Environment, Conservation, and Rural Development
AWIRU	African Water Issues Research Unit
BMP	Best Management Practices
CBO	Community Based Organization
CECT	Chobe Enclave Community Trust
CSIR	Counsel for Scientific and Industrial Research
GEF	Global Environmental Facility
GIS/RS	Geographic Information System / Remote Sensing
HOORC	Harry Oppenheimer Okavango Research Center
IMP	Integrated Management Plan
IUCN ROSA	IUCN – The World Conservation Union Regional Offices for Southern Africa
JEA	Juventude Ecologica Angolana
MOU	Memorandum of Understanding
NACSO	Namibian Association of Community-based Natural Resources Management Support Organisation
NGO	Non-governmental organization
NHI	Natural Heritage Institute
NNF	Namibian Nature Foundation
TechWoG	Technical Working Group
ODMP	Okavango Development Management Plan
OKACOM	Permanent Okavango River Basin Water Commission
PNA	Parallel National Action
RAISON	Research and Information Services of Namibia
RCSA	Regional Center for South Africa
SADC	Southern African Development Community
SEI	Stockholm Environment Institute
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
WEAP	Water Evaluation and Planning System
WERRD	Water and Environmental Resources in Regional Development

TABLE OF CONTENTS

ABSTRACT

I.	INTRODUCTION.....	11
	The Okavango Basin – The Natural Dimension.....	11
	The Okavango Basin – The Human Dimension.....	11
	The Okavango Basin – The Planning Dimension.....	12
	Sharing Water: Towards Consensus on Transboundary Management of the Okavango River.....	13
	Specific Tasks	14
	Expected Results	15
	Structure of the Final Report.....	16
II.	COLLABORATIVE LEARNING.....	17
	Selection of Delegates	17
	Workshops.....	19
	Capacity Building	22
	Negotiation and Facilitation Training.....	22
	Joint Fact-Finding Training.....	24
	Field Trips.....	27
	OKACOM.....	28
	SADC.....	30
	Steering Committee	30
	Outreach.....	30
	Coordination with Other Projects	31
III.	BASIN SETTING ANALYSIS	33
	Visioning Objectives and Methodology.....	33
	Legal and Institutional Analysis Objectives and Methodology.....	33
	Key Results: Visioning and Governance Analysis	34
IV.	SCENARIOS AND MANAGEMENT STRATEGIES.....	37
	Objectives and Methodology	37
	Key Results: Scenarios and Management Strategies	37
V.	SHARED OKAVANGO/KUBANGO DATABASE.....	46
	Objectives and Methodology	39
	Key Results: Shared Database.....	46

VI. RIVER BASIN PLANNING MODELS	48
Objectives and Methodology	48
Key Results: River Basin Planning Model	51
VII. LESSONS LEARNED AND NEXT STEPS	53
Lessons Learned	63
Proposed Next Steps	74

LIST OF FIGURES

Figure 1: Hompa Alfons Kaundu of Mbunza District welcomes Sharing Water Delegates and Partners.....	9
Figure 2: Map of Okavango.....	11
Figure 3: Okavango Delta.....	12
Figure 4: Washing and bathing near Menongue, Angola.....	13
Figure 5: Abias Huongo dancing with welcoming dance troupe, Rundu, Namibia.....	16
Figure 6: Masego Madzwamuse, Windhoek, Namibia.....	17
Figure 7: Sharing Water Delegates and Partners, Caiundo, Angola.....	20
Figure 8: Organizational Affiliation of Delegates.....	21
Figure 9: Charter planes in storm in Rundu, Namibia.....	23
Figure 10: Sharing Water Delegates and Partners, Kasane, Botswana.....	24
Figure 11: Portia Segomelo, ODMP, at the Namibia Workshop.....	25
Figure 12: Sharing Water Delegate, Roberto Machalo, ACADIR at the Namibia Workshop.....	27
Figure 13: Delegates and partners involved in analysis of precipitation data.....	29
Figure 14: Delegates and partners involved in hands-on model selection.....	29
Figure 15: Sharing Water Partner, Peter Ashton, CSIR, on the road from Menongue to Caiundo, Angola.....	30
Figure 16: Popa Falls, site of proposed hydroelectric facility on the Okavango River.....	30
Figure 17: Sharing Water Delegate Traditional Leaders, Angola, Namibia, Botswana.....	31
Figure 18: Washing clothes along the Chobe River, Botswana.....	32
Figure 19: Commissioners Pinheiro and Heyns participating in Namibia field trip.....	33
Figure 20: Commissioner Khupe from Botswana and Commissioner Kahuure from Namibia at the Namibia Workshop.....	34
Figure 21: Mr. Gabaake Gabaake, OKACOM Commissioner / Department of Water Affairs and Dr. Tombale, OKACOM Commissioner and Permanent Secretary of the Ministry of Minerals, Energy, and Water Resources, at the Kasane Workshop.....	35
Figure 22: Delegates, Raymond Kwerepe, Botswana and Dorothy Wamuniya, Namibia on the Botswana field trip when the bus broke down.....	37
Figure 23: NHI Meeting with WERRD staff.....	38
Figure 24: IUCN ROSA Project Partners, Nyasha Chishakawe, Lenka Thamae, and Eben Chonguica, at the launch of the Every River – Sharing Water Okavango Database.....	40
Figure 25: Attributes of First Two Potential Management Scenarios Modeled.....	45
Figure 26: Shared Okavango/Kubango Database Methodology.....	47
Figure 27: Map of cattle populations from online Shared Okavango/Kubango Database.....	48
Figure 28: Screen shot of Shared Okavango/Kubango Database.....	49
Figure 29: Summary of Data Sets Available in the Okavango/Kubango Shared Okavango/Kubango Database.....	50
Figure 30: Screen shot of Sharing Water website www.sharingwater.net.....	53
Figure 31: Questions for a Water Resource Planning Model.....	56
Figure 32: Angolan Delegates, Minguel Panzo and Carla Coehlo, Sharing Water Partner, Abias Huongo, and OKACOM Commissioner, Abel Fonseca at the Namibia Workshop.....	58
Figure 33: Screen shot of Sharing Water Model Evaluation Tool.....	60
Figure 34: Delegates and Partners, Masego Madzwamuse, Tracy Molefi, Bertha Nherera, Roberto Machalo, and Cornelis Vanderpost, working on hands-on hydrology exercises.....	61
Figure 35: Project partners at meeting in Kruger, South Africa.....	63
Figure 36: Rich Walkling, NHI and Derek Hitchcock, NHI eating Mopane Worms, Botswana Workshop.....	65
Figure 37: Delegate, Tracy Molefi, Kalahari Conservation Society at the Namibia Workshop.....	66

Figure 38: Women welcome Sharing Water Delegates on field trip to Chobe, Botswana.....67
Figure 39: Delegate Lapologang Magole68
Figure 40: Delegate Kulthoum Omari, Alfons Siyere, and Lapologang Magole doing a hands-on
exercise69

ABSTRACT

This report presents the results of two inter-related projects. *Sharing Water: Towards a Consensus on Transboundary Management of the Okavango River Basin* was an 18-month initiative funded by the U.S. Agency for International Development Regional Center for Southern Africa. Project objectives included:

1. To help promote the long-term sustainable management of the Okavango/Kubango River
2. To promote joint fact-finding through the development of a shared data management system, and a transparent, decision-making model of the basin
3. To broaden stakeholder participation in the OKACOM planning process, particularly Angolan water managers and stakeholders
4. To build capacity in the region to analyze complex scenarios and management strategies

Project partners included the Natural Heritage Institute (NHI) based in California, USA and IUCN – The World Conservation Union’s Regional Office for Southern Africa (IUCN ROSA) based in Harare, Zimbabwe. Partner organizations from the three basin countries include Juventude Ecologica Angolana (JEA) from Luanda, Angola and the Association of Preserving the Environment of Integrated and Rural Development (ACADIR) from Angola’s Kuando-Kubango province; IUCN – The Botswana Office in Gaborone (IUCN-Botswana), Botswana; and Namibia Nature Foundation (NNF) based in Windhoek, Namibia. The Harry Oppenheimer Okavango Research Center (HOORC) in Botswana, the Counsel for Scientific and Industrial Research (CSIR) in South Africa, and Research and Information Services of Namibia (RAISON) in Windhoek, Namibia all brought regional technical expertise to *Sharing Water*. Finally, CONCUR Inc. of California, USA and African Water Issues Research Unit (AWIRU) of South Africa formed a team, which guided the overall workshop facilitation provided training in negotiation and joint fact-finding. (Appendix A: Project Partner Contact List).

The second project funded by the International Water Management Institute (IWMI) was entitled: Factoring Fisheries into Okavango River Basin Planning (*Okavango Fisheries*). Project partners included: NHI, the University of Botswana, the University of California, and the Stockholm Environment Institute (SEI). Project goals included: 1) to explore the concept of Environmental Flow Requirements in the Okavango Basin in the context of flow needs for fish and fisheries; and 2) to identify an appropriate EFR methodology for the Basin. More specific project objectives included the following:

- ❖ To determine the state of knowledge regarding fisheries information;
- ❖ To identify critical gaps in knowledge
- ❖ To demonstrate how EFRs can be used in River Basin Planning; and
- ❖ To outline next steps to implement a full-fledged EFR methodology for the Basin

Together, these two projects tested a strategy based on the following assumptions: 1) river basin planning will proceed more smoothly and efficiently if a broad range of stakeholders understand the planning process; 2) in order to increase learning, stakeholders should have a hands-on learning experience navigating and manipulating planning tools such as a Shared Okavango/Kubango Database and a river basin planning model, even if the delegates will not become “experts” in these technical areas; and 3) this “collaborative learning” can occur in a series of workshops rather than individual training. In addition, these projects implemented a new approach of maintaining a core group of delegates through the life of the project, rather than holding a series of workshops with different topics and different delegates attending.

These projects produced valuable tools and analysis to aid in managing the Okavango River Basin including the Shared Okavango/Kubango Database Version II. The database includes over 200 data sets and GIS layers describing basin hydrology, land use, topography, history, vegetation, tourism and socio-economics, and over 200 journal articles, book chapters, and other literature relevant to the Okavango/Kubango River Basin (www.sharingwater.net). This information is in the public domain and available across borders. *Sharing Water* also conducted a data gaps analysis highlighting geographic and subject areas in the basin that are missing data critical to transboundary river basin planning and made recommendations for filling these gaps.

A more intangible but equally important result of these projects is broad agreement that data should be made available freely and openly across borders. The Shared Okavango/Kubango Database is a physical manifestation of this commitment. The importance of this shared database cannot be overstated as a critical first step in the development of a river basin management plan. With the development of the Shared Okavango/Kubango Database, the Okavango Basin has catapulted ahead of other international river basin planning efforts - many of which are still not sharing information for the benefit of cooperative planning even after 10-30 years of joint effort.

These projects also advanced the process of river basin modeling in the Okavango River Basin by developing a Model Evaluation and Scoring Tool, which is a new and innovative approach that takes seriously the pre-step of evaluating the range of river basin planning models for their applicability to a particular river basin. This approach contrasts to the most typical situation in which models are developed and applied based on the favorite model of an organization or individual rather than through a careful screening process. This approach first determined what modeling was already underway in the basin. The project then evaluated a range of models based on an initial analysis of needs and priorities in the basin. This evaluation ranked ten models, which hold the most promise for the Okavango/Kubango basin.

After the evaluation process, the projects then took one of the models that emerged as a potentially appropriate tool for the basin and produced a prototype river basin planning model that built on existing modeling efforts already underway in the basin. This prototype model used the Water Evaluation and Planning System (WEAP) developed by the Stockholm Environment Institute (SEI) as the initial platform.

The next step involved articulating possible future scenarios for the basin and associated management strategies (Section IV of this report). These example scenarios and management strategies were incorporated into WEAP and were used in training exercises. The exercise provided an opportunity for joint analysis and evaluation of these options and promoted significant dialogue across borders.

The projects also supported an analysis of the legal and institutional arrangements that govern river basin management in the Okavango Basin across several scales, including the local, national, transboundary, and international scale. This study concluded with recommendations regarding how to bridge significant gaps and how to harmonize disconnects in the policy, legal and institutional structure as they pertain to transboundary river basin management.

In addition, the project contributed to a full visioning process by compiling the existing written information expressing the goals, objectives, and visions in all three countries and at a basin level. This information can be used as a springboard from which to launch a full fledged visioning process in the future.

Not to be overlooked as project accomplishments were the project site visits. Project delegates and partners visited the headwaters of the Okavango/Kubango River Basin in Angola to see both the

ecological and social conditions in the upper basin. For many, this was the first time visiting the upper basin and it provided an opportunity to visualize and better understand the needs and desires of our Angolan neighbors. In Namibia, the project went to Rundu and the Namibian portion of the Okavango/Kubango River Basin. This trip included an overflight of the river, visits to several chiefs in the area, proposed hydropower facilities, and to agriculture and aquaculture projects.

Unfortunately, due to the high tourist season in the Okavango Delta in Botswana, we were not able to visit the Delta itself, but we did have an opportunity to understand the on-the-ground conditions in northern Botswana, at Kasane which are similar to those in the Delta. These site visits not only allowed participants to better understand the on-the-ground situation in the basin from the headwaters to the Delta, but they also provided a shared field experience that helped build relationships across interests and borders. Ultimately, these relationships may be the most important results of this work as effective transboundary management requires a high degree of trust between countries.

Many of the accomplishments described above were furthered by the core group of delegates as part of the workshop sessions. The workshops were designed to implement capacity building in several key areas including: facilitation and negotiation, joint fact-finding, hydrologic data analysis, transboundary river basin planning, and river basin modeling. To further this capacity building element of the project, project partners designed a series of hands-on simulations, role playing, and exercises that were widely praised by the project delegates, and created significant dialogue around basin issues. In addition, project partners designed and implemented a training program for facilitators in the region. As the project progressed, these facilitators became increasingly active in running workshop sessions and break-out groups, as well as recording outcomes from each session. In implementation of this complex, transboundary project under an 18-month timeline, project partners learned significant lessons that could be applied to future work in this basin and other basins around the world. Chapter VII provides a detailed list of these lessons.

As a final note, project delegates crafted a statement at the last *Sharing Water* workshop. This Statement explicitly noted the following accomplishments and aspirations:

- ❖ The dialogue over sharing the resources of the Okavango/Kubango River has been advanced, developing a better understanding of the complexities surrounding transboundary water management.
- ❖ Approaches enabling effective collaboration over transboundary waters were introduced, including Joint Fact Finding and Parallel National Action (PNA). Additionally, capacity was built in core areas such as negotiations, hydrological analysis and facilitation.
- ❖ The projects evaluated various river basin planning models and produced a prototype planning model for training purposes. This model was used to evaluate a range of planning scenarios and management strategies.

The Statement concluded with a request to the Permanent Okavango River Basin Water Commission (OKACOM) to consider the formation of an Okavango Technical Working Group, committed to maintaining and deepening the professional relationships that were established and strengthened as part of the projects.

I. INTRODUCTION

The Okavango Basin – The Natural Dimension

The Kubango River (see Figure 2) rises on the Bie Plateau of Central Angola, gathering tributaries from a dense, semi-tropical drainage network as it heads south towards Namibia. By the time the river, now called the Okavango, reaches the border it has entered more arid terrain, gaining only one additional tributary of note, the Cuito, before flowing across Namibia's Caprivi Strip and into northern Botswana. Peak flow from the upper basin reaches this point in March or April, coincident with the end of the rainy season. Owing to an extremely gentle land surface gradient, this pulse of water escapes channel confinement and spreads out in a deltaic wetlands fan covering over 25,000 km². By August, the heart of the dry season, the pulse reaches the lower limit of the Delta 175 km to the south. At that point, its discharge substantially reduced by losses incurred during transit through the Delta, the river regains the riverine channel of the Boteti River, which flows into the ultimate terminal sink in the system, the Makgadikgadi Pans. However, the flows from the Boteti River have not reached the Makgadikgadi Pans in over 15 years. Over time, the river basin has evolved into a highly complex and variable ecosystem shaped by drought and flood, scour and deposition and by channel formation, migration, and abandonment.

The expansive flooding in the Delta creates a network of channels, reedbeds, hippo pools and flood plains - home to innumerable species; 5000 insects, 3000 plants, 540 birds, 164 mammals, 157 reptiles, 80 fish and count-less micro-organisms. In the vicinity of the Delta and the Makgadikgadi Pans live some of Africa's last great free-roaming herds of Cape buffalo, zebras, antelope, and above all elephants - at some 60,000 strong, probably Africa's largest herd. In fact, the Okavango Delta is one of the best preserved corners of wilderness left in the world as no other wildlife resource of this contiguous extent remains on the African continent. There can be no dispute that the Okavango Delta, which is wholly dependent on the water and sediment entering from upstream, is a resource whose vitality should be assured.

Average rainfalls over the basin are low in the south, increasing almost four-fold to higher rainfalls in the north. The variation in rainfall over the basin gives rise to correspondingly wide differences in the relative contributions to runoff that each basin state provides to the Okavango River (CSIR, 1997; Ashton, P.J. 2000a; and Ashton, P.J. 2000b). Prolonged periods of severe drought during the 1980s and 1990s reduced average annual flows in the Okavango River by 15 to 45 percent (McCarthy, T.S., G.R.J. Cooper, P.D. Tyson & W.N. Ellery (2000). Almost every southern African river system has experienced similar patterns of declining flows during the last twenty years. This pattern seems likely to be part of an eighty-year cycle of high and low flows (McCarthy *et al.*, 2000).

The Okavango Basin – The Human Dimension

Political demarcations superimposed on the Okavango Basin complicate this assurance of vitality, for upstream of the Delta lie two of Africa's newest nations - nations which deserve the same assurance. Namibia is home to 1.5 million inhabitants and since emerging from decades of South African domination in 1990, has worked to foster democratic institutions suited to the multi-ethnic character of the nation. Given time, Namibia could serve as an example for the rest of southern Africa, indeed for the rest of Africa, of the link between democratic processes, economic vitality and social stability. In addition to time, however, Namibia needs water for the country is the driest in sub-Saharan Africa, benefiting from an average annual rainfall of only 250 mm, of which all but 42.5 mm is lost to evapotranspiration. The Okavango, flowing along the northeastern border, is considered by many in Namibia as a logical source of water supply for the important Central Region.

Although by no means as dry as its neighbor, Angola also faces vexing resource management challenges. Since independence from Portugal in 1975, Angola endured nearly three decades of civil and social instability. The result is a decimated infrastructure and a disenfranchised population. The nation still struggles to emerge from political turmoil and has yet to respond to the profound re-development needs of the Angolan people. Given the privation they have endured, the people of Angola deserve the concerted effort of their government institutions, supported by the international community, to promote social and economic opportunity. As throughout human history, the manipulation of water resources in Angola will likely emerge as a compelling strategy for improving living standards. Given its upstream position in the Okavango Basin, the manner in which Angola implements its water sector re-development strategy will have profound downstream implications.

Botswana, Africa's oldest democracy, derives the most direct benefit from the continued ecological vitality of the Delta, but must also cope with conflicting pressures for the use of the waters of the Okavango. Although the tourism and hunting industries, which depend on the integrity of the ecosystem, are an important element of the economy of Northern Botswana, farming, ranching and mining also contribute to the regional economy and require an input of water for their practice. When viewed from the perspective of Gaborone, the national capital in the south, the ecological integrity of the Delta is measured against a still wider array of objectives. In the past, these objectives have combined to yield ambitious plans for the hydraulic manipulation of the Delta. Although such plans have been postponed, the competing pressures exerted on Botswana's national planners leave open the possibility that similar plans for the southern Okavango will re-emerge.

