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SAWI

South Asia Water Initiative

Annual Report

(July 2019 - June 2020)

About SAWI

The South Asia Water Initiative (SAWI) is a multi-donor trust fund supported by the United Kingdom, Australia and Norway, and managed by the World Bank.

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; facilitating 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.

Its 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.

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The SAWI Program is managed by Janet Minatelli, with Halla Maher Qaddumi as the technical lead of the program. Core SAWI Secretariat team members include Debbie Menezes, Yinan Zhang, Taylor Henshaw, Julie Vorman and Sarwat Batool. We particularly want to acknowledge the support and inputs provided by the following task teams of various activities funded by the SAWI Trust Fund: Ahmed Shawky M. Abdel Ghany, Satya Priya (LNU), William Young, Anju Gaur, Lucy Lytton, Shyam KC (WAT); Rikard Liden, Surbhi Goyal, Xiaoping Wang, Subodh Adhikari, Barsha Pandey (EAE); Muthukumara Mani (SARCE); Tapas Paul, Andrea Kutter, Urvashi Narain, Susmita Dasgupta (ENV); Arati Belle, Dechen Tshering (SSACD); Gayatri Acharya, Priti Kumar (AGR); Ninan Oommen Biju (TRAN); as well as the World Bank's Regional Integration Program Committee (RIPC).

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Norwegian Ministry
of Foreign Affairs



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Acronyms and Abbreviations

AIRBMP	Assam Integrated River Basin Management Project
B	Billion (US Dollars)
BBIN	Bangladesh-Bhutan-India-Nepal
BBL	Brown Bag Lunch
BE	Bank-Executed
BISRCI	Bangladesh-India Sundarbans Regional Cooperation Initiative
BMD	Bangladesh Meteorological Department
BRB	Brahmaputra River Basin
BWDB	Bangladesh Water Development Board
CMU	(World Bank) Country Management Unit
CoP26	26 th Annual Conference of the Parties to UN Framework Convention on Climate Change
COVID-19	Coronavirus disease
CSO	Civil Society Organization
CWC	(India) Central Water Commission
DFAT	(Australia) Department for Foreign Affairs and Trade
DFID	(UK) Department for International Development
DHPS	Department of Hydropower and Power Systems
DHM	Department of Hydrology and Meteorology (Nepal)
DRIP	Dam Rehabilitation and Improvement projects
DSS	Decision Support System
DWRI	Department of Water Resources and Irrigations (Nepal)
FA	Focus Area
FCDO	United Kingdom's Foreign, Commonwealth and Development Office
FSPV	Floating Solar Photovoltaic
FY	Fiscal Year
GEE	Google Earth Engine
GESI	Gender and Social Inclusion
GHG	Greenhouse Gas
GoI	Government of India
GP	(World Bank) Global Practice
GRB	Ganges River Basin
GW	Gigawatt
HEP	Hydro Electric Power
HKH	Hindu Kush Himalaya
HUC	Himalayan University Consortium
IBKF	Indus Basin Knowledge Forum
IBRD	International Bank for Reconstruction and Development
ICIMOD	International Centre for Integrated Mountain Development
IIASA	Institute of Applied Systems Analysis
IRB	Indus River Basin

IT	Information Technology
IUCN	International Union for Conservation of Nature
IWMI	International Water Management Institute
IWRM	Integrated Water Resource Management
JWG	Joint Working Group
KU	Kathmandu University
KUSUM	Pradhan Mantri Kisan Urja Suraksha evem Utthan Mahabhiyan Scheme
M	Million (US Dollars)
MDTF	Multi-Donor Trust Fund
MoU	Memorandum of Understanding
MP	Madhya Pradesh (India)
MW	Megawatt
M&E	Monitoring and Evaluation
NEA	Nepal Electricity Authority
NER	North East Region (India)
NGO	Non-Governmental Organization
NHP	National Hydrology Project
NITI AAYOG	National Institutions for Transforming India
PACT	Program for Asia Connectivity and Trade
PARCC	Program for Asia's Resilience to Climate Change
PRO	Program Management
PSU	Nepal Water Platform Support Unit
RACP	Rajasthan Agricultural Competitiveness Project
RAP	Resilient Asia Program
RE	Recipient Executed
REG	Regional Focus Area
RGoB	The Royal Government of Bhutan
RICE	World Bank's South Asia Regional Integration Cooperation and Engagement Strategy
RIPC	Regional Integration Program Committee
SAR	South Asia Region
SARRE	South Asia Region's Regional Integration and Engagement
SARTFP	South Asia Regional Trade Facilitation Program
SAWGP	(DFID) South Asia Water Governance Programme
SAWI	South Asia Water Initiative
SDIP	(DFAT) Sustainable Development Investment Portfolio
SESA	Strategic Environmental and Social Assessment
SIIS	Shanghai Institute for International Studies
SUN	Sundarbans Landscape Area
TA	Technical Assistance
TF	Trust Fund
TTL	(World Bank) Task Team Leader
TU	Tribhuvan University of Nepal
VfM	Value for Money
WBG	World Bank Group
WECS	(Nepal) Water and Energy Commission Secretariat
WHU	Wuhan University
WQMS	Water Quality Monitoring System
WRM	Water Resources Management
WSS	Water and Sanitation Services

Summary Overview

The three main rivers (Indus, Brahmaputra, Ganges) of South Asia are shared by several countries and are critical to the sustainable development of the region and to the lives and livelihoods of the millions of people who rely on these water resources. The rivers of South Asia are mainly fed by glacial melt from the Himalayas and by seasonal rainfall. Climate change and glacial melt therefore become a significant threat to water security.

Every year large parts of South Asia experience intense weather events, including severe monsoon rainfall, flooding, and coastal and cyclonic storms. These disruptions cause billions of dollars of economic damage, loss of lives and livelihoods, damage to ecosystems and environments, and potential food and water insecurity.

Given the transboundary nature of the rivers, technical solutions are in themselves insufficient to tackle a range of interconnected issues. A main challenge in South Asia is that the hydro-politics around the transboundary rivers remain complex and largely determined by wider regional political relations or bilateral water sharing agreements. Incentives for cooperative management of the rivers have historically been low. The diverse topography of the basins, balance of power dynamics between countries, and uneven relations between upstream and downstream users remain some of the barriers to effective cooperation.

SAWI's main approach is to promote a holistic and inclusive approach to transboundary water governance, including in the face of climate change, and to catalyze cooperative action that delivers mutual benefits. The Trust Fund (TF) instrument does this by promoting informal and formal dialogue mechanisms and partnerships, building relevant knowledge and facilitating science-policy linkages, strengthening capacity and systems, and promoting investments.

By design, individualized Focus Area (FA) Strategies for each of the three river basins (Indus, Ganges, Brahmaputra) and the Sundarbans landscape contextualize SAWI's long-term approach and take into account the economic, social, environmental and political realities across its activities.

How to Read this Report

This annual report (July 2019 – June 2020) summarizes progress, annual results and outcomes for the seventh and penultimate year of implementation of Phase II of the South Asia Water Initiative (SAWI) (2013-2021).

Over the years, SAWI's portfolio has grown to 63 activities, and this report covers 22 that were operationally active in FY20. This Summary Overview section outlines key change processes and emerging results, including from work in previous years. It is followed by a brief introduction (Section 1), progress against each of the five FAs, followed by an update on financial management (Section 2), and risks to delivery and lessons (Section 3). Ten supporting Annexes include: Activity Performance (Annex 1); Activity Summaries (Annex 2); Knowledge Products (Annex 3); Financial Management (Annex 4); Gender Mapping (Annex 5); Country Mapping (Annex 6); Partnerships (Annex 7); New Activities (Annex 8); World Bank Investments and Operations Linked to SAWI (Annex 9); and SAWI and Covid-19 (Annex 10).

Key Messages

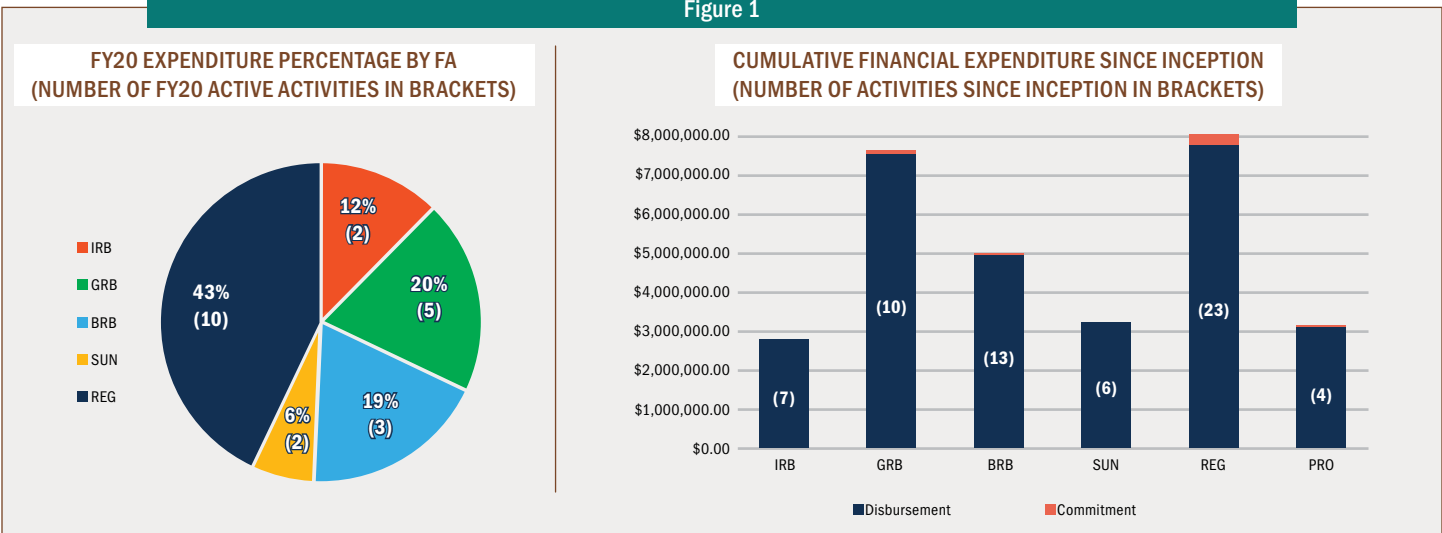
- SAWI is highly relevant, as the three rivers and landscape are vital to the growth and development needs of South Asia and the billions of people living there.
- The TF instrument is effective in linking development, governance and diplomacy to address the complexities and numerous challenges of transboundary freshwater governance in South Asia.
- The main value of the regional TF is that it is able to bring a regional perspective and nudge action on tackling transboundary issues that are otherwise not easily addressed from a purely national perspective.
- Climate change matters. SAWI's holistic approach is increasing regional awareness of the uncertainties and impacts of climate change on melting glaciers, water security, livelihoods, ecosystems, and adaptation measures to deal with extreme weather events.

- The program is making steady progress towards its objective of increasing regional cooperation in the management of the major Himalayan river systems in South Asia through a mix of regional dialogue, knowledge and capacity building, and informing investments.
- Stakeholders value the informality and neutrality of the sub-regional dialogues as a means to build trust; new knowledge and analytical work are demonstrating the benefits of basin-wide cooperation and are helping to bring a wider range of policy options to address intractable problems; capacity building and tools are strengthening institutional agencies responsible for water resource management; and detailed analytical work is helping to inform investments.
- Some important perceptible shifts have started to emerge:
 - (i) water is increasingly seen as an integrator across growth enhancing sectors, and not just as a finite resource. SAWI’s analytical and dialogue activities are helping to identify opportunities and inform debates on the potential opportunities and shared benefits from water governance, including hydropower, inland water transport, and hydromet services;
 - (ii) there is a deeper appreciation of the need to expand beyond a sole focus on water allocation to one that considers a ‘source-to-sea’ approach across the whole basin and that takes into account the links with the environment and biodiversity, and the conjunctive uses of both groundwater and freshwater;
 - (iii) the nexus between water-energy-food is gaining prominence: examples of cross-sectoral collaboration

are starting to emerge – particularly in North East Region of India (NER), as well as in the Indian state of Rajasthan; and

- (iv) there is emerging interest in new areas, such as water quality and plastic pollution, ecological security, and watershed management practices (a form of green infrastructure and part of the World Bank’s larger effort on mainstreaming nature-based solutions in its projects).
- Gender has increasingly become integrated across SAWI activities through the inclusion of women in community consultations, training, and other events; the consideration of gender impacts in policy and analytical work; and by spotlighting gender issues in regional events and analytical work.
 - The TF is enabling the testing of innovative solutions before being taken to market or to scale. For instance, new floating solar photovoltaic (FSPV) generation feasibility studies are informing a pilot in the Indian state of Madhya Pradesh.
 - This year, the portfolio has made good progress according to workplans and budget. Fourteen activities were satisfactorily completed, and eight activities continue implementation into FY21. Additionally, six new activities were endorsed by the World Bank’s Regional Integration Program Committee (RIPC), which were in the mobilization stage at the end of FY20.¹ Figure 1 below shows FY20 and cumulative expenditure distribution.
 - The Covid-19 pandemic resulted in slowdown of some activities due to travel restrictions and implementation

Figure 1



¹ Since 2018, the selection and endorsement by RIPC of new TF activities follows a process to ensure alignment with the World Bank’s strategic business planning and operations.

challenges. The SAWI team has used information technology and virtual meetings to maintain focus and momentum and has reviewed workplans to manage uncertainty.

- The pandemic could also act as a disruptor to the achievement of some of SAWI's higher-level outcomes (such as progression of the dialogues and cooperative action) by the end of project, due to wider contextual shifts and government attention focusing on tackling the pandemic and its consequences.
- However, regionally, the pandemic has also brought new opportunities for dialogue between the countries of South Asia – including through the South Asian Association for Regional Cooperation (SAARC). The pandemic has demonstrated the need to build resilience; and the convergence of Covid-19 and weather-related risks provides an opportunity for South Asian countries to consider collaborative action in tackling common challenges.
- SAWI is an integral part of the World Bank's South Asia Regional Integration Cooperation and Engagement (RICE) strategic approach (which was refreshed this year), and its activities are closely linked with 38 World Bank investments and operations (approx. \$8B) in South Asia.
- Value for Money is being delivered by working with and through other partners and collaborators – for example, ICIMOD, Bangladesh-India Sundarbans Regional Collaborative Initiative (BISRCI); and by adopting a 'whole of finance' approach that shows SAWI as part of a wider, cross-sectoral effort in South Asia.
- A Secretariat, led by the Washington, DC-based Program Manager and Delhi-based Technical Lead, continue to closely track progress and ensure that adaptive programming is followed to deliver value for money.
- SAWI is now entering its final phase of delivery (FY21) and will accordingly focus on: completing work packages; working with stakeholders to embed and disseminate knowledge through various forums; institutionalizing best practice approaches within current systems; strengthening capacity; and, promoting linkages with the World Bank's TFs and regional investments in South Asia.
- Looking ahead, in collaboration with donor partners, the World Bank will work towards transitioning SAWI to the new Resilient Asia Program (RAP) in a way that ensures continued momentum and responsiveness to new post-pandemic realities and priority areas.

The Portfolio in FY20

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.

To summarize, the portfolio in FY20 had 22 activities under implementation:

- (a) 14 activities, carried forward from previous years, were completed this year (FY20);
- (b) Eight ongoing activities continue into next year (FY21) and are at various stages of completion. Of these, five [Ganges (1) and Regional FA (4)] were approved last year (FY19) and began implementation in FY20. See [Box 2](#) (Introduction, p.13) for details.

Additionally, there are three program management activities to administer the TF.

Top-up funding this year was valuable as it enabled SAWI to extend six ongoing activities to allow for completion due to Covid-19-related delays² and to initiate six newly approved activities.

The six new activities fall under the Ganges FA (1) and the Regional FA (5) and continue into FY21 (see [Figure 2](#) below, and [Box 10](#) under the Regional FA section for more details). These new activities, at various stages of mobilization, are highly topical and relevant, focus on thematic entry points to deepen the regional water discourse, build technical knowledge and capacity that benefits both upstream and downstream riparians in the management of shared natural resources and responses to climate change, and offer policy advice on issues related to building resilience.

This means that, in all, there were eleven new activities that were initiated in FY20 (five approved last year, and six this year). All SAWI-funded work under the Indus FA and the Sundarbans FA has been completed. The bulk of planned work under the Brahmaputra and Ganges FAs was delivered in FY20, and the remainder are in the process of completion and dissemination.

² These include the following: Ganges FA: (i) WRM in Transboundary Basins and (ii) Nepal Water Platform; and Regional cross-cutting FA: (iii) Practitioner Program on Watershed Management; (iv) Agriculture-Water Nexus; (v) TA Knowledge Sharing FSPV; and (vi) Glaciers of the Himalayas.

Figure 2

SAWI PORTFOLIO OF ACTIVITIES UNDER IMPLEMENTATION IN THIS REPORTING YEAR (FY20)³

INDUS BASIN

- (1) Indus Basin (Pakistan) Groundwater Analysis (C)
- (2) Indus Basin Dialogue (C)

BRAHMAPUTRA BASIN

- (1) Basin Modeling and Analysis (C)
- (2) Brahmaputra Basin Dialogue (C)
- (3) Strengthening Hydro-met Services and Disaster Resilience in Bangladesh (O)

REGIONAL CROSS-CUTTING

- (1) HEP Sustainable Planning - Bhutan (C)
- (2) Capacity Building for Groundwater Management (C)
- (3) A Diagnostic Study on Groundwater-Energy-Agriculture Nexus (C)
- (4) Himalayan University Consortium Grant (RE) (C)
- (5) Regional Dialogue (C)
- (6) Glaciers of the Himalayas (O)
- (7) Practitioner Program on Transboundary Watershed Management in Mountain Economies (O)
- (8) Technical Assistance and Knowledge Sharing Facility for Development of Utility Scale Floating Solar PV Power Generation in India (O)
- (9) Agriculture-Water Nexus, Resilient Agriculture and Access to Markets in the NER (O)
- (10) Enhancing Ecological Integrity of the Aquatic Environment in the G-B Mainstems (O)
- (11) Rivers and Plastics: Addressing Transboundary River Pollution (M)
- (12) Price of Water (M)
- (13) Developing Regional Waterways in South Asia (M)
- (14) Monitoring Transboundary Water Quality in Bangladesh (M)
- (15) Improving Water Resources Management in Northeast India and Assam (M)

GANGES BASIN

- (1) Sustainable Water Resources Development for HEP in Nepal (BE) (C)
- (2) Power Sector Reform and Sustainable Hydropower Development Project (RE) (C)
- (3) Ganges Basin Dialogue (C)
- (4) Water Resources Management in Transboundary Basins (O)
- (5) Nepal Multi-Sectoral Water Platform (O)
- (6) Nepal River Basin Planning and Sustainable Hydropower Development (M)

SUNDARBANS LANDSCAPE

- (1) Sundarbans Dialogue (C)
- (2) Targeted Environmental Studies (C)

(O) = Ongoing into FY21; (C) = Completed; (M) = Mobilized in FY20

³ The program management activities are not included in Figure 2.

Progress in FY20

SAWI's activities have continued to make steady progress against annual workplans and in line with the outcome areas in the results framework. The main emphasis across all FAs this year has been to complete ongoing work packages and make adjustments in delivery due to pandemic-related disruptions; work with stakeholders to embed knowledge and institutionalize best practice approaches within current systems; build capacity; and disseminate knowledge products more widely. In addition, SAWI teams have worked to promote linkages with the World Bank's regional investments in South Asia to ensure coherence, sustainability and value for money. Achievement against annual program-level output milestones in SAWI's Results Framework is largely on-track with some slippage due to the pandemic (see Annex 1), and highlights are in [Table 1](#) (at the end of the main report).

Dialogue activities across all four basins and at the regional level were completed and closed. Each of the basin-level dialogues have progressed at a different pace, largely a reflection of their context. This year, the Indus Dialogue provided specific support to the Indus Basin Knowledge Forum (IBKF) event as part of transitioning the implementation responsibility to ICIMOD. The Sundarbans Dialogue did not host a sub-regional event but has continued to support the BISRCI – an informal but influential collective that is working towards the joint management of the Sundarbans landscape, and there has been positive movement towards establishing a formal joint mechanism for management of the Sundarbans. The Brahmaputra Dialogue advanced collaborative engagements through developing knowledge products to support the dialogue process and was unable to support a participatory dialogue event due to the pandemic. The Ganges Dialogue did not make any advancement, and the overall FA work plan focused instead on technical knowledge and investments, which offer more traction.

The basin and regional dialogue activities have been a central plank of water diplomacy. Perceived as neutral forums, these dialogues have become a critical mechanism to build trust and discourse among stakeholders from riparian countries each of which have diverse perspectives, incentives, political motivations, and technical solutions on management of the transboundary rivers. Significantly, the forums attracted stakeholders from across government, academia and civil society to discuss and exchange ideas on topics of mutual concern and to gain insights from experience elsewhere.

Consequently, some collaborative approaches have started to emerge, albeit in different forms across the four basins.

Knowledge products are highly valued by external stakeholders; recommendations are being taken up and tools are being adopted. Knowledge areas have been prioritized based on stakeholder demand, its relevance to the main objectives of the program especially where technical gaps have previously constrained action, and where new opportunities are on the horizon but lack sufficient information before these can be taken up.

Results Highlights: FY20

One sub-regional event held: the Indus Basin Knowledge Forum (IBKF) drew **84** participants.

36 technical products completed, which have brought new knowledge and tools to help stakeholders in planning for water resource management.

235 professionals (including **46** women), benefitted from **capacity building** support.

SAWI activities are cumulatively **linked to 38 World Bank investments and operations (worth approx. \$8B)**, up from 27 (\$5.7B) reported last year. The strategy of linking SAWI activities with national priorities and with World Bank-financed investments (pipeline and ongoing) enables SAWI to extend its reach beyond its immediate activities.

With more than **40** development partners and over **50** country-level partnerships, SAWI's **network** continues to grow and is essential to long-term sustainability.

Emerging knowledge and analytical work are highly relevant and continue to bring added value in several ways:

- Firstly, SAWI's analytical work is bringing new insights to policy makers on different options to tackle intransient problems, shift behaviours and incentives, and to exploit emerging opportunities. In particular, water security and water resource management predominantly influence the way in which South Asian stakeholders approach the rivers.

SAWI's knowledge is potentially informing more integrated policy responses and actions by spotlighting the nexus between water and other areas of common interest, namely climate change; by adopting a 'source-to-sea' lens that considers the whole basin and not just the river, and by focusing on the potential uses of water as a regional integrator across sectors, such as clean energy and inland waterways.

For instance, this year studies have delved into the water nexus across agriculture-energy; hydromet; and ecological security. One such example is that recommendations from a recent study on *Grow Solar, Save Water, Double Farmer Income* in Rajasthan have been taken up by government and have spurred the development of a pilot in different agro-climatic zones, which could potentially lead to upscaling and replication across other Indian states.

- Secondly, the collaborative process of developing technical studies not only helps to bridge the gap between technical personnel, scientists and policy makers across boundaries but also lends credibility to the products as the process is transparent and participatory. For example, the participatory process of developing the Sundarbans Targeted Environmental Studies and the engagement with Bangladeshi and Indian experts has enabled the collection of robust data. The work is being made available to the BISRCI.
- Finally, by aligning technical work with national priorities, SAWI is not only helping to address key knowledge gaps but also brings a transboundary lens while remaining grounded in contextual realities. There are several examples of this – for instance, in Nepal and in Bhutan, SAWI's recently completed analytical work is being taken up by government partners for their national hydropower development plans with potential benefits for regional energy markets.

Box 1

TECHNICAL KNOWLEDGE IN FY20

Some notable examples of technical knowledge areas in FY20 include:

- The ongoing **Glaciers of the Himalayas** study, which looks at melting glaciers (source of the rivers), is bringing new knowledge on the impacts of black carbon and climate change, and therefore future water resources that will impact the lives of 1.5 billion people who depend on these rivers. This highly technical new knowledge is endorsed by the Hindu Kush Himalaya Glacier and Mountain Economy Platform.
- Three **groundwater studies** were completed this year and are building the picture on different aspects of this critical resource in South Asia. The studies, which not only bring locally relevant information, have also delved into the conjunct between ground and surface water - an important consideration on the competing uses of water - and have highlighted the urgency for action to policy makers, civil society, the private sector and other user groups.
- **Targeted Environmental Studies** in Sundarbans (the delta area into which the rivers drain) is highlighting critical issues related to the impacts of sea level rise on salination, which is damaging the landscape and affecting health of local communities, and of extreme weather events, which come at great economic, social, ecological and human cost.
- **Ocean and river plastics** work will be critical in highlighting river pollution flows, as well as management and investment strategies.

The value addition is enormous, as SAWI's technical work is helping these national efforts to conform to international standards and is strengthening transparency through robust procurement guidelines and processes. For instance, the national hydropower and dam safety guidelines in Bhutan now serve as the preeminent guiding documents for hydropower development in the country. The development of a Water Diagnostic in Nepal is enabling convergence across Ministries and provides key directions on the way forward.

Strategy and Alignment

SAWI remains strategically aligned with the World Bank’s RICE approach and its wider portfolio of investments in South Asia (see Figure 3 below). All new TF activity proposals continue to be reviewed and approved by the RIPC. This process is enabling World Bank management to adopt a comprehensive and coordinated review of proposals across all five of the World Bank-managed South Asia regional TFs, ensure strategic alignment of trust-funded activities with regional and country priorities, ensure that activities bring value addition, and promote greater synergies among the activities themselves.

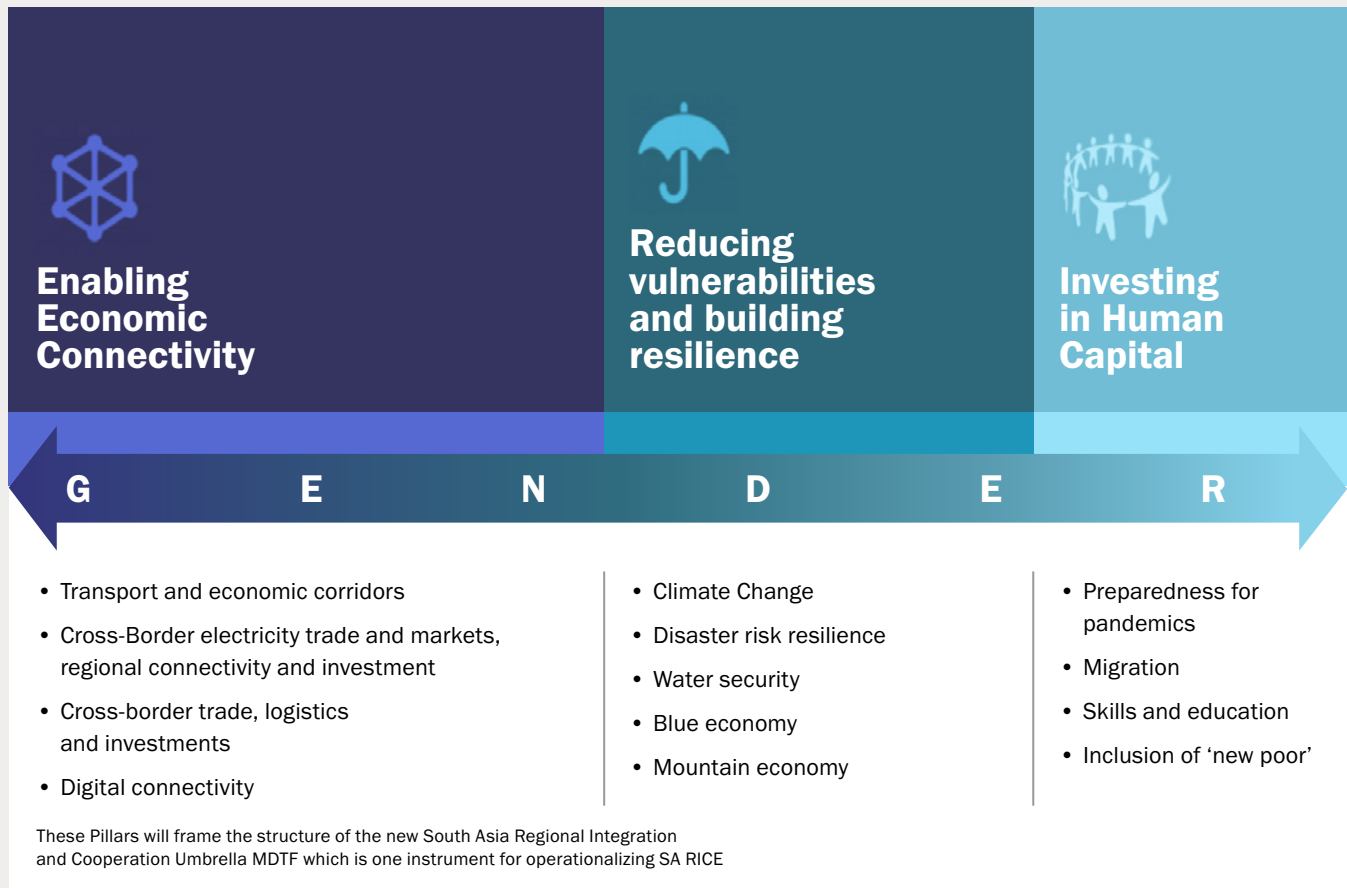
SAWI is linked with the other World Bank South Asia Trust Funds that are managed by the SARRE team: (i) hydro-met, data sharing, disaster risk management and climate-change-related work links closely with the FCDO-funded Program for

Asia’s Resilience to Climate Change (PARCC); and (ii) work related to regional connectivity (e.g., inland waterways and hydropower) resonates closely with FCDO’s Program for Asia Connectivity and Trade (PACT), and with DFAT’s South Asia Regional Trade Facilitation (SARTFP) program, enabling a more integrated, joined-up approach.

SAWI also supports the **World Bank’s Water Strategy** and its three thematic priorities of Sustaining Water Resources; Delivering Services; and Building Resilience. SAWI’s work is also closely aligned with the World Bank Group’s recently launched **Action Plan on Climate Change Adaptation and Resilience**⁴, which proposes to boost direct finance and support countries’ efforts to systematically manage climate risks in policy planning, investment design, and implementation.

Figure 3

SOUTH ASIA REGIONAL INTEGRATION COOPERATION AND ENGAGEMENT (RICE) APPROACH (REFRESHED 2020)



⁴ <https://www.worldbank.org/en/news/press-release/2019/01/15/world-bank-group-announces-50-billion-over-five-years-for-climate-adaptation-and-resilience>

Effectiveness: SAWI's Progression Along the Results Continuum

Over the years, SAWI's activities have been laying the building blocks that are deemed essential in moving towards regional collaboration and joint action on transboundary water governance. This has required differentiated strategies in each of the five FAs that have been sensitive and responsive to context, stakeholder need and interest, and remain closely aligned with the World Bank's operational focus in South Asia. While the FA work for the Brahmaputra, Ganges, Indus and Sundarbans Landscape are focused on geographic needs, the Regional FA has served to promote knowledge sharing and stakeholder dialogue across all geographies.

SAWI's nuanced approaches have been important in helping to progress the transboundary water governance agenda in South Asia. Firstly, SAWI's politically neutral approach to facilitating the dialogues and its technical expertise have been valued by regional stakeholders and remain important in engaging stakeholders. Secondly, addressing the multi-dimensional aspects of water and climate change have helped to convene stakeholders around areas of common interest and are enriching the discourse on water. For instance, technical support on water resources forms an important backdrop to future hydropower plans of countries in the SAR and is potentially informing the design of the World Bank's inland water transport projects; groundwater studies are outlining options for management of the resource; hydro-met studies are focusing attention on data for accurate forecasting and bringing new knowledge on tackling cross-border water-related hazards; and new work on plastic pollution proposes to pave the way for knowledge on tackling this issue and understanding its value chains in the Brahmaputra Basin. Thirdly, responsiveness and alignment with national priorities has been an important bridge to broader issues with regional dimensions. Finally, the partnerships approach with other regional institutions and riparian stakeholders has been critical in broadening a credible and sustainable regional engagement. SAWI has built a network of more than 40 development partners and more than 50 government and country-specific partners, which continues to grow and will be important in helping to sustain efforts beyond the lifetime of the program.

Another important aspect of SAWI is that its activities are not siloed; by design, work across the four results areas remains interconnected and mutually reinforcing. Dialogues across all

the FAs have been a useful mechanism to broaden entrenched perspectives and to discuss alternative ways of tackling issues related to regional water governance. Over the years, participation in these events has grown, the topics of discussion have evolved, and the nature of discussions has become more open. SAWI has produced **36** knowledge products (e.g., on the effects of climate change on water resources management across South Asia), which are vital to filling critical knowledge gaps, as well as tools (e.g., models for river basin planning) that are enabling more effective planning and management of water resources.

