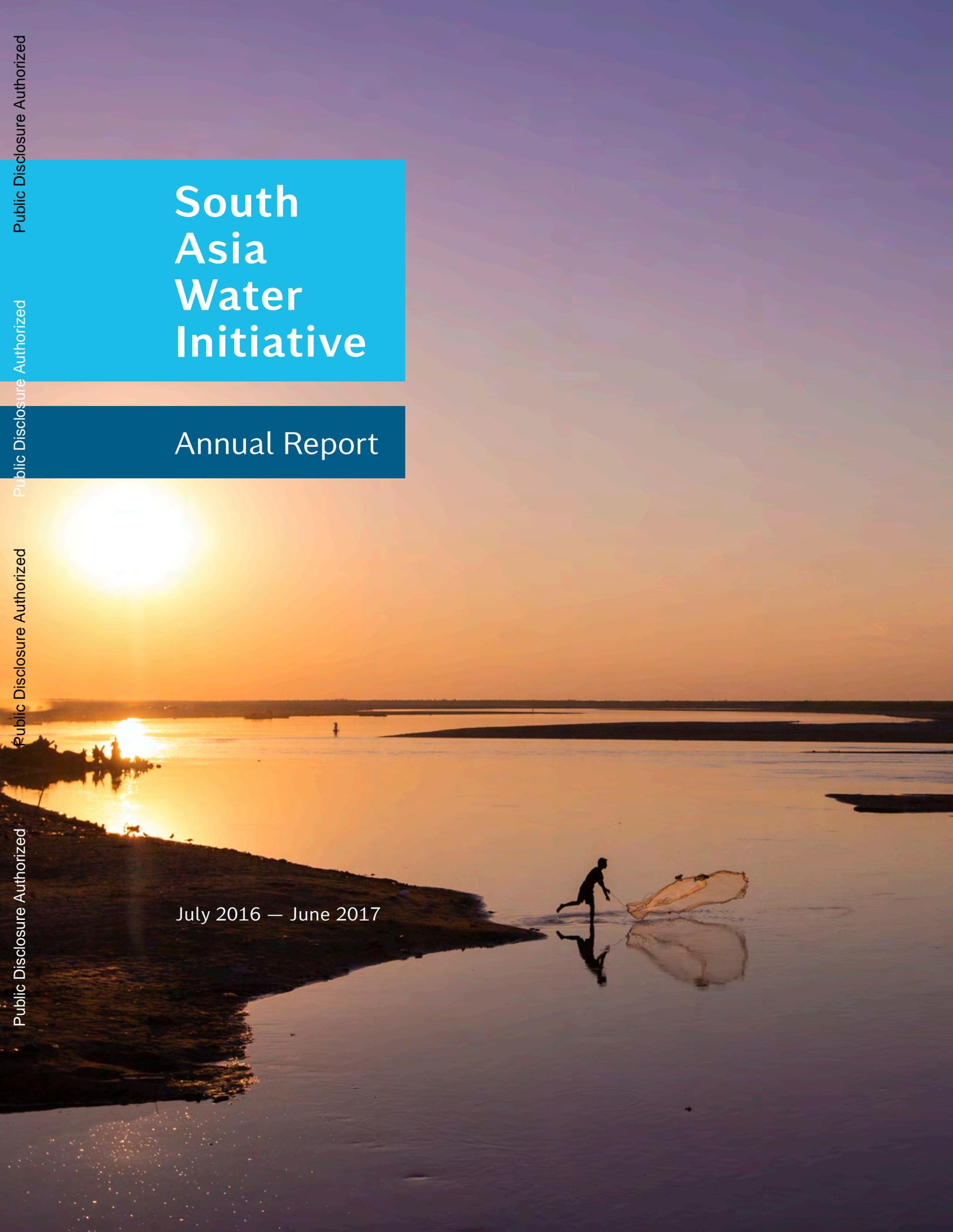


South Asia Water Initiative

Annual Report

July 2016 — June 2017





The World Bank Group

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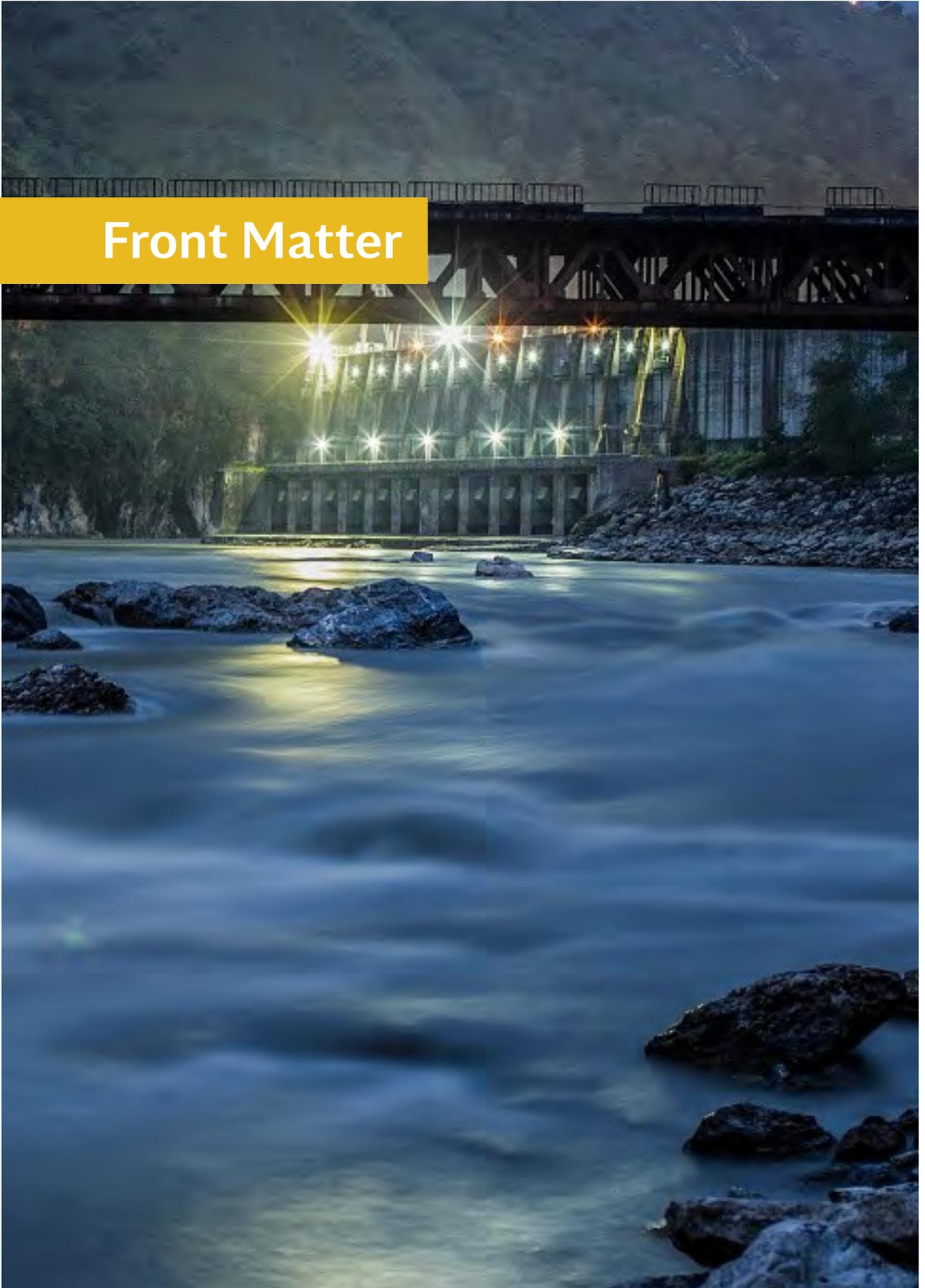
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Front Matter



Foreword

The mighty rivers of the Himalayas—the Indus, Ganges and Brahmaputra—are home to more than one billion people, who rely on their riches for economic development and to meet livelihoods needs, but are also subjected to their destructive forces with disastrous consequence. Making the most productive uses of water resources and reining in destructive forces requires the cooperative efforts of the seven countries that share these basins and their landscapes—Afghanistan, Bangladesh, Bhutan, China, India, Nepal and Pakistan. Yet, despite common challenges and major untapped opportunities, regional collaboration is limited due to a number of complex factors, ranging from political tension, insufficient trust, and nationalistic stances to poor knowledge of system dynamics and the gains to be had from cooperation. This has served as an obstacle to growth and economic integration. Increasing pressures on the water resource base and rising risks due to a changing climate make the need for cooperation in South Asia all the more imperative.

Recognizing the critical importance of cooperation in transboundary waters, the World Bank is proud to host the South Asia Water Initiative (SAWI). SAWI's objective is to increase regional cooperation in the management of the major Himalayan river systems to deliver sustainable, fair and inclusive development. A Multi-Donor Trust Fund financed by the governments of the United Kingdom, Australia and Norway, SAWI works with riparian countries to build capacity, promote dialogue, conduct analyses to guide water management, and inform the design of large investments. Gender and climate change are integrated throughout SAWI's activities, reflecting their critical importance to transboundary water resources management.

This annual report describes SAWI's progress, results and outcomes for fiscal year 2017 (July 1, 2016 – June 30, 2017) and presents the future direction of SAWI. I am delighted that the implementation of the program has accelerated. There is increasing evidence of its contribution to catalyzing positive change, including shaping policy, shifting mind-sets, strengthening client country systems with new knowledge and innovative tools, and leveraging and influencing investments into the billions of US dollars. Going forward, SAWI will continue to build on the achievements to date and ensure sustainability of outcomes, while adapting to strategic opportunities and challenges that emerge from the rapidly changing operating context.

The World Bank wishes to extend its sincerest thanks to the donors for their continued support, and looks forward to continuing to work in partnership with them to strengthen cooperative transboundary water management in South Asia.

Robert J. Saum

Director, Regional Integration and Partnerships
South Asia Region, World Bank

Acronyms and Abbreviations

B	Billion (US Dollars)
BBIN	Bangladesh-Bhutan-India-Nepal
BDP	Bangladesh Development Plan
BE	Bank Executed
BISRCI	Bangladesh-India Sundarbans Regional Cooperation Initiative
BKDP	Bihar Kosi Development Project
CMU	(World Bank) Country Management Unit
CWC	(India) Central Water Commission
DFAT	(Australia) Department for Foreign Affairs and Trade
DFID	(UK) Department for International Development
EBRD	European Bank for Reconstruction and Development
EDF	Électricité de France Group
ESSA	Environmental and Social Systems Assessment
FMISC	Flood Management Improvement Support Centre
FRA	Flood Risk Assessment
FY	Fiscal Year
GCF	Green Climate Fund
GED	General Economic Division
GFDRR	Global Fund for Disaster Risk Reduction
GLOF	Glacial Lake Outburst Flood
GP	(World Bank) Global Practice
GRM	(World Bank) Grant Report and Monitoring
HUC	Himalayan University Consortium
ICIMOD	International Centre for Integrated Mountain Development
ICOLD	International Commission on Large Dams
IFC	International Finance Corporation
IF-WG	Indus Forum-Working Group
IHA	International Hydropower Association
IIT	Indian Institute of Technology
IRS	International River Symposium
IUCN	International Union for Conservation of Nature
IWA	International Water Association
IWMI	International Water Management Institute

IWRM	Integrated Water Resource Management
JWG	Joint Working Group
M	Million (US Dollars)
M&E	Monitoring and Evaluation
MEW	Ministry of Energy and Water
MOU	Memorandum of Understanding
NCAR	National Centre for Atmospheric Research
NEA	Nepal Electricity Authority
NGMIP	National Groundwater Management Improvement Program
NGRBP	National Ganga River Basin Project
NHP	National Hydrology Project
PFSA	Partnership for South Asia
RE	Recipient Executed
RESCON	Reservoir Conservation Approach
RBO	River Basin Organization
SAARC-CCI	South Asian Association for Regional Cooperation Chamber of Commerce and Industry
SACIWATERS	South Asia Consortium for Interdisciplinary Water Resources Studies
SARRP	South Asia Region's Regional Integration and Partnerships
SAWGP	(DFID) South Asia Water Governance Programme
SAWI	South Asia Water Initiative
SDIP	(DFAT) Sustainable Development Investment Portfolio
SIWI	Stockholm International Water Institute
TERI	The Energy and Resources Institute
TTL	(World Bank) Task Team Leader
UIB	Upper Indus Basin
UNFCCC	United Nations Framework Convention for Climate Change
UPWSRP	Uttar Pradesh Water Sector Restructuring Project
USAID-PEER	US Agency for International Development-Partnerships for Enhanced Engagement in Research
WCAP	Water Sector Capacity Building and Advisory Services Project
WECS	(Nepal) Water and Energy Commission Secretariat

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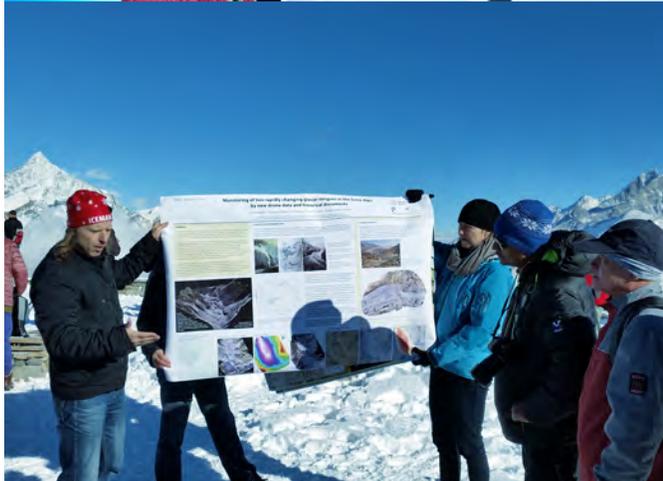
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Executive Summary

Various SAWI activities in FY17



SAWI's work is structured across three river basins (Indus, Ganges and Brahmaputra Focus Areas) and one landscape (Sundarbans Focus Area), spanning seven countries (Afghanistan, Bangladesh, Bhutan, China, India, Nepal and Pakistan). These Focus Areas interface with a Regional Cross-Cutting Focus Area that both supports non-basin specific work and translates national and basin-specific work for wider dissemination or implementation.

SAWI supports a rich portfolio of activities designed to increase regional cooperation in the management of the major Himalayan river systems in South Asia to deliver sustainable, fair and inclusive development and climate resilience. It does this through four complementary outcome areas: strengthening awareness and knowledge on regional water issues; enhancing technical and policy capacity across the region; dialogue and participatory decision processes to build trust and confidence; and scoping and informing investment designs. In the context of water resources planning and management, the program promotes poverty alleviation, economic development, gender inclusion and climate change adaptation.

This annual report covers the period July 2016 – June 2017 and summarizes progress of the fourth year of implementation of the South Asia Water Initiative (SAWI) Phase II (2013-2018). The assessment presented in this report is based on both tangible (program Results Framework) and intangible (Focus Area Lead and activity Task Team Leader (TTL) reporting) measurement. While documenting progress in the reporting year, this report also highlights critical change processes from work in previous years, which are becoming evident and building the overall momentum of SAWI.

This executive summary provides a strategic overview of progress and the overall direction of travel. Further details of annual progress, examples, and results are in Sections 1 to 3 and in the supporting six annexes.

The World Bank's overall assessment is that SAWI is performing well, with evidence that it is contributing to catalyzing change and building momentum around processes toward the higher order objective of strengthening regional cooperation on the major transboundary rivers in South Asia. SAWI activities are directly and indirectly informing other processes and activities in various ways, which include: (1) shaping policy, particularly at the national level through knowledge, tools, capacity building and informal discussions; (2) influencing thinking and debate most notably through the basin level dialogues and capacity building; and (3) providing critical regional insights and new information to the design and implementation of World Bank investments (see Leverage section below).

The first three years of SAWI-II focused primarily on setting the strategy, finding appropriate technical entry points, building new partnerships, and operationalizing activities. Year 4 has built on this foundation by widening networks, shaping and leveraging opportunities as these emerge, and connecting ongoing activities through regional and basin-level dialogue processes. Most significantly this year, SAWI has made a strong leap forward with its basin-level dialogues, which are bringing stakeholders together and starting to shift attitudes. This is evidenced by written and verbal feedback, increasing levels of engagement, and movement toward collaborative research (details are provided in each Focus Area update below). It is also showing successes in embedding the knowledge and tools developed within client country systems, building institutional capacity, and influencing large investments both within the World Bank's lending portfolio and country programs.

The program-level targets in SAWI's Results Framework for FY17 were mostly achieved, and a number were exceeded. Higher-level impacts than those tracked in SAWI's Results Framework (for instance the use of data to save more lives during natural disasters) are likely to emerge in the medium- to long-term. These are not as yet evident as activities have recently concluded or are still ongoing, and are not fully embedded within

client systems. SAWI's activities are oriented toward a long-term strategic perspective, but with a mix of quick-wins to demonstrate success and encourage stakeholders to continue toward regional cooperation. Some highlights of SAWI results are provided in Box 1. Gender concerns are integrated through the program, and some emerging results are in Box 3.

Box 1: SAWI 'Quick Wins' – Result Highlights

1. Four of five sub-regional and regional level dialogues are enabling stakeholders from different countries to build trust and to work toward mutually beneficial solutions.

- The Bangladesh-India Sundarbans Regional Cooperation Initiative (BISRCI) has been influential, adopting a behind-the-scenes approach to drive informal discussions with key stakeholders on sensitive issues on the Sundarbans. As a consequence, riparian governments (India, Bangladesh) are willing to publicly engage on potential Sundarbans cooperative action.
- SAWI has helped to evolve and scale up the Brahmaputra dialogue initiated by SaciWATERS.
- Support to the Indus dialogue is helping to expand networks and reach, which would otherwise be limited in scale and scope due to lack of funding that could constrain participation.
- The regional level dialogue has raised groundwater and transboundary river management to new levels of awareness in the region, giving impetus to the need for joint action (e.g. Indus, Sundarbans).

2. The uptake of new knowledge and tools is resulting in improved capacity and a heightened appreciation of transboundary issues by key stakeholders within countries—contributing positively to the wider operating environment.

- Technical support has brought a basin approach to the preparation of the Investment Plan for the Bangladesh Delta Plan 2100, which adopts a regional and long-term approach to prioritizing investments.
- An assessment and mapping of flood risks in the Ganges Basin resulted in the preparation of the Flood Risk Atlas (FRA), now hosted on the website of the Indian Central Water Commission (CWC).

- The Afghan Government is engaging more intensively with its neighbors—in particular, Iran and Tajikistan—in part due to its increasing confidence in negotiations through SAWI-supported training. Afghanistan's willingness to engage on transboundary water issues could pave the way for increasing dialogue on the Indus Basin.
- Innovative approaches for climate change risk screening and resilience measures under uncertainty are beginning to be integrated into government hydropower investments. Application of these methods led to prefeasibility design changes to climate proof the proposed Upper Arun Hydropower Project in eastern Nepal, and provided proof of concept for the planning and design of climate resilient water resource infrastructure for hydropower development across the Kosi Basin.
- More than 400 water professionals from 60 water management organizations across the region are benefitting from access to new tools and training. These are aimed at supporting more effective engagement on transboundary issues, better management practices and more successful implementation of related activities.

3. By aligning with national priorities, SAWI is able to influence beyond its immediate activities.

- Various national-focused activities in Bangladesh, Bhutan and India support governments to enhance hydro-meteorological data collection and management. These provide the building blocks of basin/ landscape-level information systems, as are being explored, for example in the Sundarbans and the Brahmaputra Basin.
- SAWI is directly informing the development and implementation of national investments in India (valued at \$2.8 billion (B)), and successfully

engaging 11 Indian States in the Ganges Basin, where there are competing demands for water resources.

- The Bihar flood forecasting framework is being scaled up to other basins under India's National Hydrology Project (NHP), and is being replicated for the transboundary Rapti Basin in Uttar Pradesh.

4. SAWI technical products are informing and leveraging 14 World Bank investments across the region (worth \$3.7B).

- In Afghanistan, SAWI supported restructuring (additional World Bank financing of **\$70 million (M)**) of the World Bank's Afghanistan Irrigation Rehabilitation and Development Project, with an increased focus on transboundary river basin management.
- In Bhutan, SAWI contributed to the preparation of a project on hydro-met services and disaster resilience (**\$4M**), partially funded with GFDRR.
- In Bangladesh, SAWI supported preparation of the Weather and Climate Services Project (**\$113M**) and the River Management Improvement Program Project (**\$600M**).
- In India, technical work on the Brahmaputra is supporting the preparation of the Assam Flood, Erosion and River Management Project (**\$250M**), in addition to informing and supporting the implementation of other projects: the National Hydrology Project (NHP, **\$175M**); the National Groundwater Management Improvement Project (NGMIP, **\$500M**); the Uttar Pradesh Water Sector Restructuring Project – Phase 2, (UPWSRP, **\$360M**); the West Bengal Major Irrigation and Flood Management Project (**\$145M**); the Bihar Kosi Basin Development Project (BKDP, **\$250M**); and the Neeranchal National Watershed Project (**\$178M**). At the basin-level, technical advice supports the National Ganga River Basin Project (NGRBP, **\$1B**).
- In Pakistan, SAWI supported additional World Bank financing of **\$35M** for the Water Sector Capacity Building and Advisory Services Project (WCAP), aimed at bringing an increased focus on river basin management for transboundary rivers.
- In Nepal, SAWI is commencing analysis to inform the World Bank's Power Sector Reform and Sustainable Hydropower Development Project (**\$20M**).

STRATEGIC DIRECTION

The Focus Area strategies provide an overarching framework for selecting activities and proactively engaging with other ongoing processes. SAWI's adaptive management approach also enables it to respond to windows of opportunities presented by an evolving operating context, with an eye toward making a greater impact and generating more impressive results. The choice of activities is strategic and oriented toward regional priorities, and there is growing evidence of client responsiveness to and ownership of these approaches. SAWI's strategic approach includes strategic depth and strategic breadth.

Strategic depth: By aligning with national priorities, SAWI is able to influence larger programs beyond its immediate activities. For instance, in India SAWI is closely aligned with national programs (worth more than \$2.8B), and is able to successfully develop and demonstrate the use of tools at the state level (e.g. Bihar flood models), which is helping to promote

the wider dissemination and uptake of these approaches. The flood forecasting and management work (refer Box 2) is an example of how national activities are transitioning at a regional level. SAWI-supported capacity building on transboundary water resources management, governance and negotiations has led to Afghanistan engaging more proactively in transboundary negotiations on water with neighbouring countries. These discussions are on basins that are less politically challenging to address than the Indus Basin, but Afghanistan's increasing skill at negotiations is viewed as a first step toward gaining the confidence to take on more challenging cases.

Strategic breadth: The basin / landscape approach enables SAWI to support a diverse set of context-specific activity and dialogue, and there are positive examples of joint collaborative research (e.g. in the Indus and Sundarbans). However, despite SAWI's efforts, discussions on potential joint investments by riparian countries are moving at a slower pace, as these are subject to wider political processes.

Furthermore, by working regionally SAWI is able to facilitate cross-learning and work on issues that cut across all geographies; take a regional lens to issues that are regional in nature (e.g. the risks of climate change to water management in the SAWI countries); and explore potential for regional growth and integration (e.g. regional electricity markets, regional trade, inland navigation, biodiversity).

In recognition of the long-standing political sensitivities around transboundary water management and drawing from the evaluation lessons of Phase I, SAWI-II was designed with an understanding that technical engagements are neutral and feasible entry points toward broader (political) cooperation. So far, SAWI's work with technical professionals is helping to broker strong, lasting partnerships with greater levels of trust and shared understanding. This approach has also enabled SAWI to engage with a younger cohort of professionals who could potentially be leaders of change in the future. Through this approach, SAWI

has been able to advance evidence-based and best practice solutions that can engage stakeholders in meaningful dialogue that can contribute to institutional and political change. One example is that work under the Ganges Focus Area is heralding in institutional changes (cooperation between the Center and States in India on integrated basin planning and on sharing classified data).

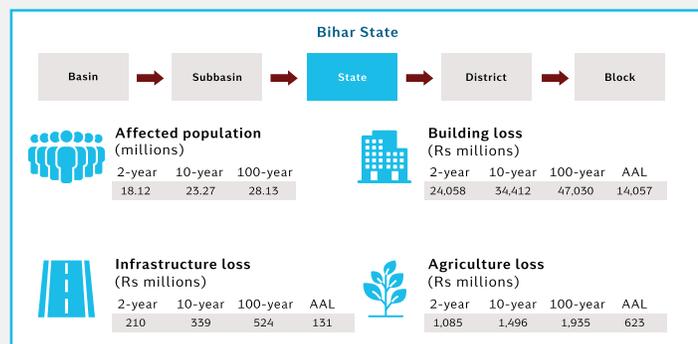
In the absence of a supra-regional level River Basin Organization (RBO) in the SAWI region, the program has used various formal and informal avenues for engaging on cooperation in transboundary waters, and works closely with a wide array of stakeholders, from government to civil society. SAWI aims to gain traction by engaging on issues of common concern that are specific to the context of each Focus Area. Thematically, these include hydropower planning and design, climate change and disaster risk management, strategic basin planning, and groundwater management, among others mentioned in the Focus Area summaries below.

Box 2: Case Study - Regional Approach to Floods in 2017

Every year, South Asia is prone to serious flood hazards with large numbers of people at risk. This year, the floods in the Ganges Basin alone affected more than 23 million people. The FRA and forecasting work are complementary activities. SAWI is not only developing essential basin level tools, but also using these as an entry point at the State level (in Bihar) to promote the benefits of effective regional water information service delivery, while augmenting government's capacity to use these tools.

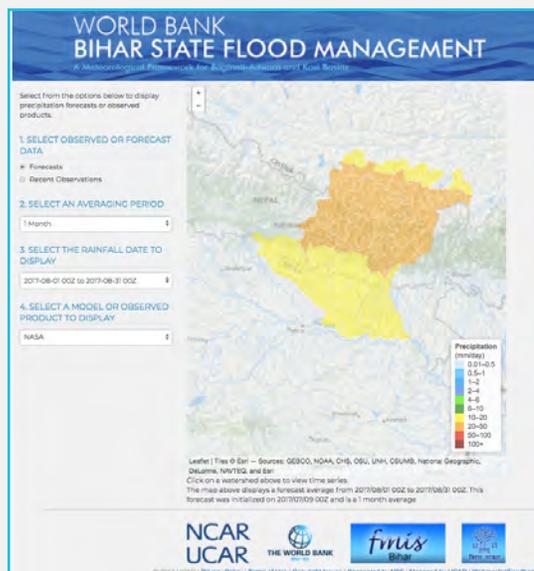
Flood Risk Assessment: Analytical and mapping work on historical flood data was undertaken to estimate economic losses in the Ganges Basin. This is helping to identify high risk areas so that activities and investments can be planned accordingly. A FRA Atlas has been developed (2016), and was endorsed by the Government of India's CWC and uploaded on their official website (<http://www.cwc.nic.in/>). The Atlas is capable of providing both inter-state as well transboundary assessment, which makes it useful for wider dissemination and knowledge sharing.

The recent Bihar 2017 floods are unprecedented, with flooding in seven of the eight rivers having affected more than 17 million people. **The FRA Atlas was used by the World Bank to generate risk reports at different geographic points in the river basin and to estimate losses for areas with severely impacted populations. This is intended to prioritize areas that would benefit from immediate attention to flood risk reduction.** The Atlas provides estimates of flood impacts for the entire basin, by district/blocks and by asset class, from a two-year to a 100-year return period. The diagram below shows the impacts of Bihar floods on number of people affected (disaggregated by gender), building loss, infrastructure loss, and agricultural loss. The Atlas provides the best possible estimates compared to other available sources.



Flood Forecasting: Following on from the above work, SAWI developed a Flood Predictability Assessment for the Ganges and the Brahmaputra Basins (available at <http://indiawbg.rap.ucar.edu/precip/>).

By providing operational real-time estimates, the tool aims to improve accuracy in the predictability of flood forecasting for rainfall and river flows, and enable comparison to be made across the basin. This can be used to help evacuation planning and mitigation of household economic losses. The tool uses different modeling techniques, makes innovative use of satellite transboundary data that is not reliant on information sharing between riparian countries or on-the-ground measurements, and provides the results in a way that can be easily understood. The tool is being customized for Bihar in partnership with the National Centre for Atmospheric Research (NCAR) (available at <http://bihar.rap.ucar.edu/rainfall/>). **During the floods (2017), real-time rainfall observations were made available (for download) for Bihar's Flood Management Improvement Support Centre (FMISC). The forecasting framework is being scaled up to other basins under India's NHP and has been replicated for the transboundary Rapti River Basin in Uttar Pradesh.**



Looking Forward: SAWI continues to work with the FMISC to improve forecast information and technologies to meet Bihar's needs; and is expanding its forecast coverage to the major river basins in Bihar as well as those covered by the whole of the Ganges and Brahmaputra Basins. SAWI is also improving its communications websites to include new alert-warning pages that highlight areas of flood risk, and is supporting greater access and technology transfer of the forecasting systems to the FMISC through a jointly-shared NCAR-FMISC cloud service. SAWI is also using dialogue and operational real-time data sharing models to encourage upstream-downstream collaboration in flood management between Nepal and Bihar. Planned activities under SAWI and the World Bank's BKDP were discussed by the joint high-powered committee of the Government of Nepal and the State Government of Bihar. Nodal officers have been appointed and technical discussions on flood forecasting are underway.

REGIONAL CONTEXT AND EMERGING OPPORTUNITIES

SAWI is operating within a complex, diverse and rapidly changing regional economic and political environment further complicated by climate change and environmental stresses. There are significant differences in the geopolitics of the eastern and western regions of South Asia, including how the countries interface with their neighbours. While some of the region's basins provide promising windows of opportunity, potential entry points are constrained in other areas. Traditional issues like water allocation remain sensitive, but there are emerging entry points for dialogue and collaborative action. These include hydropower, groundwater management, navigation, disaster risk reduction and climate resilience, and ecological integrity.

There are several positive signs toward increasing cooperation in the region. Recently, there has been a positive movement toward sub-regional level (primarily bilateral) collaboration, including on: (a) power trade agreements on hydropower production and export between Afghanistan-Pakistan, Bhutan-India, Nepal-India, and Bangladesh-India; (b) bilateral mechanisms for sharing hydrological data for flood mitigation between many countries in the region, including Bangladesh-India, Bhutan-India, and China-India; (c) cooperative management of hydro-met stations and data sharing between Nepal-India, Bhutan-India and Bangladesh-India; (d) cooperation on inland water between Bangladesh-India; (e) the Bangladesh-Bhutan-India-Nepal (BBIN) process; and (f) the bilateral Framework Agreement on Cooperation for Development between Bangladesh and India (2011), which sets the foundation for

discussions on the joint management of the Sundarbans—although joint actions envisioned in agreements are yet to be fully operationalized. SAWI deploys resources flexibly to respond in a strategic way to emerging opportunities, as well as critical challenges, which are discussed below.

CRITICAL CHALLENGES

Notwithstanding the emerging opportunities, several challenges in implementing a complex and politically sensitive transboundary water management program remain:

- *The evolving political economy context and rising regional tensions can impede progress. This is largely out of SAWI's control, and requires adjustments in approach.* SAWI's approach is to use knowledge sharing and advance informal regional and basin-level dialogues represented by influential members; broaden partnerships so that it can work with and through others to move toward a common agenda; and build ownership and sustainability by implementing activities in partnership with the client, including via several Recipient-Executed (RE) activities.
- *Nationally, there are multiple incentives and priorities that intersect with the transboundary water governance agenda and can slow progress.* By aligning with national policy priorities and investments, SAWI is able to engage with a broad set of stakeholders at the national and sub-national levels, provide a common platform for dialogue, and demonstrate innovative tools and facilitate their wider replication.
- *Technically promising avenues often do not mesh with political economy constraints.* The strategy to link 'technical work' to 'Track I' policy work is still a challenge. SAWI's activities are therefore oriented toward a long-term strategic perspective, but with a mix of quick-wins to demonstrate success and by dialogue to encourage stakeholders to continue toward regional cooperation.
- *Limited, asymmetric capacity across the region present challenges for uptake and sustainability.* This includes frequent changes in key interlocutors (e.g. transfers of officials) that make continuity and sustaining momentum difficult. This has been a significant challenge, particularly in terms of maintaining the pace of work. The SAWI teams continue to invest significant efforts in building relationships, and direct significant resources toward capacity building activities for sustained results.
- *Security concerns in some countries and sub-regions constrain the intended pace of activity.* For example, the increasing frequency and intensity of attacks in Afghanistan has implications for the pace of work, and government attention is diverted elsewhere. SAWI is managing this by working with other agencies and by investing in building capacity of targeted Afghan officials to sustain their engagement. With relationships established between SAWI and the Afghan ministries relevant to the water sector, SAWI is able to deliver trainings via telecommunications technology during periods of restricted travel for international staff and consultants.
- *Limited funding for regional investments.* SAWI is helping governments to do forward investment planning, engaging with the private sector, and promoting collaborative joint projects through the dialogue forums. SAWI activities are closely aligned with and informing the World Bank's investments in the region (currently 14 investments worth more than \$3.7B).
- *Leaving no one behind.* SAWI has consulted extensively with stakeholders at local levels to ensure voice and representation, particularly of vulnerable groups. SAWI continues to strengthen its approaches to integrate gender and climate change into its activities (refer Annex V for details) and for ensuring a more inclusive approach—for instance, by using the FRA to identify vulnerable groups so that targeted and timely action can be taken accordingly. However, this remains work in progress and SAWI is strengthening its approaches.

