

Linking Biodiversity Conservation and Water, Sanitation, and Hygiene: **Experiences from sub-Saharan Africa**

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AFRICA BIODIVERSITY COLLABORATIVE GROUP

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ACRONYMS

| | |
|----------|---|
| ACP-EU | Africa, Caribbean and Pacific – European Union |
| BALANCED | Building Actors and Leaders for Advancing Community Excellence in Development |
| BATS | Biodiversity Analysis and Technical Support |
| CBSP | Sustainable Forest Management in the Congo Basin |
| CI | Conservation International |
| CIDA | Canada International Development Agency |
| CLTS | Community-led Total Sanitation |
| CRC | Coastal Resources Center |
| CRS | Catholic Relief Service |
| CTPH | Conservation Through Public Health |
| CWP | Country Water Program |
| DANIDA | Danish International Development Agency |
| DSS | Decision Support System |
| DWA | Dutch WASH Alliance |
| DWAF | Department of Water Affairs and Forestry |
| EARPO | Eastern Africa Regional Program Office |

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|----------|--|
| ESARPO | Eastern and Southern Africa Regional Program Office |
| EFA | Environmental Flow Assessment |
| EHP | Environmental Health Program |
| EPWS | Equitable Payments for Watershed Services |
| EU | European Union |
| FAO | Food and Agriculture Organization |
| FIU | Florida International University |
| FP | Family Planning |
| FZS | Frankfurt Zoological Society |
| GEF | Global Environment Facility |
| GLOWS | Global Water for Sustainability |
| GWC | Green Water Credits |
| GWP | Global Water Partnership |
| ha | Hectares |
| HIV/AIDS | Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome |
| ICDPs | Integrated Conservation and Development Project |
| IFAD | International Fund for Agricultural Development |
| IRBM | Integrated River Basin Management |
| IWRM | Integrated Water Resources Management |
| IUCN | International Union for Conservation of Nature |
| JGI | Jane Goodall Institute |
| LVBC | Lake Victoria Basin Commission |
| MDGs | Millennium Development Goals |
| MUS | Multiple-Use Services |
| NGO | Non-Governmental Organization |
| NRM | Natural Resource Management |
| OKACOM | Okavango River Basin Water Commission |
| ORASECOM | Orange-Senqu River Commission |
| PAWD | Partnership for Africa's Water Development |

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|-----------|--|
| PBWO | Pangani Basin Water Office |
| PCM | Participatory community monitoring |
| PEPFAR | U.S. President's Emergency Plan for AIDS Relief |
| PES | Payment for Ecosystem Services |
| PHAST | Participatory Hygiene and Sanitation Transformation |
| PHE | Population, Health and Environment |
| PRBMP | Pangani River Basin Management Project |
| PRESA | Pro-Poor Rewards for Environmental Services in Africa |
| PRSP | Poverty Reduction Strategy Paper |
| PSI | Population Services International |
| PWS | Payment for Watershed Services |
| Ranon'ala | Rural Access to New Opportunities for Health and Water Resource Management Project |
| RH | Reproductive Health |
| RTI | Research Triangle Institute |
| SADC | Southern African Development Community |
| SANAPA | Saadani National Park Area |
| SANBI | South African National Biodiversity Institute |
| SDC | Swiss Agency for Development and Cooperation |
| SILC | Savings and Internal Lending Communities |
| SNV | Netherlands Development Organization |
| SSA | sub-Saharan Africa |
| SUCCESS | Sustainable Coastal Communities and Ecosystems |
| TA | Technical Assistance |
| TACARE | Lake Tanganyika Catchment, Reforestation and Education |
| TNC | The Nature Conservancy |
| UN | United Nations |
| UNDP | United Nations Development Program |
| UNEP | United Nations Environment Program |

| | |
|---------|--|
| UNESCAP | United Nations Economic and Social Commission for Asia and the Pacific |
| UNICEF | United Nations Children's Fund |
| URI | University of Rhode Island |
| USAID | United States Agency for International Development |
| USD | United States Dollar |
| UTaNRMP | Upper Tana Catchment Natural Resource Management Project |
| WADA | Water and Development Alliance |
| WANI | Water and Nature Initiative |
| WASH | Water, Sanitation and Hygiene |
| WCS | Wildlife Conservation Society |
| WEHAB | Water, Environment, Health, Agriculture and Biodiversity |
| WHO | World Health Organization |
| WRBWO | Wami/Ruvu Basin Water Office |
| WRI | World Resources Institute |
| WWF | World Wildlife Fund or Worldwide Fund for Nature |

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Executive Summary

This paper aims to build the evidence base for how implementers have integrated Water, Sanitation and Hygiene (WASH) and freshwater ecosystem conservation to date in sub-Saharan Africa (SSA) and to document lessons learned from projects taking a more holistic approach to conservation and development. According to United Nations (UN) estimates, the population of SSA is projected to double from 856 million today to about 2 billion by 2050, and as such the pressure on the region's ecosystems and water resources is only going to be accentuated, and with it reduce the ability of communities to access essential water supplies to lead healthy lives.

Sub-Saharan Africa is home to nine of Earth's 34 biodiversity hotspots, including the Cape Floristic Region, Coastal Forest of Eastern Africa, Madagascar and the Indian Ocean Islands, Guinean Forests of Western Africa and Succulent Karoo. The region also has extensive inland waters including the Nile, Congo and Zambezi basins, the Great lakes of the Rift Valley and the Okavango Delta in Botswana, harboring a vast repository of biodiversity and high level of endemism. However, around four in 10 people still rely on unimproved sources for their daily water needs in the region whereas two thirds are still without improved sanitation (UN, 2011). While there have been noticeable improvements in access to improved water sources in the region, the population growth rate is fast outpacing these efforts resulting in more people being solely dependent on surface waters. The fast growth rate is also putting pressure on the natural resource base and in turn the ecosystems.

Water, poverty and environment are intrinsically connected. Areas of high endemism and biodiversity are usually relatively remote and as a result human communities living in close proximity to these areas tend to be impoverished with little to no access to improved water sources and sanitation facilities. Conversely, in the downstream reaches of rivers, acute water shortages are becoming the norm in some areas as the myriad stakeholders take up water to meet their disparate needs e.g. heavy industry, irrigation for agriculture, fisheries, tourism, and municipal water and electricity utilities. The impacts on human health linked to the lack of access to improved water and sanitation facilities range from water-borne diarrheal diseases such as typhoid, giardia and cholera to water-washed diseases such as roundworm, trachoma and scabies.

Water and sanitation projects are a fundamental cornerstone of human development. Access to water (in relative proximity) translates into increased economic productivity and healthier communities. Well-planned sanitation infrastructure minimizes the risk of acquiring the aforementioned water-borne diseases, resulting in a healthier and more vibrant community and healthy ecosystems.

As such there is a clear and present need to integrate WASH and conservation efforts. There are exemplary case studies already out there where true integration of these two once-thought-to-be disparate sectors has occurred, ranging from integrated river basin management approaches to population, health and environment projects; and from environmental flow assessments to the implementation of payment for watershed services projects. Examples of these include:

- Integrated River Basin Management (IRBM) and basin-planning. These play a key role in such delivering economic efficiency, social equity and environmental sustainability of water within a basin (UNESCO, 2009).
- Environmental flow assessments (EFAs) are becoming the global standard for determining the amount of water required to sustain aquatic ecosystems and satisfy basic human needs, in turn informing IRBM and planning. Scenario-based EFAs provide practitioners a means to assess the types of conservation and water management interventions that will best attain project goals. There is great interest from the donor community in the environmental flow approach, as it ultimately offers an effective means to mainstream the environment – particularly freshwater ecosystems – into national development planning, including poverty reduction strategy papers (PRSPs) and strategies to address the Millennium Development Goals.
- Payment for Watershed Services (PWS) represents a cost effective way to fund the achievement of multiple development goals. PWS directly supports targets associated with human health through improvements in water quality and quantity, as well as supporting the maintenance of other ecosystem services that contribute to food security (through services such as pollination, soil retention, and nutrient cycling), income generation (through agricultural production and cultural services associated with tourism) and physical security (through regulation of floods, for example). Many pilot PWS projects are being implemented in sub-Saharan Africa by a host of donors, international and national implementing agencies, and hold a lot of promise to take the PWS concept further in the region.
- Population, Health and Environment (PHE) projects are producing good results throughout sub-Saharan Africa although are generally more pronounced within the family planning, reproductive health, and HIV/AIDS sectors. There is potential for donors and implementers to achieve great results within the WASH sector through PHE projects. By linking various sectors such as WASH, population, and forestry, as well as agriculture and community development, cost and effort sharing can ensue which in turn can increase the effectiveness of the project vis-à-vis improved conservation and improved livelihoods and health.

Integration of WASH and biodiversity conservation is occurring on an ad-hoc basis at the project level. Environmental sustainability is generally not enshrined in WASH policies and legislation. There are some great examples of projects bridging the two sectors from the outset, going beyond mitigation into the realm of true integration. This report profiles four case study examples which illustrate important aspects of integration and the benefits of these approaches.

The projects described here are: The Rural Access to New Opportunities for Health and Water Resource Management (RANON'ALA) Project in Madagascar; Pangani Basin Environmental Flow Assessment in Tanzania; Working for Wetlands in South Africa; and the Sustainable Fisheries (Ba-Nafaa) Project in The Gambia and Senegal.

Lessons must be learned from these and used to replicate successful programs throughout sub-Saharan Africa. Illustrative lessons found in this review include:

- Linking various sectors such as WASH, forestry, agriculture, population and community development can result in cost and effort sharing which in turn can increase the effectiveness of the project;
- Environmental flows and EFAs have the potential to be suitable vehicles to integrate WASH and freshwater ecosystem conservation aspects; and.
- More work is required to bridge the gap between research and assessments to operationalization and implementation of integrated WASH and conservation interventions.

There are Best Practice Guidelines for WASH activities in emergency response situations, but these do not go far enough in linking with biodiversity conservation per se, nor are they associated with general non-emergency WASH programs. There is a need for more comprehensive guidelines on how to actually integrate the two disciplines under different scenarios, ecoregions and climates.

The question is not why should integration of WASH and freshwater ecosystem conservation be occurring but rather how can they be integrated to be as effective and impactful, saving valuable time, money and effort in the process; how can the two sectors be better aligned so that synergies result as a matter of course.

Introduction

BACKGROUND

In September 2000, world leaders came together at the United Nations (UN) Headquarters in New York for the 'Millennium Summit.' Time-bound targets centered on the reduction of extreme poverty were adopted, namely the Millennium Development Goals (MDGs), to be attained by the year 2015. By the end of 2010 - five years ahead of the deadline - 89 percent of the world's population was accessing safe drinking water from improved sources, equating to a halving of the proportion of the global population without sustainable access to safe drinking water (World Health Organization/UN Children's Fund, 2012). However, poor rural populations remain at a disadvantage in accessing clean drinking water. In sub-Saharan Africa (SSA) approximately four in 10 people still rely on unimproved sources for their daily water needs (UN, 2011). Regarding sanitation, half the population of developing regions is still without improved sanitation - two-thirds in sub-Saharan Africa - and as such this part of Target 7¹ will not be met by 2015.

While there has been a concomitant increase in protected ecosystems globally, with 12.7 percent of the land area and 7.2 percent of coastal waters protected, an estimated 17,000 species of plants and animals are currently at risk of extinction due to inadequate management and gaps in protection of priority areas (UN, 2010). As such, the world has missed the 2010 target for biodiversity conservation. Poor management of biodiversity and gaps in protection threaten biodiversity and jeopardize the vital services that these ecosystems in turn provide to humanity, in the form of regulation of stream flow, erosion prevention, water filtration, aquifer recharge, carbon sequestration, wildlife habitat, outdoor recreation and flood abatement.