Generating and sharing knowledge 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 new knowledge and tools into government systems. SAWI has responded to rising demand for capacity building from stakeholders, which has included targeted training, exposure visits and technical workshops to embed new tools and knowledge for better water resources management. Over 1700 water professionals in South Asia (including about 250 women) have benefitted from training, and SAWI has helped to build the policy or technical capacity of more than 30 key water management organizations across South Asia. Most significantly, SAWI activities are now cumulatively linked to 38 World Bank investments and operations (worth approx. \$8B), up from 27 (\$5.7B) last year.

The Brahmaputra and Sundarbans basin dialogues (now closed) have significantly progressed, with good prospects for collaborative action. The **Brahmaputra** Dialogue process has been institutionalised and now involves institutions that are connected to governments in each of the four riparian countries – thus functioning as a Track 1.5 process. There is growing stakeholder interest in potential areas of collaborative action, including strengthening capacities for improving hydromet services for real-time decision making, especially as the sub-region is prone to extreme weather and climate risks, and on the climate-water-energy nexus which offers tremendous potential for regional energy. These areas are also strategically linked to the World Bank's substantial planned investments in the region in hydro-met services and disaster resilience, in hydropower, and in Inland Water Transport (IWT).

SAWI has supported and facilitated the **Sundarbans** dialogue through the BISRCI, which remains the main platform for

engaging high-level policy makers in India and Bangladesh. This forum has found traction at the highest levels in both countries and played a critical role in informing discussions among policymakers and other stakeholders that led to an agreement on the provision of passengers and cruise vessels on the Inland Protocol and coastal shipping routes (previously restricted to the movement of cargo for transit and inter-country trade on specific routes). Ferry services began this year, and this agreement potentially opens up the space for further cooperation on inland water transport and fostering people-to-people connections to strengthen bilateral relations.

BISRCI continues to facilitate dialogue among key stakeholders in both countries. Over the last year, there has been significant traction between Bangladesh and India towards developing a formal institutional mechanism for cooperation and implementation of joint activities in the shared Sundarbans Region. The planned key responsibilities of this Commission are likely to include biodiversity conservation, livelihoods development, climate change adaptation, increased resilience to disaster, ecotourism, and dissemination of information. However, due to Covid-19, discussions planned for March 2020 could not be held.

On the **Indus**, SAWI has transitioned leadership of the Indus Basin Knowledge Forum to ICIMOD and has provided support for a IBKF4 seminar on gender and social inclusion. The fluid sub-regional politics mean that the Indus basin dialogues continue to be highly sensitive and progress is largely subject to political relations between the riparian countries – which remains out of scope for SAWI. Nevertheless, the strong attendance at IBKF events and the fact that issues such as climate change and availability of quality groundwater remain common concerns and technical discourse may be the most useful route to continue to convene key stakeholders and to build trust and confidence. The continuation of the IBKF and progress on the joint research proposal developed in previous years will depend on whether funding can be secured.

SAWI has found that the regional **Ganges** basin dialogues are unlikely to progress in the immediate term. However, the engagement of sub-basin national stakeholders in dialogue, capacity building and knowledge products, and the alignment with national priority programs has been a useful strategy. There is good evidence of SAWI's work informing larger national programs, tools and models are in use as ownership has been transferred to national agencies, and there is growing

awareness and political interest in tackling the wider sets of issues on climate and water, particularly in the North-East of India.

Climate Change

The SAR is prone to weather and climate extreme events with impacts on the hydrologic cycle. This year alone SAR witnessed several events: super cyclone Amphan hit Bangladesh and West Bengal (India) in May 2020, causing devastation to the Sundarbans area, and cyclone Nisarga affected parts of Western India in June 2020. Furthermore, the Brahmaputra river basin has experienced severe floods affecting China, India and Bangladesh.

Climate Change remains an important theme that underpins SAWI's work in different ways. SAWI is bringing new knowledge and systems to help countries to adapt and build resilience to climate change. SAWI's recently completed hydromet support in in the Brahmaputra Basin (Bhutan, Bangladesh), the Ganges Basin (India), and in the Sundarbans Landscape have not only helped to address capacity gaps at national levels but have also promoted knowledge exchange, including on responses to cross-border water-related hazards. The work on hydromet is linked to larger World Bank hydromet investments in the region.

Climate change has been a key unifying theme that has brought riparians together in dialogue in the Indus and Brahmaputra basins. The Glaciers of the Himalayas study has advanced its analysis on the impacts of climate change and black carbon on glacial and snow melt and how this affects water resources. An event held last year has brought stakeholders together following which a Draft declaration was adopted leading to the creation of Glacier and Mountain Economy Knowledge-Policy platform of scientists, development partners and policy makers to constantly discuss the contemporary and emerging challenges facing the SAR countries, and develop appropriate collaborative approaches to find solutions. The Government of Nepal now hosts the interim secretariat at the Center for Green Economy and Environment.

Four groundwater studies (three of which were active in FY20) in South Asia have brought critical knowledge that are being taken up by respective governments and, technical environmental studies in the Sundarbans have brought new information on floods, storm surges, erosion and saline intrusion; previously completed work on flood forecasting in the Ganges basin has

been taken up by state authorities in Bihar, which is helping to improve forecasting times and early warnings to weather-related disasters.

Gender and Social Inclusion

Gender and Social Inclusion (GESI) are mainstreamed across the SAWI portfolio. The World Bank's refreshed Gender Strategy (2016) commits the World Bank to work toward removing remaining constraints to women's endowments, improving access to more and better jobs for women, strengthening women's access to land and financial assets, and improving women's voice and agency, including by engaging men to address gender-based violence.

SAWI's approach is to mainstream GESI across its portfolio—which adopts the principle of 'do-no-harm' and ensures that a gender-inclusive approach is integrated across activities. However, challenges remain as stakeholders may not immediately grasp the importance of tackling gender in water governance, other issues take priority, or gender-disaggregated data is not available.

SAWI has nevertheless worked to strengthen its focus on gender over the lifetime of the program and has found growing appreciation among external partners for its gender-related approach. For example, this year: (i) stakeholders at the Indus Basin Knowledge Forum event were very appreciative of the SAWI-supported session on gender, which was delivered in partnership with Australian institutions. The session was well received and stimulated comments among forum participants indicating that concepts had been introduced that had previously not been considered (such as the consideration of gender requirements when developing river flow models)⁵. The conference (proceedings) concluded that gender and social inclusion are shared challenges in development priority areas, particularly in the Indus basin for making research meaningful and impactful; (ii) training has been gender-inclusive, with 46 women participants benefitting from training and other capacity building events; and, (iii) new knowledge is spotlighting gender-related issues with potential to inform gender analysis in policy making – for example, DFAT's SDIP Gender Learning Project (2020) which included a review of SAWI case studies, has noted that SAWI's gender-disaggregated data and research provides an important entry point for engagement with policy makers on gender in the water sector. With reference to the Sundarbans

Targeted Environmental Studies, the report notes that these have “strengthened understanding of the gendered impacts of prolonged exposure to saline water, informed high-level policy discussions with regional actors at the Brahmaputra River Symposium.”

South Asia – Evolving Context and Covid-19

The broader geopolitics of South Asia continue to evolve, with incidents of both conflict and cooperation between countries as a long-standing issue. Within this context, the politics around water in South Asia remain complex and are a key factor in influencing and shaping the dynamics around transboundary cooperation on the major rivers. Although the three river basins and landscape span sovereign states, bilateral relations between countries are a key determinant of cooperative action between upstream and downstream riparians. Asymmetric relationships and a trust deficit have historically translated into competition rather than cooperation over shared resources, with limited sharing of vital hydrological data. The lack of a formal regional institution also limits collective efforts in this direction. Domestic politics, national policy priorities and geopolitical objectives have tended to dominate collaborative action on regional water, which is seen as integral to national growth and developmental priorities. Limited institutional capacity, poor quality data and weak systems also constrain any potential cooperative action.

In recent years there are encouraging signs of countries increasingly recognizing the potential use of regional water – such as through hydropower development, and its use for agriculture and for transportation. Some limited examples of cooperation exist – for example, China has shared flood forecasting data with India; and Nepal and India have an arrangement for sharing flood data. Emerging technological platforms such as Google Earth Engine (GEE) are also providing water managers with necessary data for water resource planning and management. The eastern sub-regional grouping of BBIN continue to make progress towards cooperation, with several cross-border opportunities emerging on transport connectivity, the rejuvenation of inland waterways, and energy trade. India's stated Act East policy continues to extend economic and strategic relations with South-East Asian countries. In the western sub-region, political relations are complex and determined by a host of factors that go beyond the scope of SAWI.

⁵ See Twitter #ibkf4 for participants comments on this session (and the broader event).

This year, South Asia has faced the added stress of meeting the combined challenges of the Covid-19 pandemic, climate change, natural disasters and border tensions. The pandemic has especially been a major disruptor, causing economic deceleration at both the regional and country levels. National governments are consequently re-evaluating their priorities and focus in terms of actions for economic recovery and resilience, and for regional and global economic partnerships. On the one hand, this could temporarily slow down momentum on transboundary water issues, as countries prioritize national growth and building self-resilience.

However, the devastating impacts of the Covid-19 pandemic highlight the challenges of water security and scarcity in the region especially as access to water for hand hygiene is a critical factor in controlling disease transmission. There is increasing realization that water security and scarcity have critical implications for both the effectiveness of Covid-19 response efforts and for promoting growth and building resilience in a post-pandemic world. In many communities around the world, a lack of water supply has deprived people of their most basic protections against the spread of the virus. Yet, in a post-pandemic world, more effective management of water systems provides opportunities to build greater resilience to climate, health, and food system shocks (build back better) that can prevent or mitigate future pandemics and other disturbances. As economies recover, the transition would require not only the conservation of water resources but also the finding of new, innovative and collaborative approaches that embrace the sustainable management of water resources.

Looking Ahead

SAWI's main focus will be on completing all its activities, making adjustments to workplans based on the Covid-19 situation, and working towards the dissemination of knowledge among regional stakeholders and supporting its uptake by partners as part of the sustainability measures. Activities initiated this year will focus on developing knowledge and understanding on new priority areas for transboundary water governance in the region and are closely linked to national priorities. Furthermore, most of SAWI's activities are linked to the World Bank's operations in South Asia, so there is strong likelihood that SAWI's work will sustain.

The SAWI team is also working to transition the gains from this phase of the TF through the new RAP in a way that proposes to continue momentum, leverages partnerships and networks built, and that is responsive to new realities in a post-Covid-19 environment. SAWI will also work to disseminate and communicate the knowledge and results from its decade of work in this area.

Section 1: Introduction

1.1 The Importance of Water in SAR

Water is an essential element of human society, sustaining all aspects of social, environmental and economic sectors. Water scarcity and stress are growing global crises, especially in South Asia. Water stress in some parts of the region is likely to worsen on account of climate change. Given high rates of population and economic growth, the countries of South Asia are experiencing dwindling supply per capita (both in terms of quantity and quality). Climate change may cause water supply to fluctuate both temporally and spatially and may alter the global hydrologic cycle. Looking ahead, by 2050 between 1.5 billion people, (70% of population, WCI measure) or 1.7 billion people (81% of population, WSI measure) in South Asia are projected to be exposed to water scarcity (Gosling and Arnell 2016). A recent World Bank report estimated that increasing temperatures and changing monsoon rainfall patterns due to climate change could cost India 2.8% of its GDP and lower the living standards of one-half of the population by 2050 (Mani et al 2018).

1.2 SAWI's Objective

SAWI Phase II is an eight-year (2013/14-2020/21) Multi-Donor Trust Fund (\$36.1M) administered 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.

Four inter-linked pathways support this outcome: (i) building confidence and trust amongst the riparian countries; (ii) generating new knowledge, including in partnership with others; (iii) building capacity of key institutions and stakeholders; and (iv) scoping and leveraging investments. The program is structured around four geographic FAs (Indus Basin, Ganges Basin, Brahmaputra Basin, Sundarbans Landscape) interfacing with a Regional Cross-Cutting Knowledge, Dialogue and Communications FA that both supports non-basin-specific

work and translates national or basin-specific work for wider dissemination or implementation. Each FA is framed around a high-level objective statement and strategy.

1.3 The Portfolio

SAWI overall portfolio includes a total of 67 activities since its inception⁶. In FY20, 22 grants were active, of which two⁷ were Recipient-Executed (RE) and 20 were Bank-Executed (BE). A further three activities are program management related. The selection of activities across FAs is largely determined by partner demand and alignment with priorities, relevance to the FA Strategy and SAWI's core objectives, and likelihood of delivering value addition, including to the World Bank's own operations in South Asia. Details of the five new activities that were approved in FY19 but began implementation in FY20 are in [Box 2](#) below. Details of the six new activities that have mobilized in FY20 are in [Box 10](#) under the Regional FA section.

1.4 Partnership Approach

SAWI continues to carry out its activities in close engagement with national, regional and global partners, including both government and non-government stakeholders. National authorities in all SAWI countries are involved in nearly all SAWI activities. This approach is important to increase the buy-in and uptake of SAWI knowledge and sustainability of its work beyond the duration of the program, as well as to broaden the outreach of SAWI's work.

Partnerships and networks also help in crowding in knowledge and disseminating this to multiple stakeholder groups, and congregating partners around common themes and interests. Most events are organized in collaboration with partners, while knowledge generation is carried out with involvement of policy think tanks, civil society and academics. Activities are primarily implemented through grants or contractual arrangements with external implementing agencies, regional knowledge institutions and experts.

⁶ Of the 67 activities in the portfolio, four are in pipeline

⁷ These RE activities include the Nepal Power Sector Reform and the HUC activity

FIVE ACTIVITIES THAT WERE APPROVED IN FY19, BEGAN IMPLEMENTATION THIS YEAR

(i) **Practitioner Program in Transboundary Watershed Management in Mountain Economies.** The activity is part of a larger effort to mainstream nature-based solutions in the World Bank's operations in South Asia, and is also part of the second phase of the Regional Ecological Integration Platform (REIP), which aims to increase regional cooperation in SAR related to the management of shared natural resources and response to climate change. SAWI is generating practical knowledge and good practices in sustainable management of forested watersheds of regional importance and is identifying opportunities for the use of disruptive and innovative technologies for information and data gathering for improved watershed management. The work is important as it is catalyzing understanding of sediment management and landslide risk reduction in the region through nature-based solutions, with benefits to multiple sectors including hydropower, roads, and disaster risk management.

(ii) **Agriculture-Water Nexus, Resilient Agriculture and Access to Markets in NER.** SAWI is supporting Government of India (GoI) and the States of the Northeast to develop a framework for resilient and commercial agriculture in the NER (Brahmaputra Basin) by supporting analytical assessments and consultative processes on climate smart agriculture, including nexus of water and agriculture in small-holder farming; key value chains analysis, including mapping and identification of constraints and opportunities for development and investment; and knowledge development and exchange.

(iii) **TA and Knowledge Sharing Facility for Development of Utility Scale FSPV.** The development of a database and assessment of water bodies for their floating solar potential is underway. This technology is nascent, and the work will inform markets about the potential and contribute to furthering the Government of India's agenda on achieving the Nationally Determined Contributions targets. Pre-feasibility assessments for the Omkareshwar Dam are already informing plans by the MP state government and World Bank investments.

(iv) **Nepal Water Platform.** The activity supports specific analytical and advisory services in support of the Nepal Water Strategy and Platform. It explores and showcases the synergies and challenges among the different uses of water for energy, water for food and water for people, and in particular, the conjunctive management of surface water and groundwater as a means to improve water security for irrigation and drinking water in Nepal.

(v) **Enhancing Ecological Security of Aquatic Environment:** This activity will draw on international best practice and support a multi-stakeholder platform for conservation of aquatic habitat in the Ganga-Brahmaputra, with a focus on the Gangetic Dolphin, to facilitate sustainable investment in water transport.

1.5 Relevance

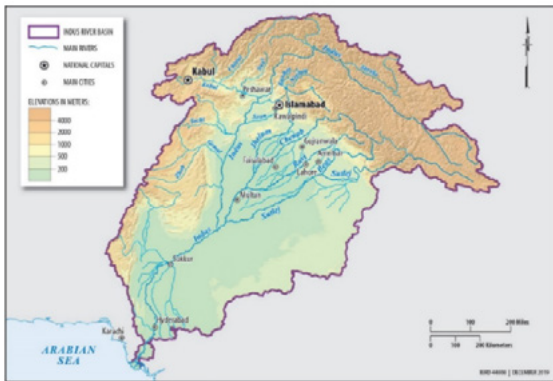
SAWI's objective, portfolio and approach remains strongly relevant to South Asia, not only to its core objectives but also through its potential role as a regional integrator across sectors, geographies and stakeholders. Firstly, SAWI remains a useful mechanism for regional integration, using technical entry points and dialogue to bring stakeholders together and support discourse. Secondly, in the face of climate change, water security is a growing issue of concern in South Asia, and SAWI is providing technical options for government to discuss and take action at the regional, national and local levels. Furthermore, climate-related extreme weather events are raising concerns about the need for preparedness and integrated management

of transboundary basins, landscapes and ecosystems. Thirdly, SAWI's work is relevant to national priorities, including those with regional spill-over effects, and to World Bank investments. Finally, this year the Covid-19 pandemic has highlighted the critical role of water availability and access for health. Water will also be an important resource in economic recovery efforts and especially in plans to build back better across sectors.

Section 2: Annual Progress (FY20)

2.1 Focus Area Reporting

Indus Basin Focus Area



Context and Strategic Approach

The Indus River Basin is home to more than 300 million people across Afghanistan, China, India, and Pakistan. The basin faces water stress due to increasing demand from growing populations and over extraction of depleting groundwater resources and is highly vulnerable to extreme weather-related events – including floods, droughts and higher temperatures. The basin has a unique topography and its rivers are fed by glacial melt, snow melt and rainfall. The impacts of climate change and shrinking glaciers are impacting river flows and water availability.

Water management challenges in the basin continue to be compounded by the basin's transboundary nature, the complex relationships among its riparians and the absence of effective basin-wide management institutions. Inter and intrastate competition over water resources is expected to intensify with population growth and is likely to increase tensions within and between riparian countries. While some issues can be managed on a national basis, the riparian countries all face some challenges that require cross-border coordination. Limited transboundary coordination means a number of opportunities for more effective and efficient water resources management and for knowledge exchange are being missed.

SAWI's approach has been two-fold: (a) to broaden basin-level dialogue and build its influence through the IBKF track II basin-wide dialogue processes to build trust; and (b) to facilitate national thinking and action towards a basin-wide approach through capacity building, targeted exposure visits on climate change adaptation and water resources, and the generation and use of technical knowledge to inform policy thinking.

Emerging Outcomes

SAWI's activities under the Indus Basin FA have been completed. Over the years, policy-relevant reports and capacity building have been deemed highly relevant and useful by regional stakeholders, while sub-regional dialogue events have been useful in incrementally fostering a spirit of dialogue and action in a region that continues to face complex political, water management, and climate challenges. The Indus dialogue events have progressively expanded from a process that involved 12-20 stakeholders from the four riparian countries, to a Forum that now convenes over 100 regional stakeholders (including government, researchers and civil society). Its key success has been in not only being able to convene representatives from all of the riparian countries in a regional dialogue, but in sustaining this interaction. This is a considerable achievement for a region that experiences political tensions, particularly in the context of water. The IBKF process resulted in the development of a joint research proposal on climate change adaptation and resilience in the basin for which funding is now being sought. To support sustainability, SAWI transitioned the convening of IBKF to a regional institution—ICIMOD.

Key Annual Deliverables in FY20

This year, the two remaining activities were completed and closed. No further SAWI activities are planned for the Indus Basin FA.

- Indus Basin Dialogue – closed
- Indus Basin (Pakistan) Groundwater Analysis - closed

(i). Building Trust and Confidence

Under the **Indus Basin Dialogue** activity, this year SAWI helped to facilitate a smooth transition to ICIMOD's leadership of the IBKF and joint research proposals. SAWI therefore provided support to the 4th IBKF event "**Pathways to Impactful Research - Applying the Science-Policy-Communication Interlinkage to Cooperation in the Indus Basin**", (23-24 August 2019, Kathmandu). SAWI provided intellectual and design support to ICIMOD and enabled the participation of additional speakers and attendees (from Pakistan and India).

SAWI also helped to ensure inclusion of a dedicated gender session - Engagement and Inclusiveness in Research - and supported its design and delivery. In partnership with Australian partner ICE-WARM, the session included a speaker presentation and panel discussion on how researchers should engage with stakeholders and how gender inclusiveness can enhance research impacts.

The session was well-received and stimulated comments among forum participants indicating that concepts had been introduced that had previously not been considered (such as

the consideration of gender requirements when developing river flow models). The conference (proceedings) concluded that gender and social inclusion are shared challenges in development priority areas, particularly in the Indus basin, for making research meaningful and impactful.

The proceedings from the IBKF4 were developed by ICIMOD and made publicly available. Although these are not counted as a SAWI output, the report contains evidence of the supported activity. The report also outlines lessons drawn from experience of participating institutions across South Asia.

Looking ahead, the IBKF has identified three key strategies for catalysing future action:

- (i) identifying a representative group of champions to take forward the IBKF mandate;
- (ii) identifying priority research areas towards building a business case; and,
- (iii) using digital networks and platforms to share knowledge and research on cross-cutting issues in the region.

Box 3

THE INDUS BASIN DIALOGUE PROCESS

The 4th IBKF convened 84 participants (including 24 women) from government, academic institutions, development organizations and civil society in Kathmandu in August 2019. Hosted and delivered by ICIMOD, in partnership with the International Institute of Applied Systems Analysis (IIASA), the event enabled participants to deliberate and share experiences on the linkages between science, policy and communications. During interactive workshop sessions, participants usefully identified the three most impactful pathways to policy as follows: Policy-driven impactful research; Engagement and inclusiveness; Packaging of research.

Key messages extracted from the workshop report are as follows:

- Policy decisions on the basin are poorly informed due to limited institutional and technical capacities. An absence of partnerships between academia and policymakers also perpetuates an air of mistrust which further impacts the capacity and expertise that exist in government and research institutions. To address this, organizations could invest in local partnerships with grass-roots organizations, define relevant objectives, develop contextual solutions, and find effective ways of knowledge dissemination.
- The research being conducted within the basin is relevant; however, the poor linkages between scientists and policymakers mean that the social impact being generated by this kind of research continues to leave room for improvement. Along with the need to communicate research findings in a concise manner, encouraging scientists to engage frequently and flexibly with the policy process may play a key role in getting a better understanding of the relevant policy needs.
- Gender and social inclusion are shared challenges in development priority areas, particularly in the Indus Basin for making research meaningful and impactful. Adopting inclusive approaches in planning and implementation are essential in ensuring that the voices of the marginalized communities, specifically women, are included.



Source: Proceedings of the 4th IBKF: Pathways to Impactful Research, ICIMOD (2019). Photo credit: ICIMOD

(ii). Generating and Sharing Knowledge

This year, SAWI completed the **Indus Basin (Pakistan) Groundwater Analysis study**. This body of work is principally targeted at provincial (Punjab and Sindh) and national government agencies with responsibility for management and use of groundwater. The report includes broad recommendations for reform, with identified options for tackling groundwater management challenges aimed at supporting ongoing strategic policy dialogue with stakeholders. The work presents a pivotal moment for water management in Pakistan, demonstrated by the action of the government of Pakistan in publishing a new national water policy in April 2018 (which includes a dedicated chapter on groundwater), and the subsequent willingness of provincial governments to take positive steps to reform water management in their jurisdictions. Punjab has already passed a new Water Act that encompasses all water (including groundwater), Sindh is in the process of drafting a Water Act and Khyber Pakhtunkhwa province has already put a bill before Parliament that proposes a new Water Act. This SAWI report is timely and contains useful messages for the management and governance of groundwater in Pakistan, and the World Bank team is considering options for taking this work further.

Accordingly, two knowledge products were produced: (i) A background paper, at the request of the Sindh government, as a contribution to the development of a new provincial water policy and the preparation of water resources legislation (Sindh Water Sector Improvement Project - P084302); and (ii) A final report for publication online entitled 'Groundwater in Pakistan's Indus Basin: Present and Future Prospects', intended to inform a long-term dialogue on groundwater management with the governments of Pakistan, Punjab (Pak) and Sindh.

The work is highly relevant in several ways:

Firstly, it has the potential to assist the Government of Pakistan in addressing groundwater management challenges in the Indus basin by identifying paths to reform and a program of investments. Pakistan is the fourth largest user of groundwater in the world and that this critical resource buffers the unreliability of surface water supply - for domestic and industrial use, and for irrigation. The Indus Basin in Pakistan has a long history of major investment in surface water infrastructure. By contrast, management of groundwater infrastructure has remained in private hands, leading to uncontrolled expansion of access to groundwater and the corresponding deterioration of the resource. Institutional capacity for governance of these

resources is weak and essential groundwater data that would facilitate improved governance are fragmented and not easily discoverable for a significant proportion of the Indus Basin.

Secondly, this work contributes to an ongoing consolidation of the groundwater knowledge base in South Asia, and highlights opportunities for regional cross-learning on common groundwater management issues. It complements previous groundwater work completed by the World Bank in the Indian Punjab portion of the Indus Basin and in turn was informed by current activities in that state, particularly the work being conducted around the energy-agriculture-water nexus in the Indian Punjab. The work also benefited from the recently completed SAWI advisory work on managing groundwater for drought resilience in South Asia.

Thirdly, the work is relevant in responding to the Covid-19 crisis. The World Health Organization has emphasized the importance of safe water, sanitation and hygienic conditions as essential to protecting human health during all infectious disease outbreaks, including the Covid-19 pandemic. The agriculture sector employs nearly half of the labor force, providing a livelihood to most of the rural population. Groundwater provides 90% of rural and over 70% of urban household water needs. In terms of employment potential and in terms of hygiene requirements, the objectives of sustainable groundwater management and those of responding to the Covid-19 crisis can be met at the same time, and in some cases by conducting the same activities.

The activity has faced several challenges – particularly the lack of reliable data. The process has therefore involved gathering in-country datasets, drawing on grey literature and undertaking extensive consultations with federal and provincial institutions, and with water experts and end-users (farmers) to draw out the main concerns for groundwater.

Formal stakeholder workshops to discuss the final draft report were postponed due to COVID-related restrictions on movement since early March 2020. Nevertheless, the work under this activity has progressively supported discussions with counterparts in the governments of Punjab and Sindh since February 2019. In FY21, the World Bank intends to hold a series of virtual dissemination workshops in Sindh and Punjab to discuss individual, provincial-level progress and actions; and a further workshop at the national level to discuss federal roles in providing national oversight and supporting provincial initiatives. Invited attendees will be from government, academia and civil society.

(iii). Building Institutional and Professional Capacity

SAWI did not undertake any specific capacity building activities in the reporting year, as its two-year program for Government of Afghanistan officials concluded in 2018.

(iv). Scoping Interventions and Investments

As previously reported, SAWI funding has supported implementation of the World Bank's restructured Afghanistan Irrigation Restoration and Development project, which financed the establishment of a transboundary water unit in the Ministry of Environment and Water. Findings from the groundwater analysis study (Pakistan) have contributed to the Sindh Water Sector Improvement Project (P084302), to the design of a pipeline project Punjab Rural Sustainable Water Supply and Sanitation (P169071) and will contribute to a component of the pipeline Sindh Water and Agriculture Transformation Project - (P167596).

Lessons Learned

Climate change remains a constant thread of conversation and offers a useful entry point for participants from different basin countries to come together in a regional sense despite their differences in perspectives.

Location matters. Holding regional events in locations outside the region is more likely to be seen as neutral, thus securing better representation from riparian countries.

Funding is critical to keep dialogue and collaborative processes ongoing. Although the IBKF and the joint research proposal are now being coordinated by ICIMOD, securing future funding will be important to move this process forward.

Access to reliable data can be challenging. This can be partly institutional, but also cultural as stakeholders may be reluctant to share data that is not officially authenticated. One way of tackling this challenge is to broaden the review to include secondary and grey literature, and to draw widely from stakeholder perceptions on the ground.

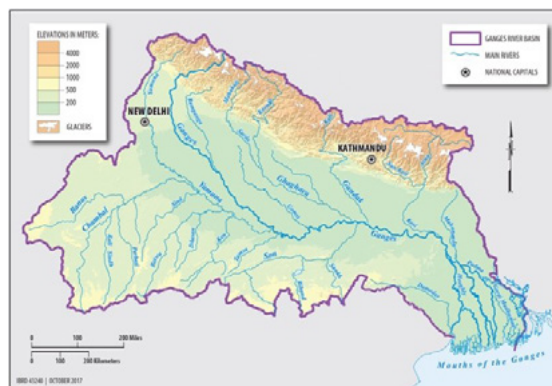
The deployment of local consultants can help to gain insights and surface issues through informal interactions which are otherwise unlikely to be raised in formal meetings.

Covid-19 Implications

There are no significant implications of the pandemic on the deliverables as both activities have ended. There has however

been some delay in getting the final reports ready for publication, and the team proposes to fund dissemination through other budget lines. As noted above, findings from the groundwater study could be used to support the case for essential reforms to bolster future resilience for situations such as caused by the pandemic.

Ganges Basin Focus Area



Context and Strategic Approach

The Ganges Basin, a complex hydrological system, spans India, Nepal, Bangladesh and a small area of China. It is one of the largest and most populous river basins in the world, covering around 1.2 million km and home to more than 655 million people. The hydrology of the basin is dominated by the annual monsoon that delivers about 80 percent of annual inflows in just three months of the year.

Water is a prominent channel through which climate change is becoming visible. Agriculture dominates water use and the resources of the basin are under increasing pressure, the ecological health of the river is affected by pollution, excessive water withdrawal, and infrastructure, and vast areas of the basin are prone to frequent and devastating floods.

SAWI's approach has been developed to respond to stakeholder priorities and interests, capacities, and to be responsive to the political economy of sensitivities related to water as a shared resource. In India, SAWI's work is closely aligned with national programs and World Bank investments. Technical assistance and capacity building across central and state organizations is focused on strengthening integrated water management. SAWI has helped to improve flood forecasting in India-Nepal border sub-basins (Bihar state). Complementary work in Nepal focuses on two priority areas: a) establishing mechanisms and capacity for basin planning to support sustainable hydropower development; and, b) supporting a process of federalization

of effective service delivery of water management in line with Nepal's new constitutions.

Emerging Outcomes

In Nepal and in India, there is growing realisation of the need to increase resilience and capacity for adaptation. SAWI's work is also supporting coordinated working across agencies for water resources planning and management.

In India, SAWI's support in previous years successfully delivered a multi-year strategic basin planning for the Ganges, which enables scenario-based river modeling and planning⁸. Furthermore, technical and capacity support to the Government of India's National Hydrology Project (NHP) – which is strengthening the water monitoring system all over the country - has helped to strengthen capacities of national and state agencies on hydromet, and in water resources planning, operation and management.

In Bihar, following testing of the flood forecasting tools (delivered in previous years) for the Bagmati-Ahwarra sub-basin⁹, these models have been operationalized by the state's Flood Management Improvement Support Center and are being scaled up under the World Bank supported Bihar Kosi Development Project and National Hydrology Project (NHP) to expand coverage in the State. Consequently, bilateral agreements between India and Nepal to share hydro-met data provided an opportunity to pilot test flood forecasting services to provide essential 7-10 days flood forecast that can guide both community preparedness and early interventions by the state government to minimize the impacts of floods.

In Nepal, there is strong political consensus for the federalization of effective service delivery of water management, and SAWI has helped to initiate a consultative process that involves stakeholders across government agencies, as well as with donor partners. Progress towards environmentally sustainable hydropower projects seems to be steady although, if the funding gap remains, there is a risk that some of this analytical work may not conclude satisfactorily.

The electricity sector is also strategically important for Nepal, and the Government of Nepal has set ambitious targets for hydropower development. SAWI's integrated approach to river basin planning and hydropower master planning is critical to the

planning and development of projects that are environmentally and financially sustainable, enable resource efficiency through multi-purpose project development, and that take account of internal demand as well as regional energy markets for trading.

Key Annual Deliverables in FY20

This year, five SAWI activities were operational, of which three drew to a close, two activities remain ongoing, and one has been mobilized as follows:

- Ganges Dialogue – closed
- Nepal-Sustainable Water Resources Development for Hydro-electric Power (HEP) (BE)- closed
- Nepal-Power Sector Reform and Sustainable Hydropower Development (RE)- closed
- Nepal Water Platform – newly initiated, ongoing
- WRM in Transboundary Basins (India) – ongoing
- Nepal River Basin Planning and Sustainable Hydropower Development (mobilized)

(i). Building Trust and Confidence

The **Nepal Water Platform** activity started in FY20. Its Platform Support Unit (PSU), launched under this activity, brings together key decision makers from water sector ministries to deliberate on water development and management. It provides the required high-level backing and authorizing environment for the approval and implementation of technical and policy recommendations for the sector.

Since last year, through the Nepal Water Platform, the World Bank has held periodic consultations on how to support the Government of Nepal in its federalization support for effective service delivery. Some notable events in this reporting year include:

- (i) Round Table on Opportunities and Challenges in Urban Water and Sanitation Service Delivery in Federal Nepal (November 2019);
- (ii) Dialogue with Independent Observers on Water Development in Nepal (November 2019);
- (iii) High-level consultation meetings followed by a joint meeting of the Secretaries (Irrigation, Water Supply, and WECS) to launch the PSU Steering Committee on November 25, 2019.