The Okavango Basin – The Planning Dimension. The classic elements of a water allocation struggle are in place; competing demands set against the backdrop of a valuable ecosystem. The Okavango is unique, however, in that this physically remote system has remained unaltered by the massive investment in hydraulic infrastructure, which defined much of the 20th century. The Okavango Basin States are in a fortunate position to evaluate recent innovations in water resources management, with their associated institutional challenges and constraints, along side of traditional physical works and operating strategies, which often contribute to ecosystem decline and eventually precipitate massive restoration expenditures. This opportunity should be seized for the Okavango's period of benign isolation may well be coming to a close.

It is a hopeful sign that the three nations sharing the basin, Angola, Namibia, and Botswana, acting under the auspices of the OKACOM, have launched a process to develop an Integrated Management Plan (IMP). The IMP will be a comprehensive study of management options in each country's water sector and a detailed environmental assessment of each option – to provide essential background for negotiating the equitable and reasonable allocation of water to the Okavango Basin States. Ideally this process will meticulously and openly weigh the legitimate water supply needs and opportunities of the basin states against the preservation of the unique riverine ecosystem, which includes the Okavango Delta.

Negotiating an agreement capable of withstanding widespread scrutiny compels the Okavango Basin States, in concert with other organizations with constituencies in the region, to explore the full range of water management alternatives. The success of this kind of participatory decision making rests on: 1) an open forum to discuss how to equitably share costs and benefits; 2) the articulation of creative and innovative management strategies; and 3) the availability of transparent, easily-manipulated analytic tools for comparative evaluation of these alternatives.

As mentioned above, Namibia already faces significant water stress and is looking for additional supplies to augment its scant water resources. With only 42.5mm of effective rainfall it is not surprising that no perennial rivers rise in Namibian territory. To cope with irregular surface flow,

Namibia invested in facilities to capture and store the episodic runoff in its ephemeral rivers. Given normal hydrologic patterns, ten existing dams in Namibia can yield 87.3×10^6 m³/year at 95 percent assurance, nearly half of Namibia's estimated safe surface water yield from non-shared rivers. An estimated 300×10^6 m³/year of safe yield from groundwater pumping compliment surface storage. In densely populated Central Namibia, however, only 14.5×10^6 m³/year of surface water and 16.5×10^6 m³/year of groundwater are locally available (Water Transfer Consultants 1997).

Prior to the start of the 1996/97 rains, ten years of drought had left Namibia's reservoirs and aquifers so depleted that absent significant rainfall and runoff, Central Namibia, including the capital Windhoek, would have been left without water by the middle of 1998. Such was the climate in June 1996 when Namibian water officials announced that they would accelerate a long-held plan to tap the waters of the Okavango River, initiating the water conflict which was diffused only by the welcome rains of early 1997 and 1998. The rains of 1999, however, were below normal with more frequent, less intense storms resulting in decreased runoff and little recharge to the dams and to the aquifers. The 2000 rains were excellent, thereby buying Namibia more time before they will have to reconsider the extension of the Eastern National Water Carrier to the Okavango River.

The challenge of balancing the water needs of emerging nations with the preservation of a unique ecosystem is now being met within the framework of OKACOM's IMP. However, the structure of OKACOM, which relies on the expertise of official water planners from each member state, exposes the Commission to the perception, particularly on the part of interests from within Botswana and the international conservation community that the IMP is pre-disposed to favor the physical works and operating strategies already articulated by the member nations. In response to these perceptions, many stakeholders have made consistent requests for a participatory role in the planning process and for the adoption of a broader technical, environmental, and economic analytical scope.

Sharing Water and *Okavango Fisheries* aimed to initiate such a broad exploration - one that can strike an appropriate balance between the basin states' need for water, watershed management, and the protection the Okavango Delta – which can garner support from across southern Africa and from around the world.

Stakeholders have consistently requested a participatory role in the basin planning process and adoption of a broader technical, environmental, and economic analytical scope. Sharing Water aimed to initiate such a broad exploration.

Sharing Water: Towards Consensus on Transboundary Management of the Okavango River.

Sharing Water was an initiative (originally designed for three years) that recognized the complexity of the Okavango/Kubango Basin in terms of its international status, its cultural and economic diversity, its ecological importance, the expectations and possible pressures on the system to support local and national development, and the uncertainties associated with future management of a highly variable system. *Sharing Water* offered a platform, called collaborative learning, for collective resource inquiry, and for negotiation about shared benefits associated with the system. This approach was designed to build the commitment and knowledge base needed to manage ecological complexity and uncertainty.

Sharing Water was implemented by a broad partnership of organizations. Project partners included the Natural Heritage Institute (NHI) based in California, USA and IUCN – The World Conservation Union's Regional Office for Southern Africa (IUCN ROSA) based in Harare, Zimbabwe. Partner organizations from each of the three basin countries in the basin include Juventude Ecologica Angolana (JEA) from Luanda, Angola and the Association of Preserving the Environment of Integrated and Rural Development (ACADIR) from Angola's Kuando-Kubango province; IUCN – The Botswana Office in Gaborone (IUCN-Botswana), Botswana; and Namibia Nature Foundation (NNF) based in Windhoek, Namibia. The Harry Oppenheimer Okavango Research Center (HOORC) in Botswana, the Counsel for Scientific and Industrial Research (CSIR) in South Africa,

and Research and Information Services of Namibia (RAISON) in Windhoek, Namibia all brought regional technical expertise to *Sharing Water*. Finally, CONCUR Inc. of California, USA and African Water Issues Research Unit (AWIRU) of South Africa formed a team and provided training in negotiation and joint fact-finding.

Sharing Water was funded by the United States Agency for International Development Regional Center for Southern Africa (USAID/RCSA) in support of the objectives of OKACOM.

Project objectives included:

1. To help promote the long-term sustainable management of the Okavango/Kubango River
2. To promote joint fact-finding through the development of a shared data management system, and a transparent, decision-making model of the basin
3. To broaden stakeholder participation in the OKACOM planning process, particularly Angolan water managers and stakeholders
4. To build capacity in the region to analyze complex scenarios and management strategies

There are very few examples worldwide of successful international river basin management on which the Okavango River Basin states can pattern their effort to develop an IMP. *Sharing Water* was aimed at helping to fill this gap by adapting a joint fact finding process that has proven extremely valuable in reducing conflict and moving towards consensus in other resource management situations. Through joint fact finding, the participants can build the trust necessary to reach agreement on the direction of an acceptable management plan.

Over the 18 months of the project, *Sharing Water* tested a strategy based on the following assumptions: 1) river basin planning will proceed more smoothly and efficiently if a broad range of stakeholders understand the planning process; 2) in order to increase learning, stakeholders should have a hands-on experience learning to navigate and manipulate planning tools such as a Shared Okavango/Kubango Database and a river basin planning model, even if the delegates will not become “experts” in these technical areas; and 3) this “collaborative learning” can occur in a series of workshops rather than individual training. In addition, *Sharing Water* implemented a new approach of maintaining a core group of delegates through the life of the training, rather than holding a series of workshops with different topics and different delegates attending.

Specific Tasks

Sharing Water was designed around the following nine tasks:

- ❖ **Task 1: Launching the Project.** Lack of attention to project management issues can have long-term implications for project success. This task ensured management, reporting, and communication elements of the project are in place. Under this task, a regional steering committee was to be established to help guide the project. This Steering Committee was chaired by a member of the Southern African Development Community (SADC) Infrastructure and Services Water Division.
- ❖ **Task 2: Confirming the Delegates.** A central aim of this task was to obtain commitment from ten core delegates from each basin state. Particular attention was paid to recruiting Angolans. This task also initiated a series of trainings to train facilitators in techniques of collaborative processes, and delegates in joint fact-finding and the management of science-intensive water resource disputes.

- ❖ **Task 3: Defining Visions and Priorities.** This task was aimed at beginning to define core values, priorities and visions for the Basin. The intent of this task was to “map” areas of agreement and narrow areas of disagreement and uncertainty.
- ❖ **Task 4: Legal and Institutional Analysis.** This task included an analysis of existing legal and institutional arrangements for transboundary water management in the basin.
- ❖ **Task 5: Setting up the Shared Database.** This task involved a collaborative process of collecting existing data for the basin, compiling it into an internet-accessible, user-friendly Shared Okavango/Kubango Database, identifying knowledge gaps, and outlining a process for regular update of the system.
- ❖ **Task 6: Identifying Scenarios and Management Strategies.** This task resulted in a range of future scenarios and associated management strategies. This task also included a facilitated training for all delegates in option generation and maximum joint gain analysis.
- ❖ **Task 7: Building the River Basin Management Model.** This task first involved a review of river basin models to determine the most appropriate model for basin. This phase of the project then involved building a prototype river basin planning model and introducing it to the core group of delegates.
- ❖ **Task 8: Simulating and Evaluating Management Strategies.** This task involved using the prototype model to simulate and evaluate the management strategies outlined in Task 6 in a workshop setting. The intent of this task was to increase understanding regarding the impact of various management options. This task aimed at compelling the type of “give-and-take” exchanges that will eventually lead to the discovery of consensus management direction for the basin.
- ❖ **Task 9: Ensuring Sustainability.** Although elements to ensure sustainability were built into the project, this task was designed to directly address the issue of on-going capacity to manage the database system. A series of trainings and planning exercises were planned as part of this task to ensure sustainability and to transfer the lessons-learned in this project throughout the SADC region.

The second project funded by the International Water Management Institute (IWMI) was entitled: **Factoring Fisheries into Okavango River Basin Planning (*Okavango Fisheries*)**. Project partners included: NHI, the University of Botswana, the University of California, and the Stockholm Environment Institute (SEI). Project goals included: 1) to explore the concept of Environmental Flow Requirements in the Okavango Basin in the context of flow needs for fish and fisheries; and 2) to identify an appropriate EFR methodology for the Basin. More specific project objectives included the following:

- ❖ To determine the state of knowledge regarding fisheries information;
- ❖ To identify critical gaps in knowledge
- ❖ To demonstrate how EFRs can be used in River Basin Planning; and
- ❖ To outline next steps to implement a full-fledged EFR methodology for the Basin

Expected Results

Most importantly, both of these projects were designed to help further the OKACOM process towards the development of an IMP governing the equitable and sustainable sharing of the Okavango Basin’s waters. More specifically, these projects were designed to provide OKACOM and other stakeholders with a transparent, user-friendly data management system and a prototype

decision-making model. Development of these management tools were combined with a process whereby delegates become familiar with how these tools can be used in a planning process.

Differential access to information and ability to analyze it has repeatedly proven to be a source of tension and even conflict in negotiations associated with water resources and other transboundary resources. The intent of the projects were to help “level the playing field” of access to information and analytical capacity by providing delegates with a joint management tool and a common source of data on which it operates.

Both the SADC Protocol on Shared Watercourse Systems and the tripartite agreement between the three riparian countries pledge to promote stakeholder participation in the management of international rivers and in the Okavango Basin, in particular. The projects intended to provide a process to expand stakeholder understanding of management alternatives and participation in management decisions.

In addition, the compilation of information related to value statements, and the legal and institutional arrangements in the Basin is expected to result in a platform for a full-fledged visioning process, and identification of gaps in institutional capacity to manage transboundary resources in the basin. In addition, the legal analysis makes recommendations regarding the need for harmonization of laws and policies across borders and when comparing regional and international agreements with national laws and policies.

Structure of the Final Report

Section II of this final report begins with a discussion of collaborative learning – the core principle behind these projects. This section also describes how this organizing principle was implemented in through a focus on workshop-based learning, capacity-building and outreach.

Sections III of this report describe the steps taken to develop the foundation for a visioning process, and for the legal and institutional analysis – both critical social science components of the projects. Sections IV-VI outline the technical components, including the development of scenarios and associated management strategies, a Shared Okavango/Kubango Database, and a river basin planning model. In Section VII, we describe the key changes made as a result of project experience as well as general lessons learned that could be applied to other transboundary river basin management efforts. The report concludes with a section on recommended next steps for collaborative learning in the context of the Okavango/Kubango River Basin.

Figure 1: Masego Madzwamuse, Windhoek, Namibia

II. COLLABORATIVE LEARNING

Collaborative learning is a platform for collective resource inquiry about shared benefits associated with a system. Collaborative learning focuses on: 1) improving the use of local knowledge and participation in the research and management process, 2) developing social capital – trust, co-operation and networks – as a necessary underlying social environment to support the improved use of information, and 3) capacity building – supporting these approaches through training. An underlying premise of the projects was that collaborative learning facilitates long-term stakeholder investment and a shared knowledge base required for building and sustaining an adaptive transboundary management plan in the Okavango/Kubango Basin.

Resolving complex natural resource management issues requires that stakeholders share an understanding of the technical dimensions of the problems they face and are able to articulate their interests (McCreary, S.T., J.K. Gamman, and B. Brooks. 2001) Joint fact-finding, a tool used in collaborative learning, is a technique that uses a new generation of analytical tools to compile and analyze relevant information, and translate it into a form that can be used by decision-makers and others to create the foundation for broad-based consensus. Joint fact-finding, a new way to integrate science and decision-making, contrasts with traditional styles of science advising such as the technical “blue-ribbon panel” and the model of opposing scientific experts.

The projects offered a joint fact-finding process in the Okavango River Basin by incorporating the following key characteristics:

- ❖ Joint fact-finding involved face-to-face dialogue between scientists, OKACOM and OBSC members, and other basin stakeholders.
- ❖ Rather than withholding information for strategic advantage, interested parties pooled relevant information.
- ❖ Training in communication, collaborative processes, and negotiating was an integral part of the joint fact-finding workshops.
- ❖ This process included a core group of delegates (ten from each country) who committed to participate in all three basin workshops, thereby striving to create the broadest understanding while extending legitimacy to the result of the process.
- ❖ Deliberations were relevant, transparent, accurately recorded, and summarized.

Selection of Delegates

Project partners drafted selection criteria used to identify 30 core delegates to attend the workshops. The logic of the project was to identify delegates who were likely to have a future role in water resource management for the Okavango Basin. Project partners agreed that there should be ten delegates from each riparian country offering equal representation. In addition, they agreed the project should encourage equal gender representation. Project partners screened delegates using the following additional criteria. The delegates should have:

- ❖ A sound level of understanding (technical or local knowledge) of water, environment and rural development issues in the basin
- ❖ Experience with local, regional and/or national policymaking
- ❖ Exposure to and experience with related initiatives in the basin
- ❖ A commitment to attend all three workshops
- ❖ Good communication and networking capabilities

In addition project partners agreed that some of the delegation should have:

- ❖ A basic understanding of water resource models and interpretation of their results
- ❖ Experience with the collection and management of relevant data (water, environment, land use, etc)
- ❖ A basic level of computer literacy

Sharing Water was not merely a modeling exercise, but rather a participatory process to broaden stakeholder involvement through the use of a new generation of transparent decision-making models, a shared data-base, training, and joint analysis.

In order to identify 30 delegates from Angola, Namibia, and Botswana, basin partners consulted with OKACOM Commissioners in each country, SADC Infrastructure and Services Water Division, in addition to various government departments, organizations, and universities. After final OKACOM approval, Project partners sent letters of invitation to ten delegates from each basin state. Delegates were asked to sign a letter of commitment in response to the invitation. The final core group of delegates represented a broad range of organizations (Figure 8).

With only a few exceptions, delegates were able to attend all three workshops. During the planning stages of each workshop, basin partner hosts, JEA, NNF, and IUCN Botswana received a number of requests from individuals and organizations who also wanted to attend. As a result, The projects accommodated additional guests at each workshop with attendance often creeping towards 90 delegates, invited guests, and observers.



- | | |
|--|--|
| ❖ Association for the Environment, Conservation, and Rural Development | ❖ Ministry of Agriculture, Water, and Rural Development, Namibia |
| ❖ Basin-wide Forum | ❖ Ministry of Environment & Tourism, Namibia |
| ❖ Conservation International | ❖ Ministry of Lands, Resettlement, Rehabilitation, Namibia |
| ❖ Department of Crop Production, Botswana | ❖ Ministry of Water Affairs, Angola |
| ❖ Department of Natural Resources, Angola | ❖ National Directorate of Water, Angola |
| ❖ Department of Tourism, Angola | ❖ National Directorate of Environment, Angola |
| ❖ Department of Tourism, Botswana | ❖ NCSA, Botswana |
| ❖ Department of Water Affairs, Namibia | ❖ North West District Council |
| ❖ Department of Wildlife and National Parks, Botswana | ❖ Provincial Government, Kuando Kubango |
| ❖ Kalahari Conservation Society | ❖ Tawana Land Board |
| ❖ Ministry of Agriculture, Angola | ❖ Trust of the Okavango Cultural and Development Initiatives |
| ❖ Department of Water Affairs, Botswana | ❖ Universidade Augustino Net |

Organizational Affiliation of Delegates

Curriculum Development

Project partners conducted an initial assessment to gauge the background and experience of the core delegates (Appendix B: Pre-Project Assessments). The project discovered that delegates had a wide range of backgrounds with different levels of core skills as a function of professional experience, national context, and prior training. Based on this range, the project partners adopted an approach for the workshop training that attempted to find a middle ground, at the risk of the course content being set too high for some, while too easy for others.

The projects' curriculum development for the workshops included several elements: (1) build a working vocabulary of principled negotiation concepts as well as terms related to hydrology and river basin modeling, (2) link theory to practice, by relating concepts to case studies of environmental decision-making in southern Africa, (3) create role-playing simulations built on southern Africa fact patterns, (4) work up to scenarios that realistically portrayed conditions in the Okavango Basin, (5) develop hands-on training to have delegates explore and implement concepts, and (6) take stock of results after each workshop and make needed adjustments.

Workshops

An objective of the workshops was to implement collaborative learning among the 30 core delegates in order to form a foundation on which to build towards consensus on a transboundary management plan for the Okavango/Kubango Basin. Project partners designed the workshops to offer hands-on training in a range of collaborative management approaches. Partners used pre-workshop and post-workshop assessments to adapt the training and workshop layout to the needs of the delegates (Appendix C: Workshop Evaluations)

The first delegates' workshop took place in October 2003 in Luanda, Angola, the second was held in March 2004 in Windhoek, Namibia, and the last workshop took place in August 2004 in Kasane, Botswana. Workshop components included:

- ❖ Training in facilitation, negotiation and joint-fact finding
- ❖ Compilation of information necessary for a basin-wide vision
- ❖ Development of a user-friendly, basin-wide Shared Okavango/Kubango Database
- ❖ Drafting of a strategy to fill data gaps
- ❖ Determination of an appropriate river basin planning model
- ❖ Training in data analysis and river basin modeling
- ❖ Exploration of a range of management scenarios
- ❖ Analysis of legal and institutional arrangements in the Basin
- ❖ Training in topics related to transboundary river basin management

As part of the collaborative learning objective, the three workshops succeeded in providing a forum for the delegates from the three basin states to interact and share ideas on the management of the Okavango River Basin.

Angola Workshop. To immediately engage the Angolans directly in the project and to focus attention on the headwaters of the Basin, project partners held the first workshop in Angola.

The Minister on Water and Energy, Botelho de Vasconcelhos, offered opening remarks. Specific components of the Luanda workshop included:

- ❖ Presentations by experts regarding the Okavango Basin, including historic water use in the basin, and plans for future use, with a focus on the Angolan portion of the basin
- ❖ Presentation by OKACOM Commissioner, Isidro Pinheiro on the history and role of OKACOM
- ❖ Presentation by Akiko Yamamoto on the status and goals of the GEF-funded OKACOM project
- ❖ Presentation by Dr. Tamar Ron, UNDP, entitled “Plans and Challenges for Biodiversity Conservation in Kuando – Kubango Province, Angola, in the Context of a Transfrontier Conservation Initiative”
- ❖ Presentation by Dr. Peter Ashton, CSIR, entitled “Overview of the Basin – Hydrology, Rainfall, Institutions and Flows”
- ❖ Building relationships and a foundation for collaboration, information-sharing and consensus-building between delegates from the three basin states
- ❖ Introducing the 30 delegates to fundamental technical aspects of model and database development
- ❖ Conveying the basic framework and techniques of joint fact-finding and interest based negotiation, and practicing new techniques through hands on simulations
- ❖ Field visit to the middle reaches of the Kubango River in Kuando Kubango Province

Namibia Workshop. The Namibia Workshop, held in Windhoek, Namibia, was entitled *Moving from Sharing Water to Sharing Benefits*. Over 80 delegates, including several OKACOM Commissioners, Steering Committee members, and guests attended the workshop.