To prioritize conservation around the world biodiversity hotspots² were identified. Sub-Saharan Africa is home to nine of Earth's 34 biodiversity hotspots, including the Cape Floristic Region, Coastal Forest of Eastern Africa, Madagascar and the Indian Ocean Islands, Guinean Forests of Western Africa and Succulent Karoo. Madagascar and the Indian Ocean islands, for example, are home to eight plant families, four bird families and five primate families that are found nowhere else on Earth. Meanwhile, the Congo Basin and the Miombo-Mopane Woodlands and Savannas of south central Africa are thought to be two of the five most important wilderness areas on Earth, the latter home to some of the largest and most popular parks and reserves in the world such as the Serengeti, Kruger, Etosha and Chobe National Parks, the Masai-Mara

¹ The United Nations Millennium Development Goal no.7 relates to environmental sustainability and specifically to integrating the principles of sustainable development into country policies and programs and reverse the loss of environmental resources (7a); reducing biodiversity loss, and achieving, by 2010, a significant reduction in the rate of loss (7b); halving, by 2015, the proportion of the population without sustainable access to safe drinking water and basic.

² Biodiversity hotspots are areas with extraordinary concentrations of endemic species but equally unparalleled loss of habitat (Myers et al., 2000).

Reserve, Ngorongoro Conservation Area and the Okavango Delta. Sub-Saharan Africa also has extensive inland waters including the Nile, Congo and Zambezi basins, the Great Lakes of the Rift Valley and the Okavango Delta in Botswana, harboring a vast repository of biodiversity. The Great Lakes, for example, collectively have the highest diversity of lake fish fauna in the world (International Union for Conservation of Nature, 1990) and are globally important centers of endemism³.

According to UN estimates, over 800 million people lived in SSA in 2010, with the growth rate reaching 2.45 percent per year in the same year (compared to the global rate of 1.16 percent per year). The region is also the least urbanized area (37.3 percent) in the world, but notably has the highest growth rate among the urban population, standing at 3.7 percent per year (Zuberi & Thomas, 2012). Nevertheless, the sharp increase in population in sub-Saharan Africa is putting pressure on its natural resources through increased agriculture, industrialization and unsustainable harvesting. While there have been noticeable improvements in access to improved water sources in the region, the population growth rate is fast outpacing these efforts resulting in more people being solely dependent on surface waters (Zuberi & Thomas, 2012). Compounding the problem is the fact many sub-Saharan African countries are still burdened with foreign debt and need to divert foreign exchange earned through exports and tourism to service this debt, leaving less for government spending on capital-intensive infrastructure projects and conservation.

Water, poverty and environment are intrinsically connected. The poor are the most vulnerable to environmental risk factors such as unsafe water and climate change. Areas of high endemism and biodiversity are usually relatively remote and as a result human communities living in close proximity to these areas tend to be impoverished with little to no access to improved water sources and sanitation facilities. Conversely, in the downstream reaches of rivers, acute water shortages are becoming the norm in some areas as the myriad stakeholders take up water to meet their disparate needs, e.g., heavy industry, irrigation for agriculture, fisheries, tourism, and municipal water and electricity utilities. In urban, peri-urban and suburban high-density areas of Africa the poor tend to lack access to improved sources of water and sanitation facilities resulting in environmental health problems. Compounding the problem is the fact the poor are often the least able to bring about improvements in their living standards due to the lack of economic and political power. Multi-sectoral integrated approaches provide a vehicle to break this vicious cycle and bring about improvements in each sector in turn.

At the World Summit on Sustainable Development in 2002, the WEHAB (water, environment, health, agriculture and biodiversity) concept was introduced, emphasizing five priority pillars of sustainable development: water and sanitation, energy, health, agriculture and biodiversity (UNESCAP, 2004). Parties to the 2004 United Nations Environment Program (UNEP) eighth special session of the Governing Council/Global Ministerial Environment Forum agreed that the UN system should 'improve the mainstreaming of Water-Poverty-Environment indicators into

³ Endemic species are plants and animals that are restricted to a specific area on Earth.

ongoing processes (such as Poverty Reduction Strategy Papers and other planning processes addressing these interlinkages), and actively use them to harmonize sectoral aid programming' (UNEP, 2004). This statement underscored the importance of integrating WEHAB priority issues.

One such integrated approach is the concept of integrated water resource management (IWRM) whereby river basins/catchments are managed in a holistic manner. IWRM as defined by the Global Water Partnership (GWP) is 'a process which promotes the coordinated development and management of water, land and related resources in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems' (GWP, 2000).

However, the IWRM approach does not have poverty alleviation as an explicit primary goal. Integrated conservation and development projects (ICDPs) went a step in this direction to link conservation, not water resources specifically, with poverty alleviation under one banner. However ICDPs generally focused on single species or protected areas and did not take into full consideration the ecosystem at large, and the services that we derive from them. As such, while ambitious in their objectives of integrating development needs with conservation of protected areas, ICDPs did not achieve the intended goals as efficiently or effectively as expected (Oglethorpe et al, 2008).

A new breed of integrated projects however was born out of the lessons learned during the ICDP era: population, health and environment (PHE) projects. PHE projects generally include a less complex and more targeted set of interventions than ICDPs, that include but are not limited to seeking synergistic outcomes in all three sectors through improving human health, ecosystem health and empowering women, often in partnerships between environmental and development or health organizations (Honzak, 2012). Donors find integrated PHE projects attractive as they can reach underserved populations in remote areas (regarding health programs) and address long-term environmental threats, such as population growth.

Rationale for Integration of WASH and Conservation

The impacts on human health linked to the lack of access to improved water and sanitation facilities are well known. These range from water-borne diarrheal diseases such as typhoid, giardia and cholera to water washed diseases such as roundworm, trachoma and scabies; and from water-based diseases such as bilharzia and guinea worm to vector-borne diseases such as malaria and river blindness (Wetlands International, 2010).

However, the impacts of poorly designed or ailing water supply and sanitation infrastructure receive relatively less attention, but are no less important, as ultimately they negatively affect

"Many ICDPs were implemented only by conservation groups, and while their expertise in conservation was excellent, they did not always have the knowledge and experience needed to undertake the development portion of the projects"

(USAID, 2008)

human health. Such adverse impacts can lead to some of the diseases already mentioned and can also result in other health problems associated with but not limited to the following factors: depletion of reservoirs, reduction in stream flow, lowering of water tables, discharge of effluents, contaminated runoff and nutrient enrichment. The impacts resulting from the preparation and construction of water and sanitation infrastructure (including land clearing, road, and pipeline construction) cannot be overlooked, such as the destruction of riverine habitat, filling of wetlands, alteration of drainage patterns, erosion and sediment run-off; all affecting wildlife populations and ecosystem functions. These impacts create a burden for society at large as the cost of down-stream water treatment for domestic and industrial uses can increase. Health problems arise as many people in developing countries extract water for domestic purposes from untreated surface waters; and recreation areas are lost. All of these costs translate into losses in economic productivity, declines in human health and ecosystem resilience.

Ecosystems are fragile interconnected webs of species and habitats that we are still to this day trying to fully comprehend. Small changes in their make-up can have grave repercussions for a whole suite of species, in turn impacting the resilience of ecosystems and their ability to withstand future stresses such as climate change. In the case of river catchments, changes in their hydrology – diversions of original channel or over-abstraction from wells and boreholes for example – can affect riverine wildlife communities but also downstream wetlands⁴ and marine ecosystems. The ramifications can also be felt on terrestrial biodiversity.

Water and sanitation projects are nevertheless a fundamental cornerstone of human development. Access to water (in relative proximity) translates into increased economic productivity and healthier communities. Well-planned sanitation infrastructures minimize the risk of acquiring the aforementioned water-borne diseases resulting in a healthier and more vibrant community and healthy ecosystems. Effective integrated water resources management applied to river basins (hereto referred to as integrated river basin management or IRBM) aims to ensure that the quality and quantity of water is suitable and sufficient for human consumption, two factors that are of paramount importance for the viability and sustainability of any water and sanitation project. For example, wetlands stabilize water levels by recharging groundwater systems and maintaining optimal baseflow in watercourses (Wetlands International, 2010). In other instances, the extensive management and protection of watersheds and construction and control of numerous large reservoirs can reduce the amount of costly water treatment infrastructure projects saving municipalities and taxpayers financial and human resources. These are win-win situations for both sectors but require integration at various levels, between different line agencies/ministries, donors, private sector and within communities.

⁴ The term ‘wetlands’, as used in this document, refers generally to areas with water (fresh, brackish, or salt) that is static or flowing, often found along coastlines, estuaries, floodplains, lakes, marshes and swamps, but does not exceed six meters.

The following case studies will highlight the various types of interventions that conservation and WASH practitioners have undertaken to mitigate these adverse environmental impacts going beyond PHE and IRBM projects. It will shine the spotlight on exemplary case studies where true integration of these two once-thought-to-be disparate sectors has occurred, and provide a non-exhaustive list of projects and programs that have successfully linked WASH and biodiversity conservation in Sub-Saharan Africa⁵.

The Objective

This paper endeavors to build the evidence base for how projects that integrate freshwater ecosystem conservation and water, sanitation and hygiene (WASH) interventions in sub-Saharan Africa can achieve simultaneous goals through more holistic approaches.

⁵ The focus is primarily on, but not limited to, freshwater ecosystem conservation.

Key Types of Interventions

INTEGRATED RIVER BASIN MANAGEMENT AND ENVIRONMENTAL FLOWS

The causal link between WASH and ecosystem health and integrity is most accentuated when dealing with freshwater ecosystems. Over-abstractions of freshwater for multiple uses, coupled with non-point source pollution from agriculture and poorly-designed sanitation facilities, or lack thereof, threaten the sustainability of water sources and the ecosystem services the water resource provides. Good quality and sufficient quantity of water are essential not just to the human communities' basic and economic needs but also to the riverine ecosystem, and further downstream, to the estuarine and marine ecosystems. Conversely, poor land management can negatively affect the riverine ecosystem, causing unintended consequences to human and wildlife communities alike.

“Addressing the water needs of aquatic ecosystems will often mean reducing the water use of one or more sectors. These are tough choices, but they have to be made to ensure the long-term health of the basin and the activities it encompasses.”

(Dyson et al, 2008)

Integrated River Basin Management and basin-planning have a role to play in such instances, delivering economic efficiency, social equity and environmental sustainability vis-à-vis water within a basin (UNESCO, 2009), with the ultimate goal being to achieve water security across all sectors and stakeholders in the basin. For example, the European Water Framework Directive is based on such a model of integrated river basin management and is widely lauded as a milestone in water legislation globally. Basin-level planning in

turn allows water managers to focus on the linkages between water resources and land management, taking into account WASH strategies and landscape-level conservation efforts.

As such, it is important to calculate the optimal flow of water required to maintain an ecosystem in close-to-pristine condition, taking into consideration the environmental, social and economic needs. This optimal flow is known as the Environmental Flow.

There are a myriad of methods for determining this environmental flow, but the main tenet is the same throughout: environmental protection and needs of people and industry must be finely balanced. Scenario-based Environmental Flow Assessments (EFAs) provide practitioners a means to assess the types of conservation and water management interventions that will best attain project goals. EFAs are becoming the global standard for determining the amount of water required to sustain aquatic ecosystems and satisfy basic human needs, in turn informing integrated river basin management and planning. There is great interest from the donor community in the environmental

flow approach, as it ultimately offers an effective means to mainstream the environment – particularly freshwater ecosystems – into national development planning, including poverty reduction strategy papers (PRSPs) and strategies to address the MDGs (Forslund et al., 2009).

In the case of the Mara River, which flows through Tanzania and Kenya's most popular Serengeti and Masai Mara national parks respectively, higher rates of water abstraction due to increases in irrigated agriculture and industrial activity are threatening to severely degrade the riverine ecosystem and adversely affect the basic water needs of people living along the river (Lake Victoria Basin Commission & Worldwide Fund for Nature-EARPO, 2010). As a result, Worldwide Fund for Nature's Eastern Africa Regional Program Office (WWF-EARPO), in partnership with the Global Water for Sustainability Program (GLOWS) and national entities from Tanzania and Kenya, underwent a U.S. Agency for International Development (USAID)-funded assessment of the environmental flow required to halt this alarming trend. A 'reserve flow' was calculated and varied considerably depending on the time of year, mimicking the natural state of the river's regime. During drought years this 'reserve flow' was not being met in the middle and upper reaches of the river to sustain the river ecosystem (which ultimate could have grave repercussions on the ecosystem and the world-renowned migration of wildebeest in the region) and provide for basic domestic water use. The EFA provided numerous prescriptions to achieve the minimum reserve flow throughout the year including the need to comprehensively monitor flow levels throughout the basin; control abstraction permits; build the capacity of water managers and users in the basin to consider reserve flow requirements in water resource permitting and to implement soil and water conservation practices respectively; and develop sustainable methods of harvesting and storing wet season flows for consumptive use during dry seasons. On November 14, 2011, the new phase of the EFA was launched, with sampling events already undertaken at low- and high-flow conditions. The latter will help inform a recommended reserve flow for the Mara River.