⁸ All project analyses are available at www.gangariverbasinplanning.com. The reports are also hosted on the Central Water Commission (CWC) website at cwc.gov.in/basin-planning-studies.

⁹ These tools enable a robust 24x7 feed of short-to-medium range rainfall forecasts for use in operational flood forecasting models.

The Platform continues to support cross-sectoral collaboration within the World Bank Group (GPs and IFC), with Development Partners, and with national and sub-national Government agencies. The activity continues to work towards supporting the institutionalization of the Platform within the Government of Nepal's federal structure, to enhance country-wide institutional coordination and ensure the Platform's long-term sustainability.

(ii). Generating and Sharing Knowledge

The **Nepal Water Platform** activity builds on work done under a previous Water Platform (funded through other non-SAWI sources) in FY18/19 in which a preliminary *Strategy note* for water development was prepared following extensive consultations with key stakeholder groups within the water sector in Nepal.¹⁰ SAWI is helping to refine and finalize the Strategy note, along with a medium-term cross-sectoral roadmap and results framework. This work is highly relevant as the ongoing Covid-19 pandemic underscores the urgency of ensuring that all households in Nepal have directed access to piped water, rather than sharing communal water points.

The following deliverables were produced this year:

(i) Nepal Water Diagnostic 2020 was prepared using available data and secondary sources. The diagnostic outlines challenges facing the sector and provides key directions for the way forward. The document is relevant and can be summarized as policy briefs for discussion with government across relevant ministries and departments.

(ii) Pre-scoping note for investment in IWRM based Municipality-wide Water and Wastewater Management in Nepal. This work is intended to support and inform the Ministry of Water Supply's proposed program to improve water supply and wastewater services in 70 rural Municipalities, six provincial headquarters and 15 large cities in Nepal. Pre-scoping site visits were also conducted to Surkhet municipality (Karnali Province) and Mahalaxmi municipality (Kathmandu).

(iii) Assessment of Nepal Policies, Institutions and Regulations (PIR). This diagnostic pertains to the provisioning of water supply and sanitation (WSS) facilities in the context of Nepal's constitution. It provides a key set of take-aways that are not only relevant for policy makers but also for the way in which development partners design their interventions to support the water sector at all levels.

(iv) Water Quality Management in Nepal. The main objective of this study is to review and analyze drinking water quality management in Nepal in the context of federalism, identify challenges in water safety planning, implementation, monitoring, and sustainability of water quality development, and propose appropriate policy, institutional, operational interventions to enable Nepal to achieve the UN Sustainable Development Goals.

(v) Urban/Municipality-wide WSS service delivery undertakes a status assessment of the provincial capitals, including institutional arrangements, the water supply situation and performance of water utilities in select municipalities, and presents steps for improvement of water supply services.

(vi) Additionally, five technical notes were developed (December 2019), including master documents on water supply and agriculture, guiding frameworks for Environmental and Social Impact Assessments and on institutional analysis for river basin planning, and training on hydrological modeling.

This year, two complementary activities, the **Sustainable Water Resources Development for HEP in Nepal** (BE) and the **Nepal Power Sector Reform and Sustainable Hydropower Development Project** (RE), were completed and closed. While the BE activity (reported separately below) focused on building capacity of key Nepali stakeholders on hydropower and water resource management, the RE activity focused on helping to prepare master plans for river basins of Nepal to support power sector agencies to plan and prepare hydropower and transmission line projects following international standards and best practices.

Through the RE activity, SAWI delivered the following:

- (i) An extensive review of policies, legislation and institutions relevant to water resource development in Nepal;
- (ii) A Political-economic analysis in relation to river basin water resources development in Nepal;
- (iii) A completed hydrological modeling of Koshi Basin and West Rapti Basin. Modeling in other basins is nearing finalization;
- (iv) Notably, a list of prospective projects to be included in the hydropower master plan have been identified and prepared;
- (v) A working paper on electric power market assessment that explores markets within Nepal, and in India, Bangladesh and China. This report comes at a time of numerous

¹⁰ World Bank, 2019. *Nepal Strategic Note for the Conservation, Development and Management of Water*. Internal Use Only.

debates on the electric power markets for Nepal's surplus electricity generation and will usefully inform economic analysis of prospective hydropower projects in the river basins. Stakeholder analysis and engagements have also been carried out at the central, provincial and field levels.

The **Water Resource Management in Transboundary Basins** activity mainly focused on capacity building this year (as detailed in the section below). As such, training products and manuals were delivered, and these resources are available on the NHP website¹¹.

The **Ganges Dialogue** activity (closed) made its report publicly available. The report, "Hydrologic and Water Resources Modeling for the Ganges Basin – A Compilation and Bibliography"¹² could be a useful technical resource as it offers a compilation of the different types of modeling work and includes a bibliography of over 100 published papers on hydrologic or water resource modeling relevant to the Ganges basin.

(iii). Building Institutional and Professional Capacity

The BE component of the **Sustainable Water Resources Development for HEP in Nepal** activity delivered trainings and exposure visits which has helped build capacity of staff members and organizations in planning and implementing water projects in more holistic and integrated approach. A fifteen-day training on hydrological modeling: concepts and applications (November 2019) targeted nine participants (three women) from government agencies and academic institutions (WECS; Department of Hydrology and Meteorology (DHM); Department of Water Resources and Irrigations DWRI; Tribhuvan University (TU)) working in the area of river basin planning and management.

A faculty exchange program was conducted between Kathmandu University (KU) and Wuhan University (WHU) (August 2019). Eight faculty from WHU visited Nepal, while three faculty from KU visited Wuhan which helped to stimulate knowledge sharing on specific research topics and project management. Furthermore, 18 Nepali fellowship students (including nine women) from five universities across Nepal, visited China's Wuhan University and benefitted from lectures and field work. Similarly, field research was carried out by WHU faculty and students in Nepal on turbine technology. Consequently, KU has noted that this experience and networking has not only helped to build their hydropower

and water resource management skills but could also lead to the development of future projects.

Pictured: 2019 Fellowship students with WHU and KU faculties at Wuhan University



The RE activity implemented a 10-day study tour (January 2020) for six officials from WECS, the Ministry of Finance and the Ministry of Energy to the Columbia Basin (Idaho and Oregon, USA). This tour included interaction with a number of national and state agencies, experts, universities and other organizations operating in the basin to build capacity in river basin and hydropower planning. Following the study tour, the officials visited the World Bank offices (Washington) to meet with World Bank staff to discuss the approach and methodology for the basin plans and hydropower masterplans, and to take home best practices from other World Bank projects and studies on the economic aspects of water resources development, IWRM and SESA.

The ongoing **Water Resource Management in Transboundary Basins** activity focused on improvement to hydromet systems and exposure of key stakeholders in India to innovative analytical techniques for water management and modeling. Some 235 people (including 46 women) participated in capacity building events and training this year.

SAWI supported five multi-day training events on GEE and other analytical tools, such as Python, as follows: (i) Training on Water Budgeting tool for river basins using Google Earth Engine (GEE) applications (19-23 Aug 2019, NIH Roorkee); (ii) Training on

¹¹ http://nhp.mowr.gov.in/HIS/docs/Manual/Hydromet_Manual.pdf

¹² <https://documents.worldbank.org/en/publication/documents-reports/documentdetail/217491583389284853/hydrologic-and-water-resources-modelling-for-the-ganges-basin-a-compilation-and-bibliography>

GEE (4-5 Dec 2019, New Delhi); (iii) Training on Python tools for Water Resource Management (16-20 Dec 2019, Ahmedabad); (iv) Training on Water budgeting tool for river basins using GEE applications (6-11 Jan 2020, Ahmedabad); (v) Online training on Water budgeting in GEE (24 June – 1 July 2020, online). GEE

is a technology that has revolutionized remote sensing data inventory, processing and analysis and that a major thrust of the activity this year was to promote GEE utilization in water resources planning processes under NHP.

Box 4

CAPACITY BUILDING PROGRAM

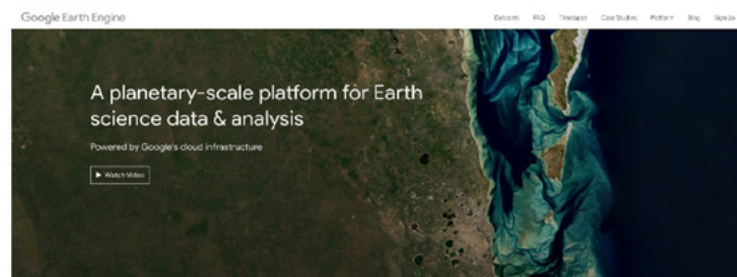
A six-day training course, Virtual training - Water budgeting in GEE (June 24-July 1, 2020), focused on harnessing the power of disruptive big data-driven Geospatial and Data Analytics technologies for application in water resources management, environment and natural resources monitoring and other related sectors, including Agriculture, Climate Change and Disaster Risks. Participants included government agencies and related water management institutions involved in India's NHP, and benefitted from new technologies to improve the extent, quality, and accessibility of water resources information.

The GEE trainings have enabled participants to develop products related to remote sensing analysis, water budgeting models and water availability reports. This tool is in particular, helping to overcome high end hardware requirement for processing remote sensing and data constraint. States are now using these to assess crop water requirement, water storage in water bodies and for hydromet optimization.

DATA TO DECISIONS: BIG DATA ANALYTICS FOR WATER, ENVIRONMENT AND NATURAL RESOURCES MANAGEMENT

Introduction to Google Earth Engine

Link to accept Training Repo: https://code.earthengine.google.com/?accept_repo=users/hrishippatel/GEEKATHON



Earth Engine Main Page: <https://earthengine.google.com/>
Code Editor Window: <https://code.earthengine.google.com/>
Overview Page: <https://bit.ly/37vIFyk>
GIS and Remote Sensing Overview: <https://bit.ly/2QkFDPw>

The training presented open source and public domain platform capabilities for water resource management, including: (i) pre-processing modules to facilitate the preparation of input data, (ii) modeling tools for the analysis of several processes using Python and GEE aimed at supporting water resource management, and (iii) post-processing tools to present knowledge and advisory products for water resource application in India.

Google's GEE platform was used to demonstrate large- and small-scale scientific analysis and visualization of geospatial datasets. The training course covered basic elements of data storage, product development and organization, and demonstrated access to a wide variety of satellite imagery and geospatial datasets to offer global-scale environmental data analysis capabilities. Participants gained practical hands-on experience of using GEE and Python and worked on case exercises such as flood mapping in Assam, Bihar, Vadodara, Kerala; cropping intensity in West Bengal; and water body mapping. This enabled them to get a real-world feel of environmental remote sensing applications.

Although not counted strictly as training events, it is worth highlighting two key meetings: (i) A Vendors consultation meeting (26 Sept 2019, New Delhi) helped address the bottlenecks faced by industry and service providers for participating in Hydromet bids. The activity resulted in changing specifications, eligibility criteria and commercial conditions. Consequently, participation in recent Hydromet bids under NHP has improved significantly; and (ii) A modeler's meeting (6-7 Dec 2019, New Delhi), organized under NHP, was aimed at improving the response of hydromet providers and at enabling the exchange of hydrologic and hydraulic modeling activities among staff of water resources organizations. Modelers from across the country participated in this event. The sessions also included discussions on Groundwater modelling, The MIS of the NHP has taken up a Mapping of Modelers to help facilitate knowledge exchange among these practitioners.

(iv). Scoping Interventions and Investments

The two complementary activities in Nepal - **Power Sector Reform and Sustainable Hydropower Development Project (RE)** and the **Sustainable Water Resources Development for HEP (BE)** support work on river basin planning and hydropower development in Nepal including through the World Bank's investment in the Power Sector Reform and Sustainable Hydropower Development project (P150066) (\$20M), and the design of a Development Policy Credit (P154693) (\$100M).

The **Nepal Water Platform** activity is informing the following projects through collaborative analytical work and cross-sectoral dialogue: Nepal Rani Jamara Kulariya Irrigation Phase 2 (P158364, \$66M); Nepal Rural Water Supply & Sanitation Improvement (P143036, \$72M); Nepal Urban Governance and Infrastructure Project (P163418, \$150M); Nepal Building Resilience to Climate Related Hazards (P127508, \$31M); Kabela- A Hydro Electric Project (P122406, \$46M), as well as the Power Sector Reform and Sustainable Hydropower Development noted above.

In India, SAWI's work is linked to the Bank-financed Bihar Kosi Basin Development Project and is being scaled up by the World Bank-financed NHP (\$175M), which is being implemented by 38 state-level agencies and 10 central government agencies.

Lessons Learned

Alignment of SAWI activities with national programs and priorities has been an important strategy. For example, working alongside national programs (such as the NHP in

India and the water strategy in Nepal) has enabled SAWI to engage with a range of stakeholders. This has been important particularly in a basin where there are diverse interests, perspectives and limited regional collaboration. This has also enabled demonstration of models, such as the flood forecasting work in Bihar India, which then have an institutional home and can be taken to scale.

Despite the lack of a regional platform, building collaborative national-level forums has been equally important in bringing together key decision makers from across sectors. For example, the Nepal Water Platform PSU has brought together decision makers from water sector ministries to deliberate on water development and management. This platform provides the required high-level backing and authorizing environment for technical and policy measures that will be beneficial to the sector.

Studies such as the Water Sector Diagnostic (Nepal) and the Strategy Basin Planning (India) are invaluable in that they have brought an integrated and multi-sectoral lens to national strategies on water resources development. In Nepal, this broader developmental approach is critical to ensuring water availability for basic and economic needs – a core component of Nepal's development plan. In India, it has built a strong knowledge base and convened multi-stakeholders to a common framework for using water resources in a sustainable manner.

Government-led RE activities need to secure funding in cases where they continue beyond SAWI. For instance, SAWI's support to the Nepal river basin study (RE) has ended. This component continues to face a funding gap and there is a risk that the completion of the study may be compromised.

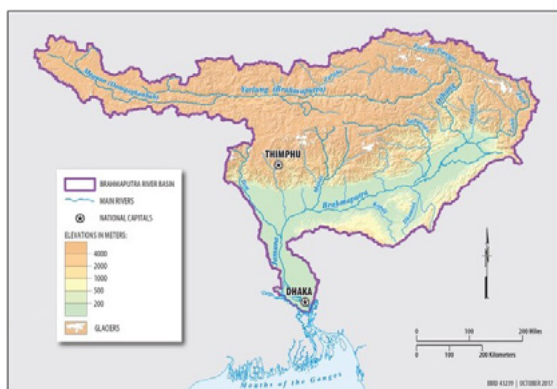
Where capacity of national implementation agencies is limited this can impact decision making and pace of implementation. SAWI's support through provision of consultancy expertise, training in key areas such as procurement and use of IT-enabled analytical tools, is helpful in building critical capacity to progress programs.

The mode of online training (due to the pandemic) has flagged some interesting lessons. The quality of pre-recorded instruction was deemed better than live recordings and has enabled a broader outreach to national stakeholders. A key lesson is that training needs to be customised to enable participants to complete the modules at their own pace as it is otherwise difficult for them to dedicate the full day to this mode of instruction.

Covid-19 Implications

There are no significant delays on program deliverables due to the pandemic, although one activity (Nepal) has been extended to 2021. However, some important issues arise as follows: firstly, the Nepal Water Platform supported the Government in its preparation of a Covid-19 response strategy. The Water Sector Diagnostic report raised the criticality of clean water supply and sanitation in medical facilities during the response phase and of overall hygiene improvement in households during the resilience phase. It has facilitated inter-agency coordination among Ministries in charge of water supply, schools and medical facilities for their efforts to improve sanitation policies and services. Furthermore, it has brought all development partners working on water and sanitation sector together to align any assistance activity. Secondly, training could not be delivered in person. The team dealt with this through online training, but this is not a full substitute for face-to-face learning. Finally, it is not as yet clear how the pandemic will shape national priorities or impact regional markets. While there is growing realization that the availability and multiple uses of water will be important for economic recovery and for building resilience, in the short term, competing priorities for budgetary resources may result in reprioritization and refocusing of activities.

Brahmaputra Basin Focus Area



Context and Strategic Approach

The Brahmaputra River Basin¹³ is one of the largest and most complex in the world for a variety of reasons, including its challenging topography and hydrological environment. The river originates in the Himalayas of China and flows through India and Bangladesh, with flow contribution from Bhutan. The river is an important source of livelihoods and increasing demand for energy is spurring investments in hydropower. The Brahmaputra is prone to severe flooding annually and climate change is expected to result in more frequent and intense floods.

Development in the basin has historically been piecemeal, undertaken on a project-by-project basis at the country level rather than a transboundary basin-wide approach.

The political economy of the Brahmaputra Basin remains complex and challenging for a variety of reasons that extend beyond issues related to sharing of the river waters itself. Complex geopolitics between upstream and downstream countries are amplified by an incomplete basin knowledge base, varying technical capacities of water resources management professionals, and power asymmetry amongst the riparians.

SAWI works to address these challenges and build on potential opportunities by supporting a basin dialogue that brings together key stakeholders to build trust and a common understanding of the challenges and opportunities, developing technical knowledge, and supporting joint action. SAWI's strategic approach involves engaging at multiple levels, for example, sub-regionally within India (NER water resources), with other country-level activities (Bhutan and Bangladesh hydro-met services / disaster risk management; and Bhutan's hydropower plans), and at the regional level (dialogue activities). SAWI's support is bringing consistency, alignment and integration with other-related World Bank investments at the state and country levels and is helping to ensure that they inform each other.

Emerging Outcomes

SAWI's activities have focused on promoting collaboration, helped to prioritize and build a comprehensive knowledge base, including on critical issues such as hydromet services, disaster resilience and water resource management, and enabled quick action in response to government demand.

Positive outcomes are starting to emerge. Firstly, the Brahmaputra Dialogue – considered a foundational activity for the program – has steadily opened up the dialogue space to multiple stakeholders from the four riparian countries and has moved from Track 3 process to Track 1.5. This has led to establishing formal and informal networks between countries (e.g., IIT-Guwahati and Shanghai Institute for International Studies (SIIS)).

Secondly, highly technical work, such as the Basin Modeling and Analysis undertaken in previous years, has significantly built the knowledge base on the Brahmaputra Basin in NER. There is growing awareness of riparian countries on the broader potential of regional aspects of water, namely

¹³ The river is called – Yarlung-Tsango- Brahmaputra-Jamuna

hydropower development and trade, inland water transport, and disaster risk reduction.

Thirdly, SAWI activities have sparked government requests for investments. For example, following a rapid assessment of water resources and an Action Plan for improving water resource management in the NER, has led to design of the \$500M AIRBMP – a multi-phased programmatic approach over ten years – which aims to improve water security in Assam.

Finally, capacity building support to hydromet agencies in Bangladesh and Bhutan is enabling better access to and use of weather-related data for effective forecasting.

Key Annual Deliverables for FY20

This year, SAWI satisfactorily completed and closed two of its three active grants as follows:

- Brahmaputra Dialogue (complete)
- Bhutan Hydromet Services and Disaster Resilience (complete)
- Strengthening Hydromet Services and Disaster Resilience in Bangladesh (ongoing)

(i). Building Trust and Confidence

There was no SAWI-supported **Brahmaputra Dialogue** event this year. Instead, the main thrust of SAWI's work has been to work through the partnerships formed in previous years and to advance collaborative engagements to support the dialogue process and serve as a tangible output.

These include the following:

- (i) The book, "*Perspectives on the Yarlung-Tsangpo-Brahmaputra-Jamuna River Basin*", initiated at the request of the Brahmaputra Dialogue participants, was co-produced with dozens of contributors from the four riparians, including ambassadors, other policy makers, top scientists, academicians, journalists and civil society. This work marks a first attempt at documenting the Brahmaputra as one river system and presenting a multi-layered, holistic perspective of the basin. Significantly, the report shows that the dialogue process has succeeded in bringing the countries together around the common objective of producing a joint output. Both gender and climate change are prominent themes in the report. SAWI

financed the editors and other aspects of the report's production, including limited travel. The book is currently in draft form and is planned to be completed in August 2020. The World Bank is discussing options for its publication and dissemination.

- (ii) An article on "*Re-Interpreting Cooperation in Transboundary Waters: Bringing Experiences from the Brahmaputra Basin*", was co-authored by experts from the region and published in *Water Journal*, December 2019.¹⁴ This article brings a broader lens to cooperation that extends beyond formal diplomacy (Track 1) and recognizes the role that institutions can play in influencing and informing dialogue and policy action.
- (iii) A *White paper on Plastics and Rivers in South Asia*, featuring the Brahmaputra Basin, was completed to respond to an emerging issue of common concern in the basin. One of the entry points on cooperation in the management of the Brahmaputra Basin is plastics pollution. In order to inform the dialogue, a desk study was conducted to better understand the scale of the problem, initiatives underway, etc. in the Brahmaputra Basin and other major rivers in South Asia. The study is currently in draft form and will be completed under a 'sister' SAWI grant on plastics in South Asia that was recently approved (details reported under the Regional FA section).
- (iv) Finally, a short video on "*Voices from the Field on the Brahmaputra Dialogue*", produced in November 2019, captures development ideas and plans from community leaders, water management experts, and other stakeholders on the Brahmaputra basin as a whole¹⁵.

The Dialogue process has helped to establish and build momentum over the years, sustaining engagement and stakeholder connections, and helping to evolve the discourse on transboundary cooperation largely through collaborative knowledge activities.

This has been institutionalized, including through partnerships established between institutions from across the riparian countries. There is strong likelihood that some of these partnerships will continue – for example, between IIT-Guwahati and SIIS through a planned MoU. However, without external facilitation there is some risk that the Brahmaputra Dialogue may not be able to continue in the same form.

¹⁴ Barua, A.; Deka, A.; Gulati, V.; Vij, S.; Liao, X.; Qaddumi, H.M. Re-Interpreting Cooperation in Transboundary Waters: Bringing Experiences from the Brahmaputra Basin, *Water* 2019, 11, 2589. <https://doi.org/10.3390/w11122589>

¹⁵ <https://www.youtube.com/watch?v=ZHhp500Rges&feature=youtu.be>

NEW KNOWLEDGE ON PLASTICS POLLUTION

South Asia is estimated to generate solid waste of 334 million tonnes per year (World Bank, 2018). There is increasing awareness and public concern in plastic waste and its effects in polluting the environment, rivers and oceans, and the impacts on human health, the ecology and the economy. The Brahmaputra Dialogue has developed a situation analysis to understand the issues related to plastic pollution, with a focus on South Asia. The objective is to collect secondary literature, drawing on the existing body of knowledge, and synthesize the information on plastics and plastic pollution at the global and regional scale.

The paper reviews the policy landscape for plastics management in South Asia, specifically Bangladesh, Bhutan, India and Nepal. Case studies and information are summarized for these focus countries on urban plastic waste management systems, recycling trends and policy framework for plastic waste management.

The analysis broadly covers the following:

- Basic information on plastic
- Current knowledge status of plastic leakage (leakage is defined as the combination of losses and releases of plastic into the environment)
- Plastic leakage in South Asia
- Alternatives to the plastic economy
- Options for waste management
- Policy landscape for plastic management in South Asia



(ii). Generating and Sharing Knowledge

In previous years, the **Basin Modeling and Analysis** developed a full model of the Brahmaputra Basin and completed a Rapid Assessment of water resources issues in the NER¹⁶. It also supported a unique Gol initiative to improve water resources management in the NER by bringing together various central and state level stakeholders to devise an Action Plan roadmap. This year, SAWI has used its knowledge base to advance discussions with Gol, including on their request for lending TA (under discussion).

Another significant development is that the World Bank has been able to respond to a request from Government of Assam for the design of the AIRBMP investment, which is intended to address a critical gap by strengthening state capacity and building resilience to flood and erosion management in the longer term. The AIRBMP focuses on Assam but it is meant to be a stepping-stone to engagement on management of the Brahmaputra in the wider NER and presents a unique opportunity to advance Central-State, inter-State and inter-agency cooperation.

The request for the project was received from the Government of India in early June and is in very early stages of project

preparation. There is potential for AIRBMP to contribute to river basin planning (which will naturally extend beyond Assam given that the Brahmaputra Basin is a transboundary river system that is shared by multiple States in the NER and other countries) and disaster risk management (for example, by bringing best practice in flood management from Bangladesh to Assam). This SAWI activity helped to initiate support to AIRBMP and is now closed. The World Bank team is drawing on another SAWI grant (funded under the Regional FA) to continue to support the preparation of the project and ensure that transboundary aspects are well integrated.

(iii). Building Institutional and Professional Capacity

This year, there were no specific training events. However, the design of the AIRBMP program will draw on SAWI analytical work and proposes to focus on improving the performance of water resources and disaster risk management agencies to more effectively carry out their mandates, put in place mechanisms for intra and inter-agency coordination in Assam, help to improve cross-border collaboration on common challenges and opportunities, and modernize water and disaster management agencies.

¹⁶ The Rapid Assessment was completed in previous years, and assessed the state of water resources planning, management, and development in the North-East region (current conditions, challenges and opportunities), recommending actions for improvement, and setting a high-level path towards proper management of water resources. This work informed the High-Level-Committee's report to the Prime Minister of India on the initiative on water resources management in North-East India. The Road Map formed the basis for a request from the Government of India for support to the AIRBMP, currently under discussion

Under the ongoing **Strengthening Hydro-met Services and Disaster Resilience in Bangladesh** activity, SAWI has supported technical assistance for the design and procurement of critical observation modernization packages, including ground water, surface water, weather observation stations and coastal storm surge monitoring stations, and provided capacity support to the hydromet implementing agencies [Bangladesh Water Development Board (BWDB, the hydrological agency), and the Bangladesh Meteorological Department (BMD)]. The SAWI grant was instrumental in supporting the revision in overall investment design and restructuring process to allow Bangladesh to proactively manage the challenges in implementation of this technically complex investment program.

Technical assistance is being provided in a wide range of topics, including the development of tender documents, contract management for implement the large observation network procurements. Support is also prioritized for developing the design of an early warning activity, including the use of remote information for flash flood early warning and continued support for agro-advisories which are a critical channel for delivery early warning. The project has conducted user-satisfaction survey baselines with support from SAWI.

This SAWI activity is supporting the three components of the World Bank investment, Bangladesh Weather and Climate Services Regional Project (BWCSR). The planned cross-border training with the India NHP to allow for intensive knowledge sharing has been delayed due to Covid-related constraints. The task team is exploring the use of virtual training as a tool. Through ongoing Technical Assistance and by fostering dialogue across departments, the World Bank's SAWI task team also supports Bangladesh's participation in the South Asia Regional Hydro-met Forum (SAHF), which is funded through other TFs.

(iv). Scoping Interventions and Investments

Several SAWI activities continue to inform the design of larger World Bank investments in South Asia. The Hydro-met activity in Bangladesh (current in FY20) and in Bhutan (ended FY19) continue to inform the design of longer-term programmatic activities, including the Hydro-met Services and Disaster Resilience Regional Project (P154477), which comprises Technical Assistance and investment operations in multiple countries; and the Bangladesh Weather and Climate Services Regional Project (P150220), currently under preparation. Other SAWI activities have led to requests from the Gol for TA (\$70M) for water resource management in the NER, and to the design of the AIRBMP program (P174593, \$500M), as noted above.

Lessons

Transboundary dialogues are complex with no quick wins, but can present windows of opportunity. The Brahmaputra Dialogue process confirmed that time and sustained commitment are required to bring the multiple stakeholders together around a common aim particularly when country priorities align with the regional agenda (e.g., inland water transport and disaster risk management, both of which require a regional approach to realize full benefits and are also country priorities).

Common areas of interest across riparian countries work best as an entry point to dialogue. The dialogue was successful in engaging a wider range of stakeholders, but there was hesitancy of government agencies in some Brahmaputra Basin countries to engage formally given the wider sensitivities. The Dialogue process avoided political sensitivities to the extent possible by using common areas of interest across the riparian countries, such as hydromet and hydropower development, and more recently, by initiating work on plastic pollution.

Strong country ownership is vital to successful uptake. Linking the dialogue activities to World Bank operations, such as projects and other analytical work, helped to leverage the outcomes of SAWI's grant activities. For example, the multi-stakeholder platform built assisted in establishing relationship with stakeholders that were involved in World Bank lending operations, such as the Assam Flood Project. Nevertheless, the success of the activity was closely linked to the fact that it directly responded to client demands and was not supply driven.

Building a common vision requires sustained work and time. Integrated river basin planning in a transboundary context (in this case, nine States of India plus the Central government) is a very complicated process, and the technical aspects (modeling frameworks, analytical tools, data, etc.) are the least of it. Such exercises require intensive consultation with the multiple stakeholders involved at various levels and across multiple sectors.

Covid-19 Implications

The Covid-19 pandemic has affected some planned work, as follows:

- (i) China (SIIS) planned to host a second conference that had to be cancelled altogether due to Covid-19. In addition, some of the Brahmaputra Dialogue participants planned to attend a related conference on Asian International Rivers hosted by TU, during which the team planned to

hold a side event for the Brahmaputra Dialogue, but the conference was called off due to Covid-19.

- (ii) The team's planned travel could not take place. These included visits to the NER and China for progressing the Yarlung Tsangpo-Brahmaputra-Jamuna River Basin report; and selected field work to supplement the desk study on rivers and plastics.
- (iii) The planned AIRBMP and the TA lending offer the potential to further explore implications of the pandemic on water resources.
- (iv) The work on plastics could be relevant for informing thinking on tackling plastic pollution due to the Covid-19 pandemic.

Sundarbans Landscape Focus Area



Context and Strategic Approach

The Sundarbans Landscape (Ganges-Brahmaputra Delta) is the largest delta in the world and home to over 123 million people, into which drain rivers from Bhutan, China, India, and Nepal. It contains the world's largest remaining contiguous mangrove forest and a wetland of international importance, spanning large portions of coastal Bangladesh and India. This area is home to 13 million people, including some of South Asia's poorest and most vulnerable communities.

This year, the combination of the cyclone Amphan that hit the Sundarbans in May 2020 and the pandemic had devastating impacts for the landscape and the people living there. The Sundarbans is exposed to a unique set of natural environmental hazards – storm inundation, saline intrusion, sea level rise, coastal erosion, and channel sedimentation – many of which are set to intensify due to global warming. Climate change is a major threat to the Sundarbans and to the forest-dependent livelihoods of its surrounding inhabitants. Technical knowledge on how climate change impacts its vital ecosystem and local

populations has been scarce yet is so essential for promoting awareness and for effective resource management.

In 2011, Bangladesh and India signed (non-binding) agreements on a host of issues to pave the way for joint actions on the Sundarbans. Both countries have been discussing the establishment of a joint mechanism for cooperation to guide development, conservation, and resilience of the Landscape, but are yet to reach formal agreement.

SAWI's activities support the operationalization of this 2011 agreement for delivering mutual benefits for both Bangladesh and India through: (1) multi-stakeholder dialogue aimed at enhancing trust and bilateral cooperation for joint management of the Sundarbans Landscape for sustainable development; and (2) technical cooperation between the two countries through joint research, studies and dissemination that focused on government priorities and needs of the inhabitants of the Sundarbans Landscape.

Emerging Outcomes

SAWI's activities are finding traction at the highest policymaking levels in both Bangladesh and India. This positive momentum over the years, is evidenced by multiple official statements and signing of bilateral agreements that have a bearing on Sundarbans. The establishment of the formal joint institutional mechanism is on the horizon and discussions are progressing well. In the interim, the SAWI-supported BISRCI remains the main platform to engage high-level policymakers. This group of government and non-government organizations, established through the dialogue activity, continues to work towards establishing the formal joint institutional mechanism.

The Sundarbans Dialogue activity has been instrumental in supporting multi-stakeholder interactions at various levels and creating a positive environment of trust. As such, there is a richer, deeper and more representative discourse between the two countries on the Sundarbans. Targeted studies, knowledge and capacity building have enhanced understanding across multiple stakeholders, spanning local to international levels and including senior-most policymakers. This is leading to deeper realization of the possibilities and benefits of cooperation on the Sundarbans – evidenced by the uptake of the knowledge products by BISRCI, and the participation of policy makers and government officials in SAWI Sundarbans events in Dhaka, Kolkata and New Delhi and at international platforms, such as the Climate Change Conferences of the Parties (CoP) in Paris and Bonn.

“For millions of people who live in the Sundarbans, development opportunities are limited. Livelihoods suffer from frequent natural disasters, such as Cyclone Amphan, which recently devastated the region. Climate-change assessments project an increase in such disasters. The multidisciplinary studies conducted by the World Bank on issues for which available evidence is limited, provide a solid foundation for discussion of targeted interventions for vulnerability reduction in the Sundarbans.”