Specific workshop objectives included:

- ❖ To continue to build relationships and a foundation for collaboration, information-sharing and consensus-building between delegates from the three basin states
- ❖ To explore the concept of moving beyond sharing water toward sharing benefits

- ❖ To present the initial version of the Shared Okavango/Kubango Database
- ❖ To continue discussion of data inventory, data gaps and information needs
- ❖ To practice hands-on training in database usage and the use of hydrologic information
- ❖ To present and discuss a draft legal and institutional analysis of the basin
- ❖ To discuss potential management strategies for the basin
- ❖ To present the evaluation process for the river basin planning model
- ❖ To introduce the Scandinavian-derived concept of Parallel National Action (PNA)
- ❖ To learn more about on-the ground basin issues through a field visit to the Kavango region of Namibia

Botswana Workshops. The first Botswana Workshop, held in Kasane Botswana, was entitled *Sharing Benefits: Tools and Analysis for Balancing Interests* and included the following objectives:

- ❖ To present the accomplishments of the projects, and to receive input from delegates and OKACOM Commissioners on future activities for the basin
- ❖ To further explore the concept of moving beyond sharing water to sharing benefits through the use of river basin planning tools
- ❖ To allow basin delegates to express and refine various concepts around scenario development in the basin
- ❖ To discuss future management of the Shared Okavango/Kubango Database
- ❖ To present and discuss the legal and institutional analysis of the basin
- ❖ To present the foundation for a full-fledged visioning process in the basin, and to discuss how one moves from visioning to management strategies
- ❖ To better understand and coordinate with other initiatives in the basin, including the Okavango Delta Management Plan (ODMP), TWINBAS, and others
- ❖ To visit a community based initiative, the Chobe Enclave Community Trust (CECT) and to take a riverboat cruise in Chobe National Park
- ❖ To continue to build relationships for collaboration and information sharing between delegates from the three basin states

At the Kasane workshop, delegates formed a subcommittee, which produced the Kasane Statement (Appendix F : Kasane Statement). Chief among its components, the Kasane Statement proposed that the delegates form an Okavango Technical Working Group (TechWoG). Below, are sections of the Kasane Statement (Appendix F: Okavango Technical Working Group Contacts).

Recognizing that the Sharing Water project has brought together a broad array of interests and expertise in the delegates, who now respectfully request OKACOM to consider the formation of the Okavango Technical Working Group.

This proposed Working Group will be committed to maintaining and deepening the professional relationships that have been established and strengthened as part of the Sharing Water project, and will communicate with the Basin-Wide Forum to provide a link between the community and technical committees and OKACOM.

Further, this proposed Working Group affirms the underlying value put forth by the Sharing Water project – to share in an open and transparent manner all information, data, and understanding across borders and between disciplines in pursuit of shared visions and benefits for the Okavango/Kubango Basin.

In addition, this newly formed Working Group, recommends that follow-on activities that occur in the basin take into account the lessons-learned described above, and respectively requests that additional funding be provided to support the Working Group and associated sub-committees to

continue these roles of professional exchange, capacity building, basin exchange visits, and project and institutional coordination.

We, the delegates and Sharing Water project partners sign below requesting the establishment of the Okavango Technical Working Group, giving thanks for the support to date, acknowledging lessons-learned, and committing ourselves to professional relationships across borders.

Capacity Building

One of the major goals of projects was to build capacity amongst a core group of basin delegates in topics directly relevant to transboundary river basin management. In most transboundary river basin settings, this planning tends to fall exclusively within the jurisdiction of government-level experts and diplomats. Decisions are often made without input from a range of stakeholders and thus, as a result, they are often not implemented. The projects operated under the premise that a broad range of stakeholders could more efficiently and effectively participate in the planning process if they had a stronger hold on the planning process itself, as well as the components of the process, such as mutual gains negotiations, data analysis, and river basin modeling. The projects aimed to build this capacity within a workshop setting instead of individual training in order to also build professional relationships across borders. These workshops provided opportunities to recognize and coordinate strategies towards common goals on multi-sectoral, national and international levels. Below is more specific information on training in six areas.

Negotiation and Facilitation Training

Project partners CONCUR Inc. and AWIRU conducted training in negotiation and joint fact-finding at all three workshops. First, partners sought to systematically introduce concepts of principled negotiation. Second, as information sharing is central to the project, project partners worked to introduce and elaborate concepts of joint fact-finding.

In Luanda, the projects introduced a series of key concepts from the practice of principled negotiation. These included: recognizing distinctions between positions and underlying interests, techniques for identifying potential zones of agreement, the critical importance of developing objective criteria and devising multiple options, and the need to build in linkages to implementation for negotiated agreements. One simulation from this workshop included a three-way water allocation scenario in which representatives from three hypothetical basin states negotiate over a special one-time allocation of water. Another simulation required delegates to negotiate tradeoffs between protection of wetlands and development of needed infrastructure. (Appendix F: Detailed Descriptions of the Simulation Exercises).

The negotiation training presentations in the following Windhoek workshop included two water-based simulation exercises – “*Manzini Lake Multi Party Simulation Collaborative Planning for Water Resources Management and Benefit Sharing*” and “*Mkuzi Wetland and its People*”. Together, these exercises had as objectives:

- ❖ Provide delegates experience in reframing sharing water as a sharing benefits opportunity
- ❖ Provide delegates experience in facilitating negotiations across multiple, linked issues
- ❖ Illustrate the value of creating a framework of issues as a catalyst for invention of new options
- ❖ Illustrate the technique of straw voting as a tool to track progress toward agreement
- ❖ Explore the role of a facilitator in collaborative planning
- ❖ Incorporate the role of traditional leaders in the management of natural resources

The focus of the Manzini Lake simulation was on mutual gains bargaining, in the context of benefit sharing. Delegates were asked to negotiate a “package” solution to three inter-related issues. In addition, this exercise was formatted as a ‘semi scoreable’ simulation, in that each negotiators is

given a ranked set of preferences for the outcomes. The Mkuzi wetland simulation, on the other hand, asked the delegates to work as members of a team, bringing to bear different disciplinary specialties. The scenario asked delegates to devise a strategy for consultation with local communities, given the proposed designation of a new RAMSAR site. Both scenarios were hypothetical and set in southern Africa.

At the Kasane workshop, project partners designed a negotiation training simulation that built directly upon the river basin modeling work. Unlike the previous simulations which constructed hypothetical southern Africa scenarios, this exercise was focused on the Okavango Basin itself. In this simulation, CONCUR Inc. and AWIRU organized delegates into eight roles: three representatives of OKACOM, three representatives of basin states, and two representatives of NGO's. The key themes which will be investigated are distinguishing underlying interests from fixed positions; framing issues clearly and identifying information sharing and fact finding needs; discovering potential zones of agreement among apparently divergent interests and determining which interests lend themselves well to representation in models.

Facilitation Training

In addition to offering a broad training in negotiation and joint fact-finding in the plenary workshops, project partners also instructed a two-day intensive course in facilitation for selected 14 delegates and project partners before each of the three workshops. The project's approach had several elements: (1) build a working vocabulary of principled negotiation concepts, (2) link theory to practice, by relating concepts to case studies of environmental decision making in southern Africa, (3) create scenarios built on southern Africa fact patterns, (4) work up to scenarios that realistically portray conditions in the Okavango Basin, and (5) take stock of results after each workshop and make needed adjustments.

In the facilitation training session in Luanda, Angola, project partners introduced a series of key concepts from the practice of principled negotiation. These included: recognizing distinctions between positions and underlying interests, techniques for identifying potential zones of agreement, the critical importance of developing objective criteria and devising multiple options, and the need to build in linkages to implementation for negotiated agreements. We also presented three models in order to bring scientific information to bear in public policy. In this way, we introduced the concept of Joint Fact Finding and described how it differs from "adversarial science" and the "panel of experts" techniques. We provided materials based on hypothetical case studies and ran two role-playing simulations, on collaborative water management approaches, which evoked a great deal of interest.

Building on the "lessons learned" in Angola, we made several adjustments in our teaching approach in the facilitation training for the Namibia workshop. These adjustments included: shifting to a focus with more elicitive, participatory teaching; shifting more of the teaching from CONCUR Inc. to AWIRU team members; bringing forward southern Africa examples, rather than relying on examples from outside the region; creating a simulation that required participants to brainstorm and work as a group; creating a simulation that illustrated the complexity of solving an environmental dispute with multiple dimensions (moving from sharing water to sharing benefits); adjusting the flow and agenda of the training to allow for more group discussion and to create more opportunities for caucusing before simulated negotiation; and using the simulation in both the pre-training workshop and the Plenary workshop to highlight differences in facilitator styles and tactics. Based on our review of the evaluations from the Namibia workshop, these adjustments were generally well received.

At the Kasane workshop, project partners aimed to include the trainees in facilitating the plenary workshop negotiation exercises. In a pre-workshop strategy meeting CONCUR Inc. and AWIRU met with the facilitation trainees with the following three agenda items: 1) planning for the simulation

exercise, 2) assigning roles for facilitators and recorders for the main workshop, and 3) reflecting on the trainees' experience in the projects with the explicit aim of drawing broader "lessons learned". All three activities proved fruitful. By walking through the simulation exercise in advance, facilitators became familiar with the fact pattern and logistics of the simulation they would soon run. By assigning roles for facilitators and recorders, we created a relatively high degree of confidence that each session would be supported with strong guidance and note taking. Finally, the Kasane Statement, mentioned above, was also a great example of 'single text negotiation' in which the delegates participated in real time.

Joint Fact-Finding Training

As an integral part of the training, joint fact finding espouses the advantage of working directly with scientists, engineers and other specialists to assemble and clearly communicate the very best available technical information. By guiding and structuring the exchange of technical information together, joint fact-finding bypasses the pitfalls of "adversarial science" and builds a firm foundation for policy and political agreements.

At the Luanda workshop project partners presented other models for bringing scientific information to bear in public policy, and described how Joint Fact Finding differs from "adversarial science" and the "panel of experts" techniques. Presenters provided materials based on hypothetical case studies and ran two role-playing simulations on collaborative water management approaches, which evoked a great deal of interest.

To further work with the concept of joint fact-finding, project partners designed a presentation called *Collaborative Water Management: Southern Africa Case Examples* for the Windhoek workshop, which illustrated three broad approaches to natural resource decision making. All three approaches have advantages and disadvantages depending on the context in which they are being used. Project partners developed case examples from the southern Africa region of the following:

- **Blue Ribbon Panel:** the setting of the border-line between Namibia and South Africa on the Orange River
- **Adversarial Science:** the Sedudu/Kasikili island dispute between Botswana & Namibia
- **Joint Fact Finding:** the Tripartite Interim Agreement on the Nkomati River

In addition, project partners described the projects as a working example of Joint Fact-Finding (Appendix G: "Refining and Testing Joint Fact-Finding for Environmental Dispute Resolution: Ten Years of Success").

Training in Transboundary River Basin Management

To illuminate the process of transboundary river basin management, the projects designed a series of presentations. Dr. Tony Turton from AWIRU gave the first presentation entitled “*Transboundary River Basin Management in Southern Africa*” at the Luanda workshop. This presentation focused on strategies for negotiation amidst significant regional and international pressure to abide by treaties, protocols and agreements, as well as a need for effective stakeholder engagement in the decision-making processes. Dr. Turton highlighted data and trust as the two primary negotiating tools for negotiating water benefits between the transboundary river dependent national economies of southern Africa.

Also at the Luanda Workshop, Dr. Peter Ashton gave a presentation entitled: “*Management Issues in the Okavango/Kubango Basin: Opportunities and Constraints.*”, which described the data management process. He argued that in order for OKACOM to make decisions, it needs information on the current and projected system characteristics and information on stakeholder needs (especially relating to water quantity, quality and reliability of supply) and their concerns. Dr. Ashton argued that once a decision is taken at a high level, we need to understand the consequences theoretically, and then through monitoring and evaluation.

Later, at the Windhoek workshop, project partners introduced the concept of *Parallel National Action adapted to the Okavango Basin* and stimulated a structured debate around how the concept may be developed in the Okavango context. Dr. Turton described PNA as a concept, developed in Scandinavia over the past two centuries, which aims to strengthen bonds between states, leading to the pooling of skills and resources and harmonization of policies between states. Cooperation is promoted at various levels – between government departments, civil-society groups, NGOs and business interests of the states concerned. PNA focuses on “low-politics” – issues such as defense and foreign policy are not addressed. Over time the national laws become increasingly similar between the various states and cooperation is engendered from the lowest levels upwards. This process is implemented through an informal non-prescriptive environment with decisions taken on consensus and not majority ballots.

Project delegates concluded that to some extent, PNA already exists in the Okavango-Kubango Basin. The challenge is to extend the current reach of interaction to more stakeholders and improve the interaction between the governments of all three states.

Training Associated with the Shared Okavango/Kubango Database

The projects engaged with delegates over the development of the Okavango Shared Database and presented the process as an implementation of the joint fact-finding concept. At the workshops, delegates provided input on the structure of the database, and identified gaps in the existing datasets. They also participated in a data analysis exercise, and learned to navigate the Shared Okavango/Kubango Database. In the workshop setting, delegates also discussed future housing for the database, appropriate systems to distribute data and information, and methods for quality assurance.

At the Namibia workshop, Dr. John Mendelsohn of RAISON, who developed the structure of the Okavango Shared Database and populated it, presented Version 1 of the database and an analysis of existing trends. Following the presentation, project partners conducted hands-on training and exercises using the database as a collaborative learning tool. Small break-out groups of delegates learned how to manipulate the database at their own computers and in the process, began to learn together about existing information on particular subjects, trends in existing data, and the value of data in decision-making processes. By engaging delegates in this way, the projects actualized the joint fact-finding concepts and furthered the delegates’ investment in the Okavango Shared Database.

Training in Hydrology and River Basin Modeling

At the Luanda workshop, the projects introduced the basic hydrological processes of watersheds and the vocabulary used to discuss them. Using hands on data manipulation exercises, presenters covered the concepts of precipitation, runoff, evapotranspiration, and interception in hands-on exercises in breakout groups. This foundation of knowledge prepared delegates for an introduction to river basin modeling at the Windhoek and Kasane workshops.

At the Windhoek workshop, project partners exposed delegates to river basin modeling, its uses and limitations. Using small breakout groups and computer workstations as the central training method, project partners designed exercises that allowed delegates to explore and analyze for themselves the process of selecting river models based on a set of key attributes using the River Basin Model Evaluation Tool. This hands-on exploration of modeling was not meant to train delegates to be “modelers” but to give them a functional understanding of the role of modeling in the overall process of developing a river basin management plan.

Having established a sense of river basin modeling, project partners introduced the concept of how the models, along with the visioning and legal and institutional analyses can inform the exploration of a range of management scenarios for the Okavango / Kubango Basin. This component of the curriculum will be further detailed in Section IV of this report.

English Language Training

During the first workshop, there was a strong sentiment among delegates that the projects should increase the level of interaction between the English-speaking Botswanan and Namibian delegates and the Portuguese-speaking Angolan delegates. Angolan delegates proposed that the projects offer English language courses to the Angolan delegates in order to break down the language barrier. After project partners discussed the issue, the *Sharing Water* project funded English language classes for Angolan delegates in Luanda and Menongue in the spring of 2004.

Field Trips

As part of the Luanda workshop, the projects succeeded in bringing an international party of basin stakeholders into the long-inaccessible Kubango basin in the Angolan headwaters. After flying to Kuando Kubango, the governor Chindange and vice governor of Menongue, Mr Francisco Manjolo welcomed the delegation. From there, the delegation traveled to Caiundo, where they could view the Kubango River. This experience provided the partners and delegates with valuable experience and insight into the social and ecological conditions of the headwaters of the Basin and also contributed to including the Angolan partners in the project. This built comraderie and a collective sense of having broken through an historical barrier.

After the Windhoek workshop, partners and delegates made a field visit to the Namibian sector of the Okavango River Basin. This field visit included a flight from Windhoek to Rundu in the Kavango region in the north of Namibia. Project delegates were able to view from the air the network of existing pipelines and reservoirs that transfer much needed water supplies to the arid country's growing urban areas, and would link to a water pumping scheme from the Okavango if and when any such pumping were initiated.

The delegation also flew over of the Kavango River between Rundu and Popa Falls. The flyover provided an opportunity for delegates to see the Kavango River in flood and to get a view of the winding Cuito River coming from Angola as it joined the Kavango River along the border between the two countries. The series of floodplain terraces along the Angolan and Namibian banks of the Kavango River were extensively flooded and water levels were some three meters higher than normal.

Once landed, project delegates made visits to local leadership centers including visiting the traditional palace in Kapako hosted by the Honorable Hompa Alfons Kaundu of Mbunza District, the Kayengona traditional palace in Shambyu District, hosted by the Honorable Hompa Matumbo Ribebe, and a visit to the Mukwe Tribal Court, hosted by the Honorable Fumu Munika Mbambo. The field visit allowed delegates to better understand the importance of the tribal structure in the region, to learn about the cultural history of various tribes, and to hear from tribal leaders regarding specific accomplishments and needs at the local level as they relate to transboundary river basin management.

Delegates also visited the Uvungu-vungu Agriculture scheme, the Kaisosi fish farming project, and the Popa Falls, which is the site of the proposed hydroelectric scheme. These site visits provided delegates with a close-up view of planned and on-going water use in the Namibia portion of the basin.

The field trip after the Kasane workshop in Botswana brought delegates to Chobe where the Kgosi (Chief) of Kavimba village, Lux Masule, welcomed the delegates to the Elephant Kingdom of Chobe. He explained that Kavimba is the headquarters of the Basubia culture and the largest of the five villages in the CECT. The trust area is sandwiched between the Chobe National Park and the Forest Reserve. The Kgosi stated that the water comes from Angola – down the Kwando, into the Linyanti

and then the Chobe. It has provided the communities with water for crops, river plants, livestock and fishing. In recent years the amount of water reaching the area has decreased substantially. He requested information on the dam built by Jonas Savimbi and asked if now that Mr Savimbi had died could some person please open the dam and release the water?

In response to the Chief's request to open the dam, OKACOM Commissioner Pinheiro made a statement addressed to the Kgosi and the community that in fact there is no dam in Angola on the Okavango nor on the Kwando rivers. Commissioner Pinheiro noted that the drop in flow is due to climatic factors and assured the community that consistent with the spirit and principles of collaboration discussed in the projects, should Angola wish to proceed with a development on any of their shared rivers they will first consult with the downstream riparians. Mr. Pinheiro's statements were then corroborated by Mr Masedi, SADC Infrastructure and Services Water Division, who explained that with modern remote sensing technology, it is possible to quickly discern whether a country is developing infrastructure on its portion of the river.

After the meeting at the Kgotla the delegates met local fishermen who demonstrated how people fish for tilapia, bream and catfish from the river. The next village visited was Satau, the fourth in the Chobe enclave. Renowned for their beautiful singing and dance movements, the women of the village made the delegates feel welcome with a performance before moving into the Kgotla. A representative of the fisheries committee of the village described the challenges faced by the fishermen of the region.

Overall, the field trips brought Angolans, Namibians, and Botswanans to parts of the Okavango Basin they had never visited before, significantly deepening their understanding of their riparian neighbors' management concerns and interests.