LEVERAGE

SAWI is an important part of the World Bank's Regional Strategy in South Asia. This relatively small financial investment adds value by its ability to leverage¹ significantly larger country level investments and programs (see Box 1 for details), and have a much larger influence and reach than would otherwise be the case. The Trust Fund vehicle is not used to supplant standard World Bank project preparation and design funds. Instead, its additionality is that it facilitates a cross-sectoral approach, and enables regional transboundary and basin-scale issues, including riparian implications (beyond the procedural aspects of transboundary notification required by the World Bank) to be brought into the technical design of investments. In addition to injecting transboundary aspects into project design, SAWI has taken advantage of client engagement in projects to build their capacity on issues that encompass not only the specifics of project preparation and implementation, but also broader issues of transboundary water cooperation, including by bringing exposure to global best practice, and linking with SAWI's analytical work on basin planning and flood forecasting, etc. Thus, SAWI enables the World Bank to work on sensitive transboundary issues and engage on issues outside of its normal investment portfolio by leveraging on it.

SAWI is also engaging with broader national and regional initiatives and institutions, the private sector, and development partners for financial support to incentivize action during this phase and beyond. These partnerships help in crowding-in expertise and in disseminating knowledge to multiple stakeholder groups. They also ensure the sustainability of SAWI activities, including beyond the program, and as such are an explicit part of SAWI's sustainability strategy.

ALIGNMENT

SAWI is firmly embedded within the World Bank system. As a Multi-Donor Trust Fund, SAWI is

itself a vehicle that promotes the Paris Declaration principles harmonization and alignment. As such, it is strongly aligned with client country priorities and investments, and with the World Bank's country and regional strategies and investments. SAWI works in partnership with other related regional World Bank Trust programs, such as the DFAT-funded Partnership for South Asia (PFSA), which includes the South Asia Regional Trade Facilitation Program (SARTFP) as one of its windows. SAWI also works with other partners in the DFID-funded South Asia Water Governance Programme (SAWGP) and DFAT's Sustainable Development Investment Portfolio (SDIP) in South Asia in an effort to build synergies and ensure alignment with those broader programs. SAWI is building partnerships with a broad network of implementing partners, including IWMI, ICIMOD, SaciWATERs, IWA, and TERI, among many others.

SAWI operates through the World Bank's Country Management Units (CMUs), which are responsible for country-level World Bank operations, analytical work and technical assistance that respond to the needs of the client. SAWI is also closely aligned with sectoral priorities as they relate to transboundary water resources. Its governance includes relevant Global Practice (GP) teams—including from Water, Agriculture, Energy and Extractives, Environment, and Social, Urban, Rural & Resilience (SURR). Several of SAWI's activities are led by specialists in these units, which gives it the ability to exercise influence beyond the narrow water sector. The internal committee that steers the SAWI program is comprised of representatives from the World Bank's regional programs, managers from all related sectors, and the CMUs. Increasingly, SAWI is joining forces with other parts of the World Bank Group, including the International Finance Corporation (IFC).

GENDER

SAWI recognises that women are key stakeholders—both in terms of ensuring that their interests are equally represented and that they benefit from SAWI

¹ The term "leveraging investments" or "leveraging opportunities" in this report is used in the general sense to mean any large overall impact of a smaller amount of World Bank investment or advisory input. This usage is adopted in line with World Bank convention.

and its related activities. The integration of gender issues within and across SAWI's activities remains a priority. However, this remains challenging as transboundary water management has been traditionally male dominated, and there is limited analysis on the connection between transboundary water management and gender concerns. This year, SAWI stepped up efforts to mainstream gender within the program, in line with the World Bank's Gender Strategy (2016-2023) and its guidance Toolkit for Mainstreaming Gender in Water Operations (March 2016). A Gender Mapping of selected SAWI activities is in Annex V. This is being monitored regularly by the SAWI team, including through expert technical guidance from the World Bank's lead gender specialist. SAWI's approach

across activities focuses on gender analysis; actively promoting women's participation in key stages of activity design and implementation to ensure balanced participation in dialogues and that women's voices are heard; raising public awareness; capacity building and organizational development; and strengthening monitoring and reporting of gender-disaggregated results. SAWI has conducted initial analysis to identify the issues, needs and contextual factors affecting male and female stakeholders. More in-depth targeted work on social inclusion in transboundary water management with a focus on gender is planned to commence in FY18. Some emerging results of SAWI's gender mainstreaming work across its activities are highlighted in Box 3 below.

Box 3: Emerging Gender Result Highlights

- The recently completed FRA Atlas provides reliable estimates of the gender-disaggregated impacts of the devastating Bihar floods in 2017. In future years, this is expected to help government to prioritize its actions, including for women and the most vulnerable groups.
- Thirty-eight women have benefitted from formal technical and capacity building training this year.
- Consultations at local levels in the Sundarbans have included women's groups, to take account of their priorities and needs in forward activities.
- Gender is being integrated into the design of the Brahmaputra Strategic Basin Assessment, which is intended to inform future strategies and investments that integrate gender equality and women's empowerment.
- The Sundarbans studies on fisheries and on nutrition are bringing a gender lens to the negative impacts of climate change, and opening up space for a more holistic dialogue on these issues.
- Multiple consultations and capacity building events were conducted during the preparation of the environmental and social systems assessment (ESSA) for NGMIP in India. The ESSA focused on gender issues and provided concrete recommendations for a gender-informed groundwater investment program (e.g. the need for 20 percent women participation in the development of groundwater security plans).

LOOKING AHEAD

- As this phase of funding reaches maturity, SAWI is ensuring the successful completion of all activities, ramping up its adaptive management approach to seize emerging opportunities, strengthening outreach and uptake with partners, and putting in place measures for sustainability.
- SAWI could further explore the potential for alignment with regional programs elsewhere, such as the Central Asia Regional Economic

Cooperation; and deepen relationships with other regional Trust Funds, such as SARTFP, particularly on issues such as inland navigation, gender and climate change.

- Forward priorities include pressing ahead on identifying and fast-tracking joint activities between the riparian countries that shift entrenched positions and incentivize further collaboration; keeping momentum on the knowledge and advocacy platforms to promote mind-set shifts; and ensuring that knowledge

and evidence are used to inform upcoming investments for the World Bank and client countries.

- SAWI is likely to unlock opportunities for future cooperative action and investments (World Bank, riparian countries and others) in areas that are emerging entry points, including flood management, hydropower generation and power trade, inland water navigation for trade and transport, and groundwater management. The SAWI team will explore means to harness these windows of opportunity.
- SAWI is expected to continue until 2020, but activities have been oriented toward ensuring the sustainability of outcomes. It is expected that the developed systems and tools (e.g. flood forecasting) will become increasingly embedded into government systems as, in many cases, the client has been deeply involved in developing them and has received extensive capacity building in their use. However, while knowledge products will be available in the public domain and efforts are being made to integrate these into planning processes, it is possible that not all products will be systematically utilized by government or other stakeholders. Further, it is unlikely that the dialogues will sustain in their current form without external funding. A future phase of Trust Fund support would be beneficial, as it would enable fully embedding activities within client country institutions, build on the momentum gained under the current phase of SAWI (including the dialogues), and allow increasing alignment and leveraging of the World Bank's forward country strategies and investments, currently under development.

SECTION 1 INTRODUCTION

Activity on the Ganges River at Varanasi, India



1.1. HOW TO READ THIS REPORT

This annual report provides an assessment of progress, supported by Focus Area-based updates and examples of change. This Section 1: Introduction briefly sets out SAWI's key objectives, approaches and details of the portfolio, and the relevance of this approach. Section 2: FY17 Reporting Annual Progress summarizes program effectiveness, assesses progress against the four intermediate outcomes in the Results Framework for each Focus Area, reports on expenditure and efficiency, presents progress against five cross-cutting themes, and outlines program management. Section 3: Lessons and Forward Look sets out key challenges and risks, outlines emerging lessons, and presents reflections on the future direction of SAWI. Six annexes provide details on FY17 performance, activity implementation, knowledge products, financials, gender, and activities relating to each of the SAWI countries.

1.2. SAWI'S OBJECTIVE, STRATEGY AND APPROACH

SAWI Phase II is a five-year (2013-2018) \$30.7M Multi-Donor Trust Fund managed by the World Bank, with financing from the governments of the United Kingdom, Australia and Norway. Its objective is to increase regional cooperation in the management of the major Himalayan river systems in South Asia to deliver sustainable, fair and inclusive development and climate resilience. SAWI's strategic approach is oriented toward shifting the status-quo and promoting collaborative dialogue and joint action so that South Asian countries can leverage opportunities and reduce risks. This involves supporting regional and basin-wide activities, as well as national scale activities that build the support and confidence of national governments to engage in constructive regional dialogue as a precursor to more formal future cooperation. The

program is structured around four geographic Focus Areas (Indus Basin, Ganges Basin, Brahmaputra Basin, Sundarbans Landscape) interfacing with a Regional Cross-Cutting Knowledge, Dialogue and Communications Focus Area that both supports non-basin-specific work and translates national or basin-specific work for wider dissemination or implementation. Each Focus Area is framed around a high-level objective statement and strategy.

1.3. THE PORTFOLIO

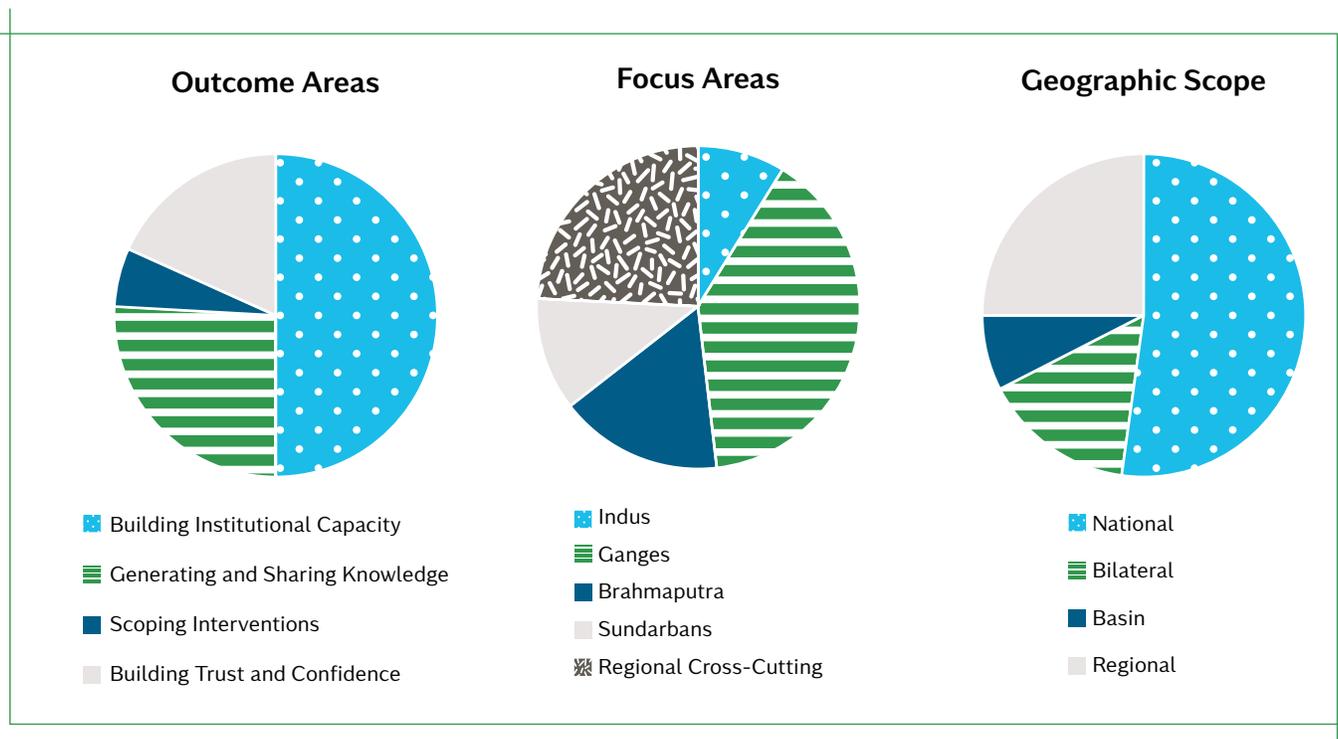
SAWI has had a total of 51 activities since its inception. In FY17, 33 activities were active and the remainder were completed in that FY or before. Activities are grouped as follows:

- **Analytical and knowledge-focused activities** range from national scale (e.g., to ensure transboundary and basin-scale issues are adequately considered in World Bank investments and analytical work), through river basin scale (e.g., to guide cooperative planning) up to regional scale (e.g., on climate change adaptation).
- **Capacity building** includes national activities in response to specific government requests or tailored to specific issues (e.g., sediment management in hydropower) as well as regional activities on shared challenges and needs. National level capacity building is also directed toward addressing the capacity asymmetry that often makes riparian interactions less effective.
- **Dialogue activities** are either basin or regional in scope. National level work provides knowledge and capacity "pillars" for basin and regional-level dialogue on transboundary water governance and cooperation. These national-focused activities are often related, and their inclusion under the SAWI umbrella allows for exchange and cooperation across boundaries and across activities.

- **Scoping and informing interventions and investments** involves identifying opportunities for joint action, using SAWI to inform ongoing national priorities and investments, and contributing to the design and implementation of other World Bank investments.

In FY17, there were five RE activities (approx. 15 percent of the portfolio)—two with regional institutions, IUCN for training on transboundary water governance and ICIMOD for a sustainable network of Himalayan universities, and three with

governments to strengthen specific government programs and / or to build capacity of departments. These included: the Government of Bhutan for hydro-met services and disaster improvement, the state of Bihar for flood modeling, and the Government of Nepal’s Water and Energy Commission Secretariat (WECS) for hydropower. All other activities are Bank Executed (BE). Details on activity-level reporting for FY17 are contained in Annex II. The cumulative distribution of activities across the above groupings, Focus Areas and geographic scope through FY17 is shown below.²



1.4. RELEVANCE

The rationale and need for SAWI remains strong; more than 1 billion people are reliant on the waters of the three great Himalayan rivers. Economic development, changes in land use, and population growth are increasingly placing stress on the

water resources of the region. Climate change is likely to exacerbate the challenges associated with the management and use of transboundary water resources for growth, shared prosperity and stability in the region. SAWI operates within a context of a dynamic political environment rooted in historic regional tensions and deeply entrenched

² The predominance of knowledge activities is misleading as most activities in this category also have a significant capacity building component and work to build trust and confidence. Indeed, all activities ultimately contribute directly or indirectly to building trust and confidence for regional cooperation. The predominance of national scale work reflects the importance of interfacing with World Bank national-level investment lending, as a stepping stone to regional cooperation. It also reflects the fact that few requests for joint transboundary work have been received, given the sensitivity of these issues. To circumvent this constraint, in some cases, activities on 'both sides of the border' are conducted concurrently. Several activities under the Regional Cross-Cutting Focus Area focus on a specific country and so count toward national scale work.

positions. It has diverse socio-economic and cultural characteristics, with a multiplicity of stakeholder interests. Solutions are therefore required to minimize the risks and maximize opportunities through promoting regional collaboration.

There are several other ongoing efforts in South Asia (including those conducted by SAWI implementing partners) to facilitate cooperative management of transboundary rivers and landscapes. However, these tend to be localized, piecemeal, working with a subset of stakeholder groups, focused on particular sectoral issues, and undertaken at small scale. SAWI is a core vehicle for building on individual efforts through a coordinated and strategic approach aimed at strengthening the momentum toward sub-regional / regional cooperation. SAWI maintains relevance by aligning closely with national priorities while tapping into windows of opportunity that emerge at the regional level.

SAWI's value addition is as follows:

- Ability to conceptualize the problem at scale and tackle this in a holistic manner through a mix of activities, including dialogue, capacity building, knowledge, technical advice, and informing investments;
- Exercising its mandate and tapping into its network to bring together representative stakeholders across countries, from government, private sector, civil society, the research community and the media. These dialogue processes are increasingly connecting water professionals and policymakers across the region, with subtle shifts in mind-sets now becoming evident;
- The weight behind a multi-donor effort, combined with World Bank leadership, is broadening networks and reach, enabling use of innovative methods to develop knowledge and demonstrate its utility, and influencing stakeholders at the highest levels that would not be possible with bilateral efforts alone; and
- Ensuring that transboundary issues are adequately considered in the design and

implementation of billions of dollars of World Bank operations in South Asian countries.



SECTION 2 FY17 ANNUAL PROGRESS REPORTING

The Indus River Basin



2.1. EFFECTIVENESS (SAWI ACHIEVEMENTS)

Overall, SAWI's progress is consistent and remains on track, although it is not even across all of the Focus Areas due to variations in context, client capacity and demand, and other external factors. The four main intermediate outcomes areas in the Results Framework are complementary, and reinforce each other. Taken together, these contribute toward SAWI's intended outcome of "increased regional cooperation in the management of the Himalayan River systems to deliver sustainable, fair and inclusive development and climate resilience". Although the riparian countries are yet to develop joint cooperation on projects, there is good progress on joint collaborative research and other activities (examples are in the Focus Area updates below and in the annexes). This is a significant achievement, as even the engagement of various stakeholders in common forums was previously challenging. The Focus Area dialogues have built momentum, and by combining this with capacity building and knowledge products, SAWI is helping riparians to understand the significance of benefit sharing approaches in cooperative planning and management of transboundary basins and landscapes.

Summary of progress toward the four intermediate outcome areas are as follows (with more details on the Results Framework in Annex I):

1. **Building Trust and Confidence:** SAWI has made significant progress in promoting and facilitating a stakeholder-centric approach to advancing dialogue in the basins and landscape. While multi-stakeholder forums on transboundary water management have previously existed, SAWI has helped to advance and scale these up. The aim is to create effective mechanisms and a safe space to facilitate open dialogue that is specific and relevant to the particular context of the basin / landscape. SAWI has also undertaken informal networking, and other tacit approaches to engaging government and other key stakeholders particularly on sensitive issues. By expanding its network of partners, SAWI's strategy of working with and through others is also proving to be effective—particularly in terms of building common understanding and momentum toward regional / sub-regional cooperation.
2. **Generating and Sharing Knowledge:** The production of new tools (e.g. models for river basin planning) and technical knowledge products (e.g. climate change across South Asia and in the Indus) has been an effective way of engaging stakeholders on sensitive issues, bringing new perspectives and evidence into dialogue and systems, promoting joint research among riparian countries, and using the dialogues and other mechanisms to embed SAWI's knowledge and tools into government systems. SAWI has also introduced gender and climate change perspectives into its technical approaches with stakeholders.
3. **Building Institutional and Professional Capacity:** Targeted training, exchange visits and study tours have been an effective way to engage senior officials on issues of transboundary water management. Training for staff practitioners is helping to operationalize and build capacity to use these new tools. These are being incrementally taken up by government systems (e.g. FRA Atlas on the website of the CWC; the Government of India's interest in adopting the Strategic Basin Planning) and by other institutional partners (e.g. glacial mapping data completed under the Indus Focus Area is hosted on the IWMI knowledge portal). Capacity building of riparians that are relatively weaker is focused on strengthening skills and technical information which are particularly useful for regional and bilateral discussions

and negotiations on transboundary water (e.g. capacity on transboundary water governance for Afghan officials).

4. Scoping Interventions and Investments: The most immediate results are the links with other investments, namely national programs and the World Bank's lending operations (active and pipeline), both of which are important for sustainability. The nature of the Trust Fund instrument, and the World Bank's presence, reach and networks mean that SAWI continues to be well positioned to inform and influence current operations and future investment plans in the region.

2.2. FOCUS AREA REPORTING

INDUS BASIN FOCUS AREA

Context and Strategic Approach

SAWI's long-term approach is focused on creating the necessary conditions for basin-wide cooperation and planning and investments in water management infrastructure. Although tensions on the Indus have escalated significantly between India and Pakistan since September 2016, SAWI has continued to engage strategically in a necessarily sensitive and low-key fashion. It is doing this through building trust among stakeholders across the riparian countries (Afghanistan, China, India, Pakistan) through an Indus Basin-wide dialogue process; providing capacity building; generating knowledge and information sharing in order to equip water management institutions with the right tools for glacier monitoring; assessing climate change impacts; and promoting data exchange and collaborative research. The Indus Forum (IF), established in June 2013, is an informal mechanism comprising participants from each of the four basin countries and facilitated by the World Bank. Its members are influential voices in-country and a critical link between SAWI's activities and

the national level discourse on water resources management and basin/sub-basin-level cooperation. This is significant as it is a track II dialogue involving participants from all four countries (and not just India and Pakistan). Since February 2016, the IF is co-facilitated with IWMI and IUCN.

Key Results - What is SAWI Delivering?

The IF established an Indus Forum-Working Group (IF-WG) in March 2015. This year, SAWI has focused primarily on building momentum on trust and confidence through meetings of the IF and the IF-WG; strengthening capacity through targeted training and study tour visits in October 2016³; using carefully selected entry points to inform policy; and building collaborative partnerships through other regional institutions to be able to sustain efforts in the long-term. While all dialogue between India and Pakistan was suspended for a few months, an important achievement is the small scale technical dialogue through the IF-WG, which continued to keep the academic and research community engaged.

Building Trust and Confidence

- **The IF has become more participative and proactive.** Over the past year there has been a remarkable shift—the IF participants have taken charge of the process for organizing meetings. SAWI is enabling the IF to **broaden the circle of engagement, consolidate collaborative partnerships, and work toward a core of “basin-thinkers”**. In particular, partnerships have been extended with the Upper Indus Basin (UIB) Network facilitated by ICIMOD⁴, and with IWMI. This is helping to build an enabling environment for cross-border collaboration on research as well as ensure longer-term sustainability for the dialogue process. In July 2017 the IF/World Bank partnered with IWMI and ICIMOD (as well as other partners, e.g. USAID PEER Program) to organize the first Indus Knowledge Forum (Colombo, Sri Lanka). The objective was to

³ In October 2016, SAWI led a study tour on glacier monitoring in the Swiss Alps, bringing together participants from the four Indus Basin countries and international experts on climate change, glaciology and hydrology. The study tour allowed participants to understand and learn about research approaches to glacier monitoring in the Swiss Alps, to discuss and finalize the IF-WG joint research proposal, and to identify next steps for coordination and research mobilization (discussed further under the *Generating and Sharing Knowledge* section below).

assess the nature of existing knowledge and development challenges of the Indus and identify coordination mechanisms that can potentially inform decision making to address those challenges and to bring together the multiple organizations and individuals working on Indus Basin knowledge-related issues.

Generating and Sharing Knowledge

- **The IF-WG has developed a proposal for a joint research program on climate change impacts in the Indus Basin, facilitated by SAWI.** The IF is using science as a mechanism to inform policy and public discourse on the Indus. This joint research will be an important means of sustaining the engagement of academics and practitioners working on the Indus to build a shared knowledge base toward the larger strategic goal. The IF selected climate change as the topic as it impacts all four riparians, albeit with different effects. The research aims to address scientific knowledge gaps and could usefully guide policymakers for adaptation strategies. A joint meeting with ICIMOD's UIB Network in May 2017 presented the joint research proposal⁴ and continued discussions on how to strengthen coordination between these two networks of researchers. The IF-WG is currently finalizing the proposal, after which point it will be sent for peer review.
- With SAWI's support, the IF-WG has finalized a **baseline assessment and a data-mapping tool** on glacier data and a literature search on climate change impacts on the glacierized area in the Indus Basin. The GIS data-mapping tool developed by IF-WG is publicly available on the Indus Basin Knowledge Platform, which is hosted by IWMI (www.indusbasin.org). Young region-based researchers were engaged to undertake this work under the guidance of the IF-WG members.

Building Institutional and Professional Capacity

- Responding to a request from the Government of Afghanistan, **SAWI has delivered a two-year program of training** in the period from fall 2015 to fall 2017 that focused on relationship building with riparians, international law, negotiating skills, transboundary water governance, benefit sharing and instructional dimensions of building RBOs. In FY18, the training material will be combined into a training manual that can be used as reference material and by Afghan institutions.
- Forty-nine Afghan government officials have participated in 18 seminars and 142 hours of training. Of these, fifteen individuals have participated in 80 percent or more of the seminars, which demonstrates their deep commitment to capacity building. Intensive training on **transboundary water resources management is leading to strong inter-ministerial collaboration and confidence to engage in riparian dialogue with neighbouring countries.**
- A positive development is that **Pakistan has invited Afghan participants to capacity building trainings on glacier monitoring.** The Deputy Minister of Water of Afghanistan has nominated participants to attend the Pakistan training.
- SAWI has been able to **coordinate with other donors to provide additional support to other ministries**, in particular the Ministry of Foreign Affairs of Afghanistan through the EU since fall 2016. Throughout FY17, the team held joint training with the EU-funded consultant team for the inter-ministerial working group. A study tour to the Nile Basin, co-funded by SIWI and also involving the EU consulting team, is planned for October 2017.

⁴ The UIB Network is a consortium of research institutions and government agencies engaged in glacier research in the UIB.

⁵ The research proposal is developed as four working packages on: (1) baseline observations; (2) climate change scenarios; (3) climate change adaptation; and (4) capacity building and knowledge exchange.

In Afghanistan, SAWI's capacity building has helped inform the following:

1. The institutional structure of the Afghanistan inter-ministerial cooperation on transboundary waters, including the High Commission on Transboundary Waters headed by the President and an inter-ministerial working group;
2. The structure of the transboundary water department within the Ministry of Energy and Water (MEW);
3. The drafting of the Afghanistan transboundary water policy (in principle approved by the President).
4. The national dialogue on transboundary waters at the 4th National Water Conference in March 2017.

SAWI is therefore both informing and leveraging the development of the World Bank's in-country investments to achieve regional benefits, particularly with regard to environmental sustainability, flood management and hydropower development and trade for regional benefits, as well as facilitating networks through informal processes. SAWI's activities offer a suite of capacity building and training, exposure to international best practice through knowledge exchanges, and demonstration of participatory river basin modeling to support water resources management. This approach has been designed to tackle the main challenges of weak capacity, a fragmented sector with multiple uncoordinated agencies, and limited availability and sub-optimal sharing of hydro-meteorological data both between countries and between State and Central governments in India.

Scoping Interventions and Investments

- Capacity building has been designed and delivered to Afghanistan's MEW and to strengthen inter-ministerial collaboration and information exchange. This builds upon last year's support to preparation of the restructuring (additional World Bank financing of \$70M) of the World Bank's **Afghanistan Irrigation Restoration and Development Project**⁶, which led to the establishment of a transboundary water unit within the MEW.
- SAWI supported additional World Bank financing of **\$35M for the Pakistan Water Sector Capacity Building and Advisory Services Project (WCAP)** aimed at bringing an increased focus on river basin management for transboundary rivers.⁷

GANGES BASIN FOCUS AREA

Context and Strategic Approach

Despite several bilateral agreements in place, there is no formal multilateral transboundary governance or investment involving all three Ganges riparian countries (India, Nepal and Bangladesh).

Key Results - What is SAWI Delivering?

So far, SAWI has achieved significant engagement with key government stakeholders on the benefits of integrated water resources management (IWRM). There are signals of a growing willingness among state and national stakeholders to more fully engage on issues related to transboundary water management, including on data and information sharing. This year, SAWI has had the most traction from aligning with large national projects in India and by developing innovative flood forecasting alongside capacity building in the Indian State of Bihar. Within India, water quantity and quality are contentious issues among the Indian States that share the waters of the Ganges. The modeling and planning tools are critically influencing and informing the technical design and framework of the NHP⁸ (\$175M), meant to strengthen water monitoring systems, decision support tools and knowledge applications across 29 States in India. They are additionally informing the basin-wide NGRBP⁹ (\$1B) by bringing greater attention to environmental flows, water quantity and essential groundwater management. While these are critical processes

⁶ See <http://projects.worldbank.org/P122235/irrigation-restoration-development-project?lang=en&tab=overview>

⁷ See <http://projects.worldbank.org/P110099/water-sector-capacity-building-advisory-services-project-wcap?lang=en&tab=overview>

⁸ See <http://projects.worldbank.org/P152698?lang=en>

⁹ See <http://projects.worldbank.org/P119085/national-ganga-river-basin-project?lang=en>

that need sensitive handling in order to maintain momentum, gradual shifts in mind-sets and the outcomes of improved management are expected to become more evident over the longer term.

Building Trust and Confidence

- As Bihar is downstream from Nepal, **SAWI is encouraging operational real-time data sharing models to encourage upstream-downstream collaboration in flood management.** Planned activities under SAWI and the World Bank's BKDP¹⁰ were discussed by the joint high-powered committee of the Governments of Nepal and the State Government of Bihar.

Generating and Sharing Knowledge

- SAWI supported the development of an **online river basin planning and management model** that is available for use by government (with user accounts). The model can be used for optimizing reservoir operation to manage floods and maximize storage for irrigation. SAWI has also produced an updated hydro-met manual. Both the model and manual are available online (www.indiawrm.org).
- The IWRM tool for the Damodar Basin, currently being tested, has already resulted in inter-agency **collaboration on data** between the West Bengal Irrigation and Waterways Department, Damodar Valley Corporation, and West Bengal State Level Ground Water Resources Development Authority.¹¹
- Technical assistance in **scenario-based river basin modeling and participatory river basin planning for the Ganges Basin in India** has acted as a demonstrator in participatory basin planning. This approach integrates the consideration of water quantity and quality, as well as surface-groundwater interactions to guide policy and management. It is considered to be a pilot for the NHP, and is planned

for wider uptake by the Government of India and basin State governments under the project.

- **Bihar's flood forecasting framework is being scaled up** to other basins under the NHP and has been replicated for the transboundary Rapti Basin in Uttar Pradesh.

Building Institutional and Professional Capacity

- Twenty-seven participants (including five female engineers) from Water Resource Departments of 11 Indian States in the Ganges and Brahmaputra Basins were brought together in November 2016 for a **comprehensive training on 'WaterWare', a river basin planning and management software.**¹² A reputed institute (IIT Kharagpur) is planning follow-up training.
- Five Government of Nepal officials were supported to attend the International Hydropower Congress in Ethiopia in May 2017 to **enhance their knowledge of and share experiences in hydropower development.** This is expected to contribute toward charting the course for hydropower development and operations over the coming decade in Nepal, with regional implications for its neighbours.
- SAWI is supporting **capacity building for Government of Bihar officials** through targeted training and study visits. A high-level delegation (including the Minister and Principal Secretary, Water Resources Department, Government of Bihar) visited Japan in December 2016 to learn about institutional and technological perspectives of real-time flood forecasting and adopt the technology suitable for Bihar. Two Government of Bihar officials attended an operational flood forecasting training organized by RIMES and UNESCAP at the Asian Institute of Technology in Bangkok, in October 2016.

¹⁰ See <http://projects.worldbank.org/P127725/bihar-flood-rehabilitation-phase-ii?lang=en&tab=overview>

¹¹ See <http://80.120.147.40/phpincludes/auth/login.php?url=%2FDamodar2%2Fmain.php&PROJECTID=800>

¹² In its current form, the WaterWare application, developed by the Environmental Software and Services GmbH (Austria), includes modules on rainfall-runoff, optimization, expert system, groundwater, land use change, irrigation and crop production, GIS objects, monitoring and data management and expert system. It includes incorporation of all five reservoirs managed by the Damodar Valley Corporation, rainfall and discharge data for past two years, domestic and industrial demands, reservoir storage area elevation curves and basic calibration on reservoir levels and outflow. SAWI worked to make it more comprehensive, incorporating more data on rainfall and discharge, scenarios for dry, normal and wet years, refine model calibration, incorporate reservoir operation rules, design scenarios for evaluating impact of climate change, and scenarios on changing domestic and industrial demands.

Scoping Interventions and Investments

- **SAWI provided technical support to WECS to draft Nepal's Integrated Water Policy and Water Act**, working in partnership with Asian Development Bank (ADB) and the International Centre of Excellence in Water Resources Management (ICE WaRM). These will **act as a trigger for World Bank policy lending (P154693, \$150M) for the energy sector in Nepal**. Key stakeholders are now consulting upon the draft Policy and Act. A final consultation workshop is planned for FY18, after which the Policy and Act will be submitted to Cabinet and Parliament.
- In Nepal, two SAWI activities (RE and BE) aim to **inform the World Bank's Power Sector Reform and Sustainable Hydropower Development Project¹³ (\$20M)**, specifically by conducting river basin planning on transboundary rivers in Nepal. However, the RE activity has not advanced as planned due to a number of factors, primarily related to client capacity. The associated BE activity has been delayed as it is linked to the RE activity. The World Bank has proposed modifications to fast track the work. These are currently under discussion.
- **SAWI activities are directly informing the development and implementation of various investments in India (valued at \$2.8B):**
 1. The Strategic Basin Planning activity is seen by Government of India as a pilot for multiple river basin modeling and planning activities under the NHP, and is informing India's NGMIP¹⁴ (\$500M) and the UPWSRP Phase II¹⁵ (\$360M). It is relevant to the basin-wide NGRBP (\$1B).
 2. Water resources management tools are directly supporting the NHP by helping to upscale and serve as technical guidance to the entire country of India. In addition, the toolkits are expected to support the

proposed West Bengal Major Irrigation and Flood Management Project (\$145M) toward improving irrigation and flood infrastructure in the Damodar command area.

3. The Bihar Flood forecasting is linked with the World Bank's BKDP (\$250M), both of in terms of providing technical advice and of benefitting from access to refined and large-scale data for its mathematical modeling.

BRAHMAPUTRA BASIN FOCUS AREA

Context and Strategic Approach

Despite water co-dependency among the riparian countries of the Brahmaputra River Basin (Bangladesh, Bhutan, China and India), bilateral and regional cooperation on water remains contentious. For example, while several bilateral treaties and agreements govern water sharing and infrastructure development between Bangladesh and India, in practice, mistrust and political tensions surround their implementation. Over the last few years, opportunities for advancing transboundary water cooperation are emerging. Water allocation remains sensitive, but there is an increasing regional interest in reviving inland navigation, which is strongly linked to issues of flood mitigation and sedimentation. Hydrological data sharing is a technocratic area of cooperation which is sowing the seeds for enhanced policy alignment that can yield significant results over time.