- J.M. Mauskar, Advisor ORF and Former Special Secretary, Ministry of Environment, Forests, and Climate Change

In terms of the wider enabling environment, other developments over the years include: (a) setting up of the bilateral Joint Working Group (JWG) on Conservation of the Sundarbans, which is a positive signal of continued intent to find collaborative solutions. SAWI's activities and studies support the objectives of the JWG; and, (b) The Bangladesh and India agreement on movement of passenger and cruise services as part of the 'Protocol on Inland Water Transit and Trade', which, through BISRCI facilitation and use of SAWI knowledge products, enabled a policy action to commence eco-tourism river cruise between Dhaka and Kolkata via Sundarbans in March 2019.

Key Annual Deliverables for FY20

This year, the two remaining activities were satisfactorily completed and closed. No further activities under SAWI are planned for the remainder of this phase:

- (i) Sundarbans Dialogue – closed
- (ii) Targeted Environmental Studies – closed

(i). Building Trust and Confidence

The **Sundarbans Dialogue** has been a key contributor in building trust between Bangladeshi and Indian stakeholders towards operationalization of agreements for joint management of the Sundarbans Landscape. This year, each of the countries progressed internal discussions towards the joint institutional mechanism. SAWI supported a process which involved the development of a draft internal policy note outlining the broad parameters of such an institution, its governance structures, scope of work, mechanisms for coordinating and engaging with implementing bodies at all levels, and provisional budgetary resources. A bilateral meeting to discuss this, planned for March 2020, could not take place due to the pandemic.

Going forward, SAWI anticipates that these efforts will sustain.

The JWG is expected to continue to meet to set the agenda for collaboration, including joint and/or coordinated technical studies towards meeting its objectives. Several studies and documents from the activity will support the objectives and activities of the JWG over the next few years. Furthermore, SAWI has been instrumental in facilitating personal interactions among the multi-stakeholder participants from both countries, and this is expected to help ensure the continued collaboration between government and non-government officials engaged in the Sundarbans region. The BISRCI continues to meet regularly and conducts strategic discussions and activities aimed towards creating greater momentum on cooperation and enhanced understanding from the local to the regional level. The BISRCI-managed knowledge portal on the Sundarbans (www.sundarbansonline.org), which went live last year, is expected to continue to operate beyond SAWI. This website provides regular updates on media coverage on the Sundarbans and related issues; functions as discussion platform to engage key stakeholders and the general public; and acts as a repository of scientific, technical and socio-economic knowledge that are relevant to cooperation on the Sundarbans.

(ii). Generating and Sharing Knowledge

Climate change and sea-level rise pose a significant threat to the ecosystem and inhabitants of the Sundarbans. The **Targeted Environmental Studies** activity (completed) has developed technical knowledge through a set of hydrological, ecological and econometric studies for vulnerability assessment of the Sundarbans ecosystem in a changing climate. The activity has helped to build awareness of climate risks and enhance the knowledge base on the implications of water resources for women and children's health, nutrition and productivity in a changing climate. This body of work is highly relevant, as salinization, inundation risk, and cyclone strike frequency

“This research provided the Government of Bangladesh with spatio-temporal assessment of vulnerability, as well as a menu of feasible investment options. It contributed to five out of six pillars of the Climate Change Strategy and Action Plan of Bangladesh. This analytical approach can also be used as a tool for future research.”

- Ainun Nishat, Professor Emeritus, BRAC University and Principal Member, Climate Change Negotiation Committee of Bangladesh

and intensity are likely to increase steadily as climate change proceeds – thus offering critical insights for regional policy makers and planners on planning a holistic approach to the sustainable management of this extremely fragile mangrove forest.

In previous years, this activity has completed work in the study areas related to the following: (i) Vulnerability of the Sundarbans ecosystem in a Changing Climate, and (ii) Targeted Approach to Poverty Reduction in the Sundarbans in a Changing Climate.

Building on this work, this year SAWI finalized multi-disciplinary studies on the implications of changes in the quality, availability and productivity of water resources for women’s and children’s health, nutrition, and women’s labor force participation and participation in household activities.

The work included an analytical focus on of the impact of salinity on women’s health in the Indian Sundarbans; two geocoded open access datasets of surface and groundwater salinity in the Indians Sundarbans; and continued research on erosion and accretion of land, climate impacts and population dynamics in coastal Bangladesh and Indian Sundarbans. Findings were disseminated at four seminars and workshops, and through four web feature stories.

The five knowledge papers include the following:

- (i) *Co-Location, Socioeconomic Status and Perceptions of Environmental Change in the Indian Sundarbans*¹⁷: Using new survey data, this paper considers perceptions of climate risk among heterogenous groups in the Sundarbans as a key determinant for collective action;

- (ii) *Long-Term Island Area Alterations in the Indian and Bangladeshi Sundarban: An Assessment Using Cartographic and Remote Sensing Sources*: this documents the long-term island area changes through coastline shifts that took place in this region since the early 19th century, using maps and images.
- (iii) *Discounting Disaster: Land Markets and Climate Change in the Indian Sundarbans*¹⁸: The study uses new household survey and environmental data to investigate the relationships linking land prices, household incomes and climate-change-related factors in the Indian Sundarbans;
- (iv) *Explaining Regional Variations in Mother-Child Health: Environmental Determinants in India and Bangladesh*¹⁹: Drawing on data from Demographic and Healthy Surveys, the study identifies regional differences in measures of maternal and child health that are not explained by commonly cited socio-economic determinants; and,
- (v) *Fishing in Saltier Waters: Climate Change, Saline Exposure and Women’s Health in the Indian Sundarbans (Mimeo)*.

Two geo-coded databases include the following: (a) Datasets on Erosion and Accretion of Bangladesh and Indian Sundarbans: 1904-2016,²⁰ which draws comparison between 1904–24 topographical maps and 2015–16 satellite images and highlights the extent of erosion along nearly the entire surface of the western delta and accretion in the interior parts, mainly in the west; and, (b) Datasets on Water (Tube-well and River) Salinity in Indian Sundarban: February-May 2019,²¹ which measures salinity of water across several areas to assess whether it is potable and usable.

¹⁷ <https://ecoinsee.org/journal/papers/issue-3-1/76.pdf>

¹⁸ <https://www.sundarbansonline.org/wp-content/uploads/2020/03/Paper-Land-Markets-and-Climate-Change-in-the-Indian-Sundarbans.pdf>

¹⁹ <https://www.sundarbansonline.org/wp-content/uploads/2020/03/Paper-Explaining-Regional-Variations-in-Mother-Child-Health-Role-of-Environmental-Factors-.pdf>

²⁰ <https://datacatalog.worldbank.org/dataset/india-erosion-and-accretion-bangladesh-and-indian-sundarbans>

²¹ <https://datacatalog.worldbank.org/dataset/india-water-tube-well-and-river-salinity-indian-sundarban>

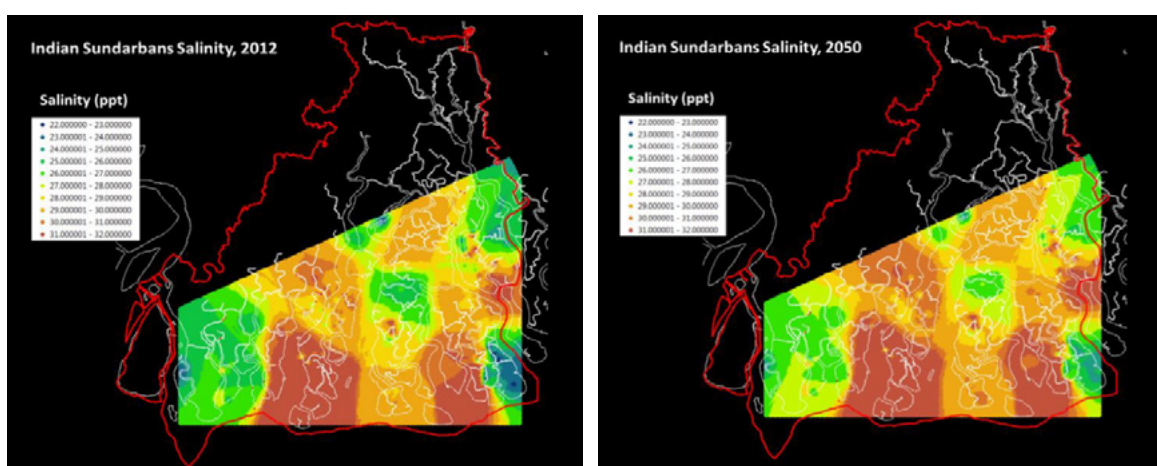
SUNDARBANS: IMPACTS ON WOMEN AND CHILDREN'S HEALTH AND NUTRITION

The salinization studies done under the **Targeted Environmental Studies** activity are relevant, as progressive salinization of water in Sundarbans is expected with sea-level rise in a changing climate. In FY20, SAWI monitored salinity of surface and ground water of Sundarbans, analyzed primary data collected from 4,000 individuals from 900 households in 69 locales spread across the region, and conducted econometric analysis for understanding implications for expected changes in the quantity and quality of water resources that are critical for women's and children's health and nutrition.

The studies outline implications for the quantity and quality of water resources that are critical for women's and children's health and nutrition, and find that:

- (a) progressive salinization of rivers and groundwater will result in the decline of available fresh drinking water. This situation will likely have numerous adverse effects on time activity patterns of women and adversely affect mother-child health; and,
- (b) adverse impacts of progressive salinization of rivers on freshwater fish habitats will influence the intakes of protein and essential micronutrients of the poor. The stakes are particularly high for children and pregnant women since protein, mineral, and micronutrient deficiencies can lead to increased mortality risk and reduced immunity to disease.

Figure 4: STATISTICAL PROJECTION INDICATES RIVER WATER SALINITY WILL REACH NEAR-OCEAN SALINITY IN MANY AREAS OF INDIAN SUNDARBAN BY 2050



Other complementary research reveals a significant poverty/environment nexus that affects the livelihoods and health of women in the Indian Sundarbans. In this nexus, the adverse economics of occupational choice affect both women's economic status and their experience of significant health problems.

Furthermore, analysis of more than 100,000 records of the India National Family Health Survey (NFHS-4) for 2015–16 and the Bangladesh Demographic and Health Survey for 2011 indicated that sensitivity to flood-proneness will make mother-child health vulnerable to varying patterns of extreme weather events with climate change. Better outcomes may depend on more effective planning for water-resource allocation. Cooperative basin-wide planning would require closer coordination between India and Bangladesh, as well as the basin sub-regions within each country.

(iii). Building Institutional and Professional Capacity

While in previous years the **Targeted Environmental Studies** activity conducted knowledge exchange workshops and hands-on training between Bangladeshi and Indian experts, this year the activity focused on dissemination of these knowledge products through a series of blogs and a workshop.

A technical workshop on *Vulnerability of Sundarbans in a Changing Climate* was conducted at the World Bank- Bangladesh Office, July 24, 2019. Some 40 people attended, including nine women. The objective was to present the methodologies and findings of the hydrological, ecological and econometric studies undertaken by the World Bank in collaboration with experts of Bangladesh for vulnerability assessment of the biodiversity and population of the Sundarbans in a changing climate. Key stakeholder groups included officials from the Ministry of Environment, Forest and Climate Change, Department of Fisheries, Forest Department; various Think Tanks, Universities and Research Organizations of Bangladesh.



Web Feature Stories:

- (i) Drinking Water in the Indian Sundarbans;²²
- (ii) The Perils of Prawn-Catching for Sundarbans Women;²³
- (iii) Proactive, crosscutting adaptation measures are needed to reduce climate change impacts on the poor;²⁴
- (iv) Mangroves and Coastal Protection: A Potential Triple-Win for Bangladesh.²⁵

Presentations:

- (i) Technical (one day) Workshop on Vulnerability of Sundarbans in a Changing Climate at World Bank- Bangladesh Office, July 24, 2019.

- (ii) Sundarbans: Targeted Environmental Studies. Presented at a Seminar organized by World Bank-India Office, August 1, 2019.
- (iii) Vulnerability of Sundarbans in a Changing Climate. Presented to Australian Department of Foreign Affairs and Trade, the Norwegian Agency for Development Cooperation, and the UK Department for International Development at the World Bank-India Office, August 2, 2019.
- (iv) Coping with the Vulnerability of Sundarbans in a Changing Climate: Results of Multidisciplinary Research Funded by South Asia Water Initiative (SAWI). Presented at a Seminar organized by Environment, Natural Resources and Blue Economy Global Practice, World Bank, Washington DC, October 29, 2019.

(iv). Scoping Interventions and Investments

This year, SAWI's **Targeted Environmental Studies** activity provided information to six World Bank operations as follows: (i) The findings on expected changes in mangrove composition in a changing climate, particularly which mangrove species will likely survive in different areas of southwest coastal Bangladesh and expected impacts on the forest-based livelihood of the poor informed the **Sustainable Forest and Livelihood Project (\$175M)**; (ii) The findings on comparative gain and loss of habitats for each of 83 fish species typically found in the southwest region and identification of particular fish species (*Mystus gulio*, *Pama pama*, *Liza parsia*, *Lates calcarifer*, and *Acantho paguslatus*) with the potential to thrive in aquaculture informed the **Bangladesh Sustainable Coastal and Marine Fisheries Project (\$240M)**; (iii) Findings on geomorphological changes: erosion/ accretion for each island of Indian Sundarbans and changing time-trend of cyclone downfalls informed **India Integrated Coastal Zone Management (\$220M)**; (iv) and (v) Findings on changing time-trend of cyclone downfalls informed the **India National Cyclone Risk Mitigation Project (\$310M)** and the **Bangladesh Multipurpose Disaster Shelter Project (\$375M)**; (vi) Estimation of varying levels of reductions in storm-surge height and water-flow velocity from various species of mangroves, as well as alternative width and density of mangrove forests, were used to inform the mangrove afforestation components for Polders 35/1, 40/1, and 40/2 under the **Bangladesh Coastal Embankment Improvement Project (\$375M)**.

²² <https://www.sundarbansonline.org/wp-content/uploads/2020/03/Note-Drinking-Water-Salinity-in-Indian-Sundarban.pdf>

²³ <https://www.sundarbansonline.org/wp-content/uploads/2020/03/Note-Perils-of-Prawn-PL-Catching-in-Sundarban.pdf>

²⁴ <https://blogs.worldbank.org/developmenttalk/proactive-crosscutting-adaptation-measures-are-needed-reduce-climate-change-impacts>

²⁵ https://blogs.worldbank.org/endpovertyinsouthasia/mangroves-and-coastal-protection-potential-triple-win-bangladesh?CID=WBW_AL_BlogNotification_EN_EXT

Lessons

The two-pronged approach of multi-stakeholder dialogue to build trust, backed by supporting technical work, has been effective. At one level, the iterative Dialogue approach was an important precursor in moving towards joint management of the landscape. The process which facilitated an expanded stakeholder engagement across multiple channels and levels, has been important in helping to build enhanced levels of trust and increase scientific and economic knowledge and collaboration. This has contributed to a better working relationship between Bangladeshi and Indian stakeholders at multiple levels. The dialogue activity also connected print and electronic media across both countries through the media collaboration plan; and created a direct exchange of ideas among stakeholders at village/local, state, national and bilateral levels. At another level, the technical studies helped to create evidence to support the narrative on cooperation of the Sundarbans. This has led to building collaboration, common understanding and sets the stage for greater stakeholder ownership and action.

In the absence of a formal joint mechanism, engagement through BISRCI has been important mechanism to sustain engagement of high-level stakeholders in both countries. This representative forum has also led to greater credibility and acceptance of the SAWI Sundarbans initiative. With BISRCI continuing to maintain the knowledge portal on the Sundarbans and holding stakeholder engagement events, momentum and support to the joint operationalization of the Sundarbans is likely to sustain beyond SAWI.

Multi-disciplinary collaboration is important in order to tackle the complex and multi-faceted impacts of climate change on the Sundarbans ecosystem and on local populations. Effective design and management of protocols for the landscape, and especially in a changing climate, requires collaboration among hydrologists, soil scientists, ecologists, economists, engineers, and regional planners between Bangladesh and India that draws on their complementary skills. This led to not only more relevant and need-based solutions and recommendations but also there has been generation of support for such joint and/or coordinated actions on Sundarbans among multiple stakeholders at all levels.

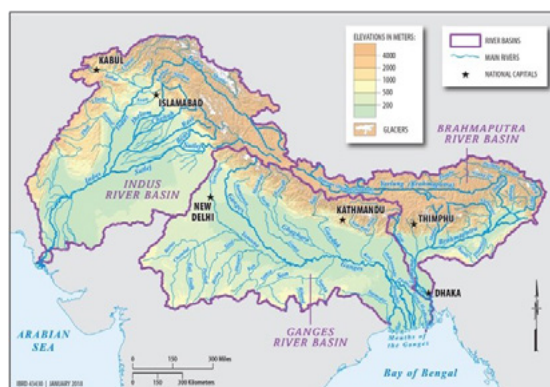
Significant (untapped) opportunities exist for knowledge sharing and information exchange between countries in the Bengal and Mekong deltas, many of which are facing similar challenges in a changing climate. Various countries in the Asia region with low-lying coastal regions have already expressed

interest in learning from one another's successes and failures. The World Bank's convening capacity as a knowledge bank can help to facilitate this process.

Covid-19 Implications

There are no significant implications of the pandemic on SAWI's deliverables, as all activities ended. However, the pandemic has delayed discussions between Bangladesh and India on the joint institutional mechanism. The combination of the pandemic and the cyclone have further exposed the vulnerability of the Sundarbans Landscape, its people and brought home the reality of the need to build resilience. SAWI's knowledge products – such as the Targeted Environmental Studies and the Joint Landscape Narrative (previous year) highlight these issues and could therefore be useful products in informing discussions going forward.

Regional Cross-Cutting Focus Area



Context and Strategic Approach

The political economy of South Asia is currently not conducive to a coordinated regional response to transboundary water governance. The Regional Cross-Cutting FA is therefore intended to complement and underpin sub-regional level under the four geographic FAs. The value add of the Regional FA is that it supports cross-fertilization of knowledge and capacity building across basins towards transboundary cooperation. SAWI does this through regional dialogue to build shared understanding on opportunities and challenges in regional water management; targeted capacity building activities that bring multiple stakeholders together; and by advancing technical knowledge that cuts across several thematic areas and geographies.

Emerging Outcomes

SAWI has successfully established partnerships with regional institutions, including ICIMOD, IUCN, IWMI and with South Asian

Universities, which remains critical to broadening support for the agenda, building regional ownership, and ensuring sustainability beyond this phase of SAWI funding. Although the regional dialogue activities have now ended, previous events have been important in bringing stakeholders together from across basins thus helping to share experiences, forge relationships and expand dialogue. Knowledge products on issues commonly faced across the region, such as groundwater management, water quality, climate change risks, and hydroelectric power are not only contributing to a body of knowledge for South Asia, but also helping to build deeper appreciation and awareness among stakeholder on the need for concerted action to tackle these challenges.

Key Deliverables for FY20

This year, SAWI has focused on delivering ten activities. Of the active grants, five were completed and five are ongoing into FY21 (of which four were initiated in this reporting year FY20). A further five new activities are in the mobilization stage.

(i). Building Trust and Confidence

The **Regional Dialogue** activity closed this year and no events were held in FY20. This activity has served its initial purpose of convening stakeholders across the three river basins to discuss common challenges across the region, share ideas to support more informed decision-making on specific issues related to transboundary water resources management, and facilitate informal and formal partnerships. In previous years SAWI supported three events, which helped to expand the dialogue, and to reach a broader representative audience across government, universities and research institutes, civil society and other key stakeholders and partners.

SAWI concluded its support to the **Himalayan University Consortium (HUC) Grant** (delivered through a RE in partnership with ICIMOD over 36 months). The partnership has helped to strengthen collaboration of research institutions in the Hindu Kush Himalayan region on issues of significance to regional water resources management. In turn, SAWI's activities have also benefitted from the HUC and ICIMOD's long trusted track record. The restructuring of the grant in early 2019 enabled a Secretariat to be established within ICIMOD to anchor the Indus Basin joint research, and facilitate research coordination, knowledge exchange forums and outreach activities.

The network of research institutions now has 67 full time members and 19 associate members (from a baseline of 33).²⁶ Collaborative research capacity among higher education and research institutions, government and civil society organizations and media has continued. Work is still ongoing to progress the joint Research Program on 'Understanding and Assessing the Impact of Climate Change in the Indus Basin'. Furthermore, the HUC Thematic Working Group on Water (Water Group), established in previous years, consists of water scholars and practitioners in eight Hindu Kush Himalaya (HKH) countries. This group has continued to discuss its strategy and priorities of actions. An HUC Online Portal has been developed (<http://huc-hkh.org/>) as part of the strategy to enhance the partnership of research institutions in the HKH Region. It contains a database of member institutions and HUC fellows and serves as a platform to promote knowledge sharing among interested scholars.

With support from the HUC grant activity, the Secretariat organized the 4th IBKF (August 2019, Kathmandu), which is reported in more detail under the Indus FA, and the annual Indus Forum Working Group meeting (November 22-23, 2019, Dubai). The Working Group meeting brought together over 46 participants from relevant research institutions, members of HUC, academia, relevant government entities, policy and decision makers and media from the Indus Basin to enhance coordination, cooperation and cross learning. Its objective was to discuss options to mobilize funds for the joint research program on 'Understanding and Assessing the Impact of Climate Change in the Indus Basin' prepared in previous years by the Indus Basin Forum Working Group.

The Secretariat submitted a concept note to the Global Innovation Fund entitled "Conserving Indus Basin as a Vital Resource for Local Prosperity; and Leveraging Local Prosperity as an Incentive to Preserve the Vital Resource". A previous proposal titled "Social Resilience to Climate Variability and Change in the Ganga and Brahmaputra Basins", involving 14 institutions from the United Kingdom and HKH countries (Afghanistan, Bangladesh, Bhutan, India, and Nepal) was developed and submitted to the Global Challenges Research Fund Call in 2019 but was not accepted.

The Secretariat has also developed an operational manual for the joint research program, which will come into use once funding is secured. Additionally, the Secretariat is developing

²⁶ List of HUC member institutions is available at: <https://www.icimod.org/huc/members/>. Associate Members are from outside the HKH with a strong interest in the region and mountain issues

outreach material including brochures to reach out to interested partners regionally and internationally.

Looking ahead, efforts to maintain an active network will largely depend on whether funds can become available, through

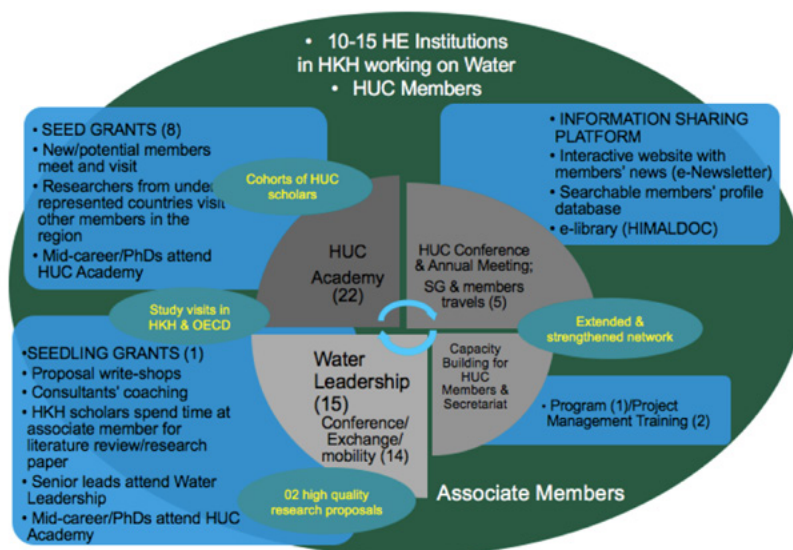
external project funding or other sources. This remains a key challenge to the sustainability of the HUC Secretariat's work. The Secretariat proposes to seek other relevant funding opportunities and customize the joint research proposal as required for submission.

Box 7

REGIONAL RESEARCH PARTNERSHIPS: HIMALAYAN UNIVERSITY CONSORTIUM

SAWI support to the HUC concluded in December 2019. The HUC was founded in 2007 with a mandate to develop an effective and sustainable network of universities to foster collaboration with academic, research and knowledge generating institutions both within and outside the HKH Region.

Figure 5: INTEGRATION BY COMPONENTS



Source: Completion Report, Himalayan University Consortium Grant, ICIMOD (3 June 2020)

Major achievements over the lifetime of the grant, as highlighted in the project completion report, include the following:

- (i) An **extended network** of 62 higher education institutions focusing on sustainable mountain development and natural resource management from eight regional member countries. This includes an enhanced quality of membership and intensified interaction among members at all levels, ranging from Vice Chancellors/Rectors to senior/mid and earlier career researchers;
- (ii) Development of a **Strategy and Plan for Actions 2018-2025** through a wide consultative process, incorporating global learnings from similar higher education consortia and institutions working on relevant issues of natural resource management;
- (iii) **Enhanced capacity** of senior, mid- and earlier career faculty in conducting research on water and natural resource management from inter- and trans-disciplinary perspectives, including through training of 32 researchers, five study tours and 14 research visits to institutions. Enhanced capacity of librarian and IT staff members of participating institutions in resource sharing through fully functioning HUC Online Platform, containing approximately 50 searchable institutional profiles and 300 individual profiles of researchers and scholars working in the fields of natural resource management and sustainable mountain development studies;
- (iv) **Strengthened regional platforms**, including the delivery of the fourth IBKF in 2019. A strengthened Indus Forum Working Group through its governance mechanism to support the proposed joint research program on understanding and assessing the impact of climate change in the Indus Basin; and,
- (v) **Enhanced capacity** of the HUC Secretariat and selected partners in programme and project cycle management and monitoring and evaluation. Indus Forum Secretariat housed in ICIMOD to support coordination among the partners.

(ii). Generating and Sharing Knowledge

The challenge of glacier melt is common to all countries in the HKH region, with impacts on the rivers and their flows. The **Glaciers of the Himalayas** activity completed its analysis this year and is in the process of finalizing its flagship report, anticipated to be launched in October / November 2020. The study involved processing of huge amounts of data as well calibration and validation of the glacier hydrology model for the entire HKH basin. This first of its kind study fills an important technical knowledge gap by analyzing and quantifying the impacts of climate change and black carbon on glacier and snowmelt in the Himalayas. The work identifies the causes of potential changes to the glacier and snow dynamics in the Himalaya, Karakoram, and Hindu Kush mountain ranges, presents scenarios of possible glacier and snow changes under different climate change and black carbon scenarios, and determines implications for water resources within the Indus, Ganges, and Brahmaputra basins.

The report is expected to inform policy makers on how to plan for future water resources. In particular, it will improve understanding of potential long-term climate change impacts on surface water availability due to global and regional climatic changes. This knowledge will allow infrastructure investment decisions that are robust under possible future scenarios. The work will also provide useful benchmarks for World Bank teams planning hydropower, agricultural and livelihood projects. Once complete, the activity will develop analytical and policy papers for distribution within the scientific community, resource managers, policy makers, and broader society. These will be informed by the findings of the activity and by the stakeholder needs. As outlined in a previous annual report, SAWI has enabled access to renowned specialist international expertise for modeling and remote sensing work, and to a scientific advisory panel to ensure the scientific robustness of the work.

The **Capacity Building for Groundwater Management** activity concluded this year with the online publication of a report and seven case studies, produced by the World Bank team. Groundwater abstractions account for 40 percent of all water withdrawals in the South Asian region (Hirji, Nicol and Davis 2017). The work highlights the criticality of groundwater resources for South Asia and notes that, if well managed, groundwater can make an important contribution to climate change adaptation and to tackling water stress in South Asia. This is a part of a long-term engagement in South Asia.

The main deliverable, “Managing Groundwater for Drought Resilience in South Asia”²⁷ presents the findings of the diagnostic study examining pathways and options for strengthening the governance of South Asia’s groundwater resources in the face of climate change and increasing reliance on the resource by dependent communities, particularly during times of drought. The report identifies, analyzes, and recommends management interventions that aid reforms of groundwater governance within the South Asia Region and, thus, greater sustainability of groundwater and strengthened drought resilience. A broad analytical framework and a series of case studies cover a range of policy and management approaches in different hydrogeological and socioeconomic settings with reference to key groundwater challenges. So far, the report has been downloaded over 700 times, an indication of strong interest in this knowledge resource and its accompanying case studies.

The supporting case studies include the following:

- (i) Can Participatory Groundwater Management Enhance Drought Resilience? The Case of the Andhra Pradesh Farmer-Managed Groundwater Systems Project;
- (ii) Drought-Proofing Through Groundwater Recharge: Lessons from Chief Ministers’ Initiatives in Four Indian States;
- (iii) Groundwater Management in Balochistan, Pakistan: A Case Study of Karez Rehabilitation;
- (iv) Pro-Poor Groundwater Development: The Case of the Barind Experiment in Bangladesh;
- (v) Groundwater and Surface Water in the Mega-Irrigation Systems of Pakistan: The Case for Conjunctive Management;
- (vi) Mitigating Floods for Managing Droughts Through Aquifer Storage: An Examination of Two Complementary Approaches;
- (vii) Groundwater Governance and Adoption of Solar-Powered Irrigation Pumps: Experiences from the Eastern Gangetic Plains.

The body of knowledge aims to deepen understanding that while groundwater has enormous potential to support communities during drought, this cannot be achieved without actively managing groundwater and that groundwater cannot be managed without mechanisms or incentives to control demand (measurement, pricing and crop diversification). This will require protection of aquifers, which provide a significant storage buffer, supporting

²⁷ World Bank. 2020. Managing Groundwater for Drought Resilience in South Asia. World Bank, Washington, DC. © World Bank. Available at <https://openknowledge.worldbank.org/handle/10986/33332> License: CC BY 3.0 IGO.

reliable water during dry spells and drought, representative data collection at national and regional levels, investing in new research to protect and safely develop groundwater resources, strengthening policies that reduce inequity, robust governance frameworks to prevent over-extraction and to ensure protection from contamination, building institutional capacity within relevant branches of government, and adopting a cross-sectoral approach to improving governance.

The **Diagnostic Study on Groundwater-Energy-Agriculture Nexus** activity (completed this year) tested and designed alternative models of subsidy for farmers in Rajasthan. The study, “Grow Solar, Save Water, Double Farmer Income”²⁸ work presents several valuable business and institutional models that use solar panels to generate electricity for extracting groundwater and selling surplus electricity in selected groundwater-stressed areas.

The work proposes these models from the perspective of three key stakeholders: farmers; power distribution companies; and the Government of Rajasthan, and points out the possibilities of achieving the triple benefits of saving water, doubling farmer income, and improving reliability of power supply and irrigation, through a grid-connected solar irrigation system.

To respond to the concern that solar power could lead to over-extraction of groundwater, a methodology was developed to estimate the value of water in agriculture. This methodology is helping to estimate the feed-in-tariff for solar electricity required to shift the trade-offs towards conserving water and increasing water use efficiency.

The study presents three key innovative ideas:

- (i) Converting farmers from “consumers” to “prosumers” of power, thus shifting the dynamics of commercial relationship between the farmer and the power utility;
- (ii) Creating strong financial incentive for the farmer to conserve both electricity and groundwater and making appropriate crop choices; and,
- (iii) A flexible policy instrument “drought premium” that provides opportunity to not only create awareness of scarcity value of electricity and water but also maintain the dignity of the farmer during a period of distress by offering relief as a payment for electricity (instead of hand-outs).

SAWI’s study approach was highly consultative and multi-sectoral. During consultations, the farmers showed a high level of awareness of the challenges and gave an encouraging response to the proposed approaches to address these. Advancements in technology and falling prices of solar energy investment, have opened enormous opportunities for grid-connected solar which has the potential to shift the Water-Energy-Agriculture nexus into a virtuous cycle of conserving water, raise farm incomes, increase energy efficiency of groundwater irrigation, and transform rural livelihoods.

The work was undertaken following a request from the Government of Rajasthan, and its recommendations were endorsed by the state government and NITI Aayog. As a result, the GoR, is implementing “learning-by-doing” pilots to field test the recommended business models through the Bank-supported Rajasthan Agricultural Competitiveness Project (RACP).

Box 8

REGIONAL – RAJASTHAN, MANAGING THE WATER-ENERGY-AGRICULTURE NEXUS

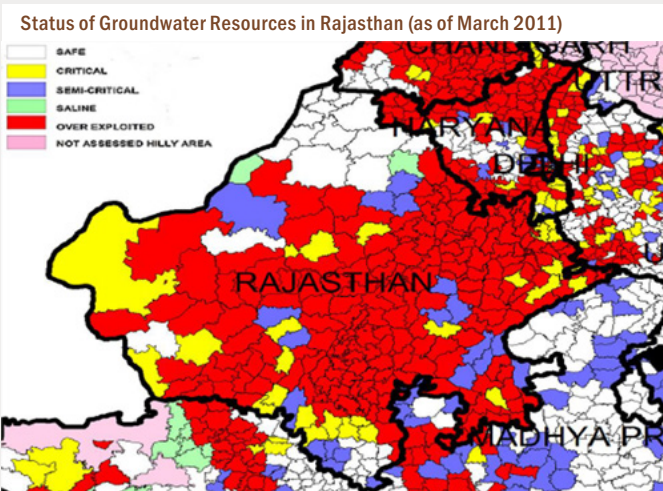
The Indian state of Rajasthan is highly water-stressed, with limited surface water resources and a highly groundwater-dependent economy. Agricultural growth in the State consumes 86% of available water resources, 42% of electricity, while contributing 30% to State's GDP. There is recognition of an urgent need to improve outcomes of the water-energy-agriculture nexus.