The Wami sub-basin in Tanzania also encompasses several protected areas. The Nguru Forest Reserve within the Eastern Arc Mountains is renowned for high concentrations of endemic species and the country's first coastal protected area, Saadani National Park, is situated at the mouth of the Wami River estuary. The Wami River Basin is thought to be in a reasonably healthy condition but increasing encroachment of water sources, upstream abstractions, and groundwater pollution pose looming threats to the sustainability of the ecosystem of the lower Wami. In the five districts within the Wami sub-basin, less than a quarter of the population has access to potable water (IUCN Eastern and Southern Africa Programme, 2010).

An EFA was therefore undertaken in the basin with funding from USAID and the Coca-Cola Company, as part of the Tanzania Water and Development Alliance (WADA). Florida International University and the University of Rhode Island Coastal Resources Center (URI CRC) worked in tandem with the Wami-Ruvu River Basin Office and other local stakeholders to ascertain the recommended environmental flow to ensure enough freshwater throughout the year for basic domestic uses as well as to maintain minimum water levels in the biologically-rich swamps and estuary. The latter, protected by the Saadani National Park, is a critical habitat for commercially important fish species as well as coastal shrimp, and is reliant on a good flow of freshwater and sediment delivery from the Wami River. The findings provided the building blocks for the design of

a monitoring and research program that will inform an adaptive water management approach for the Wami River sub-basin.

While the Wami River is thought to be relatively intact with regard to its ecological integrity, the same cannot be said about another river basin in Tanzania: the Great Ruaha river basin. Certain reaches of the river, namely those that feed the Usangu wetland and flow through the Ruaha National Park, are completely drying up during the dry season (and have done so since 1993) due to abstractions and catchment modifications (Dickens, 2011). The result has been mass mortality of fish and hippopotami (Kashaigili et al., 2005) – which is having ripple effects throughout the region’s riverine and terrestrial ecosystems – as well as impacts on the human communities that rely on the water body for potable water and electricity in the form of hydropower. An EFA was undertaken led by WWF and the Danish International Development Agency (DANIDA), drawing from almost a decade-worth of research and studies into the basin. Recommendations were generated for the management of the basin that take into account future scenarios and the now well-understood dynamics of the river basin. Specific measures were put forward for implementation including: the transfer of water across rivers via artificial channels, historical river channels or a new barrier and transfer pipeline; construction of an impoundment on a tributary of the Ruaha, and encouragement of better water conservation and demand management in the agricultural sector. Other measures included the establishment of water user associations and a catchment committee, the control of illegal water abstraction, development of alternative non-farming related livelihoods and the development of alternative water sources, resulting in certain reaches of the river flowing throughout the year, even during the dry season (Dickens, 2011).

In 2002, a new National Water Policy for Tanzania was approved that provides for the protection of environmental flows, recognizing that water is a scarce resource and that the ecosystem services derived from watersheds play a pivotal role in the national economy. Under the new policy and the Water Resources Management Act of 2009, water for the environment is accorded second priority after basic human needs: a big concession. Tanzania’s policies lead the way for effective and forward-thinking environmental flow prescriptions that in time have a chance of reversing the degradation. They also provide a model for other sub-Saharan African countries of how to ingrain the enabling conditions for environmental flows that in turn can better guide integrated river basin management and basin plans.

The International Union for the Conservation of Nature (IUCN) commissioned a review of the aforementioned EFAs undertaken in Tanzania and Kenya and then in 2010, organized a workshop in Tanzania to present the findings and provide a roadmap to operationalize and implement the respective environmental flows (IUCN, 2010). WWF also supported a similar workshop in Naivasha, Kenya on environmental flows in the Ruaha, Pangani and Mara river basins (plus the Zambezi in southern Africa). With this support, the basins developed action plans and have begun to implement these.

PAYMENTS FOR WATERSHED SERVICES

In the developing world, many economic incentive schemes have been implemented to inject much-needed funding into natural resource management and conservation efforts. One such innovative and sustainable financing mechanism that has increasingly gained support worldwide is the concept of payments for environmental services (PES; also referred to as payments for ecosystem services, or in this case Payments for Watershed Services or PWS).

Many upland and mountain communities manage watersheds in ways that benefit lowland and downstream communities, utility companies and cities, but most do not receive any compensation for providing ecosystem services. These watershed services fall under four broad categories: provisioning, such as the production of food, clean water, timber, hydroelectric power and non-timber forest products; regulating, such as the control of soil erosion and sedimentation, regulation of water flows and water purification; supporting, such as nutrient cycles, environmental flows, crop pollination, and wild species populations; and cultural, such as spiritual, landscape and recreational benefits (UN, 2005). Economic incentives must be created for managing and sustaining watershed services that are essential for upstream and downstream human and wildlife health.

The PWS approach entails the payment from beneficiaries of watershed services to compensate natural resource stewards for the services they provide while aligning incentives⁶ for local communities, investors and other stakeholders. It is one of many conservation finance mechanisms available to governments, non-governmental organizations (NGOs), conservation organizations and development agencies. Nevertheless, it is an attractive approach in that it can generate additional and sustainable funding for freshwater and terrestrial biodiversity conservation while providing a platform for mutual understanding between stakeholders historically at odds with one another, thereby encouraging better governance structures and better alignment of land use and water management policies. Finally, PWS can represent a cost effective way to fund the achievement of multiple development goals by directly supporting targets associated with human health through improvements in water quality and quantity. PWS also supports the maintenance of other ecosystem services that contribute to food security (through services such as pollination, soil retention, and nutrient cycling), income generation (through agricultural production and cultural services associated with tourism) and physical security (through regulation of floods.)

Natural resource economic valuation is an important tool in conservation. It places a monetary value on natural resources – wildlife, protected areas and ecosystem services – thereby providing

⁶ PWS provides an opportunity for governments to improve land tenure issues, eliminate subsidies harmful to biodiversity and positively affect poverty indices in remote areas. Communities in turn receive training through extension services, as well as direct payments to take up new sustainable land management approaches and technologies. Payments from private companies deliver a return on their investment in the form of reduced operation and maintenance costs, for example, and increased lifespan of reservoirs.

governments, private investors and local communities an economic incentive to protect the resources. In Southern Africa for example, research work carried out in the Zambezi Basin shows that natural wetlands have a net present value of more than USD \$16 million in terms of groundwater recharge and an estimated USD \$45 million in water purification and treatment services (Turpie et al., 1999). The total economic value of aquatic ecosystem services in developing countries – calculated from a review of 27 existing valuation studies – is estimated in the order of USD \$30 to USD \$3,000/ha/year equating to USD \$10 to USD \$230/capita/year (Korsgaard and Schou, 2010).

In Uganda, forest catchment protection and erosion control services were estimated to contribute more than USD \$140 million a year (in 2012 prices) to the national economy. Given the lack of sewage systems in most large towns and cities of Uganda (including the capital, Kampala) an estimated 725,000 people were reliant on natural wetlands for wastewater retention and purification services (Emerton and Muramira, 1999).

However, a regional review of PWS in sub-Saharan Africa (Ferraro, 2009) undertaken in 2009 makes the case that while there is great potential for this incentive-based conservation approach, the reality is there are many barriers to its effective implementation. Obstacles to the development of PES schemes in general in Africa include: lack of technical and market information, limited institutional experience, inadequate legal framework, limited successful business models, and equity concerns. Fundamental barriers specific to PWS implementation include: financial health of institutions (to make payments) as well as lack of hydroelectric sources (that tend to be big funders for PWS services), few formal water delivery systems and connected consumers, and very low tax revenue to fund PWS programs. PES inventories were commissioned by the Katoomba Group in Kenya, Madagascar, South Africa, Tanzania and Uganda. As of 2008, 20 biodiversity projects were identified, but only four were making payments; and of the 12 water projects assessed only two were making payments (Stanton et al., 2010). Having said this, pilot PES projects, while perhaps not necessarily making consistent direct payments, are breaking new ground in sub-Saharan Africa and concomitantly building the national institutional and technical capacity, slowly chipping away at the obstacles and barriers to PES.

Another PES example is the Tana basin in Kenya, with five different projects undertaking PES-related work including the Green Water Credits (GWC) work undertaken by the International Fund for Agricultural Development (IFAD) and the World Soil Information Centre; the Upper Tana Water

BOX 1. Integrating Critical Environmental Issues into WASH Cluster Emergency Activities

WASH interventions are generally reliant on natural resources and processes, whether indirectly or directly. Conversely, WASH services produce outputs that are potentially detrimental to the environment if not managed properly.

Acknowledging these concepts, CARE International and ProAct Network compiled practical and relevant technical guidance on environmental issues that need to be taken into consideration during emergency WASH responses. The peer-reviewed guidance and technical documentation, commissioned by the global WASH Cluster, is intended for WASH practitioners to be more proactive vis-à-vis environmental issues. It lays out key considerations for water, sanitation and hygiene including embracing an integrated water resource management approach and the fact that integration of environmental issues into WASH activities in turn results in better and healthier living conditions for the target affected populations. Action points are offered that provide WASH practitioners with tangible steps to take toward integrating environmental issues into WASH interventions; these include:

- Use of rapid WASH-oriented environmental assessment, availing of environmental expertise wherever necessary;*
- Identification of fundamental WASH-Environment monitoring indicators;*
- Reference existing guidance and standards for siting and construction of WASH facilities, for example those set by the Sphere Project's Humanitarian Charter and Minimum Standards in Humanitarian Response handbook (see Online Resources section);*
- Identification of qualified local partners for support with natural resource-related issues (i.e. groundwater facilities, waste disposal sites);*
- Assessment of the environmental impacts of immediate post-disaster WASH assistance, including consideration of the potential for longer term environmental impacts.*

A simple and easy-to-use checklist of potential environmental impacts was produced for common WASH interventions, broken down into sub-sector activities and impacts on atmospheric, aquatic, terrestrial and social environment. Technical papers on environmental considerations for disaster waste management, vector control chemicals, re-use and recycling disaster waste and water treatment were also compiled (See Online Resources section for link to these).

Fund implemented by The Nature Conservancy; the Global Environmental Facility (GEF)/UNEP/IFAD Mt. Kenya East Pilot Project for Natural Resource Management; and the Pro-Poor Rewards for Environmental Services in Africa (PRESA) work being done along the Kapingazi sub-catchment. This is a testament to the importance attached to this basin, which ultimately is the main source of water for Nairobi's inhabitants, produces hydroelectricity, and supplies irrigation water to some of the largest public schemes in Kenya. The basin also encompasses a variety of

important protected areas that are wholly or partly reliant on the environmental flows from the Tana River including the Tana River Primate National Reserve; the Arawale National Reserve; Mwea National Reserve; Meru, Kora, Mwingi and Bisanadi conservation areas; and the Meru and Kora National Parks.

The experiences of the Mt. Kenya East Pilot Project and the knowledge generated under the GWC and PRESA initiatives have in turn informed the design of a USD \$68 million eight-year project (2012-2020) to be funded by IFAD, the Spanish Trust Fund and the Government of Kenya. This project strives to cover all 24 river basins and tributaries that feed into the Tana River (IFAD, 2012). Under the Upper Tana Catchment Natural Resources Management Project (UTaNRMP), rewards for environmental services will be in the form of commercially sustainable investments in improved soil and water management – rather than direct cash payments – incorporating performance-based conditions.

Across the border in Tanzania, the Equitable Payments for Watershed Services (EPWS) in Tanzania and Kenya (led by CARE Tanzania and WWF) is showing positive results in rural income-generation and water quality improvements. Farmers completed extensive training on land use practices including terracing, agroforestry/reforestation, improved animal husbandry and restoration of riparian areas and subsequently implemented interventions on the ground. Improved seeds and animal manure were also made accessible through extension services. Since the inception of the project, run off has been drastically reduced resulting in less soil erosion and higher soil moisture content, translating into three times greater crop yields; with the surplus sold in markets earning farmers about USD \$7,000, mainly from beans, tomato and cabbage (Lopa, 2011). This pilot has also prompted the Government of Tanzania to include PES as a conservation instrument in the 2009 Water Resources Management Act.