SAWI is working to harness these opportunities with the objective of demonstrating the potential for realizing mutual economic benefits (e.g. hydropower development and agriculture) and reduced costs of shared problems (e.g. floods, erosion) from cooperative water management across the basin. SAWI is doing this through the Brahmaputra dialogue forum that engages stakeholders from the four

¹³ See <http://projects.worldbank.org/P150066?lang=en>

¹⁴ See <http://projects.worldbank.org/P158119?lang=en>

¹⁵ See <http://www.projects.worldbank.org/P122770/uttar-pradesh-water-sector-restructuring-project-phase-2?lang=en&tab=overview>

¹⁶ National level workshops held in Bangladesh June 2016, China July 2016, India August 2016, and Bhutan September 2016. The national level workshops were attended by senior government officials, at Secretary level. The first regional workshop included government representatives, but not at this senior of a level.

riparian countries, by developing an in depth and unbiased shared knowledge and understanding of the Brahmaputra River, and by scoping and informing the design of investments.

Key Results – What is SAWI Delivering?

A significant achievement this year has been progress on the Brahmaputra dialogue process, which has moved from track II level to track I½, signifying its strength and relevance. The first regional dialogue event on the Brahmaputra (led by SaciWATERS, October 2016) was attended by representatives from all four riparian countries, including senior level delegations from Bangladesh, Bhutan and India, and academics from China. This marked the beginnings of a breakthrough in track diplomacy in the basin and signified a commitment to continue the dialogue toward transboundary cooperation. The dialogue process is closely linked to the various analytical and technical assistance activities under the Brahmaputra Basin Focus Area, providing an avenue for the dissemination of key knowledge products and tools which aim to inform decision-making.

Building Trust and Confidence

- **SAWI is effectively providing a neutral platform for all four riparian countries of the Brahmaputra Basin** (government officials, academia, think tanks and civil society) to engage, build a common understanding of the issues and challenges, and begin to identify potential opportunities for basin-wide collaboration. To convene the first regional dialogue (October 2016) required a sustained effort, including several rounds of formal and informal national level consultations¹⁶ to build support at the country level (including across the multiple States of India that share the Brahmaputra Basin).
- Building on this momentum and follow-on national dialogues held throughout FY17, **preparatory discussions and detailed planning for a high level regional event, the Brahmaputra River Symposium: Knowledge Beyond Boundaries**, were conducted in FY17. The Symposium is planned to take place in September 2017 in New Delhi. It

is expected that a broader range of senior level government officials from the riparian countries (notably, India) will be attending for the first time, in addition to civil society, research institutes and other key stakeholders. An expanded network of influential Chinese academicians plan to attend—the result of intensive one-on-one meetings held in China that enhanced the partnership between SaciWATERS and Chinese academic institutions/think tanks.

- The dialogue process is supported by a **review of existing transboundary protocols and accords, and an exercise on institutional mapping**, which will be completed in December 2017. The intention is to better understand the complex, multi-tiered institutional and policy landscape of the Brahmaputra Basin as a basis for identifying current strengths and weaknesses, gaps and duplications, etc., and feasible measures for strengthening cooperative mechanisms that are informed by relevant international experience.

Generating and Sharing Knowledge

- A **strategic assessment of the Brahmaputra Basin (in India and Bangladesh)** is being conducted to improve the understanding of the highly complex and poorly studied system, identify key knowledge gaps and prepare an action plan for further work to identify sustainable solutions for dealing with current (and rising) risks, and make more productive use of the basin's rich water resources. The Bangladesh study has been completed, and stakeholders, including various government agencies involved in implementation, have expressed a keen interest in continuing the collaboration in follow-on work. The India study is ongoing and links most directly to a pipeline World Bank lending operation in Assam (refer below). The Ministry of Water Resources, India is also closely involved in the study.
- A detailed analysis of existing hydro-met monitoring networks, forecasting and early warning systems for Bhutan was completed. A report summarizing the findings of **Modernizing Weather**,

Water and Climate Services: A Road Map for Bhutan has been published and disseminated.

The report was prepared through extensive consultations with the Royal Government of Bhutan, and informed the design of a World Bank lending operation in Bhutan (refer below).

Building Institutional and Professional Capacity

- Extensive consultations, stakeholder engagement and training on analytical approaches to **basin planning** and model design parameters took place in Bangladesh, involving some **100 individuals from more than 20 organizations**, including government, technical support organizations, academia and NGOs.
- Building on the Road Map for Bhutan mentioned above, a \$3.8M project co-financed by the Global Facility for Disaster Risk Reduction and Recovery was initiated to **strengthen Bhutan's capacity for hydro-met services and disaster preparedness**. The Hydro-met Services and Disaster Resilience Regional Project in Bhutan (P154477)¹⁷ became effective in October 2016.

Scoping Interventions and Investments

- SAWI flexibly responded to the Government of Bangladesh's request for technical support to the **preparation of an Investment Plan (IP) for the Bangladesh Delta Plan (BDP 2100)**. The IP was recently completed (June 2017). It adopts a basin-wide approach based on adaptive delta management principles to prioritize investments aimed at addressing water resources management challenges (including water supply and irrigation), supported by policy and regulatory reforms and institutional capacity building. The preparation of the IP was led by the Government of Bangladesh's General Economic Division (GED) and involved working closely with a wide range of stakeholders including ministries, civil society, research organizations, the private sector, and development partners. **Bangladesh intends**

to implement the plan, which represents a shift in the historical approach to delta management and could lead to a request for a new World Bank lending operation.

- In Bangladesh, SAWI helped to scope and inform investments in hydro-met systems for improved flood forecasting and early warning. Technical work improved the design of the World Bank-financed \$113M **Bangladesh Weather and Climate Services Regional Project**,¹⁸ effective May 2017.
- Technical work and dialogue on the Brahmaputra Basin is informing the preparation of the **Assam Flood, Erosion and River Management Modernization Project**¹⁹ (\$250M), including providing the knowledge base and platform for improved planning and management of the system to reduce the risks of floods, erosion and sedimentation.

SUNDARBANS LANDSCAPE FOCUS AREA

Context and Strategic Approach

The objective of this Focus Area is to support operationalization of the bilateral agreement between India and Bangladesh (signed 2011) on the joint management of the Sundarbans Landscape for sustainable development and to deliver mutual benefits for both countries. Although bilateral relations between Bangladesh and India have significantly improved, other politically sensitive issues constrain open public dialogue and joint action; government authorities remain absent from formal (high policy levels) multi-stakeholder events; and in India several changes in Ministers and senior officials have made it difficult to sustain momentum. SAWI is working to advance the formal bilateral Joint Working Group (JWG) on Conservation of the Sundarbans (first meeting in July 2016), toward a more dynamic and permanent Joint Mechanism, and to fast-track cooperation on joint activities between the two countries. The main mechanism for engagement is through the informal but influential Bangladesh-India

¹⁷ See <http://projects.worldbank.org/P154477?lang=en>

¹⁸ See <http://projects.worldbank.org/P150220?lang=en>

¹⁹ See <http://projects.worldbank.org/P158260?lang=en>

Sundarbans Regional Cooperation Initiative (BISRCI), which SAWI helped to establish in 2016.

Key Results - What is SAWI Delivering?

SAWI's strategy of incrementally building trust, and of combining technical knowledge with an advocacy-based approach, is starting to pay off. There is notable progress toward enhanced working relationships between Bangladesh and India. Building on prior initiatives, such as Ecosystems for Life, the SAWI-supported BISRCI (a guild of policy think tanks, civil society organizations and academia from both countries) is convening stakeholders, fostering dialogue and consultation with diverse groups, and bringing in influential voices in ways that have previously not been possible due to tense relationships and distrust. There is more buy-in to adopting a holistic approach to management and sustainable development. The production and dissemination of joint technical products is building capacity and new understanding, thus opening up the space for collaborative action.

BISRCI has indirectly influenced several policy related discussions, including nationally determined climate change actions in both India and Bangladesh; advancing strategic cooperation between both countries, especially on the Sundarbans; initial ideas on managing national parks on both sides without explicit reference to the border; gaining agreement on cooperation on the 'blue economy' agenda between the two countries; and facilitating the signing of an agreement that allows passenger and cruise vessels on coastal and protocol routes. BISRCI is working toward a formal Joint Mechanism between Bangladesh and India, which is expected to come through in FY18, to support planning, management and collaborative action on measures to reduce poverty and vulnerability to natural disasters in the landscape.

Building Trust and Confidence

- **BISRCI has found significant traction at the highest policymaking levels in both Bangladesh and India.** BISRCI has done the following:

1. Supported the Bangladeshi and Indian delegations on jointly designing and planning cooperative activities during the JWG meeting on Conservation of the Sundarbans (July 2016);
 2. Provided inputs to the SAWI-supported joint Government of India-Government of West Bengal meeting on cooperation on Sundarbans (January 2017); and
 3. Provided inputs to the agenda for discussions between the Prime Ministers of Bangladesh and India in April 2017. This helped to establish local dialogues (between the community/local government and the state/federal levels of government), and was perceived as critical to strengthening the high-level discussions.
- SAWI is bringing together civil society and academia of both countries. This year, **three multi-stakeholder dialogue workshops and more than 20 stakeholder events** were organized to deliberate on and support long-term cooperative institutional arrangements. By building upon print and electronic media from both countries in the dialogue process, SAWI is promoting **collaborative reporting** and generating calls for collaborative actions from national to local levels. Over time, this is expected to create a shared understanding of the challenges and opportunities on the Sundarbans, thereby building social consensus around the joint management of the Delta.

Generating and Sharing Knowledge

- A first of its kind joint landscape narrative (describing the defining characteristics of the Sundarbans Landscape across national boundaries) is helping to establish and sustain dialogue between the scientific community, government and key stakeholders involved in preparing these drafts. This includes a **Landscape Joint Environment Plan** for sustainable economic growth through joint cooperation and action, business development and economic growth for local communities, and valuation of ecosystem services.
- BISRCI is increasingly playing a leadership role, and based on its guidance SAWI prioritized **four**

new background studies to strengthen common understanding and inform potential program investments in the Sundarbans: (1) nutritional status and causal linkages to diet for mothers and children to be able to propose a program to enhance nutritional status of women and children, particularly the most vulnerable populations in the Sundarbans who are also adversely affected by climate and environment. This is a priority in both Bangladesh and India, directly linked to the productive use and conservation of water resources for fisheries; (2) a joint initiative for the development of sustainable tourism and nature conservation; (3) joint initiatives on transboundary inland navigation; and (4) joint initiatives on inventorization of flora and fauna, and biodiversity mapping and evaluation. Draft reports will be discussed in multi-stakeholder workshops in FY18. Studies on impacts of climate change on species, habitats, and coastline of the transboundary Sundarbans are near completion.

Building Institutional and Professional Capacity

- SAWI is **building common understanding on the physical and economic impacts of climate change on the Sundarbans**. By bringing together more than 400 researchers from Bangladesh and India in a technical knowledge exchange (February 2017, Kolkata), SAWI has helped make progress in establishing a common data protocol and research methodology, and in facilitating large-scale knowledge exchange between the two countries—a major challenge since the partition in 1947.

“This initiative has set the stage for pursuing the climate change agenda in an intensive manner. This is the first step, a very important one. Now we need to discuss more on how these inputs can feed into framing right policy framework.”
Mr. Prabhat K Mishra, Secretary, Department of Fisheries, Government of West Bengal, India (Technical workshop, Kolkata, February 2017).

Scoping Interventions and Investments

- BISRCI facilitated the **signing of a bilateral Memorandum of Understanding—a significant policy development—that enables shipping protocols to allow passenger travel and tourism in the Sundarbans area**. This offers significant potential for eco-tourism and local livelihoods, but there are also challenges in operationalizing the arrangement. BISRCI is also considering a request from the Government of West Bengal for the development of a proposal for funding from the Green Climate Fund.
- Draft papers to inform potential papers have been prepared, including development of an integrated asset management system for the Sundarbans (India only); and a proposal for development of joint hydro-meteorological services.
- A report on the status and health of **fisheries resources** in the Sundarbans, and near-shore fisheries and estuarine aquaculture is expected to inform the design of a **proposed World Bank-financed coastal fisheries project in Bangladesh**. Both sides of the Sundarbans border share similar characteristics, and common inter-connected issues related to fisheries health. Estuaries are connected, and aquaculture impacts on water resources are similar. Deeper understanding of these issues and processes will not only improve the design of the Bangladesh project, but could also pave the way to a similar project in India, where interest has already been shown.

REGIONAL CROSS-CUTTING FOCUS AREA

Context and Strategic Approach

The Regional Cross-Cutting work supports cross-fertilization of similar activities between basins and regional knowledge sharing. This Focus Area complements and underpins the work under the four geographic Focus Areas.

Key Results - What is SAWI Delivering?

Trust and confidence are heightening through an expanding regional dialogue that is increasingly

reaching a broader and higher-level audience, including government, universities and research institutes, civil society and other key stakeholders and partners. SAWI is delivering tools and guidelines for climate resilient planning and social and environmental sustainability in hydropower to ensure sustainable hydropower development that yields the greatest transboundary benefits. It is also making strides in addressing a need for greater institutional capacity on transboundary water management and governance through intensive training, support to strengthening university programs, and partnerships in areas related to transboundary water management.

Building Trust and Confidence

- The **Regional Dialogue has been gradually evolving, extending reach and having an increasing impact** since the first event in 2015 (refer Box 4). Participant feedback notes that knowledge sharing

is raising awareness of the status of the Himalayan Rivers, and “providing windows of opportunity to understand each other’s concerns for improved management of the Himalayan Rivers”.

Generating and Sharing Knowledge

- With SAWI support, Bhutan is developing its first-ever complete national guidelines for preparation and construction of hydropower covering environmental, social and technical aspects. The draft guidelines were consulted upon in various workshops with a broad array of stakeholders covering sectors such as Gross National Happiness, Health and Cultural Affairs. The drafts are being improved and tested through a field application for the Dorjilung hydropower project—a potential pipeline project for future hydropower development in Bhutan. Repositories for key variables that could be

Box 4: Case Study – Evolution of Regional Dialogue

The first major regional dialogue event (SAWI-supported) was held in Kathmandu, Nepal (February, 2015). The flagship “Water-Energy-Food Nexus Forum” was convened in partnership with the Fulbright Commission, ICIMOD, and the Nepal Water Conservation Foundation, bringing together more than 100 participants, including representatives from government and NGOs, national and international experts, and recognized specialists on nexus thinking and analysis. The event focused on the transboundary dimensions of managing the water-energy-food nexus, complemented by reflections on success factors in past and current track II processes.

Building on relationships established in Kathmandu, SAWI partnered with the International Water Association (IWA) to organize the South Asia Groundwater Forum in Jaipur, India in May 2016. This was the first-ever significant regional water event with participation from Government of India’s Ministry of Water Resources. It brought together more than 125 delegates from all countries in the region as well as experts from beyond the region, including current and former ministers, senior bureaucrats, water practitioners and scientists. The Forum elevated to the political level the importance of groundwater for economic

development in the region and reinforced the need for collaborative action to overcome existing challenges of groundwater quantity as well as quality.

In September 2016 SAWI facilitated the convening by the International River Foundation of the International River Symposium (IRS) in New Delhi—one of the most reputed technical conferences in the region. More than 450 delegates attended, including 249 from India, of which 80 were officials from Indian State and Central government water agencies. The World Bank’s extended Special Session on the Future Management of the Major Himalayan Rivers was very well attended and culminated in a candid discussion on river basin planning including riparian cooperation by a panel of senior government water officials from Afghanistan, Bangladesh, Bhutan, India and Nepal (Pakistan officials were unable to obtain visas). This panel event broke new ground, as multilateral discussions on water by government officials in South Asia remain highly sensitive. Following this session, the World Bank organized a closed dialogue on regional water cooperation, which resulted in frank discussion on the subject of benefit sharing between the South Asian countries. Feedback from individual government participants indicated the event was highly valued.

affected by hydropower development are also being developed. This includes aquatic and migratory fish species in Bhutan. **These activities have led to requests from the Royal Government of Bhutan to support basin studies, including cumulative impact assessments, for the major rivers in Bhutan that all flow into India.**

- A structured framework for addressing climate change in South Asia's water sector has been developed. The framework focuses on key knowledge gaps, issues and needs, including policy harmonization, institutional coordination, and responses that are adapted to the diverse conditions found across South Asia—from the Himalayan mountains with glaciers and snow to the arid regions of Afghanistan and Pakistan to the tropical coasts of India and Bangladesh. The findings of the study have been shared across the region with a wide range of stakeholders, including key policymakers.
- To build climate resilience in hydropower, SAWI supported the development of **first of its kind resilience guidelines for climate change and natural disasters in hydropower and dams with special reference to GLOFs and other natural disasters specific to South Asia.** The guidelines set out an integrated framework that brings together credible climate information, climate impact assessment and decision-making tools to help governments better account for climate risks in the planning of investments. The guidelines were developed with input from IHA, ICOLD and EBRD, in addition to case studies provided by Hydro Tasmania, Landsvirkjun, EDF and Manitoba Hydro, and involved an extensive stakeholder process with major international hydropower and dams industry stakeholders, among others. The guidelines are part of a broader World Bank initiative under the Hydropower and Dams Global Solutions Group to enhance the effectiveness, quality, and sustainability of World Bank Group operations and advisory services related to hydropower and dams. The guidelines will soon be ready to be applied at the project and basin level, and will be widely disseminated. SAWI also supported the upgrading of the Reservoir

Conservation Approach (RESCON2) to identify viable approaches for sustainably managing reservoirs, including to address reservoir sedimentation, which is currently resulting in more storage being lost annually than added and could be worsened with climate change. The significance of both climate change resilience and sediment strategies to the design and operation of complex projects is becoming increasingly important in South Asia. For example, Nepal has a pipeline of projects to export power to India and Bangladesh that need to account for these factors to be sustainable in the long run.

- Reports were completed on crowdsourcing water quality. This included a conceptual framework and existing and emerging technologies for continuous **water quality measurement and analysis** of water quality data from real time water quality monitoring stations on the Ganges.

Building Institutional and Professional Capacity

- An advanced river model software was introduced for the first time in India, and **trainings have directly contributed to preparation of river basin planning systems for five sub-basins in India.** Some 62 participants attended two basic trainings on river basin operation software (November 2016 and January 2017), and 26 participants benefitted from advanced training on the Riverware software for water resources planning and management (May 2017). A further 24 people participated in training on real time reservoir operation. The trainees were water resources engineers from Ganges and Brahmaputra riparian states. Training resources are available at www.indiaiwr.org.
- The SAWI-financed IUCN and ICIMOD RE activities are building on the two-year capacity building program to **provide sustainable training at scale.** They are supporting the design of short training modules and curricula in water diplomacy and basin governance for uptake by participating universities, in addition to enhancing partnerships across research institutes and universities throughout the region to promote cross-border collaboration on water related research.

- A two-year capacity strengthening program covering various topics (basic and advanced water resources management, transboundary water governance, etc.) is near completion. In all, seventeen government officials from the Joint Rivers Commission, Bangladesh and the Bangladesh Ministry of Water Resources and Ministry of Foreign Affairs, and government officials from Bhutan and Afghanistan participated in eleven training courses offered by internationally renowned institutions.²⁰ Participants have stressed **the value of the trainings in building professional capacity and networks**, and have noted that they would use the knowledge gained to educate others within their respective government departments.

Scoping Interventions and Investments

- Technical assistance supported early stage implementation of the World Bank **Neeranchal Watershed Project**²¹ (\$178.5M), including strengthening coordination with related regional programs on basin-level water resources, watershed management and climate resilience.
- SAWI support strengthened the design of the **NGMIP**²² (\$1B with government co-financing) and created a solid foundation for regional work on groundwater that will commence in FY18.

2.3. CROSS-CUTTING THEMES

Gender

A recent World Bank literature review on gender and water (currently in draft)²³ has found that analysis on gender and transboundary water is limited. Two themes dominate the empirical literature: (1) barriers to water supply and sanitation; and (2) water and agriculture. A strand of literature also focuses on rainfall shocks, land and health.

SAWI recognizes that women are key stakeholders—both in terms of ensuring that their interests are equally represented and that they benefit from SAWI and its related activities. The integration of gender issues in transboundary water management is challenging, because fundamental shifts in mind-sets are required in a sector that has been traditionally male dominated. SAWI has struggled over the years to work within and indeed overcome this constraint; to fully grasp the connection between transboundary water management and gender concerns; and to meaningfully integrate gender concerns into a program that primarily focuses on policies and government-level decisions rather than at the grassroots level.

However, SAWI is taking proactive steps to address this challenge. Following feedback from the previous annual reviews, and consistent with the World Bank's Gender Strategy 2016–2023, SAWI is better integrating gender issues within the program. The program is applying the World Bank's guidance Toolkit for Mainstreaming Gender in Water Operations (March 2016), which focuses on five key aspects:

(1) *Gender Analysis*: SAWI has conducted initial analysis to identify the issues, needs and contextual factors affecting male and female stakeholders. However, more in-depth targeted work on social inclusion in transboundary water management with a focus on gender is planned to commence in FY18. This builds on the ongoing work by the World Bank's Water GP on social inclusion and water.

(2) *M&E*: This year, SAWI has initiated a gender mapping that shows entry points within each of the technical areas at the state / local, national and transboundary levels. This is helping SAWI to monitor gender disaggregated results, assess progress and prioritize its forward gender approaches. From FY17, all SAWI Task Team Leaders (TTLs) have

²⁰ Training institutions include Tufts University, Harvard University and MIT; UNESCO-IHE; Asian Institute of Technology; and University of Dundee.

²¹ See <http://projects.worldbank.org/P132739/neeranchal-national-watershed-project?lang=en>

²² See <http://projects.worldbank.org/P158119?lang=en>

²³ World Bank (draft 2017): *The Rising Tide, A New Look at Gender and Water*

started reporting in their annual Grant Report and Monitorings (GRMs) on gender mainstreaming actions and what difference this is making, while providing supporting evidence where possible.

(3) *Targeting and participation:* SAWI strives to meaningfully engage beneficiaries and other stakeholders in gender sensitive project design and implementation. Many SAWI initiatives have an outreach component to ensure balanced participation of women in dialogues so that their voices are heard. For example, the Ganga Strategic Basin Planning work has adopted a participatory process of involving stakeholders through interactive workshops at State and basin levels, and is considering issues of gender equality.

(4) *Public awareness and social marketing:* A key element of SAWI is oriented toward informing and effecting behavioural changes among water users in the way they manage shared resources. Gender issues constitute an important part of this approach. For instance, the conceptual framework for crowdsourcing water quality data (refer Box 10) adopts a gender lens both in terms of assessing the social conditions within which it is applied, as well as the relevance and usefulness to both men and women.

(5) *Capacity Building and organizational development:* SAWI is taking measures to help build requisite skills and knowledge of its stakeholders for gender-sensitive water resource management, and ensuring the inclusion of female participants.

A gender mapping of selected activities against these five areas at the state / local, national and transboundary levels is provided in Annex V.

Tackling Issues of Poverty and Social Inclusion

The Indus, Ganges, and Brahmaputra Basins are home to millions of extremely poor, marginalized and vulnerable people. More than 200 million people live below the poverty line in the Ganges Basin in India alone, and the Sundarbans is home to about 7.5 million people with an average per capita income of less than US\$1 per day—the vast majority of whom are exposed to regular and highly destructive natural disasters. As stated elsewhere in this report (Box 2), SAWI's FRA has been completed this year and can be used to generate risk reports and estimate losses for areas with severely impacted populations, disaggregated by gender. This is expected to help governments to prioritize their response to populations and areas that would benefit from immediate attention to flood risk reduction.

SAWI support to improve water resources management in these international basins will indirectly benefit the millions of their poor inhabitants. SAWI's overall approach is oriented to ensure that its activities take account of poverty and social inclusion issues. This is explicit in each of the Focus Area Strategies, complemented by a range of supportive activities such as risk and vulnerability assessments from flooding, economic and livelihood impacts from climate change, and water quality and availability. Increasing pressures on water resources, due to population growth, urbanization, and industrialization, have the most severe impacts on the basic livelihoods of poor people, which are intimately linked to water resources through water supply and sanitation, irrigation for subsistence agriculture, inland fisheries, hydropower, and dependence on ecosystem goods and services.

Box 5: Women in Inland Navigation

As part of the Sundarbans dialogue, SAWI held a workshop (April 2017, Kolkata) on the participation and employment of women in inland navigation. The event brought together women leaders from the shipping industry; representatives from academic institutions responsible for training of inland shipping crew; women from the National Cadet Corps; and women from the local community involved in commercial boat operations. The Government of West Bengal has requested that similar workshops be held in all coastal and estuarine districts.

Box 6: Sundarbans – Human Development

Poor women in the Sundarbans rely on fish for their main protein intake, but climate change is a threat to water resources and the fisheries sector. SAWI's gender-focused study is assessing the health of mothers, status of child nutrition and stunting in early years, and exploring the causal linkages with dietary habits of expectant mothers. This is likely to lead to a larger investment program for improving women and children's nutritional status through conservation and productive use of water resources and fisheries development.

The poor are also vulnerable to negative health consequences caused by reduced water quality. SAWI is also helping to strengthen capacity of stakeholders by introducing them to key concepts—for instance, a training course was held for Nepal Electricity Authority (NEA) staff in April 2017 on the “Process of Social Impact Assessment”.

Climate Change and Building Resilience

The aim of building resilience and reducing vulnerability to climate change strongly underpins all of the SAWI activities, and its approaches are aligned with country climate adaptation and disaster risk management priorities. It is also a priority for the World Bank's South Asia Regional Strategy.

SAWI tackles these challenges through knowledge generation, capacity building and dialogue. For example:

- More than 400 researchers and officials from Bangladesh and India have benefitted from participating in a **workshop on modeling of the physical impacts of climate change** on the Sundarbans.
- SAWI has developed and disseminated several **analytical tools and approaches to build resilience to climate change and to mitigate flood risks**, including climate risk screening for the design of climate resilient water resources infrastructure at

the basin scale, flood forecasting technologies and techniques (Ganges and Brahmaputra); hydro-met and disaster resilience (Bhutan); and reservoir sediment management to adapt to impacts of climate change, among others.

- **An in-depth assessment of water resources and climate change in South Asia** (with several volumes covering the science of water and climate change, institutional and policy aspects, and economic impacts) has been completed.
- Hydrological, ecological and econometric studies are ongoing for **vulnerability assessment** of the ecosystem (Sundarbans) to enhance awareness of climate change risks, promote technical cooperation, build a knowledge base to support joint management, and facilitate planning a holistic approach to the sustainable management of this extremely fragile mangrove forest.
- Analytic **studies on impacts of climate change on mangrove** species are complete for Bangladesh and India (Sundarbans).
- **A joint research program on climate change in the Indus** has been initiated under the Indus Forum.

The design and implementation of all SAWI activities in FY17 was compliant with the World Bank's environmental and social safeguard policies. This includes compliance with the policy on Projects on International Waterways (7.50).

Box 7: Climate Change Roadmap for Bhutan

A Road Map for Bhutan on “Modernizing Weather, Water and Climate Services” has been published and disseminated. This detailed analysis of existing hydro-met monitoring networks, forecasting and early warning systems for Bhutan was prepared through extensive consultations with the Royal Government of Bhutan. It contributed to the preparation of the World Bank's Hydro-met Services and Disaster Resilience Regional Project in Bhutan (\$3.8M), approved September 2016 and jointly funded by SAWI and GFDRR.

Box 8: Engaging the Private Sector

SAWI supported the **Nepal** Power Summit 2016 (December), organized by the Independent Power Producers Association of Nepal, which brought together investors, developers, policymakers and civil society to realize the government's target of 10,000 MW installed in 10 years.

The cost-benefit analysis of climate investments in **Bangladesh** includes surveys and interviews with more than 120 private sector experts on their sources, uses, and values for current and potentially improved weather and water information, as well as national public surveys on the value of improved hydro-meteorological information for households.

Private Sector

SAWI encourages the participation of private sector actors in discussion forums and events as part of the wider stakeholder engagement strategy, as well as consultation on specific issues and investment potential. Furthermore, SAWI activities are also creating the enabling environment for private sector participation (e.g. Bangladesh Delta Plan 2100). There appears to be growing interest of the private sector to engage in transboundary water issues, as indicated by recent discussions with the South Asian Association for Regional Cooperation Chamber of Commerce and Industry (SAARC-CCI) on potential collaboration in a planned workshop on transboundary waters and climate change. IFC is also increasingly engaged in SAWI-related activities, and will be co-hosting an international workshop (October 2017) on sediment management to train practitioners from South Asia on tools to extend the life of reservoirs developed through SAWI support.

Innovation

SAWI is adopting multiple strategies and actions to adapt to existing challenges, to create and harness new opportunities, and to shift intractable positions on transboundary cooperation. For example:

- The development and dissemination of **several new tools and technical knowledge**, coupled with training in their use, is helping to build capacity of officials and inform action. This includes the development and application of modeling tools for basin planning and management (refer Box 9 below), methods for building climate resilient

water resources infrastructure, and numerous technical studies that have informed investment design and filled critical knowledge gaps, e.g., in the Brahmaputra Basin and Sundarbans Landscape.

- **Innovative methods** have been used to overcome the challenges of unavailable, unreliable and incompatible data. For instance, during the development of a uniform hydro-met information system in the Sundarbans, the SAWI team made a significant breakthrough after painstaking efforts to trace archive data from the Dampier-Hodges Survey (conducted in 1876, but since forgotten), which will help in delineating the natural boundary of the Landscape and in correcting myths. SAWI has also adjusted to the problem of lack of information sharing between riparian countries or of poor ground-level data by using real-time satellite data for transboundary rainfall and flood forecasting. Crowdsourcing methods have improved the availability and accuracy of water quality data (refer Box 10 below).
- SAWI has adopted **social media to reach a broader audience and inform wider discussion on these critical issues** (thus incorporating a recommendation for broader outreach from SAWI-I). For example, during the two-day regional stakeholder workshop in Sri Lanka (July 2016) on climate risks and water resources management, deliberations were supported by communication and outreach platforms—messaging reached more than 234,000 people, and live tweeting of the event led to 38,000 impressions on Twitter.

Box 9: Tools for Integrated Water Resources

A unique “WaterWare” software has been introduced for the first time in India (Ganges) that can help to optimize reservoir operation for multiple uses including hydropower, irrigation and domestic uses, while also ensuring minimization of flood. The model has also been linked with real time climate data so that it can be used to forecast flows and for operational planning. Indian water professionals have indicated their eagerness to apply this tool, even without formal training, because of its ease of use.

Box 10: Crowdsourcing Data for Water Quality Monitoring

SAWI has developed a citizen-centric framework for crowd-sourced data to improve water quality monitoring (published November 2016). This combines public participation in the scientific process (“citizen science”) with modern technologies to collect and disseminate data (“crowdsourcing”). It is expected that this framework will enable citizens to receive real-time water quality status, and help water management agencies to undertake less costly screening and to respond to water quality incidents in a timely manner. It also offers planners and decision-makers access to key information on the type of water use, locations of water sources accessed, timing of use and seasonality patterns of water use.

2.4. PORTFOLIO SPEND AND EFFICIENCY

Financial Expenditure

SAWI resources have almost been fully allocated. In FY17, 33 activities were under implementation and 10 activities were completed. Up to the end of FY17, the cumulative allocation to approved SAWI

activities was \$29.9M. Cumulative disbursement stood at \$16.7M. Of this, disbursement in FY17 was \$5.67M, down from a disbursement of \$6.4M in FY16.²⁴ An additional \$4.3M was committed in contracts. The cumulative Focus Area financials for FY17 are summarized in the figure below. The detailed breakdown of the financial status for each Focus Area is given in Annex IV.

Implementation Status by Window, FY17 (\$M)

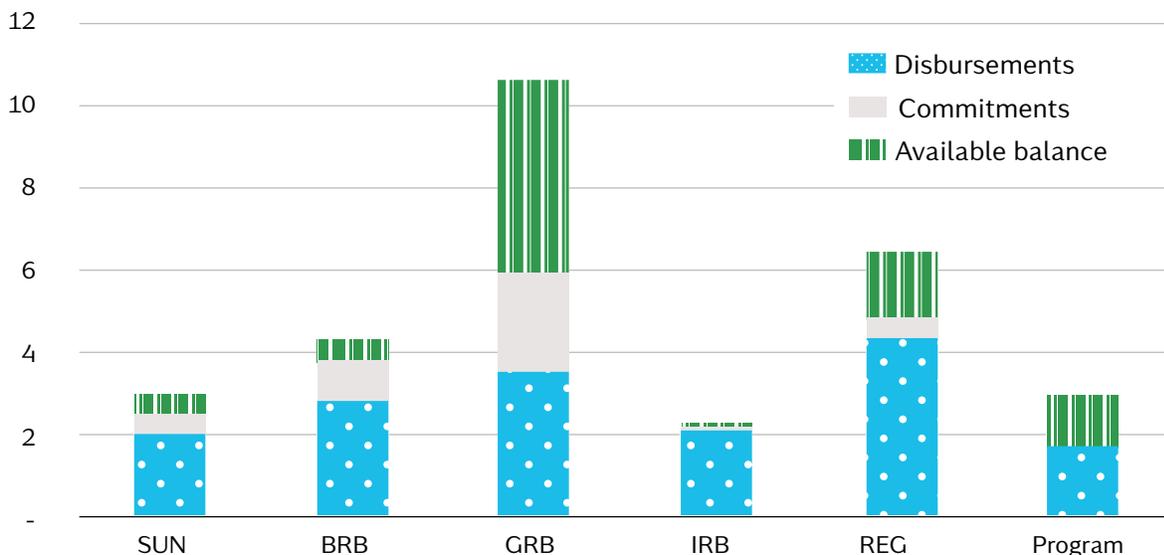


Table 1: SAWI Financials (Cumulative to June 30, 2017)	(USD \$M)	(USD \$M)
a. Donor disbursements (of the overall pledge of \$30.7M)		30.64
b. Amount allocated for established activities		29.86
- Disbursed up to June 2017 (including \$5.67M in FY17)	16.74	
- Committed in contracts but not yet spent	4.34	
- Balance for approved activities	8.78	
c. Overall Balance (activities awaiting internal approval) (a-b)		0.78

VALUE FOR MONEY

SAWI is administered in accordance with World Bank established procedures to ensure that the funds are spent efficiently and effectively to deliver Value for Money following transparent standards. The World Bank has demonstrated **efficiency** through timely decisions to top up, claw back, add or drop certain activities where the external environment or demand has changed, or where there is changed scope for their uptake, including through larger investments. The SAWI program was critically reviewed by the Secretariat in FY17, which resulted in **a net savings of more than \$3M**. These savings will be reallocated to other activities in FY18 (further details are provided in Section 3.4).