SAWI’s study in Rajasthan has shown that the proposed model of grid-connected solar irrigation can achieve the trifecta of increasing water productivity and water conservation, doubling farmer income, and increasing energy efficiency of irrigation. In addition, it has the potential to eliminate recurring power subsidy to agriculture, provide climate-resilient income to farmers, and reduce the carbon footprint of agriculture. The unit of implementation of the model is an electricity feeder supplying power for agriculture pumps.

²⁸ <https://hubs.worldbank.org/docs/imagebank/Pages/docProfile.aspx?nodeid=31774787>

Salient features of the model are: (a) farmers served by the selected electricity feeder buy and install solar panels and an irrigation pump on their own land for which the vendor provides performance guarantee, maintenance and insurance for the first five years; (b) farmers are offered a capital cost buy-down of 30% each by the Central and the state governments; (c) the power distribution company agrees to buy surplus power from farmers at a feed-in-tariff decided by the state electricity regulatory commission; (d) at least 70 percent of local farmers participate, and preferably form a Farmer Enterprise to aggregate surplus electricity; and (e) the farmer (or the Farmer Enterprise, as the case may be) and the distribution company sign a power purchase agreement for the sale of surplus electricity.

SAWI presented the findings of the study at a national level dissemination workshop (December 18, 2019, Delhi). The event was attended by approximately 90 participants including policy makers from energy, water resources and agriculture from central ministries and different Indian states, representatives of multilateral organizations, bilateral organizations, DISCOMs, farmers collectives, CSOs and the academia. This provided the opportunity to explore the possibilities of leveraging the full potential of the Government of India's centrally sponsored KUSUM scheme that supports solarization of irrigation pump-sets.



The Workshop was opened by the CEO NITI Aayog, Mr. Amitabh Kant, and the World Bank Country Director, Dr. Junaid Ahmad. Dr. Ramesh Chand, Member (Agriculture) NITI Aayog gave a keynote address. Mr. Akhil Kumar, Joint Secretary, Ministry of Jal Shakti, and Ms. Namita Priyadarshiee, Joint Secretary, Ministry of Agriculture, Government of India chaired one session each. Dr. N. S. Bains, Director (Research), Punjab Agriculture University gave the concluding remarks and closing address.

The **HEP Sustainable Planning - Bhutan** activity completed support to the Royal Government of Bhutan (RGoB) in its ongoing implementation of the roadmap to tap the country's hydropower potential.

This activity is part of the World Bank's wider South Asia work towards regional energy markets and is informing design of the 1125MW Dorjilung Hydropower Project, which could potentially export cheap and clean power from Bhutan to Bangladesh.

SAWI's support has been framed and refocused in response to RGoB requests for specific support to implement its new national Guidelines for the Development of Hydropower Projects, Bhutan (2018), which follow international standards.

This year, three outputs were produced, including:

- (i) Bhutanese Dam Safety Guidelines – a new set of guidelines based on international good practice for Preparation and Construction of Hydropower, including support to essential

national baseline data on aquatic biodiversity. These carefully take into consideration a comprehensive set of issues, including on Dam Safety Management (Module 1); Investigation, Design and Construction (Module 2); and Dam Safety Performance (Module 3).

(ii) A National Bidding Document, which provides guidance for improved bidding documents for construction works of hydropower. In particular, it describes steps necessary to mitigate issues negatively impacting hydropower project

development and outlines how to address these at all stages of project development.

(iii) An internal Review Report (confidential), which provides a gap analysis against the new Bhutanese hydropower guidelines and recommendations on how to address these gaps, for the Dorjilung Hydropower Project. The assessment was conducted jointly by the Department of Hydropower and Power System (DHPS) and international experts and included site visits.

Box 9

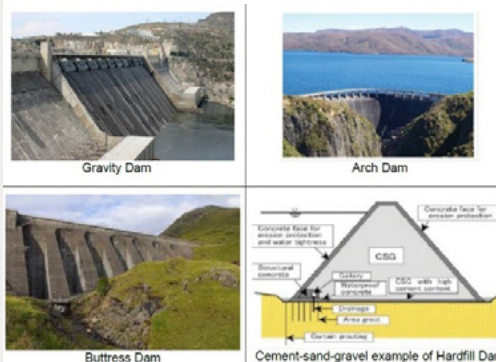
REGIONAL - EMERGING OUTCOMES OF BHUTAN HYDROPOWER SUPPORT

Bhutan is endowed with hydropower resources and 100% of its electricity is generated from hydropower. To date the country has harnessed 2,335MW and has over 2,930MW under development, plus a further 10,000MW in various stages of planning.

SAWI's technical support has focused on helping Bhutan to improve the bankability and sustainability in the development of large hydropower projects, as well as capacity building support to help RGoB to ensure that these meet international standards, enable them to enforce good practice, ensure that the projects are environmentally and socially sound, and reduce risk. SAWI's technical support to the RGoB, provided over the last two years, is showing positive results:

- The RGoB has taken ownership of the Bhutan Dam Safety Guidelines and has identified the need to apply the new guidelines to hydropower projects in the pipeline, i.e. projects where studies have been conducted but construction has not started. Indications from limited comparative exercises are that there exist gaps in preparatory studies compared to the new guidelines. Finding and filling these gaps would make these planned future hydropower projects more sustainable and better integrated in the basin development. In addition, RGoB in its request has highlighted, in line with the new Hydropower Guidelines, the need for improved dam safety regulations in Bhutan.
- The DHPS has prepared common and standard national bidding documents for hydropower construction based on the new hydropower guidelines and existing policies. This has helped to increase awareness of the new hydropower guidelines and international good practice for hydropower development among key stakeholders in Bhutan.
- Two internal studies from previous reporting years, undertaken at the request of the RGoB, have increased awareness among key stakeholders and continue to inform Bhutan's roadmap for hydropower development. For example, the multi-sectoral report on the Kuri-Gongri basin indicates potential cumulative impacts of hydropower development on valued environmental and social components in different scenarios for this basin. Another climate change assessment report provides an update of the potential impacts of climate change on hydropower development and how these effects may vary between the main river basins in the country. Both of these reports will be useful for design of any future projects, including as an input to the World Bank's Environmental and Social Impact Assessments.

Examples of Concrete Dam Types



The newly initiated **Technical Assistance and Knowledge Sharing Facility for the Development of Utility Scale Floating Solar PV Power Generation in India** is timely, as, given India's strong commitment towards its NDC targets, this engagement will directly help in scaling up the measures being adopted by the Government of India in installing cleaner and greener projects in the country. As land has an opportunity cost, newer ground-mounted solar capacities are slowing down and thus presents a huge opportunity for the floating solar projects.

SAWI's work is oriented towards bringing floating solar projects in the mainstream by both the power sector entities as well as water resource planning utilities in the country. The activity has already delivered a number of interim products. An ongoing study, which maps parameters relevant to the floating solar PV technology, will be useful in identifying promising sites and pipeline projects, thus helping to deepen the floating solar market in India. So far, the activity has produced a report following a reconnaissance survey in the selected reservoir in

the state of Madhya Pradesh (MP), developed a database on 2173 water bodies in India, and has selected 100 reservoirs across five early mover states to assess their preliminary FSPV potential. The selection of the 100 reservoirs was done with the intent to build on the World Bank’s existing support to Dam Rehabilitation and Improvement Project in India so that the findings can be taken up by some of these projects. The outputs of the study will help in sensitizing market players, thus providing them an opportunity to consider such projects as promising areas of engagement in their long-term perspective.

As mentioned above, SAWI is also undertaking due diligence for setting up a 500 MW floating solar project in Omkareshwar Reservoir in the Indian state of MP and preparing a pre-feasibility report. So far, the work has produced an inception report, a report on Global Knowledge and Experience in FSPV, and an initial reconnaissance survey of the site. There is strong enthusiasm from state officials, and the project was also referred to in the Prime Minister’s speech during inauguration of MP’s 750 MW ground mounted Rewa solar project (World Bank-supported).²⁹

The **Practitioner Program on Transboundary Water Management** activity began in this FY and is part of a larger effort to mainstream nature-based solutions in SAR operations. The first stage of this effort (not funded by SAWI) was completed in conjunction with Stanford’s Natural Capital Project, and developed tools and approaches for prioritizing investments in watershed management to maximize the flow of ecosystem services to benefit different stakeholders (hydropower, roads, water supply, agriculture, disaster management). The tools were applied to the Kali Gandaki watershed (Nepal) and the Mangla watershed (Pakistan). A major innovation of the activity was the development of an innovative landslide risk assessment methodology that allows for application of nature-based landslide risk mitigation solutions.

Under the ongoing second stage (SAWI-funded), the activity is bringing a transboundary approach to watershed planning and will inform project design by generating and sharing practical knowledge and good practices in sustainable management of forested watersheds of regional importance. The work is also part of the second phase of the Regional Ecological Integration Platform, which aims to increase regional cooperation in SAR related to the management of shared natural resources and responses to climate change. This stage also includes

supporting other World Bank project teams in the use of these tools to inform and design operations to mainstream nature-based solutions.

For example, the Kali Gandaki case study, launched in Nepal in December 2019, has broader implications for how watersheds can be better managed to increase the efficiency and resilience of grey infrastructure such as roads and hydropower plants, particularly given the challenge of sediment management in the region and the growing vulnerability from climate change. SAWI funding is helping to prepare guidance notes on both sediment management and landslide risk assessment that will help to simplify the presentation of the tools for internal and external audiences and provide direction on their application at different levels of sophistication, geographic scales and sectors. The team is also currently working with Stanford to develop an e-learning module from the materials developed, and to bring the knowledge to stakeholders in SAR.

This year, SAWI has advanced the development of a knowledge platform of data, tools, and literature/resources on watershed management. A data portal³⁰ has been developed, which compiles publicly accessible open source global datasets relevant to watershed management in South Asia.



The data and analytics included in the data portal leverage cutting-edge technology solutions, build on public online services for data and analytics, and employ e-packaging of knowledge products, including developing an online story map with text and interactive graphics. The knowledge base has links to new technologies for monitoring, planning, managing

²⁹ <https://timesofindia.indiatimes.com/city/bhopal/pm-launches-rewa-mega-solar-park-says-india-in-top-5-in-green-power/articleshow/76901372.cms>.

³⁰ <http://spatialagent.org/SARWatersheds/>

and evaluating watershed management and natural resources management in a watershed context.

Additionally, the SAWI team has compiled a robust collection of articles, reports, websites and videos, which will be uploaded onto an online knowledge portal. The team is also developing guidance notes that will help to simplify the presentation of the tools on sediment management and landslide risk reduction.

The intended differences the activity seeks to make include: (a) establishment of a robust knowledge base on watershed management in SAR; (b) operationalization of guidance for watershed management and landslide risk reduction to guide future investments; (c) mainstreaming of nature-based solutions in the Bank's landscape projects; informing of project design for greater impact; (d) capacity building of teams and external partners in watershed management; (e) identification of new ways of monitoring investments using earth observation; and (f) assessment of the institutional resources available in the region to disseminate and implement these watershed management tools.

The recently initiated **Agriculture-Water-Nexus** activity is focused on supporting the Government of India and the States of the Northeast towards climate-smart agriculture building in the triple-wins of climate resilience, farm profitability and reducing GHG emissions. It will therefore inform development of a framework for resilient and commercial agriculture in the North East Region, which is dominated by the Brahmaputra Basin.

Analytical assessments and consultative processes are focused on the following themes:

- (i) climate smart agriculture, including nexus of water and agriculture in small-holder farming;

- (ii) key value chains analysis, including mapping and identification of constraints and opportunities for development and investment;

- (iii) knowledge development and exchange. The activity is also expected to inform a potential investment operation in the North East on Agribusiness and Economic Development.

Despite the pandemic, the activity managed to progress two deliverables this year. The first is a draft report on the analysis of Covid-19 pandemic on agriculture in NER. Subsequently, a high-level webinar to disseminate the emerging findings is planned in collaboration with government of India, state governments and external agencies such as IFAD and FAO. The second deliverable is a survey instrument for the value chain analysis and institutional analysis. Phone surveys and discussions will be initiated by the consultants thereafter.

The pandemic and associated travel restrictions have resulted in reorientation of the activity. Firstly, significant field-based research and stakeholder engagement could not go ahead as planned. The team is instead engaging with stakeholders through webinars, other online exchanges and telephonic interviews. A webinar is being organized in August 2020 with senior policy makers from both central and state (NER states) government in India as well as other multilateral agencies such as the FAO and IFAD. Secondly, the scope of work was modified to capture the impact of pandemic on the agriculture value chains in NER. It has shifted focus towards secondary research and literature review to harness the existing knowledge base especially in case of value chain studies and climate resilience assessments. Ultimately by supporting assessment of the impact of the pandemic, the work is expected to inform policy measures and influence future project designs to make them Covid sensitive.

Box 10

REGIONAL – NEW ACTIVITIES IN MOBILIZATION

Six new activities began towards the end of the reporting year and are at early stages of mobilization. The activities are intended to address key knowledge gaps and include the following:

- (i) The **Rivers and Plastics** activity proposes to build a shared understanding of transboundary river pollution flows in South Asia, especially plastics pollution, and to catalyze actions that reduce the flow of plastic pollution into South Asian seas. SAWI will help to identify challenges and opportunities for stronger regional coherence of ongoing and future World Bank programming to improve pollution management. The work is highly relevant, and especially in Covid times, as ocean plastics and discarded single use plastics that pollute the land, flow into rivers and are deposited into the sea. This brings significant environmental, social and economic costs that threaten South Asian prosperity. While

several South Asian nations have taken pioneering steps to address parts of the plastic pollution problem, they are often unrecognized, left unshared and not replicated. Moreover, the rivers that carry plastic waste and the regional seas polluted by tens of thousands of pieces of plastic per square mile are themselves transboundary in nature, further amplifying the need for greater understanding of the problem, solutions and the importance of shared responsibility among nations. With the political will across SAR nations rising, as evidence through participation and agreements made at the G7, G20, ASEAN Summit, UN, among others, the time has never been better to mobilize South Asian nations for collective action to address plastic pollution.

(ii) The **Price of Water** activity (regional flagship) will explore the potential role for water markets in South Asia to improve water-use efficiency and reduce water stress. It will mainly answer the following questions: (i) What are the regions/basins in South Asia that have the favorable pre-conditions for introducing water markets; (ii) What are the economic benefits (including potential water savings and increased water-use efficiency) across various sectors from introducing water markets in these regions/ basins, and, (iii) What will be the economy-wide and distributional impacts of introducing water markets in the South Asian countries. The work is highly relevant as South Asia is on the threshold of a water crisis. Despite a growing body of knowledge and investment on water scarcity in South Asia, investments into reducing scarcity have not yielded positive results to scale. This regional flagship study will fill key knowledge gaps that will help South Asian governments design and implement more effective policies to increase water efficiency and address the growing water crisis in the region while promoting economic growth and poverty reduction. The study will first determine which regions/basins have favorable pre-conditions for introducing water markets, and then for these areas apply economic modeling approaches to measure potential water savings and increased water-use efficiency, and the broader economics and distributional impact.

(iii) **Monitoring Transboundary Water Quality in Bangladesh.** This activity aims to examine transboundary water quality monitoring issues from the perspective of Bangladesh. A rapid assessment will be performed to understand the current operating status of the water quality monitoring system (WQMS) of the Department of Environment of Bangladesh and to identify gaps and deficiencies of this system in monitoring transboundary water pollution. The activity will also support the design and implementation of a pilot water quality monitoring program at selected entry points of the Padma, Teesta and Jamuna rivers. Based on the assessment and results of the pilot program, the activity will help develop a proposal to update Bangladesh's existing WQMS, based on international best practice and wide stakeholder consultations.

(iv) **Developing Regional Waterways in South Asia.** This activity will support developing a substantive body of knowledge through focused technical assessments on regional trade and transit policy-related constraints impeding the growth of waterborne transport, gaps in operational standards, and the limitations to an integrated network of river and maritime transport in Bangladesh, Bhutan, India and Nepal (BBIN). It will also support evolution of a regional waterway framework through establishment of an embryonic institutional structure and inter-country data and information exchange architecture.

(v) **Improving Water Resources Management in Northeast India and Assam.** This activity aims to improve water resources management and management of water-related disaster risks in the Brahmaputra Basin, with a focus on Northeast India and Assam. The activity will support Assam to scope and develop analytical tools to conduct river basin planning towards the identification, prioritization and sequencing of investments in water resources management and disaster risk management. It will build on earlier SAWI grants to support preparation of the Assam Integrated River Basin Management Program (AIRBMP).

(vi) **Nepal River Basin Planning and Sustainable Hydropower Development in a Regional Context.** This activity will continue SAWI's support to integrated river basin development planning and sustainable hydropower development for major rivers in Nepal. It will support preparation of integrated and sustainable basin plans through integrated water resources management principles, supported by a publicly accessible information repository. It will also prepare hydropower development master plans for all the major river basins, which will recommend optimal development of hydropower, including identifying site, capacity and storage type for each development.

(iii). Building Institutional and Professional Capacity

The **Practitioner Program on Transboundary Water Management** activity undertook numerous consultations to develop the knowledge platform, guidance notes and an e-learning module, including multiple consultations with Bank staff and external partners. This process has not only helped the team to compile relevant information and resources, and to design the guidance documents for sediment and landslide risk but has also been useful to build stakeholder understanding.

To develop the landslide risk assessment guidance note, a landslide risk modeling workshop (with over 30 participants) and an internal associated BBL were held in December 2019, with options for both in-person attendance at the World Bank's HQ and virtual participation. Both events helped to catalyze understanding of landslide risk reduction methods; to identify where landslide risk reduction work was already being implemented in Bank projects; and to identify knowledge gaps that could be filled through the guidance document.



These consultations have helped to identify sectors and projects where landslide risk reduction methods could be implemented to reduce project risk and increase project resilience. This activity is also engaging with the Bank's Global Sediment Management ASA, which includes catchment management guidelines for sustainable sediment management at hydropower facilities. Finally, the activity is exploring collaboration across relevant activities at regional and national levels and with other watershed-related knowledge products globally. At the regional level, this work has helped to inform early prototypes of a Regional Data and Analysis Service platform under the Climate Adaptation and Resilience (CARE) for South Asia Project.

(iv). Scoping Interventions and Investments

The **Capacity Building for Groundwater Management** activity is bringing new understanding of the unique technical and institutional challenges for groundwater in South Asia, which is helping to shape thinking on several lending projects in the region (particularly in India and Pakistan), and is likely to continue to do so, although these impacts are not necessarily directly mappable. Activities completed in previous years directly contributed to the development of Atal Bhujal Yojana (Abhy)-National Groundwater Management Improvement for India P158119) by providing a technical, environmental and social appraisal of groundwater management in India and by informing design of a management information system design to support local community involvement. The tool is planned to be hosted on the Ministry of Water Resources website. This project (\$450M) was signed into effectiveness by the Indian Government in March 2020 and is now underway.

The **Diagnostic Study on Groundwater-Energy-Agriculture Nexus** was linked to the World Bank-supported RACP, (\$80M) (P124614), which ended on June 30, 2020 after eight years of implementation. The business model developed under the SAWI grant is aligned with the central government's *Kisan Urja*

Suraksha evam Utthan Mahabhiyan (KUSUM) scheme and is potentially replicable in other states across India and other South Asian countries. As a result, the State of Rajasthan has a huge opportunity to transform the adverse outcomes of the water-energy-agriculture nexus into a virtuous cycle.

The HEP Sustainable Planning - Bhutan is closely linked to the development of hydropower investments in Bhutan. In March 2020, RGoB requested World Bank TA support to initiate the preparatory work for the 1125 MW Dorjilung Hydropower Project using the national guidelines and dam safety guidelines, thus also demonstrating SAWI's value addition.

The **Development of Utility Scale Floating Solar PV Power Generation in India** activity is linked to three World Bank initiatives as follows: (i) India: Innovation in Solar Power and Hybrid Technologies Project (P160379, \$150M of IBRD and \$50M of Clean Technology Fund), which is supporting the investments in floating solar projects and furthering the Government of India's agenda on achieving the Nationally Determined Contributions targets. SAWI's preliminary assessment will set the benchmarks in terms of undertaking due diligence of essential parameters by the reservoir owners before approaching the market. The activity will also contribute to helping the Solar Energy Corporation of India – a nodal agency of the Government of India – in promoting floating solar technology at a larger scale and thus contributing to renewable energy targets; (ii) the mapping of 100 selected reservoirs is being integrated with the ongoing work under World Bank supported Dam Rehabilitation and Improvement projects (DRIP-I, US\$437.5M; and DRIP-II, \$500M, awaiting Board approval in September 2020). DRIP projects are looking at floating solar projects as an additional revenue generating opportunity by some of these dam owners. This will essentially result in the water resources planning by these owners to allow for minimum water flows available throughout the year for floating solar and other uses; and, (iii) there are several other ongoing efforts within the World Bank to undertake global mapping of large hydropower projects with the potential for FSPV. The World Bank's Energy and Extractive Global Practice team in India has already developed the database for more than 2000 water bodies in India and proposes to synchronize these developments and create a unified database that further can be hosted on the Global Solar Atlas webpage. SAWI will make a significant contribution to this work.

The **Practitioner Program for Transboundary Water Management** activity forms part of the World Bank program Nepal: Investing in Forests for Prosperity at a Time of Transformation (P170798,

\$24M) and is part of a larger effort to mainstream nature-based solutions in SAR operations. SAWI's support builds on previous analytical work supported under another donor trust fund and will specifically help to identify concrete opportunities to use these tools in other projects across sectors and geographies for active watershed management, assessment of landslide risk, and use of nature-based solutions to minimize risks. So far three other opportunities have been identified, including: Landscape Management project in Afghanistan; Hydromet and Climate Services Project in Pakistan; and a Community-led Landscape Management Project in Meghalaya.

Lessons:

SAWI's regional dialogue activity was successful in engaging a diverse set of stakeholders together in a neutral forum.

However, in retrospect, organizing regional workshops of this type can be highly time and resource intensive and the outcomes are not always concrete or immediately evident. There is also some hesitancy of agencies in some countries to engage formally or for high level representation at these events. Time and sustained commitment are required to open the regional space to dialogue -- there are no quick wins, but there are windows of opportunity that can be seized. Workshop agendas and formats need to take due consideration of these sensitivities.

IT technology is a fundamental means to establish and maintain partnerships, particularly during the current Covid-19 pandemic circumstances. An interactive website with searchable database and E-digest can be a useful tool to foster regional collaboration of researchers. However, constant maintenance and update of the information of the website is a must to motivate users to stay engaged. For that, researchers could be contractually obliged to update material regularly for posting to the website and librarians and IT could be trained together to update website information and notify users.

Looking ahead, efforts to maintain an active network will largely depend on whether funds can become available, through external project funding or other sources. This remains a key challenge to the sustainability of the Secretariat's work. The Secretariat proposes to seek other relevant funding opportunities and customize the joint research proposal as required for submission.

Covid-19 Implications

Some of SAWI's newly initiated activities have experienced start-up delays, while those nearing completion have had to

adjust workplans. For new activities, the delays were related mainly to initiating discussions with partners, undertaking field visits and data gathering exercise, and procuring international consultants. Ongoing activities nearing completion were unable to facilitate face-to-face discussions with government and other stakeholders, and this has resulted in some delays to plans for dissemination, including through external events.

2.2 Cross-Cutting Themes

Gender and Social Inclusion

The World Bank's Gender Strategy (2016) commits the World Bank to work toward removing remaining constraints to women's endowments, improving access to more and better jobs for women, strengthening women's access to land and financial assets, and improving women's voice and agency, including by engaging men to address gender-based violence. An underlying theme is to build the resilience of women and men to cope with natural (climate-related) shocks.

Across its portfolio, SAWI's approach is to mainstream GESI, which not only adopts the principle of 'do-no-harm', but also ensures that a gender-inclusive approach is integrated across activities where relevant. SAWI's Focus Area Strategies were designed to take account of poverty, vulnerability and social inclusion based on the particular characteristics and needs of the basin and landscape.

For example, the Sundarbans landscape activities have undertaken deep analysis of the impacts of saline intrusion from sea level rise on the health and nutritional status of women and children. The Indus basin has sensitively engaged women during field level consultations on groundwater while respecting local customs. The Brahmaputra basin has seen strong engagement and leadership of women in its regional events, and the Ganges basin work has also encouraged representation and participation of women technical experts across its activities on water resource management and modeling. Across the Regional FA work, SAWI's technical work takes into account the impacts of policies and actions on women.

This year, SAWI has continued to build on its previous gender-related work, and includes the following:

- i. **Capacity Building is gender-inclusive:** SAWI has **encouraging the inclusion of women in training and capacity building.** As noted in the Focus Area updates, in FY20 46

women participated in capacity building events (taking the total to about 250 over the SAWI implementation period). SAWI has continued to encourage women to play leadership roles – for example, four of the six lead authors of the published article “Reinterpreting Cooperation in Transboundary Waters” were respected women experts. The article also notes the development of a gender narrative in the dialogue processes and flags the importance of including women in stakeholder consultations and communications. The IBKF also held a session on gender, which was well appreciated by stakeholders who noted that this had helped to broaden their perspectives.

ii. **Gender analysis has brought new insights into the linkages between water governance, climate and impacts on women:** A notable contribution of SAWI this year has been the salinization studies in the Sundarbans Landscape and the impact on nutritional and health status of women and children. This body of work brings critical information and evidence, drawing on stakeholder consultations and surveys.

Box 11

GENDER IS CENTRAL TO THE SUNDARBANS WORK

The Sundarbans Targeted Environmental Studies have brought an important focus on gender and social inclusion, including the linkages with increased vulnerability from climate change as follows:

- Progressive salinization of water with sea-level rise is a major threat to Sundarbans in a changing climate. In FY20, SAWI monitored salinity of surface and ground water of Sundarbans, analyzed primary data collected from 4,000 individuals from 900 households in 69 locales spread across the region and conducted econometric analysis for understanding implications for the quantity and quality of water resources that are critical for women’s and children’s health and nutrition. See [Drinking Water in the Indian Sundarbans](#) and Fishing in Saltier Waters: Climate Change, Saline Exposure and Women’s Health in the Indian Sundarbans.
- The econometric study, [Explaining Regional Variations in Mother-Child Health: Environmental Determinants in India and Bangladesh](#), highlighted the importance of local differences in the timing and magnitude of water-cycle impacts for regional variations in maternal anaemia and child-wasting in Bangladesh and India (West Bengal, Bihar and Jharkhand). It also drew attention to the critical role of environmental conditions—previously ignored in the literature and policy dialogue on malnutrition. Remarkably, the research suggests that regional and temporal variations in the water cycle through flood and drought conditions affect mother-child health as strongly as the more commonly cited socioeconomic factors (namely, income, education, age of the mother etc.).
- Findings from a water monitoring study (see web story, [Drinking Water in the Indian Sundarbans](#)), highlighted high salinity in monitored water- sample collected from tube wells - the sole source of drinking water in populated areas of the Indian Sundarbans. Water salinity will increase further with the diffusion of ocean water further inland in a changing climate, As potable water becomes scarcer, women in poor households will have to spend more and more of their time traveling to distant sources. Therefore, this activity raised evidence-based concern regarding quality of drinking water and time activity patterns of women in the region.
- Findings of a primary research (see web story, [The Perils of Prawn-Catching for Sundarbans Women](#)) provided a better understanding of the lives of poor women who wade waist deep in salty water of rivers and creeks in the Sundarbans for hours to collect wild prawn seedlings. Analysis of the data revealed that years of education and child-rearing obligations are sufficient to distinguish between women who have no engagement in wild prawn seedling- collection and those with many years of engagement. The activity also suggested a few measures which, if implemented, will improve the health and livelihood options of these women.
- Findings of a primary survey (see research paper, [Co-Location, Socioeconomic Status and Perceptions of Environmental Change in the Indian Sundarbans](#)), highlighted the importance of locally-oriented collective action with local governance that promotes non-elite participation for cost-effective adaptation to climate-related changes in the Sundarbans. Cost-effective adaptation to climate-related changes in the Sundarbans will require local support for appropriate collective action, combined with increased public investment. To be effective, however, collective action requires that problems across the affected population be similarly perceived. The survey conducted by this activity in the Indian Sundarbans shows that perceptions of environmental problems vary significantly across localities and even within localities, by household, especially among elite households. Effective management of environmental resources in the Sundarbans will require locally oriented collective action with local governance that promotes non-elite participation.

iii. **Strengthening Data and Systems for decision making:** In FY20, the study “Explaining Regional Variations in Mother-Child Health: Environmental Determinants in India and Bangladesh”³¹ analyzed more than 100,000 records of the India National Family Health Survey (NFHS-4) for 2015–16 and the Bangladesh Demographic and Health Survey for 2011 indicated sensitivity to flood-proneness will make mother-child health vulnerable to varying patterns of extreme weather events with climate change. The work is expected to inform policy makers in India and Bangladesh to improve health outcomes for mothers and children.

The ongoing **Practitioner Program for Transboundary Water Management** activity, which will bring new knowledge in sustainable management of regional forested watersheds, is producing an e-book that combines data, knowledge, and guidance notes. The e-book will serve as an online knowledge platform with sections that address gender, social inclusion and disability. The guidance notes, currently under development, will also identify areas in which these cross-cutting themes can be addressed vis-à-vis watershed management. The activity will leverage World Bank research and work completed in this area, such as the recent guidance on Including Persons with Disabilities in Water Sector Operations.³²

iv. **Gender M&E:** Task Team Leaders (TTLs) continue to report on gender mainstreaming actions on an annual basis, providing evidence where possible. Capturing annual gender results remains work in progress, especially as SAWI’s efforts are focused at the policy level and do not include grassroot-level targeted initiatives. Nonetheless, SAWI is continuing to use the gender mapping (initiated three years ago) that shows entry points within each of the technical areas at the state / local, national and transboundary levels. This supports efforts to monitor progress and gender disaggregated results.

Climate Change and Building Resilience

The linkages between climate change and transboundary water are crucial in South Asia. There is strong evidence from World Bank and other reports that the three major Himalayan transboundary rivers are likely to be significantly impacted by climate change in numerous ways: through climate and weather events like floods and droughts; and, longer-term climatic changes of higher temperatures that affect glacial melt,

variable precipitation, and storm surges. Additionally, water quality will deteriorate due to salinization of coastal aquifers as a consequence of rising sea levels and intense storm surges.

SAWI’s work closely aligns with the World Bank Group (WBG) 2025 Climate Change Corporate Commitments,³³ and its WBG Climate Change Action Plan (2016-2020)³⁴ which are designed to scale up climate action. Across SAWI, activities have an underlying theme of resilience building to tackle existing and future climate related risks.

SAWI is already helping to bring new knowledge and support collaborative action towards tackling these challenges. This year SAWI has continued to build on and deliver its work, incorporating climate change issues into activities. Some examples of work in the reporting year are as follows:

i. Building scientific climate knowledge, tools and disseminating this widely: World Bank reports note that the Himalayan glaciers store some 10 percent of the world’s freshwater and are a vital source of water for eight countries from Afghanistan to Myanmar. Glaciers help to moderate river flows in the region’s major rivers by providing a source of meltwater in hot, dry years and storing water during colder, wetter years. Deposits of black carbon on the surfaces of some glaciers are causing them to absorb more solar radiation, thus contributing to increase in glacial melt. With rising temperatures, acceleration in glacier melting will trigger a higher loss of biodiversity, negatively impact agriculture, livelihoods and economic growth, and have consequences for food and water security in the future. As reported in an earlier section, the **Glaciers of the Himalayas** study is looking at the impact of climate change and black carbon on the glacier and snow melt in the Himalayas and their implications for water resources in the Ganges, Indus and Brahmaputra Basins. Following a successful event last year that resulted in the adoption of a draft Declaration, the creation of a Hindu Kush Himalaya Glaciers and Mountain Economy Platform of scientists, development partners and policy makers, and an interim Secretariat hosted by the Government of Nepal at the Center for Green Economy and Environment, the team has progressed and completed its highly technical analysis with the involvement of international scientific experts. When complete, the study will usefully feed into policy dialogue with countries through the World Bank’s country strategies and investments.

³¹ <http://www.sundarbansonline.org/wp-content/uploads/2020/03/Paper-Explaining-Regional-Variations-in-Mother-Child-Health-Role-of-Environmental-Factors-.pdf>

³² <https://openknowledge.worldbank.org/handle/10986/27542>

³³ <https://www.worldbank.org/en/news/press-release/2018/12/03/world-bank-group-announces-200-billion-over-five-years-for-climate-action>

³⁴ <https://openknowledge.worldbank.org/bitstream/handle/10986/24451/K8860.pdf>

A new area of focus this year is on watershed management – which can contribute to important development goals and increase resilience to climate change. Economic activities in watersheds are interconnected, both locally and regionally, as well as upstream and downstream. Watersheds are increasingly being seen as a form of “green infrastructure” that provide multiple benefits across sectors – particularly, agriculture, water and energy. However, they also have implications for disaster risk reduction and climate change mitigation.