OKACOM

The projects have worked closely with OKACOM to ensure that the project is supportive and complementary to the goals and objectives of OKACOM. Before the project began, partners met twice with OKACOM as a Commission and with OKACOM Commissioners individually, subsequently revising the project proposal based on their input. Project partners continued to meet with individual OKACOM Commissioners throughout the life of the project.

Project partners coordinated the May 2003 OKACOM meeting in Maun, Botswana and presented project objectives and components at that time. At the Windhoek workshop in March 2004, project partners provided OKACOM members with binders of *Sharing Water* project documents, to brief them on *Sharing Water's* progress.

On October 3, 2002, OKACOM Commissioners Stephen De Wet (Namibia), Dr. Tombale (Botswana), Mr. Da Silva (Angola), and Mr. Pinheiro (Angola) signed an endorsement of the *Sharing Water* project at a meeting in China (Appendix H: OKACOM Endorsement). As part of this endorsement OKACOM requested that the project develop a Memorandum of Understanding (MOU) with OKACOM to address issues related to data sharing and intellectual property rights. Accordingly, project partners drafted a MOU to formalize the working relationship between the *Sharing Water* project and OKACOM (Appendix I: Draft Memorandum of Understanding between OKACOM and *Sharing Water*). The MOU defined a communication and coordination strategy to promote a cooperative relationship, and committed the *Sharing Water* partners to making work products available to OKACOM and the general public in both electronic format and print.

Close on the heels of the *Sharing Water* Windhoek workshop, OKACOM met in Luanda from 27-29 April, 2004. NNF and JEA attended the meeting to represent *Sharing Water* and receive feedback on

the draft MOU. At the meeting OKACOM offered the following recommended next steps to the *Sharing Water* project:

- The Commission decided that there was little point in signing a MOU with the *Sharing Water* project at this late stage of Phase I. However, for Phase II of the project they would review a MOU
- The Commission would like to review the aims and objectives of future work in the Okavango at the concept stage in order to have the opportunity to provide input
- The Commission would like to see more funding spent in the basin states in Phase II, and correspondingly more focus on the partners in the basin states, particularly in Angola
- The Commission would like to see more use made of local technical inputs

Over the life of the project, JEA made laudable progress in engaging the Angolan OKACOM Commissioners and garnering their support despite their initial hesitation. JEA spent considerable time meeting with Angolan OKACOM Commissioners to clarify project objectives and receive input from OKACOM on key activities. In particular, JEA worked with Angolan Commissioners to clarify the goals of the project's river basin modeling component. The Angolan Commissioners also provided welcome assistance in the difficult task of gathering documents on legal and institutional arrangements, visioning statements, and management scenarios.

Basin partner, IUCN Botswana, also succeeded in engaging OKACOM Commissioners in Botswana. Commissioner Khupe was appointed as a focal point for the *Sharing Water* project for Botswana following a meeting with OKACOM Commissioners and Okavango Basin Steering Committee (OBSC) members in February 2004.

NNF enjoyed a very close relationship with the Namibian OKACOM Commissioners partly as a result of occupying office space down the hall from two of the OKACOM Commissioners in the Department of Water Affairs. The Namibian Commissioners treated the NNF *Sharing Water* representative as a "pseudo-secretariat" and as a result, she was well connected to the activities of OKACOM.

In addition, the *Sharing Water* Steering Committee included OKACOM representatives from each country: Mr. Isidro Pinheiro from Angola; Dr. Stephen de Wet from Namibia; and Mr. Stevie Monna from Botswana. Their active guidance through the Steering Committee further legitimized the project and drew it closer to advancing OKACOM's goals.

In addition to sitting on the Steering Committee, several OKACOM Commissioners and OBSC members actively participated in the *Sharing Water* workshops. Commissioners Isidro Pinheiro, Piet Heyns and Gabaake Gabaake gave speeches at the Angola, Namibia and Botswana workshops respectively. OKACOM's participation facilitated direct interaction between stakeholders and Commissioners and furthered OKACOM's understanding and engagement in the project's aims and activities. Overall, *Sharing Water* provided a vehicle through which OKACOM Commissioners could interact with their constituents and learn more about their needs.

In addition, OKACOM Commissioners recommended that *Sharing Water* consult with identified senior hydrologists from each basin country in order to garner guidance and lend legitimacy to the final "prototype model". As a result of this suggestion, project partners consulted with Namibian hydrologist Guido van Langenhove and Botswanan hydrologist Ontlogetse Dikgomo to solicit input and comments on the river basin planning model. Project partners tried to meet with OKACOM Commissioner Armindo Da Silva and his colleague Minguel Panzo in Luanda to review the model selection criteria and receive their input unfortunately project partners could not secure a visa in time for travel. In an attempt to further engage Angolan input in the model selection and development

process, *Sharing Water* invited Angolan OKACOM Commissioners and modeling experts to the NHI offices in the USA to discuss modeling and exchange ideas on modeling strategies for the Okavango Basin. Unfortunately, representatives could not travel during the months remaining in the *Sharing Water* project, but responded favorably by expressing their intention to make this trip at a later date. Commissioner Da Silva nominated Minguel Panzo as an Angolan modeling expert with whom *Sharing Water* should consult.

SADC

Project partner, Lenka Thamae, IUCN ROSA, met with and briefed SADC Infrastructure and Services Water Division on *Sharing Water*. At this meeting, SADC welcomed the *Sharing Water* project and reiterated their interest in playing an active part in interactions with OKACOM. They mentioned that previously there had been limited involvement of SADC Water in OKACOM processes, and they hoped that this project might provide a bridge for such communication. In a separate meeting in Harare, Chris Brown, NNF, also briefed the SADC Infrastructure and Services Water Division. Later, Mr. Obonetse Masedi of SADC Infrastructure and Services Water Division became the Chair of the *Sharing Water* Steering Committee.

Steering Committee

Project partners discussed representation on the Steering Committee at the initial project partners meeting in Kruger, South Africa. Project partners recommended that SADC be represented, as well as someone from the Every River Project and the UNDP GEF OKACOM project to ensure coordination between these three main basin projects. After finalizing the Terms of Reference for the Steering Committee, *Sharing Water* invited the recommended representatives to sit on the *Sharing Water* Steering Committee. After the first Steering Committee meeting at the Luanda workshop, project partners decided to also invite an OKACOM Commissioner from each basin state to join the Steering Committee. Ultimately, the eight Steering Committee members represented: United Nations Development Programme (UNDP-GEF); SADC Infrastructure and Services Directorate -Water Division; ACADIR-Kuando Kubango, Angola; Ministry of Environment, Wildlife, and Tourism, Botswana; Namibian Association of Community-based Natural Resources Management Support Organisation (NACSO), Namibia; Kalahari Conservation Society; and one OKACOM Commissioner from each of Angola, Namibia, and Botswana (Appendix J: Steering Committee Contact List).

The purpose of the Steering Committee was to guide and advise the implementation of the *Sharing Water* project. The Committee met three times during the life of the project and at the end of each of the three main workshops (Appendix K: Steering Committee Minutes – Angola, Namibia, Botswana). At the last meeting, the Committee indicated that the *Sharing Water* project had played a complementary role in the basin. They agreed that the project had brought stakeholders together to actively participate in shaping the management of the Okavango River Basin. The Committee emphasized the need for river basin organizations to demonstrate ownership and share best practices and hoped that there would be a “Phase II” for *Sharing Water*.

Outreach

Throughout the life of the project, *Sharing Water* coordinated outreach through several different modes including: website, newsletter, radio, and press briefings. In an attempt to put all the information from *Sharing Water* in the public domain, and to make it accessible to as many people as possible, *Sharing Water* created a website with the following address: www.sharingwater.net. NHI oversaw the development of the new website with eDot Web Technologies in South Africa. Project partners tested the website and provided comments on improvements. This website hosts all the data collected in the Okavango Shared Database; provided a communications portal for people interested in discussing the management of the Okavango/Kubango River Basin; and provides the project documents, analyses, presentations, and some of the tools developed.

In addition to creating the website, *Sharing Water* also conducted outreach by publishing and distributing a project newsletter to partners, delegates, and a wide range of interested parties (Appendix L: *Sharing Water* Newsletter). Furthermore, in Angola, JEA produced radio programs as means of promoting *Sharing Water's* work in the basin. Included in these programs were periodic updates on the activities of the *Sharing Water* project, and reports on the workshop activities and field visits. In addition, Abias Huongo, JEA, gave a radio interview after the Botswana workshop in which he discussed the *Sharing Water* Shared Okavango/Kubango Database, river basin modeling, and legal and institutional analyses. Basin partners wrote and distributed press releases before and after the workshops in each country, and provided interviews to the press. The press joined the delegation for parts of the Kavango field trip in Namibia, and parts of the Angola workshop were shown on national television.

In order to reach out to others involved in southern African transboundary river management, project partners presented *Sharing Water* at a variety of conferences including the WaterNET Symposium in October 2003 in Gaborone, and at the First Southern African Network for Training and Research on the Environment (SANTREN) Exhibition and Conference in May 2004 in Gaborone. The presentation discussed technical tools in general as they relate to transboundary river management, and then specifically referenced and described the *Sharing Water* project, to give context to the ongoing application of these concepts. Participation in the conference provided an opportunity to raise the profile of *Sharing Water* in the region, particularly in academic circles, and to promote the integrative and participatory approach that *Sharing Water* brought to transboundary river basin management. Conference attendees working in other regional river basins such as the Zambezi showed a strong interest in applying a similar approach in their respective river basins.

Sharing Water had significant impact for Angolan stakeholders in terms of capacity building and networking. *Sharing Water* served as a platform from which basin partner, JEA, established itself as an internationally recognized environmental organization with regards to the Okavango and other environmental issues in Angola. As testament to this, JEA has been approached to join teams applying for work under USAID RCSA's new strategy in the Okavango. NNF and the Every River project are planning to work with JEA to complete its community surveys in the Angolan part of the Okavango/Kubango Basin. The National Directorate of Water is planning to involve JEA in more national issues related to water. In addition, the working relationship between current Luanda-based project partner JEA and ACADIR continues to develop. This relationship is critical if significant on the ground activities are to be initiated in the Angolan portion of the Basin. On a national level *Sharing Water* enabled JEA to make inroads with Angolan OKACOM Commissioners and other government agencies, further solidifying its identity as the frontline Luanda environmental organization working on the Okavango and broader environmental issues for Angola.

Furthermore, according to JEA, *Sharing Water* provided the first opportunity for Angolan stakeholders to participate directly in the process of moving towards transboundary management of the Okavango Basin. This kind of project was a first for the Angolan delegates in terms of the number of people attending the workshops, countries involved, and integrated focus on the basin through a broad range of tasks. In light of this, *Sharing Water* has made a contribution to moving towards securing the full participation of Angola in the development of transboundary management plan for the Okavango/Kubango Basin.

Coordination with Other Projects

The projects invested considerable effort in coordinating with other projects in the Okavango/Kubango Basin to ensure that the project's efforts are supportive, consistent, and non-duplicative. Towards this end, the projects put together a widely distributed Matrix of Complementary Projects in the Okavango Basin (see the enclosed CD for the Matrix of Projects in

the Okavango). This matrix gives current and future projects a broad snapshot of activities in the basin, provides the beginning of a basin network, and demonstrates gaps between projects. This matrix was broadly distributed and posted on the *Sharing Water* website.

Several new projects with a focus on the Okavango Basin have been initiated, including Water and Environmental Resources in Regional Development (WERRD), the Okavango Delta Management Plan (ODMP), and Twinbas Plan. The projects also spent considerable time meeting and coordinating with various managers of these projects. In order to ensure productive coordination with them, the projects convened an international conference call with individuals involved in each of these projects to identify unique project opportunities and overlaps. Where they found overlaps, they discussed whether it was a useful redundancy or a potentially inefficient duplication. Project representatives also traveled to Delft, Netherlands to meet the WERRD project and discuss the models of the basin it had produced and their ability to inform the selection of potential management scenarios. Building on the relationships the projects had established, project partners invited representatives from WERRD and Twinbas to attend the Kasane Workshop in order to introduce these projects to the delegates. WERRD invited project partners to present project results at a workshop that they organized during November 2004 in Johannesburg. Most recently, NHI has been collaborating with the ODMP to provide input data for their delta model. IUCN-Botswana also coordinated with ODMP during the visioning exercise. All projects committed to continue to collaborate to the benefit of the Okavango riparian states.

III. BASIN SETTING ANALYSIS

The tasks associated with describing and analyzing the Okavango Basin setting involved: 1) compiling existing written values, visions, and objectives to help launch a future visioning exercise for the basin; 2) analyzing the existing institutional capacity in the basin; and 3) analyzing the legal and policy in relationships to transboundary river basin management. Below each of these tasks are described in more detail.

Visioning Objectives and Methodology

In general, the objective of a visioning exercise is to move from where we are today to where we need to be to meet future water needs and ensure sustainable use of water. This exercise involves a process of study, and consultation, which will produce a consensus on a vision for water for some time into the future, raise awareness on water issues among the population and decision-makers and generate a framework for action. The framework then sets the basis for the development of a detailed action plan to help move from the concept outlined in the vision to tangible results. In addition, a long-term visioning exercise promotes sustainable development as it takes into account the silent future generation, otherwise known as “the next lot.”

Initially, the intent of the visioning was to develop a “mock” or draft vision for the basin based on existing documents and stated interests and needs. This draft vision would then be used to develop scenarios and management strategies to motivate the modeling effort. Based on this original approach, the projects would demonstrate how visions, scenarios, strategies, modeling, and data collection are all linked and useful steps in river basin planning. This approach regarding visioning, however, was adapted twice during the implementation of the project.

Beginning at the project partners’ meeting in Kruger, South Africa, project partners discussed the possibility of broadening this effort and launching a full-fledged visioning exercise that would involve consultations at all levels of society from community to national, and then across countries. After careful consideration, this full-fledged effort was curtailed given that for such an effort to be successful more time and resources than were available to the project were necessary. In addition, we decided that OKACOM would need to call for and help structure such a visioning exercise in order for it to be widely accepted.

Eventually, after six months of discussion, project partners returned to the original intent of collecting the existing strategies, plans, goals, and visions at both national and regional levels, and organizing them into a background document that could be used as a springboard for a future basin-wide visioning process mandated by OKACOM.

Once compiled, these documents were then circulated to project partners for comments. Project partners reviewed and commented on this set of preliminary visioning statements. The comments from project partners were incorporated into a final report (Appendix M: Towards Development of a Vision for the Okavango Basin), which was then translated into Portuguese for distribution.

Legal and Institutional Analysis Objectives and Methodology

The objective of this component was to document the governance structures, and the legal and institutional arrangements, present in the three basin states. The legal analysis involved identifying the legal and policy instruments that govern the sustainable use of the Okavango River in each basin state. For the institutional analysis, the task involved identifying the institutions and stakeholders at local, national and basin levels; determining the specific roles played by institutions in the management of the Okavango River Basin; and finally identifying possible gaps and shortfalls in these arrangements.

To implement this task, IUCN ROSA drafted the Terms of Reference (TOR) including a questionnaire for collecting information on profiles of the institutions. The TOR was circulated to project partners for their comments. These comments were then incorporated into a revised TOR.

Basin partners, JEA, NNF, and IUCN Botswana collected and compiled policy documents, national master plans, national development plans and strategies that govern the use of the Okavango River in each basin state. This literature was then reviewed by IUCN ROSA's legal expert.

NNF identified Namibian institutions active in the basin both at national and local (within the Kavango Region) levels and sent a questionnaire to them. In addition, NNF collected documents on policies, reports and legislative documents, including emerging policies and legislation still in draft form, and undertook a detailed review of these documents.

When NNF did not receive responses from community level institutions active in the basin and the private sector (perhaps because they found the questionnaire too daunting), they employed a more informal interview approach. Angola and Botswana did not use the questionnaire but provided information on the institutions and their roles in the management of the river basin based on their own research.

IUCN ROSA undertook a literature review on institutional arrangements in other river basins and then combined this basin-level information with the national level information into a draft report. Project partners reviewed draft reports and provided detailed feedback based on their own knowledge of current conditions and best practice. IUCN ROSA, on behalf of *Sharing Water*, presented the draft Legal Report and Institutional Report at the Windhoek, Namibia workshop in March 2004. Based on feedback at the workshop, IUCN ROSA incorporated comments and combined the two reports into a draft report entitled "River Basin Management Governance – The Importance of Regulatory and Institutional Aspects in Managing a Shared River Basin" for presentation at the Botswana workshop in August 2004.

After the Kasane workshop, IUCN ROSA incorporated additional information from NNF on the legal analysis for Namibia and circulated the report to project partners for comments. Project partners examined and evaluated the "Governance" document in terms of its ability to provide an accurate description of the current situation in the Okavango Basin and an appropriate analysis framework against which management options and plans for the Okavango Basin could be formulated.

While the second document was a major improvement on the earlier preliminary draft, there remained a number of inaccuracies and inconsistencies that needed to be clarified. The corrected final version of this document specifies the prevailing legal and statutory instruments in each basin state (as well as any that may shortly prevail – such as the SADC Water Policy), and highlights the responsibilities of each appropriate authority. This final document forms the foundation for the development of a set of rational management strategies for the Okavango basin, and informs the relevant authorities as to the nature of any interventions that are needed to ensure and improve management of the Okavango Basin (Appendix N: River Basin Governance: The Importance of Regulatory and Institutional Arrangements in Managing the Okavango River Basin). After finalizing the Governance Report, the project translated the report into Portuguese to facilitate effective information sharing with Angola (Appendix O: River Basin Governance, Portuguese version).

Key Results: Visioning and Governance Analysis

For the visioning report (Appendix N: Towards Development of a Vision for the Okavango Basin), IUCN ROSA outlined at the regional and international levels, the value, goals and visions associated with the Millennium Development Goals, the World Water Vision, the Africa Water Vision, the

Southern African Water Vision, and the SADC Objectives. In reviewing the development goals for Botswana, IUCN Botswana found that Ngamiland has one of the highest levels of poverty in the country; Botswana plans on eliminating the poverty in this area by 2016. Clearly, the management of the Okavango Delta is key to this goal. NNF highlighted principles for a future full-fledged effort that includes: 1) articulation of the comparative advantages as a foundation for basin planning; 2) adopting a “rolling plan” approach that is refined and revised over time, and 3) incorporating a full partnership approach to visioning and implementation of a basin plan that includes governmental and non-governmental partners. JEA found that Angola’s visions and plans call for inter-sectoral integration, a role for the private sector, and acknowledgement of international agreements. In addition, project delegates discussed the importance of a vision in underpinning decisions regarding basin management. One project partner quoted Alice in Wonderland saying, “If you don’t know where you are going, it doesn’t matter how you get there.”

In addition, the project produced “River Basin Management Governance – The Importance of Regulatory and Institutional Aspects in Managing a Shared River Basin” (Appendix O), which examines institutional and legal arrangements in the Okavango River Basin. The report highlighted key challenges including: increasing demand for water, diverse stakeholder groups, conflicting interests, regulatory and institutional framework weaknesses, and development of mutual benefits without loss of sovereignty. The institutional analysis identified government departments, non-governmental institutions, Community Based Organizations (CBO’s) and private sector companies. Ultimately, this report outlined key emerging regulatory and institutional frameworks that the basin states and community may want to address individually or collectively. The legal analysis yielded a synthesis of the policies and strategies at a local, national and regional level that govern the use of the Okavango River.

The report observes that Angola and Namibia are in a more advanced state of reform in the water sector, than Botswana. In addition, the basin states display different developmental emphasis in their national agendas. For instance, Botswana’s water sector policy and legislative framework focus on efficient utilization of internal and shared water resources rather than equitable and reasonable use. The report notes that there is a need to incorporate conservation and sustainable use principles into policies in the sectors of trade, investment, and industry, which generally emphasize development without provisions for sustainability or conservation.