SAWI maintains **economy** in its procurement, minimizing costs and ensuring high quality, by requiring that all RE activities finance goods, works and services in accordance with the World Bank's guidelines on "Procurement under IBRD Loans and IDA Credits" and the World Bank's guidelines on the "Selection and Employment of Consultants by World Bank Borrowers," jointly referred to as the "Procurement and Consultant Guidelines." For all BE SAWI activities, the World Bank is responsible for procurement of goods as well as employment and supervision of consultants in accordance with applicable policies and procedures, including travel according to established procedure. The guidelines provide specific instructions for use of World Bank documents (standard bidding documents,

requests for proposals, contract forms), conflict of interest, advance contracting, co-financing, fraud and corruption.

The World Bank is able to draw in international best practice, as well as independent and credible expertise that regional or local governments would otherwise not be able to harness. SAWI's positioning within the World Bank has been critical to achieving **effectiveness** by leveraging technical and financial support in a way that has a multiplier effect. This has been accomplished by leveraging the World Bank's country portfolios and presence; tapping into the World Bank's deep partnerships with global collaborators to harness regional experience and networks; applying its experience and expertise in managing trust funds, thereby streamlining administrative costs; and drawing on strong global technical expertise of World Bank staff across GPs, such as Water, Energy and Extractives, Environment, and Social, Urban, Rural & Resilience.

Financial Management and Fiduciary Risks

Ethics: The World Bank requires all trust fund beneficiaries and bidders to observe the highest standard of ethics in World Bank-financed grants and contracts. All SAWI grants are subject to the World Bank's Anti-Corruption Guidelines, the Procurement and Consultant Guidelines, and the Standard Conditions for Trust Fund Grants, which delineate standard operating procedures for any

fraud issues. The Anti-Corruption Guidelines provide for certain actions to be taken by grant recipients to prevent and combat fraud and corruption, and the Standard Conditions provide for suspension and/or cancellation of disbursements, as well as the refund of disbursed grant proceeds in the event that fraud and corruption does occur.

Audits and Financial Management: The World Bank provides donors, within six months following the end of each World Bank FY, with an Annual Single Audit Report in respect of all cash-based trust funds, comprising: (1) a management assertion together with an attestation signed by the external auditors concerning the adequacy of internal controls over cash-based financial reporting for trust funds as a whole; and (2) a combined financial statement together with the external auditor's opinion thereon. The Single Audit Report finds no instances of corruption or fraudulent conduct in FY17, and is available at: <http://web.worldbank.org/WBSITE/EXTERNAL/EXTABOUTUS/0,contentMDK:22669594~menuPK:8336873~pagePK:51123644~piPK:329829~theSitePK:29708,00.html>.

In the case of RE trust funds, recipients are required to maintain adequate financial management systems, prepare annual financial statements in accordance with accounting standards acceptable to the World Bank, and to have these statements audited by independent auditors acceptable to the World Bank. The recipient is also required to submit interim financial reports acceptable to the World Bank. Each RE trust fund operation involves a Financial Management Specialist who reviews financial management compliance of the recipient and is responsible for reporting instances of non-compliance.

2.5. SUSTAINABILITY APPROACH

Relationships

SAWI enables the World Bank to directly engage with senior government and non-government stakeholders on transboundary water management. The World Bank is a significant partner in South Asia and has

strong relationships in all of the seven countries, which will sustain beyond SAWI funding. Furthermore, as SAWI is closely aligned with the World Bank's regional strategy and is informing several strategic country-level investments, there is strong likelihood that these provide a strong vehicle for continued dialogue and action to support country priorities.

Institutional Partnerships

SAWI's shift from sponsoring individual practitioners to working in partnership with regional-based organizations (e.g. WWF, ICIMOD, SaciWATERS, IUCN, etc.) on various activities is noteworthy and an important part of the sustainability approach. This is helping to promote the uptake of SAWI products, create synergies, reach wider audiences, and strengthen the platform for sub-regional cooperation. By supporting regional participation in international fora, SAWI is bringing more stakeholders on board. For instance, the Sundarbans work has engaged the media as a stakeholder to help raise awareness of environmental issues, and to shift the public discourse. SAWI is also reaching constituents at the local level, for instance, through consultations to raise awareness and ensure that voices are represented.

Capacity Building and Embedding Knowledge

The uptake of new systems, tools and knowledge is being pursued by all activities through multiple strategies and avenues. The vast majority of activities are at the request of government agencies and / or link closely with larger country programs. SAWI's capacity building activities are focused toward supporting institutions engaged in water resource management and related organizations (e.g. energy, disaster risk management). Key stakeholders are brought on board at an early stage and involved in the process of development through discussions in formal and informal settings, training events, study visits and exchanges to demonstrate its successful application elsewhere, and by facilitating joint research where appropriate. There are several successful examples of the uptake of SAWI products; for instance, the IWRM, flood forecasting and data management tools in the Ganges. However, it is

unlikely that all of the knowledge generated will be fully taken up or embedded within government systems and processes during the lifetime of SAWI. A knowledge repository is being developed that will be a publicly available resource beyond the program.

Enabling Environment

SAWI has invested in building up informal institutional processes (such as the dialogues) which are showing promise—for instance, through more active engagement of the working groups with government (e.g. Sundarbans BISRCI); joint research efforts (e.g. IF-WG); senior levels of participation and candid discussions (e.g. International RiverSymposium); and agreement by riparians to engage in basin-level forums for the first time (e.g. Brahmaputra dialogue processes). These will need continued support to be able to gain momentum. Without financial support, some SAWI activities are unlikely to sustain in their current form in the medium term. Direct funding for these activities through the World Bank has been critical in ensuring that the dialogues are approached in a politically neutral and participatory manner; and any future funding will need to manage risks of biased perception by stakeholders that might derail these processes. Targeted training of government agency staff and exposure visits for senior officials, and technical training for staff of research institutions has helped to introduce new concepts, and increase understanding of the ways in which challenges can be tackled through collaborative approaches. SAWI is working with other national institutions (e.g. Indian Institute of Technology (IIT)) to develop advanced curricula so that efforts can be sustained.

Investments

SAWI is closely aligned with national priorities and programs and supporting forward investment plans, funding demonstrators that can be replicated more widely, drawing in private sector and civil society into discussions, and informing World Bank portfolios in-country. SAWI is helping to foster a supportive environment and fast-track joint investment—particularly in the Sundarbans, where the opportunities are more immediate—but even this is likely to take

time and the first activity will need to be calibrated carefully to ensure its successful implementation.

2.6. PROGRAM MANAGEMENT, STRATEGIC COMMUNICATIONS, M&E

Program Management

SAWI sits within the World Bank's South Asia Region's Regional Integration and Partnerships (SARRP). It remains an important and strategic instrument for the World Bank in South Asia, and the World Bank's senior managers devote significant time in providing a strategic steer. The World Bank's Internal Review Committee (IRC) for SAWI is chaired by the Director, SARRP and represented by senior staff, including the Chief Economist, and GP Managers of all relevant sectors. The IRC meets once a year to approve the annual work plan, endorse all new activities over \$50,000, and conduct an annual review of program implementation. The World Bank's Team Practice Managers (Water), based in Delhi and DC, maintain technical oversight.

At the operational level, the Team Leader and Assistant Team Leader (Delhi and DC based) manage the program and ensure technical quality control, track progress through several monitoring tools, including an internal dashboard system and the annual Grant Report and Monitoring (GRM) process, and regularly follow up with TTLs to ensure that activities are delivered in a timely and cost-effective manner. Administration and financial management are handled by the Trust Fund Program Manager in DC. A communications specialist supports implementation of the program Communications and Engagement Strategy. Two M&E specialists support SAWI to streamline monitoring and reporting systems, gather evidence-based and tangible results, shift the emphasis to reporting against intermediate outcomes, and develop approaches to assess effectiveness. These are being used to inform the World Bank's senior management's decision-making.

Strategic Communications and M&E

The SAWI Communications and Engagement Strategy (endorsed by donors in 2014) focuses on establishing

SAWI's credibility as a source of robust knowledge and as a facilitator of cooperative dialogue on water resources management across South Asia. The regional/basin level dialogue fora have been main avenues for targeted outreach of evidence generated by SAWI. These fora often provide direct access to policymakers, opinion leaders and practitioners who are the intended beneficiaries of the knowledge products. For example, key findings from the climate change risks in water resources management study were shared at the July 2017 Indus Knowledge Forum in Colombo, attended by more than 100 delegates from Afghanistan, China, India and Pakistan. At the International River Symposium 2016, which was attended by the South Asia government officials, SAWI publications were disseminated to more than 400 participants and well-received by the delegates, as evidenced by their interest for more information and from the feedback received. Interactive tools such as Spatial Agent, the FRA Atlas, and the Indus GIS mapping, developed with SAWI support, were showcased during the event and generated significant interest. Annex III contains a list of knowledge products.

SAWI's external website (<http://www.worldbank.org/en/programs/sawi#6>) serves as a knowledge repository and dissemination platform. The website features the current FY implementation plan, activities supported under the different Focus Areas, and a calendar of upcoming events. Program updates are shared with donors on a bi-monthly basis, as well as across World Bank Country Offices and GPs (Water, Energy and Extractives, Environment and SURR) to facilitate internal communication, promote cross learning, and build synergies. Direct engagement with the media is limited due to sensitivities around transboundary waters, but SAWI consistently partners with organizations such as IWMI, IWA, and The Third Pole Project to create visibility around its activities and to acknowledge donor contributions. Partner networks are used to inject scientific evidence into the public discourse on transboundary water management, while keeping the SAWI/World Bank footprint low to minimize risk (e.g., the 2016 South Asia Groundwater Forum and

the Indus Media Dialogue led by IWMI). The Weekly Media Digests, servicing 300 subscribers, helps to keep SAWI's extended team and stakeholders updated on the latest relevant developments. This comprehensive compilation of news reports and editorials gives a 360-degree view of how water-related issues are covered in different countries and the media narrative that informs public perception.

This strategic approach to communications has helped SAWI to evolve from the closed-door Abu Dhabi Dialogue process to a more open and engaged network of decision makers, water practitioners, academics, think tanks and civil society representatives, who increasingly recognize the value of the SAWI program. As Phase II approaches completion, SAWI will give greater focus to dissemination and uptake of program outputs. This could, for instance, include building narratives around the value of cooperation and benefit sharing and other fit for purpose communications products such as policy briefs and infographics for targeted dissemination.

This year, SAWI has strengthened its M&E approach to better capture and assess the impact of the program. As the program completes its fourth year, the SAWI team is increasingly focused on gathering evidence-based results across the four intermediate outcome areas in the Results Framework (see Annex I). Result stories are captured as and when these become available and are updated regularly (an example is in Box 2). These are shared with donors and within the World Bank. Progress is being reviewed against the assumptions in the original Theory of Change and the Focus Area Strategies. This year, SAWI is using its framework to assess progress against gender mainstreaming, but this remains work in progress and is being strengthened. A number of challenges remain. SAWI's design means that its activities are oriented toward facilitating and enabling wider change over a long time period. This makes it challenging to directly attribute impacts and report concrete results. SAWI is therefore using a qualitative narrative to assess progress, supported by examples and quantitative data. Further, SAWI may not be able to claim certain results given particular sensitivities.

SECTION 3 LESSONS AND FORWARD LOOK

Dawn over the Himalayan range



3.1. LESSONS

SAWI-II is in its fourth year of implementation, with a number of activities in advanced stages of implementation (and several closed). Over the course of the program, several lessons have been learned on what has and has not worked. The lessons that are informing the program moving forward include the following:

What Has Worked Well

- The incremental approach to build trust and confidence starting at the technical level and working up to the policy level is a sensible one, and has led to building a common understanding, better priority setting, greater stakeholder ownership and calls for action.
- Over time, activities that strengthen capacity for transboundary negotiation and management have aided in leveling an uneven playing field and empowered relatively weaker parties to play a more active role in discussions around transboundary waters.
- Analytical work and technical assistance financed by SAWI has enabled shaping (national) water investments and engagement in ways that better reflect transboundary considerations, including by supporting the World Bank's wider lending operations. There are signs that evidence and informed discussions on the benefits of transboundary cooperation are paving the way to joint regional initiatives.
- Following a mutually supporting top-down and bottom-up approach is effective. This includes working within countries to advance cooperation in water management to provide a strong basis from which to build international cooperation, while supporting informed dialogue and the alignment of capacity and interests across countries.

What Has Worked Less Well

- SAWI is taking active steps to better integrate gender concerns in the program. However, there are challenges in tracking quantitative results disaggregated by gender, given the upstream nature of the work and the long gestation period of activity impacts. There is also a trade-off between designing specific approaches early on in the program versus flexibly integrating gender issues into activities and discussions with partners as these arise.
- SAWI works very closely with clients in designing and implementing activities so that they are of most use and relevance. However, there have been challenges in ensuring immediate uptake of outputs (e.g. Bihar flood forecasting). This is due to capacity and other operational constraints, such as high rates of attrition of government staff. However, as most activities are part of larger World Bank investment programs that will continue into the future, the uptake and sustainability of the knowledge and tools generated can be strengthened through follow-on investment activity. Start-up time for some activities has taken longer than expected (as reported in earlier sections). This is in part due to internal processing and due diligence requirements. However, capacity constraints have significantly affected the initiation of some RE activities, e.g., Nepal hydropower with WECS.
- Ultimate program impact will depend not simply on the outcomes of individual activities. SAWI is proactively addressing the need for the portfolio of activities to add up to more than the sum of the parts by redirecting resources strategically for greater impact. Tracking and attribution of results to SAWI remains a challenge. As the program reaches maturity the SAWI team is placing greater focus on articulating SAWI's contribution to shifting the needle toward improved cooperation in transboundary waters. The design of any future

program could consider discrete funds for pilot activities that were directly targeted to benefit people, so as to assess impact.

3.2. CHALLENGES AND OPPORTUNITIES

SAWI is operating within a complex, diverse and rapidly changing regional political environment further complicated by climate change and environmental stresses. There are significant differences in the geopolitics of the eastern and western regions of South Asia, including how the countries interface with their neighbours. Although there are some positive signs toward increasing cooperation in the region, several key challenges within which SAWI works remain:

Evolving Political Economy

The evolving political economy context impacts progress, is largely out of SAWI's control, and requires flexibility in approach. Power asymmetry among the seven riparian countries is a significant constraint to regional cooperation and basin level management of the rivers. This is driven by a combination of factors, including national interests, regional politics and events, security considerations, and international relations. India is a riparian in all of SAWI's five Focus Areas, and remains a significant regional player in terms of its growing economic clout, ambitious Act East policy, and its bilateral relations with its regional neighbors. Bilateral relations between Bangladesh-India are increasingly positive, and there is willingness to progress discussions on potential data sharing and co-management of projects on both the Sundarbans Landscape and the Brahmaputra Basin. However, unresolved issues remain (e.g., water sharing arrangements of the Teesta). Bilateral relations between India-Pakistan and China-India have become strained this year primarily due to issues of security, and the continued complexity of relations affect cooperation between Afghanistan-Pakistan. Regional dynamics are further influenced by India

and China's policies in South Asia. SAWI is tackling this through knowledge sharing, informal regional and basin-level dialogues represented by influential members, and broadening its partnerships so that it can work with and through others to move toward a common agenda. This includes RE activities to build ownership and sustainability, being fleet footed in responding to opportunities as these emerge, and adjusting approaches to avoid processes from stalling.

Multiple Incentives

Nationally, there are multiple incentives and priorities that intersect with transboundary water governance. For most riparian countries, management of the rivers is a national security issue, requiring the involvement of multiple Ministries and sub-national administrative units. This is time intensive and slows the pace of progress, as buy-in needs to be achieved across multiple government agencies and sub-national entities. For instance, India's emphasis on its National Water Policy largely reduces the political imperative for pursuing a regional agenda.²⁵ Furthermore, water is a state subject and the sharing of rivers is a contentious issue. The sub-regional dialogue processes enable representation of diverse stakeholder perspectives (including government backed think tanks and independent civil society institutions). At the national level, SAWI's support is closely aligned with country priorities and is helping to inform policy-relevant issues. Through the process of development and dissemination of knowledge and tools, SAWI engages key stakeholders and opinion makers at an early stage.

Technically Promising Avenues and Political Constraints

Technically promising avenues often do not mesh with political economy constraints. In South Asia (as elsewhere), transboundary water management is complex and highly political. This means that good technical work is a necessary but not

²⁵ "Negotiations about sharing and management of water of international rivers should be done on bilateral basis in consultative association with riparian States keeping paramount the national interest. Adequate institutional arrangements at the Center should be set up to implement international agreements".

<http://wrmin.nic.in/writereaddata/NationalWaterPolicy/NWP2012Eng6495132651.pdf>

always sufficient condition for improved political collaboration. The strategy to link ‘technical work’ to ‘Track I’ policy work was explicit in the design of the SAWI program, but remains a challenge. SAWI aims to tackle this by ensuring that the technical work is policy-oriented, relevant and responsive to government priorities. The basin dialogues are enabling SAWI to expand to reach a broader set of stakeholders and to engage more closely with high-level policymakers. These platforms act as avenues for SAWI’s technical work to be disseminated and to influence thinking more widely.

Limited and Assymmetric Capacity

Limited and asymmetric capacity across the SAWI region presents challenges for uptake and sustainability. This includes frequent changes in key interlocutors (e.g. transfers of officials) that make continuity and sustaining momentum difficult. This has been a significant challenge particularly in terms of maintaining the pace of work. The SAWI teams continue to invest significant efforts in building relationships, and direct significant resources toward capacity building activities for sustained results.

Security Concerns

Security concerns, particularly in Afghanistan, constrain the intended pace of activity. The World Bank has a robust security policy that applies to its staff and consultants. Nevertheless, the increasing frequency and intensity of attacks in Afghanistan has implications for the pace of work, and government attention is diverted elsewhere. SAWI is managing this by working with other agencies and by investing in building capacity of targeted Afghani officials to sustain their interest. SAWI is able to deliver trainings via telecommunications technology with local staff present during periods of restricted travel for international staff and consultants due to the established relations between SAWI and Afghani ministries.

Funding for Regional Investments

Collaborative projects are most likely to be financed by government resources and private sector investment. The private sector is engaged in

dialogue but would need permissions and alignment with government to fund regional investments. The Sundarbans Landscape is considering the development of a proposal for funding from the Green Climate Fund (GCF), a financial mechanism under the UNFCCC, but this thinking is at initial stages. The World Bank Country portfolios support large investment programs, but regional investments are limited and India is no longer eligible for IDA funding. SAWI grant funds are therefore a critical resource for preparatory work in India, and for maintaining momentum on a regional agenda, which would otherwise be left under-funded and unsupported.

Leaving No One Behind

Traditional engineering-based approaches have dominated water management. SAWI has used the dialogues as a platform to discuss issues around representation of vulnerable populations, indigenous groups and gender issues. This requires shifting mind-sets, working around perverse incentives and placing these issues sensitively into discussions. SAWI has also consulted with stakeholders at local levels, and is integrating gender and climate change into its activities. However, this remains work in progress and SAWI is strengthening its approaches in this regard.

SAWI’s Regional Coverage

China’s involvement in SAWI has been relatively limited, but there appears to be increasing interest on regional engagement that could be considered in the future. Up to this point, Myanmar has not been covered under SAWI, but it is part of the highly vulnerable Ganges-Brahmaputra-Meghna Delta. Any future programming could consider engaging Myanmar, including through dissemination of SAWI knowledge and approaches.

3.3. RISKS AND MITIGATION

SAWI’s overall risk rating remains **Medium**. The SAWI Program Strategy (2013) identified five key implementation risks and mitigation measures, on which an update is provided below:

Financial Risks

Low Risk: The key financial risk of a reduction in or lack of program funding remains low. An emerging risk is not being able to fully and effectively utilize remaining funds in the available time. SAWI is increasingly adopting an adaptive approach to program management, redirecting activities strategically where appropriate, and cutting back or closing non-performing activities. Other risks include financial sustainability to continue efforts beyond the program, and SAWI is working with partners on options.

Operational Risks

Low/Medium Risk: Two key operational risks were identified: (1) loss of key program staff; and (2) poorly designed or executed activities. The first risk is being adequately managed—a qualified team, supported by top World Bank management, is firmly in place. The risk of poorly designed or executed activities remains. The review process for activity designs remains important as does ongoing supervision and quality control across all activities by the program management team. To date, the execution of activities and the quality of their outputs has been uneven. SAWI is becoming increasingly strict in applying World Bank internal quality control processes that include extensive technical peer review and management sign off.

Relationship Risks

Medium Risk: Three key relationship risks were identified: (1) reluctance of stakeholders to engage; (2) disengagement of donor partners; and (3) poor integration with World Bank operations. The program is successfully engaging with an increasingly diverse body of stakeholders through multiple fora. Although engagement with stakeholders is generally positive, at the level of specific activities the pace of implementation has been dependent on the willingness and readiness of key stakeholders, including government, to engage. Donor engagement has positively increased during program implementation, notwithstanding periodic changes in donor representatives—for instance, through more regular formal and informal meetings with

donor partners, and information sharing on critical issues as these arise. The risk of poor integration with World Bank operations remains low. SAWI has built strong linkages into the World Bank's lending operations through support to project design and supervision, and through joint policy dialogue with government clients.

Reputational Risks

Low Risk: Risks at the start-up of SAWI-II in 2013 included: (1) perceived poor quality; and (2) dialogue processes that enter spheres inappropriate for World Bank engagement. As noted above, SAWI is strengthening its application of World Bank internal quality control processes for activity design and delivery. The focus is shifting from activity design and activity initiation to quality control of outputs and effective communication and dissemination of findings. SAWI dialogue activities have been carefully designed to be appropriate to the World Bank's role.

Security Risks

Medium-High Risk. In-country security risks were identified as having the potential to slow implementation of some activities. Where necessary, the composition of teams and travel schedules of teams have been adjusted to allow for effective engagement with local stakeholders. However, regional political relations continue to be tenuous with bilateral tensions growing in some areas, and the security situation has intensified in some parts of the region.

3.4. FORWARD LOOK

As this phase of funding enters maturity, SAWI is ensuring the successful completion and quality assurance of all ongoing activities, strengthening outreach and uptake with partners, and putting in place measures for sustainability. At the same time, the recent extension to December 31, 2018 has presented the opportunity to make adjustments based on variations in the pace and success of ongoing activities and to better align with strategic priorities.

Lessons learned from experience to date (Section 3.1) are informing program management going forward. Measures are being put in place so that ongoing and new activities can flexibly adapt to the evolving operating environment—the opportunities and challenges—that is discussed in various parts of this report. Greater focus is being given to:

- Adopting a more holistic approach to managing SAWI, particularly in terms of consolidating activities within each Focus Area, facilitating cross-learning across these, and working in close partnership with and through others.
- Being more strategic on programming (i.e., linking national priorities with regional engagements), while promoting supply driven activities, innovation and new ideas.
- Better aligning trust funded activities with country programs and pipeline investments, in addition to the World Bank's regional strategy.
- Improving alignment between World Bank GPs, including strengthening collaboration between Water, Environment, Energy, Disaster Risk Management, and Agriculture.
- Increasing efficiency in management, including seeking opportunities to streamline and consolidate processes with the other regional trust funds.

In line with the above principles and lessons learned to date, in FY17 the active SAWI program was critically reviewed by the Secretariat. The evaluation assessed progress, disbursement, quality of outputs, future plans and projections. Activities were identified for extensions, top ups and claw backs. This exercise resulted in net 'savings' of more than \$3M. The majority of the savings came from one activity that faced significant capacity constraints and had not advanced as expected.

Funds are currently being reallocated to activities that fall within six thematic areas. These thematic areas were identified based on a strategic analysis that explored key trends in cooperation in transboundary waters in South Asia, including shifting priorities and emerging entry points. The

thematic areas for which specific activities are being developed are as follows:

- Indus (including assessment of the hydrological knowledge base, issues surrounding dam design and operation that have stalled progress, and a social / poverty assessment)
- Inland navigation in BBIN
- Hydropower development (Afghanistan and Pakistan, Bangladesh and Bhutan)
- Groundwater management
- Climate change, including impact on glaciers
- Non-monetary value of water, with a focus on gender

Forward priorities include pressing ahead on identifying and fast tracking activities that shift entrenched positions and incentivize further collaboration; keeping momentum on the knowledge and advocacy platforms to promote mind-set shifts; and ensuring that knowledge and evidence are used to inform upcoming investments for the World Bank and for client countries.

Future funding support would be beneficial as it would enable fully embedding activities within client country institutions, allow increasing alignment and leveraging of the World Bank's forward country strategies and investments currently under development, and build on the momentum of the dialogues. There is potential to explore deeper partnerships with other countries in the region and partners, including through the dissemination and replication of SAWI knowledge and approaches. The upcoming donor-led SAWI Program Evaluation will provide important input to inform possible future funding support.

Annexes

Featching water in the Sundarbans in Bangladesh



Annex I: Performance

FY17 Results Dashboard

Results Indicators	IRB	GRB	BRB	SUN	REG	TOTAL
1. Trust and confidence in regional or basin water management increased by dialogue processes						
1.1 Number of regional and basin/landscape dialogue processes facilitated or supported by SAWI	1/1	0/1	1/1	1/1	1/1	4/5
2. Stakeholder input to government decision making strengthened by participatory processes that facilitate transboundary knowledge generation and sharing						
2.1 Number of regional, basin/landscape or sub-basin level participatory processes that support transboundary knowledge generation and sharing and stakeholder input to government decision making	1/0	1/1	2/0	1/1	0/0	5/2
3. Capacity of water resources organizations strengthened in areas relevant to transboundary cooperation						
3.1 Number of professionals trained in the aspects of water management, water policy or water diplomacy relevant to basin-scale planning and management or regional cooperation ¹	44/5	243/140	0/0	37/5	120/50	444/200 ³
3.2 Number of key water management organizations with policy or technical capacity significantly strengthened by SAWI activities in areas relevant to basin-scale planning or regional cooperation ²	4/2	24/40	1/2	9/2	15/4	49/50
4. Regional, basin or sub-basin-level knowledge increased and accessible to stakeholders including decision makers						
4.1 Number of regional, basin/landscape or sub-basin-level knowledge products produced and shared with key stakeholders, including decision makers	2/1	2/2	7/2	3/1	9/2	23/8
5. Regional, basin or sub-basin-level interventions designed to improve livelihoods and ecosystem sustainability						
5.1 Number of regional, basin or sub-basin-level feasibility studies or intervention designs informed by SAWI activities	0/0	2/0	2/2	0/2	0/0	4/4

Acronyms: Indus River Basin Focus Area (IRB); Ganges River Basin Focus Area (GRB); Brahmaputra River Basin Focus Area (BRB); Sundarbans Landscape Focus Area (SUN); Regional Cross-Cutting Focus Area (REG)

¹ 3.1 tracks those who participated in training that was conducted over a sustained period of more than one day.

² 3.2 tracks “capacity strengthened” rather than the subjective “capacity significantly strengthened”. Water-related organizations that participated in training conducted over a sustained period (more than one day) are counted.

³ Performance targets were set in advance of detailed activity design. Actual target achievement depends on the level of client engagement. Momentum is building on client engagement in capacity building activities, which explains the strong performance this year.

Program Development Objective	Outcome Indicators for PDO	Progress Update
<p>To increase regional cooperation in the management of the Himalayan River systems to deliver sustainable, fair and inclusive development and climate resilience</p>	<p>1. To support five existing or new bilateral or multilateral governance processes</p>	<p>1. SAWI has supported several formal or semi-formal sustained processes for making or operationalizing water management decisions, including in the Brahmaputra and Sundarbans, where there are well-established and ongoing platforms for discussion to inform decision-making and operationalize existing agreements (MoUs in the Sundarbans). SAWI has supported, in partnership with ICE WaRM and ADB, the drafting of Nepal's IWRM Policy and Water Resource Act. SAWI is also informing the development of Bhutan's new Hydropower Policy, which will reflect the first-ever national guidelines for hydropower development that take into account transboundary impacts. SAWI is contributing to India's movement toward making data more transparent, and helped pave the way for data sharing between States and the Central government, which is now being operationalized under the NHP.</p>
	<p>2. To inform \$1B of investments</p>	<p>2. A number of SAWI activities link closely with World Bank investments and have contributed to investment design and supervision support. To date, investment projects valued at more than \$3.7B in Afghanistan, Bangladesh, Bhutan, India, Nepal and Pakistan have been informed by SAWI. In other words, SAWI's \$31M has leveraged nearly 11 times that amount. This is a conservative figure as not all SAWI funds have been allocated or disbursed, and some investment projects are in early stages of conceptualization, so are not counted.</p>
	<p>3. To improve the quality of planning processes underpinning new investments.</p>	<p>3. This qualitative indicator is difficult to measure, but there is evidence that the breadth and strength of stakeholder consultation has increased as a result of SAWI support. To take one example, SAWI support to the Brahmaputra Dialogue is strengthening engagement of stakeholders beyond Assam to improve the quality of preparation of the Assam Flood Project, and technical support to the Bangladesh Delta Plan 2100 has provided a framework for prioritizing investments over the next 15 years. New approaches for climate risk screening developed under SAWI provided a stronger technical basis for the design of hydropower investments in Nepal. Application of the Decision Tree framework, developed in part by SAWI, led to prefeasibility design changes to climate proof the proposed Upper Arun Hydropower Project in eastern Nepal, and provided proof of concept for the planning and design of climate resilient water resource infrastructure for hydropower development across the Kosi Basin. In India, SAWI-supported activities are providing proof of concept in flood forecasting and river basin planning that will be scaled up under ongoing lending operations. In Afghanistan, SAWI support ensured that transboundary considerations were adequately accounted for in the restructuring of a World Bank lending operation.</p>

Intermediate Results	Result Indicators	FY17 Milestone	Progress Update
1. Trust and confidence in regional or basin water management increased by dialogue processes	1.1 Number of regional and basin/landscape dialogues facilitated or supported by SAWI	4/5	<p>*Met Expectations*</p> <p>Three of four sub-regional dialogue processes are underway and making good progress. SAWI's value add has been in getting diverse stakeholders together, providing a neutral platform, bringing issues of gender and climate change onto the agenda, and using technical discourse to facilitate dialogue and discussion on a range of sensitive issues. Getting stakeholders to agree to and initiate joint research is a good beginning and an indication of growing confidence in the process, and discussions are underway to identify suitable projects for joint cooperation. Serving government officials are participating in Brahmaputra and Sundarbans dialogue processes and there is evidence that their involvement is constructively influencing discussions within government. For example, the participation of officials in the Brahmaputra Dialogue has led to an increasing appreciation of the need for basin-wide planning across the States of India sharing the Brahmaputra Basin, and between India and the co-riparians.</p> <p>The regional dialogue has been evolving, extending reach and having an increasing impact since the first event in 2015. Participant feedback notes that knowledge sharing is raising awareness of the status of the Himalayan Rivers, and "providing windows of opportunity to understand each other's concerns for improved management of the Himalayan Rivers".</p> <hr/> <p>IRB [1]: (1) Indus Forum: A joint meeting (May 2017) between the IF and the UIB Network on how to strengthen collaboration and prepare for the Indus Knowledge Forum in July 2017. The proposal for a joint research program on climate change impacts in the Indus Basin was advanced, with a study tour on glacier monitoring to the Swiss Alps in October 2016.</p> <hr/> <p>GRB [0]: (0) SAWI management took a decision to place the Ganges dialogue process on hold in FY17, while scoping opportunities for further engagement.</p> <hr/> <p>BRB [1]: (1) Brahmaputra Forum dialogue: A regional-level workshop was held in Singapore in October 2016 (national-level workshops were also held in Bangladesh in June 2016, China in July 2016, India in August 2016 and Bhutan in September 2016). Workshops have provided a neutral platform for various stakeholders from the four riparian countries to engage, build a common understanding of the issues and challenges, and begin to identify potential opportunities for basin-wide collaboration.</p> <hr/> <p>SUN [1]: (1) Sundarbans BISRCI dialogue found significant traction at the highest policymaking levels in both Bangladesh and India. BISRCI is facilitating the creation of a joint bilateral mechanism.</p> <hr/> <p>REG [1]: (1) Regional Dialogue: International RiverSymposium (September 2016) brought together 450 delegates, including 249 delegates from India, of which 80 were officials from Indian state and central government water agencies. A panel event broke new ground, as multilateral discussions on water by government officials in South Asia remain highly sensitive.</p>

Intermediate Results	Result Indicators	FY17 Milestone	Progress Update
2. Stakeholder input to government decision making strengthened by participatory processes that facilitate transboundary knowledge generation and sharing	2.1 Number of regional, basin/landscape or sub-basin level participatory processes that support transboundary knowledge generation and sharing and stakeholder input to government decision making	5/2	<p>*Exceeded Expectations* These participatory processes that bring together diverse stakeholders are an offshoot of the basin-level dialogues and are helping to raise awareness, share knowledge and best practice across multiple sectors, and to advance understanding on sensitive issues outside of formal dialogue processes.</p> <hr/> <p>IRB [1]: (1) A conference on Water and Environment: Sustainable Development in a Changing Climate, held in Islamabad in October 2016, aimed at sharing best practices to build awareness and facilitate dialogue toward formulating an action plan to address climate change impacts in the Indus Basin.</p> <hr/> <p>GRB [1]: (1) Under the Strategic Basin Planning process, considerable effort has gone into building the trust and confidence of the Government of India to engage in this work in close partnership with the 11 basin States.</p> <hr/> <p>BRB [2]: (1) The preparation of the Investment Plan for Bangladesh Delta Plan 2100 involved working closely with a wide range of stakeholders, including Ministries, civil society, research organizations, the private sector and development partners. (1) Strategic Basin Assessment process in India and Bangladesh.</p> <hr/> <p>SUN [1]: (1) Sundarbans dialogue: established and sustained local dialogues (between the community/local government and the state/federal levels of government), as this is critical to strengthening the current positive steps in Bangladesh-India dialogue and collaboration.</p> <hr/> <p>REG [0]: (0) None targeted</p>
3. Capacity of water resources organization strengthened in areas relevant to transboundary cooperation	3.1 Number of professionals trained in the aspects of water management, water policy or water diplomacy relevant to basin-scale planning and management or regional cooperation.	444/200 people	<p>* Exceeded Expectations* SAWI has responded to rising demand for capacity building from stakeholders, which has included exposure visits, targeted training and technical workshops to embed new tools and knowledge, and familiarization with social impact analysis and climate change issues.</p> <hr/> <p>IRB [44]: (44) An extensive capacity building program for an inter-ministerial working group on transboundary waters, comprising technical-level staff representatives from the MEW, the Ministry of Finance, the Ministry of Foreign Affairs and the National Environmental Protection Agency. Training on transboundary water resources management covered a wide range of topics and issues related to dialogue and relations with co-riparians.</p>