Many other organizations are now involved in PES in Tanzania to a certain degree: Wildlife Conservation Society (WCS) of Tanzania is implementing a PES project in North Uluguru Mountains; Sokoine University of Agriculture is providing trainings on PES; while the Food and Agriculture Organization (FAO) is assessing the potential for PES in the Kagera basin in Bukoba. The Working for Water and Working for Wetlands Programs in South Africa are two other successful examples of PWS initiatives that have consistently made payments to communities (see Case Study Briefs for more information).

POPULATION, HEALTH AND ENVIRONMENT PROJECTS

Population, Health and Environment (PHE) projects have been implemented over the last decade in order to meet the health and livelihood needs of remote or underserved communities while simultaneously ensuring the sustainability of the environment they are intrinsically dependent on. In many cases conservation organizations integrate a health component into their programs in order to simultaneously improve access to health services, especially family planning and reproductive health care (FP/RH), while also building community capacity to better manage natural resources. These integrated PHE approaches provide immediate and tangible results that will foster community goodwill and buy-in for the natural resource management components of the program that tend to have long-term horizons.

“The ethical contradiction of protecting animals but not people is a thorn that can be removed by earnest PHE and livelihood interventions”

(D Carr, 2008)

A large proportion of PHE projects include increasing access to FP/RH as many rural communities’ impacts on their surroundings – in the form of habitat destruction, water pollution and over-exploitation of wildlife resources – are compounded by population pressure. This is also a reflection of donor funding (mostly, but not limited to USAID’s Office of Population and Reproductive Health) and the fact that population funds are the driving force for PHE programs (D’Agnes, 2012). In the case of sub-Saharan Africa, HIV/AIDS is also prevalent and of grave consequence to rural communities and this is reflected in the number of HIV/AIDS-related components in USAID-funded PHE projects in the region, especially East Africa. Again, this could also be influenced by the US President’s Emergency Plan for AIDS Relief (PEPFAR) funding, given that 90 percent of global PEPFAR funding in FY2010 was approved for sub-Saharan Africa. Countries such as Kenya, Tanzania, Uganda, Rwanda and Ethiopia are PEPFAR focus countries. USAID supported the establishment of the East Africa PHE Network in 2007, with the Network’s secretariat located in Kenya’s National Coordinating Agency for Population and Development.

Given the integrated nature of PHE projects, water, sanitation and hygiene do invariably figure in the suite of interventions, albeit not usually as a main focus. In the case of the Blue Ventures Family Planning Project in Madagascar, the main thrust of the project revolves around FP. However, one in nine children in this remote part of Madagascar do not live to the age of five, mainly as a result of diarrheal diseases (V Mohan, 2012). As a result sanitation and hygiene are very important issues in this area. The coastal area is remote and dry, and as a result access to water is limited and saltwater intrusion is on the increase. Only half of the communities have their own wells, but even these are increasingly more saline, and therefore less potable. Assessments are being undertaken to determine

the optimal sites for boreholes, always in consultation with the communities. In one instance there were cases of salmonella in fish entering the European Union (EU) that was traced back to this area of Madagascar; and possibly a direct result of open defecation in the communities in question (Mohan, 2012). The project is therefore tackling the sanitation problem and working on behavior change using the Community-Led Total Sanitation (CLTS) approach. Community-based education on hand washing is being funded by USAID until June 2012, with the hope that it will be extended to 2013.

Blue Ventures used the CLTS approach to ‘trigger’ a community into action on hygiene and sanitation including community walks/transects along areas of open defecation where members of the community are confronted with the negative effects of their actions. The linkages between bad hygiene and sanitation practices are depicted in pictures and diagrams to make the fecal-oral transmission as obvious as possible. The latter is ultimately to shock the people into action and behavior change.

Communities often rank clean water high in their list of priorities, with sanitation garnering less attention. In the case of the Lake Tanganyika Catchment Reforestation and Education (TACARE) Project in Tanzania, implemented by the Jane Goodall Institute (JGI), an assessment clearly showed that village leaders and individuals valued better health – with an emphasis on clean water and reduction in water-borne diseases like cholera – and poverty reduction above conservation activities (JGI, 2004). Paradoxically, this is where PHE projects have been seen to be effective in dealing with conservation of biodiversity – where other conservation projects have failed – particularly in remote areas. By focusing on the immediate needs of communities such as water and sanitation, well-executed PHE projects can foment community goodwill and buy-in for the often undervalued impacts of conservation. This was also apparent during a PHE situational analysis of the Saadani National Park Area (SANAPA) in Tanzania as part of the USAID-funded Building Actors and Leaders for Advancing Community Excellence in Development (BALANCED) Project, where of the 44 percent of respondents who actually perceived positive impacts coming from the natural resource management (NRM) activities only about half stated that the activities were beneficial because they protected fisheries. On the other hand, one-third of respondents saw benefits not only to wildlife resources but also because SANAPA supported community development (i.e., building of school, financial support and food aid) in the villages around the park (The BALANCED Project, 2010).

That is not to say that WASH cannot and has not been explicitly integrated with biodiversity conservation through PHE projects in sub-Saharan Africa. Conservation Through Public Health (CTPH), a non-profit organization in Uganda, has focused its efforts on gorilla conservation in and around the Bwindi Impenetrable National Park using a multi-disciplinary PHE approach

integrating wildlife conservation and community public health interventions. Due to habitat

BOX 2. Awareness-Raising and Education on WASH: Nosivolo River, Madagascar

Protecting the Nosivolo River to Better Serve Water, Health and Sanitation is a project implemented by Conservation International (CI) Madagascar with support from the Durrell Wildlife Conservation Trust and the Jersey Overseas Aid Commission. The project acknowledges the ecosystem services the river and its watershed provide to the local population in the form of irrigation water, flood and erosion control, water filtration and provision, not to mention the intrinsic conservation value. It complements the conservation activities carried out in the area since 2009 to protect the river, home to 19 endemic fish species. These activities ultimately culminated in the river's designation as a Ramsar site – the first such designation in Madagascar – on September 17, 2010.

Poor hygiene and sanitation conditions in the riparian communities is reflected in the high incidence of waterborne diseases such as diarrhea, malnutrition, intestinal parasites and dysentery among local communities. These diseases in turn have a detrimental effect on the river's water quality. In response, the project conducted an awareness, education and capacity building campaign in the area, focusing on the direct link between improvement of hygiene and sanitation practices and the conservation of the endangered fish species and the provision of vital ecosystem services the river affords the communities. Project partners trained peer educators (selected locally and multidisciplinary in nature, including forestry, biology, health, education and communications), conducted awareness raising at schools and in the general community, and advocated to authorities and local leaders for improved planning and collaboration. Over 40 villages and 60 schools participate in the activities, reaching over 74,000 inhabitants, just under half of the total District's population. The other 62 villages that were not directly engaged in the campaign requested to participate in the project when they saw the improvement in health and sanitation practices of participating communities, testimony to the success of the project. Active participation of the local communities was of paramount importance to the viability and ultimate success of the project, while the training of peer educators guaranteed the sustainability of the project's original activities.

encroachment and concomitant poor hygiene, human-borne infectious diseases such as scabies have spread to the gorilla populations over the years causing the death of an infant gorilla and morbidity in the general gorilla population. Through grassroots campaigns the project is not only educating communities about diseases such as scabies and tuberculosis and how to avoid them through proper hygiene, but it is also highlighting the link between these diseases and their livelihoods and ecotourism (itself the livelihood of a large portion of the population).

Case Study Briefs

Based on a preliminary review of existing WASH and conservation projects in SSA, four case study examples were identified which illustrate important aspects of integration and the benefits of these approaches.

RURAL ACCESS TO NEW OPPORTUNITIES FOR HEALTH AND WATER RESOURCE MANAGEMENT (RANON'ALA) – MADAGASCAR

Ranon'ala is a USAID-funded USD \$7.5 million agreement (2010 – 2013) targeting over 125,000 vulnerable people in 14 rural communities of northeastern Madagascar. The goal of the project is to provide vulnerable and poor communities in the remote eastern coastal areas of the country – in the Makira forest corridor area – access to assured, economically viable and safe water and sanitation services for improved health and water resource management. With the collaboration of Catholic Relief Services (CRS), Caritas Madagascar, Conservation International (CI), RTI International, Bushproof, Sandandrano and Human Network International, the project aims to improve access to water infrastructure at the commune level; increase appropriate and diverse use of sustainable, safe water supply and sanitation services; and support the protection and management of water resources in a sustainable fashion. The project is taking the Community-led Total Sanitation (CLTS) and Participatory Hygiene and Sanitation Transformation (PHAST) approaches to effect behavioral change amongst the community as a whole vis-à-vis latrine use and sanitation, scaling up work initiated by the UN Children's Fund (UNICEF), WaterAid and the USAID-supported Hygiene for Improvement Project in Madagascar. Two governance-strengthening activities, Savings and Internal Lending Communities (SILC) and Commune Water and Sanitation Business Plans, are designed to ensure the economic viability and sustainability of the various infrastructure projects into the future.

Originally, the project intended to install more than 300 boreholes and pumps and 10 water supply systems to provide water to 4,271 private water taps and 427 community water points. However, the 2009 political situation resulted in the suspension of United States Government financial and technical assistance, necessitating the reprogramming of WASH activities through NGOs, private sector and community leaders (Noelson, 2012), and resulting in the delay of activities. To date, the Ranon'ala Project has developed an approach to link the protection of water sources and WASH services and products. Working alongside community stakeholders, the project team conducted a detailed baseline survey to assess current practices in water and sanitation, and initiated community-level water supply and sanitation planning. Action plans and strategies were devised to protect these existing water sources including the use of community fines, reforestation and fencing of catchment areas and the application of collective responsibility. Ultimately the project endeavors to manage water and sanitation resources in an integrated and holistic way, seeking synergies with other projects and partners wherever possible and appropriate.

PANGANI BASIN ENVIRONMENTAL FLOW ASSESSMENT - TANZANIA

The Pangani River Basin in northeast Tanzania spans an area of over 43,000 km². The basin encompasses Mt. Kilimanjaro National Park and Mt. Meru (where the Pangani River has its source) and the Pare and Usambara Mountains in the north, while lowlands make up about 50 percent of the basin, with patches of forest (mangrove, coastal, afro-montane and riverine forest as well as Miombo woodland), including parts of Arusha National Park. These mountains and forests harbor an important array of species and endemism, as well as including Mt. Kilimanjaro, the tallest mountain in Africa and arguably the most emblematic. The basin is also the source of 17 percent of Tanzania's electricity in the form of hydroelectricity. Other main uses of the water include irrigation for agriculture and urban and industrial demands. The demand on the water resource in the Basin is increasing dramatically due to increased irrigation and urban demands, creating a situation of water stress. Meanwhile the Kirau Swamp, one of the largest wetlands in the basin, is drying up as the water flow is being regulated at the Nyumba ya Mungu Dam.

The Pangani River Basin Management Project is funded by the IUCN Water & Nature Initiative, the Government of Tanzania, the European Commission through a grant from the Africa, Caribbean and Pacific (ACP-EU) Water Facility,⁷ and the Global Environment Facility through the UN Development Program (UNDP). The Project is implemented by the Pangani Basin Water Board with technical assistance from IUCN, Netherlands Development Organisation (SNV) and the local NGO PAMOJA. The project is generating technical information and developing participatory fora to strengthen Integrated Water Resources Management in the Pangani Basin. One of four components focuses on assessing the environmental flows within the basin.