Climate change can impact watersheds. The timing and intensity of precipitation is expected to impact watersheds through increases in erosion and sedimentation into waterways. Heavy precipitation can also destabilize slopes and trigger landslide risks thereby contributing to overall sediment loads in some SAR watersheds. High sediment loads have negative impacts and reduce the resiliency of infrastructure (hydropower facilities/roads) and other elements (agriculture) in watersheds. SAWI's ongoing **Practitioner Program for Transboundary Water Management** activity is bringing a transboundary approach to watershed planning and will potentially inform design of future investment projects through the development of its knowledge platform and prioritization tools. SAWI's products will incorporate best practices for watershed management in order to maximize the flow of ecosystem services to benefit stakeholders in a range of sectors.

ii. Using climate studies to promote technical cooperation between countries: Climate change is a major threat to the Sundarbans which spans both Bangladesh and India. The current scientific consensus holds that, with a changing climate, any changes in temperature-related evapotranspiration rates, altered meltwater flows from mountain regions and increasingly-erratic monsoons (with more severe drought conditions in some sub-regions and greater flooding in others) will magnify regional and temporal variations in the water cycle of the Ganga-Brahmaputra Basin, calling for improved flood/drought management. Yet, technical information on how climate change will impact the local population of the Sundarbans has been scarce. As reported in previous sections, the **Targeted Environmental Studies** are building a knowledge base for sound climate-change adaptation and resilience responses. Critical problems addressed by these studies included inundation from sea-level rise, cyclone-induced storm surges and salinization of water and soil. The findings highlight that the impacts of sea-level rise, when measured in magnitude and time-phasing, would differ significantly across the Sundarbans, leading to

differential pressures across the political border for adaptation responses to the same environmental conditions.

Work towards a joint research proposal, “Understanding and Assessing the Impact of Climate Change in the Indus Basin”, arising from activities under the Indus Dialogue (since 2016), is regarded as a positive step towards advancing technical collaboration between the four riparian countries. This year, SAWI started to transition its facilitative role to ICIMOD—including that of progressing and sourcing finance for the research and ensuring quality of research outcomes.

iii. Integrating Climate Change into Institutional Practices and Programs: Water resource management is the main challenge in adapting to climate induced droughts and floods, and unpredictable weather patterns. Groundwater is a vital resource for South Asian countries, but its quality and availability is under threat from climate change and from over extraction for irrigation and other productive uses. Groundwater issues are closely linked to river and surface water management but are not managed by the same institutions in the region –thus leading to an uncoordinated approach to the detriment of one or both sources of water. As reported in detail last year, SAWI has progressed a suite of four groundwater studies – of which three were completed this year and one in a previous year.

In previous years, SAWI completed its support to strengthening hydromet systems in Bhutan and flood forecasting models in Bihar (India). These are now in use by governments. This year, SAWI also continued technical work to support development of Bangladesh's hydromet data management systems. All of these activities are closely linked to and informing the World Bank's ongoing hydromet modernization investments in the region.

Innovation

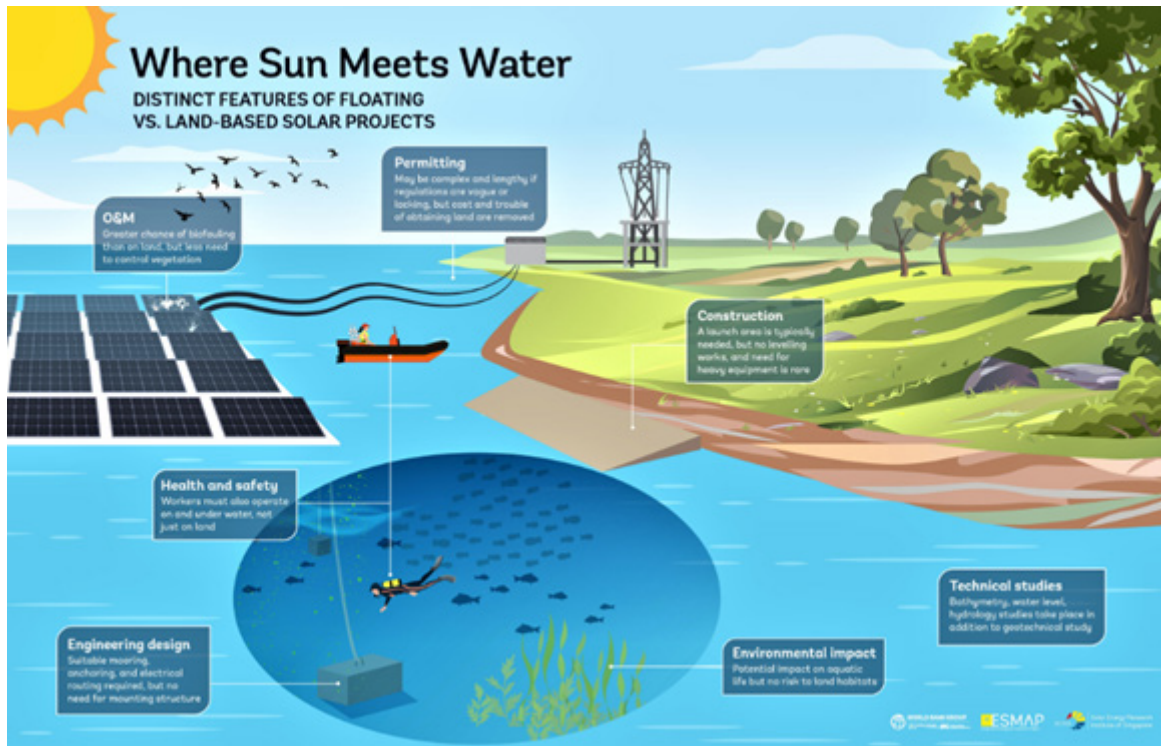
SAWI continues to adopt multiple strategies and actions to adapt to existing challenges, to create and harness new opportunities, and to shift intractable positions on transboundary cooperation. Some examples of innovative practice in this reporting year include the following:

(i) Tackling the information barrier to new technology: SAWI's innovative TA is helping to address the information barrier in India on FSPV and will help to set benchmarks for similar future projects within India and elsewhere.

FLOATING SOLAR PHOTOVOLTAIC – NEW SOLUTIONS TO CLEANER ENERGY?

Globally, there is growing interest in the use of FSPV – an innovative technology involving the installation of PV panels on water surfaces such as hydroelectric dams, large ponds, lakes and reservoirs. As systems are located on water bodies, the technology can help to address constraints such as limited land availability, and in some cases make use of existing power infrastructure associated with hydropower or irrigation dams. Such projects can also contribute towards reduction in water evaporation and improvement in water quality by slowing algal growth.

Figure 7: FEATURES OF FLOATING SOLAR PHOTOVOLTAIC



Source: World Bank Group, ESMAP and SERIS, 2019, *Where Sun Meets Water: Floating Solar Handbook for Practitioners*, Washington, DC: World Bank. <http://documents.worldbank.org/curated/en/418961572293438109/Where-Sun-Meets-Water-Floating-Solar-Handbook-for-Practitioners>

Within India, SAWI's preliminary reports note that FSPV is in an early but growing stage of development, with a cumulative capacity of 2.7 MW installed until 2018. It is estimated that 18,000 km² water surface area spread across various states could be suitable for the installation of FSPV plants – thus allowing the installation of hundreds of GWs of FSPV and helping India in its transition to a cleaner national energy system. However, the market is still nascent with several implementation challenges remain, World Bank ESMAP reports note the potential for scaling up solar generating capacity, especially in countries with high population density and competing uses for available land. However, such projects are still considered risky by commercial banks, making it difficult to mobilize private investments in such projects. One key issue is the lack of information available about the proposed project sites.

SAWI activities are targeted to build and showcase the robust practices in this new technology so that its uptake is improved through setting the right benchmarks of undertaking the due diligence as well as by giving the signals to the market about the promising potential in the country. Since India is leading the way for most of the South Asian countries, once the final outcomes of the tasks are delivered, the same approach could also be replicated in the neighboring countries. This will allow them to build on the Indian experience and expanding their horizons on achieving cleaner and greener economies.

(ii) **Exposure to New Platforms and Technologies:** In the Ganges Focus Area, the **Water Resource Management in Transboundary Basins** activity is supporting innovative analytical techniques for water management and modeling. This year, SAWI promoted the use of GEE – one of the latest technologies that has revolutionized remote sensing data inventory, processing and analysis in water resources planning processes. For instance, the tool enables access to open source satellite data on a public platform. Google's GEE platform can therefore be used to showcase large- and small-scale scientific analysis and visualization of geospatial datasets. The technology is widely used by researchers, non-profit organizations, educators, and governmental agencies to analyze large-scale geospatial data, and is available free of cost for non-commercial users. SAWI's introductory training (delivered virtually) helped stakeholders to become familiar with this platform and to understand the wide range of its analytical applications and potential uses.



In Nepal, SAWI's **Sustainable Water Resources Development for HEP** is supporting technological innovations under the River Basin Planning component, through support for developing a decision support system (DSS). A consultant has been hired to develop a DSS, including process models, and a knowledge base for each basin based on systematic collection, evaluation and analysis. The DSS will include baseline information on existing conditions in the basin, relevant information on institutional and social factors that can influence water resources use and management, as well as both existing plans and consultant-developed projections for future changes in land use, water use/demand, and water availability. The DSS will specifically provide support to flood/drought forecasting, basin planning and management, techno-socio-economic clearance for projects, water allocation, regulation, monitoring and evaluation, benefit optimization, conflict resolution, IWRM implementation, co-ordination, sustainable water resources development,

demand/supply projection, water resources infrastructure and operational policy development.

2.3 Sustainability

As SAWI moves into its final year of implementation, all activities have actively considered sustainability beyond this phase of funding. SAWI's overall approach to sustainability has not changed from that reported in previous years and follows good practice for a TF of this nature. Its sustainability measures include the following:

- (i) Help to institutionalize knowledge products and tools, and disseminate these externally and within the World Bank;
- (ii) Provide any outstanding support to help strengthen dialogue processes (particularly for the Sundarbans area);
- (iii) Work in partnership with and through others to build ownership and uptake, for instance, other institutions are increasingly taking over the organization of sub-regional events and pursuing future financing options;
- (iv) Continue to inform linked investments (mainly World Bank and national projects, details of which are in Annex 9);
- (v) Undertake strategic communication to keep momentum and celebrate SAWI's achievements.

2.4 Program and Financial Management

SAWI is managed and administered by the World Bank's South Asia Region's Regional Engagement (SARRE), which is headed by the Director and managed by a team of experts in Washington, DC and Delhi. SAWI works across multiple GPs (Energy, Environment, SURR, etc..) and the Water GP plays a special role as technical lead for program implementation, ensuring that SAWI is fully embedded within and aligned to the World Bank's broader water agenda. SAWI is an important and strategic instrument for the World Bank in South Asia. These arrangements are working effectively and remain unchanged.

Under the World Bank Trust Fund Reform, new proposals submitted to SAWI and the other four regional trust funds were reviewed and approved by the RIPC, which is chaired by the Director, SARRE and comprises representatives from the South Asia Chief Economist's office, relevant Global Practices and Country Management Units in South Asia. This approach was

adopted early last year to ensure that trust-funded activities are aligned with regional and country priorities, maximizing complementarity and efficiency. The individual activities are managed by TTLs, who are experts in their field, and who also bring experience of working on similar issues across other countries in South Asia and elsewhere.

SAWI resources have been fully allocated and expenditure remains on-track. By end of project, SAWI expects to fully disburse its funds. A summary is in Table 2 below, and more details are provided in [Annex 4](#).

Table 1

CUMULATIVE DISBURSEMENTS

	Amounts (\$) (as of June 30, 2020)
Total pledged to SAWI	US\$36.1M
a) Funds received by World Bank	US\$35.4M
b) Allocations to activities (but not fully disbursed)	US\$32.6M
c) Actual Disbursements to date	US\$29.4M

The World Bank follows technical, legal and fiduciary procedures to establish activities and commits funds through its standard processes. All trust fund beneficiaries and bidders are required to observe the highest standard of ethics in World Bank-financed grants and contracts. Funds are disbursed according to the grant agreements and financing plans. 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. Standard audit procedures and value for money protocols are followed.

The World Bank has a rigorous established internal process for data collection. This Annual Report was developed drawing on reporting and evidence provided by World Bank TTLs – including from the processes outlined above – and in line with the results framework.

This year, SAWI held its Annual Meeting; however, a field mission, organized for donors by the World Bank in November 2019, could not go ahead due to local security concerns. Donors were also invited to participate in SAWI events—i.e., the knowledge

sharing workshop on the Sundarbans targeted environmental studies.

In 2019, the World Bank stepped up efforts to communicate how the South Asia TFs work. A public website, [OneSouthAsia](http://www.worldbank.org/OneSouthAsia) at www.worldbank.org/OneSouthAsia, was redesigned to highlight success stories, reports, analyses, and videos about regional integration and collaboration. The site’s content now focuses on regional work in five major areas: trade, transport, energy, water, and climate. The website encompasses work with trust fund partners and Bank investments to build stronger regional links that can boost economic growth and climate resilience. Also included is a description of SAWI and links to analyses and reports it has funded. The site also hosts relevant blogs.

2.5 Value for Money Considerations

SAWI applies Value for Money (VfM) in its selection of activities, and in their implementation. As requested by FCDO partners, this section reports on VfM against the United Kingdom’s 4E framework.

Economy

The main cost drivers are expert fee rates, travel, events and management costs. SAWI follows the World Bank’s standard technical, legal and fiduciary procedures to establish activities and commits funds.

(i) **Procurement:** 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 World Bank guidelines on “Procurement under IBRD Loans and IDA Credits” and on the “Selection and Employment of Consultants by World Bank Borrowers,” jointly referred to as the “Procurement and Consultant Guidelines.”

Where the World Bank needs to source external consultants, it uses established guidelines for procurement of TA and fee rates which are benchmarked against standard arrangements. International and local expertise are sourced for highly specialized technical work, and as these offer value on the ground. All TF beneficiaries and bidders are required to observe the World Bank policies and procedures for World Bank-financed grants and contracts.

(ii) **Standard processes for BE and RE modalities:** This year, all but two of SAWI’s current portfolio are Bank-Executed (BE), which means that, for a majority of the portfolio, the World Bank is responsible for procurement of goods and the employment and supervision of consultants in accordance with its established policies and procedures. For the two RE activities, Bank guidelines provide specific instructions for selection of activities and the use of World Bank documents (standard bidding documents, requests for proposals, contract forms), conflict of interest, advance contracting, co-financing, fraud and corruption. Funds are disbursed according to the grant agreements and financing plans.

(iii) **Management:** Robust management and governance processes are in place. The World Bank’s SAWI Secretariat closely monitors financial spend and proposes adaptive resource management based on performance of the TF activities. Individual activities are led by relevant GP teams, drawing on World Bank knowledge, resources, and in-country presence. Travel guidelines are also applied according to the Bank’s established procedures and systems.

Efficiency

(i) **Allocation efficiency:** As part of the TF Reform, the process of endorsement of activities by the World Bank’s internal RIPC helps to ensure strategic alignment of SAWI activities with the Bank’s operations in South Asia – thus reducing the risk of duplication or of engaging in non-strategic activities. This year, the same approach was applied to the endorsement of SAWI’s six new activities.

(ii) **Several of SAWI’s activities build on previous work funded from other sources, thus showing a continuum and delivering efficiency gains.** This signals that SAWI is part of a wider joined-up effort. This approach is part of the World Bank’s “Whole of Finance approach” which emphasizes importance on the substance of these activities rather than the funding source. For example, the **Practitioner Program in Transboundary Watershed Management** activity (under the Regional FA) is part of a larger effort to mainstream nature-based solutions in the World Bank’s operations in South Asia. The work is being delivered in three phases – of which SAWI is supporting the second phase, while work under the first phase was completed with funds from the Korean Green Growth Trust Fund. The **Nepal Water Platform** activity (under the Ganges FA) builds on work done under a previous Water Platform (funded through other non-SAWI sources).

(iii) **Keeping momentum despite travel restrictions:** There have been some savings on events and in-person consultation resulting from Covid-19-related travel restrictions. Instead, World Bank teams have helped to keep momentum with partners through virtual meetings and trainings, and by using locally based consultants for data collection and for discussion with local partners.

Effectiveness

(i) **Strategic Alignment and Influence:** SAWI does not operate as a stand-alone TF, as it has wider links to other work in South Asia. Over half of SAWI’s portfolio (some 35 activities) were/are linked to or were/are informing World Bank investments in South Asia (worth \$8B). For example, the **Practitioner Program in Transboundary Watershed Management** activity helped to inform early prototypes of a Regional Data and Analysis Service platform under the World Bank’s Climate Adaptation and Resilience (CARE) for South Asia. SAWI is also a part of the Bank’s wider regional effort in South Asia and forms part of the South Asia RICE strategic approach by helping to build climate resilience. Several of SAWI’s activities are also closely aligned with national priorities and programs – thus not only helping to extend the reach of the TF but also supporting opportunities for aligning national and regional agendas.

(ii) **Uptake of SAWI products by partners:** Over the years, there are several examples of the uptake of SAWI’s knowledge products by partners – signaling the relevance and effectiveness of SAWI’s work. For example, this year, the recommendations from a recent study on *Grow Solar, Save Water, Double*

Farmer Income in Rajasthan, under the **Diagnostic Study on Groundwater-Energy-Agriculture Nexus** activity, have been taken up by government and have spurred the development of a pilot in different agro-climatic zones which could potentially lead to upscaling and replication across other Indian states; the Brahmaputra basin modeling work has been taken up by Government of India, and a request for follow up TA has been received.

Access to the SAWI grant has allowed the Bank to quickly respond to government requests for support. For example, under the Brahmaputra FA, SAWI has been able to engage with government partners in ambitious plans to improve management of water resources in the NER. Without SAWI funds it is unlikely that the World Bank would otherwise have been able to engage to the same extent. SAWI enabled the World Bank to ensure that all stakeholders were engaged in the process, and to conduct extensive multi-stakeholder consultations at both the Central and State levels.

(iii) **Small investments in knowledge and modeling are likely to bring significant improvements in government systems and policy making processes.** For example, early feasibility assessments for nascent **FSPV** technology are already informing investments by the World Bank and Indian state governments.

(iv) **Nudging towards regional collaboration by working with and through others.** SAWI continues to use a diversified strategy of working with and through regional institutions, networks and platforms. Examples include the **Nepal Water Platform** (established through another World Bank activity), which convenes stakeholders across government departments; partnership with ICIMOD who has regional presence and acts as the Secretariat for the **HUC** which has an extended network of 62 institutions and for the **IBKF**; and significant shifts in the Track 2 dialogues particularly in the Brahmaputra (evidenced by joint articles this year) and in the Sundarbans focus areas (evidenced by progress in discussions on the joint collaborative mechanism).

Equity

As reported in the GESI section, these issues continue to be integrated into activity workplans where it makes best sense to do so and based on the particular objectives of the activity. SAWI's activities are also bringing new knowledge that contributes to effective project design through the innovative potential – for instance, through the development of an online

e-book that will address gender, social inclusion and disability in watershed management. SAWI is also supporting knowledge on low or no regret adaptation measures in investment projects – such as through dam safety guidelines for Bhutan hydropower projects, studies on the governance of ground water in South Asia, and work on building hydromet capacity and systems in Bhutan and Bangladesh. SAWI's work has potential for equity related outcomes to be realized – for example, some of the related outputs (such as the Sundarbans targeted environmental studies) have just been finalized and the Covid situation has limited further discussions with BISRCI and other stakeholders.

Section 3: Lessons, Risks, Forward Look

3.1 Lessons

What Has Worked Well

The combined approach of diplomacy through dialogue processes, strengthening governance through capacity building, systems and knowledge, and informing investments is proving to be effective when dealing with complex issues involving diverse interests across borders. Traditionally, formal bilateral government-to-government dialogue has not been able to promote holistic, transboundary cooperation. Using a combination of diplomacy, governance, investments and capacity building is important as they are mutually reinforcing, help to build trust, bring in representative voices from non-government stakeholders, equip water managers with critical skills and tools, and unlock required resources to support action. This integrated approach can also unlock windows of opportunities, particularly when stakeholders convene around a common aim, and when country priorities align with regional agendas (e.g., inland water transport and disaster risk management, both of which require a regional approach to realize full benefits and are also country priorities).

Building a common vision requires sustained work and time.

Integrated river basin planning in a transboundary context is a complicated process, and the technical aspects (such as modeling frameworks, analytical tools, data, etc.) are the least of it. Such exercises require intensive consultation with multiple stakeholders involved at various levels and across multiple sectors, backed by knowledge and capacity building.

Aligning SAWI's activities with national priorities works as a useful entry point to engage on issues that have a regional impact and to build consensus among different stakeholder groups and adaptation actors at national and state levels.

The likelihood of successful uptake of SAWI's activities increase manifold when there is strong country ownership of processes and products, and when activities directly respond to client

priorities are not wholly supply-driven. For example, engaging cross-departmental stakeholders during the Brahmaputra technical work is helping to highlight the important nexus between water and other associated sectors so that water resource management planning can be done in a more comprehensive manner, and is facilitating a broader developmental approach. This has been an important strategy in India, particularly as SAWI is strongly aligned with large national investments that are also supported by the World Bank. Similarly, the Nepal Water Platform provides an authorizing environment and is enabling SAWI to work through a forum with key decision makers from water sector ministries to deliberate on water development and management.

The diverse strategy of holding basin and regional level events has been effective, as each of these have a different reach, common complexities and issues of interest that are pertinent to the sub-region, and bring their own value addition. SAWI has also taken care to introduce discussion topics that foster dialogue and to use established national and regional institutions to play a role in organizing these events. Regional-level dialogue events enable discussion on a wider range of topics and cross-fertilization of ideas across basins and build wider networks and partnerships.

SAWI's approach of multi-stakeholder engagement in the development of technical knowledge, has helped to create multiple channels of communication, forge a link between science and policy makers, and create a positive collaborative spirit among government and non-government entities in the Sundarbans. This process has also enabled the strategic assimilation of vast and diverse existing knowledge on Sundarbans into the discourse over time. The activity established collaboration between local researchers in Bangladesh and India working on Sundarbans. The multidisciplinary research team including local ecologists, economists, engineers, geographers, hydrologists and soil scientists from two neighbouring countries designed surveys

together, compiled location-specific databases, co-authored analytic papers, and experts from Bangladesh trained Indian researchers on modeling of cyclonic storm surge and aquatic salinity in Indian Sundarbans.

What Has Worked Less Well

Securing of funding is critical to sustain momentum in the long term, particularly where these are being taken up by regional institutions or implemented as RE activities. These considerations should be built into activities at an early stage. For example, the RE component of the Nepal hydropower activity is picking up pace and is now facing a funding gap in the event that government funding becomes unavailable. The HUC Secretariat's is seeking external funding, which will be important to maintain an active network. This remains a key challenge to the sustainability of the HUC Secretariat's work. Similarly, the joint research proposal emerging from the Indus Basin Knowledge Forum process has been unsuccessful in securing international funding, without which it is unable to progress.

The pandemic has been an unforeseen and unanticipated occurrence that has not only brought disruption to SAWI's planned work but has also raised future uncertainties about regional cooperation approaches in general. Due to Covid-19 there has been limited face-to-face engagement with client partners, events to convene multiple stakeholders were not held, consultant experts were unable to travel to the field, and data collection efforts were severely hampered. SAWI has used virtual technology to sustain client engagement and deliver training, and has extended some activities, but it is too early to assess the impact of these alternative approaches. More generally, governments are immediately focused on tackling their national priorities and it is too early to assess whether the pandemic recovery efforts will leverage opportunities for cooperation or will hinder efforts in this direction.

3.2 Risks and Mitigation

SAWI's overall risk rating remains **Medium**. The SAWI Program Strategy (2013) identified five key implementation risks and mitigation measures. Additionally, this year a new pandemic-related risk has emerged.

(i) Covid-19 Risks (new) – Medium: This is a new risk with two possible implications: (i) impacts on delivery of SAWI activities; and (ii) regional and national attention diverted away from SAWI to focus on new threats.

So far, some of SAWI's activities have experienced some temporary delays due to the sudden and unexpected onset and scale of the pandemic, which prevented essential travel and collection of field data, face-to-face discussions with stakeholders, including on progressing technical work, and hiring of technical expertise. Task teams have tackled this through virtual meetings, by drawing on secondary literature and data, and by engaging local expertise where possible.

There is some risk of stakeholder attention being diverted to other priorities due to Covid-19. However, water and climate are very topical and remain relevant priorities in South Asia, including to the building back better agenda. Also, given that SAWI is an advanced initiative and has well established networks and partnerships, it is likely that this agenda will continue to be of importance in the region.

(ii) Financial Risks – Low: Two financial risks were identified: (i) reduction in program funding; and (ii) unutilized funds.

SAWI undertook a portfolio rationalization exercise two years ago as part of adaptive management practice. Subsequently, the Secretariat keeps a close track of expenditure on a monthly basis. SAWI funds are fully allocated and will be fully disbursed by the end of program. The risk of unutilized spend remains low.

(iii) Operational Risks – Medium (changed from Low/Medium in FY18): Two key operational risks were identified: (i) loss of key program staff; and (ii) poorly designed or executed activities.

These remain low risk for the remainder of the program. There have been no changes in key program staff, and all SAWI activities are selected on the basis of their relevance to regional priorities and to the World Bank's operational focus in South Asia. The SAWI Secretariat continues to use its management information system and other monitoring mechanisms to track activity progress and financial performance, with senior engagement and attention to the quality of spend. This year, there has been no instances of loss of key staff or of poor performance by contractors. Where activities are BE, there is a strong process in place to ensure that activities deliver to standard. SAWI-support to RE activities has ended, and the sustainability of this work may be at some risk if alternative financing options do not come through. The World Bank continues to liaise with partners on RE activities to manage these risks.

Other external factors, such as geopolitical developments, bilateral / regional tensions, or shifts in national priorities can

impact the pace and uptake of SAWI's work. The SARRE team continues to keep a watching brief on regional developments to inform its management and decision making.

(iv) Relationship Risks – Low (changed from Medium in FY18):

Three key relationship risks were identified: (i) reluctance of stakeholders to engage; (ii) disengagement of donor partners; and (iii) poor integration with World Bank operations.

These risks remain low. Over the years, stakeholder engagement in SAWI activities has increased in terms of participation in regional events, involvement in technical work and consultations, and in capacity building. For instance, the Brahmaputra Dialogue has institutional engagement from across all four riparian countries, ICIMOD has taken a facilitative lead role for the IBKF, and there is strong engagement on numerous technical products such as the water resources management work in the NER. A majority of SAWI's activities continue to be linked to the World Bank's wider efforts in South Asia, providing opportunity for cross-learning and for a comprehensive approach to regional cooperation and integration.

(v) Reputational Risks – Low: Risks at the start-up of SAWI-II included: (i) perceived poor quality; and (ii) dialogue processes that enter spheres inappropriate for World Bank engagement.

This risk remains Low as dialogue processes in three of the four basins have progressed well and stakeholders are appreciative of the technical and facilitative role played by the World Bank. There are no further dialogue events planned as this phase of SAWI draws to a close.

SAWI's knowledge and technical products are closely oriented to partner demand and priorities – thus adding value - and are well accepted. However, in some cases uptake by partners may not be immediately evident, particularly where there is a time lag, when issues are highly technical or sensitive, or where these need wider consultation processes at a national or regional level.

3.3 Portfolio Forward Look

This phase of SAWI is now moving into its final year of implementation, with all activities scheduled to complete in FY21. As such, the remaining activities in the portfolio are focused on completing their workplans and adjusting approaches based on the knock-on effects of the pandemic, engaging with partners

to institutionalize the knowledge and promote uptake of tools and approaches, supporting dissemination and communication of the knowledge, and working with other World Bank teams for lesson learning and for informing World Bank investments.

Some examples of the key deliverables for FY21 include the following:

- (i) Dissemination and virtual launch of the flagship Glaciers of the Himalayas study in October / November 2020;
- (ii) Studies from the Agriculture-Water Nexus activity on the Impact of Covid-19 on the agriculture value chains in NER of India, as well as a value chain analysis of major commodities in NER with a focus on climate resilience in production, agriculture-water nexus and trade potential.
- (iii) A compendium of studies from the South Asia Waterways activity in four policy/operational areas and establishment of initial contours of an institutional framework leading to evolution of a broader regional waterway framework in the eastern part of South Asia.
- (iv) Policy relevant analysis on plastic pollution flows in the transboundary rivers, with identification of opportunities to reduce and manage transboundary river pollution.
- (v) A study on the economic benefits from introducing water markets in major regions/basins in the South Asian countries that meet all the pre-conditions necessary for water markets to exist.
- (vi) Capture and disseminate end of project results outcomes and stories of impact.

The World Bank is exploring future programming options, including through the new RAP, which will enable continued momentum of SAWI approaches and help to sustain results. As part of the new Umbrella Trust Fund reforms, the World Bank will also look to explore future donor partnership opportunities.

TABLE 1: SELECTED RESULTS HIGHLIGHTS (FY20)

DIALOGUE AND DIPLOMACY

1. SAWI’s value add includes convening diverse stakeholders, 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.

- While Brahmaputra Dialogue events could not be held due to Covid-19, the activity implemented a highly-collaborative knowledge product (*Yarlung-Tsangpo-Siang-Brahmaputra-Jamuna: The Restless River*) produced by dialogue participants and other stakeholders from each of the four Brahmaputra basin riparians.
- SAWI and the BISRCI continued to support momentum toward a joint institutional arrangement to sustainably manage the Sundarbans. The report, *Institutional Structure for Joint Action in the Sundarbans Region*, was finalized, based on hundreds of opinions solicited on a possible joint structure; a policy brief of proposed joint mechanisms was produced; and one-on-one discussions with decision makers from both countries were carried out on establishing the joint institutional arrangement. A planned high-level event announcing momentum toward a joint commission was postponed due to the pandemic;
- SAWI, in partnership with ICE WaRM, supported a special session at the IBKF4 that focused on how researchers can better engage with stakeholders and how gender inclusiveness can enhance research impacts in the Indus Basin. This session was well-received and introduced concepts that had not been previously considered in the dialogue (such as consideration of gender requirements when developing river flow models);
- The completed SAWI HUC Grant has revitalized the Consortium to make it a fully functioning and vibrant network that serves as an effective and holistic voice for mountain development and research. The network of research institutions now has 67 full time partner member institutions (from a baseline of 33). the HUC Thematic Working Group on Water (Water Group), established in previous years, consists of water scholars and practitioners in eight HKH countries. This group has continued to discuss its strategy and priorities of actions;
- The HKH Glacier and Mountain Economy Platform, facilitated with SAWI support last year—which will work in a collaborative, cooperative and transboundary manner to co-produce, consolidate, share and utilize knowledge on cryosphere, glaciers and mountain economy by linking to suitable programs on the ground—is now hosted by the Government of Nepal at the Center for Green Economy and Development, and will gradually extend to each member country based on need and ownership;
- The Nepal Water Platform activity supported development of a Platform Support Unit, which brings together key decision makers from water sector ministries to deliberate on water development and management. It provides the required high-level backing and authorizing environment for the approval and implementation of technical and policy recommendations for the sector.

KNOWLEDGE AND CAPACITY

2. New knowledge products (36 in FY20), coupled with targeted capacity building (235 people and 24 water management organizations), continue to deepen understanding of transboundary issues by key stakeholders and provide options and tools for addressing these - thus contributing positively to the wider operating environment.

- GEE is a technology that has revolutionized remote sensing data inventory, processing and analysis. A major component of SAWI’s working under the Ganges FA this year was to promote GEE utilization in water resources planning processes under NHP. The activity trained 235 water professionals in GEE and related applications;
- The Targeted Environmental Studies activity carried completed five technical studies and two geocoded databased to help build awareness of the Sundarbans ecosystem in a changing climate. This body of work is highly relevant, as salinization, inundation risk, and cyclone strike frequency and intensity are likely to increase steadily as climate change proceeds. It offers critical insights for regional policymakers and planners on planning a holistic approach to the sustainable management of this extremely fragile landscape;

- The Nepal Sustainable Hydropower BE activity continued to support enhancing the capacities of students and faculty of local academic institutions in hydropower and water resources management in order to strategically meet Nepal's future water professional capacity needs to manage a planned hydropower regime ten times what it is today. Eighteen students (nine women) were selected and participated in a one-month fellowship exchange to Wuhan University in China;
- The Power Sector Reform for Sustainable Hydropower in Nepal RE activity carried out a 15-day training on hydrological modeling to build understanding in how hydrological models can be used for river basin planning and operations. Nine participants—comprising engineers and hydrologists from WECS and other government agencies—took part. The activity also implemented a 10-day study tour for six government officials to the Columbia Basin (USA). This tour included interaction with a number of national and state agencies, experts, universities and other organizations operating in the basin to build capacity in river basin and hydropower planning.
- Business models developed under the completed *Energy-Water-Agriculture Nexus: Grow Solar, Save Water, Double the Farm Income* study (which were endorsed by the Government of Rajasthan and NITI Aayog), are now being field tested through “learning by doing” pilots under the Rajasthan Agricultural Competitiveness Project with the aim to implement solutions on the ground to calibrate the business models, increase engagement and outreach to farmers, and demonstrate viability for a scale up across the State.
- SAWI supported development of National Guidelines for Dam Safety for the Government of Bhutan and Guidance for Harmonized Bidding Documents for Works on Hydropower in Bhutan. These documents will be utilized by the government to increase dam safety and mitigate time, cost and quality issues at current and future hydropower projects in Bhutan.