Intermediate Results	Result Indicators	FY17 Milestone	Progress Update
			<p>GRB [243]: (4) A high-level delegation (four participants, including the Minister and Principal Secretary, Water Resources Department of Government of Bihar) participated in a study tour to Tokyo, Japan in December 2016 to understand the institutional and technological perspectives of real-time flood forecasting and adopt the technology suitable for the State of Bihar. (See Box 2 in main report) (27) Training on river basin planning and management software was conducted for 27 participants (Central and State water resources engineers), including from water resource development departments of Ganges and Brahmaputra States. (2) Two officials from WRD attended a weeklong operational workshop on transboundary flood forecasting, organized by RIMES and UNESCAP, at AIT, Bangkok, Thailand, in October 2016. (210) Between February 2017 and June 2017, 210 Central and State government officials were trained under the Collaborative Modeling Phase, on the rainfall-runoff models, groundwater model and water distribution model in four States (40 participants) and in Delhi (seven workshops for 170 participants).</p> <hr/> <p>BRB [0]: (0) None targeted.</p> <hr/> <p>SUN [37]: (37) A hands-on training on modeling of cyclone induced storm surges and river water salinity in a changing climate took place at in Kolkata in February 2017. Participants had the opportunity to review the MIKE 21 hydrodynamic model and how to process input data and climate change parameters for rainfall runoff using different hydrological models for simulation of location specific river salinity. It is expected that the training will aid in mainstreaming climate change in relevant policies, action plans and programs related to management of Sundarbans by Bangladesh and India, as well as for long-term development and poverty alleviation in adjacent areas.</p> <hr/> <p>REG [120]: (112) Two basic trainings on river basin operation software for 62 participants and one advanced training for 26 participants who had set up Riverware software for water resources planning and management. Twenty- four water resources engineers were trained from Ganges and Brahmaputra riparian States on real time reservoir operation. The trainings were organized in Delhi, Ahmedabad and Jaipur. All training material and presentations are available at www.indiaiwr.org. The trainings have directly contributed to preparation of river basin planning systems for five sub-basins. The river model was introduced for the first time in India. This setup will inform the river basin framework for the NHP, and help in testing scenarios for a proposed World Bank-funded project in Damodar command area, which would contribute to optimization of reservoir operation to managing floods and maximize storage for irrigation. (8) A capacity strengthening program included three external training events: five officials (including the Director General (South Asia), Ministry of Foreign Affairs, Government of Bangladesh and Sub-Divisional Engineers, Joint Rivers Commission, Bangladesh) at the 2017 Water Diplomacy Workshop in Boston, USA; two officials (including the Member, Joint Rivers Commission, Bangladesh) at the 2016 Annual International Law and Transboundary Freshwater Training Workshop in Dundee, Scotland; and one participant at the 2016 Short Course on Watershed and River Basin Management, at UNESCO-IHE in Delft, the Netherlands.</p>

Intermediate Results	Result Indicators	FY17 Milestone	Progress Update
<p>3. Capacity of water resources organizations strengthened in areas relevant to transboundary cooperation</p>	<p>3.2 Number of water management organizations with policy or technical capacity significantly strengthened by SAWI activities in areas relevant to basin-scale planning or regional cooperation</p>	<p>49/50</p>	<p>* Met Expectations* SAWI's strategy is to target its capacity building toward organizations and key professionals who are involved in water management and cooperation, and to focus on technical areas where there is strong need, demand, and relevance to basin-scale planning. By enabling stakeholders to participate in a range of events, SAWI is helping to enhance understanding of good practice from international experience, deepen knowledge on specific issues, introduce new models and tools to improve efficiency, and help to stimulate new ways of beginning to address old, intractable problems.</p> <hr/> <p>IRB [4]: (4) Government of Afghanistan capacity building program targeted an inter-ministerial working group on transboundary waters, comprising representatives from the Afghanistan MEW, Ministry of Finance, Ministry of Foreign Affairs, and the National Environmental Protection Agency.</p> <hr/> <p>GRB [24]: (11) Strategic Basin Planning State workshops on collaborative modeling. Between February 2017 and June 2017, trainings on model use were conducted in four States and in Delhi (seven workshops). Water resource organizations of all 11 States participated in these workshops. (1) Water Resources Department of Government of Bihar participated in a study tour to Tokyo, Japan in December 2016 to understand the institutional and technological perspectives of real-time flood forecasting and adopt the technology suitable for the State of Bihar. (12) WRD "departments" and organizations across Ganges and Brahmaputra States trained in river basin planning software.</p> <hr/> <p>BRB [1]: (1) Government of Bhutan: technical capacity support has enabled the National Center for Hydrology and Meteorology and BMD and BWDB in addressing technical issues as they arise in implementation of their investments.</p> <hr/> <p>SUN [5]: (1) Inland Waterways Authority of India (on opportunities of women empowerment; critical risks in navigation in the Sundarbans). (1) West Bengal Department of Fisheries (on opportunities of women empowerment; climate vulnerabilities, climate induced changes, adaptation measures, climate and water resources modeling). (1) Bangladesh Fisheries Research Institute (on climate vulnerabilities, climate induced changes, adaptation measures, climate and salinity modeling). (1) Institute of Water Modeling, Bangladesh (on climate vulnerabilities, climate induced changes, adaptation measures, climate and salinity modeling). (1) Bangladesh Soil Research Development institute (on climate induced changes, adaptation measures, climate and salinity modeling).</p>

Intermediate Results	Result Indicators	FY17 Milestone	Progress Update
			<p>REG [15]: (4) Training was provided under a two-year capacity strengthening program for officials of the Joint Rivers Commission, Bangladesh, the Bangladesh Ministry of Water Resources and Ministry of Foreign Affairs, and Government of Afghanistan in transboundary waters governance. Capacity strengthening program organizations have received training in both basic and advanced water resources management (e.g. fundamentals of hydrology and IWRM, river basin modeling, flood risk management, hydropower management, groundwater management and conjunctive use) and topics related to transboundary water governance (e.g. international law and institutional frameworks, benefit sharing, and hydro-diplomacy). (1) Technical advice/training to the India Central Pollution Control to implement a network of real-time water quality monitoring sensors to increase the use of modern technologies. (10) Nine Neeranchal partner State governments and India Department of Land Resources visited sites in Karnataka (December 2016) to learn from the Sujala I Watershed Project, and meet the Karnataka Watershed Development Department to understand the Land Resources Inventory concept, approach, and expected benefits, etc.</p>
<p>4. Regional, basin or sub-basin-level knowledge increased and accessible to stakeholders, including decision makers</p>	<p>4.1 Number of regional, basin/landscape or sub-basin-level knowledge products and shared with key stakeholders, including decision makers</p>	<p>23/8</p>	<p>* Exceeded Expectations* As part of its strategic outreach and dissemination activities, SAWI has not only generated innovative knowledge products but has also ensured that these are disseminated appropriately. Most of the products are developed in close partnership with key stakeholders and thus embedded within existing systems to strengthen quality of planning and management and ensure their uptake.</p> <hr/> <p>IRB [2]: (1) Managing Blue Gold in South & Central Asia: A Comparative Study of Islamic Law and International Water Law, to be published in an academic journal. (1) GIS data-mapping tool, which is publicly available on the Indus Basin Knowledge Platform portal, hosted by IWMI.</p> <hr/> <p>GRB [2]: (1) Kali Gandaki Hydropower Plant Rehabilitation Project: Catchment Management for Sediment Retention technical report. (1) Securing Irrigation in Rainfed Areas: Strategies and Experiences of the West Bengal Accelerated Development of Minor Irrigation Project.</p> <hr/> <p>BRB [7]: (1) Detailed Analysis of Existing Hydro-met Monitoring Networks, Forecasting and Early Warning Systems. (1) Dialogue and Water Cooperation in the Brahmaputra River Basin (1) Knowledge Inventory Report (Brahmaputra River Basin Assessment) (1) Brahmaputra River Basin Issues, Models, Needs Assessment (1) Baseline of Brahmaputra Basin Water Resources for Development Planning within Key Economic Sectors (1) Stakeholder Consultation Report (1) Interactive Excel-Based File System (allowing users to explore the basin and extract relevant data)</p>

Intermediate Results	Result Indicators	FY17 Milestone	Progress Update
			<p>SUN [3]: (1) The Impact of Aquatic Salinization on Fish Habitats and Poor Communities in a Changing Climate: Evidence from Southwest Coastal Bangladesh (1) The Impact of Climate Change and Aquatic Salinization on Mangrove Species in the Bangladesh Sundarbans (1) Nature's Own People (documentary film).</p> <hr/> <p>REG [9]: (1) Climate Risks and Solutions: Adaptation Frameworks for Water Resources Planning, Development and Management in South Asia. (1) Crowdsourcing Water Quality and Monitoring Data: A Conceptual Framework produced. (1) Analysis of Existing and Emerging Technologies for Continuous Water Quality Measurement. (1) Analysis of Water Quality Data from Real Time Water Quality Monitoring Stations on River Ganga. (1) Flood Risk Assessment and Forecasting for the Ganges-Brahmaputra- and Meghna River Basins (1) Economic Assessment of India's National Groundwater Management Improvement Program (1) Technical Assessment of India's National Groundwater Management Improvement Program (1) The Use of Remote Sensing in Monitoring Groundwater Use for Irrigation and Validating the Arrest of Groundwater Decline in India (1) Hydropower Sector Climate Resilience Guidelines Final Report</p>
<p>5. Regional, basin or sub-basin-level interventions designed to improve livelihoods and ecosystem sustainability</p>	<p>5.1 Number of regional, basin or sub-basin-level feasibility studies or intervention designs informed by SAWI activities</p>	<p>4/4</p>	<p>* Met Expectations* The basins and landscape have made good progress in responding to emerging opportunities. In some cases, SAWI has leveraged funding or directly shaped larger policies and investments (e.g. Ganges, Brahmaputra), while in other instances SAWI is informing the design and implementation of larger programs. The technical focus of these efforts is on improving climate responsive planning in water resource management, and integrating gender issues and sustainability into approaches. Regional level investments are yet to happen, but SAWI's support to advancing the basin-level dialogues is a critical step toward that objective by continuing to build trust between various stakeholder groups across the riparian countries. SAWI also has traction with national and sub-national governments, particularly through the World Bank's country investments.</p> <hr/> <p>IRB [0]: (0) None targeted</p> <hr/> <p>GRB [2]: (2) In partnership with ADB and ICE WaRM, supported the drafting of Nepal's IWRM Policy and Act, both of which are undergoing consultation before being tabled to cabinet and parliament. SAWI provided technical consultants who provided critical implementation support to government in finalizing the ToRs and procurement package, and in assisting WECS to navigate government internal processes in order to obtain relevant approvals.</p>

Intermediate Results	Result Indicators	FY17 Milestone	Progress Update
			<p>BRB [2]: (1) Supported Government of Bangladesh in the preparation of the Investment Plan for Bangladesh Delta Plan 2100—a long-term holistic and integrated plan that will prioritize investments over the 15 years, supported by policy and regulatory reforms and institutional capacity building, and based on the principles of adaptive delta management. The activity builds on the State of the Basin Assessment to identify interventions or capacity building areas that assist in investment planning. (1) A summary analysis of hydro-met systems in Bangladesh informed the design of the Bangladesh Weather and Climate Services Regional Project, which is effective as of May 2017.</p> <hr/> <p>SUN [0]: (0) None targeted.</p> <hr/> <p>REG [0]: (0) None targeted.</p>

Annex II: Activity Summaries

PROGRAM

OVERVIEW

Activities have been established to cover: (1) program management; (2) strategic communications; and (3) monitoring and evaluation. The program management activity is seven percent of all contributions and is the management “fee” referred to in the Administrative Agreements. This fee is taken from each contribution payment.

PROGRAM MANAGEMENT

SAWI sits within the World Bank’s South Asia Region’s Regional Integration and Partnerships (SARRP), which has the ultimate responsibility for program delivery. The program is overseen by the Internal Review Committee, chaired by the Director, SAARP. The IRC meets once a year to approve the annual work plan, endorse all new activities over US\$50,000, and conduct an annual review of program implementation. On a day-to-day basis, a small Secretariat team in the Water GP and SARRP manages the program. The program management activity supports strategic oversight and coordination of the program across all Focus Areas and activities, financial management, and annual progress reporting and donor liaison, including the annual donor meeting. Donor liaison includes the governance processes as laid out in the Administrative Agreements, interactions with the partner organizations funded by Australia’s Department of Foreign Affairs and Trade (DFAT) under their South Asia Sustainable Development Investment Portfolio (SDIP) and DFID’s South Asia Water Governance Program, in addition to participation in the annual reviews of those programs.

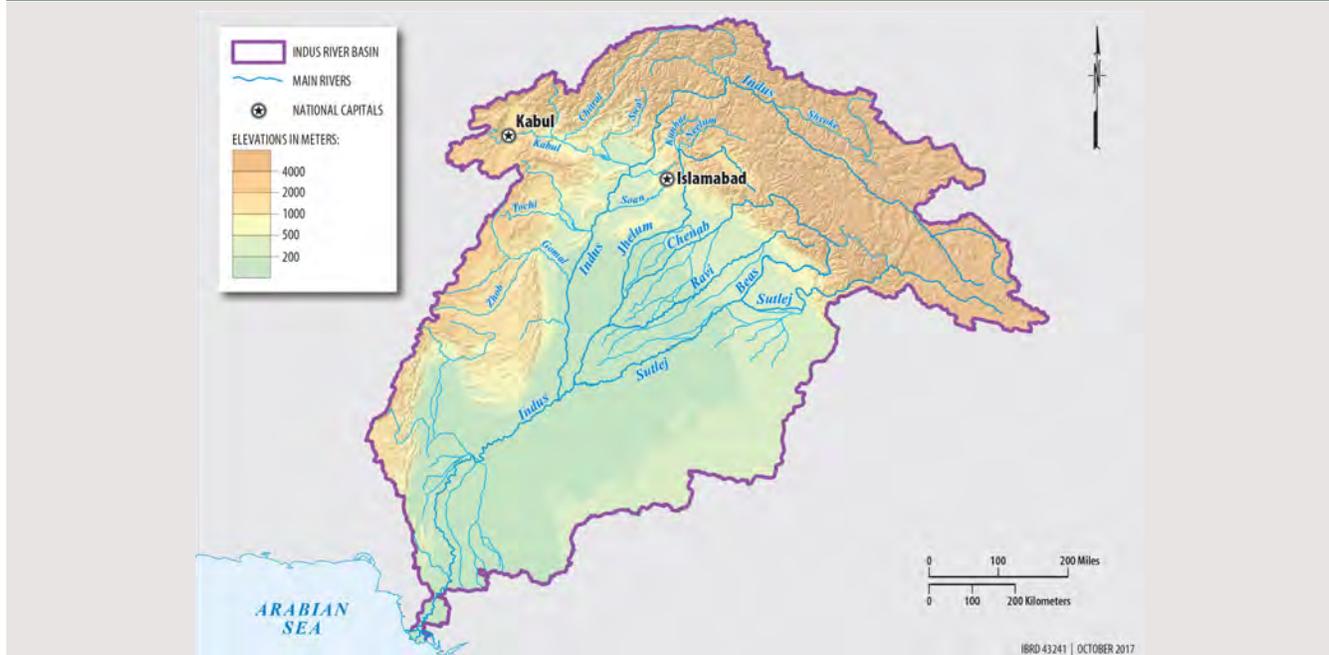
STRATEGIC COMMUNICATIONS

This activity supports implementation of the program Communications and Engagement Strategy, with a long-term goal to create an enabling environment for cooperation at the basin level. This includes advocacy, awareness building, dissemination and engagement with key stakeholders (government officials, NGOs, academia, civil society groups and the media). The activity works upstream to strengthen positioning at dialogues, national and international workshops and conferences, and extends support to Focus Area activities toward the delivery of programmatic results. The activity also supports the maintenance of the program website, regular Program Updates, and the widely distributed weekly media roundup.

ACHIEVING RESULTS (M&E)

This activity supports M&E at the program level and at the Focus Area level. This includes tracking progress in achieving indicator targets at all links of the results chain—activities, outputs, intermediate results and ultimately outcomes. It includes regular reporting, including annual, “mid-term” and closing. M&E also includes qualitative narratives to report on and demonstrate impact in terms of tangible results aligned with the program objective. The activity supports communication with donor partners to ensure that information used in their M&E processes is accurate and up-to-date.

INDUS BASIN FOCUS AREA



OBJECTIVE

To improve water resources management and coordination among the riparian countries, Afghanistan, China, India and Pakistan, to enhance water and energy security.

FOCUS AREA THEORY OF CHANGE

Given complex water challenges, high glacier dependency and growing per capita water scarcity, the Indus is the most vulnerable river basin in Asia. The uneasy relationship between riparian countries, different levels of capacity and the presence of a fragile, post-conflict country in the basin pose additional challenges to regional cooperation on water resources management. Given the World Bank's role in the 1960 Indus Waters Treaty (IWT) and the importance of neutral engagement, maintaining transparency in World Bank engagement in the Indus Basin is critical. In response to communications from key riparian stakeholders, investment in this Focus Area is relatively low and focuses on issues not under the purview of the IWT.

Activities focus on tractable efforts where client demand is clear, including: (1) identification of the need for and provision of technical assistance at the national level to enhance transboundary (including inter-provincial boundaries) water resources management capacity; and (2) continued support to the basin dialogue (commenced in 2013) focusing on development of joint research activities on climate change impact in the Indus Basin. Pillar 2 focuses primarily on Afghanistan, and also Pakistan, to mitigate for cross-basin differences in country capacity.

Pillar 1 – Long-Term Basin Development and Investment Planning

No active grants

Pillar 2 – Investments and Capacity Building for Water and Energy Security

KABUL/KUNAR BASIN DEVELOPMENT

Scope: This activity aims to strengthen capacity within the governments of Afghanistan and Pakistan for establishing institutional frameworks for transboundary waters and infrastructure, and to facilitate dialogue between the two countries to enhance coordination and reach cooperation on the development and management of the Kunar/Kabul River Basin. Based on government request, the activity is engaged in an extensive capacity building program with the Government of Afghanistan on transboundary water resources management. The training has covered a broad spectrum of issues related to dialogue and developing relations with co-riparians. This activity is closely linked to the World Bank's Irrigation Rehabilitation and Development Project (IRDP) Additional Financing (\$70M); SAWI support aided in strengthening the focus on water sector issues more generally in the IRDP (\$220M).

Timeframe: June 2015 – October 2017. **Geography:** Indus Basin; Afghanistan, Pakistan. **Budget Allocation:** \$0.60M

FY17 Progress: An inter-ministerial working group on transboundary waters, comprising technical-level staff representatives from the MEW, the Ministry of Finance, the Ministry of Foreign Affairs and the National Environmental Protection Agency were trained. Forty-four participants received training across 18 seminars and 142 hours of in class time, with a core group of 15 attending 80 percent or more of the trainings. Ministerial advisors as well as heads of departments also participated in the training events. Seminars in FY17 included Negotiating: Finding Solutions, August 2016; Awareness Building, December 2016; Kunar Cascade Development, December 2016; US-Mexican Water Relations, December 2016; Central Asian Water Development, February 2017; Basin Modeling, February 2017; Climate Change and Transboundary Water, February 2017; Jordan River Case Study, April 2017; Evaluating Equitable and Reasonable, May 2017; and Nile Basin Case Study, June 2017). The working group also participated in a workshop with counterparts from the Ministry of Water Resources from Ethiopia on organizing nationally for transboundary water management. While causality is not always attributable, the capacity building package has informed (1) the institutional structure of the Afghanistan inter-ministerial cooperation on transboundary waters, including the High Commission on Transboundary Waters headed by the President and an inter-ministerial working group on transboundary waters; (2) the structure of the transboundary water department within the MEW; and (3) the drafting of the Afghanistan transboundary water policy (approved in principle by the President). The resulting increased confidence and capacity led to increased engagement in riparian dialogue with neighboring countries. To ensure that the wealth of material developed during this training can be built upon, both by the participants and the World Bank, all non-sensitive materials have been made available to participants in a digital format. The material is being formatted and collated into a training manual. Discussions were initiated to have some of the materials developed into curricula for Afghan institutions. The activity also provided technical advice to MEW in the run up of the Afghanistan National Water Conference with respect to communication and discussion of transboundary water issues during this conference with national stakeholders.

FY18 Plan: Twelve additional hours of classroom time in Kabul were scheduled for June 2017, but were postponed to FY18 for security reasons. Training workshops are planned on organization and function of RBOs and transboundary groundwater. A study tour/exposure visit to the Nile Basin is planned in October 2017, at the end of the activity.

Pillar 3 – Basin-Level Dialogue

INDUS BASIN DIALOGUE

Scope: Since 2013 the World Bank has supported a dialogue for Indus Basin countries—the IF—to build confidence and trust in order to establish an enabling environment for basin-wide cooperation. This activity aims to support dialogue in the Indus Basin, including the IF, and it focuses on technical collaboration on issues previously identified by the IF. The activity finances meetings and exposure visits of participants of the IF. It also aims to facilitate a national dialogue process with key stakeholders in Pakistan to implement the recommendations from the 2013 Pakistan Water Summit and to identify specific opportunities for water reform and investment. The IF-WG has been developing a proposal for a joint research program on climate change impacts in the Indus Basin. The proposed research aims at addressing the scientific gaps in knowledge, regarding the impacts of climate change on the Indus Basin and would guide the policymakers of the basin for adaptation strategies.

Timeframe: November 2014 – June 2018. **Geography:** Indus Basin; all riparians. **Budget Allocation:** \$0.70M

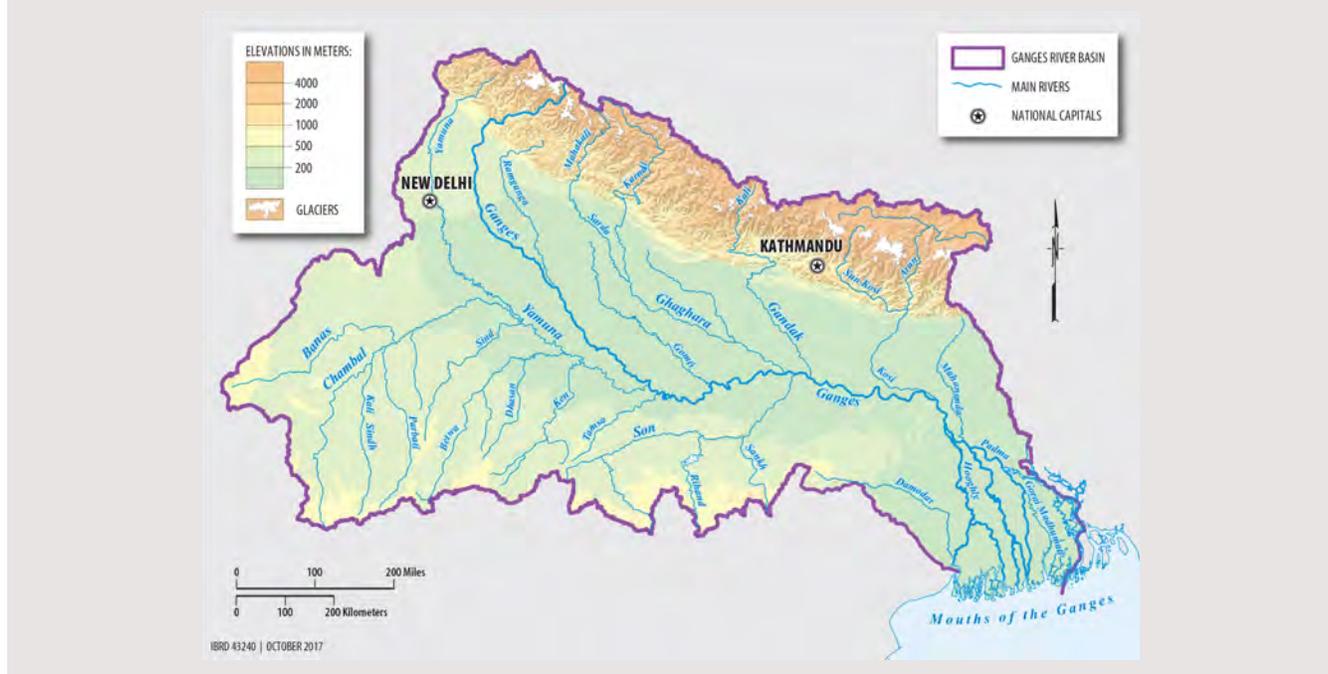
FY17 Progress: In October 2016, SAWI led a study tour on glacier monitoring in the Swiss Alps, bringing together participants from the four Indus Basin countries and international experts on climate change, glaciology and hydrology, to understand and learn about research approaches to glacier monitoring in the Swiss Alps and to discuss and finalize the IF-WG joint research proposal and lay down next steps for its coordination and research mobilization. The proposal for a joint research program was developed as four working packages: on (1) baseline observations; (2) climate change scenarios; (3) climate change adaptation; and (4) capacity building and knowledge exchange. An IF joint meeting with the ICIMOD Upper Indus Basin (UIB) Network, and with IWMI, was held in Kathmandu in May 2017 to present the joint research proposal (and discuss resource mobilization opportunities to fund the study), continue discussions on how to strengthen collaboration between the IF and the UIB, and prepare for the Indus Knowledge Forum (July 2017).

The activity facilitated the finalization of the IF-WG baseline assessments on available knowledge on glaciers and climate change in the Indus Basin as well as a glacier knowledge mapping tool (fall 2016). Young researchers from the region were engaged as consultants to carry out the baseline assessment and develop the knowledge mapping tool under guidance of the IF-WG members. The baseline assessment on available glacier data was made publicly available on the Indus Basin Knowledge Platform (hosted by IWMI; www.indusbasin.org). An outcome of the IF process is that Pakistan has invited Afghan participants to capacity building trainings on glacier monitoring. The Deputy Minister of Water of Afghanistan has nominated participants to go to the Pakistan training.

As part of the national dialogue supported through this activity, a conference on Water and Environment: Sustainable Development in a Changing Climate, held in Islamabad in October 2016, was supported in partnership with ICIMOD, the Pakistan Ministry of Climate Change, and the Water Environment Forum (a national dialogue forum that was established as an outcome of the overall Indus Basin Dialogue process). The conference aimed at sharing best practices to provide awareness and facilitate dialogue toward formulating an action plan to address climate change impacts in the Indus Basin. The event drew high-level government participation, including the Ministers of Climate Change and National Food Security & Information, and the respective secretaries from the ministries, and the General Director of the Pakistan Meteorological Service.

FY18 Plan: The Indus Knowledge Forum, hosted by IWMI and supported through this activity, in Colombo, Sri Lanka, in July 2017, will aim to provide a platform for exchange of the latest research on the Indus Basin between participants from the basin and from third countries. It will bring together more than 100 key stakeholders from government, civil society, academia and the private sector, including IF members from the four basin countries. The research proposal will undergo a final review among the IF-WG members and an internal peer review.

GANGES BASIN FOCUS AREA



OBJECTIVE

To improve management and development of water resources in the Ganges Basin to support economic growth and improve resilience to climate variability and change.

FOCUS AREA THEORY OF CHANGE

Countries in South Asia are unlikely to cooperate for effective basin management if water resources are not well managed nationally. Therefore, the strategy for the Ganges Basin Focus Area is to support improved water resources management nationally and facilitate connections between countries through technical dialogue and capacity building. In addition to improving water management nationally for economic stimulation and poverty reduction, these connected efforts build confidence in transboundary engagement and increase trust around knowledge and information exchange. In India, working to improve data sharing between the center and the states is a necessary precursor to broader public and international transparency.

In India and Nepal, support is being provided to river basin planning. In Nepal this is via the accelerating development of hydropower (with associated work on watershed management for sediment control), and in India this is via the drive for river cleanup as well environmental flows for healthy rivers, cross-sectoral water allocation and inland navigation. Work under the Focus Area supports the design and implementation of the World Bank-financed NHP in India that includes river basin planning on a platform of more open data access and sharing, in addition to informing other lending operations.

Operationalizing flood forecasting in the Ganges Basin at the sub-basin-level focuses on activities in the Bagmati sub-basin to build technical competence and improve forecasting skill, as well as to strengthen cross-border cooperation in flood management between Bihar and Nepal. Again this work will guide larger-scale and longer-term efforts in flood forecasting planned under the NHP.

Pillar 1 – Valuing the Environment and Ecosystem Services

STRATEGIC BASIN PLANNING FOR THE GANGES IN INDIA

Scope: This activity is providing technical assistance to the Government of India and basin State governments in scenario-based river basin modeling and participatory river basin planning for the Ganges Basin in India. The activity aims to develop a comprehensive basin model for the Ganges in India that enables objective assessment of the likely effectiveness of different options for improving river health and the impacts these options have on the ability to meet consumptive water demands and support inland waterway navigation. The activity is being implemented via a major contract with Deltares for work on basin-scale modeling, surface water-groundwater interactions, environmental flows, stakeholder consultation and basin information systems. The work is proceeding in close cooperation with the Indian Ministry for Water Resources, River Development and Ganga Rejuvenation and relevant state government agencies. The activity is highly relevant to the NHP and is seen by the Government of India as a pilot for the multiple river basin modeling and planning activities to be progressed under this project. The activity is also relevant to the NGRBP and the UPWSRP.

Timeframe: December 2014 – June 2018. **Geography:** Ganges Basin; India. **Budget Allocation:** \$4.00M

FY17 Progress: The activity undertook technical work on an integrated modeling suite for the Ganges Basin in India (documented an open-access model of the basin in India calibrated to existing data for the baseline situation); designed an Information Dashboard to display/interrogate modeling data; documented methods for environmental flows assessments (report prepared) and surface water-groundwater interaction analyses (report prepared); and carried out comprehensive programs of stakeholder consultation and technical training across 11 basin States. Between July 2016 and December 2016, the Deltares-led team conducted 11 State workshops on collaborative modeling for 284 participants and 105 departments and organizations. The third basin-wide workshop was held in Kolkata in March 2017 with the aim to discuss the outcomes of the Collaborative Modeling Phase and present the model developed to further initiate the Scenario Development Phase. Key participants included officials from Central Ministries/Departments, riparian State governments, academic institutions and NGOs. First versions of the rainfall-runoff models, groundwater model and water distribution model were developed and discussed with stakeholders. Between February 2017 and June 2017, trainings on model use were conducted in four States for 40 participants and in Delhi (seven workshops) for 170 participants. The development of the water quality and ecology modules was completed. The complete modeling system was ready for first calibration at the end of the FY.

The activity was an active contributor to the 2016 International River Symposium in New Delhi (September 2016), sponsored by SAWI, with the project leader presenting on implementation progress in a SAWI convened session showcasing capacity building, analytical and dialogue work across the major transboundary basins of South Asia.

FY18 Plan: The activity will be completed in FY18. A final dissemination workshop is planned.

SUSTAINABLE WATER RESOURCES DEVELOPMENT FOR HEP IN NEPAL (RE)

Scope: This RE activity aims to strengthen the capacity of the Nepalese power sector to plan and prepare hydropower and transmission line projects according to international standards and best practices that take account of basin-wide water resource management issues, and to improve the readiness of the power and water sector for regulatory and institutional reforms. This activity is linked to the Power Sector Reform and Sustainable Hydropower Development Project.

Executing Agency: Water and Energy Commission Secretariat (WECS) in the Ministry of Irrigation, Nepal

Timeframe: June 2016 – June 2018. **Geography:** Ganges Basin; Nepal. **Budget Allocation:** \$2.50M (reduced to \$0.5M in FY18)

FY17 Progress: The WECS' implementation of integrated water resource planning and management to guide sustainable hydropower development using a basin-wide approach continued, albeit at a pace that was significantly slower than planned. At the end of FY17 WECS was evaluating proposals of the firms shortlisted to carry out a strategic environmental and social assessment to support a basin-wide approach for hydropower development planning.

FY18 Plan: The selected firm will carry out the assessment. An introductory workshop on SESA will be conducted.

SUSTAINABLE WATER RESOURCES DEVELOPMENT FOR HEP IN NEPAL (BE)

Scope: This activity will enable the World Bank to provide implementation support to the above RE activity. This activity aims to enhance the Government of Nepal's GoN water resources management and development capacity by: (1) increasing awareness of river basin planning as a mechanism to guide environmentally sustainable development hydropower balanced with water resource uses; (2) facilitating institutional and regulatory reform in the water resources sector; and (3) building capacity in environmental and social safeguards. By strengthening capacity in the GoN and supporting river basin planning and improved water management the activity will enable the GoN to engage in a more informed and more confident way with downstream riparian countries in future transboundary discussions and negotiations.

Timeframe: September 2014 – August 2018. **Geography:** Ganges Basin; Nepal. **Budget Allocation:** \$1.70M

FY17 Progress: SAWI, in partnership with ICE WaRM and ADB, supported the drafting of Nepal's IWRM Policy and Water Resource Act. A local firm was hired to support WECS in preparing the draft Policy and Act. Three consultants (two local and one international) were hired to provide critical implementation support to WECS in finalizing the corresponding ToR and procurement package. At the end of FY17 the firm was consulting stakeholders to finalize the drafts, which would then be tabled to cabinet and parliament.