Specific to Botswana, this report highlights the fact that Botswana does not have a specific document that outlines a national water policy, although water use is guided by the National Water Master Plan, which is currently under review. Efforts are underway to develop a National Water Conservation Policy that will address water conservation measures. In addition, the institutional analysis revealed that there are numerous players in the water sector in Botswana and efforts are underway from the Botswana Government to define responsibilities within these institutions.

During the Windhoek workshop, there was a lively discussion around whether or not there is a need for adding provisions to national-level laws and policies so that they reflect international transboundary agreements. Many delegates noted that there is only a need to “harmonize” laws so that there is not a conflict between national and international laws, policies, and agreements, and that integration is not necessary. Others maintained that integration serves an additional purpose of changing the way people think – by including these additional provisions in national laws, people are educated that they need to think of their resources in an international context.

An overall gap in the basin states’ regulatory frameworks is the lack of provisions promoting equitable and reasonable utilization of shared river basins as stated in international law. Angolan provisions formally acknowledge the existence of shared watercourses and provide for their joint management. However, these provisions still fall short of reflecting international law. Namibia has

drafted provisions reflecting international law in its' Water Resources Management Bill, which is yet to be approved. In addition, the basin states also need provisions that establish transboundary mechanisms for enforcement, dispute settlement, and conflict resolution. These mechanisms are critical to attaining compliance with transboundary regulatory frameworks.

Another significant gap in transboundary governance of the Okavango River Basin is that all three basin states are not party to the Ramsar Convention. Botswana designated the Okavango Delta a Wetland of International Importance and Namibia is party to this Agreement. However, Angola, which contributes 94 percent of river inflows has not signed the Convention.

The Governance Report also shows that basin-wide institutions are still in development. A significant challenge will be to coordinate and reach out to the numerous stakeholders at local, national, and basin levels. There is an urgent need to facilitate stakeholder coordination, cooperation, and integration, which could be partially addressed with the establishment of a Permanent Secretariat. The basin needs a formal basin-wide forum, which would serve as a conflict-resolution platform for different groups of stakeholders. Every River has established such a basin forum, which, if officially formalized, can provide a useful vehicle for community consultation and involvement in OKACOM. This basin-wide forum could partially satisfy a need for overarching conflict-resolution mechanisms in the basin. Yet, other platforms beyond this will still be needed at the basin and sub-basin level.

The institutional review also revealed that the current institutional frameworks lack clarity on their long-term visions. A common developmental vision is a critical tool for institutional coordination and cooperation in the basin.

One realization that emerged from the institutional analysis was that OKACOM currently does not have a mandate or the authority to jointly manage the Okavango Basin, but is charged with giving advice to their governments and coordinating activities in the basin. Furthermore, the OKACOM Agreement does not include provisions for enforcement, dispute settlement, conflict resolution, or corollary sanctions.

Although the Revised SADC Protocol on Watercourse Systems makes provisions for the establishment of river basin authorities, the basin states have not established such authorities to the full extent necessary. While OKACOM provides for inter-state interactions, a basin-wide authority is required to organize and supervise the cooperation of the basin states. Such an authority is required for operational tasks such as joint operation and management of infrastructure; standardization of data collection; monitoring water quantity and quality; exchange of hydrologic information; development of concerted action program; enforcing agreements; dispute resolution; and facilitation of compensation for benefit sharing.

Institutional coordination of efforts to build on each other and reduce duplication is also needed. There is no clear basin-wide institution that is coordinating cooperation and data sharing across the basin. While Namibia and Botswana have been cooperating on data sharing, joint research and monitoring for many years, it is critical now to engage Angola fully in these efforts. In addition, in some cases communication inside basin states between sectors, national agencies, and stakeholders is insufficient.

Finally, inadequate provision of financial resources remains a key constraint for the institutional arrangements in the Okavango Basin. There is also a need to mobilize private sector contributions to the development and management of the basin.

IV. SCENARIOS AND MANAGEMENT STRATEGIES

Objectives and Methodology

The overall intent of developing a range of future scenarios for the basin is to promote a forward-looking planning process, whereby stakeholders begin to articulate likely scenarios given shared values, goals, and visions. Once these scenarios have been articulated, then stakeholders can begin to explore management strategies that support these scenarios. This drafting of scenarios and management strategies allows a creative space for stakeholders to discuss a range of options and innovative responses to fulfill shared goals and aspirations.

The projects' specific objective with regards to developing management scenarios was to develop a short suite of relevant and appropriate management strategies that could be applied and potentially deployed in the Okavango Basin (Appendix O: Selecting Scenarios that Reflect the Possible Futures of the Okavango River Basin: A Proposed Planning Network for the Sharing Water Project).

CSIR reviewed available information on management strategies and approaches used in the three basin states and compared this information with examples of current practice deployed elsewhere in southern Africa. From this, the project developed a rational set of possible scenarios for the basin, identifying respective management strategies required to reflect the most likely development options in Angola, Botswana and Namibia. These scenarios were developed to promote informed discussion of the potential consequences of each strategy and were not intended to reflect or promote any particular strategy or choice of strategies. In April 2004, CSIR presented to delegates a scenario development approach and then presented the scenarios themselves at the August 2004 workshop in Kasane, Botswana.

Key Results: Scenarios and Management Strategies

Each of the four scenarios provided an informative basis that could be used to select appropriate management strategies. In turn, these could provide OKACOM with an overview of the typical sets of management challenges that would need to be overcome. The scenarios were grouped into four contrasting sequences, namely:

- “Least development”, or “Maintain the current levels of water resource exploitation and only allow for population growth” (where there is no change or improvement in the existing situation in each basin state, and demands for more water were driven solely by increased numbers of people);
- “Minimal level of development in the short- to medium-term” (covering the realistic developments that could occur during the next five to ten years – i.e. up to 2015);
- “High development level” (that reflected the likely consequences of each basin state continuing to maximize its own national development agendas in the Okavango Basin in the medium-term); and
- “Water Import Level” that sought to offset the increased demands for water from the basin by importing water from the Kasai system to the north – this could be used to ensure that demands for water in the Okavango Basin would not lead to an unacceptable decline in the quantity of water available.

Each management scenario contained progressively greater water demands providing instructive insights into the specific management needs that each scenario would require from each basin state and institution.

The final list of four potential management strategies for each of the three scenarios outlined above was presented at the Kasane Workshop in August and elicited considerable interest and discussion

amongst the delegates. Delegates discussed the need for people living near the river to be aware of these management issues. It was suggested that OKACOM needs to mandate suitable people to educate all basin residents and other stakeholders. Dr. Ashton suggested current activities engaging stakeholders need to be intensified, so that stakeholders can hold the management organization accountable. In addition, delegates suggested that there should be external reviewers in place so that the correct data gathering and monitoring is done. OKACOM Commissioner Gabaake Gabaake elicited suggestions from Dr. Ashton as to whether a top-down or bottom-up approach was more appropriate. Dr. Ashton responded that sometimes a hybrid approach is the most effective. The top-down aspect gives direction to the process, but in the long-term it is necessary to get buy-in from stakeholders to make the process stable and sustainable. For instance, managers can propose principles that need to be incorporated into a vision, but after that, stakeholders' needs should be incorporated. These scenarios and management strategies were then used to drive the prototype model as described in Chapter VI of this report.

V. SHARED OKAVANGO/KUBANGO DATABASE

Objectives and Methodology

The success of participatory decision-making in a river basin context rests on the articulation of creative and innovative management strategies and on the availability of a common, shared data system and transparent, easily manipulated analytic tools for comparative evaluation of these alternatives. Specifically, the availability of a common, shared data system allows for joint fact finding, and interpretation of data, and the generation of shared assumptions about the river basin and proposed management alternatives. A Shared Okavango/Kubango Database also levels the negotiating table between parties and avoids mistrust generated by withholding data and information for unilateral advantage. Despite the importance of sharing data across borders, there are few examples of this process in the context of transboundary rivers.

The objectives of the project relative to the task of developing a Shared Okavango/Kubango Database for the basin involve a collaborative process of collecting existing data for the basin, compiling it into an internet-accessible, user-friendly shared database, identifying knowledge gaps and an institutional home for the database.

The Shared Okavango/Kubango Database task consisted of four concurrent activities: 1) compiling relevant data; 2) populating and building the database; 3) making the database Internet accessible; and 4) finding a permanent institutional home for the database. The relationships between these three activities are summarized in Figure 25 below. Following is a detailed description of the methodology used for each of these database activities and the key results achieved.

Data Subcommittee

The project formed a Database Subcommittee with the project partner members (NHI, HOORC, IUCN ROSA, NNF, and CSIR) at the first project partners meeting in Kruger in May, 2003. This subcommittee oversaw critical decisions regarding the form, character, and implementation of the Shared Okavango/Kubango Database. The database subcommittee's first task was to create a "wish list" or a data matrix that defined what data it would like to include in the Shared Okavango/Kubango Database (Appendix P: Sharing Water Data Collection).

Data Matrix

The data matrix was further refined and presented to the project delegates at the Angola workshop in October 2003. The delegates broke into country-based working groups and reviewed the data matrix, added data and information to be included in the database, and most critically, identified people and/or organizations that could source missing data.

Database

In May 2003, the database subcommittee deliberated extensively over the form and character of the Shared Okavango/Kubango Database. The question was whether to create a database that serves as an efficient and simple data retrieval tool or "metadatabase"; a database that displays, charts, and interprets the data; or a comprehensive database system that includes data quality assurance and an explicit process for updating and refreshing data overtime. The key variables in the decision were the resources required for database development; the ultimate utility of the chosen database; and the needs of the basin's database users.

Project partners spent the next few months analyzing the options, reviewing the existing Shared Okavango/Kubango Database, and considering the costs and benefits. At the Angola workshop, the database subcommittee reconvened and decided by consensus that given the resources available, the

timeframe of the project, and most importantly, the needs of the basin, the best option was to create a simple and efficient data retrieval system or “metadatabase”. Essentially, the database committee decided resources should be invested in compiling the data rather than interpreting them (Appendix Q: Database Memo).

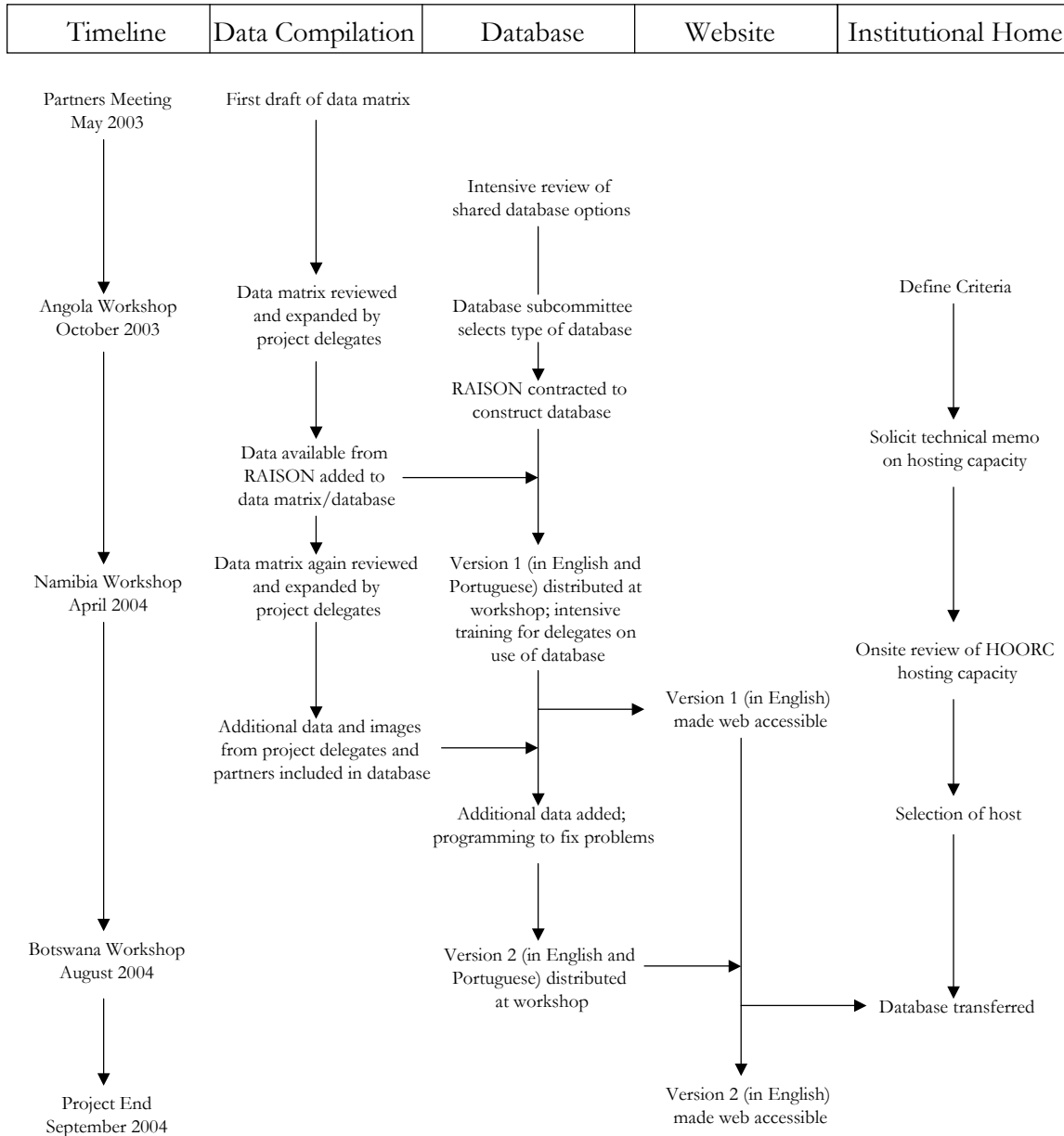


Figure 26: Shared Okavango/Kubango Database Methodology

Data Compilation

Project partners used this revised data matrix to gather and compile data sets. The most significant contribution of data came from RAISON, which had recently completed two books, *Okavango: Flow of a Lifeline* and *Sand and Water: A Profile of the Kavango Region*, which involved a significant data compilation effort. *Sharing Water* contracted RAISON to digitize the data in these two publications including graphics, photos, maps, and descriptions of the Okavango system and its people.

RAISON organized all the data sets into appropriate theme folders. Then they compressed ArcView data sets to ensure that all the component files held together. RAISON then listed the data in a Microsoft Access table with one data set per record. Fields in the table provided items that could be used to search for data based on themes, the regions covered by the data and key words. The table also included brief descriptions on the sources, coverage, meaning and dates for the data. Lastly, the table included hyperlinks to the data itself. Figure 26 above, demonstrated the type of data and maps available in the Shared Okavango/Kubango Database.

RAISON compiled a similar table for literature resources to facilitate searches for published documents and reports on the basis of theme, key words and authors' names. They listed these scanned and pdf converted documents by reference in table form. In addition, RAISON listed approximately 140 other references for which pdf versions were not available and connected them with key words.

To create the database, RAISON converted over 200 maps and graphs into jpeg images, and listed each of these in a Microsoft Access table. The three tables (for data, literature and graphics) formed part of the searchable MS Access metadatabase. Listings of satellite images and institutions working in the Okavango River Basin also formed part of the metadatabase. Below is a screen shot from the database.

Data Gaps

Simultaneous to the data collection, project partners analyzed data available and key gaps in data necessary for river basin planning models in the Okavango/Kubango system and proposed strategies for filling the data gaps. The process involved input from delegates at the Angola and Namibia workshop on both the existence and availability of data and their needs and desires for additional data (Appendix R: Data Gaps Analysis).

This collaborative work to gather data resulted in the completion of Version 1 of the Shared Okavango/Kubango Database, which RAISON presented and distributed (in English and Portuguese) at the Namibia workshop in 2004. The workshop included nearly a day of presentations and interpretation of data, exploration of the database, and hands-on training in retrieving and displaying the data. After these presentations, project partners again asked project delegates to indicate which additional data sets were available and where to find them.

In the weeks following the workshop, delegates provided additional feedback on data sets. At this time, HOORC contributed several more data sets not already included in the database. These datasets were included in the second version of the Shared Okavango/Kubango Database. Feedback from users at the workshop and in the following weeks informed changes made to Version 2, which was later distributed at the Botswana workshop (in English and Portuguese) in August 2004.

The final version of the Shared Okavango/Kubango Database includes 203 datasets provided by project delegates and project partners (described in the table below). The datasets consist of geographic datasets (e.g. population distribution) and statistical datasets (e.g. rainfall records). In

addition, the database includes a bibliography of literature resources, of which over 200 are available as pdf digital files.

Of note in the table above are the critical data gaps in Angola. For some data sets available in Angola, the information within is either limited to a short - and now outdated - time series - (in the case of hydrology), or constrained by categorization that is inconsistent with data sets elsewhere in the basin (in the case of soils). Some data for Angola, such as demography, are based on coarse estimates.

Priority data improvements that are critical for modeling in the basin include:

- Actual streamflow measurements made at various points in the catchment over extended periods of time
- Data on groundwater availability and use
- Data on water demand and use in a number of water use sectors, including irrigation, domestic water use, and industrial water use
- Refined environmental flow objectives based on consideration of actual biophysical needs
- Detailed descriptions of actual and planned water infrastructure.
- More detailed data on basin topography
- Data on actual population distribution/resettlement and related water demand in Angola

For a hydraulic model that will be used to describe the actual conditions in the river channels and floodplains, additional information is needed. This includes:

- Information on channel/floodplain geometry and topography
- Measurements of flow velocity and stage
- Information on the material that comprises the channel bed
- Information on sediment transportation
- Measurements of water quality constituents

To improve the performance of the rainfall-runoff hydrology model, additional information is required, including:

- Reliable climate records of precipitation and temperature, along with humidity, evapotranspiration and wind speed data if available
- Refined land use/land cover data
- Improved data on topography/ improved digital elevation model

Additionally, almost all existing data sets warrant further improvement in terms of the quality, the accuracy and the spatial coverage of the data.

The project partners recommend four general actions related to filling data gaps. First, the project supports GEF's efforts to expand and finalize the draft TDA. Neither the draft TDA nor the database matrix was intended as complete, authoritative data gaps analyze. The project partners agree with recommendations made at the Kasane Workshop by project delegates that the GEF Project Management Unit complete a full data gaps analysis that expands on both GEF's earlier work and the project's contribution. We encourage the PMU to prioritize this effort and complete it early in the project life cycle.

Second, the project supports GEF's efforts to collect additional data. In its project brief, GEF states:

The compilation of existing data and new data sets that are needed will be fast-tracked to identify the minimum data sets to initiate the preparation of basin management models and subsequent negotiation and joint management. This

compilation of water resource data will be done on the basis of priority and need concentrating on the glaring data gaps in Angola. Thereafter data will be selectively compiled on the basis of the most sensitive uses scenarios so that a realistic range of likely water management scenarios can be modelled and options prepared at later stage of project implementation.

We offer both the Shared Okavango/Kubango Database and the list of priority data improvements (above) as starting points for GEF's efforts and support their recommendation to focus on filling critical data gaps in Angola.