The Pangani River Basin Flow Assessment developed an understanding of the hydrology of the basin, the flow dynamics within the ecosystem, and the links between the latter and socioeconomic values of the water resource. Specific outputs included a hydrology model for the basin; an assessment of the health of the rivers and estuaries within the basin; a baseline socio-economic assessment report; numerous specialist studies and reports including hydropower operations, riparian vegetation, fisheries, macroeconomics and climate change; and a flow assessment scenario evaluation Decision Support System (DSS) tool. Fifteen scenarios were selected, all including basic human needs, domestic, industrial, agriculture, and hydroelectric power generation as categories of major users. One of the main "take home" messages from the scenarios generated is that agriculture will be the prevailing land use and as such increased water-use efficiency should be the top priority for water managers in the basin (Pangani Basin Water Office/IUCN, 2009). Managers participated in capacity building and training on

⁷ The EU, through its Water Initiative (EUWI), created the ACP-EU (Africa, Caribbean and Pacific) Water Facility in 2004 to support the improvement of water management and governance, provide well-needed funding for water and sanitation infrastructure, and encourage civil society initiatives in the sector.

the environmental flow concept and on interpreting the outputs from the scenarios developed through the somewhat complex DSS tool.

WORKING FOR WETLANDS - SOUTH AFRICA

South Africa has taken great strides to provide universal access to potable water for its population since the end of Apartheid. In 1994, 59 percent of the 39 million South Africans had access to basic water services, while 16 million were deprived of access. By 2008, about 88 percent of the population had access to basic water services (DWAF, 2009). An estimated six million are therefore still not able to access safe basic potable water. Through the years however, increased economic development and urbanization have taken its toll on South Africa's wetlands. Understanding that wetlands are critical for water storage and filtration, and the fact unemployment in high-density impoverished areas was still high, the South African government, through its departments of Environmental Affairs and Tourism, Agriculture, and Water Affairs and Forestry and with the support of the South African National Biodiversity Institute, rolled out its now hugely successful *Working for Water* program. The main thrust of the program is to remove water-thirsty invasive alien plants that are threatening indigenous biodiversity, the ecological function of natural water systems, adding to water security woes. Started in 1995, the program, which has expanded to include *Working for Wetlands*, has cleared over one million hectares of invasive alien plants while providing an estimated 20,000 jobs per year for the most marginalized from society, including skills training. The programs currently encompass over 300 projects spanning all of South Africa's provinces, including catchment management programs and wetland restoration.

Outside Pretoria, one freshwater wetland supplies about 3 percent of the city's water and is in fact owned by the City of Tshwane Metropolitan Municipality (which includes Pretoria). The Rietvlei wetland is located inside the 4,000 hectare Rietvlei Nature Reserve, which is home to buffalo, rhino, hippo and cheetah. Given that the rest of the water for Pretoria must be brought in from outside, there is a strong economic motivation to rehabilitate the wetland and peat land thereby restoring the natural diffuse flow of water through the wetland and reviving the ecosystem service it provides to the Municipality in the form of water purification. Over 62 workers recruited from nearby township communities have built gabions (concrete and earth structures to control erosion) and removed invasive alien vegetation. Such interventions are bearing fruit, with reeds re-establishing throughout the wetland, water being distributed evenly, and birds and frogs starting to come back to the area. A study has confirmed the return on investment of at least USD \$1 million to date by the government departments' rehabilitation of the Rietvlei wetland (SANBI, 2008).

Working for Water and *Working for Wetlands* are successful examples of payment for watershed services. The "services" being provided in these cases are increased water flow resulting from the removal of invasive alien plants and the purification of water that restored wetlands provide. While the government pays for a lion's share of the payments to community members from its poverty relief

funds, private organizations including the forestry sector and farmers are joining the fray. The success of this PWS program is due to the stability, political will, legislative capacity, and secure governance structure that South Africa possesses (Barnes *et al.*, 2007). If other sub-Saharan countries are to emulate South Africa's success, they must first ensure these measures are in place.

SUSTAINABLE FISHERIES (BA-NAFAA) PROJECT – THE GAMBIA-SENEGAL

A five-year regional initiative funded by USAID's West Africa Regional Mission and implemented through the URI CRC cooperative agreement on Sustainable Coastal Communities and Ecosystems (SUCCESS), Ba-Nafaa focuses its efforts on sustainable fisheries management in The Gambia and Senegal. WWF's West Africa Marine EcoRegional Program is a key partner, given that unsustainable fishing practices are threatening the marine ecosystem at large in the area. By encouraging integrated management approaches at the local and regional scale, the project aims to reduce overharvesting of key species and reduce by-catch of endangered species and juvenile fishes. By taking an ecosystem and threats-based approach, the critical habitats of key marine species can be protected and threats on these reduced.

The project is in its third year and has initiated co-management planning processes for the Tanbi mangrove protected area and sole fishery landing sites; established management committees; undertaken feasibility studies on village banking; piloted aquaculture farms for enhanced production of oysters; and supported the international certification of sustainable Gambian sole fisheries products (CRC, 2011). The project has also initiated water quality monitoring of the Tanbi wetland (a Ramsar site⁸) and bi-valve harvesting areas to ascertain the health risks and potential for starting a shellfish sanitation program that in turn could open new markets for fresh/raw products.

The communities identified water and sanitation as an issue in almost all the sole landing sites. As a result, the project undertook needs assessments in 16 sites (nine oyster and seven fishery landing sites). The project will focus on six or seven of these fish landing and public fish market sites, and once stakeholder consultations are undertaken, will pinpoint the optimal interventions (i.e., in areas where high water tables and sandy soils compost toilets or septic tanks will be more appropriate) to upgrade and improve water and sanitary facilities. The program will also target household and oyster processing sanitary facilities in nine communities where oyster harvesting is prevalent. This will not only improve hygiene within the community but will also have a positive effect on the sanitary quality of fish supplies for domestic and export markets thereby bolstering the industry that provides sustainable livelihoods for the women oyster harvesters and fisherfolk. The improved sanitation conditions will also have a direct benefit on the ecological integrity of the important Tanbi wetland.

⁸ Wetlands that are deemed to be of 'international importance' under the Ramsar Convention are known as Ramsar Sites. The Convention supports the conservation and sustainable utilization of wetlands around the world.

BOX 3. IUCN's Water and Nature Initiative

Launched in 2001, IUCN's Water and Nature Initiative (WANI) is an action oriented program that supports the mainstreaming of environmental and social issues into water resources planning and management. The program has worked in more than 30 countries using ecosystem management as a way of integrating land, water, and biodiversity management with the needs of communities. WANI is structured around six strategic objectives:

- Demonstrate ecosystem management in river basins*
- Support wise governance of water resources and wetlands*
- Develop and apply economic tools and incentive measures*
- Empower people to participate in sustainable water management*
- Improve knowledge to support decision making*
- Learn lessons to raise awareness on wise water use*

WANI's main vehicle to drive the IWRM agenda are demonstration projects including the development of freshwater biodiversity assessments, the support of water policies and laws that enable transparent definition of rights, roles and responsibilities, including sufficient allocation of water to sustain healthy ecosystems, IWRM planning coupled with pilot activities, and the support of the concept of environmental flows. Having piloted the 2002 Tanzanian National Water Policy in the Pangani Basin through the assessment of environmental flows (see Case Study Brief section above), WANI is looking to replicate the approach in other basins in Tanzania.

In the Okavango Delta in Botswana community support for a comprehensive water management plan led to pilot projects; WANI demonstrated how managers can assess environmental flows in the transboundary Limpopo Basin; while in the Volta River Basin in Ghana and Burkina Faso WANI supported the formation of water user associations that linked communities across borders. Case Studies in wetland valuation were developed for the Barotse floodplain in Zambia, the Tana River in Kenya and the Nakivubo swamp in Uganda. WANI is ultimately supporting scientifically-robust research and its practical application through pilot and demonstration projects, whilst always advocating for earnest IWRM approaches by means of publications such as 'Flow: The essentials of environmental flows' and 'Value : Counting ecosystems as water infrastructure.'

Lessons Learned

Throughout the review of existing projects, several key lessons emerged from the projects and key informants involved in this study. The key points are summarized here.

Linking various sectors such as WASH, forestry, agriculture, population and community development can result in cost and effort sharing which in turn can increase the effectiveness of the project including improved conservation and improved livelihoods and health. This was seen to be the case in the TACARE project implemented by the Jane Goodall Institute in Tanzania for example (Macharia, 2004).

PHE projects are producing good results throughout sub-Saharan Africa. These results are generally more pronounced within the family planning, reproductive health, and HIV/AIDS sectors. There is **potential for donors and implementers to achieve great results within the WASH sector through PHE projects**, even if WASH is not the primary goal or a large component of a PHE approach.

Communities can receive tangible short-term gains from an integrated project even if there is no explicit link between WASH and conservation drawing a causal relationship between the ecosystem and the WASH intervention. For example, a PHE project's health intervention can create a foundation of trust within the community, and provide the enabling environment for the project to attain longer-term objectives related to conservation.

Integration of a multitude of sectors entails the integration of a host of organizations and practitioners that often requires coordination among many partners. Nonetheless, **if this integration is limited to more targeted WASH and conservation projects, particularly those that deal with freshwater ecosystems where the causal link is greatest – such as wetlands – the implementation of such projects may be streamlined and outcomes more salient.**

Environmental flows and EFAs have the potential to be suitable vehicles to integrate WASH and freshwater ecosystem conservation aspects. For example, the environmental flow work that has been undertaken in the Greater Ruaha River in Tanzania is showing positive results with regard to sustained flows during dry season and stakeholder's capacity and attitudes. However, more EFA prescriptions must be put into practice and implemented on the ground if they are to have tangible results for both communities and ecosystems.

More work is required to bridge the gap between research and assessments to operationalization and implementation of integrated WASH and conservation interventions. For example, the Pangani River Basin Project in Tanzania framed the EFA studies with the backdrop of various future development scenarios for the basin, making the information more readily accessible for management purposes. However, the scenarios were not, as of the end of 2009, used to inform implementation of basin water-resource management plans (PBWO/IUCN, 2009). In the case of the Pangani Basin, extensive training of local personnel has helped put the Basin Water Office in good stead to move from scenario generation to implementation.

Basin plans provide the apt platform for EFA prescriptions to be implemented. In the case of transboundary river basins, such as the Zambezi, implementing such a plan can have its pitfalls. The Zambezi Action Plan, over 20 years since its creation, is thought to be ineffective, in that no integrated basin wide management plan has been drawn up yet. This is undoubtedly due to the transboundary nature of the basin and the complexities that come with having eight countries sharing the one river basin (Angola, Zambia, Zimbabwe, Namibia, Botswana, Malawi, Tanzania and Mozambique). Nevertheless, the overly rigid subprojects and strict “output-oriented” plan was also deemed to have hindered the overall goal (Lindemann, 2005).

Water resource management interventions must be applied with caution and as much scientific rigor as possible to take into account complex river basin and wildlife dynamics. Some advocate the resolution of downstream water scarcity by developing locally available untapped water resources such as boreholes or stock dams in the Ruaha National Park (Lankford, *et al*, 2004). However, similar water management interventions in Hwange National Park in Zimbabwe were undertaken to avoid die-offs in elephant populations due to a drought in 2005. The water from the newly drilled boreholes and artificial troughs resulted in a disproportionate increase of the elephant population which has had a negative effect on herbivore populations, tree species, and the ecology of the national park in general.

The numerous PWS projects being implemented in Kenya and Tanzania are a testimony to the **donors’ and governments’ confidence in the PWS mechanism and its ability to safeguard environmental services while providing for rural communities’ WASH needs and ultimately their livelihoods.** To date, only a handful are *consistently* making direct payments to communities as in the case of the *Working for Water* Program in South Africa and the *Equitable Payment for Watershed Services* project in Tanzania. In some cases direct payments may actually not be the way forward. The upcoming IFAD UTaNRMP project in Kenya is moving from direct payments for environmental services to a form of commercially sustainable investments in improved soil and water management; in essence moving away from subsidizing the intervention or providing a grant.

In the case of emergency WASH activities, environmental impacts are often overlooked during at least the initial phases. In instances where consideration is given to the environmental impacts there is a tendency to rely on staff’s professional experience and common sense, as well as their consultations with local stakeholders (CARE & ProAct Network, 2008), rather than provide established guidelines and direction. While some environment-related issues surrounding WASH may be documented, there are gaps that need attention.

In integrated programming, the interactions can increase exponentially requiring the need to adapt continuously to keep in line with original goals (Renwick, 2012). Projects’ long-term impact and success could hinge on this adaptability, taking into consideration lessons learnt from pilot projects, pre-feasibility studies and perceived failures.