The activity supported five GoN officials to attend the International Hydropower Congress in Ethiopia in May 2017 to enhance their knowledge of and share experiences in hydropower development, and to help chart the course for hydropower development and operations over the coming decade in Nepal. The activity also supported implementation of the Nepal Power Summit 2016 (December 2016), organized by the Independent Power Producers Association of Nepal. The Summit aimed to attract investors, developers, policymakers and civil society to realize the 10,000 MW installed in 10 years target set by government. The activity also supported the NEA staff to attend the Process of Social Impact Assessment Course in April 2017. This course aimed to help strengthen the capacity for NEA in social impact assessment processes.

FY18 Plan: A workshop on IWRM is planned for September 2017. A high-level government delegation will visit Three Gorges Dam in China in August 2017 and Itaipu Dam in Brazil in November 2017.

Pillar 2 – Moving from Data to Information Services

WATER RESOURCES MANAGEMENT IN TRANSBOUNDARY BASINS

Scope: This activity provides support to the preparation and implementation of the NHP by facilitating access to international best practice to inform project design—especially relating to river basin planning and management in transboundary basins. NHP focuses on the use of water data in planning and management, including via modeling in support of basin planning and basin water resources assessments, flood management and reservoir operations.

Timeframe: November 2014 – June 2018. **Geography:** Ganges and Brahmaputra Basins; all riparians. **Budget Allocation:** \$0.50M

FY17 Progress: The activity facilitated strengthened dissemination of various products developed in FY16 and introduced an online river basin planning and management tool that can be used for reservoir operation and optimizing irrigation and hydropower ("WaterWare"; December 2016). In its current form, the WaterWare application, developed by the Environmental Software and Services GmbH (Austria), includes modules on rainfall-runoff, optimization, expert system, groundwater, land use change, irrigation and crop production, GIS objects, monitoring and data management and expert system. SAWI worked to make it more comprehensive, incorporating more data on rainfall and discharge, scenarios for dry, normal and wet years, refine model calibration, incorporate reservoir operation rules, design scenarios for evaluating impact of climate change, scenarios on changing domestic and industrial demands. The WaterWare software is being applied to the Damodar River Basin. Damodar is a transboundary river within India that flows across the states of West Bengal and Jharkhand, joining Hooghly and ultimately draining into Bay of Bengal. If the application is successful, similar models can be replicated for other river basins to make management more effective. Two reports were produced on real-time hydrological information systems and on IWRM river basin modeling systems for Damodar Basin.

Training on river basin planning and management software was conducted for 27 participants (Central and State water resource engineers), including from WRD departments of Ganges and Brahmaputra States (January 2017). All training material is available at www.indiawrm.org.

FY18 Plan: Training on river modeling software for stakeholders of Damodar Basin and the NHP team in Kolkata is planned.

STRENGTHENING FMIS CAPACITY IN BIHAR (RE)

Scope: This RE technical activity builds on the outcomes of the regional scoping study on flood forecasting to strengthen institutional capacity in the Government of Bihar, India, and to improve community outreach for flood management in the Bagmati-Adhwara (B-A) Basin (a transboundary sub-basin of the Ganges Basin spanning Nepal and India). The activity is linked to the ongoing BKDP.

Executing Agency: Government of Bihar, India

Timeframe: February 2016 – June 2018. **Geography:** Ganges Basin; India. **Budget Allocation:** \$0.475M

FY17 Progress: The work to improve flood modeling capacity of the WRD of the Government of Bihar was in process; setting up the flood model delayed progress. Model calibration was in process and is expected to be ready by the end of 2017. A high-level delegation (four participants, including the Minister and Principal Secretary of the WRD of Government of Bihar) participated in a study tour to Tokyo, Japan in December 2016 to understand the institutional and technological perspectives of real-time flood forecasting and adopt the technology suitable for the State of Bihar.

FY18 Plan: The flood inundation model, under development at the time of reporting, will undergo calibration for operational rollout before the 2018 monsoon season.

BIHAR FMIS FLOOD FORECASTING (BE)

Scope: This activity enables the World Bank to provide focused support to the Government of Bihar in their implementation of the RE activity above. The activity aims to improve flood forecasting capability of the Government of Bihar by supporting travel of government officials to flood modeling centers of excellence, and supporting visits to Bihar by experts and consultants to improve the existing flood risk model.

Timeframe: November 2015 – September 2017. **Geography:** Ganges Basin; India. **Budget Allocation:** \$0.50M

FY17 Progress: The activity developed the concept and itinerary and logistical arrangements for the study tour to Japan in December 2016. It supported two officials from WRD Government of Bihar to attend a weeklong operational workshop on transboundary flood forecasting, organized by RIMES and UNESCAP, at AIT, Bangkok, Thailand, in October 2016. A local flood expert was hired to de-bug the B-A Basin model to improve its geometry and reconfigure the model before the 2017 monsoon floods. NCAR was brought on to develop and operationalize lead ensemble rainfall forecast for the B-A and Kosi Basins.

FY18 Plan: Lead rainfall and flood stage (water height at gauge stations) forecasts, under development at the time of reporting, will undergo calibration for operational rollout before the 2018 monsoon season. An IT-based system will be set up to provide support for the completed lead rainfall and flood forecasting model.

Pillar 3 – Basin-Level Dialogue

GANGES BASIN DIALOGUE

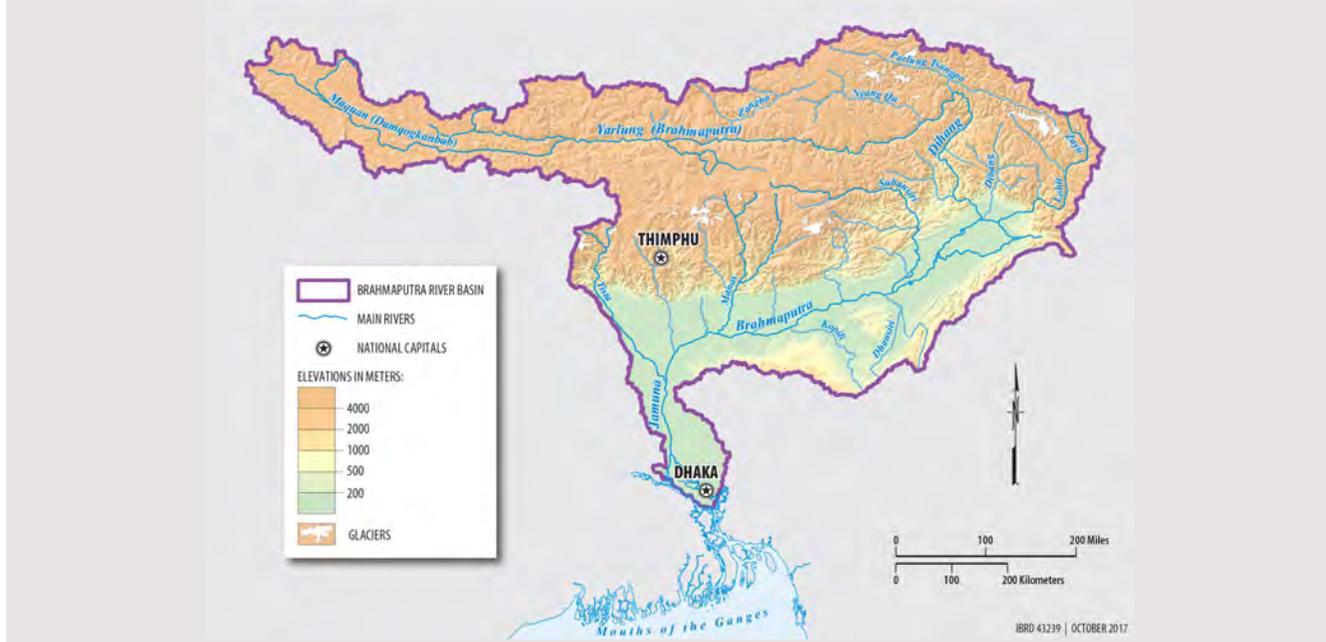
Scope: Building on the national level technical assistance in river basin modeling and planning in both India and Nepal, this activity supports basin-wide dialogue on hydrologic and water resources modeling. The activity aims to connect technical institutions in the region with scientists and academics around the world that are actively engaged in modeling the Ganges Basin. A key element of the original design of this activity was to bridge river basin modeling work supported under SAWI in India and Nepal. The activity was effectively placed on hold for FY17 pending outcomes of an internal review of the SAWI program and an assessment of the progress of river basin modeling work in support of hydropower development in Nepal, which has not proceeded as planned (as mentioned above).

Timeframe: November 2014 – September 2018. **Geography:** Ganges Basin; all riparians. **Budget Allocation:** \$0.40M

FY17 Progress: No outcomes achieved as activity was placed on hold for FY17.

FY18 Plan: Scoping of opportunities for advancing dialogue.

BRAHMAPUTRA BASIN FOCUS AREA



OBJECTIVE

To improve the shared understanding and management of the Brahmaputra Basin as a means to strengthen resilience and economic growth for the riparian countries.

FOCUS AREA THEORY OF CHANGE

Activities under the Brahmaputra Basin Focus Area focus on addressing water-related challenges (flooding and riverbank erosion) and assessing economic opportunities, including from hydropower and inland navigation. Knowledge exchange activities, study tours and workshops and assessments conducted to support these issues will not only demonstrate economic benefits from cooperative management but will provide a platform for riparian countries to come together and build the case for regional cooperation.

Pillar 1 activities will develop a shared knowledge base for the entire Brahmaputra Basin to support investment planning and decision-making. This will include relevant assessments and modeling, decision support tools to assist policymakers in making informed, analysis-driven decisions, and capacity building activities within relevant agencies to operationalize these tools and make strategic, informed decisions. The knowledge base will fill critical knowledge gaps and support basin-wide river management, investment planning at a national and/or basin level, adaptive management in deltaic regions, flood and sediment management and exploring cross-sector opportunities such as hydropower and navigation.

Pillar 2 activities focus on reducing community vulnerability to water and climate-related risks and building community resilience. An adaptive management framework is used to strengthen riparian countries' capacity to respond and adapt to changes in the basin. Activities include (1) improvements in investments and instruments, including early warning systems and flood mitigation measures; (2) improving the understanding of river morphology and sedimentation and erosion trends; and (3) capacity building, training and knowledge exchange activities, particularly focused on flood and erosion management.

Pillar 3 provides a platform for riparian countries to discuss challenges and identify opportunities for collaboration through study tours, workshops and conferences. The overarching aim is to improve cooperation through increasing opportunities to engage and discuss common challenges.

Pillar 1 – Knowledge and Capacity Building for Basin Management and Investment Planning

BASIN MODELING AND ANALYSIS

Scope: This activity aims to fill critical knowledge gaps in the Brahmaputra Basin and serve as a launching pad for integrated basin planning. It will undertake a strategic basin assessment (in India) as a basis for basin planning, conduct detailed investment planning in selected sub-basins as pilots for scale-up in the future, and develop a comprehensive basin-wide knowledge base. The activity will include multi-stakeholder consultations and capacity building for State agencies. The activity links closely with the Assam Flood, Erosion and River Management Modernization Project that is under preparation. It is also aligned with the 'sister' activity in Bangladesh (refer below).

Timeframe: March 2016 – August 2018. **Geography:** Brahmaputra Basin; India. **Budget Allocation:** \$1.20M

FY17 Progress: The contract with the firm to carry out the strategic assessment in India was signed in August 2016. Some adjustments were made to the activity tasks in order to address challenges associated with implementing the original TOR, and to better align with the Assam Flood, Erosion and River Management Modernization Project. An inception report was prepared (May 2017) and various consultations were held with key stakeholders. The activity experienced considerable delays due to unforeseen circumstances.

FY18 Plan: The original contract was cancelled in early FY18 and the team is in the process of re-procuring services and working to fast-track delivery. Planned completion milestones for FY18 include: strategic basin assessment; investment plan for one sub-basin and assessment and roadmap for a second sub-basin; assessment and roadmap of two to three other sub-basins; functional basin-wide knowledge base system with user manual; and training material and capacity building plan. Several consultation workshops are also planned, in addition to capacity building working closely with water resources departments, disaster risk management agencies, and other related agencies.

DELTA MANAGEMENT INVESTMENT PLANNING AND BASIN ANALYSIS

Scope: This activity is supporting the Government of Bangladesh in the preparation of the Investment Plan for BDP 2100— a long-term holistic and integrated plan for the Bangladesh Delta. The activity will build on the State of the Basin Assessment to identify interventions or capacity building areas that assist in investment planning. The work will explore a range of issues, including the climate change impacts; options analysis for investment planning; impacts from development scenarios including HEP development and interventions to improve irrigation productivity; and recommendations for improving basin-wide water management. The activity is a key part of a larger analytical study that will provide multi-sectoral solutions to delta management in Bangladesh. It helps give effect to the MoU signed by the governments of Bangladesh and the Netherlands, together with the World Bank, to advance Adaptive Delta Management in Bangladesh in the context of basin-wide planning and management, and is co-financed by an activity under the Sundarbans Focus Area. The activity is also carrying out a basin analysis to develop a better understanding of the dynamics of the Brahmaputra Basin in Bangladesh, through inventory and assessment of available data and knowledge and prioritizing development issues through a stakeholder consultation process. The existing knowledge base will be used to examine the potential development in the basin and attendant impacts of development. An information-based dialogue within and between riparian basin entities will be encouraged and supported.

Timeframe: September 2015 – September 2017. **Geography:** Brahmaputra Basin; Bangladesh. **Budget Allocation:** \$0.80M

FY17 Progress: SAWI worked closely with the General Economic Division (GED) in the preparation of the Investment Plan to support the implementation of the Bangladesh Delta Plan 2100. An Assessment of Bangladesh Delta Plan 2100 projects and a cost and benefit report were prepared (fall 2016). These papers have been integrated into the draft Investment Plan. A consultation workshop with stakeholders, including the different ministries/divisions/agencies, NGOs, academic and research organizations, the private sector and development partners was conducted in April 2017 (chaired by GED). Participants responded to a multi-criteria analysis questionnaire to provide input for the selection and ranking of projects. The draft Investment Plan was being finalized at the end of the FY reflecting the consultation workshop responses and the outcomes of a QER in May 2017, where constructive discussion was conducted to strengthen the quality of the document.

For the basin analysis, a consultation workshop was held in Dhaka in January 2017 to solicit feedback from experts and stakeholders on an analytical framework for basin planning. The workshop identified and prioritized issues and indicators in development planning in the basin, and obtained feedback from the 30 stakeholders in attendance on a shortlist of basin models and tools to address future basin development and impact scenarios. Training on water resources modeling tools was conducted at this workshop for government officials and individuals from technical support organizations, academia and NGOs. A March 2017 consultation workshop in Dhaka was organized to obtain feedback from experts and stakeholders on the framework design of a specific Brahmaputra Basin model, and to explore model requirements, data needs, computational approaches and expected modeling outputs. Further technical training on modeling tools was provided to workshop participants.

Five other reports were prepared in FY17. A Knowledge Inventory Report (October 2016) organizes and assesses readily available public data and dispersed databases in the Brahmaputra Basin. A Baseline of Brahmaputra Basin Water Resources for Development Planning within Key Economic Sectors (March 2017) reviews and inventories Brahmaputra Basin characteristics. It was also prepared as an interactive Excel-based framework, which allows users to click and select nodes along the basin network and identify unique data. A Brahmaputra River Basin Issues, Models and Needs Assessment (April 2017) supports the basin analysis process by identifying potential analytical approaches, shortlisting appropriate models, and identifying data needs and availability. A Stakeholder Consultation Report (April 2017) documents one-on-one consultations held with a wide range of agencies and other groups to identify and document key development issues.

FY18 Plan: The Investment Plan was being finalized at the end of FY17. A final report on the Investment Plan will be completed and disseminated at a workshop toward the end of 2017. For the basin analysis, the final report is being finalized, and a follow-up activity is being considered to respond to high demand from the government for further developing national planning capacity.

Pillar 2 – Reducing Vulnerability to Floods and Erosion

HYDRO-MET MODERNIZATION IN THE BRAHMAPUTRA BASIN

Scope: This activity aims to undertake technical analysis and provide recommendations for modernization of hydro-met systems in Brahmaputra Basin countries. This will be done through an assessment of hydro-met-related needs and priorities, assessment of their existing meteorological and hydrological observation networks and forecasting systems, and flood/disaster related early warning systems. The overall aim of the task is to strengthen national capacity for monitoring and forecasting that can lay the groundwork for long term regional cooperation on water and climate.

Timeframe: December 2014 – September 2017. **Geography:** Brahmaputra Basin: Bhutan and Bangladesh. **Budget Allocation:** \$0.25M

FY17 Progress: A detailed analysis of existing hydro-met monitoring networks, forecasting and early warning systems for Bhutan was completed (May 2017). A report summarizing the findings of Modernizing Weather, Water and Climate Services: A Road Map for Bhutan, largely prepared in FY16, was published and disseminated (July 2016). The report was prepared through extensive consultations with the Royal Government of Bhutan. An assessment of capacity needs for agro-met services delivery in Bhutan in FY17 contributed to the preparation of the Hydro-met Services and Disaster Resilience Regional Project in Bhutan, which was approved in September 2016. The activity also provided technical inputs that informed the design of the Bangladesh Weather and Climate Services Regional Project, which is effective as of May 2017. This includes a detailed economic analysis to provide a more accurate economic assessment of the costs and benefits of investments in Bangladesh, which is near completion. Technical capacity support has enabled the National Center for Hydrology and Meteorology and BMD and BWDB to be better equipped to address technical issues as they arise during implementation.

FY18 Plan: An assessment of areas for regional collaboration on capacity enhancement on meteorological forecasting and services delivery will be conducted. Draft reports on agro-met services in Bhutan and economic analysis in Bangladesh will be published and disseminated. A conference on strengthening regional cooperation with respect to hydro-met and climate services is planned for FY18.

BHUTAN HYDRO-MET SERVICES AND DISASTER IMPROVEMENT (RE)

Scope: This RE activity builds on the Hydro-met Modernization in the Brahmaputra Basin activity to strengthen Bhutan's capacity for hydro-met services and disaster preparedness through (1) strengthening the capacity of Bhutan's Department of Hydro-met Services to improve hydro-met monitoring, forecasting and service delivery to priority sectors; (2) strengthening capacity for disaster preparedness and response (working through the Department of Disaster Management); and (3) funding the design of an agro-met decision support system, development and delivery of agro-met information products in two administrative and judicial districts, training and capacity building (working through the Department of Agriculture). This is a \$3.3M activity co-financed by the Global Facility for Disaster Risk Reduction and Recovery.

Executing Agency: Royal Government of Bhutan

Timeframe: October 2016 – June 2018. **Geography:** Brahmaputra Basin: Bhutan. **Budget Allocation:** \$0.50M

FY17 Progress: At the close of FY17 the bids for the main package under the enhancement of aviation meteorology component were under evaluation, and the awarding of the contract is scheduled for the end of July 2017. The activity supported the financing of the Bhutan Hydro-met Services and Disaster Resilience Regional Project, which was signed in September 2016. The project is expected to strengthen the capacity for flood forecasting and hydro-met services delivery to aviation, disaster risk management and agriculture sectors.

FY18 Plan: Installation of aviation-met equipment will be procured under the project. The activities to set up the common operating platform and carry out flood forecasting in selected basins will commence in FY18.

Pillar 3 – Basin-Level Dialogue

BRAHMAPUTRA BASIN DIALOGUE

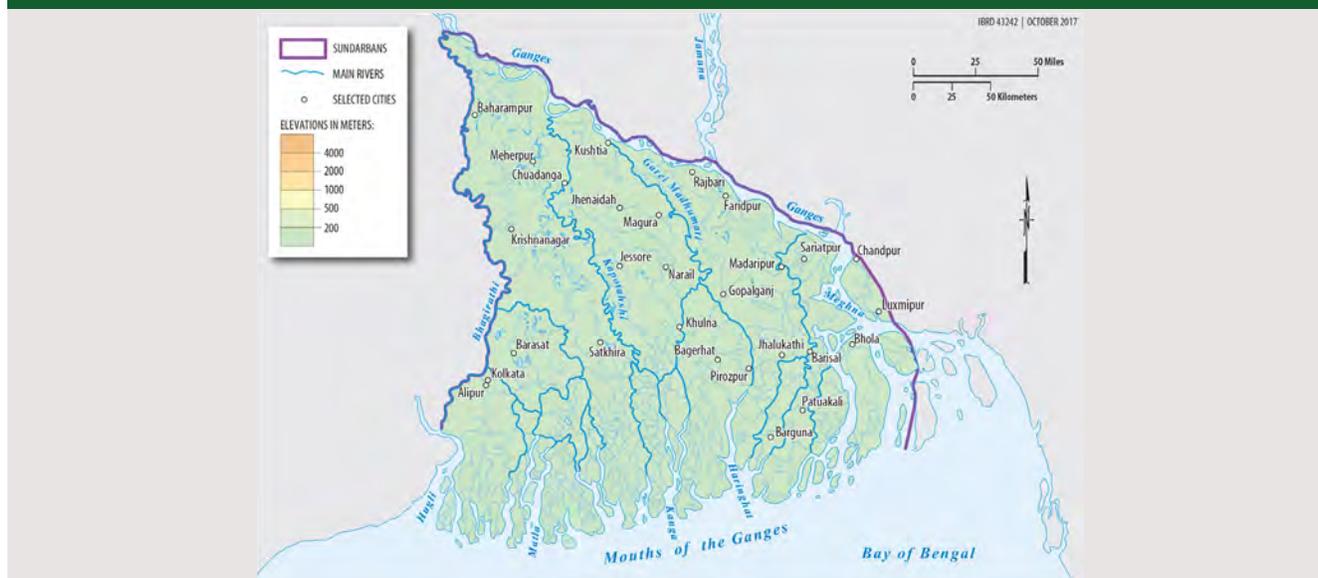
Scope: This activity is increasing regional cooperation by providing a platform to discuss shared water challenges and opportunities. It is enhancing trust and working relationships between basin riparian countries to progress consideration of river basin management of the Brahmaputra Basin, considering country-specific needs and priorities. The activity is supporting national and basin-level meetings as well as capacity building events, dialogue events, workshops, roundtables, and study tours to facilitate the exchange amongst stakeholders of ideas, viewpoints, knowledge and development plans for the Brahmaputra Basin. It is also serving as a platform for engaging stakeholders in the development of knowledge products developed under the Focus Area and for dissemination.

Timeframe: January 2015 – September 2018. **Geography:** Brahmaputra Basin: all riparians. **Budget Allocation:** \$0.70M

FY17 Progress: The SaciWATERS-led dialogue process, supported by SAWI since February 2016, held a series of national-level workshops (Bangladesh in June 2016, China in July 2016, India in August 2016, and Bhutan in September 2016) and one regional workshop—the first regional dialogue event—in Singapore in October 2016. These workshops have provided a neutral platform for various stakeholders (government officials, academia, think tanks and civil society) from all four riparian countries to engage, build a common understanding of the issues and challenges, and begin to identify potential opportunities for basin-wide collaboration. The regional event drew senior government participation from Bangladesh, including the Senior Secretary, Ministry of Water Resources, as well as delegates from Bhutan, China and India, signifying a commitment to continue the transboundary dialogue toward improved transboundary cooperation. This process has been supported by a review of existing transboundary protocols and accords and an exercise on institutional mapping. A second round of national-level workshops were held in Bhutan in March 2017 (40 participants) and Bangladesh in April 2017 (SAWI provided technical inputs). Eight informal one-on-one meetings, facilitated through SAWI financial support, were held in China in May 2017, which enhanced the partnership between SaciWATERS and Chinese academic institutions/think tanks. The meetings helped SaciWATERS expand its network beyond Yunnan University, and the dialogue now has on-board reputed government institutes such as the Shanghai Institute of International Studies, Beijing Institute of Contemporary International Relations and China Reform Forum.

FY18 Plan: A follow-up workshop in China is planned for August 2017, which will bring together Indian, Chinese and Bangladeshi academicians and will focus on identifying opportunities for cooperation on food, energy and water security. A Brahmaputra media dialogue, in collaboration with The Third Pole, in Bangkok in August 2017, will target local journalists from all four Brahmaputra riparian countries and aim to inform the public narrative around the river and reinforce the need for sustainable water resources management in the basin. This media dialogue is expected to inform the media engagement strategy going forward. A high-level regional symposium on the Brahmaputra, to be organized in partnership with SaciWATERS, IIT-Guwahati and TERI University, is scheduled for September 2017 in New Delhi. It aims to bring together policymakers, academicians, NGOs and other stakeholders involved in the basin to share experience and knowledge of the system with an eye toward strengthening the shared understanding of opportunities and risks and the potential for future cooperation. Recommendations from the symposium will inform the design of the next phase of dialogue activities.

SUNDARBANS LANDSCAPE FOCUS AREA



OBJECTIVE

To operationalize joint management of the Sundarbans for sustainable development that delivers mutual benefits for the two countries.

FOCUS AREA THEORY OF CHANGE

The challenges of the Sundarbans (extreme poverty, frequent natural disasters and erosion of ecosystem services) would be better managed if Bangladesh and India developed and implemented a joint conservation and development policy, and increased collaboration on plans and programs. To date the formal dialogue and collaboration between the two countries has been inadequate. While non-binding bilateral agreements were signed in late 2011 outlining a framework for collaboration on international waters, information sharing, disaster management and climate change, these are yet to be implemented. The Sundarbans Focus Area directly supports implementation of these agreements and country actions based on a landscape perspective.

Focus Area support includes developing a stronger analytical basis to help governments move toward integrated planning and management. Bilateral dialogue, research and information exchange will support the analytical work and will build technical capacity, thus enhancing cooperation. A landscape-level planning and management framework and supporting institutions are required for collaborative management. Technical analyses will be complemented by (1) advocacy work to generate public support for cooperation; (2) establishment of governance arrangements for joint planning; and (3) substantive joint actions (e.g. shared plans and policies) for conservation and sustainable development.

Given broad agreement for collaboration exists, activities under the Focus Area are demand-driven. Initial activities were informed by stakeholder consultation. Establishing a more formal mechanism for collaboration will guide future activity choices, and multi-stakeholder dialogue will guide all joint studies and joint planning work.

Pillar 1 – Enhancing Bilateral Cooperation

LANDSCAPE-SCALE JOINT ENVIRONMENTAL PLAN

Scope: This activity aims to help Bangladesh and India establish appropriate information (collection, collation and dissemination) systems to support preparation and implementation of plans for the development and conservation of the Sundarbans.

Timeframe: April 2016 – June 2018. **Geography:** Sundarbans; Bangladesh, India. **Budget Allocation:** \$0.30M

FY17 Progress: Stakeholder guidance was sought on the list of studies to be conducted under the activity. Based on feedback, especially from the BISRCI, it was decided that rather than the studies originally intended, greater purpose would be served if the list is modified to focus on large landscape-level joint initiatives: (1) an assessment of the state of nutrition of mothers and children and stunting in children and the causal linkage to diet of expectant mothers to be able to propose a program for improving the nutrition among women and children in the Sundarbans Landscape; (2) background studies and stakeholder consultation to propose a joint Bangladesh-India initiative for Development of Sustainable Tourism with Reflection of Conserving Nature for the Sundarbans Landscape; (3) background studies and stakeholder consultation to propose a joint Bangladesh-India initiative for promoting sustainable transboundary inland navigation in the Sundarbans Landscape; and (4) background studies and stakeholder consultation to propose a joint Bangladesh-India initiative for preparing an inventory of flora and fauna and comprehensive biodiversity mapping and evaluation study for the Sundarbans Landscape. These studies investigate the possibilities of sustainable economic growth through major joint Bangladesh-India cooperation.

All four studies have advanced and draft reports were under review at the end of the FY. A joint landscape narrative describing the defining characteristics of the Sundarbans Landscape across the national boundary is also advancing well. It has informed the four draft studies. Several small technical meetings and roundtables among stakeholders, academics and experts were organized to prepare these draft outputs. A study is being conducted to support the preparation of a plan to nurture and enhance the fisheries and aquaculture resources to the benefit of poor communities living in the Sundarbans.

FY18 Plan: The final dissemination workshop for the report on status and health of fisheries resources in the Sundarbans, including the near-shore fisheries as well as the estuarine aquaculture is (tentatively) planned for March 2018. The four studies will be disseminated, including the joint landscape narrative, at the various events organized under the SAWI Sundarbans Dialogue activity.

SUNDARBANS DIALOGUE

Scope: This activity aims to build trust and working relationships between India and Bangladesh to further sustainable management of the Sundarbans based on country-specific needs and landscape-level priorities. The dialogue process (through identification and implementation of specific cooperative activities) aims to create Sundarbans management ownership among government and non-government agencies and to facilitate the operationalization of the MoU on Sundarbans Cooperation signed between the two countries in 2011. WWF, IWA and the Observer Research Foundation are key partners in delivering this activity.

Timeframe: April 2015 – September 2018. **Geography:** Sundarbans; Bangladesh, India. **Budget Allocation:** \$1.00M

FY17 Progress: BISRCI (which follows the IUCN Ecosystems for Life project) found significant traction at the highest policymaking levels in both Bangladesh and India. This is evidenced by support from BISRCI to both the Bangladesh and Indian delegations during the Bangladesh-India Joint Working Group on Conservation of the Sundarbans meeting in July 2016 to design and plan joint and cooperative activities on Sundarbans as envisaged under the 2011 MoU, as well as the SAWI-supported joint Government of India-Government of West Bengal meeting on cooperation on Sundarbans in January 2017. BISRCI provided inputs to the agenda for discussion on the Sundarbans between the Prime Ministers of Bangladesh and India, which took place in April 2017. The activity established and sustained local dialogues (between the community/local government and the state/federal levels of government), as this was seen to be critical to strengthening the final Bangladesh-India dialogue and collaboration. A documentary film, Nature's Own People, was developed by the BISRCI (finalized June 2017).

FY18 Plan: Several meetings are proposed, including preparatory meetings in July and August 2017 in support of the BISRCI. The BISRCI film on the Sundarbans will be launched in fall 2017 in Delhi, Kolkata and Dhaka. A workshop to discuss BISRCI recommendations for augmented inland waterway transport will also be held in fall 2017. A media workshop will be conducted in December 2017. Several small roundtables and one-on-one meetings to build support for the final organizational design of the Joint Platform will be held between July 2017 and January 2018.

Pillar 2 – Technical Cooperation to Support Joint Management

LANDSCAPE HYDRO-MET DESIGN

Scope: This activity supports the design of a hydro-met system for the Sundarbans that would include climate stations, tide gauges, wave rider buoys and water quality monitoring. It will develop a strategy for establishing and operating hydro-met and local weather forecasting systems, and analyze bathymetry, salinity intrusion and conservation needs of the freshwater resources.

Timeframe: July 2015 – August 2018. **Geography:** Sundarbans; Bangladesh, India. **Budget Allocation:** \$0.40M

FY17 Progress: Substantial effort was spent on reviewing the quality of data available from the Indian part of the Sundarbans and comparing the data with the quality and extent of data from the Bangladesh side. A notable achievement was tracing back the Dampier-Hodges Survey (conducted around 1876), which required sifting through archives. This will help delineate the natural boundary of the landscape and correct several 'myths'. It was presented to technical experts in both countries. Draft reports on geomorphological setting and hydro-met setting and a background report and proposal for joint hydro-met services for the entire landscape were prepared (May 2017). A water quality analysis and salinity intrusion analysis were prepared to support the technical papers prepared under the Targeted Environmental Studies activity (below). Small technical meetings and roundtables were organized to prepare these outputs.

FY18 Plan: An outline plan for establishing a harmonious hydro-met plan for the entire Sundarbans Landscape will be developed and handed over to the respective government agencies in both countries. Once consistency is established among the draft reports prepared in FY17, the reports will be used to support the Sundarbans Dialogue on joint work and cooperation.

TARGETED ENVIRONMENTAL STUDIES

Scope: This activity is undertaking hydrological, ecological and econometric studies for vulnerability assessment of the Sundarbans ecosystem in a changing climate. This activity will enhance awareness about climate change risks, promote technical cooperation, build the knowledge base to support joint management, and facilitate planning a holistic approach to the sustainable management of this extremely fragile mangrove forest.

Timeframe: April 2015 – June 2018. **Geography:** Sundarbans; Bangladesh, India. **Budget Allocation:** \$0.80M

FY17 Progress: An analytical study, The Impact of Climate Change and Aquatic Salinization on Mangrove Species in the Bangladesh Sundarbans, was completed and published in the scientific journal *Ambio* (May 2017). The completed analysis, The Impact of Aquatic Salinization on Fish Habitats and Poor Communities in a Changing Climate: Evidence from Southwest Coastal Bangladesh, will be published in the scientific journal *Ecological Economics*. The analysis on change in the Sundarbans coastline over the past 100 years was near completion at the end of the FY. An analysis was conducted on identification of optimal width and density of mangrove plantation for protecting the Sundarbans Impact Zone from likely intensification of cyclonic storm surges in a changing climate. Studies were ongoing on estimation of impacts of climate change induced natural degradation on displacement of poor people.

A technical workshop was held in Kolkata in February 2017 for understanding the physical and economic effects of climate change on the Sundarbans. Supported by SAWI, the workshop was held as part of the World Bank's work to assess the implications of climate change in the Sundarbans through a number of multidisciplinary studies in collaboration with several research organizations in Bangladesh and India. Representatives from the Department of Fisheries and Department of Forestry in West Bengal and Bangladesh, along with 400 researchers from the two countries, participated in the workshop. A training session for 37 participants, by invitation only, on modeling of cyclone induced storm surges and river water salinity in a changing climate followed the event. Participants had the opportunity to review the MIKE 21 hydrodynamic model set up, including the Bay of Bengal model set up of cyclonic storm surge with and without climate change, input data processing, boundary generation and model simulation. The training provided a learning opportunity on how to process input data and climate change parameters for the rainfall runoff NAM model, the MIKE 11 and MIKE 21 hydrological models for simulation of location specific river salinity as well as the analysis of model results.