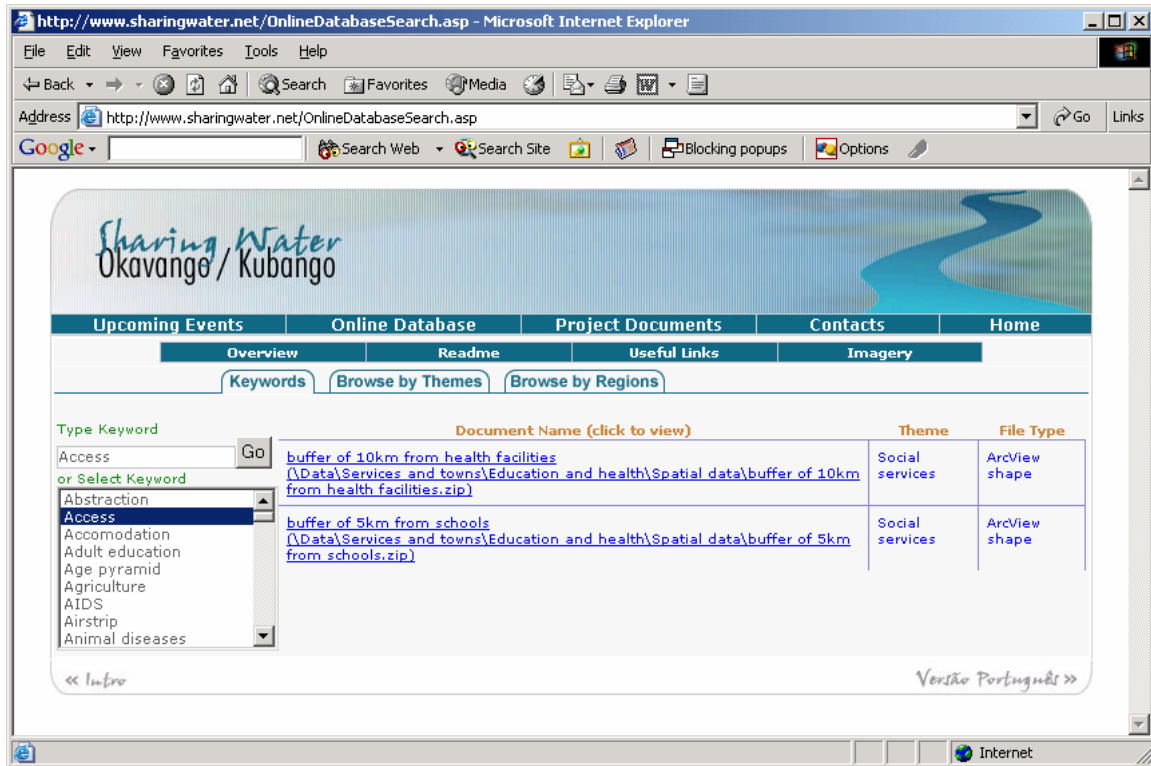
Third, as the PMU is ultimately a project with a limited life span, the project strongly encourages the expansion of data collection efforts within existing government, research, and academic institutions in all three basin states. This expansion will require the dedication of additional funding, capacity building in data collection methods, data management, and data dissemination. Very promising contacts have been established in the context of the project with institutions in Namibia and Botswana, notably with the respective departments of Water Affairs and with the Namibia Nature Foundation in Namibia and the Harry Oppenheimer Okavango Research Centre of the University of Botswana. The latter institutions have committed themselves to participate in updating and maintaining the Shared Okavango/Kubango Database.

More work is still required to establish similar contacts in Angola. HOORC has committed to serve as a central repository for data in the Okavango. It will endeavor to foster relations with data "nodes"; organizations in each basin country that will gather that countries data and transfer it to HOORC for public distribution and dissemination.

Finally, the project encourages all parties to adopt policies of open and free data sharing. The project has aggressively pursued a policy of sharing data freely amongst all interested parties for the benefit of joint fact-finding and improved decision-making. We anticipate that other parties in the basin will continue this policy into the future.

Website

Soon after Versions 1 and 2 were each distributed at the workshops, the project put English versions of the database on the *Sharing Water* website (www.sharingwater.net). The online version is, available to anyone with an Internet connection. Below is a screen shot of the web version of the Shared Okavango/Kubango Database.



Screen shot of Sharing Water website www.sharingwater.net

Institutional Home

The project conducted an analysis of potential institutional homes for the Shared Okavango/Kubango Database. The selection criteria required that the host institution:

- Have a permanent or long-term presence in the basin
- Maintain both the hardware and the technical capacity necessary to host the Shared Okavango/Kubango Database;
- Be committed to the philosophy of sharing data in the Okavango basin; and
- Be recognized as an impartial player in the management of the basin.

These criteria led the project to select the Harry Oppenheimer Okavango Resources Centre (HOORC) to house the *Sharing Water* Shared Okavango/Kubango Database. Below, we describe in more detail the technical capacity of HOORC and their mandate.

Technical Capacity of HOORC

HOORC offers a Geographic Information System/Remote Sensing (GIS/RS) laboratory with up-to-date technical facilities for the creation and maintenance of geographic and non-geographic information and related data. The laboratory is equipped with three modern servers and seven GIS workstations linked on an intranet that is also accessible from outside the Centre. The computers are also linked to the Internet through HOORC's dedicated line. In addition, a large size plotter, capable of A0 size plots, complements the facilities. Further, HOORC has a website (<http://orc.ub.bw>) that can be used to host selected data-sets, using ArcIMS map-serving software and facilities are kept up-to-date and regularly upgraded.

The Centre operates as an independent entity within the overall structure of the University of Botswana and has access to the University of Botswana institutional license for ESRI's ArcGIS suite of GIS software and Leica's Erdas-Imagine image processing software, permitting multiple user-

access to the software hosted on the local server. In addition, HOORC funds staff training to ensure that their system is kept up to date. For example, in November 2003 and February 2004, HOORC sent technical staff to training courses in ArcIMS and ArcGIS.

HOORC's Mandate

HOORC's mandate allows its GIS laboratory to facilitate researchers involved in environmental monitoring to discover environmental change and identify threats at an early stage, using satellite imagery or other spatial and statistical data. The laboratory also provides services to government departments such as the Department of Water Affairs and the Ministry of Agriculture, as well as to OKACOM and the Okavango Delta Management Plan (ODMP).

HOORC's objectives for their GIS database function in the organization's five-year development plan are as follows:

Geographic Information System (GIS) and Remote Sensing (RS) laboratory objectives:

1. To function as a database centre for the collection, storage, analysis and dissemination of digital research and other data about wetlands and watersheds in southern Africa with emphasis on the Okavango basin
2. To provide researchers and other stakeholders with access to GIS and RS functionality, both in terms of data and data products (such as maps)
3. To maintain up-to-date GIS/RS analytical capability

Institutional Capacity

The GIS/RS laboratory is maintained through the University of Botswana/HOORC annual budget. This allows for regular software updates, repairs to equipment and acquisition of necessary consumable supplies, such as, paper and inks for the plotter, as well as additional equipment items and additional data (e.g. satellite imagery).

In terms of staffing, the GIS/RS laboratory is managed and supervised by an experienced Senior Research Fellow, a geographer with a PhD in the Social Sciences, a Postgraduate qualification in GIS and recent experience with a variety of GIS-projects and related database management. HOORC also has staff with Remote Sensing expertise.

An established post exists at the Centre for a Senior GIS/database-management technician. This position is expected to be filled within the next four months. In the interim, a temporary senior technician from the Delta Management Plan Project operates the GIS laboratory. Computer technical matters and network issues are addressed by HOORC's Senior Computer Technician.

Hosting and Updating the Shared Okavango/Kubango Database

As a permanent and independent academic institution HOORC is in a good position to ensure impartial updating of the Shared Okavango/Kubango Database and to facilitate the use of scientific data by policy makers, NGO's and the general public. These objectives are part of HOORC's research mandate.

HOORC's data policy allows for the sharing of research and other data, while offering some protection to researchers and PhD students. This open data policy is in line with the project's intent for all project products to be freely and widely distributed to any interested parties.

HOORC cooperates with a number of research and applied projects in the Okavango Basin, including the WERRD project and the Every River has Its People Project. In addition, the Centre maintains good connections with a variety of international research institutes worldwide; government institutions; and NGO's in Botswana, Namibia, and now, with the advent of this project, Angola.

In terms of housing the Shared Okavango/Kubango Database, HOORC's aims to:

- Continue gathering data through research and collaboration with government agencies and NGO's
- Improve data processing and storage through continued updating of facilities and improved metadata
- Facilitate access to data for a variety of users
- Promote utilization of data; and Monitoring, and analyze activities using the database

HOORC will implement three strategies to facilitate stakeholders' access to the Shared Okavango/Kubango Database. First, HOORC will continue to distribute the database on CD's to individual users. This allows users without Internet access or with limited Internet access to access the data. Second, stakeholders can access the Shared Okavango/Kubango Database in the GIS laboratory at HOORC's facilities in Maun, Botswana. The Namibia Nature Foundation provides a similar service in Namibia and the Centre is hoping to develop a similar facility in Angola, where stakeholders can directly access the database. Third, stakeholders can access the database through the Internet at www.sharingwater.net until August 2005. The HOORC website at www.orc.ub.bw, once completed, will also host the database. In addition, HOORC's website will also house an Internet mapserver service as well as links to web-sites with research information, such as the website of the Okavango Research Group of the University of the Witwatersrand in South Africa.

Web-based access to data through the HOORC website is also a component of the ODMP, which intends to create a user friendly interface for the database they create for the Okavango Delta. This interface will be applied to the entire Shared Okavango/Kubango Database.

Key Results: Shared Okavango/Kubango Database

For the shared database task, the project produced the following results:

- Distributed Version 1 of the Okavango/Kubango Shared Database on compact disc (CD) to approximately 70 English speaking delegates and 30 Portuguese speaking delegates, project partners, and guests. This Shared Okavango/Kubango Database contained all the digital data gathered by project partners and a selection of literature.
- Distributed 90 CDs of version 2 of the Okavango Shared Database at the Kasane workshop in August, 2004
- Produced a Version 2 Metadatabase, which provided brief descriptions of the data and a mechanism for searching and accessing the data and literature
- Increased knowledge of data availability; comprehensiveness; and format
- Set a precedent for open and transparent data sharing in the basin
- Demonstrated how data and information can be used in conjunction with river basin planning models to evaluate basin management strategies
- Built capacity in data analysis amongst a core group of delegates from all three countries
- A Data Gaps Analysis, which can be used to guide future data collection efforts in the basin
- Another significant result was that the ODMP adopted this database as its own Version 1 Shared Okavango/Kubango Database and has assumed stewardship of it through HOORC
- The Kasane Statement, authored by the delegates, acknowledged that the project "produced the comprehensive Shared Okavango/Kubango Database with other partners and delegates"
- The delegates also expressed their desire "to set up a sub-working group approach to continue to research and develop [the Shared Okavango/Kubango Database] with sub-working group members being from all three basin countries"

- The Statement said, building on the collection of data performed by the project, the delegates would now focus on the legitimization of data and collection and analysis of additional data from Angola

VI. RIVER BASIN PLANNING MODELS

Objectives and Methodology

River basins are characterized by a complex set of interactions between physical processes, biologic systems and human decisions and actions. In developing management plans for large river basins it is generally useful to develop and deploy models that capture these important interactions and which can be used to understand the potential ramifications of various management alternatives. There is a range of model types available in the water management arena, each designed to answer specific sets of questions.

An important step in the development of a modeling plan to support river basin planning is to identify the critical questions facing planners and to determine which models are responsive. The *first objective* of the modeling component of the project was to distinguish, along with the project delegates distinct roles played by various types of water resource models in the development of water management plans for systems like the Okavango River Basin (e.g. planning models, hydrology models, hydraulic models, water quality and sediment transport models, and ecosystem models) (Appendix S: Sharing Water Model Framework).

Within the range of model types, the project placed a particular focus on water resource planning models and its central role in integrating other types of water resource analytical tools. As shown in Figure 31, planning models are designed to answer questions about how water supplies should be allocated between competing uses, particularly in times of shortage. These uses include diversions for municipal and agricultural use as well as the natural services provided by rivers and associated aquatic ecosystems. These are very pertinent questions for the Okavango Basin States. In addition, there was a need for this type of tool in order to compliment existing databases and models in the Okavango Basin.

For example, researchers in the region had developed a model describing the natural hydrology of the Okavango Basin. In addition, along with other projects, we had begun to assemble the database needed to describe current water utilization patterns in the basin. Accordingly, a *second objective* for the modeling component was the construction of a prototype water resource planning model of the Okavango River system that could integrate existing information into an analytical platform that could be used in the region beyond the timeframe of the current project and which could be used during the project as a capacity-building tool.

As model development does not occur in isolation, the modeling component of the project also sought to demonstrate the linkages between modeling and several other project components, including database development, scenarios development, and collaborative learning (joint-fact finding). A *third objective* of the modeling component, therefore, was to demonstrate for the project delegates the necessary links between model development and other water resource planning activities and to begin to sketch out a plan for establishing these linkages.

For each of the three objectives stated above, the project implemented a series of activities. These are discussed below. Some of the activities responded to more than one of the component objectives and are repeated as appropriate.

Demonstrating the Roles for Water Resource Models

This step was a focus of activity at the Luanda and Windhoek workshops. At the Luanda workshop *Sharing Water* initiated sessions, which provided the project delegates with an opportunity to understand how climatic and hydrologic data are used to characterize streamflow in a river

catchment. At the Windhoek workshop, we developed sessions that allowed the project delegates to use the type of information discussed in Luanda to run a rainfall-runoff hydrology model. Having gained experience with this type of model, the project delegates also attended a session that demonstrated how rainfall-runoff hydrology models are distinct from water resource planning and hydraulic models. Specific actions pursued by the project team in response to this objective included:

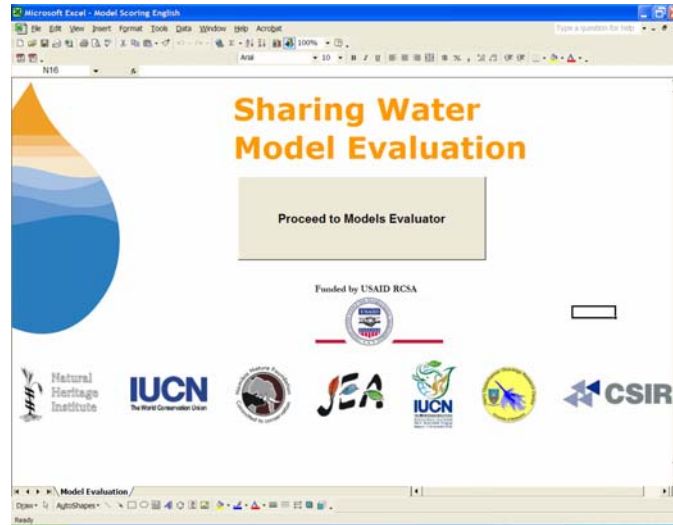
1. Conducting a review of rainfall-runoff hydrology models used in southern Africa leading to the identification and selection of the Pitman Model as a suitable tool for demonstrating the role of this type of model to project delegates. The Pitman Model was chosen as a demonstration tool because it had already been developed for the Okavango River Basin as part of the WERRD project that was also active in the region. There was no apparent logic in introducing a new rainfall-runoff hydrology model to the region and in investing the time and resources needed to build and calibrate such a model.
2. Interacting with regional experts on the uses of the Pitman Model, including the South African Department of Water Affairs and Forestry in Pretoria and the Institute of Water Resources at Rhodes University in Grahamstown, South Africa to understand how the model is used in regional river basin planning initiatives.
3. Gathering basic data useful in the development of a rainfall-runoff hydrology model like the Pitman Model, such as climate data, streamflow records, and sub-catchment delineations. Much of this information had been gathered by the WERRD project and was kindly provided.
4. Developing a training version of the Pitman Model in an Excel spreadsheet and designing it to be delivered as a training exercise for project delegates around the use of the model. This training was completed during the second *Sharing Water* workshop in Windhoek, Namibia.
5. Developing a presentation that focused specifically on the types of questions that can be answered using rainfall-runoff hydrology, water resource planning, and hydraulic models. For example, rainfall-runoff models are suited to answer questions related to how water naturally flows through a catchment in response to rainfall events while hydraulic models are configured to address questions related to the dynamics of flow (flow depth, flow velocity, flooded area) in an open channel at different discharge levels. Water resource planning models answer questions similar to those shown above in Figure 31. This was the target of our model development in the Okavango River Basin.

**“All models are wrong.
Some are useful.”**

**David Purkey, PhD,
Natural Heritage Institute**

Building a Prototype Water Resources Planning Model

Building a prototype water resource planning model was a focus activity at the Windhoek and Kasane workshops. At Windhoek, workshop sessions were prepared to outline a model evaluation process that could lead to selection of an appropriate water resources planning model platform. This Model Evaluation and Scoring Tool was built around a simple piece of software designed to guide the model evaluation process (to see the “Model and Evaluation Scoring Tool”, please see www.sharingwater.net; under Project Documents/Namibia Workshop). This software, with its underlying priorities, was presented to delegates in Windhoek for their input. Their response was that a limited set of experts from the region should participate in the model evaluation process. Following the Windhoek workshop, the evaluation software was used in conjunction with various regional experts in an attempt to make recommendations on an appropriate platform for the development of a prototype model (Appendix T: River Basin Model Evaluation Process Initiated by the Sharing Water Project: Priority Attributes and Preliminary Scores).



Screen shot of Sharing Water Model Evaluation Tool

At the conclusion of the evaluation process, one of several promising platforms, Water Evaluation and Planning System (WEAP), was selected for the development of a prototype water resource planning model. The project developed a prototype model in WEAP and presented the model at the third workshop held in Kasane, Botswana (Appendix U: Sharing Water Okavango Prototype Planning Model Report). This presentation included the opportunity for delegates to gain some hands on experience with the model and to develop an understanding of the role that models can play, as well as their limitations in river basin planning. Specific actions pursued by the project team in response to this objective included:

1. Designing a pre-project assessment of the skills and knowledge of delegates regarding river basin hydrology, data use, and modeling. Project partners then used this information to more appropriately design capacity-building activities.
2. Interacting with experts in the region, including government officials, consultants, and researchers involved with other projects in the Okavango River Basin to ascertain that the development of a prototype water resource planning model was the most appropriate modeling activity for the project.
3. In collaboration with regional experts, developing and applying a water resource planning model evaluation tool used to identify promising modeling platforms for systems such as the Okavango River.
4. Selecting the WEAP platform as an appropriate option for building a prototype water resources planning model based on priority attributes defined during the application of the water resource planning model evaluation tool (as described below).
5. Translation of the WEAP model into Portuguese so that it could be used easily by analysts from Angola.
6. Interacting with the Institute of Water Resources at Rhodes University in Grahamstown leading to the acquisition of the estimated streamflow data developed for the Okavango River system using the Pitman Rainfall-Runoff Hydrology Model and linking this information to the prototype planning model.
7. Interacting with the University of Witwatersrand in Johannesburg leading to the acquisition of a model of the extent of flooding in the Okavango Delta as a function of inflow to and precipitation on the Delta and linking this information to the prototype planning model.
8. Developing and demonstrating a prototype water resource planning model for the Okavango River system using the WEAP platform.
9. Presenting a hand-on training exercise using the prototype water resource planning model.

10. Preliminary modeling using the prototype model to run several scenarios developed as part of the associated scenario and management strategy development component of the project.

Demonstrating Linkages between Model Development and other Water Resources Planning Activities

At all three workshops, project partners focused on demonstrating these linkages model development and other water resource planning activities. In Luanda, a great deal of time was spent on examining the link between data availability and the ability to run models. In Windhoek and Kasane, we focused on scenario development to help define the types of water resources scenario analysis that could be carried out with a planning model of the Okavango Basin. At Kasane, the hands on experience with the prototype model included the reformulation of several scenarios based on the results of collaborative learning (joint fact finding) exercises.