BOX 4. Key directions for effective collaboration on WASH and wetland conservation

- 1. Develop a stronger understanding of the linkages that in turn can be translated into effective on-the-ground interventions with the support of action research;*
- 2. Foment cross-sectoral partnerships between organizations that focus on WASH and wetland conservation to engender joint ownership of the linkages;*
- 3. Increase the capacity of WASH and conservation practitioners to better manage the linkages, including the development of tools, joint networks, trainers and training resources, and guidance handbooks;*
- 4. Lobby policy makers and donors to recognize the importance of these linkages and to prioritize them thereby channeling funding to them.*

(Wetlands International, 2010)

CHALLENGES AND OPPORTUNITIES

The aforementioned case studies (and other projects listed below) provide a compendium of information on on-the-ground experiences integrating WASH and biodiversity conservation in sub-Saharan Africa. Many of these projects have encountered similar challenges but often have dealt with these in convergent ways leading to different but no less edifying end points. Challenges have opened the door for new and innovative interventions and, with these, valuable lessons learnt. The following table highlights such challenges and the opportunities available to the WASH and biodiversity conservation communities that can further solidify the linkages in question.

CHALLENGES

*1. With separate funding streams, differing programmatic start dates, and discrete staff skill sets, it is often a **challenge to attain legitimate integration between sectors** rather than thinking and acting with only one primary program objective in mind.*

OPPORTUNITY

Vertical and horizontal engagement is required, within and across sectors, to better integrate management approaches. As was the case with Blue Ventures in Madagascar, frequent cross-program meetings and training sessions on how the programs integrate and are interdependent were conducted.

2. Natural resource management and biodiversity conservation programmatic goals tend to have long-term time horizons affecting the community buy-in and sustainability of such needed interventions. Conversely, WASH projects tend to have short-term goals (or immediate in emergency relief situations).

As noted in the evaluation of WWF's USAID and Johnson & Johnson-supported PHE projects⁹ (Carr, 2008) impoverished communities do not pursue conservation activities due to the imperative to meet basic human needs for food and shelter. By integrating WASH activities into longer-term environmental projects, not only does it garner community support for conservation but allows for WASH practitioners to better track the sustainability of the WASH interventions over a longer time period.

3. Integration invariably results in complex vertical and horizontal engagement with disparate stakeholders including private sector, government agencies, non-governmental organizations and communities. Integration requires a multidisciplinary team to cover the various sectors involved, all necessitating greater funding streams.

Need to strike a balance between having specialist staff, while also encouraging mutually-supportive generalists. If done effectively, this can in fact drive costs down (through shared transportation, staff and resources) compared to the alternative where multiple distinct projects are needed to reach the same goals.

4. A lack of awareness of the linkages means that much work aimed at beneficiary communities is planned and implemented independently, to the detriment of the communities. There is also a lack of awareness amongst other stakeholder groups (e.g. development agencies, river basin authorities, donors) about the strength of the linkages between improved human health and the health of wetland ecosystems.

Undertake cross-sectoral action research in wetland areas (incorporating catchments/basin links) that can provide the required knowledge to develop more integrated approaches and tools. The IUCN under its 'Integrating Wetland Economic Values into River Basin Management' project deals with the practical application of environmental economics techniques and measures to ecosystem and river basin management.

5. With integration of various sectors comes the challenge to determine and structure appropriate and effective monitoring and evaluation frameworks that take into account the many varied parameters and indicators of an integrated project.

Need to develop integrated monitoring and evaluation systems at the organizational level, but also an opportunity to implement complementary participatory community monitoring (PCM) as was undertaken by the USAID Environmental Health Project (EHP).

⁹ An evaluation of WWF's USAID and Johnson & Johnson-funded PHE projects in Africa and Asia was undertaken from August to December 2007. Sub-Saharan African countries included Mozambique, Madagascar, Kenya, Cameroon and Central Africa Republic. A brief evaluation of each country's PHE project was undertaken including the relative progress made and the specific suggestions for improving outcomes.

6. Traditionally the water supply and sanitation sector focuses on providing 20-25 liters of water per person per day for domestic basic. However, in this day and age **people, particularly in rural areas, use water for multiple purposes other than drinking, laundry and bathing.** These include livestock watering, irrigation of home gardens, and small-scale enterprises (e.g. pottery). Providing water for these multiple-use services (MUS) costs more than single-use services however.

A marginal increase in water supply can have a positive impact on impoverished communities' livelihoods through increased income generation from multiple use services. The return from these has been shown to be sufficient to cover incremental investment costs, generally 6-36 months (Renwick *et al.*, 2007). The MUS approach provides an avenue to instill environmental sustainability by explicitly incorporating environmental flows as another multiple use.

7. Integration of WASH and conservation is occurring on an ad-hoc basis at the project level. However, **environmental sustainability is generally not included in WASH policies and legislation.**

There is a need to craft thoughtful policies and legislation on WASH that encourage environmental sustainability of any WASH project, from conception to implementation and beyond.

8. **Climate change is affecting rainfall patterns and the regularity of flows, in turn causing acute droughts and floods.** Water scarcity is affecting human and wildlife populations alike and exacerbating conflicts.

There is an urgent need to develop and roll out climate change adaptation strategies in communities where access to water is, or can become, a stressor. These strategies must be an integral part of any WASH intervention in order to ensure environmental and programmatic sustainability.

9. Communities are often unwilling to fully engage in, and be open to ideas from, conservation projects that are **perceived to have little to do with their everyday life and livelihoods.**

Integrated WASH and conservation projects should create awareness of the linkages amongst target communities in the simplest way, and in a manner that relates to their everyday lives. Wherever necessary a social and/or monetary value can be placed on the natural resource to be managed or protected in order to emphasize its importance. In the case of the CTPH work in Uganda, parishes that benefited from gorilla tourism were most receptive to the health education being provided to them. One of the key benefits of incorporating WASH strategies through a PHE approach is the ability to directly improve health services in communities that lack access - an outcome that may increase community receptivity to conservation organizations, their environmental affiliates and their missions (C Honzak, *pers. comm.*,

June 2011).

10. EFAs can be protracted research activities typically performed by external consultants and requiring substantial financial resources.

The SUCCESS Project in partnership with the Wami/Ruvu Basin Water Office (WRBWO) pioneered a tailor-made methodology (incorporating Building Block and Savannah River methodologies) that can be carried out effectively with local experts and fit well with the limited resources and time.

11. Take-up of EFA prescriptions can be less than optimal due to the lack of consultation by projects with the local institutions, stakeholders and water users.

Need to undertake EFAs in consultation and partnership with local stakeholders and water users that in time will ultimately have to change their behavior in light of EFA recommendations. This proved to be instrumental in the case of the Wami sub-basin, where the inclusive nature of the EFA process engendered credibility in the results and fostered a coordinated and consistent vision for the management and protection of the river (URI CRC & Florida International University, 2008).

12. Political and community support is imperative if projects are to get traction and be sustainable.

The experience of the Working for Water and Working for Wetlands programs shows that integrating wetland rehabilitation with poverty reduction and water resource management can better ensure the requisite political support from government, industry, agriculture and rural communities.

13. The development of new water sources under WASH projects can have grave repercussions on the ecosystem if not well planned

WASH projects should refer to the global WASH Cluster's 'Environmental Best Practices in Emergency WASH Operations' (see Online Resources below) – in light of a lack of alternative guidelines/best practices – and wherever possible integrate their efforts in line with landscape-wide conservation plans.

BOX 5. Partnership for Africa's Water Development (PAWD) Program

The Global Water Partnership implemented the USD 10 million CIDA-funded Partnership for the Africa's Water Development (PAWD) Program from 2003 to 2008. Five countries (Kenya, Malawi, Mali, Senegal and Zambia) were supported to manage their water resources in a sustainable fashion with the ultimate goal being to contribute to poverty alleviation and natural resource protection. Specific components included the support to national IWRM frameworks; support to institutional development of existing and emerging national and regional multi-stakeholder water partnerships; and the support towards integration of water into Poverty Reduction Strategy Papers (PRSPs) or their equivalent.

Since the end of the program in 2008, all five countries have included their IWRM plans into national development plans and policies, and are in varying stages of implementation. These plans call for, amongst other things:

- Cross-sectoral integration in policy development;*
- Participation of stakeholders in water planning and management;*
- Ensure water-related decisions at the local and basin levels be in line with the achievement of broader national objectives as delineated in PRSPs for example;*
- Integration of water planning and strategies into broader social, economic and environmental goals.*

Country Water Partnerships (CWPs) were established in each country, seeking to bring together key stakeholders in water resources. These CWPs were made up of water management practitioners at all levels of government, public institutions, private companies, professional organizations, and development agencies. Such an organized forum allowed for the participatory formulation of the IWRM plan, as well as created a new space for dialogue with government on water issues.

(GWP, 2008)

Conclusions

Water and sanitation projects are a fundamental cornerstone of human development. Access to water translates into increased economic productivity and healthier communities. Well planned sanitation infrastructure minimizes the risk of acquiring debilitating water-borne diseases resulting in a healthier and more vibrant community and healthy ecosystems. Conversely, freshwater ecosystems not only provide habitat for a myriad of species, they also bestow on humanity vital ecosystem services that ultimately underpin economic development. River basins are the source of essential water for human and wildlife communities alike.

Complex river basin interactions however necessitate integration of conservation and water management concepts and strategies. Couple this with the socioeconomic dimension of river basins and the complexity increases manifold.

Integrated water management provides a framework for integrating freshwater ecosystem conservation and WASH, and specifically integrated river basin management provides a suitable vehicle to tackle basin-level multi-sectoral issues. Environmental flow assessments generate essential information regarding optimal water flow for the different stakeholders' needs within a basin that can inform future basin plans. To date many EFAs have been undertaken in sub-Saharan Africa with valuable outputs and prescriptions generated. Few of these prescriptions have been put into practice and actively informed basin planning in SSA. Nevertheless, basin-level planning provides water managers the opportunity to focus on the linkages between water resources and land management, taking into account WASH strategies and landscape-level conservation efforts. As such more time and effort must be allocated into operationalizing EFA prescriptions and subsequent river basin plans.

In most cases integration of WASH and biodiversity conservation is occurring on an ad-hoc basis, with many projects tacking-on WASH components after design and inception rather than as a matter of course. There are some great examples of projects bridging the two sectors from the outset, going beyond mitigation into the realm of true integration. Lessons must be learnt from these and used to replicate successful programs throughout sub-Saharan Africa. Population, health and environment programs have shown that community buy-in for the environmental component of a project can be garnered through provision of health services including water, sanitation and hygiene. With Payment for Watershed Services approaches positive and relatively immediate results can be felt in upstream communities' livelihoods through, for example, direct payments from forest patrolling or investments in improved agricultural inputs, more effective cropping methods, and more efficient irrigation. With time the improvements in water quantity and quality will take effect, positively affecting the upstream and downstream communities' health.

The process of integration requires carefully delineated programs that are designed with proper consultation of interested parties. While this adds another layer of interaction and hence need for integration, it is essential if the individual components, projects and programs are to have true and tangible outcomes as a whole. In such cases, the burden of integration is foisted on the government

ministries and agencies and the various project management units. This is an onerous burden to take on and cannot be taken for granted. It highlights the need to build the capacity of the institutions that have responsibility for water management, freshwater ecosystem conservation and WASH service delivery. Such capacity building must be undertaken in tandem with project-specific interventions, action research and awareness raising.

There is a need to craft thoughtful policies and legislation on WASH that encourage environmental sustainability of any WASH project, from conception to implementation and beyond. More guidance must be provided to WASH practitioners to effectively integrate conservation perspectives into their work, building on the guidance resources the WASH Cluster has compiled to date. These useful resources must be disseminated and made readily accessible to the WASH community at large if positive change vis-à-vis environmental impacts of WASH activities (whether emergency or long-term in nature) is to take full effect.

Ultimately, integration of WASH and biodiversity conservation can be an effective means to mainstream the environment – particularly freshwater ecosystems – into national development planning, including poverty reduction strategy papers (PRSPs) and strategies to address the Millennium Development Goals. If undertaken in earnest, integrated WASH and biodiversity conservation programs can release the burden on already thread-bare national and donor budgets to achieve their myriad national priorities including WASH and natural resource management.