FY18 Plan: The reports will be finalized and disseminated, including as a consolidated report/book. A technical knowledge exchange workshop, similar to the February 2017 Kolkata workshop for understanding the physical and economic effects of climate change on the Sundarbans, is tentatively planned for January 2018 in Dhaka.

DELTA MANAGEMENT INVESTMENT PLANNING

This activity is co-financed under the Brahmaputra Basin Focus Area and progress is described under that Focus Area (above). **Timeframe:** October 2015 – September 2017. **Geography:** Sundarbans Landscape; Bangladesh. **Budget Allocation:** \$0.20M

REGIONAL CROSS-CUTTING FOCUS AREA

OBJECTIVE

To build knowledge and capacity across the region in support of transboundary basin dialogue and cooperation.

FOCUS AREA THEORY OF CHANGE

The Regional Cross-Cutting Focus Area will improve the regional water resources knowledge base, undertake capacity building for shared water resources management and cooperation, and support broad-based regional dialogue to enhance cooperation and management of transboundary waters in South Asia.

Pillar 1 – Knowledge Related Activities

CLIMATE CHANGE RISKS IN WATER RESOURCES MANAGEMENT

Scope: This activity is compiling and reviewing the knowledge base and tools that could assist governments in South Asia to adapt to emerging climate change challenges in the water sector. It will identify knowledge gaps for potential program support.

Timeframe: November 2015 – July 2017. **Geography:** Regional. **Budget Allocation:** \$0.53M

FY17 Progress: A comprehensive study, Climate Risks and Opportunities: Adaptation Frameworks for Water Resources Planning, Development and Management in South Asia, was completed (June 2017). Jointly implemented by SAWI and IWMI, it drew from three background papers commissioned by SAWI: (1) Review of Climate Change Science, Knowledge and Impacts on Water Resources in South Asia; (2) Water and Climate Change Policy Review; and (3) Review of Water and Climate Adaptation Financing and Institutional Frameworks (December 2016). The reports unpack and address the nature of policy, planning, and operational challenges as regional governments and social systems attempt to adapt, mitigate, and manage these challenges and ensure that sustainable water management remains a central pillar in economic development and social stability. The comprehensive study reflects discussions held during a regional meeting convened in July 2016 in Colombo, Sri Lanka, that brought eight countries together to discuss climate-related water management for adaptation. More than 65 water resource and climate change experts, scientists and policymakers from Afghanistan, Bangladesh, Bhutan, China, India, Nepal, Pakistan and Sri Lanka attended the regional event. The event was organized in partnership with IWMI and with support from the Government of Sri Lanka. Discussions centered around the adaptation frameworks and strategies necessary to respond to the dangers of climate change. Building on the Paris CoP21 agreement, the conference called for ensuring that water management is a key part of the adaptation agenda, and aimed to address the capacity challenge to manage resources more effectively. The conference recommended an adaptation framework for water resources planning, development and management that centers around five key dimensions: improving water resources and climate data and information; strengthening water resources governance instruments (policies, laws, institutions); building climate resilient infrastructure; promoting systematic planning and management of surface and groundwater; developing targeted communication and education about water-related climate; change risks and solutions, and enhancing participation of communities at all levels of decision making.

FY18 Plan: The main report drawing on the three background papers will be disseminated in FY18.

HIMALAYAN UNIVERSITY CONSORTIUM GRANT (RE)

Scope: This activity will enhance the partnership of research institutions participating in the Himalayan University Consortium (HUC) and strengthen their joint capacity for collaborative research. It will establish the HUC as a vibrant and active South-South forum of knowledge generation and sharing, mountain curricula development, and capacity building among regional members, who will be able to leverage HUC participation and resultant benefits to provide water and mountain-related policy and technical advice to their respective governments.

Executing Agency: ICIMOD

Timeframe: January 2017 – June 2018. **Geography:** Regional; Hindu Kush Himalaya. **Budget Allocation:** \$1.02M

FY17 Progress: The RE grant became effective in January 2017. ICIMOD undertook activity preparation work, including formulating a grant selection committee. Calls for the institutional and individual grants were drafted, finalized and circulated in April and May 2017. Grant applications were reviewed; four researchers and faculty members from institutions in Bangladesh, Bhutan, Nepal and Pakistan received Conference Grants to participate in international conferences in FY18. The contracts for eight Seed Grants and one Seeding Grant were scheduled for signature in July 2017. To enhance the partnership of research institutions in the Hindu Kush Himalaya Region, the HUC Secretariat visited existing and potential HUC members in April and May 2017. Twenty-two full time faculty members and PhD scholars were admitted to a ten-day field school, titled HUC Academy on Disaster Risks and Water Management, to take place in July 2017. Development of the HUC online portal also commenced.

FY18 Plan: Study tours will be conducted between institutions to broaden the HUC network and intensify interactions. Informal consultations will be held with IT and librarian teams of current and future member institutions to discuss information-sharing interests. Staff within the HUC Secretariat will be trained in program management. A visit by representatives from the Asian International River Center, Yunnan University, China, and Tribuvan University, Nepal to the Center of River Studies, Aryabhata Knowledge University, Patna, India, is planned for curriculum building purposes. An International Conference on Mountain Water and Livelihood, in conjunction with the HUC Annual Meeting, is scheduled to take place in Chengdu, China. A soft launch of the HUC website will be done in October 2017.

HEP ENVIRONMENTAL AND SOCIAL PLANNING

Scope: This activity aims to support the development of sustainability guidelines for hydropower development in Bhutan. The new guidelines are urgently needed to support the sustainable development of the planned vast expansion of hydropower in Bhutan in the next decade, which will see development in all major rivers of Bhutan (which are all transboundary).

Timeframe: October 2016 – December 2017. **Geography:** Regional: Bhutan focus. **Budget Allocation:** \$0.30M

FY17 Progress: Guidelines for the Preparation and Construction of Hydropower, which cover environmental, social and technical aspects of hydropower development, were developed in close collaboration with the key hydropower institutions—the Department of Hydropower and Power Systems, Druk Green Power Corporation and Bhutan Power Corporation. A broad range of 50 stakeholders extensively consulted upon the guidelines during a three-day workshop in March 2017. Based on feedback the drafts were being improved and tested through a field application for one major hydropower project in Bhutan.

The activity supported three staff from key hydropower institutions in Bhutan to participate in the World Hydropower Congress in Addis Ababa, Ethiopia in May 2017, where the first draft of the guidelines was introduced. Extensive work was conducted during March and April 2017 to identify data holders, conduct inventories of aquatic biodiversity data, and to draft a report on the status of aquatic biodiversity in Bhutan. A similar exercise to support a national repository on cultural heritage with the Ministry of Home and Cultural Affairs was also fully supported by SAWI. The use of the national databases will be mandated by the new national hydropower guidelines, which also will give directives on how new data compiled for hydropower projects should be used to populate the national data repositories to gradually improve them.

FY18 Plan: A workshop on the repository for aquatic biodiversity data is planned for early FY18. The draft hydropower guidelines will be tested on the Dorjilung hydropower project—which is one of the potential pipeline projects for future hydropower development in Bhutan—in July 2017. This test aims to give feedback on the draft guidelines to ensure the final version will be applicable and customized for Bhutan, and to give on-the-job-training in the use of the new guidelines. The guidelines will be finalized in September 2017 and are intended to be incorporated by the Government into the new hydropower policy.

HEP RESILIENCE STUDIES

Scope: Building on the successful Climate Change Impacts in HEP activity that concluded in FY16, this activity will undertake a small number of South Asian case studies of new global guidelines that are being developed for building climate resilience into hydropower design. The work will link closely to the ongoing SAWI technical assistance in support of hydropower basin planning and the environmental and social sustainability work for hydropower in Bhutan. This activity is part of a larger global World Bank effort on resilience in hydropower.

Timeframe: November 2016 – October 2017. **Geography:** Regional. **Budget Allocation:** \$0.2M

FY17 Progress: Mott MacDonald was hired to develop technical guidelines to improve climate resilience for the hydropower and dams development community (final stage draft, June 2017). The guidelines are meant to be a practical set of methods and insights that enable projects to be resilient to future climate change risks as they proceed to completion. A renowned consultant was contracted to make sure that resilience to natural disasters, such as GLOFs and earthquakes specific to the Himalayas, were covered in the guidelines. The International Hydropower Association (IHA) in London was contracted to carry out the sediment components of the activity.

Workshops on climate resilience and sediment management were organized in cooperation with the IHA in May 2017 at the World Congress on Hydropower. A two-day introductory course, Addressing Uncertainties in Water and Hydropower Projects: the Decision Tree Framework, was delivered in Kathmandu in September 2016 for 15 representatives of national development research and modeling institutions in Nepal. Led by a co-author of the “Decision Tree” framework developed with SAWI funding in FY16, the training walked participants through the four phases of the framework, and the data, models and level of effort needed and main questions that can be answered during each phase. The aim was for participants to be able to determine and define a project’s vulnerabilities and the likelihood of their occurrence, and how to hedge against climate/natural hazard risks.

FY18 Plan: The technical guidelines will be finalized by September/October 2017. A workshop, supported by ICOLD and SAWI on climate resilience issues will be held during the 2017 ICOLD annual meeting in Prague. A workshop will be supported on shaping the future of hydropower at HYDRO in Seville, Spain in October 2017.

Pillar 2 – Capacity Building Activities

CAPACITY BUILDING—WATER QUALITY MONITORING AND ANALYSIS

Scope: This activity is building capacity in the use of modern technologies for water quality monitoring and in techniques for water quality data analysis across South Asia. It is providing technical assistance to government agencies for design and implementation of real-time water quality monitoring networks, and supporting study tours for government officials to facilitate regional knowledge sharing on the real-world application of modern technologies and tools for real-time water quality monitoring, analysis and dissemination of information.

Timeframe: February 2015 – September 2017. **Geography:** Regional; India focus. **Budget Allocation:** \$0.31M

FY17 Progress: SAWI provided technical advice to the Central Pollution Control Board (India) to implement a network of real-time water quality monitoring sensors to increase the use of modern technologies. Further analysis of real-time water quality data was conducted and a scorecard approach to data use is being introduced to the National Mission Clean Ganga on the use of real-time data. Three reports, Crowdsourcing Water Quality Data: A Conceptual Framework (November 2016), Existing and Emerging Technologies for Continuous Water Quality Measurement (December 2016) and Analysis of Water Quality Data from Real Time Water Quality Monitoring Stations on River Ganga (April 2017), were completed. Dissemination activities for products financed by the activity are in process. A presentation, “Monitoring Systems to Manage Water Quality of River Ganga” was made at the World Bank Expo of Water Resource Management Technologies and Tools in Almaty, Kazakhstan in September 2016.

FY18 Plan: Training for the National Mission Clean Ganga on the use of a scorecard approach to analyze and communicate water quality data will be conducted.

CAPACITY BUILDING—TRANSBOUNDARY WATER GOVERNANCE

Scope: This activity is enhancing the capacity for transboundary waters governance and hydro-diplomacy of current and future water leaders in South Asia. To date, this grant has been used to support the implementation of a two-year capacity strengthening program requested and approved by the Bangladesh Ministry of Water Resources for training of officials of the Joint Rivers Commission, Bangladesh, and the Bangladesh Ministry of Water Resources and Ministry of Foreign Affairs in transboundary waters governance. Capacity strengthening program participants have received training in both basic and advanced water resources management (e.g. fundamentals of hydrology and IWRM, river basin modeling, flood risk management, hydropower management, groundwater management and conjunctive use) and topics related to transboundary water governance (e.g. international law and institutional frameworks, benefit sharing, and hydro-diplomacy). Government officials from the other SAWI countries have also received support to participate in these external training events.

Timeframe: December 2014 – August 2017. **Geography:** Regional: Bangladesh focus. **Budget Allocation:** \$0.37M

FY17 Progress: Eight government officials (seven from Government of Bangladesh, one from Government of Afghanistan) were trained across three external training events: two officials at the 2016 Annual International Law and Transboundary Freshwater Training Workshop in Dundee, Scotland (July 2016); one participant at the 2016 Short Course on Watershed and River Basin Management, at UNESCO-IHE in Delft, the Netherlands (July 2016); and five officials at the 2017 Water Diplomacy Workshop in Boston, USA (June 2017). SAWI receives detailed testimonials from nearly all program participants, which highlight the fruitfulness of the program to build professional and institutional capacity within the three government agencies. Participants noted that they would be able to use the knowledge attained to educate others within their respective government departments.

FY18 Plan: The capacity strengthening program will close in early FY18. One official from the Government of Bangladesh will attend the July 2017 Short Course on Watershed and River Basin Management, at UNESCO-IHE in Delft, the Netherlands.

CAPACITY BUILDING—WATER GOVERNANCE (RE)

Scope: This RE activity will support the design of short training modules and curriculum in water diplomacy and basin governance for uptake by participating universities and other institutions for long-term teaching of the topics. The training modules will aim to build capacity at the policy and technical levels, with a focus on transboundary water governance and hydro-diplomacy at the basin and sub-basin levels for policymakers, water agency technical staff, and students. With a goal to institutionalize and ensure sustainability of teaching on these subjects, the modules will support current and future decision makers to identify and consider transboundary and cooperative water governance as a policy option, and to negotiate and handle sensitive inter and intra-state water resources issues in bilateral and multilateral contexts.

Executing Agency: IUCN

Timeframe: January 2016 – January 2018. **Geography:** Regional. **Budget Allocation:** \$0.42M

FY17 Progress: The grant agreement was signed with IUCN in January 2017. The first Project Advisory Group meeting and inception workshop was planned for the end of the FY. The hiring of a program officer was in progress at the end of the FY.

FY18 Plan: The short training modules and curriculum will be designed.

CAPACITY BUILDING—IWRM IN TRANSBOUNDARY RIVER BASINS

Scope: This activity supports activities relating to building capacity of water engineers, basin managers and policy/decision makers on holistic river basin approaches for effective water resources planning and management across the South Asia region. Capacity building activities include international study-cum exposure visits; customized training programs; and international workshops for sharing best practices.

Timeframe: October 2015 – September 2017. **Geography:** Regional, India focus. **Budget Allocation:** \$0.20M

FY17 Progress: SAWI conducted two basic trainings on river basin operation software for 62 participants (January 2017) and one advanced training for 26 participants (May 2017) who had set up Riverware software for water resources planning and management. The activity also trained 24 water resources engineers from Ganges and Brahmaputra riparian States on real-time reservoir operation. The trainings were organized in Delhi, Ahmedabad and Jaipur. All training material and presentations are available at www.indiaiwr.org. The trainings have directly contributed to preparation of river basin planning systems for five sub-basins. The river model was introduced for the first time in India.

FY18 Plan: All training material and a technical note to be used for upscaling under NHP will be finalized.

CAPACITY BUILDING FOR GROUNDWATER MANAGEMENT

Scope: This activity is supporting improved groundwater management across South Asia by informing the design of the World Bank-financed NGMIP, and by supporting India's ongoing dialogue with Pakistan and Bangladesh to reduce reliance on groundwater and to better utilize the resource as a buffer against droughts.

Timeframe: February 2016 – June 2018. **Geography:** Regional; India focus. **Budget Allocation:** \$0.70M

FY17 Progress: The activity continued to inform the design of World Bank technical assistance related to policy and institutional reforms and investment operations in groundwater management, including the major NGMIP that is currently under preparation in India. The activity supported a number of India-specific studies that can potentially be replicated throughout the South Asia Region, including on standards and protocols for groundwater quality assessment and an assessment of groundwater quality in Rajasthan (September 2016), and an economic assessment (August 2016) and technical and environmental and social assessments (March 2017) of India's NGMIP. As part of the preparation for these assessments, multiple consultations and capacity building on improved environmental and social management were conducted. A report on use of remote sensing in monitoring groundwater use was prepared (January 2017). SAWI supported a seminar on managing groundwater resources for sustainable growth at the Stockholm Water Week in August 2016. The seminar focused on several regional issues such as the governance frameworks for groundwater management in South Asia; emerging policy research areas for transboundary and cross-sectorial groundwater collaboration; and the implications of groundwater depletion on economic growth in South Asia.

FY18 Plan: A regional diagnostic study of groundwater governance reforms and groundwater management for developing actions that can guide strengthening drought resilience in South Asia will commence in FY18. Carried out by IWMI, it will include a series of case studies and stakeholder consultation to focus on situations where agriculture is a major user of groundwater but will also include domestic water supply, including in the urban context, and in the context of sectoral prioritization of groundwater access as a component of drought management.

IMPROVING WATERSHED MANAGEMENT

Scope: This activity is strengthening coordination between the Neeranchal National Watershed Project (India) and other programs addressing basin-level water resources, watershed management and climate resilience in the region.

Timeframe: October 2014 – June 2017. **Geography:** Regional; India focus. **Budget Allocation:** \$0.13M

FY17 Progress: SAWI provided significant support to the early implementation of the Neeranchal Project, both with the national partner and the nine partner States, through workshops and on-the-job training (September to December 2016), resulting in on-time approval of the 10 separate procurement plans. SAWI supported the national partner in preparation of ToRs and certain bidding documents for proposed consultancies and partnerships on agricultural performance, watershed technologies and forward linkages (September to December 2016). A State Project Implementation Plan was drafted with SAWI support, which will provide operational details of activities to be specifically taken up by the States, including requirements for human resources, expertise, financial allocations and procurement methods. Continued coordination and facilitation support was provided to the Department of Land Resources, which is the national implementing agency for Neeranchal (October–November 2016 and April–May 2017). Initial support was provided to the Assam Flood Project for watershed-related aspects. With a more regional focus, the activity supported the client to effectively organize and document a knowledge sharing event on Integrated Planning for Improved Agricultural and Natural Resource Outcomes (November 2016) for the national Pradhan Mantri Krishi Sinchai Yojana (PMKSY) scheme, which was attended by representatives from 22 Indian States, including Neeranchal Partner States. A knowledge sharing cum exposure visit to the Karnataka Watershed Development Project II (Bangalore) (December 2016) was organized for representatives from the nine partner States. Representatives had the opportunity to undertake field visits to see the impacts of the Sujala I Project and engage with stakeholders and beneficiaries. Presentations and meetings were also organized with the various partners engaged in the Land Resources Inventory initiative taken up under the Karnataka Watershed Development Project II.

FY18 Plan: Completed.

Pillar 3 – Regional Flood Forecasting

IMPROVING FLOOD FORECASTING IN SOUTH ASIA

Scope: This activity is contributing to flood forecasting across the greater Ganges–Brahmaputra Basin. It encompasses a detailed flood risk mapping of the Ganges Basin, development and testing of an innovative new flood forecasting modeling system and regional workshops to disseminate knowledge and to build momentum for cooperative action.

Timeframe: December 2014 – September 2016. **Geography:** Ganges and Brahmaputra Basins. **Budget Allocation:** \$0.50M

FY17 Progress: UNESCAP and RIMES jointly organized the Regional Training for Flood Forecasting in Transboundary River Basins in October 2016 in Bangkok. This workshop brought together senior and mid-level professionals with operational responsibilities from national hydro-meteorological departments and disaster management authorities from Bangladesh, Bhutan, India, Pakistan and Nepal. Participants shared their operational mechanisms of flood forecasting and early warning systems and discussed the requirements for a transboundary flood forecasting system. This workshop was seen as the next step to achieve the resolution taken by the countries during the Regional Flood Early Warning System Workshop in FY16 to establish a Panel on Transboundary Flood Management for the South Asian Region, with RIMES serving as technical secretariat.

Analytical and mapping work on historical flood data was undertaken to estimate economic losses in the Ganges Basin. A FRA Atlas has been developed, and was endorsed by the Government of India's CWC and uploaded on their official website. The Atlas is capable of providing both inter-state as well transboundary assessment, which makes it useful for wider dissemination and knowledge sharing. SAWI developed a Flood Predictability Assessment for the Ganges and the Brahmaputra Basins. By providing operational real-time estimates, the tool aims to improve accuracy in the predictability of flood forecasting for rainfall and river flows, and enable comparison to be made across the basin. This can be used to help evacuation planning and mitigation of household economic losses. The tool uses different modeling techniques, makes innovative use of satellite transboundary data that is not reliant on information sharing between riparian countries or on-the-ground measurements, and provides the results in a way that can be easily understood.

FY18 Plan: Completed.

Pillar 4 – Dialogue Processes

REGIONAL DIALOGUE

Scope: This ongoing activity supports diverse opportunities to engage a broad set of stakeholders, including new and past dialogue participants. This grant has been used to convene multi-stakeholder dialogue processes at the regional level in South Asia in order to build trust and confidence among riparian countries and create an enabling environment for sustainable management of transboundary water resources. The approach has been to build on technocratic networks established at the country level and leverage the relationship to engage decision and policy makers at the regional level. The dialogue processes are designed to open up government-dominated water management to participatory multi-stakeholder processes from the local to the river basin level. The activity supports a diverse suite of dialogue events and forums and reaches out to a wider and more diverse set of actors across South Asia.

Timeframe: December 2014 – June 2018. **Geography:** Regional. **Budget Allocation:** \$0.90M

FY17 Progress: Through its principal event sponsorship (under the World Bank), and event steering committee membership, the activity facilitated the convening of the International RiverSymposium in New Delhi in September 2016—the first time the event has been held outside Australia. The event brought together 450 delegates, including 249 delegates from India, of which 80 were officials from Indian state and central government water agencies (under the umbrella of the Government of India's sponsorship of the event in recognition of the event's capacity building value to the large technical team across the country engaged in the World Bank-funded NHP). The World Bank was highly visible at all RiverSymposium events and through a high profile display booth featuring several SAWI publications and SAWI-supported web tools, such as the FRA Atlas and the Indus GIS Mapping software. SAWI convened a special half-day session on the future management of the major Himalayan rivers, which was attended by more than 110 delegates. It culminated in a candid discussion on river basin planning, including on riparian cooperation by a panel of senior government water officials from Afghanistan, Bangladesh, Bhutan, India and Nepal. Pakistan officials were unable to obtain visas to attend. This panel event broke new ground, as multilateral discussions on water by government officials in South Asia remain highly sensitive. Following the session, SAWI organized a closed policy dialogue on regional water cooperation, which included senior government water official participation from the basin riparian countries attending the *RiverSymposium*.

FY18 Plan: SAWI is in discussion with the US State Department and other partners on the possibility of co-hosting a regional dialogue event in FY18. Thematic focus areas potentially include groundwater management, water quality and basin planning.

Annex III: Knowledge Products

This table lists knowledge products supported entirely or partially by SAWI resources in FY17.

Output	Format	Dissemination
Indus Focus Area		
<i>Managing Blue Gold in South & Central Asia: A Comparative Study of Islamic Law and International Water Law.</i> Prepared by Rezaee, May 2017	Journal Article	Public
GIS data-mapping tool, which is publicly available on the Indus Basin Knowledge Platform portal. Prepared by the IF-WG (accessible on IWMI website).	Online	Public
Ganges Focus Area		
<i>Kali Gandaki Hydropower Plant Rehabilitation Project: Catchment Management for Sediment Retention.</i> Prepared by Vogl, Wolny, Hartger, Chinnasamy, Sood, Narain, Jiang, Rajbhandari, Sangraula, and Lamichhane, February 2017	Report	Public
<i>Securing Irrigation in Rainfed Areas: Strategies and Experiences of the West Bengal Accelerated Development of Minor Irrigation Project.</i> Prepared by TTL, March 2017	Technical Note	Public
Brahmaputra Focus Area		
<i>Dialogue and Water Cooperation in the Brahmaputra River Basin.</i> Prepared by Barua, September 2016	Journal Article	Public
<i>Detailed Analysis of Existing Hydro-met Monitoring Networks, Forecasting and Early Warning Systems.</i> Prepared by Royal Government of Bhutan and the World Bank, July 2016	Report	Public
<i>Knowledge Inventory Report (Brahmaputra River Basin Assessment).</i> Prepared by RTI International, October 2016	Report	Public
<i>Brahmaputra River Basin Issues, Models, Needs Assessment.</i> Prepared by RTI International, March 2017	Report	Public
<i>Baseline of Brahmaputra Basin Water Resources for Development Planning within Key Economic Sectors.</i> Prepared by RTI International, March 2017	Report	Public
<i>Stakeholder Consultation Report.</i> Prepared by RTI International, April 2017	Report	Public
<i>Interactive Excel-Based File System</i> (allowing users to explore the basin and extract relevant data)	File System	Public
Sundarbans Focus Area		
<i>The Impact of Aquatic Salinization on Fish Habitats and Poor Communities in a Changing Climate: Evidence from Southwest Coastal Bangladesh.</i> Prepared by Dasgupta, Huq, Mustafa, Sobhan and Wheeler, June 2017	Journal Article	Public
<i>The Impact of Climate Change and Aquatic Salinization on Mangrove Species in the Bangladesh Sundarbans.</i> Prepared by Dasgupta, Sobhan and Wheeler, May 2017	Journal Article	Public
<i>Nature's Own People.</i> Prepared by BISRCI, June 2017	Documentary Film	Unreleased
Regional Cross-Cutting Focus Area		
<i>Crowdsourcing Water Quality Data: A Conceptual Framework.</i> Prepared by Borden and Borden, November 2016	Report	Public
<i>Analysis of Water Quality Data from Real Time Water Quality Monitoring Stations on the River Ganges.</i> Prepared by Modak, April 2017	Report	Public
<i>Analysis of Existing and Emerging Technologies for Water Quality Assessment.</i> Prepared by Innovative Hydrology Inc, December 2016	Report	Public

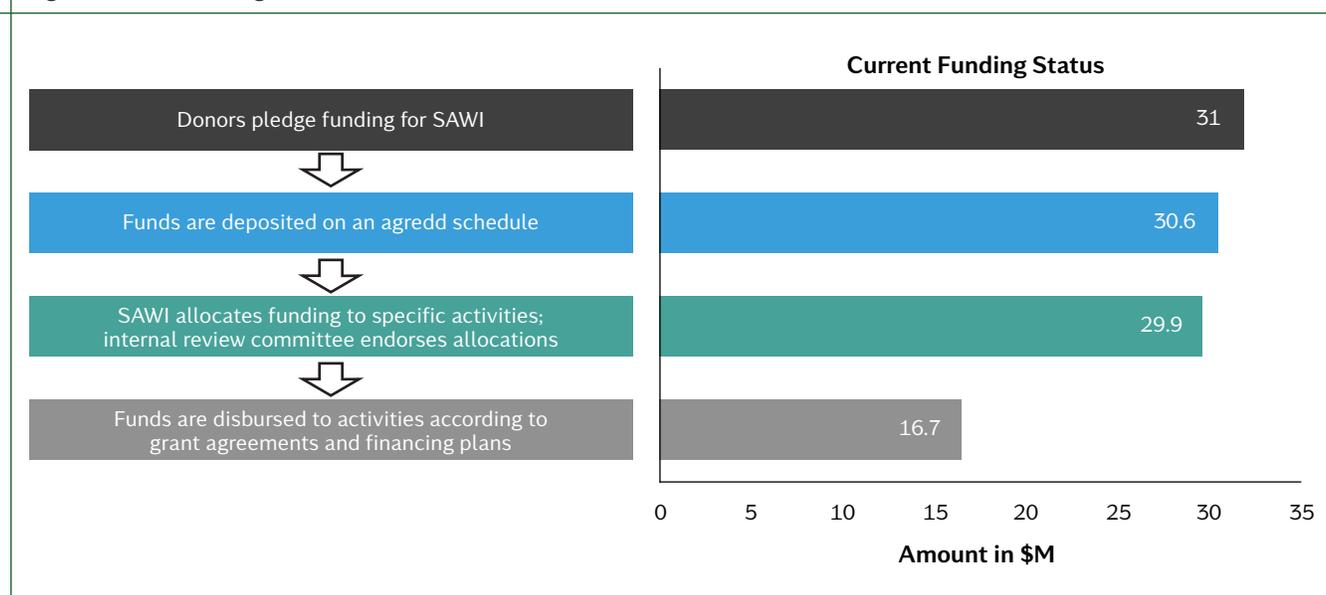
<i>Flood Risk Assessment and Forecasting for the Ganges-Brahmaputra-and Meghna River Basins.</i> Prepared by Priya, Young, Hopson and Avasthi, January 2017	Report	Public
<i>Climate Risks and Solutions: Adaptation Frameworks for Water Resources Planning, Development and Management in South Asia.</i> Prepared by Hirji, Nicol and Davis, June 2017. Based on three background papers: Background Paper 1: <i>Review of Climate Change Science, Knowledge and Impacts on Water Resources in South Asia.</i> Prepared by Lacombe, Chinnasamy and Nicol, December 2016 Background Paper 2: <i>Water and Climate Change Policy Review.</i> Prepared by Davis and Hirji, December 2016 Background Paper 3: <i>Review of Water and Climate Adaptation Financing and Institutional Frameworks.</i> Prepared by Suhardiman, de Silva, Arulingam, Rodrigo and Nicol, December 2016	Report	Public
<i>Economic Assessment of India's National Groundwater Management Improvement Program.</i> Prepared by Industrial Economics, Inc, August 2016	Report	Draft
<i>Technical Assessment of India's National Groundwater Management Improvement Program.</i> Prepared by the World Bank, March 2017	Report	Draft
<i>Use of Remote Sensing in Monitoring Groundwater Use for Irrigation and Validating the Arrest of Groundwater Decline in India.</i> Prepared by Ozdogan, January 2017	Report	Draft
<i>Hydropower Sector Climate Resilience Guidelines Final Report.</i> Prepared by Mott McDonald, June 2017	Report	Draft

Annex IV: Financials

The SAWI program is supported by a Multi-Donor Trust Fund (MDTF) administered by the World Bank on behalf of contributing development partners. This specific type of MDTF is known as a “Programmatic Trust Fund” to which donors commit funds designed to support a thematic framework rather than financing a specific project or activity. Within this framework, SAWI supports activities executed by recipient organizations as well as activities directly executed by the World Bank.

Consistent with standard World Bank Trust Fund practices, donors pledge funding for SAWI (current pledges total US\$30.7 million) and funds are deposited on an agreed schedule (current deposits total US\$30.6 million). Then, in accordance with SAWI’s strategic planning efforts, funding is allocated to specific activities (at the close of FY17, allocations were US\$29.9 million).²⁶ Allocations are approved by the SAWI Internal Review Committee. SAWI works with clients (for RE activities) and World Bank Task Team Leaders (for BE activities) to develop Grant Funding Requests (GFRs) and related activity documentation. The World Bank then follows technical, legal and fiduciary procedures to establish activities and commits funds through its standard processes. Funds are disbursed according to the grant agreements and financing plans (cumulative disbursements thus far are US\$16.7 million). SAWI’s funding process is depicted in Figure 1.

Figure 1: SAWI’s Funding Process



FINANCIAL SUMMARY (AT JUNE 30, 2017)

Focus Area	Allocations as of June 30, 2017	Actual Expenditure for FY17	Cumulative Expenditure since Inception	Contractual Commitments
Indus	\$ 2,325,293	\$ 453,550	\$ 2,124,407	\$ 68,410
Ganges	\$ 10,644,633	\$ 1,161,905	\$ 3,590,509	\$ 2,358,295
Brahmaputra	\$ 4,372,632	\$ 1,179,990	\$ 2,828,244	\$ 975,172
Sundarbans	\$ 3,027,448	\$ 840,060	\$ 2,050,599	\$ 459,315
Regional Cross-Cutting	\$ 7,382,463	\$ 1,788,262	\$ 4,897,813	\$ 467,825
Program	\$ 2,109,145	\$ 242,475	\$ 1,250,990	\$ 15,360
TOTAL	\$ 29,861,615	\$ 5,666,243	\$ 16,742,563	\$ 4,344,378

²⁶ Note that this is SAWI’s financial position as of June 30, 2017. In early FY18 adjustments to allocations were made following an in-depth review of the program. These adjustments are not reported here.