Key Results: River Basin Planning Model

The most tangible result of this sequence of activities was the prototype water resource planning model developed on the WEAP platform. WEAP was one of the promising tools that emerged from the model evaluation activity, and while we do not consider it the definitive consensus choice for a planning model platform, it is a good example of the type of modeling environment that could be used in the Okavango River Basin. WEAP is capable of processing several attributes that were deemed to be of high priority by technical experts in the region including:

1. Affordable licensing arrangements
2. Distribution of both English and Portuguese versions of the prototype model to project delegates
3. A user-friendly model interface
4. The ability to integrate rainfall-runoff calculations
5. The ability to develop and manage numerous scenarios about future water management actions
6. The ability to define individualized operating logic for a particular system

In the current version of the prototype model, rainfall-runoff calculations are not integrated. Instead, the project used the streamflow values developed by Dr. Denis Hughes of Rhodes University through application of the Pitman Model. This collaboration was an important intermediate result because it created a precedent in the region for one activity in the basin to build on another rather than starting from scratch. Rather than develop an independent assessment of stream flows in the Okavango system, project partners developed a relationship with another group of experts working on the same system.

Another intermediate result was the increased understanding of challenges inherent in building consensus around a single analytical platform, in this case a water resource planning model. While the tool developed to facilitate the model evaluation process was well conceived, and is now available for use in the region, more broadly, we learned that it is difficult to build consensus around the ranking of priority attributes for a particular analytical tool and to assign scores representing the performance of a model with respect to these attributes. This situation made it difficult to settle on a single consensus-planning model within the time available for model review. This experience demonstrated the challenges that can be anticipated with the selection of all future analytical tools employed in the Okavango River Basin.

In the end, however, a prototype model of the Okavango system is now available to all project delegates and many of them have expressed interest in receiving additional training on the use of the Okavango WEAP model (including individuals from the water departments in each of the basin states as well as several of the non-governmental project participants). The model uses data that has

been gathered and assembled into the Shared Okavango/Kubango Database. The model includes many of the scenarios developed as part of the associated scenario and management strategy and can also accommodate a wide range of alternative scenarios that may emerge from future collaborative learning activities in the basin. The links necessary to integrate hydrologic and hydraulic analysis with the prototype planning model have been defined and are being developed through interactions with other analysts in the region.

In order to further develop the capacity of key individuals in the region to use the prototype planning model, additional training needs to be provided. With the conclusion of Phase I of this project, all interested participants will have received a license to use the WEAP model as well as the data needed to run the Okavango prototype. During the next phase of activity, a training session should be organized in English and in Portuguese for individuals in the basin states with an interest in water resource planning models. This training should be integrated with a process whereby interesting future scenarios are defined for additional analysis. This would make the training particularly relevant to ongoing activities in the region.

VII. LESSONS LEARNED

Collaborative Learning

Overall, our collaborative learning approach underscored the need to work in partnership with a range of organizations and government agencies, across sectors. Other lessons learned and key changes are described below.

Early Project Partners Workshop

Before the major activities of the project commenced, project partners convened in South Africa to clarify project objectives, roles and responsibilities, and communication protocols. The project's Cognizant Technical Officer (CTO) from USAID RCSA also attended this early workshop. Although most of the project partners knew each other, there were some new faces. This meeting allowed us to solidify these relationships, which was particularly important as much of our in-between workshop correspondence was done across borders and time zones via telephone and email. The workshop was held at the Southern Africa Wildlife College near Kruger National Park. In retrospect, we would have held this workshop either in the basin or at a location closer to Johannesburg as the travel to and from the Kruger location was time consuming.

Incorporate Gender Training and Analysis

At the Early Project Partners Workshop in Kruger, all project staff participated in a gender sensitivity training. The intent was to carry this training further so it would be integrated into all aspects of the project. Towards this end, project partners drafted a scope of work (Appendix V: Gender Scope of Work) that we submitted to the USAID Women in Development (WID) Office at the request of USAID RCSA. The objectives of this additional gender assistance would be to: 1) further build the capacity of project staff and partners to identify and address the gender issues related to transboundary water planning and management; 2) build the capacity of project staff and partners to address gender issues at different stages in the project cycle, i.e., planning, implementation and evaluation; and 3) providing periodic technical support to project staff and partners after the initial workshop so as to reinforce the skills learned. Unfortunately the staff in the WID Office was never able to provide this assistance. In the future, we would build this assistance into the project implementation plan, instead of looking outside the project for assistance.

Delegate Selection

The project was designed for stakeholders from a broad range of groups (government, NGOs, academics, private sector, etc), but the original intent was for all of the delegates to have a strong technical background and be involved with water or river basin planning issues. The 30 core group of delegates, however, ended up being more broadly spread in terms of their technical abilities. At first, project partners struggled because it was difficult to provide training that was not too difficult or too simplistic for some people in the group. We considered parallel sessions at the workshops with topics pitched to various skill levels, but given the cost associated with additional rooms, translators and their booths, and equipment, we decided that option was not financially feasible. In the end, we were able to adjust the curriculum and presentations so they were applicable to a broader audience, and concluded that the loss of technical depth was outweighed by the having a broader set of delegates.

From the first Luanda workshop, the project attracted significant interest from people beyond the selected delegates from each basin country. With each subsequent workshop, additional people, often from the hosting countries, contacted the project and asked to attend as self-paid guests. Though their presence sometimes pushed the limits of the facility's capacity, the added value of networking, further outreach, and the presence of representatives of complementary projects contributed greatly to the richness of the workshops.

Before the Windhoek workshop, the project received a request that a traditional leader from Botswana join the delegation as there were Angolan and Namibian traditional leaders already attending the workshops. This traditional leader also was already involved in the *Every River* project and, therefore, represented a link to that project. Project partners authorized the inclusion of an extra Botswanan delegate in order to include a balance of traditional leaders from each country. This key change not only provided the appropriate political balance but also made the traditional leaders a fully represented contingent among the delegates. In terms of number of delegates, the original project proposal aimed to include 6-7 representatives from each country. At the Kruger meeting, project partners felt that there should be at least ten delegates from each country in order to allow more people to take advantage of the training and information provided.

Angolan Portuguese Is Unique

In addition, translating the power point presentations into Portuguese, as well as providing simultaneous translation, allowed for the Angolans to participate more readily in the workshop dialogue. We learned, however, that we needed to have material translated using Angolan Portuguese. At first we were using a translator who spoke Brazilian Portuguese and we quickly realized that there are many differences between the two countries' dialects.

Workshop Presentations

Based on the workshop assessments, delegates welcomed the high quality presentations which enabled them to better understand many of the complexities that characterize effective river basin management. In addition, as the workshops progressed, we reduced the amount of material, and the pace at which it was being delivered, and allowing for more time in plenary, as well as break-out session discussions.

Building on the "lessons learned" from the Luanda workshop, project partners made several adjustments to the training approach, including:

- ❖ Shifting to a focus with more participatory teaching
- ❖ Bringing forward southern African examples, rather than relying on examples from outside the region. (During the first workshop, project partners noticed that examples from outside the region did not resonate with resource managers as well as examples from the region. As a companion recommendation, delegates' feedback suggested we develop summaries of environmental decision making from other cases to highlight different approach to negotiation and information and to examine the impact these different approaches have on results.)
- ❖ Creating a role simulation that required delegates to brainstorm and work as a group and that illustrated the complexity of solving an environmental dispute with multiple dimensions (moving from sharing water to sharing benefits)
- ❖ Adjusting the flow and agenda to allow for more group discussion, and create more opportunities for caucusing before simulated negotiation
- ❖ Using the simulation in both the pre-training facilitation workshop and the Plenary workshop to highlight differences in facilitator styles and tactics

Intensive Individualized Training Needed

We structured this project so that we would build the capacity of as many people as possible through workshop-based training. Although we believe this is an appropriate and useful approach, we have learned that additional capacity-building is needed through more intensive individualized training.

More Resources Applied to Angola

The project made significant effort to reach out to Angola and involved many Angolans for the first time in river basin planning efforts in the Basin. All future activities in the basin should continue with this approach of providing additional training and resources to Angola, particularly in terms of data collection and analysis, and also in terms of building capacity.

Role of Traditional Leaders

Project partners suggest that in the future, we more closely examine the role of traditional leaders in shaping and participating in environmental negotiation. This approach would include the role of traditional leaders when devising simulations as there are frequently situations, which place national-level planners at odds with traditional decision-making structures and institutions.

Tracks of Training

Project partners also recommended that we establish multiple tracks of negotiation and facilitation training keyed to the level of decisions in which trainees most often engage. These three levels were (a) international, diplomatic levels; (b) national level; (c) community level.

Roles to Fit Existing Positions

Finally, project partners recommended that we create negotiation opportunities in the training that allow delegates to take on roles similar to those they fill in their real life. While it is useful to ask delegates to take on the roles of other parties, our negotiation trainees suggested that they would find it more useful to take on a role similar to what they fill in real life. A recommendation from delegates at the meeting was that training should be aligned with the type of work people do, with different approaches used and topics covered for people from NGOs, government agencies, community organizations and research institutes. It was also suggested that these groups receive separate training as their needs are different. We saw some interesting variants on this during the simulation exercise: (1) an OKACOM Commissioner literally “playing himself”, (2) an OKACOM Commissioner alternately taking on the role of all three nations’ Commissioners; and (3) an all-Angola group struggling to accurately (and convincingly) take on the interests of community representatives.

More Negotiation Training

From the full plenary group of delegates, we heard a recurring theme to the effect that “We need to negotiate. We need to negotiate better.” Delegates suggested that we need to further emphasize the value of bringing negotiation skills to transboundary river basin management. That is, the idea and techniques of negotiation need to be more broadly legitimized among the delegates to the project and its successor activities.

English Classes for Angolans - Increase Communication

Although providing English language training was not part of the original workplan, the decision to fund English classes for the Angolan delegates not only moved them closer to open communication with their Namibian and Botswanan counterparts but also demonstrated that the project was committed to supporting the Angolan delegates in full engagement in the Okavango Basin. There was an obvious shift in the number of times delegates approached communications with the other delegates from the first to the third workshop – a shift that seemed due to increased fluency with a common language. From this experience, we learned that providing interpretation and translation services in formal settings is not enough; it is necessary to support language training so that all delegates can fully participate in the informal yet critical arenas of networking and caucusing.

Field Trips – Important Learning Tool

The field trips were a critical component of the collaborative learning associated with this project. Witnessing the large number of refugees moving home into the upper basin after decades of war, seeing agricultural diversions from the river in the Caprivi, and elephants drinking in the river in Kasane – these are just a few of the examples of on-the-ground experiences that the delegates shared

as part of the field trips. They will forever be a memorable part of our expanded and joint understanding of the basin.

OKACOM

Increased Communication with OKACOM

This project has made significant efforts to communicate with OKACOM, perhaps more than most other basin projects. But OKACOM only met once during the life of the project. In the future, with the launch of the GEF project, and more support to OKACOM, there are likely to be more meetings and more chances for communication. Despite these obstacles, the project did develop a close working relationship with OKACOM in Namibia through Shirley Bethune acting as a part-time “working secretariat” in the OKACOM offices. Perhaps this arrangement can be duplicated in Angola and Botswana.

Key Changes

The original intent of *Sharing Water* was to involve OKACOM as a Commission in the major results and decisions associated with the project. Because OKACOM met only once during the timeframe of the project (Luanda, April 2004), project partners decided to conduct more informal consultations with OKACOM Commissioners, rather than engage the Commission as a whole. During the OKACOM meeting in Luanda, *Sharing Water* presented on-going results of the project, but given the number of items on the agenda, we did not have a chance to specifically consult with the Commission regarding model selection. As a result, the *Sharing Water* project moved forward with the model and scenario selection process while consulting informally with OKACOM Commissioners in each basin state as much as possible.

Rather than select the model to be used in the Okavango Basin with OKACOM endorsement, project partners determined that the appropriate path to producing an accepted and suitable model for the basin first required NHI to work with key individuals in each basin state to produce a model “training tool”. The project would then also use this tool to highlight proposed management strategies and present the package to OKACOM.

Steering Committee

As stated previously, a key change for the Steering Committee involved the inclusion of OKACOM Commissioners as members of the Steering Committee after the first workshop in Luanda. The intent of making this change was to more tightly link OKACOM to the project. In addition, initially, the Steering Committee was only scheduled to meet twice during the 18-month project but upon recommendation from the Steering Committee, partners scheduled three meetings – one at each workshop.

Basin Setting Analysis

Visioning Exercise Will be Time-Intensive

Although there was a clearly expressed need for a full-fledged Okavango Basin vision to embrace and incorporate a wider framework of issues in addition to water, harmonization of the values and visions of stakeholders from the different basin states will require protracted interactions and discussions between stakeholder groups.

In the production of the Visioning Report, project partners found that regional and national experiences bring distinct expertise and that there is value in working in partnership with national, regional, and international organization. JEA, NNF, and IUCN Botswana brought national experiences from three basin states while IUCN ROSA, NHI, and CSIR brought resources from both regional and international levels. The partners' input on the Visioning Report demonstrates this broad spectrum of resources.

Working Across Languages

We realized that there were several terms that did not translate well across languages and it is critical to carefully define terms across language barriers. For example, at the outset of the visioning exercise, we called the process a “mock” visioning exercise. This term did not translate as “draft” into Portuguese and so the Angolans were at first not supportive of this task. However, as the term was redefined and clarified, and even renamed, the project was able to garner wide support for this activity.

More Informal Gathering Techniques

In addition, we learned that it is important to tailor formats to specific target groups. When gathering information from rural areas and community-based organizations, long written questionnaires may not elicit a quick or robust response. A more informal information gathering exercise is required.

Visioning and Governance Documents Produced Earlier

Governance structures, especially the legal and institutional frameworks that guide and inform water resource management, are important aspects of any shared or collaborative approach to transboundary water resource management. These aspects must be examined in great detail from the earliest possible stage of any project – they provide significant insights into the feasibility and practicality of existing and proposed resource management plans and possible new institutional structures. Careful analysis of these aspects should form the core of a collaborative effort. In addition, it would have been helpful if the visioning compilation had been finished earlier in the project so that it could have helped inform and be linked to the development of future scenarios.

As a result of the language barriers between Angola (Portuguese) and Botswana and Namibia (English), synthesis of the Legal and Institutional analysis report and the Visioning report were constrained. The project needed to translate information coming from Angola before it could be incorporated into the reports, which requires extra time built into the task schedule.

Scenarios and Management Strategies

Draw Programmatic Links between Visioning and Management Strategies Tasks

Management strategies are the pivot upon which series of desirable (or undesirable!) outcomes can be predicted for a shared river basin. In turn, the selection of appropriate and rational management strategies depends on the development priorities within each basin state and the degree to which each government or institutional structure intends to meet its responsibilities against national development objectives. It is inappropriate to simply draw up a ‘theoretical’ list of possible options if these are not based on the “current realities” that prevail within a river basin. This is particularly important when possible time-scales for implementation of strategies have to be considered.

Shared Okavango/Kubango Database

Ensure Legitimacy of Collected Data

In addition, we have learned that it is one thing to collect data, and it is another thing to legitimize it. We have started the first process, but need to focus on the second. To quote Peter Ashton: “Technical ingenuity generates data, but social ingenuity legitimizes data.”

Trust is Necessary when Dealing with Issues Relating to Data

Even in the seemingly cut and dry task of assembling data into a searchable database, trust between parties is of paramount importance. Data is perceived as power and sharing data can be perceived as relinquishing power. Data requires significant investment to collect and maintain. Data is the foundation for specialized knowledge and many researchers, organizations, and other groups base their reputations and self-worth on the specialized knowledge they provide. To share data can be interpreted as risking one’s advantage. To overcome this barrier, project partners created processes, which built trust amongst those involved in the database tasks and demonstrated the utility of sharing data.

First, the project created the Database Subcommittee not only to tap the collective knowledge of those involved, but also to generate a common vision and trust among project partners. The subcommittee met in person three times and communicated extensively by email. All decisions made by the database subcommittee were made by consensus after appropriate deliberation. It is critical that enough time and appropriate resources be dedicated to generate a process that creates a sense of goodwill and trust amongst those involved in this kind of work.

Additionally, project partners invested the necessary resources to allow RAISON and HOORC to spend significant amount of time face to face. As the primary “data-brokers” in the region, it was necessary that these two organizations understand and trust each other as they worked together to compile this Shared Okavango/Kubango Database. This investment proved worthwhile not only to the projects immediate outcomes, but also for the long-term sustainability of the Shared Okavango/Kubango Database.

Generating trust was especially critical when appealing to the project delegates. At the first workshop in Angola, some delegates perceived the data matrix exercise as an attempt by outsiders to commandeer their data and put it to some unknown and perhaps undesirable use. To overcome this, the project distributed version 1 of the database to project delegates (in English and Portuguese) at the Namibia workshop. It would perhaps have been simpler, or perceived as more efficient, to produce a single version of the database at the end of the project. However, it was necessary to provide delegates with a concrete representation of what their data would be used for and how it would be distributed. This exercise with version 1 of the Shared Okavango/Kubango Database not only allowed delegates to better understand the database task, but by soliciting their feedback on a preliminary version of the database, they became invested in the creation of this tool. Because of incremental exercise, many the project partners and delegates submitted data for inclusion in the second volume of the Shared Okavango/Kubango Database.

Due to concerns over ownership of project outputs and accessibility, it should be advertised and repeated by such projects that no copyrights apply to data because rights to pieces of data do not hold in terms of international law. The project repeatedly expressed the intent to make all data available in a public-access database. Advertising this intent and then demonstrating it early on with draft versions of the Shared Okavango/Kubango Database helped initiation and reinforce a culture of data sharing in the basin – perhaps one of the most important and lasting contributions of this project.

Build on Existing Work

The project was fortunate to have both HOORC and RAISON as project partners. Both organizations had invested significant amount of work in compiling data on the basin. Additionally, both organizations will remain in the region long after the end of the project. The project elected to shift a significant portion of the budget that had been originally allocated to NHI to HOORC and RAISON so that the final product could better take advantage of their work and momentum, as well as simultaneously building capacity in the region.

Work in Small Increments

Repeatedly throughout this task, the project has been faced with decisions to be either highly ambitious or methodical, incremental, and transparent. Though the project partners possessed the technical capacity to create an ambitious and technically savvy database, the database subcommittee decided that it was more important to approach the task incrementally, allowing project delegates to acclimate to the idea of a Shared Okavango/Kubango Database and to present a tool that was understandable and transparent. If the project had elected for the more ambitious alternative, the tool most likely would have failed to gain acceptance in the basin. The current Shared Okavango/Kubango Database has gained acceptance as evidenced by the ODMP's decision to adopt it as its first version of its own Shared Okavango/Kubango Database and by HOORC's commitment to continue to maintain the database after the end of the project.

Plan Extra Time to Collect Data

There are always unanticipated delays in sourcing data and information. This is particularly true for systems such as the Okavango, where the basin state of Angola has experienced a protracted period of Civil War. This also results in extensive data gaps, and inevitable inequalities in the quantity and quality of data available.

Clarify the Limitations of the Database Tool

Some stakeholders and representatives of basin states thought the database should not be started because it could not be comprehensive. It should be clarified from the beginning of such projects that databases such as this can hardly ever be fully comprehensive. Rather, the project compiled the database rapidly, to make information available as soon as possible. Such exercises should be coupled with the constant message that compilation and distribution of the resource is conducted in the spirit of making information as widely and freely available as possible and will be updated continuously over time.

Define Stakeholder Role in Gathering, Disseminating, and Interpreting Data

Further in this spirit, such projects need to make sure that stakeholders are urged to further analyze and add to the data, and then - in turn - to make copies of their new data available to others.

River Basin Planning Models

Open and Transparent Processes Are Needed to Build Agreement around the Selection of Any Analytical Platform.

It is not sufficient for the choice of a model to be made in isolation without clearly identifying the attributes that make it appropriate for the basin. This process is not only important to ensure that a model be selected that fits the needs and data availability in the basin, but also to ensure that the

modeling selection, development and use proceed with the understanding and cooperation of as many experts and stakeholders as possible. From our experience, we believe that this type of open and transparent modeling process, although rarely practiced, is critical to long-term planning success.