3. SAWI is expanding partnerships and engaging with emerging opportunities and with national priorities beyond its immediate activities.

- SAWI has built a network of more than 40 development partners and more than 50 government and country-specific partners, which continues to grow and will be important in helping to sustain efforts beyond the lifetime of the program.
- One of the entry points on cooperation on the management of the Brahmaputra Basin is plastics pollution. To inform the dialogue process, a white paper, *Understanding Plastic Pollution: Focus on South Asia*, was prepared. This situation analysis collects secondary literature and synthesizes the information on plastics and plastic pollution at the global and regional scale. It also reviews the policy landscape for plastics management in South Asia. This study will continue under a “sister” grant on plastics in South Asia that will be implemented in FY21 under SAWI.
- Discussions continued with the Government of India on a lending TA to support improving water resources management in the NER. Related to this TA, the Government of Assam requested World Bank support for the US\$500M AIRBMP—which is informed by earlier SAWI work. A new SAWI grant will support the continuation of activities in the NER, and specifically preparation of AIRBMP. The new SAWI activity will ensure transboundary aspects are well-integrated into the project.
- SAWI has adapted some activities to support governments with their Covid-19 response efforts. For instance, the Agriculture-Water Nexus activity revised its outputs to include a Covid-19 impact analysis on value chains. The activity team will engage with senior policymakers in central and state governments in NER to discuss the impact of the pandemic and the way forward in strengthening agriculture value chains in the NER (through necessary policy measures and pandemic-sensitive project design). The Nepal Water Platform activity assisted the Government of Nepal in its preparation of a COVID-19 response strategy. Through the Water Sector Diagnostic, the activity has raised the criticality of clean water supply and sanitation in medical facilities during the response phase and overall hygiene improvement in households during the resilience phase. The activity facilitated inter-agency coordination among ministries in change of water supply, schools and medical facilities in their efforts to improve sanitation policies and services following the onset of the pandemic. Furthermore, the activity brought development partners working on water and sanitation services in the country together to align assistance activities during the pandemic.

- Inland water transport is an emerging entry point for water resources management cooperation in South Asia. A new activity, in the mobilization stage in FY20, Developing Regional Waterways in South Asia, will support developing a substantive body of knowledge through focused technical assessments on regional trade and transit policy-related constraints impeding the growth of waterborne transport, gaps in operational standards, and the limitations to an integrated network of river and maritime transport in the BBIN. It will also support evolution of a regional waterway framework through establishment of an embryonic institutional structure and inter-country data and information exchange architecture.

4. Over the years, SAWI technical products are informing 38 World Bank investments / operations across the region (valued at approx. \$8B).

- **Afghanistan**—Afghanistan Irrigation Restoration and Development Project, with an increased focus on transboundary river basin management (**\$70M**).
- **Bhutan**—Hydro-met Services and Disaster Resilience Project (**\$4M**); South Asia Power Electricity Market Project (**\$3.7M**);
- **Bangladesh**—Bangladesh Weather and Climate Services Project (**\$113M**); Bangladesh Sustainable Coastal and Marine Fisheries Project (**\$240M**); Bangladesh Coastal Embankment Improvement Project (**\$375M**); Sustainable Forests and Livelihood Project (**\$175M**); Climate-Smart Agriculture and Water Management Project (**\$120M**); First Regional Waterway Transport Project for Bangladesh (**\$360M**)
- **India**—Assam Integrated River Basin Management Project (**\$500M**); National Hydrology Project (**\$175M**); Atal Bhujal Yojana - National Groundwater Management Improvement Project (**\$500M**); Uttar Pradesh Water Sector Restructuring Project-Phase 2, (**\$360M**); West Bengal Major Irrigation and Flood Management Project (**\$145M**); Bihar Kosi Basin Development Project (**\$250M**); Punjab Rural Water Supply and Sanitation Project (**\$200M**); Neeranchal National Watershed Project (**\$178M**); National Ganga River Basin Project (**\$1B**); Integrated Coastal Zone Management-India Project (**\$220M**); the National Cyclone Risk Mitigation Project (**\$310M**); Multipurpose Disaster Shelter Project (**\$375M**).
- **Nepal**—Power Sector Reform and Sustainable Hydropower Development Project (**\$20M**); Kali Gandaki A Hydropower Plant Rehabilitation (**\$27M**); Nepal Energy Sector Development Policy Credit project series (**\$100M**);
- **Pakistan**—Water Sector Capacity Building and Advisory Services Project (**\$35M**); Sindh Water Sector Improvement Project Phase I (**\$150M**)
- **Region**—South Asia Region Climate Adaptation and Resilience Program (**\$36M**);

New in FY20

- **Pakistan**—Punjab Rural Water Supply and Sanitation Project (**\$200M**); Sindh Water and Agriculture Transformation Project (**\$350M**)
- **Nepal**— NP Modernization of Rani Jamara Kulariya Irrigation Scheme – Phase 2 (**\$66M**); NP Rural Water Supply and Sanitation Improvement (**\$72M**); Nepal Urban Governance and Infrastructure Project (**\$150M**); Building Resilience to Climate Related Hazards (**\$31M**); Kabeli A Hydro Electric Project (**\$46M**); Nepal: Investing in Forests for Prosperity at a Time of Transformation (**\$24M**)
- **India**—Rajasthan Agricultural Competitiveness Project (**\$109M**); Innovation in Solar Power and Hybrid Technologies Project (**\$150M**); IN Dam Rehabilitation and Improvement Project (**\$350M**); Second Dam Rehabilitation and Improvement Project (**\$500M**)

Annex 1: Activity Performance

1. FY20 Results Dashboard³⁵

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	0/0	1/1	1/1	0/0	3/3
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	0/0	1/1	0/0	0/0	2/2	3/3
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	0/0	235/45	0/20	0/0	0/30	235/95
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	0/0	24/10	0/2	0/0	0/10	24/22
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	2/2	10/5	4/3	9/5	11/10	36/25
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	1/1	1/1	0/0	1/1	6/3	9/6

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 and the effects of the Covid-19 pandemic.

³⁵ How to read the results numbers: the numerator denotes annual Results actually achieved against the denominator of Targets in the Results Framework

Program Development Objective	Outcome Indicators for PDO	Progress Update
To increase regional cooperation in the management of the Himalayan River systems to deliver sustainable, fair and inclusive development and climate resilience	1. To support five existing or new bilateral or multilateral governance processes	SAWI continued to support formal and semi-formal sustained processes for making or operationalizing water management decisions, including in the Indus, Brahmaputra and Sundarbans, where there are now well-established and ongoing platforms for discussion to inform decision-making and to operationalize existing agreements.
	2. To inform US\$1B of investments 3. To improve the quality of planning processes underpinning new investments.	A number of SAWI activities link closely with World Bank investments and have contributed to investment design and supervision support (improving the quality of planning processes underpinning new investments). To date, 38 projects valued at more than US\$8B in Afghanistan, Bangladesh, Bhutan, India, Nepal and Pakistan have been/are being informed by SAWI. The cumulative portfolio of linked investments is: <ul style="list-style-type: none"> • Pakistan Water Sector Capacity Building and Advisory Services Project – Additional Financing (P155226) US\$35M • Afghanistan Irrigation Development and Rehabilitation Project – Additional Financing (P152892) US\$70M • Sindh Water Sector Improvement Project Phase I (P084302) US\$150M • Punjab Rural Water Supply and Sanitation Project (P169071) US\$200M • Sindh Water and Agriculture Transformation Project (P167596) US\$350M • India National Ganga River Basin Project (P119085) US\$1B • India National Hydrology Project (P152698) US \$175M • India Uttar Pradesh Water Sector Restructuring Project Phase II (P122770) US\$360M • Nepal Power Sector Reform and Sustainable Hydropower Development (P150066) US\$20M • Nepal Kali Gandaki A Hydropower Plant Rehabilitation Project (P132289) US\$27M • Nepal Energy Sector Development Policy Credit (P154693) (P170248) US\$100M • India Bihar Kosi Basin Development Project (P127725) US\$250M • India's West Bengal Major Irrigation and Flood Management Project (P162679) US\$145M • NP Modernization of Rani Jamara Kulariya Irrigation Scheme – Phase 2 (P158364) US\$66M • NP Rural Water Supply and Sanitation Improvement (P143036) US\$72M • Nepal Urban Governance and Infrastructure Project (P163418) US\$150M • Building Resilience to Climate Related Hazards (P127508) US\$31M • Kabeli A Hydro Electric Project (P122406) US\$46M • Assam Integrated River Basin Management Project (P174593) US\$500M • Hydro-met Services and Disaster Resilience Regional Project (P154477) US\$4M • Bangladesh Weather and Climate Services Project (P150220) US\$113M • Climate Smart Agriculture and Water Management Project (P161534) US\$120M • Bangladesh Sustainable Coastal and Marine Fisheries Project US\$240M • Sustainable Forests and Livelihood Project (161996) US\$175M • Bangladesh Regional Waterway Transport Phase 1 US\$360M

Program Development Objective	Outcome Indicators for PDO	Progress Update
		<ul style="list-style-type: none"> • Coastal Embankment Improvement Project (P128276) US\$375M • Integrated Coastal Zone Management - India (P097985) US\$220M • National Cyclone Risk Mitigation Project (P144726) US\$310M • Multipurpose Disaster Shelter Project (P146464) US\$375M • IN Punjab Rural Water Supply and Sanitation project (P150520) US\$200M • ABY - National Groundwater Management Improvement Program (P158119) US\$450M • India Neeranchal National Watershed Project (P132739) US\$178M • South Asia Power Electricity Market (P167971) US\$3.7M • Nepal: Investing in Forests for Prosperity at a Time of Transformation (P170798) US\$24M • Rajasthan Agricultural Competitiveness Project (P124614) US\$109M • Innovation in Solar Power and Hybrid Technologies Project (P160379) US\$150M • IN Dam Rehabilitation and Improvement Project (P089985) US\$350M • Second Dam Rehabilitation and Improvement Project (P170873) US\$500M

Intermediate Results	Result Indicators	FY20 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	3/3	<p>*In Line with Expectations* SAWI's value add includes convening diverse stakeholders, 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.</p> <p>IRB (1) (1) Fourth Indus Basin Knowledge Forum, including support to a special session on gender and social inclusion.</p> <p>GRB (0) In line with target.</p> <p>BRB (1) Brahmaputra Dialogue. While dialogue events could not be held due to Covid-19, the activity implemented a highly-collaborative knowledge product involving dialogue participants and other stakeholders from each of the four riparian countries.</p> <p>SUN (1) Sundarbans BISRCI, supported by SAWI, continued to manage the Sundarbans knowledge portal and website and work behind the scenes to advance the dialogue process toward a joint management mechanism.</p> <p>REG (0) In line with target. The Regional Dialogue holds an event, on average, every two years. The last regional event was December 2018; therefore, no event was held in FY20.</p>

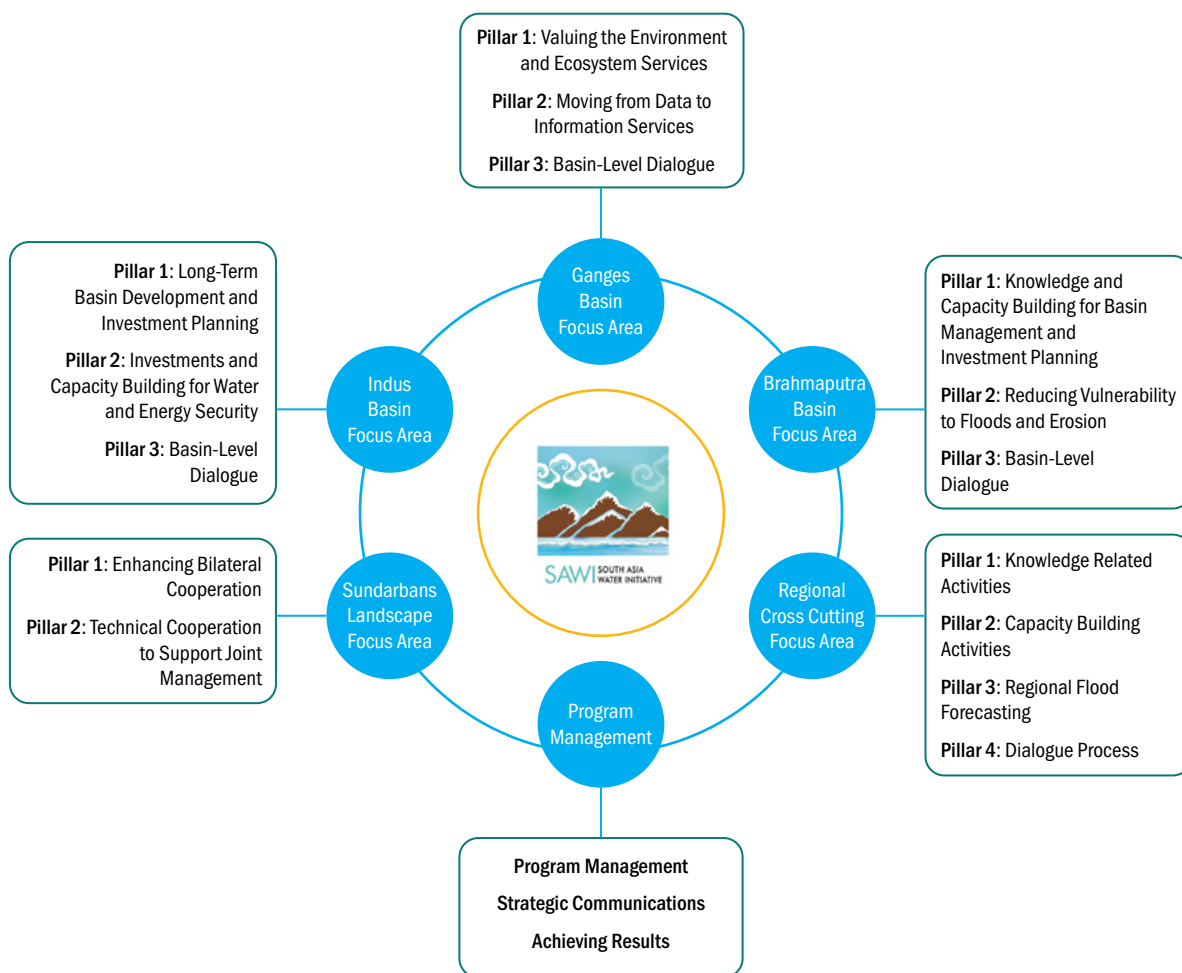
Intermediate Results	Result Indicators	FY20 Milestone	Progress Update
<p>2. Stakeholder input to government decision making strengthened by participatory processes that facilitate transboundary knowledge generation and sharing</p>	<p>2.1 Number of regional, basin/ landscape or sub-basin level participatory processes that support transboundary knowledge generation and sharing and stakeholder input to government decision making</p>	<p>3/3</p>	<p>*In Line with Expectations* These participatory processes that bring together diverse stakeholders are an offshoot of the basin-level dialogues and are helping to raise awareness and share knowledge and best practices across multiple sectors, and to advance understanding on sensitive issues outside of formal dialogue (often through structured consultative processes).</p>
			<p>IRB (0) In line with target</p>
			<p>GRB (1) (1) Support to the Nepal Water Platform, including setup of a Water Platform Support Unit within the Government of Nepal to ensure sustainability.</p>
			<p>BRB (0) In line with target.</p>
			<p>SUN (0) In line with target.</p>
			<p>REG (2) (1) Support to implementation of Himalayan University Consortium Working Group meetings to advance the joint research proposal on climate change in the Indus Basin. (1) Support to implementation of the HKH Glacier and Mountain Economy Platform (created at a 2018 SAWI supported conference), which will work in a collaborative, cooperative and transboundary manner to co-produce, consolidate, share and utilize the knowledge on cryosphere, glaciers and mountain economy by linking to suitable programs on the ground.</p>
<p>3. Capacity of water resources organization strengthened in areas relevant to transboundary cooperation</p>	<p>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.</p>	<p>235/95</p>	<p>*Exceeded Expectations (but did not meet Regional or Brahmaputra FA targets due to Covid-19)* SAWI has responded to rising demand for capacity building from stakeholders, which has included targeted training, exposure visits and technical workshops to embed new tools and knowledge for better water resources management.</p>
			<p>IRB (0) In line with target.</p>
			<p>GRB (235) (9) Training on Hydrological Modeling (Nepal) (6) Columbia Basin Study Tour (Nepal) (18) Student Fellowship Program (Nepal) (3) Kathmandu University faculty exchange (Nepal) (28) Training on Water Budgeting Tool for River Basins Using GEE Applications (India) (25) Training on GEE Applications (India) (21) Training on Python Tools for Water Resources Management (India) (56) Training on Water Budgeting Tool for River Basins Using GEE Applications (India) (69) Online Training on Water Budgeting in GEE (India)</p>
			<p>BRB (0) Under the Bangladesh Hydro-met Services activity, the planned cross-border training with the India NHP, to allow for intensive knowledge sharing, was delayed due to Covid-19 constraints</p>
			<p>SUN (0) In line with target.</p>
			<p>REG (0) Due to the pandemic, planned capacity building events could not proceed. Scheduled events are now planned for FY21, with a number moving to a virtual format.</p>

Intermediate Results	Result Indicators	FY20 Milestone	Progress Update
3. Capacity of water resources organizations strengthened in areas relevant to transboundary cooperation	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	24/22	<p>*Met Expectations (but did not meet Regional or Brahmaputra FA targets due to Covid-19)* SAWI's strategy is to target its capacity building toward organizations 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 stakeholder organizations to participate in a range of training 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> <p>IRB (0) In line with target.</p> <p>GRB (24) (1) Kathmandu University (Nepal) (1) Tribhuvan University Nepal (1) Department of Hydrology and Meteorology (1) Department of Water Resources and Irrigations (1) Remote Sensing Applications Centre, Uttar Pradesh (India) (1) Gujarat Water Resources Development Corporation (India) (1) National Institute of Hydrology, Roorkee (India) (1) CEPT University, Ahmedabad (India) (1) Central Water Commission (India) (1) Central Water and Power Research Station (India) (1) Government of Uttar Pradesh (India) (1) Government of Tamil Nadu (India) (1) Government of Rajasthan (India) (1) Government of Mizoram (India) (1) Government of Meghalaya (India) (1) Government of Maharashtra (India) (1) Government of Karnataka (India) (1) Government of Himachal Pradesh (India) (1) Government of Chhattisgarh (India) (1) National Remote Sensing Centre (India) (1) Bhakra Beas Management Board (India) (1) Government of West Bengal (India) (1) Government of Telangana (India) (1) Government of Punjab (India)</p> <p>BRB (0) Under the Bangladesh Hydro-met Services activity, the planned cross-border training with the India NHP, to allow for intensive knowledge sharing, was delayed due to Covid-19 constraints</p> <p>SUN (0) In line with target.</p> <p>REG (0) Due to the pandemic, planned capacity building events could not proceed. Scheduled events are now planned for FY21, with a number moving to a virtual format.</p>
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 and shared with key stakeholders, including decision makers	36/25	<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 products 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 to ensure their uptake.</p>

Intermediate Results	Result Indicators	FY20 Milestone	Progress Update
			<p>IRB (2) (1) Background paper for Sindh Government as a contribution to provincial water sector reforms (1) Groundwater in Pakistan’s Indus Basin: Present and Future Prospects</p> <p>GRB (10) (1) Nepal Water Sector Diagnostic 2020 (1) Pre-Scoping Note for Investment in IWRM-Based Municipality-Wide Water and Wastewater Management in Nepal (1) Nepal Policies Institutions and Regulations Assessment Pertaining to Provisioning of Water Supply and Sanitation Facilities (1) Water Quality Management in Nepal (1) Urban/Municipality-Wide WSS Service Delivery (1) Status of River Basins in Nepal (1) Power Market Assessment (Nepal) working paper (1) List of Prospective Hydropower Projects in Nepal (1) Technical Note on a Stakeholder Analysis to Inform SESA (1) Ganges Hydrologic Modelling Report</p> <p>BRB (4) (1) Yarlung-Tsangpo-Siang-Brahmaputra-Jamuna: The Restless River (1) Understanding Plastic Pollution: Focus on South Asia (1) Re-Interpreting Cooperation in Transboundary Waters: Bringing Experiences from the Brahmaputra Basin (1) Voices from the Field: Brahmaputra Dialogue</p> <p>SUN (9) (1) Erosion and Accretion of Bangladesh and India Sundarbans: 1904-2016 (Geocoded Database) (1) Water (Tubewell and River) Salinity in Indian Sundarban: February-May 2019 (Geocoded Database) (1) Co-Location, Socioeconomic Status and Perceptions of Environmental Change in the Indian Sundarbans (1) Long-Term Island Area Alterations in the Indian and Bangladesh Sundarban: An Assessment Using Cartographic and Remote Sensing Sources (1) Discounting Disaster: Land Markets and Climate Change in the Indian Sundarbans (1) Explaining Regional Variations in Mother-Child Health: Environmental Determinants in India and Bangladesh (1) Fishing in Saltier Waters: Climate Change, Saline Exposure and Women’s Health in the Indian Sundarbans (1) Policy Brief for High-Level Decision Makers on a Joint Institutional Arrangement to Sustainably Manage the Sundarbans (1) Web-Feature Stories: Drinking Water in the Indian Sundarbans; The Perils of Prawn-Catching for Sundarbans Women; Proactive, crosscutting adaptation measures are needed to reduce climate change impacts on the poor; Mangroves and Coastal Protection: A Potential Triple-Win for Bangladesh</p> <p>REG (11) (1) Energy-Water-Agriculture Nexus: Grow Solar, Save Water, Double the Farm Income (1) National Guidelines for Dam Safety for the Government of Bhutan (1) Guidance for Harmonized Bidding Documents for Works on Hydropower Projects in Bhutan (1) Review Report for the Dorjilung Project (Nepal) (1) Analyzing the Covid-19 Pandemic Impacts on Agriculture Value Chains in NER (1) South Asia Watersheds Dashboard Data Portal (1) Recce Survey in Omkarsreswar Dam</p>

Intermediate Results	Result Indicators	FY20 Milestone	Progress Update
			<p>(1) Due Diligence Report of Omkarsreswar Reservoir: Global Knowledge and Experience in FSPV</p> <p>(1) Floating Solar PV Mapping in India - Database on 2173 Water Bodies</p> <p>(1) List of 100 selected reservoirs for Preliminary Floating Solar Panel Potential</p> <p>(1) Himalayan University Consortium online portal</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>9/6</p>	<p>*Exceeded Expectations*</p> <p>The focus areas have continued to make 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. 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 among 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> <p>IRB (1)</p> <p>(1) Background paper for Sindh Government as a contribution to provincial water policy and legislation (under the Sindh Water Sector Improvement Project)</p> <p>GRB (1)</p> <p>(1) Sector analytics and business development studies on integrated municipality-wide water and wastewater management to inform a government program on improving water supply and wastewater services in 70 rural municipalities, six provincial headquarters and 15 large cities in Nepal.</p> <p>BRB (0)</p> <p>In line with target.</p> <p>SUN (1)</p> <p>(1) <i>Institutional Structure for Joint Action in the Sundarbans Region</i> report (late FY19 output), associated high-level policy brief, and dialogue process is informing the design of a joint institutional arrangement for sustainable management of the Sundarbans.</p> <p>REG (6)</p> <p>(1) Support to preparation of National Guidelines for Dam Safety for the Government of Bhutan, which serves as an overarching document for dam safety management in the country</p> <p>(1) Gap analysis and assessment of the proposed Dorjilung Hydropower Project, which sparked a government request in March 2020 to the World Bank to provide technical assistance to support the preparatory work for the project</p> <p>(1) Prepared Guidance for Harmonized Bidding Documents for Works on Hydropower Projects in Bhutan to mitigate time, cost and quality issues arising at current and future hydropower projects in the country.</p> <p>(1) Analysis of the Covid-19 pandemic on the agriculture value chain in the North East Region of India. This study received immediate traction among stakeholders to inform the larger pandemic response in the region.</p> <p>(1) Due diligence and pre-feasibility assessments to inform the proposed 500 MW Omkareshwar Floating Solar Project.</p> <p>(1) Business model recommendations developed under the Rajasthan Nexus Diagnostic study were endorsed by the Government of Rajasthan and NITI Aayog. The models are now being field tested through "learning by doing" pilots under the Rajasthan Agricultural Competitiveness Project with the aim to implement solutions on the ground to calibrate the business models, increase engagement and outreach to farmers, and demonstrate viability for a scale up across the State.</p>

Annex 2: Activity Summaries



PROGRAM MANAGEMENT

Program Management

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. Donor liaison includes the annual donor meeting, mid-year check-in meeting, governance processes as laid out in the Administrative Agreements, and interactions with the partner organizations funded by FCDO South Asia Water Governance Program and Australia’s Department of Foreign Affairs and Trade (DFAT) under their South Asia Sustainable Development Investment Portfolio (SDIP).

Strategic Communications

This activity supports implementation of the program Communications and Engagement Strategy. 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.

Achieving Results (M&E)

This activity supports M&E at the program and Focus Area levels. 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.

INDUS BASIN FOCUS AREA

Objective

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

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. Relationships among riparian countries and different levels of capacity pose additional challenges to regional cooperation on water resources management. Given the World Bank's role in the 1960 Indus Waters Treaty 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 Indus Waters Treaty.

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 1 – Long-Term Basin Development and Investment Planning

Indus Basin (Pakistan) Groundwater Analysis

Scope: While the Indus region has a long history of major investment in surface water infrastructure, by contrast, the management of groundwater infrastructure has remained in private hands, contributing to uncontrolled expansion of access to groundwater. Poorly managed conjunctive use of the interconnected surface and groundwater systems has led to a corresponding deterioration of the groundwater resource. Institutional capacity for governance of these resources is weak and essential groundwater data that would facilitate improved governance are fragmented and not easily discoverable for a significant proportion of the Indus Basin. This activity aims to extract and synthesize knowledge of groundwater and its governance in the Indus Basin (Pakistan) and conduct an analysis of trends in available data. The work will contribute to an ongoing consolidation of the groundwater knowledge base in South Asia, and highlight opportunities for regional cross-learning on common groundwater management issues. It will complement the groundwater work already completed by the World Bank in the Indian Punjab portion of the Indus Basin.

Timeframe: March 2018 - May 2020. **Geography:** Indus Basin; Pakistan. **Grant Amount:** \$0.30M

FY20 Progress: The final report, *Groundwater in Pakistan's Indus Basin: Present and Future Prospects* was completed (March 2020). This publication is a synthesis of knowledge on groundwater and its governance in the Indus Basin (Pakistan) and an analysis of trends on available groundwater data. It identifies both natural and anthropogenic factors that affect the temporal and spatial variability in the availability and quality of groundwater across the basin; it outlines sectoral risks posed by the ongoing challenges to adequately measure and manage the resource; it provides examples of targeted groundwater management interventions in the local, regional and international experience; and it proposes institutional reforms and essential management interventions, which can be introduced over a span of years, for long-term resource viability. This report aims to both contribute to the ongoing consolidation of the groundwater knowledge base in the South Asia Region and form the basis for a long-term dialogue on groundwater management among the provincial governments of Sindh and Punjab and the national government. At the request of the Government of Sindh, the activity also prepared a background paper (February 2020) for the government as a contribution to the development of a new provincial water policy and the preparation of provincial water resources legislation.

FY21 Plan: Completed. The dissemination of the *Groundwater in Pakistan's Indus Basin: Present and Future Prospects* report will be handled under a new World Bank project. Following online publication of the final report, three dissemination workshops will be conducted via videoconference: one for each of Punjab and Sindh to discuss individual, provincial-level progress and actions; and one at the national level to discuss the federal role in providing national oversight and support to provincial groundwater initiatives. Invited attendees will be from government, academia and civil society.

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

No active grants

Pillar 3 – Basin-Level Dialogue

Indus Basin Dialogue

Scope: This activity aims to support dialogue in the Indus Basin to build confidence and trust to establish an enabling environment for basin-wide cooperation. SAWI utilizes the World Bank's comparative advantage as a global knowledge (and neutral) broker in the basin through the Indus Forum (and Indus Basin Knowledge Forum), established in 2013 as a sub-group of a regional dialogue process facilitated by the World Bank and SAWI from 2007. This Track II dialogue process distinguishes itself from other Indus Track II dialogues, as it takes a basin-scale perspective and brings together participants from all four riparian countries to understand the basin in its totality. It has aimed to play a critical role in galvanizing the study of hydrology, glaciology, and climatic and socioeconomic processes at the basin level to enable informed decision making for sustainable water resources management. A joint research proposal put forward by the Indus Forum aims to address knowledge gaps to inform policymakers on basin-wide water availability scenarios and their impacts on people, along with adaptation strategies. The research program will accomplish this through a collaborative approach aimed at strengthening understanding of the range of climate change scenarios, establishing long-term benchmark glaciers, and developing a framework to examine the potential impacts of climate change scenarios on socioeconomic development.

Timeframe: November 2014 – May 2020. **Geography:** Indus Basin; all riparians. **Grant Amount:** \$0.90M

FY20 Progress: The activity supported ICIMOD and IASA with the planning and design of the fourth Indus Basin Knowledge Forum (IBKF4) (Kathmandu, August 2019). Eighty-four water professionals attended IBKF4, of which 24 were women. The event explored the connection between science and policy and how to achieve impactful communication to sustainably manage the basin. To this end, participants from academic institutions, development organizations, civil society and government identified three key messages: (1) policy decisions on the basin are poorly informed as a result of a lack of institutional and technical capacities. An absence of partnerships between academia and policymakers also perpetuates an air of mistrust, which further impacts the capacity and expertise that exist in government and research institutions. To address this, organizations could invest in local partnerships with grassroots organizations, define relevant objectives, develop contextual situations, and find effective ways of knowledge dissemination. (2) The research conducted within the basin is relevant; however, the poor linkages between science and policymakers mean that the social impact generated by this kind of research continues to leave room for improvement. Along with the need to communicate research findings in a concise manner, encouraging scientists to engage frequently and flexibly with the policy process may play a key role toward a better understanding of the relevant policy needs. (3) Gender and social inclusion are shared challenges in development priority areas, particularly in the Indus Basin, for making research meaningful and impactful. Adopting inclusive approaches in planning and implementation are essential to ensure that the voices of marginalized communities, specifically women, are included. To reach this last key message, SAWI, in partnership with ICE WaRM, supported a special session that focused on how researchers can better engage with stakeholders and how gender inclusiveness can enhance research impacts in the Indus Basin. SAWI directly supported the participation of two women from Pakistan and India to attend the event and serve as speakers in this session. This session was well-received and introduced concepts that had not been previously considered in the dialogue (such as consideration of gender requirements when developing river flow models). Participants identified three key strategies to catalyze action on the future of the IBKF: (1) identify the champions willing to take the mandate of the IBKF forward; (2) identify and work toward building a business case for the IBKF; and (3) leverage the existing knowledge and digital networks and use online platforms to share past, present and upcoming research on cross-cutting issues in the region.

FY21 Plan: Completed. Discussions for the implementation of the climate change research proposal continued under the Himalayan University Consortium grant.

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 to 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 Centre and the States is a necessary precursor to broader public and international transparency.