DISBURSEMENTS BY ONGOING ACTIVITIES (AT JUNE 30, 2017)

	Activity Name	Grant Amount US\$	Expenditure for FY17 US\$	Cumulative Expenditure Since Inception US\$
Program				
TF014265	SAWI II Program Administration and Management	2,109,145	242,476	1,250,991
TF017869	Strategic Communications	700,000	177,917	485,807
TF0A2363	Achieving Results	200,000	16,920	21,375
Total Program		3,009,145	437,313	1,758,173
Indus Basin Focus Area				
TF018455	Indus Dialogue	700,000	263,412	594,387
TF0A0640	Kabul/Kunar Basin Development	600,000	190,137	504,727
Total Indus Basin		1,300,000	453,549	1,099,114
Ganges Basin Focus Area				
TF018129	Sustainable Water Resources Development for HEP in Nepal (BE)	1,700,000	81,144	318,795
TF018488	Water Resources Management in Transboundary Basins; India	500,000	126,815	380,614
TF018509	Ganges Dialogue	401,309	15,318	150,379
TF018570	Sustainable Water Resources Development for HEP in Nepal (RE)	2,500,000	0	0
TF018717	Strategic Basin Planning	4,000,000	552,436	1,841,910
TF0A1269	Strengthening Flood Modelling Capacity in Bihar (RE)	475,000	215,140	215,140
TF0A1373	Bihar FMIS Flood Forecasting	500,000	76,753	115,348
Total Ganges Basin		10,076,309	1,067,606	3,022,186
Brahmaputra Basin Focus Area				
TF018637	Hydro-met Modernization in the Brahmaputra Basin	250,000	43,030	242,712
TF018849	Brahmaputra Dialogue	700,000	107,982	529,781
TF0A1154	Delta Management Investment Planning and Basin Analysis; Bangladesh	800,000	466,865	569,949
TF0A2312	Basin Modelling and Analysis	1,200,000	337,302	351,143
TF0A3513	Bhutan Hydro-met Services and Disaster Resilience Regional Project	500,000	212,027	212,027
Total Brahmaputra Basin		3,450,000	1,167,206	1,905,612

Sundarbans Landscape Focus Area				
TF0A0121	Targeted Environmental Studies	800,000	477,207	723,128
TF0A0122	Sundarbans Dialogue	1,000,000	229,431	637,857
TF0A0986	Landscape Hydro-met Design	400,000	46,094	120,852
TF0A1366	Delta Management Investment Planning (Sundarbans)	200,000	0	134,300
TF0A2516	Landscape-scale Joint Environmental Plan	300,000	87,329	107,015
Total Sundarbans Landscape		2,700,000	840,061	1,723,152
Regional Cross-Cutting Focus Area				
TF017869	Strategic Communications	700,000	177,917	485,807
TF018290	Improving Watershed Management; India	125,000	65,137	121,012
TF018766	Regional Dialogue	900,000	338,161	703,786
TF018768	Capacity Building - Transboundary Water Governance	370,000	65,608	347,465
TF019090	Capacity Building - WQ Monitoring and Analysis	310,000	64,752	268,624
TF0A1367	Capacity Building - IWRM in Transboundary River Basin; India	200,000	84,184	188,023
TF0A1491	Climate Change Risks in Water Resources Management	530,000	324,773	500,842
TF0A2044	Capacity Building for Groundwater Management	700,000	258,294	461,942
TF0A2363	Achieving Results	200,000	16,920	21,375
TF0A3877	Bhutan-HEP Environmental and Social Planning	300,000	157,210	157,210
TF0A3886	Capacity Building Water Governance (RE)	420,000	150,000	150,000
TF0A3996	South Asia HEP Resilience Studies	200,000	84,264	84,264
TF0A4131	Himalaya University Consortium Grant (RE)	1,020,000	0	0
Total Regional Cross-Cutting		5,975,000	1,787,220	3,490,350
Ongoing Activities Total		25,610,454	5,558,118	12,491,405

CLOSED ACTIVITIES (AT JUNE 30, 2017)

	Activity Name	Grant Amount US\$	Expenditure for FY17 US\$	Cumulative Expenditure Since Inception US\$
Indus Basin Focus Area				
TF014935	SAWI Indus FA Engagement	271,735	0	\$271,735
TF015737	Project Development: Glacier Monitoring in the Upper Indus Basin	101,825	0	\$101,825
TF016290	Learning Innovative Approaches to Glacier Monitoring to Address Climate Change	212,567	0	\$212,567
TF016430	Integrated Management of the Kunar River Basin	439,167	0	\$439,167
Total Indus Basin		\$1,025,293	0	1,025,293
Ganges Basin Focus Area				
TF015480	SAWI Ganges FA Engagement	348,611	0	\$348,611
TF0A0621	Managing Watersheds to Reduce Upstream Sediment for HEP: Nepal	219,713	94,299	\$219,713
Total Ganges Basin		\$568,324	94,299	568,324
Brahmaputra Basin Focus Area				
TF015001	Concept Note Development Brahmaputra FA	195,808	0	\$195,808
TF016291	Brahmaputra Basin Focus Area	40,218	0	\$40,218
TF016429	The Brahmaputra River Basin Assessment	35,526	0	\$35,526
TF017496	River Management Improvement: Bangladesh	268,213	11,755	\$268,213
TF017526	Brahmaputra Integrated Water Resources Management Study Tour	183,700	0	\$183,700
TF0A0642	Environmental and Social Management for Sustainable HEP: Bhutan	199,169	1,030	\$199,169
Total Brahmaputra Basin		\$922,632	12,785	922,632
Sundarbans Landscape Focus Area				
TF017032	SAWI Sundarbans FA Engagement	327,448	0	\$327,448
Total Sundarbans Landscape		\$327,448	0	327,448
Regional Cross-Cutting Focus Area				
TF015757	SAWI Cross-Cutting Knowledge, Dialogue and Consultation	252,366	0	\$252,366
TF016326	Transboundary Risk Management and Data Sharing	171,386	0	\$171,386
TF017907	Climate Change Impacts on HEP	337,045	0	\$337,045
TF018522	Snow/Glacier Contributions to Stream-flows and Climate	147,174	0	\$147,174
TF018731	Improving Flood Forecasting in South Asia	499,493	1,042	\$499,493
Total Regional Cross-Cutting		1,407,463	1,042	1,407,463
Closed Activities Total		4,251,161	108,127	4,251,161

Annex V: Gender Mapping of Selected Activities

	Transboundary	National	Sub-National
1. Gender Analysis	<p>In depth targeted work on social inclusion in transboundary water management, with a focus on gender is planned to commence in FY18. This builds on the ongoing work, by the World Bank's Water GP on social inclusion and water.</p> <p>The Sundarbans studies on fisheries and on nutrition are bringing a gender lens to the negative impacts of climate change, and opening up space for a more holistic dialogue on these issues.</p>	<p>FRA has gender disaggregated data which facilitates analysis.</p>	<p>Bihar FMIS uses gender disaggregated data which facilitates analysis.</p>
2. M&E (Ongoing)	<p>Through M&E tracking.</p>	<p>Through M&E tracking.</p>	<p>Through M&E tracking.</p>
3. Targeting and Participating	<p>Gender is being integrated into the design of the Brahmaputra Strategic Basin Assessment, which will help to inform future strategies and investments that integrate gender equality and women's empowerment. Gender is also one of the themes around which the Brahmaputra Symposium (scheduled in September 2017) is being structured.</p> <p>As part of the Sundarbans dialogue, SAWI held a workshop (April 2017, Kolkata) on the participation and employment¹ of women in inland navigation. The event brought together women leaders from the shipping industry, representative from academic institutions responsible for training of inland shipping crew, women from the National Cadet Corps, and women from the local community involved in commercial boat operations. The Government of West Bengal has requested that similar workshops be held in all coastal and estuarine districts.</p>	<p>Multiple consultations and capacity building events were conducted during the preparation of the environmental and social systems assessment (ESSA) for national groundwater management improvement program in India. The ESSA focused on gender issues and provided concrete recommendations for a gender-informed groundwater investment program (e.g. the need for 20 percent women participation in the development of groundwater security plans).</p>	<p>Gender considerations are included in the Ganges Strategic Basin Planning activity that works across 11 States of India.</p> <p>Consultations at local levels in the Sundarbans have included representative engagement with women's groups.</p>

	Transboundary	National	Sub-National
4. Public Awareness and Social Marketing		SAWI has developed a citizen-centric framework for crowd-sourced data to enable citizens to get real-time data on the status of water quality. Gender issues constitute an important part of this approach, both in terms of assessing the social conditions within which it is applied, as well as the relevance and usefulness to both men and women.	
5. Capacity Building and Organizational Development		<p>Twenty-seven women engineers (from a cohort of 112) have benefitted from formal training on river basin planning and management software this year.</p> <p>SAWI is also helping to strengthen capacity of male and female stakeholders by introducing them to key concepts; for instance, a training course was held for NEA staff on the "Process of Social Impact Assessment" in April 2017.</p>	

Annex VI: Country Activity Profiles

AFGHANISTAN

SUMMARY

SAWI efforts in Afghanistan are pursued under the **Indus Focus Area**. Program activities are directed primarily toward: (1) strengthening capacity within the Government of Afghanistan for establishing institutional frameworks for transboundary water and infrastructure; (2) facilitating dialogue between Afghanistan and Pakistan to enhance coordination and reach cooperation on the development and management of the Kunar/Kabul River Basin; and (3) supporting a dialogue for Afghanistan and the other Indus Basin countries to build confidence and trust in order to establish an enabling environment for basin-wide cooperation.

Primary organizations SAWI is engaging with in Afghanistan:

An inter-ministerial working group on transboundary waters, comprising technical-level staff representatives from the MEW, the Ministry of Finance, the Ministry of Foreign Affairs and the National Environmental Protection Agency.

Major Country Level Activities: (Total Investment: ~US\$1.3M)

- Kabul/Kunar Basin Development: \$0.6M
- Indus Dialogue: \$0.7M

FY17 KEY OUTPUTS

- In July 2015, the Government of Afghanistan approached the World Bank to design and implement an extensive capacity building package for government officials to conduct meaningful dialogue with Pakistan and other riparian neighbors regarding the management and development of the water resources Afghanistan shares with these countries. It was determined that the government had some capacity in many areas, and this capacity needed to be harnessed, further enhanced, and made more cohesive and comprehensive in the short-term. Forty-nine Afghan government officials have participated in 18 seminars and 142 hours of training covering a wide range of topics to cover the broad spectrum of issues related to dialogue and developing relations with co-riparians. Fifteen individuals have participated in 80 percent or more of the seminars, which demonstrates their deep commitment to capacity building. The training material will be combined into a training manual that can be used as reference material and by Afghan institutions.
- The IF is a multi-stakeholder dialogue platform (with participation from the four basin countries, including Afghanistan), aimed at identifying strategic opportunities for collaborative management of the Indus Basin's water resources, for inclusive development and climate resilience. The IF identified climate change research as an area for cooperative action among the riparians. SAWI has supported the development of a joint research proposal of the four riparians on Understanding the Impact of Climate Change in the Indus Basin through convening (1) a study tour on glacier monitoring in the Swiss Alps, bringing together participants from the four Indus Basin countries and international experts on climate change, glaciology and hydrology, to understand and learn about research approaches to glacier monitoring in the Swiss Alps and to discuss and finalize the IF-WG joint research proposal and lay down next steps for its coordination and research mobilization; and (2) an IF joint meeting with the UIB Network in Kathmandu in May 2017 to present the joint research proposal package (and discuss resource mobilization opportunities to fund the study).

- SAWI facilitated the finalization of the IF-WG's baseline assessments on available knowledge on glaciers and climate change in the Indus Basin as well as a glacier knowledge mapping tool. The baseline assessment on available glacier data was made publicly available on the Indus Basin Knowledge Platform (hosted by IWMI).
- SAWI supported restructuring (additional World Bank financing of \$70M) of the World Bank's Afghanistan Irrigation Rehabilitation and Development Project, with an increased focus on transboundary river basin management.

LOOKING FORWARD

Capacity Building: Training workshops are planned on organization and function of RBOs and transboundary groundwater. A study tour/exposure visit to the Nile Basin is planned in October 2017, at the end of the activity.

Dialogue: SAWI will support the implementation of the Indus Knowledge Forum in Colombo, Sri Lanka in July 2017, which will aim to provide a platform for exchange of the latest research on the Indus Basin between participants from the basin and from third countries. It will bring together more than 100 key stakeholders from government, civil society, academia and the private sector, including IF members from the four basin countries. The research proposal will undergo a final review among the IF-WG members and an internal peer review.

BANGLADESH

SUMMARY

SAWI efforts in Bangladesh are pursued under the **Brahmaputra, Sundarbans and Regional Cross-cutting Focus Areas**. The program activities in Bangladesh (some of which are linked to activities in India) are directed primarily toward: (1) preparation of an Investment Plan for the Bangladesh Delta Plan 2100 and conducting an analysis of modelling platforms for the Brahmaputra Basin; (2) strengthening hydro-met modernization by informing the design of the Bangladesh Weather and Climate Services Regional Project; (3) undertaking targeted studies in the Sundarbans and designing a Sundarbans hydro-met system; (4) involving high level country delegations in SAWI-supported dialogue activities at the regional as well as basin (Brahmaputra and Sundarbans) scale; and (5) capacity building.

Primary organizations SAWI is engaging with in Bangladesh:

Department of Water Resources, Bangladesh Forest Department, Joint Rivers Commission, Bangladesh, Bangladesh Fisheries Research Institute, Institute of Water Modeling, Bangladesh Soil Research Institute, General Economics Division, BISRCI.

Major Country Level Activities: (Total Investment: ~US\$4.6M)

- Delta Management Investment Planning and Basin Analysis: \$0.8M + \$0.2M
- Sundarbans Landscape-scale Joint Environmental Plan: \$0.3M
- Sundarbans Targeted Environmental Studies: \$0.8M
- Sundarbans Landscape Hydro-met Design: \$0.4M
- Sundarbans Dialogue: \$1.0M
- Brahmaputra Dialogue: \$0.7M
- Capacity Building—Transboundary Water Governance: \$0.4M

KEY OUTPUTS

- The Bangladesh country-level study of the Brahmaputra Basin aimed to establish a modelling framework for basin planning, including conducting an inventory of existing information / data and modeling efforts. The study has been completed and stakeholders, including government, have expressed a keen interest in continuing the collaboration in follow-on work.
- Technical support aided preparation of the Investment Plan for the Bangladesh Delta Plan 2100, which adopts a regional and long-term approach to prioritizing investments.
- Various national-focused activities are supporting the government toward enhancing hydro-met data collection and management, which provide the building blocks of basin/landscape-level information systems.
- Extensive consultations, stakeholder engagement and training on analytical approaches to basin planning and model design parameters have taken place in Bangladesh, involving some 100 individuals from over 20 organizations, including government, technical support organizations, academia and NGOs.
- SAWI has helped to scope and inform investments in hydro-met systems for improved flood forecasting and early warning. Technical work improved the design of the World Bank-financed (\$113M) Bangladesh Weather and Climate Services Regional Project, effective May 2017.
- A two-year capacity strengthening program covering various topics in transboundary water governance and resource management is near completion. In all, seventeen government officials from the Bangladesh Joint Rivers Commission, Ministry of Water Resources, and Ministry of Foreign Affairs; Bhutan; and Afghanistan participated in eleven training courses offered by internationally renowned institutions. Participants have stressed the value of the trainings in building professional capacity and networks, and have noted that they would use the knowledge gained to educate others within their respective government departments.
- Senior government officials and opinion leaders are involved in both Brahmaputra and Sundarbans Dialogue. Specifically, the SAWI-supported BISRCI has indirectly influenced several policy related discussions including: nationally determined climate change actions in both India and Bangladesh; advancing strategic cooperation between both countries, especially on the Sundarbans; initial ideas on managing national parks on both sides without explicit reference to the border; gaining agreement on cooperation on the 'blue economy' agenda between the two countries; and facilitating the signing of an agreement that allows passenger and cruise vessels on coastal and protocol routes. On the Brahmaputra, a regional-level workshop was held in Singapore in October 2016, which provided a neutral platform for various stakeholders from the four riparian countries, including Bangladesh, to engage, build a common understanding of the issues and challenges, and begin to identify potential opportunities for basin-wide collaboration.

LOOKING FORWARD

Delta Planning: The Investment Plan was being finalized at the end of FY17. A final report on the Investment Plan will be completed and disseminated at a workshop toward the end of 2017. For the basin analysis, a follow-up activity is being considered to further develop national planning capacity.

Landscape Joint Environmental Plan: The final dissemination workshop for the report on status and health of fisheries resources in the Sundarbans, including the near-shore fisheries as well as the estuarine aquaculture is (tentatively) planned for October 2017. Other outputs from the activity, including the landscape narrative, will be disseminated at the various events organized under the SAWI Sundarbans Dialogue activity.

Dialogue: Several meetings are proposed in the Sundarbans and Brahmaputra Basins. In the Sundarbans, these include preparatory meetings in July and August 2017 in support of the BISRCI. The BISRCI film on the Sundarbans will be launched in October 2017 in Delhi, Kolkata and Dhaka. A workshop to discuss BISRCI recommendations for augmented inland waterway transport will also be held in October 2017. A media workshop will be conducted in December 2017. Several small roundtables and one-on-one meetings to build support for the final organizational design of the Joint Platform will be held between July 2017 and January 2018. In September 2017, a high-level regional symposium on the Brahmaputra Basin will be organized in partnership with SaciWATERS, IIT-Guwahati and TERI University. It aims to bring together policymakers, academicians, NGOs and other stakeholders involved in the Basin to share experience and knowledge of the system with an eye toward strengthening the shared understanding of opportunities and risks and the potential for future cooperation.

BHUTAN

SUMMARY

SAWI efforts in Bhutan are pursued under the **Brahmaputra and Regional Cross-cutting Focus Areas**. The program activities are directed primarily toward: (1) strengthening Bhutan's capacity for hydro-met services and disaster preparedness; and (2) improving the design of Bhutan's hydropower projects by enhancing the environmental and social aspects. Bhutan has also been actively involved in SAWI-supported dialogue activities on the Brahmaputra Basin, in addition to regional dialogue events.

Primary organizations SAWI is engaging with in Bhutan: the Department of Hydropower and Power Systems, Druk Green Power Corporation and Bhutan Power Corporation, the National Center for Hydrology and Meteorology, Department of Hydro-met Services, Department of Disaster Management, Department of Agriculture, Royal Society for the Protection of Nature, Ministry of Agriculture and Forests, and National Environment Commission.

Direct Country Relevant Activities: (Total Investment: ~US\$2.5M)

- Hydro-met Modernization in the Brahmaputra Basin: \$0.3M
- Bhutan Hydro-met Services and Disaster Improvement: \$0.5M
- Bhutan-HEP Environmental and Social Planning: \$0.5M
- South Asia HEP Resilience Studies: \$0.3M
- Environmental and Social Management for Sustainable HEP: \$0.2M
- Brahmaputra Dialogue \$0.7M

KEY OUTPUTS

- SAWI supported two national-level workshops in Bhutan (September 2016 and March 2017) as part of the Brahmaputra dialogue. The first workshop was a lead-up to the regional-level workshop held in Singapore in October 2016, which neutral platform for various stakeholders to engage, build a common understanding of the issues and begin to identify opportunities for basin-wide collaboration.
- A detailed analysis of existing hydro-met monitoring networks, forecasting and early warning systems for Bhutan was completed. A report summarizing the findings of Modernizing Weather, Water and Climate Services: A Road Map for Bhutan, prepared through extensive consultations with RGoB, has been published and disseminated.
- SAWI technical capacity support is strengthening the Royal Government of Bhutan (RCoB) National Center for Hydrology and Meteorology to address technical issues in their investments, through improving hydro-met monitoring

networks, forecasting and early warning systems and undertaking capacity needs assessment.

- Senior government water officials from Bhutan participated in the International River Symposium held September 2016 in New Delhi—one of the most reputed conferences in the region. The event culminated in a ground-breaking candid panel discussion on river basin planning and riparian cooperation.
- Senior and mid-level professionals from Bhutan attended the UNESCAP and RIMES jointly organized flood forecasting training workshop in October 2016 in Bangkok. This workshop was an important step toward the establishment of a Panel on Transboundary Flood Management for the Region.
- With SAWI support, Bhutan is developing its first-ever complete national guidelines for preparation and construction of hydropower covering environmental, social and technical aspects.
- Building on SAWI's knowledge work, a \$3.8M project co-financed by the GFDRR was initiated to strengthen Bhutan's capacity for hydro-met services and disaster preparedness, which became effective in October 2016.

LOOKING FORWARD

Hydro-met and Disaster Management: An assessment of areas for regional collaboration on capacity enhancement on meteorological forecasting and services delivery will be conducted. Reports on agro-met services in Bhutan will be published and disseminated. A conference on strengthening regional cooperation on hydro-met and climate services is planned for FY18. The bids for the main package under the enhancement of aviation meteorology component are under evaluation and the contract awarding is scheduled for the end of July 2017, followed by installation and testing of the aviation met equipment. The activities to set up the common operating platform will be commenced in FY18.

HEP Environmental and Social Planning: A workshop on the repository for aquatic biodiversity data is planned for early FY18. The draft hydropower guidelines will be tested on the proposed World Bank-funded Dorjilung hydropower project in July 2017. The guidelines will be finalized in September 2017 and are intended to be incorporated into the new government Hydropower Policy.

Dialogue: Senior representatives from Bhutan are expected to participate in the September 2017 regional Symposium on the Brahmaputra Basin, which follows from the country-level meetings in Bhutan on the Brahmaputra Basin.

CHINA

SUMMARY

SAWI efforts in China are pursued under the **Indus, Brahmaputra and Regional Cross-Cutting Focus Areas**. The activities in China are directed primarily toward knowledge sharing and dialogue for improved water resources management in the Brahmaputra and Indus River Basins.

Primary organizations SAWI is engaging with in China: Chinese Academy of Sciences, China Meteorological Division, Shanghai Institute of International Studies, Yunnan University, Fudan University, Beijing Institute of Contemporary International Relations, and China Reform Forum.

Major Country Relevant Activities: (Total Investment: ~US\$1.4M)

- Indus Dialogue: \$0.7M
- Brahmaputra Basin Dialogue: \$0.7M

KEY OUTPUTS

- Given SAWI's activities in China are primarily through the basin and regional level dialogue forums, the outputs also

cut across engagements in other basin countries that have included participation of Chinese delegates.

- **Brahmaputra:** In October 2016, a basin scale workshop was held in Singapore, which included participation by Chinese academics and think-tank representatives. Prior to that, in July 2016, a national-level dialogue was held in China in partnership with Yunnan University that provided a platform for the dialogue convenors (SaciWATERS) to engage with academics from China and strengthen bilateral relationships. In May 2017, several one-on-one meetings were held between representatives of IIT Guwahati and Shanghai Institute of International Studies, which further expanded the Brahmaputra Dialogue network in China and helped identify opportunities for collaboration between the stakeholders from all four riparian countries.
- **Indus:** Academics from China Meteorological Division have been integral to the Indus Basin Dialogue forum since its inception and are leading the development of Work Package 4 in the Joint Research Proposal, that is currently under preparation. In FY17 they have participated in all meetings, including a study tour on glacier monitoring to the Swiss Alps (October 2016), and a joint meeting between the IF and the UIB Network (May 2017).

LOOKING FORWARD

Dialogue: Delegates from China have committed to staying involved in the basins as well as regional dialogue processes, including at the Indus Knowledge Forum in Colombo, Sri Lanka in July 2017, and the Brahmaputra River Symposium in New Delhi in September 2017.

Climate Change Impacts Research: Academics from China are taking a leadership role in mobilizing resources for the joint research proposal on impact of climate change on the glaciers of the Indus Basin.

Compared to other countries, China's involvement in SAWI has been relatively limited and primarily restricted to non-government actors, but there appears to be increasing opportunities for regional engagement.

INDIA

SUMMARY

SAWI efforts in India are pursued under the **Indus, Ganges, Brahmaputra, Sundarbans and Regional Cross-Cutting Focus Areas**. The program activities in India are directed primarily toward (1) scenario-based river basin modeling and participatory river basin planning; (2) informing the design of various investment operations in India through analytical work and exposure to international best practice; (3) improving climate risk assessment and flood forecasting; (4) improving groundwater management; (5) capacity building through training in issues related to water resources management, including water quality and basin planning; (6) targeted studies on the Sundarbans; (7) participation in dialogue events on the Sundarbans, Brahmaputra Basin and regionally.

Primary organizations SAWI is engaging with in India: MoWR, RD&GR; CWC and CGWB; National Institute of Hydrology; Brahmaputra Board; Central Pollution Control Board; multiple State Governments (in Ganges and Brahmaputra Basins); and Central Pollution Control Board.

Direct Country Relevant Activities: (Total Investment: ~US\$11.8M)

- Strategic Basin Planning for the Ganges in India: \$4.0M
- Water Resources Management in Transboundary Basin: \$0.5M
- Strengthening FMIS Capacity in Bihar (RE): \$0.47M
- Bihar FMIS Flood Forecasting (BE): \$0.5M

- Brahmaputra Basin Modeling and Analysis: \$1.2M
- Brahmaputra Basin Dialogue: \$0.7M
- Sundarbans Landscape-scale Joint Environmental Plan: \$0.3M
- Sundarbans Dialogue: \$1.0M
- Sundarbans Landscape Hydro-met Design: \$0.4M
- Sundarbans Targeted Environmental Studies: \$0.8M
- Capacity Building—Water Quality Monitoring and Analysis: \$0.3M
- Capacity Building—IWRM in Transboundary River Basins: \$0.2M
- Capacity Building for Groundwater Management: \$0.7M
- Improving Watershed Management: \$0.1M
- Indus Dialogue: \$0.7M

KEY OUTPUTS

- SAWI is providing technical assistance, including capacity building and analytical work to inform the preparation of and support the implementation of various investment operations in India, including NHP; NGMIP; NGRBP; the Assam Flood, Erosion and River Management Project; UPWSRP; West Bengal Major Irrigation and Flood Management Project; BKDP; and the Neeranchal National Watershed Project.
- An assessment and mapping of flood risks in the Ganges Basin resulted in the preparation of the FRA Atlas, now hosted on the website of the Indian CWC.
- SAWI developed a Flood Predictability Assessment for the Ganges and the Brahmaputra Basins. By providing operational real-time estimates the tool aims to improve accuracy in the predictability of flood forecasting for rainfall and river flows, and enable comparison to be made across the basin.
- The above tool is currently being customized for Bihar in partnership with the National Centre for Atmospheric Research (NCAR). SAWI is also supporting capacity building for Government of Bihar officials on flood forecasting technologies through targeted training and study visits. A high-level delegation (including the Minister, and Principal Secretary Water Resources Department, Government of Bihar) visited Japan in December 2016 to learn about institutional and technological perspectives of real-time flood forecasting. Two Government of Bihar officials attended an operational flood forecasting training organized by RIMES and UNESCAP at the Asian Institute of Technology in Bangkok, in October 2016.
- Technical assistance in scenario-based river basin modeling and participatory river basin planning for the Ganges Basin in India has acted as a demonstrator in participatory basin planning. The activity includes a comprehensive program of stakeholder consultation and technical training across 11 basin States.
- An advanced river model software was introduced for the first time in India, and trainings have directly contributed to preparation of river basin planning systems for five sub-basins in India.
- An integrated water resources management tool for the Damodar Basin, currently being tested, has already resulted in inter-agency collaboration on data between the West Bengal Irrigation and Waterways Department, Damodar Valley Corporation, and West Bengal State Level Ground Water Resources Development Authority.
- SAWI is effectively providing a neutral platform for all four riparian countries of the Brahmaputra Basin, including India, to engage, build a common understanding of the issues and challenges, and begin to identify potential opportunities for basin-wide collaboration. To convene the first regional dialogue required a sustained effort, including several rounds of formal and informal national level consultations to build support at the country level (including across the multiple States of India that share the Brahmaputra Basin).
- The BISRCI has found significant traction at the highest policymaking levels in both Bangladesh and India. BISRCI facilitated the signing of a bilateral Memorandum of Understanding (a significant policy development) that enables shipping protocols to allow passenger travel and tourism in the Sundarbans area. BISRCI provided inputs the agenda for discussions between the Prime Ministers of Bangladesh and India, in April 2017. This helped to establish local dialogues (between the community/local government and the state/federal levels of government), and was perceived as critical to strengthening the high-level discussions. India is involved in the SAWI-supported targeted studies being conducted in the Sundarbans.
- SAWI contributed to improving groundwater management in India by conducting a number of India-specific studies that can potentially be replicated throughout the South Asia Region. These include on standards and protocols for groundwater quality assessment and an assessment of groundwater quality in Rajasthan, an economic assessment of improved groundwater management in India, and technical, environmental and social assessments of India's NGMIP. These studies have informed NGMIP and serve as a basis for regional work that will commence in FY18 (refer below).
- Through its principal event sponsorship (under the World Bank), and event steering committee membership, SAWI facilitated the convening of the International RiverSymposium in New Delhi in September 2016—the first time the event has been held outside Australia. The event brought together 450 delegates, including 249 delegates from India, of which 80 were officials from Indian state and central government water agencies (under the umbrella of the Government of India's sponsorship of the event in recognition of the event's capacity building value to the large technical team across the country engaged in the World Bank-funded NHP).
- SAWI provided technical advice to the Central Pollution Control Board to implement a network of real time water quality monitoring sensors to increase the use of modern technologies.
- See Afghanistan country profile above regarding the IF and joint research proposal on climate change impacts in the Indus Basin, and baseline assessments on available knowledge on glaciers and climate change in the Indus Basin

LOOKING FORWARD

Groundwater Management: a regional diagnostic study of groundwater governance reforms and groundwater management for developing actions that can guide strengthening drought resilience in South Asia will be conducted.

River Modeling: training on river modeling software for stakeholders of Damodar Basin is planned or the immediate future, with roll-out to other basins envisioned under NHP. The development of a participatory basin planning framework for the Ganga Basin in India will be concluded in FY18.

Flood Forecasting: SAWI will continue to work with government of Bihar to improve forecast information and technologies to meet Bihar's needs; and is expanding its forecast coverage to the major river basins of Bihar as well as those covered by the whole of the Ganges and Brahmaputra Basins. SAWI will continue to promote dialogue and operational real-time data sharing models to encourage upstream-downstream collaboration in flood management between Nepal and India.

Strategic Basin Assessment: a strategic basin assessment will be undertaken as a basis for basin planning in the Brahmaputra in India.

Dialogue: India is planning to send a high-level delegation to the regional Brahmaputra River Symposium in September 2017, and is continuing dialogue processes with Bangladesh on the Sundarbans.

NEPAL

SUMMARY

SAWI efforts in Nepal are pursued under the **Ganges and Regional Cross-Cutting Focus Areas**. The program activities in Nepal are directed primarily toward: (1) strengthening transboundary climate change resilience and flood mitigation; (2) supporting development of hydropower taking into consideration transboundary considerations and future climate risks; and (3) strengthening transboundary water governance and technical cooperation.

Primary organizations SAWI is engaging with in Nepal: WECS, Department of Soil Conservation and Watershed Management (DSCWM); NEA; Independent Power Producers Association of Nepal, Himalaya University Consortium.

Direct Country Relevant Activities: (Total Investment: ~US\$4.2M)

- Sustainable Water Resources Development for HEP in Nepal (RE+BE): \$2.2M
- Strengthening FMIS Capacity in Bihar (RE+BE): \$1.0M
- Himalayan University Consortium Grant (RE), US\$1.0M

KEY OUTPUTS

- SAWI is encouraging development of operational real-time data sharing models to encourage upstream-downstream collaboration in flood management between Nepal and the State Government of Bihar.
- First of their kind models for climate change risk screening and resilience measures under uncertainty are being integrated into government hydropower investments. This led to design changes to climate proof the Upper Arun Hydropower Project in eastern Nepal, and provided proof of concept for climate resilient hydropower across the transboundary Kosi Basin. A two-day course on the Decision Tree Framework, developed with SAWI funding, was delivered in Kathmandu (Sept 2016) for 15 representatives of Nepal national research and modeling institutions.
- SAWI support also contributed to identifying and prioritizing investments in upstream catchments to reduce sediment inflow to the Kali Gandaki Hydropower Project. Catchment modeling using RIOS and SWAT models was completed in consultation with the NEA, WECS, and the DSCWM, and results used to inform a catchment investment plan.
- SAWI supported, in partnership, the drafting of Nepal's IWRM Policy and Water Resource Act, which could trigger World Bank energy sector policy lending (\$150M).
- SAWI activities to inform the World Bank's Power Sector Reform and Sustainable Hydropower Development Project (\$20M) are improving the GoN's water resources management and development capacity for sustainable hydropower. NEA staff attended the Process of Social Impact Assessment Course in April 2017.
- Engaging the Private Sector: SAWI supported the Nepal Power Summit 2016, organized by the Independent Power Producers Association of Nepal, which brought together investors, developers, policymakers and civil society to realize the government's target of 10,000 MW installed in 10 years.
- SAWI is supporting the HUC, hosted by ICIMOD in Kathmandu, to enhance the partnership of regional research institutions for collaborative research.

LOOKING FORWARD

Flood Forecasting: SAWI continues to provide support to improve flood and weather forecast information and technologies on the transboundary Kosi River Basin. Planned activities under SAWI and the World Bank's Bihar Kosi Development Project are under discussion by the joint high-powered committee of the GoN and the State Government of Bihar.

Generating and Sharing Knowledge: SAWI also continues to support knowledge and data sharing through technical dialogue, collaborative research, communications websites, on critical areas of national and regional importance such as flood forecasting, climate change, and Himalayan mountain ecology through the HUC.

Informing Investments: SAWI activities will continue to inform the World Bank's Nepal Power Sector Reform and Sustainable Hydropower Development Project to support a basin-wide approach for hydropower development, and climate resilient planning and designs.

PAKISTAN

SUMMARY

SAWI efforts in Pakistan are pursued under the **Indus Focus Area**. Program activities are directed primarily toward: (1) facilitating a national dialogue process in Pakistan to implement the recommendations from the 2013 Pakistan Water Summit with key stakeholders to identify specific opportunities for water reform and investment; (2) to facilitating dialogue between Pakistan and Afghanistan to enhance coordination and reach cooperation on the development and management of the Kunar/Kabul River Basin; and (3) supporting dialogue between Pakistan and the other Indus Basin countries to build confidence and trust in order to establish an enabling environment for basin-wide cooperation.

Primary organizations SAWI is engaging with in Pakistan: Pakistan Ministry of Climate Change and Water Environment Forum.

Major Country Level Activities: (Total Investment: ~US\$0.7M)

- Indus Dialogue: \$0.7M

KEY OUTPUTS

- As part of the national dialogue supported by SAWI, a conference on Water and Environment: Sustainable Development in a Changing Climate, held in Islamabad in October 2016, was supported in partnership with ICIMOD, the Pakistan Ministry of Climate Change, and the Water Environment Forum (a national dialogue forum that was established as an outcome of the overall Indus Basin Dialogue process). The conference aimed at sharing best practices to provide awareness and facilitate dialogue toward formulating an action plan to address climate change impacts in the Indus Basin. The event drew high-level government participation, including the Ministers of Climate Change and National Food Security & Information, and the respective secretaries from the Ministries, and the General Director of the Pakistan Meteorological Service.
- SAWI supported additional World Bank financing of \$35M for the WCAP, aimed at bringing an increased focus on river basin management for transboundary rivers.
- See Afghanistan country profile above regarding the IF and joint research proposal on climate change impacts in the Indus Basin, and baseline assessments on available knowledge on glaciers and climate change in the Indus Basin.

LOOKING FORWARD

Capacity Building: A positive development is that Pakistan has invited Afghan participants to capacity building trainings on glacier monitoring. SAWI could flexibly respond to a request from Pakistan for capacity building on transboundary and river basin management, similarly to what was delivered for Afghanistan.

Basin Development: Should Pakistan wish to pursue development of the Kabul/Kunar River Basins with Afghanistan, SAWI could flexibly respond to continue with the technical assistance it conducted on Kabul/Kunar hydropower development potential in FY14-FY16.