Online Resources

Integrating Critical Environmental Issues into WASH Cluster Activities, including Environmental Best Practices in Emergency WASH Operations (CARE International):

<http://oneresponse.info/GlobalClusters/Water%20Sanitation%20Hygiene/Pages/Project11Environment.aspx>

Guidelines for the Development of Small-Scale Rural Water Supply and Sanitation Projects in East Africa: http://www.encapafrika.org/documents/Wat0509_e.pdf

Environmental Flow Assessments for Rivers: Manual for the Building Block Methodology (Updated Edition). Water Research Commission, South Africa:

<http://www.wrc.org.za/Knowledge%20Hub%20Documents/Research%20Reports/TT%20354-CONSERVATION.pdf>

Environmental Guidelines for Small-Scale Activities in Africa (EGSSAA), Chapter 16: Water Supply and Sanitation: <http://www.encapafrika.org/EGSSAA/watsan.pdf>

Environmental Health Project – USAID-supported PHE Projects: in Africa

http://www.ehproject.org/PDF/phe/past_pheprojects-africa.pdf

IUCN Water and Nature Initiative Toolkits: <http://www.waterandnature.org/en/resources/toolkits>

Global Water Partnership – Toolbox: www.gwptoolbox.org

Healthy People, Healthy Ecosystems: A Manual on Integrating Health and Family Planning into Conservation Projects -

<http://www.k4health.org/system/files/sites%252Fdefault%252Ffiles%252FHealthy%2BPeople%2BHealthy%2BEcosystems-WWF%2B2008.pdf>

PES Sourcebook: Lessons and Best Practices for Pro-poor Payments for Ecosystem Services -

[http://rmportal.net/library/content/copy2_of_usaid-pes-sourcebook-best-practices-for-pro-poor-payments-for-ecosystem-services/view?searchterm=Payments%20for%20Watershed%20Services%20\(PWS\)](http://rmportal.net/library/content/copy2_of_usaid-pes-sourcebook-best-practices-for-pro-poor-payments-for-ecosystem-services/view?searchterm=Payments%20for%20Watershed%20Services%20(PWS))

PHE 101 Bibliography: http://pdf.usaid.gov/pdf_docs/PNADX989.pdf

Population, Health and Environment Toolkit: <http://www.k4health.org/toolkits/phe>

Sphere Handbook: Humanitarian Charter and Minimum Standards in Humanitarian Response:

<http://www.sphereproject.org/handbook/>

Wetlands and Water, Sanitation and Hygiene (WASH) - Understanding the linkages:

<http://www.wetlands.org/WatchRead/tabid/56/mod/1570/articleType/ArticleView/articleId/2467/Wetlands-and-Water-Sanitation-and-Hygiene.aspx>

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Appendices

ANNEX 1. WORKING LIST OF PROGRAMS, PROJECTS AND ORGANIZATIONS

| ID | Name | Country | Org | Type | Description | URL |
|----|---|----------|---------------|------------|---|--|
| 1 | Waza Logone Floodplain, Cameroon; economic benefits of wetland restoration | Cameroon | IUCN | Case Study | Case study in wetland valuation #4: May 2003. Assess the economic effects of floodplain degradation due to upstream water diversions for irrigation. | http://cmsdata.iucn.org/downloads/casestudy04waza.pdf |
| 2 | C BSP - Sustainable Management of the Mbe River Forested Watershed through the Development of a PES Mechanism | Gabon | UNDP/UNEP/WCS | Project | Designed to address barriers to developing a long-term source of funding for the Mbe watershed based on payments for ecosystem services provided to the capital city of Libreville and surrounding areas. The project will undertake the quantification and valuation of those services for the development of a system of charges that guarantee the continuity of those services. | wetlands.org/WatchRead/tabid/56/mod/1570/articleType/ArticleView/articleId/2467/Wetlands-and-Water-Sanitation-and-Hygiene.aspx |

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| 3 | Gambia- Senegal Sustainable Fisheries Project | Gambia/ Senegal | USAID/WWF/CRC | Project | A five-year regional initiative, focusing its efforts on sustainable fisheries management. Unsustainable fishing practices are threatening the marine ecosystem. By encouraging integrated management approaches at the local and regional scale the project aims to reduce overharvesting of key species and reduce by-catch of endangered species and juvenile fishes. By taking an ecosystem and threats-based approach, the critical habitats of key marine species can be protected and threats on these reduced. | http://www.crc.uri.edu/index.php?projectid=108 |
| 4 | Mt Kenya East Pilot Project for Natural Resource Management | Kenya | GEF/UNEP/IFAD | Project | The overall objectives of the Mount Kenya East Pilot Project for Natural Resource Management is to reduce poverty through improved food security and income levels of farmers and rural women by promoting more effective use of natural resources, improve access and management practices for water resources and introduce better farming practices for sustainable land use and water resources. | http://www.thegef.org/gef/sites/thegef.org/files/repository/KenyaMKEPP.pdf |
| 5 | Upper Tana Catchment Natural Resource Management Project | Kenya | IFAD | Project | The goal of the project is to “contribute to reduction of rural poverty in the Upper Tana river catchment”. This goal will be pursued via two development objectives which reflect the poverty-environment nexus: (i) increased sustainable food production and incomes for poor rural households living in the project area; and (ii) sustainable management of natural resources for provision of environmental services. Land, water and forest resources will ultimately be sustainably managed for the benefit of the local people and the wider community | http://www.ifad.org/operations/projects/design/105/kenya.pdf |

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| 5 | Green Water Credits | Kenya | IFAD/SDC | | Assesses eco-hydrological upland-downstream links and the costs and benefits of different management interventions in the Tana River Basin in Kenya. | http://greenwatercredits.net/content/kenya |
| 6 | Upper Tana Water Fund (Kenya) | Kenya | TNC | Project | forest and rangeland not just agriculture | . |
| 7 | Nature's Benefits in Kenya: An Atlas of Ecosystems and Human Well-Being | Kenya | WRI | Report | Provides a new approach to integrating spatial data on poverty and ecosystems in Kenya. Focus is on soil, water, forest, rangeland, livestock and wildlife. | http://www.wri.org/publication/natures-benefits-in-kenya |
| 8 | Environmental Health Project (Madagascar) | Madagascar | USAID | Project | Water-focused project, looking at the integration of FP/RH and NRM interventions at the community level, with one organization providing TA and training to implementing NGOs to deliver services in integrated fashion. Provides early evidence of specific benefits of program integration. Specifically, EHP reports that PHE integration yielded increases in contraceptive prevalence rates, immunization coverage, and access to safe water (from 19 to 24 percent) and basic sanitation (from 52 to 55 percent). | http://www.ehproject.org/PDF/phe/madagascar-phe.pdf |
| 9 | Makira Forest Project | Madagascar | USAID/WCS | Project | In collaboration with PSI Madagascar and CARE addresses biodiversity protection and resource conservation in the face of expanding rural human population pressure. | http://www.ehproject.org/phe/wcs-madagascarfinal.html |
| 10 | Ranon'ala Project | Madagascar | USAID/CI/CRS | Project | Project brings together improved access to clean water and sanitation IWRM to protect resources for the long-term in remote areas of Madagascar. | http://madagascar.usaid.gov/programs/health-population-and-nutrition/1156 |

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| 11 | Family Planning Project | Madagascar | Blue Ventures | Project | In response to an unmet need for health care and health education, Blue Ventures is providing a range of health services, addressing reproductive health, maternal and child health, sanitation and hygiene practices and the provision of safe water. By integrating the delivery of these services into the portfolio of projects that Blue Ventures manages, they are able to achieve their health and conservation objectives more effectively. | www.Blueventures.org |
| 12 | Shire River Basin Management Project | Malawi | World Bank/GoM | Project | The Shire River Basin Management Project (SRBMP) would: (a) strengthen the institutional capacities and mechanisms for Shire Basin monitoring, planning, management and decision support systems; (b) invest in water related infrastructure that sustainably improves water resources management and development; (c) reduce erosion in priority catchments and sedimentation and flooding downstream, while enhancing agricultural productivity and improving livelihoods; and (d) improve flood management in the Lower Shire and provide community level adaptation and mitigation support. The objective of GEF support will be to strengthen sustainable management of remaining natural systems as part of the basin planning and catchment management approach in the Shire Valley to conserve globally important biodiversity and protect forests and wetlands essential for livelihoods, climate resilience and economic development. | http://web.worldbank.org/external/projects/main?pagePK=64283627&piPK=73230&theSitePK=40941&menuPK=228424&Projectid=P117617 |

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| 13 | E-mainstreaming for DWA Mali | Mali | Wetlands International | Project | In the Mali Country Programme Wetlands International Mali plays an important role in building up the portfolio within the Alliance regarding the practical ways of how ecological sustainability can be made part of WASH delivery. Project looks to provide ways for people to be able to make water management related decisions. a Malian WASH partners' supported technical action plan will be developed which will be elaborated to an operational plan including budget allocation starting 2012 and covering the period 2012-2015. | http://washalliance.akvoapp.org/project/447/ |
| 14 | Assessment of USAID's Population and Environment Projects and Programming Options | Regional | USAID | Assessment | Useful assessment of PHE efforts by USAID up to 2007, although not water specific, some examples of need to focus more on WASH. | http://www.ehproject.org/PDF/phe/phe_assessment2007.pdf |

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| 15 | Southern Africa Regional Environment Program (Angola, Botswana, Namibia) | Regional | USAID | Project | Improve the provision of water supply and sanitation services that will enhance the conservation of biodiversity; Create demand for improving hygiene and promote behavior change and link to improved sanitation services; Reduce potential for Human-Wildlife Conflicts (such as elephants); build on previous USAID activities to further develop the land-use plan for transboundary areas within the Okavango basin critical for both human settlements and wildlife; Conserve biodiversity within the Okavango river basin critical for maintaining ecosystem services and wildlife habitat; Create demand for community based sustainable use of natural resources for productive livelihoods. | http://sa.usaid.gov/southern_africa/sites/south_africa/files/SAREP09%20on%20page%20fact%20sheet_0.pdf |
| 16 | Water Towers of Eastern Africa: Policy, issues and vision for community-based protection and management of montane forests | Regional | WWF | Publication | Report puts forward a number of recommendations in the conservation and management of montane ecosystems in eastern Africa. These include: the promotion of the protection and management of montane forests as water towers; building partnership; making improvements on governance structures–policies, institutions and practices; strengthening and coordinating decision-making across sectors; developing a multiple-use management strategy for the montane forests; strengthening community organizations/institutions; and, using champions. | http://awsassets.panda.org/downloads/water_towers_policy_report_1.pdf |

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| 17 | Development and adoption of a Strategic Action Program for balancing water uses and sustainable NRM in the Orange-Senqu River transboundary basin | Regional | UNDP/UNOS/ORA SECOM | Project | The overall goal of the Project is to contribute to improved management of the Orange Senqu River Basin's trans-boundary water resources through IWRM approaches that remediate threats and root causes. The expected global environmental benefits will include preservation and restoration of transboundary water resources, creation of models for other similarly challenged basins that face the need to adapt to increasing resource demands, climate change, pollution, biodiversity loss, and increasing rates of desertification; an increased understanding and refinement of transboundary IWRM approaches, improvements of conditions in the Lower Orange and threatened Ramsar site at the mouth of the Orange, improved water quality flows into the estuary. | http://iwlearn.net/iw-projects/2701/@@gefonierview.html |
| 18 | Okavango Integrated River Basin Management Project | Regional | USAID/OKACOM/S ADC | Project | A four-year activity financed by the USAID's Regional Center for Southern Africa. Tetra Tech ARD is working with a consortium of members and local partners in Botswana, Angola and Namibia, guiding OKACOM to become a stronger, more effective institution. The objective of this project is to strengthen institutional, legal, regulatory, technical, and community capacity to manage the region's transboundary river basin resources. This support will enable OKACOM to better manage these resources in the best interest of all. | http://www.okacom.org/okacoms-work/partners-and-projects/projects/partner-projects/irbm/irbm-documents/IRBM%20Final%20Report%20-%20August%2031%202009.pdf |
| 19 | Pangani River Basin Management Project | Regional | IUCN/SNV/UNDP | Project | The Pangani River Basin Management Project (PRBMP) is generating technical information and developing participatory forums to strengthen Integrated Water Resources Management in the Pangani River Basin, including mainstreaming | http://www.iucn.org/about/union/secretariat/offices/esaro/what_we_do/water_and_wetlands/prb |