While a complete consensus around a single model may not emerge, a transparent evaluation process will assure that the analytical tool that is ultimately selected will at least be “one of the most appropriate” options. Evaluation tools like the one built by the project to evaluate water resource planning models should be developed and applied to the selection of all analytical tools.

Data Is of Critical Importance Because Model Uncertainties Associated With Poor or Missing Data Can Compromise the Perceived Validity of a Model. This lesson highlights the importance of jointly developing and linking a Shared Okavango/Kubango Database with the modeling activities. All parties in a river basin planning dialogue must validate the data used in a model in order for a model to be viewed as useful. The recommendations of the database component of the project should be pursued to develop a level of comfort so that future modeling work using the data is appropriate and useful.

Planning Models Must Be Complimented by Other Types of Analysis. There is recognition in the region that while planning models occupy a central place in the web of analytical tools deployed in the development of a river basin management plan, they must be complimented by other types of analyses. These include ecological, socio-economic, legal and institutional analyses. The selection of the tools needed to conduct these types of analysis must also be transparent and the integration of these analytical tools is critical. Building the necessary linkages between planning models and other analytical tools will require attention to the mechanical data transfers between models as well as the institutional linkages between analysts developing the various required tools. Both will best be achieved by developing an expert panel on model integration protocols.

Linkages Must be Forged with Other Technical Investigations Underway in the Basin. There are currently several funded projects underway which focus on water management in the Okavango River Basin. These include the continuation of USAID sponsored activity in the basin which is being lead by Associates for Rural Development (ARD, Inc.), the WERRD project, the TwinBas Project, the Okavango Delta Management Plan initiative, and most importantly the new GEF project launched by OKACOM. The project took a strong initiative to provide a framework for coordination by organizing a conference call of all of the projects and by inviting representatives of the various projects to participate in the third workshop in Kasane. At this workshop there was a general recognition that there are many actions that could best be accomplished by inter-project collaboration. This was the case in our decision to use hydrologic information developed by WERRD in the development of the prototype planning model for the Okavango. Further inter-project collaboration could occur in the further development of a Shared Okavango/Kubango Database; the process for vetting the data and assumptions used in developing various models; and the process used for developing useful future scenario for the basin and the coordinated benchmarking of various modeling tools for use in the basin. Realizing the potential of collaboration in these areas will require a commitment on the part of the project to continue the dialogue initiated by this project and the definition of some structure to assure coordination.

Broad Project Lessons Learned

Identifying and Developing Relationships with In-Basin Partners Is Critical, but Can Be Difficult

In the project in which we invested significant resources in identifying appropriate partners and clarifying relationships and roles and responsibilities during a project launch retreat, it has still taken almost a year to develop significant trust and levels of understanding among project partners.

We have also learned the importance of having basin partners in all basin states. Without these partners, our work in these countries would be extremely difficult and possibly, ineffective.

Consider Integrating Social and Economic Strategies that Result in Poverty Reduction into our Technical Approach

Initially, we had difficulty getting traction with the project, particularly with the Angolans, because the project focuses on technical and policy issues associated with the transboundary management of the river. The Angolans, and to some extent the other riparian countries, are understandably concerned with building the sustainable livelihoods of local people. In the future, we might consider developing broader partnerships with groups that have expertise in areas that are relatively unfamiliar to us, including groups that focus on human health, economic and socio-cultural development, good governance, etc. These partnerships would allow us to develop strategies that are implemented on a range of scales (from local to international) and that provide the necessary incentives for local communities (and national level governments) to engage in international conservation and contribute to sustainable river basin management.

It Is Important Not to Generate Unreasonably High Expectations of Quick Results among Project Partners, Funders, and Stakeholders

The *Sharing Water* project has been successful in outlining and delivering on an ambitious, but not unreasonable workplan. Our ability to deliver the project workshops and work products in the timeframe agreed upon at the outset of the project has helped anchor the project.

Set Aside Resources for Translation

It is important to set aside resources for translation of documents. If there had been no resources set aside for translation, the project would have had very little information on Angola. The Steering Committee documents and the final Legal and Institutional Analysis and Visioning reports were translated from English to Portuguese and this facilitated effective communication.

Develop a Good Information Base before Moving onto Policy Issues

The project, through the development of the Shared Okavango/Kubango Database has done a good job of preparing a publicly accessible joint database for the basin in advance of tackling policy and management issues.

18 Months Is Too Short a Time Period To Accomplish Some of the Activities We Set Out to Do

Given the short timeframe of this project – just 18 months – the project was fast out of the gate and accomplished a lot quickly. In particular the basin partners put a huge amount of effort into organizing the workshops. But 18 months is too short a time period to accomplish some of the activities we set out to do. In the future, we have to either convince donors that transboundary river basin management requires a longer commitment than 18 months, or else we need to scale back our ambitions and take smaller steps. In other words, finish the first step and get concurrence from the river basin community at all levels, and then take on the next step, and so on.

Increase Direct Involvement of Basin Experts

In future work associated with the Okavango, we would recommend there be more direct involvement of basin experts in the development of work products such as the database, the modeling, and the institutional and legal analysis. It would be important to set up a “working group” approach to researching and developing these work products with working group members from all three basin countries.

Grassroots Monitoring and Evaluation

The project used both quantitative and qualitative measures to capture the progress of the project. In addition to the standard monitoring and evaluation program, we would recommend that future work implement a Grassroots Monitoring and Evaluation Program (M&E) to ensure real downward accountability. One of the underlying aims of grassroots M&E is to give voice to those who are often ignored in conventional impact assessment. In addition, this type of participatory multi-stakeholder

assessment asserts that the assessment process itself can contribute to empowerment and can assist in setting up a sustainable learning process to increase the long-term accountability of the development process and contribute to development itself. More specifically, Grassroots M&E provides a forum for participants to articulate their aims and goals, determine indicators of success, and with local research institutions track progress and make recommendations for project change.

Steer Clear of Politics of Implementation

Although the project made a significant effort to coordinate with other projects in the basin and did so effectively, we learned that various projects funded by different donors should perhaps not “co-mingle” their work plans in a way that one project needs to wait for another to proceed as the “politics of implementation” can result in shifting timelines.

VIII. NEXT STEPS

Based on project partners' experience in the Basin and the input from project delegates, below we outline several activities that we believe should follow on to build on the success already made and to ensure the sustainability of the investment in the first 18 months of the project.

Activity 1: Continued Development and Dissemination of the Shared Database

Objective: To ensure that the Shared Okavango Database is available and functional.

Background: This task will involve continued support for the existing Okavango Shared Database developed under in collaboration with *Every River*. This shared database is a major achievement for the Basin and one that should not languish. Both the will and the institutional capacity to host the database exist at HOORC, but continued funding is necessary for an additional year to finalize the database structure and management procedures, and to ensure a user-friendly interface for broad-based use. This support will also reinforce the legitimacy and credibility of the data.

Task 1.1: Convene and organize a database workgroup in Maun (comprised of 2 representatives from each basin state) to discuss and resolve the following points:

- The final structure and functionality of the database and develop a work plan for completing necessary upgrades to the database, including adding information from the *Sharing Water* legal and institutional analysis
- The final roles and responsibilities for updating the database with new information, including expanding the database to include newly gathered data, satellite images and aerial photographs
- Coordination of database refinements with other projects interested in the further development and use of the shared database (e.g. ODMP, GEF, others)
- Draft Procedures Manual for updating the Database

Task 1.2: Develop outreach and education plans regarding the database and its use in the Okavango Basin, including finalizing web-based access to the Database, incorporating user-friendly interfaces into the Database, test-running the Database with stakeholders; making adjustments to ensure access and ease of use; and developing mechanism to transfer or link the Okavango Database to OKACOM

Task 1.3: Draft Business Plan for resources and staff needed to maintain Database over 10 years

Activity 2: Website Transfer and Development

Objective: To successfully port the *Sharing Water* website to a more general Okavango information dissemination and communication tool.

Task 2.1: Identify a new host/webmaster for the website.

Task 2.2: Coordinate with OKACOM to identify the essential elements of this information dissemination and communication tool.

Task 2.3: Update the website to make it a more useful as a general regional information dissemination and communication tool by evaluating the essential elements that need to be ported from the existing *Sharing Water* website.

Task 2.4: Transfer the updated website to the new manager.

Activity 3: Establish Database Nodes in Riparian Countries

Objective: To identify an institution in each of the riparian countries to serve as “Database Nodes” to work closely with HOORC and OKACOM and provide national-level back-up and support for the Shared Okavango Database. These nodes would ensure data quality, gather and analyze data at the national level, and other relevant tasks. These institutions would assume responsibility for providing accurate and verifiable data to the Okavango Shared Database. They would also play an outreach role by disseminating national and basin-level in their countries and across sectors.

Task 3.1 Identify Database Node in Angola, HOORC and NNF have already been identified

Task 3.2 Provide training in Database Management at each Node

Task 3.3 Establish Protocols for national-level data reporting and analysis

Task 3.4 Develop process for legitimizing and controlling data quality

Task 3.5 Coordinate with HOORC regarding data transfer

Activity 4: Fill Strategic Data Gaps, Especially in Angola

Objective: To fill strategic gaps in data collection and analysis which have been identified by project partners. It is anticipated that the majority of this work will be focused on the upper basin in Angola. These gaps would be filled through both actual on-the-ground monitoring and through remote sensing strategies.

Task 4.1 Use the prototype model runs to evaluate the quality of data and identify data gaps

Task 4.2 Identify and repatriate data from Portugal to Angola

Task 4.3 Analyze existing and repatriated data and identify critical data gaps

Task 4.4 Assess training and equipment needs in terms of data collection and analysis

Task 4.5 Build and support capacity in Angola, Botswana, and Namibia to collect, store, analyze and report data and data trends through certificate and workshop training and through targeted assistance in terms of equipment, computers, software, etc.

Task 4.6 Collect and analyze data to determine actual and future water use and demand in the Basin. Use remote sensing techniques to fill data gaps when applicable.

Task 4.7 Ensure that mechanisms for transferring newly collected data into the shared Okavango Database are in place

Activity 5: Continued Development of the Okavango Prototype Planning Model and Associated Training

Objective: Continue to develop the prototype water resource planning model of the Upper Basin

Background: the project has completed the following steps:

- ❖ A model evaluation process leading to the identification of 2-3 promising water resource planning models for use in the Okavango River Basin.
- ❖ The definition of three plausible development scenarios in the Okavango River Basin and a set of reasonable management strategies associated with each scenario.
- ❖ The development of a prototype model based on one of the identified promising model platforms that was used to demonstrate the utility of planning models. This model included representations of the scenarios and management strategies defined in the previous step.
- ❖ The establishment of professional relationship with other modelers active in the region. These included interactions with models from the WERRD, ODMP and TwinBas Projects that lead to (1) the integration of hydrologic information for the upper basin into the prototype model; (2) linkage of the prototype to a hydrodynamic model of the Delta; and (3) integration of the Okavango model to a model of the Central Namibia water system.

Discussion with technical experts in the region have lead to the conclusion that it is difficult to prioritize the essential attributes of a water resource planning model in the abstract and that it would be helpful to develop a test case that could assist in defining critical questions and responsive model attributes. The thought is that this test case should be developed with the input of technical experts from the three basin states.

The prototype model has been constructed to be a transparent decision-making tool. Nonetheless it contains a great deal of information and additional training is needed to build the comfort level of all parties in the river basin planning dialogue in navigating and manipulating the data and assumptions included in the model. Training was initiated and should continue on at least three levels. First, training for policy makers should continue so that they can understand the basic assumptions underlying a planning model. Second, more detailed training of technical experts should occur so that future model development can occur in the region without significant input from outside experts. Third, stakeholders who are engaged in discussions about the future of the basin need to understand the role that models can play in framing management issues, and be able to determine whether their interests (and visions for the basin) are represented in the models.

Task 5.1: In coordination with the GEF Project PMU, convene a workshop in Angola. The workshop will cover the following items.

- Finalize a set of critical scenarios and associated management strategies for the Okavango Basin
- Assemble the critical scenarios and management strategies into a test case that could be the subject of evaluation using a water resource planning model for the basin.
- Consider including scenarios based on climate change, and perhaps integrating economic dimensions.
- Configure the prototype model for the test case, the extent possible, in order to identify critical model attributes (it is not necessary that the prototype model successfully capture all elements of the test case as even a failure to do so will assist in identifying critical planning model attributes).
- Develop a new list of critical planning model attributes.

Task 5.2: Build capacity for the use of the water resource planning model of the Okavango River Basin. Many delegates requested further training on the use of the prototype model. Training on the

use of the expanded model would be critical in developing this capacity and could occur in the US or in the basin through NHI.

Task 5.3: Collaboration with the developing modeling community in the basin trained in Task 5.2 in the continued refinement and application of the model in support of a policy dialogue.

Activity 6: Evaluation of Analytical Tools

Objective: Complete the process of evaluation and selection of a water resource planning model and develop a process and methodology for evaluating and selecting other types of analytical tools for the basin.

Background: The project has initiated a process to evaluate potential water resource planning models for the Okavango Basin. This process has been based around the application of a simple piece of model evaluation software developed by the project. This software allows the user to rank model attributes in terms of priority and score models against these attributes. The regional experts involved in the planning model review process identified some useful software upgrades. These include:

- The ability to identify critical model attributes where the model must achieve a top score in order to be considered.
- The ability to more seamlessly introduce new models and model attributes to the software system.

Task 6.1: Upgrade the evaluation software to include the abilities described above

Task 6.2: In a workshop setting, re-evaluate the range of river basin planning models using the attributes identified in Task 5

Task 6.3: Make recommendations to OKACOM regarding the optimal river basin modeling approach

While this tool has been applied to the evaluation of planning models during the project, the same approach can be pursued in developing a consensus around any other analytical tool that is need for the basin.

Activity 7: Support OKACOM through a “Working Secretariat”

Objective: Create a “Working Secretariat” for OKACOM that would precede the establishment of a formal Secretariat.

Background: This task would involve supporting OKACOM through funding a dedicated coordination person to be based in government offices in close proximity to OKACOM Commissioners in each of three riparian countries. This approach has worked well in Namibia as part of the project and thus could be extended to the other riparian countries.

Task 7.1: Confirm overall approach with OKACOM in each of three countries

Task 7.2: Develop Scope of Work for each Coordinator, identify and contract with each Coordinator, establish Coordination Offices, and joint workplans

Task 7.3: Implement coordination activities, and draft and finalize Review of Working Secretariat approach

Activity 8: Incorporate Instream Flow Requirements (IFRs) into River Basin Modeling

Objective: Integrate IFR into the river basin planning model and build on progress made under the IWMI-funded Okavango Fisheries Study. In addition, this activity is aimed at building capacity in the basin to analyze and consider quantitative approaches to incorporating environmental services into basin planning. Towards this end, this activity will be undertaken using a workgroup process with individuals in the basin identified to participate in each subtasks listed below:

Task 8.1 Working with delegates from each country, determine critical ecological services beyond fisheries, such as sediment transport, wildlife habitat, including instream flow requirements needed to meet the ecotourism potential in Angola

Task 8.2 Identify available data associated with these services and include in the Okavango Shared Database

Task 8.3 Draft IFRs with working group based on available data and link these IFRs to the river basin planning model

Task 8.4 Run “what if” scenarios in a participatory setting with working group and other stakeholders with these IFRs in place

Task 8.5 Draft and finalize report describing process, including a “next step” strategy

Task 9: Further Legal and Institutional Analysis

Objective: To provide analyses and recommendations regarding the legal instruments and institutional structures that have been used successfully in other international river basins around the world.

Background: Joint management of transboundary water resources has been one of the most fruitful and productive areas of bilateral and multilateral agreements. Lessons and models will be derived from these governance frameworks—some of which have been operating for over a century—that could be adapted to the Okavango context. In addition, the analyses under this task will draw upon the text of the Convention on the Non-Navigable Uses of Shared River Basins that has recently been proposed by the U.N. General Assembly. This task will provide an empirical analysis of this operating history, identifying the structures and processes that have worked well and what it would take to replicate them successfully in the Okavango context, providing a basis on which the OKACOM Commissioners could draw, in their discretion, in constructing an Integrated Management Plan and implementing laws and institutions. This task will be undertaken using a workgroup process with individuals in the basin identified to participate in each subtasks listed below:

Task 9.1: Itemize the types of management mechanisms that OKACOM and the three national governments may find useful in developing an integrated management plan for the Okavango basin. This list would be compiled through consultations with the OKACOM Commissioners and basin stakeholders. Examples might include:

- A mechanism to assess the impacts of water development proposals on downstream biophysical processes and water availability and quality.

- A mechanism for dissemination of such information to, and for consultations with, the potentially affected stakeholders either through their government representatives or directly.
- A mechanism through which affected stakeholders, through their national governments, can register their concerns or opposition to such proposals, if any.
- A mechanism by which such concerns would be taken into account by the project proponent and satisfactory mitigations or modifications would be undertaken.
- In default of such adjustments, a mechanism for conflict reduction, resolution or compensation
- Mechanisms for benefit sharing.
- Mechanisms for continuous monitoring of the bio-hydrologic system and its responses to anthropogenic perturbations

Task 9.2 Conduct a global survey of transboundary water resource management agreements to identify the successful examples of each of these mechanisms. The work group would utilize the data base that has been created by Oregon State University and also conduct interviews with other international natural resource law and institutional experts.

Task 9.3 Study successful cases to ascertain the features/attributes/processes that account for their success. The work group would conduct detailed analyses of these regimes, review the relevant literature, and interview the key management officials.

Task 9.4 Analyze the changes that would be needed in the national laws and institutions of the Okavango basin states to implement such successful models (using the data collected in the project). This would give the three national governments a basis for deciding whether the necessary changes are politically feasible and desirable.

Task 9.5 Obtain peer review of the findings and conclusions. Before finalization, the report of the work group would be disseminated to government and academic legal experts within the basin for review and comment.

Task 9.6 Prepare final report. The final product would be a report to the OKACOM Commissioners in English and Portuguese which includes the views of the peer reviewers. The report would be accompanied by a detailed briefing for OKACOM Commissioners and interested national officials.

Task 10: To Promote Negotiated Agreements in the Basin

Objective: To continue to build capacity in the basin in negotiation and facilitation skills

Background: Based on our workshop evaluations and group discussions, project partners identified a series of potential topics for future negotiation and facilitation training:

- ❖ Planning, designing & convening facilitated meetings
- ❖ Mediating disputes between parties, including breaking deadlocks
- ❖ Dealing with difficult people and difficult situations
- ❖ Dealing with competing models and interpretations of scientific information
- ❖ Linking models and interpretations to resource management policy
- ❖ Collaborative modeling of hydrology and environmental conditions to increase stakeholder participation and management transparency
- ❖ Getting and using negotiating power to attain positive-sum outcomes
- ❖ Cultural, political, ethnic and religious factors in collaborative management
- ❖ Bring trainees more intensive, sustained training in their respective nations

Task 11: Support Okavango Basin Technical Working Group

Objective: To support the Okavango Basin Technical Working Group as described in the Kasane Statement.

Background: This group was called for as part of the Kasane Statement and derives its strength from its diversity, but this same diversity can make it difficult to delve into specific topics. Delegates recommend that subgroups be established from the within the Technical Working Group based on sector expertise. These subgroups should focus on the development of best management practices (BMPs) for each sector as they apply to the Okavango Basin, and then report back to the full Working Group.

Task 11.1: Convene Working Group, finalize membership, charge, and identify Sector Subgroups

Task 11.2: Work with Sector Subgroups to research and develop BMPs

Task 11.3: Reconvene Working Group as needed to provide feedback to Basin-level management issues and provide link between OKACOM, technical group, and communities

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