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| | | | | | climate change, to support the equitable provision and wise governance of freshwater for livelihoods and environment for current and future generations. | mp_esaro/ |
| 20 | Maloti Drakensberg Transfrontier Project | South Africa and Lesotho | NATIONAL DEAT/ KZNNC/ DEAT (FS)/ DEAET (EC)/ SANP | Project | A collaborative initiative between South Africa and the Kingdom of Lesotho to protect the exceptional biodiversity of the Drakensberg and Maloti mountains through conservation, sustainable resource use, and land-use and development planning. This area encompasses distinct landscape and biological diversity. It is quite rich in species and high in endemism. Excessive livestock grazing, crop cultivation on steep slopes, uncontrolled burning, alien invading species and human encroachment threatens this asset. The Maloti-Drakensberg Transfrontier Project safeguards a crucial water catchment for the country of Lesotho | http://www.maloti.org.ls/home/ |
| 21 | Integrating biodiversity concepts with good governance to support water resources management in SA | South Africa | CSIR- Environmentek | Publication | Explores the potential implications of adopting such an “interdependence” philosophy as a basis for sustainable water resource management in South Africa. Considers the concepts of biodiversity and how these relate to ecosystem processes within the hydrological cycle. Examines the concepts and definition of good governance in the context of water resource management. Discusses how our understanding of governance and of biodiversity concepts might be better aligned to ensure that water resource management approaches meet the needs of | http://www.ajol.info/index.php/wsa/article/view/5135/12784 |

society in South Africa.

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| 22 | The Sabie River: Protecting biodiversity in an internationally important conservation area | South Africa | IUCN | Case Study | Environmental flow approach to guide water-resource developments near Kruger NP and Sabie-Sand Game Reserve. | http://cmsdata.iucn.org/downloads/sabie.pdf |
| 23 | Environmental Flow Assessment, Wami River Basin, Tanzania | Tanzania | FIU/CRC/USAID/World Vision | Project | The Wami River Initial Environmental Flow Assessment (Wami IEFA) project was a process-based approach to determining flow requirements of the Wami River and its related ecosystems, as a means for enabling more sustainable water management in the Wami River Sub-Basin. Component of the Water and Development Alliance Program supported by USAID and Coca-Cola. | http://wami.fiu.edu/ |

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| 24 | Wami Basin Situation Analysis | Tanzania | IUCN | Project | Separate analyses of the status, conditions and key issues affecting ecosystems in each basin; provides information on natural resources (including water), socio-economic issues and the governance structure of water resource management, to provide an assessment that will be sufficiently adequate for priority themes or areas for actions to be developed in each basin. | http://data.iucn.org/dbtw-wpd/edocs/2010-035.pdf |
| 25 | Tuungane: Creating a Healthy Future for People and the Natural Resources They Depend On (Tanzania) | Tanzania | TNC/Pathfinder/FZS | Project | A new Mahale PHE project that addresses fisheries, forestry and primary and reproductive health. In designing this study, The Nature Conservancy drew on work done through PHE projects in Tanzania, Madagascar and the Philippines. | http://www.nature.org/ourinitiatives/regions/africa/wherewework/tuungane-project.xml |
| 26 | Tanzania Integrated Water Sanitation and Hygiene Program (iWASH) | Tanzania | USAID/FIU/WI/CARE/WaterAid | Project | To address some of the most pressing needs for rural human populations in Tanzania—access to clean water, sanitation and hygiene—within an integrated water resources management framework. This approach recognizes the need to improve immediate access for human populations to critical services, without compromising the integrity of water sources and the aquatic ecosystems upon which these human populations depend. | http://www.globalwaters.net/iwash_tz.html |
| 27 | How to Climate Proof Water and Sanitation Services in Peri-Urban Areas in Naivasha | Tanzania | WaterAid | Report | This report evaluates the impacts of climate change on water and sanitation technologies in the peri-urban areas around Lake Naivasha, reviews the water resources in Lake Naivasha and considers the potential adaptations required to mitigate the impacts. | http://www.wsup.com/sharing/documents/HowtoclimateproofWASHinNaivasha-2010.pdf |

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| 28 | Building Actors and Leaders for Advancing Community Excellence in Development (BALANCED Project) | Tanzania | USAID/CRC/PFPI/CI | Project | Project is expanding the number of organizations and practitioners being trained in and using the integrated PHE approach, tools, and methodologies in developing countries around the world—especially in those areas with significant biodiversity in Asia and Africa. The Project produces PHE research briefs, technical publications, training manuals, an e-newsletter, champion/success stories, and videos for wide dissemination. | http://www.conservation.org/learn/health/Pages/balanced_project.aspx |
| 29 | Tanzania Coastal Management Partnership for Sustainable Coastal Communities and Ecosystems | Tanzania | USAID/CRC | Project | Support the Government of Tanzania to implement the National Strategies on Integrated Coastal Environment Management, and Economic Growth and Poverty Reduction at national and local levels in selected coastal areas. At the local level, it focused on coastal and marine conservation in three land-seascape areas—the Mkuranga land-seascape, the Pangani-Bagamoyo land-seascape, and the Wami River basin landscape. | http://pdf.usaid.gov/pdf_docs/PDACQ826.pdf |
| 30 | Improved Community Livelihoods and Sustainable Water Management | Tanzania | USAID/Coca-Cola/ FIU/World Vision/CRC | Project | The Water and Development Alliance (WADA) is applying an integrated river basin management approach to address water-related challenges in two of Tanzania’s most populated river basins, the Pangani and Wami-Ruvu, directly and indirectly benefiting over 150,000 people. The activity complements and builds on the efforts of a longer-term USAID/Tanzania ecosystem conservation program. | http://www.thecocacolacompany.com/citizenship/community_initiatives/Tanzania_031808.pdf |

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| 31 | Lake Tanganyika Catchment Reforestation and Education Project (TACARE) | Tanzania | USAID/JGI/ | Project | TACARE implements a community-centered conservation approach, which effectively addresses human needs while promoting conservation values. TACARE's activities are divided into five primary project areas: Community development, Forestry, Agriculture, Health, and Roots & Shoots – environmental education for youth. TACARE is the flagship PHE Project for the Jane Goodall Institute and its successful approach is being modeled and replicated in other JGI PHE Activities. | http://www.ehproject.org/phe/jgi-tanzania_final.html |
| 32 | Transboundary Water for Biodiversity and Human Health in the Mara River Basin | Tanzania/Kenya | USAID/CARE/FIU/WWF | Project | USAID/EA is working in Kenya and Tanzania to improve water resource management and reduce and mitigate threats to biodiversity in the Mara River Basin and Mara-Serengeti Ecoregion. The water sources for this area are under threat due to deforestation, agricultural development, human settlements and mining, and intensive ecotourism inside the protected areas. The program helps to improve water resource management in order to reduce these threats to biodiversity in the Mara River Basin and Mara-Serengeti eco-region. | http://www.globalwaters.net/downloads/TBW-MRB%20Brief%20May%202010-07-15-10.pdf |
| 33 | Equitable Payment for Watershed Services (Tanzania and Kenya) | Tanzania/Kenya | CARE/WWF | Project | Objectives of the EPWS project in Tanzania are to establish long term financial investment in modifying land use to conserve and improve "watersheds" for reliable flow and quality of water. To establish compensation mechanism that recognizes the needs and priorities of the marginalized and poor people to improve their quality of life hence contributing to poverty | http://www.solutionsforwater.org/solutions/equitable-payment-for-water-services-project-in-tanzania |

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| 34 | Nakivubo Swamp, Uganda; managing natural wetlands for their ecosystem services | Uganda | IUCN | Case Study | Case study in wetland valuation #7, May 2003. | http://cmsdata.iucn.org/downloads/casestudy07nakivubo.pdf |
| 35 | Conservation Through Public Health (Uganda) | Uganda | USAID/CTPH | Project | Water as the main theme for linking forest conservation with improved health and FP practices along the borders of the Bwindi National Park. Project began when it was determined that the deteriorating health of mountain gorillas was due to their susceptibility to scabies, intestinal parasites, and tuberculosis transmitted by unhygienic human populations living near the park. | http://www.ctph.org/ |
| 36 | Mapping a Better Future: How Spatial Analysis Can Benefit Wetlands and Reduce Poverty in Uganda | Uganda | WRI | Report | Drawing on Uganda's rich baseline of wetland data and poverty mapping, this report provides a detailed examination of the links between ecosystem services and the location of poor communities and presents practical lessons for policy-makers across government. | http://www.wri.org/publication/mapping-a-better-future |

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| 37 | Sustainable Livelihoods Project | Uganda | JGI/CIDA/ Heifer Intl. | Project | This three-year project aims to improve the health, wellbeing and livelihoods of local people, while simultaneously conserving and restoring habitat for populations of wild chimpanzees. | http://www.janegoodall.ca/institute-news/CIDAProjectUganda.php#ProjectOverview |
| 38 | Sedze Wetland and Woodlands Management for Biodiversity Conservation Project | Zimbabwe | GEF/UNDP | Project | Small grants project in Zimbabwe. Project objectives are to increase wood biomass production at the household and community levels, improve efficiency in the use of wood biomass energy resources for coking, improve access to water resources, and management of wetlands areas in the foothills of Nyangani mountain range. | http://sgp.undp.org/web/projects/9823/sedze_wetland_and_woodlands_management_for_biodiversity_conservation_project.html |
| 39 | Value: Counting Ecosystems as Water Infrastructure | Global | IUCN | Report | Value is a practical guide that explains the most important steps and techniques for the valuation of ecosystem services, and the incorporation of its results in decision making. It explains, step by step, how to generate persuasive arguments for more sustainable and equitable development decisions in water resources management. | http://data.iucn.org/dbtw-wpd/edocs/2004-046.pdf |

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| 40 | Flow: The Essentials of Environmental Flows | Global | IUCN | Report | This report draws extensively on the experiences in these countries to offer hands-on advice for this emerging issue on the water resource agenda. It goes well beyond existing literature to offer practical guidance on technical issues, such as assessment methods and infrastructural adaptation, and the economic, legal and political dimensions of establishing environmental flows. It is part of a process that also includes support to national and local initiatives to establish environmental flows, for example in Tanzania where, the guidance provided in this guide will be tested in collaboration with national stakeholders, experts, policy-makers and elected officials. | http://data.iucn.org/dbt-w-wpd/edocs/2008-096.pdf |
| 41 | Securing Water for Ecosystems and Human Well-Being: The importance of environmental flows | Global | Stockholm International Water Institute | Report | Highlights service role played by healthy ecosystems in helping managers meet goals of maximizing socioeconomic welfare of all water users in equitable manner. | http://www.siw.org/documents/Resources/Reports/Report24_E-Flows-low-res.pdf |
| 42 | Wetlands and Water, Sanitation and Hygiene (WASH) | Global | Wetlands International | Publication | Provides a baseline understanding of how people and wetlands are connected, why these linkages are vital and how they can be better managed. It calls for action to integrate wetland management and WASH approaches, so as to benefit the health and development of people in rural and peri-urban areas in developing countries without compromising ecosystem functioning. | http://www.wetlands.org/WatchRead/tabid/56/mod/1570/articleType/ArticleView/articleId/2467/Wetlands-and-Water-Sanitation-and-Hygiene.aspx |

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| 43 | Healthy People, Healthy Ecosystems: A manual on integrating health and family planning into conservation projects | Global | WWF | Manual | Several conservation organizations have started integrating health and family planning into conservation projects. This integration has multiple benefits. Often conservation practitioners recognize the potential value of integrated PHE (population-health-environment) projects but need guidance on how to effectively incorporate P and H components into their project or on how to create a PHE project from scratch. This manual was created as a resource for these practitioners. It reviews not only the how, but also the why and what of PHE projects. | http://pdf.usaid.gov/pdf_docs/PDAC0253.pdf |
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