SAWI is supporting river basin planning in Nepal via accelerating development of hydropower (with associated work on watershed management for sediment control), and in India via the drive for river cleanup as well as 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 National Hydrology Project (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 Baghmata 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. 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

Power Sector Reform and Sustainable Hydropower Development Project (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 – December 2019. **Geography:** Ganges Basin; Nepal. **Grant Amount:** \$0.50M

FY20 Progress: WECS' implementation of integrated water resource planning and management to guide sustainable hydropower development using a basin-wide approach continued. The preparation of river basin plans and hydropower masterplans for all rivers of Nepal, and a strategic environmental and social assessment to support the basin-wide approach, is being led by Tractbel and Changjiang Institute of Survey, Planning, Design and Research. A Status of Basins Report (comprising sub-reports for each river basin) was prepared (September 2019). These sub-reports for each river basin include information on basin water resources in terms of availability in time and space; current uses and ability to meet future demand; environmental conditions, including main ecosystems with regard to geographical factors; demography of the basins, focusing on population growth and water demand forecast for different uses; agriculture, cultivated areas, and existing irrigation facilities; hydropower; drinking water supply; and climate change issues. A power market assessment working paper (November 2019) was prepared to form the basis for economic analysis of prospective hydropower projects in the river basins in order to rank and optimize hydropower development plans. This paper is designed to help key stakeholders in Nepal's electricity sector understand the export market in Bangladesh, China and India for Nepal's surplus energy. A list of prospective hydropower projects was also compiled (November 2019), which followed a technical and economic analysis of prospective hydropower projects for inclusion in the hydropower masterplans for each basin (completed for Kosi, Karnali, Gandaki and West Rapti Basins). A technical note on a stakeholder analysis to inform the planned Strategic Environmental and Social Assessment (SESA) was prepared (October 2019). This note offers guidelines on ensuring a stakeholder analysis for the SESA will be done efficiently and effectively. SAWI supported implementation of a 15-day training on hydrological modeling (Kathmandu, November 2019) to build understanding in how hydrological models can be used for river basin planning and operations. Nine participants—comprising engineers and hydrologists from WECS, the Ministry of Energy, Water Resources and Irrigation, and the Department of Hydrology and Meteorology—took part. The activity also implemented a 10-day study tour (January 2020) for six officials from WECS, the Ministry of Finance and the Ministry of Energy to the Columbia Basin (Idaho and Oregon, USA). This tour included interaction with a number of national and state agencies, experts, universities and other organizations operating in the basin to build capacity in river basin and hydropower planning. Following the study tour, the officials visited the World Bank offices (Washington) to meet with World Bank staff to discuss the approach and methodology for the basin plans and hydropower masterplans, and to take home best practices from other World Bank projects and studies on the economic aspects of water resources development, IWRM and SESA.

FY21 Plan: Completed. SAWI will support completion of this work under a separate activity, which will begin and complete in FY21.

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 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 government and supporting river basin planning and improved water management, the activity will enable the government to engage in a more informed and more confident way with downstream riparian countries in future transboundary discussions and negotiations.

Timeframe: September 2014 – May 2020. **Geography:** Ganges Basin; Nepal. **Grant Amount:** \$0.72M

FY20 Progress: This activity continued to support enhancing the capacities of students and faculty of local academic institutions in hydropower and water resources management in order to strategically meet Nepal's future water professional capacity needs to manage a planned hydropower regime ten times what it is today. Eighteen students (nine women) from the faculties of civil, mechanical, electrical and environmental engineering, agriculture, forestry and water resources management were selected and participated in a one-month fellowship exchange to Wuhan University in China (August 2019). The students were enrolled in a number of cross-disciplinary courses, with lectures mainly focused on the ongoing research at Wuhan University. The students were also exposed to various high-tech laboratories and ongoing lab experiments (the Hydraulic Structure Lab, the Hydropower Station Lab, and the Pump Storage Power Station Lab). The students also shared their own research with Wuhan professors to obtain feedback and bolster research outcomes. The students participated in a field trip to Three Gorges Dam to enhance their understanding of hydropower project development and operation. A faculty exchange also took place during the fellowship period. Three experts from Kathmandu University visited Wuhan University and eight faculty and experts from Wuhan University visited Kathmandu University to deliver lectures and share research findings with students and faculty, and to begin collaboration on new research in the hydropower sector. To enhance procurement service and decision-making capacity within the Nepal Electricity Authority and other government agencies, the activity hired a consultant to deliver in-depth procurement and contract management training (delivered throughout the fiscal year). The activity also continued to support the convening of periodic roundtables with government officials to discuss and review pressing matters on hydropower and water resources management. The activity hired KPMG to support the newly operational regulatory commission in Nepal and to advise the commission in creating a level playing field for all parties to a hydropower project (the government, the supplier and the consumers).

FY21 Plan: Completed. SAWI will continue to support the Government of Nepal's sustainable hydropower development under a separate activity, which will begin and complete in FY21.

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 – April 2021. **Geography:** Ganges and Brahmaputra Basins; all riparians. **Grant Amount:** \$0.70M

FY20 Progress: In collaboration with the National Institute of Hydrology and the National Project Monitoring Unit, a Second Modelers Meet under NHP (Delhi, December 2019) was organized for 80 (25 women) modelers from around India. Hydrological models developed by various agencies were presented. A mapping of modelers was taken up under the NHP MIS to facilitate the exchange of views and knowledge sharing among practitioners. A Vendors Meet (Delhi, September 2019, 50 participants, six women) helped to address bottlenecks faced by industry and service providers for participating in hydro-met bids. This Meet resulted in changing specifications, eligibility criteria and commercial conditions for hydro-met bids under NHP. Google Earth Engine (GEE) is a technology that has revolutionized remote sensing data inventory, processing and analysis. A major thrust of the activity this year was to promote GEE utilization in water resources planning processes under NHP. Five multi-day training events on GEE and other analytical tools, such as Python, were conducted: (1) Training on Water Budgeting Tool for River Basins Using GEE Applications (NIH Roorkee, August 2019, 28 participants, six women); (2) Training on GEE (Delhi, December 2019, 25 participants, eight women); (3) Training on Python Tools for Water Resources Management (Ahmedabad, December 2019, 21 participants, five women); (4) Training on Water Budgeting Tool for River Basins Using GEE Applications (Ahmedabad, January 2020, 56 participants, 10 women); (5) Online Training on Water Budgeting in GEE (June 2020, 69 participants, 17 women). These trainings focused on harnessing the power of disruptive big data geospatial and data analytics technologies for application in water resources management, environment and natural resources monitoring and other related sectors, including agriculture, climate change and disaster risks. The trainings and Modelers Meet have enabled participants to develop products related to remote sensing analysis, water budgeting models and water availability reports. GEE in particular is helping to overcome high end hardware requirements for processing remote sensing and data constraints. The States are now using the tool to assess crop water requirements and water storage in water bodies, and for hydro-met modernization.

FY21 Plan: Trainings on GEE and hydro-met optimization using the latest technologies will continue. Operating within the Covid-19 environment, the activity will work to customize virtual training plans, enabling participants to complete training courses online at their own pace.

Nepal Water Platform

Scope: This activity will support specific analytical and advisory services in support of the Nepal Water Strategy and Platform. Through consultative support, the activity will explore and showcase the synergies and challenges among the different uses of water for energy, water for food, and water for people, and in particular, the conjunctive management of surface water and groundwater as a means to improve water security for irrigation and drinking water in Nepal. The activity will also scope the impacts of increasing pollution and contamination of drinking water sources in urban and rural areas. The study will map potential sources of pollution and carry out a qualitative assessment of potential

problems from each pollution source. Activity findings will feed into the policy dialogue with the Government of Nepal on the overall national water strategy and will be used to inform future World Bank operations.

Timeframe: October 2019 – April 2021. **Geography:** Nepal. **Grant Amount:** \$0.25M

FY20 Progress: A draft updated water sector diagnosis was prepared (June 2020). This document, which can be summarized into policy briefs as needed, outlines the challenges facing the water sector in Nepal and provides key directions to combat these challenges moving forward. The narrative was shared with the Ministry of Finance, Ministry of Energy, Water Resources and Irrigation, Ministry of Water Supply and other water-related sector ministries and other development partners to ensure ownership by the relevant stakeholders. The Diagnostic will be used to highlight the economic and social importance of enhancing government investment in water-related infrastructure and sector institutions. The activity also supported (1) the development of an Urban Water Supply Status Assessment (June 2020), which focuses on urban water supply in provincial capitals; (2) a Water Quality Management Study (June 2020), which undertakes a review and analysis of drinking water quality management in Nepal, in the context of federalism, to identify challenges in water safety planning, implementation, monitoring, and sustainability of water quality development, and proposes appropriate policy, institutional and operational interventions; (3) a diagnostic report on *Water and Sanitation Provision in Nepal: Considering Policies, Institutions and Regulations in the Context of the Federal Disposition*, which presents 11 key messages to align and re-orientate the new constitution and current water supply and sanitation services legislation, policies, institutions and regulations (June 2020); (4) development of a pre-scoping note for *Investment in IWRM-Based Municipality-wide Water and Wastewater Management in Nepal*, which will be utilized to support a proposed Government of Nepal program to improve water supply and wastewater services in 70 rural municipalities, six provincial headquarters and 15 large cities (US\$1.1B) (June 2020). A Water Platform Support Unit (PSU) has been set up in the Government of Nepal to ensure sustainability of the Nepal Water Platform. The PSU brings together key decision makers from water sector ministries to deliberate on water sector development and management. It provides the required high-level backing and authorizing environment for the approval and implementation of technical and policy recommendations generated under the Nepal Water Platform. Notable events conducted under the Nepal Water Platform this year included: (1) roundtable on opportunities and challenges in urban water and sanitation service delivery in federal Nepal (November 2019); (2) a dialogue with independent observers on water development in Nepal (November 2019); (3) government champion meetings to discuss the draft Nepal Water Strategy with government ministries and departments (March 2019); (4) cross-ministerial meetings between Ministries of Health, Education and Water Supply on water and sanitation and the federal transition and potential convergence with education, health and nutrition (June 2019); and (5) High-level meetings of the Secretaries of Energy, Irrigation, Water Supply and WECS for the rollout of the Nepal Water Platform on the government side. These were followed by a joint meeting of the Secretaries to launch the PSU in November 2019. The Nepal Water Platform also continued to serve as a convergence mechanism for dialogue and coordination among the World Bank's Global Practices, development partners, and key government stakeholders involved in the development of water in Nepal.

FY21 Plan: The Water Sector Diagnostic will be utilized to advance dialogue with the Government of Nepal on water sector infrastructure and institutional investment. Nepal Water Platform activities—such as dialogue among national and local government agencies and organizations; mini workshops; joint meetings of Secretaries; and field visits—will continue. Under the auspices of the Platform, periodic development partner meetings and bilateral discussions will be carried out to discuss the status of the Water Sector Development Plan and to progress the developing WASH Bill for the country. Periodic consultations on how the World Bank can support the Government of Nepal in its federalization support for effective service delivery will also be carried out.

Pillar 3 – Basin 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.

Timeframe: November 2014 – February 2020. **Geography:** Ganges Basin; all riparians. **Grant Amount:** \$0.25M

FY20 Progress: Outcomes were achieved in previous fiscal years. Activity closed in FY20.

FY21 Plan: Completed.

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 also provide a platform for riparian countries to come together and build the case for regional cooperation.

Pillar 1 activities aim to develop a shared knowledge base for the Brahmaputra Basin to support investment planning and decision-making. This includes 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. 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.

Timeframe: March 2016 – May 2020. **Geography:** Brahmaputra Basin; India. **Budget Allocation:** \$1.50M

FY20 Progress: Discussions continued with the Government of India on a lending TA to support improving water resources management in the Northeast Region of India. Related to this technical assistance, the Government of Assam requested World Bank support for a US\$500M Assam Integrated River Basin Management Program (AIRBMP)—which is informed by earlier work completed under this activity (including the rapid assessment and actionable roadmap for improving water resources management in the region). AIRBMP focuses on Assam, but it is meant to serve as a stepping stone to engagement on management of the Brahmaputra River Basin in the wider Northeast. This request came in June 2020 and the World Bank is in early stages in project preparation.

FY21 Plan: Completed. A new SAWI grant supports the continuation of activities in the NER, and specifically preparation of AIRBMP. The new SAWI activity will ensure transboundary aspects are well-integrated into the project.

Pillar 2 – Reducing Vulnerability to Floods and Erosion

Strengthening Hydro-met Services and Disaster Resilience in Bangladesh

Scope: Given the institutional capacity issues and the highly technical nature of the Bangladesh Weather and Climate Services Regional Project (BWCSR), the activity focuses on documenting and applying regional and global good practices related to hydrological monitoring and forecasting; building capacity through regional training, twinning and consultative activities; and strengthening the hydro-met knowledge base in Bangladesh to better leverage the use of regional information resources available in the public domain within government agencies. While this effort will transform the scale of information availability in Bangladesh, support to address critical technical and capacity gaps is essential to ensure that the country is poised to utilize and translate modernized infrastructure investments into improved and innovative service delivery.

Timeframe: October 2018 – April 2021. **Geography:** Brahmaputra Basin; Bangladesh. **Budget Allocation:** \$0.25M

FY20 Progress: SAWI supported technical assistance for the design and procurement for critical observation modernization packages, including groundwater, surface water, weather observation stations and coastal storm surge monitoring stations, providing capacity support to the hydromet implementing agencies Bangladesh Water Development Board (BWDB, the hydrological agency) and the Bangladesh Meteorological Department (BMD). The grant also was instrumental in supporting the revision in overall investment design and restructuring process to allow

Bangladesh to proactively manage the challenges in implementation of this technically complex investment program. Technical assistance was provided in a wide range of topics, including the development of tender documents, contract management for implement the large observation network procurements. Support is also prioritized for developing the design of an early warning activity, including the use of remote information for flash flood early warning and continued support for agro-advisories, which are a critical channel for delivery early warning. The project has conducted user-satisfaction survey baselines.

FY21 Plan: The activity will continue to support the three components of the World Bank investment, Bangladesh Weather and Climate Services Regional Project. The planned cross-border training with the India NHP to allow for intensive knowledge sharing was delayed due to Covid-19 constraints. The activity is exploring the use of virtual training as a tool. Through ongoing TA and by fostering dialogue across departments, the activity will continue to support Bangladesh's participation in the South Asia Regional Hydro-met Forum (SAHF), which is funded through other donor resources.

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 among 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 – May 2020. **Geography:** Brahmaputra Basin: all riparians. **Budget Allocation:** \$1.1M

FY20 Progress: Consensus a few years ago emerged among Brahmaputra Dialogue participants that preparing a collaborative knowledge product on the basin would support the dialogue process and serve as a tangible output of deliberations. Since then, dozens of individuals (from ambassadors and policymakers to top scientists, academicians, journalists and members of civil society) from the four riparian countries have made voluntary contributions to this effort. The *Yarlung-Tsangpo-Siang-Brahmaputra-Jamuna: The Restless River* is a first attempt at documenting the Brahmaputra as one river system and presenting a multi-layered, holistic perspective of the full basin from the viewpoints of the four riparian countries themselves. Bringing representatives from all countries together to contribute to the same document was made possible only due to sustained efforts at bringing the riparian countries together for several years under the dialogue. SAWI financed editor contributions to the book and other aspects of production. The book is currently in draft form and is planned to be completed in early FY21. The World Bank is discussing its publication and dissemination. One of the entry points on cooperation on the management of the Brahmaputra Basin is plastics pollution. To inform the dialogue process, a white paper, *Understanding Plastic Pollution: Focus on South Asia*, was conducted. This situation analysis collects secondary literature and synthesizes the information on plastics and plastic pollution at the global and regional scale. It also reviews the policy landscape for plastics management in South Asia. Case studies and information are summarized for Bangladesh, Bhutan, India and Nepal on urban plastic waste management systems, recycling trends and policy frameworks for plastic waste management. This study will continue under a "sister" grant on plastics in South Asia that will be implemented in FY21 under SAWI. Due to Covid-19, a second basin-wide dialogue event in China and attendance at a related conference on Asian International Rivers hosted by Tsinghua University, for which a Brahmaputra Dialogue side event was planned, could not proceed.

FY21 Plan: Completed.

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

Challenges in the Sundarbans, including extreme poverty, frequent natural disasters and erosion of ecosystem services, could be better managed if Bangladesh and India developed and implemented a joint conservation and development policy, and increased collaboration on plans and programs. 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. 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.

Pillar 1 – Enhancing Bilateral Cooperation

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.

Timeframe: April 2015 – February 2020. **Geography:** Sundarbans; Bangladesh, India. **Budget Allocation:** \$1M

FY20 Progress: This activity finalized the report, *Institutional Structure for Joint Action in the Sundarbans Region* (counted as a FY19 output). Based on the dialogue process, which solicited hundreds of opinions on a possible joint structure, this report sets out the challenges and priorities for sustainable management of the Sundarbans; the implications of joint management and the cost of non-cooperation; the need for a joint institutional arrangement; and a discussion of proposed models for the joint mechanism, including best case and least case options, and one that can be resilient to the changing climate. The activity also conducted one-on-one dialogue with decision makers from both countries on establishing the joint institutional arrangement and produced a policy brief to enrich these discussions. BISRCI continued to maintain the knowledge portal and overall sundarbansonline.org website.

FY21 Plan: Completed. BISRCI efforts to operationalize the 2011 agreements between the two countries will continue beyond the life of the activity.

Pillar 2 – Technical Cooperation to Support Joint Management

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 – December 2019. **Geography:** Sundarbans: Bangladesh, India. **Budget Allocation:** \$1.05M

FY20 Progress: Climate change is a major threat to the Sundarbans and its inhabitants. Yet, technical information on how climate change will impact the local population is scarce. This activity continued to focus on understanding implications of changes in the quality, availability and productivity of water resources for women's and children's health and nutrition in a changing climate. The activity monitored salinity of surface and groundwater of the landscape, analyzed primary data collected from 4,000 individuals from 900 households in 60 locales spread across the region, and conducted econometric analysis for understanding implications from expected changes in the quantity and quality of water resources that are critical for women's and children's health and nutrition. The activity produced two geocoded open-access datasets: *Erosion and Accretion of Bangladesh and India Sundarbans: 1904-2016* and *Water (Tubewell and River) Salinity in Indian Sundarban: February-May 2019*. The activity also produced five technical papers in the reporting period: (1) Co-Location, Socioeconomic Status and Perceptions of Environmental Change in the Indian Sundarbans (Journal article, January 2020), which uses regression analysis to explore variations in environmental risk assessments across socioeconomic classes and localities, using new survey data from the Indian Sundarbans; (2) Long-Term Island Area Alterations in the Indian and Bangladesh Sundarban: An Assessment Using Cartographic and Remote Sensing Sources (July 2019); (3) Discounting Disaster: Land Markets and Climate Change in the Indian Sundarbans (October 2019), which uses new household survey and environmental data to investigate the relationships linking land prices, household incomes and climate-change--related factors in the Indian Sundarbans; (4) *Explaining Regional Variations in Mother-Child Health: Environmental Determinants in India and Bangladesh* (July 2019), which analyzes more than 1000,000 records of the India National Family Health Survey for 2015-16 and the Bangladesh Demographic and Health Survey for 2011 to indicate sensitivity to flood-proneness that will make mother-child health vulnerable to varying patterns of extreme weather events with climate change; and (5) *Fishing in Saltier Waters: Climate Change, Saline Exposure and Women's Health in the Indian Sundarbans* (November 2019), which reports on the in-depth survey of women's socioeconomic status, their occupational choices, and health impacts of those choices. The activity also conducted a one-day workshop on Vulnerability of Sundarbans in a Changing Climate (Dhaka, July 2019) for 40 participants (nine women).

FY21 Plan: Completed. A book, *Coping with Climate Change in the Sundarbans: Lessons from Multidisciplinary Studies* will be published in October 2020 by the World Bank – International Development in Focus Series. This book will be an aggregate of the studies under the activity since its inception.

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

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 – December 2019. **Geography:** Regional; Hindu Kush Himalaya. **Budget Allocation:** \$1.22M

FY20 Progress: The activity supported the implementation of the IBKF4 (Kathmandu, August 2019) (see Indus Dialogue). The activity also supported a HUC Secretariat working group meeting, which was organized in November 2019 in Dubai (46 participants) to facilitate discussion on the way forward for the joint research proposal on climate change—which was conceived under the Indus Dialogue activity by the Indus Basin Forum Working Group—including options for seeking financial resources to implement it and ways to strengthen gender equality and social inclusion, knowledge management and communications into the proposal. The working group also revisited the Work Package Leads, where many of the earlier Leads have either retired from their services or been inactive in the forum. A consultant was hired to explore funding opportunities and customize the joint research proposal based on the inputs of the Working Group to fit in the call for funding requirements. A funding application to the Global Innovative Fund has been submitted, with other funding applications in process at the end of the fiscal year. SAWI supported the development of an HUC Online Portal (<http://huc-hkh.org>). The portal includes announcements, news, information on future events, articles, a members map, member news, HUC fellow stories, and information on collaborative mechanisms under the Consortium, such as the Thematic Working Groups.

FY21 Plan: Completed.

A Diagnostic Study on Groundwater-Energy-Agriculture Nexus

Scope: This activity aims to design an alternative model of subsidy delivery to farmers in Rajasthan. The activity will review surface water, groundwater, energy and agricultural policies, schemes and associated subsidies with stakeholders, focusing on areas of convergence and conflicts between sectoral policies to identify opportunities for tapping into synergies for a virtuous nexus. It will engage closely with the Government of Rajasthan's departments of energy, groundwater and agriculture programs, projects and schemes in these sectors for planning and detailed design of subsidy delivery mechanisms in the State. It will propose options of subsidy delivery, considering the current public policy choices of the government on concessional electricity tariff for agriculture, normative allocation of electricity instead of "duration restricted" power supply, and monetization of energy savings from normative allocation to create incentives for the farmers to save both energy and groundwater. The activity will engage farmers and other stakeholders in a meaningful consultation and participation to review and adapt the subsidy delivery model to the local context and design it for field testing to present "proof of concept" to the decision makers.

Timeframe: May 2018 – February 2020. **Geography:** India. **Budget Allocation:** \$0.15M

FY20 Progress: The report, *Energy-Water-Agriculture Nexus: Grow Solar, Save Water, Double the Farm Income*, was completed and published in December 2019. This report, completed at the request of the Government of Rajasthan, is a diagnostic analysis of the water-energy-agriculture nexus in the State and explores practical ways to address what has hitherto remained an intractable challenge of managing these critical resources in a sustainable manner. Using locally contextualized institutional models for implementation, the study presents a framework for cross-sectoral policy analysis, business models and financial evaluation of the proposed business models from the perspective of three key stakeholders: farmers, power distribution companies, and the State government. The study points out the possibilities of achieving the triple benefits of saving water, doubling farmer income, and improving reliability of power supply and irrigation, through grid-connected solar irrigation system. To respond to a concern that solar power could lead to over-extraction of groundwater, a methodology was developed to estimate the value of water in agriculture. This methodology helps estimate the feed in tariff for solar electricity required to shift the trade-off toward conserving water and increasing water use efficiency. The recommendations of this study have been taken on board by

the Government of Rajasthan. The State is keen to leverage these models to address the challenges faced in the State, including: depleting resources of groundwater and the deterioration of its quality, stagnating agricultural productivity, declining farmer income, and growing fiscal impact of power subsidies. A learning-by-doing pilot is being planned in different agro-climatic zones of Rajasthan with the hope that the pilot will lead to implementation of solutions on-the-ground to calibrate the business model, increase engagement and outreach to farmers, and demonstrate its viability for a scale up across the state. The model could also potentially be replicated in other Indian states that are facing similar challenges. A national-level workshop was co-organized with NITI Aayog in December 2019 under the 'Lighthouse India' initiative to bring together 90 people, including policymakers from energy water resources and agriculture from Central ministries and different Indian States, representatives of multilateral organizations, bilateral organizations, DISCOMS, farmer collectives, civil society and academia to share experiences in managing energy-water-agriculture nexus issues and to explore the possibilities of leveraging the full potential of the KUSUM scheme (which aims to add solar and other renewable capacity of 25,750 MW by 2022 in the country). The *Energy-Water-Agriculture Nexus: Grow Solar, Save Water, Double the Farm Income* report was disseminated at this event.

FY21 Plan: Completed.

Glaciers of the Himalayas

Scope: The activity will undertake first-of-its-kind studies looking at the impacts of climate change and black carbon on glacier and snowmelt in the Himalayas; scenarios of possible glacier and snow changes under different global and regional scenarios; and implications for water resources in the Ganges, Indus and Brahmaputra Basins. The science will look at how changes in glacier mass and seasonal snowpack affect the stability and reliability of regional water resources and global climate. The impacts studied will focus on implications of water availability for the various sectors and economies. The activity is also designed to bring policymakers, experts, development communities, civil society, academic researchers, journalists and other stakeholders in South Asia together to form a common and shared understanding of the challenges faced by the region.

Timeframe: May 2018 – March 2021. **Geography:** Regional. **Budget Allocation:** \$0.45M

FY20 Progress: The HKH Regional Conference on Cryosphere, Glacier Melting and Mountain Economy: Transboundary Solutions for Resilient HKH Mountains, implemented in the previous fiscal year, led to the creation of an HKH Glacier and Mountain Economy Platform, which will work in a collaborative, cooperative and transboundary manner to co-produce, consolidate, share and utilize the knowledge on cryosphere, glaciers and mountain economy by linking to suitable programs on the ground. The Platform will take on regional action research and knowledge management projects, and regularly share results through organized knowledge and policy dialogues. Currently, the platform secretariat is hosted by the Government of Nepal at the Center for Green Economy and Development. This regional platform will gradually extend to each member country based on need and ownership. The activity completed the first-of-its-kind analysis that looks at the impact of climate change and black carbon on glacier melt across the entire Himalayan Region and assesses the implications for water resources in the Indus, Ganges and Brahmaputra Basins (and several smaller basins). The final report, delayed due to the pandemic, was under development at the end of the fiscal year.

FY21 Plan: The final report will be completed and disseminated in the October-December 2020 timeframe. Informed by the study findings, the activity will develop analytical and policy papers for distribution within the science community and for use by resource managers, policymakers and civil society. A virtual workshop will be convened as the follow on to the 2018 HKH Regional conference.

TA and Knowledge Sharing Facility for Development of Utility Scale Floating Solar PV

Scope: This activity aims to inform ongoing development financing operations to demonstrate successful approaches to developing utility-scale floating solar photovoltaic (FSPV) generation projects in India. It will also help in informing such investments to make them sustainable such that environmental impacts are nil or minimal with appropriate mitigation measures in place as well as replicable. The activity will finance resource mapping of FSPV potential; technical studies and reviews of feasibility and other preparation studies and bid documents for FSPV sub-projects; knowledge sharing and stakeholder engagement activities, including market sounding exercises, seminars, workshops and study tours; and knowledge products, such as technical notes, policy notes and presentations that collect and share experience in design and operation of FSPV power plants. These activity components aim to address knowledge and experience gaps of the Solar Energy Corporation of India (SECI) and other stakeholders, in the development, construction and operation of utility scale FSPV, and disseminate lessons to market stakeholders and policymakers.

Timeframe: July 2019 – March 2021. **Geography:** India. **Budget Allocation:** \$0.15M

FY20 Progress: TERI was hired to conduct a Floating Solar (FSPV) Mapping study. This study aims to identify an early set of floating solar projects in India by undertaking mapping exercises of various parameters relevant for such technology. It is intended to give early indication about the potential of floating solar projects across various reservoirs. A database of 2,173 water bodies in India was created, which builds on the database of TERI and the International Hydropower Association (in collaboration with ESMAP). To reach a wider group of solar stakeholders, this database will be uploaded to the Global Solar Atlas portal, which provides a series of global, regional and country GIS data layers and poster maps to support the scale up of solar power. TERI is studying the historical variations in water levels to assess preliminary floating solar potential in 100 selected water bodies across five early-mover States in India. Building on the database, this task collects historical data on

water spread over years and undertakes analysis pertaining to a range of changes occurring over this defined period of time. This work aims to showcase the potential of FSPV and kickstart the scaling up of its market in the country. A consortium of Enzen, Aquatera, Planys and Geostar Surveys was hired to carry out the study, *Preparation of Pre-Feasibility for a Floating Solar Project at Omkareshwar Dam, Madhya Pradesh*. This study carries out a due diligence assessment for setting up a floating solar project of up to 500 MW capacity at the Omkareshwar Dam and undertakes a pre-feasibility report for such a project. In the reporting period, the consultant team undertook a survey of the site and submitted a preliminary survey report. A detailed survey is to begin after subsiding of the rainy season, to estimate site potential in more detail, including identification of suitable areas in the reservoir for FSPV, a review of legal and regulatory requirements, a techno-economic analysis, and a financial analysis of the potential project. The State Government is planning to commission this project by December 2022 and is in process of hiring International Finance Corporation (IFC) as the transaction advisor to improve bankability of this proposed project.

FY21 Plan: Completion of the due diligence assessment of the Omkareshwar Reservoir site, which will inform the State Government of Madhya Pradesh to take forward the project to the next stage of study. Once the historical assessment of 100 selected waterbodies is hosted on the GSA portal, the data will be accessible to all market players and can be built on for consideration of new FSPV across the country.

Enhancing Ecological Integrity of the Aquatic Environment in the G-B Mainstems

Scope: This activity will support a multi-stakeholder platform for conservation of aquatic habitat in the Ganga-Brahmaputra, with a focus on the Gangetic Dolphin, to facilitate sustainable investment in water transport. It will draw from best international practice to assess key risks to the aquatic biodiversity (focusing on the Gangetic Dolphin) in the two rivers and will develop measures and mechanics to manage these risks. Stakeholder engagement will be undertaken to build up the momentum for conservation of flagship species, such as the Gangetic Dolphin, across areas traversed by the Ganga and the Brahmaputra. This will include activity counterparts, line departments, and interested key NGOs that can support the conservation, outreach and analytical work. Outreach programs will be held concurrently with the analytical work, with campaigns tailored to different challenges and targeted stakeholders. The platform will be used for information dissemination on study findings, supporting behaviour change and possibly for canvassing key decision makers to champion the cause of protecting aquatic fauna while planning investments for harnessing the potential of the rivers.

Timeframe: May 2020 – March 2021. **Geography:** Regional. **Budget Allocation:** \$0.50M

FY20 Progress: This activity began implementation near the end of the fiscal year. The terms of reference for studies identifying and assessing the key risks to the aquatic diversity of the Ganges and Brahmaputra was finalized, following consultation with relevant stakeholders. Covid-19 delayed the identification and evaluation of a suitable consultant with global expertise and experience, qualified to carry out the studies.

FY21 Plan: The studies and stakeholder engagement program are expected to commence in September 2020 and will complete by March 2021, should the pandemic and lockdown limitations improve.

Pillar 2 – Capacity Building Activities

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 National Groundwater Management Improvement Program (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 – January 2020. **Geography:** Regional; India focus. **Budget Allocation:** \$0.85M

FY20 Progress: SAWI completed a flagship contribution to the development of the groundwater knowledge base in South Asia, which is incomplete and scattered. The report, *Managing Groundwater for Drought Resilience in South Asia*, was finalized and published online (March 2020). This report presents the findings of a diagnostic study examining pathways and options for strengthening the governance of South Asia's groundwater resources in the face of climate change and increasing resilience on the resource by dependent communities, particularly during times of drought. The report presents a range of policy and management approaches in different hydrogeological and socioeconomic settings with reference to key groundwater challenges, and potential solutions, tailored to specific groundwater resources and contextual problems across South Asia. The activity also finalized seven case studies from the region to showcase the management of groundwater for drought resilience in the region: (1) Can Participatory Groundwater Management Enhance Drought Resilience? The Case of the Andhra Pradesh Farmer-Managed Groundwater Systems Project; (2) Drought-Proofing through Groundwater Recharge: Lessons from Chief Ministers' Initiatives in Four Indian States; (3) Groundwater Management in Balochistan, Pakistan: A Case Study of Karez Rehabilitation; (4) Pro-Poor Groundwater Development: The Case of the Barind Experiment in Bangladesh; (5) Groundwater and Surface Water in the Mega-Irrigation Systems of Pakistan: The Case for Conjunctive Management; (6) Mitigating Floods for Managing Droughts through Aquifer Storage: An Examination of Two Complementary Approaches; (7) Groundwater Governance and Adoption of Solar-Powered Irrigation Pumps: Experiences from the Eastern Gangetic Plains. This work has the potential to support dialogue on transboundary waters and encourage more strategic utilization of groundwater resources to buffer against drought shocks in the region.

FY21 Plan: Completed.

HEP Sustainable Planning - Bhutan

Scope: SAWI is contributing to improving quality of, and reducing risks for, hydropower projects in Bhutan. This activity is undertaking a gap analysis against Bhutanese guidelines/international good practice and developing recommendations on how to address these gaps (for at least one planned large hydropower project); improving bidding documents for construction of hydropower and dam safety guidelines; increasing institutional capacity within the main government authorities to apply the new national hydropower guidelines; and increasing awareness of the new hydropower guidelines and international good practice for hydropower development among key stakeholders.

Timeframe: September 2018 – February 2020. **Geography:** Bhutan. **Budget Allocation:** \$0.22M

FY20 Progress: On request from the Royal Government of Bhutan, the World Bank, with SAWI support, has provided support over the last two years to formulate *Bhutanese Guidelines for Preparation and Construction of Hydropower*. The government has taken ownership of the new guidelines, which are based on international good practice. The government has identified the need to apply the new guidelines to hydropower projects in the pipeline and requested the World Bank to support this task. Indications from limited comparative exercises are that gaps exist in preparatory studies compared to the new guidelines, and finding and filling these gaps would make the planned future hydropower projects more sustainable and better integrated into basin development. SAWI supported an assessment of the Dorjilung Project, which included a site visit, where the Detailed Project Report and ESIA/EMP were compared to the requirements of the new national guidelines. This gap analysis (February 2020) was conducted by a joint team from the counterpart, DHPS, and international experts. The international experts advised the counterpart on how to evaluate the different topics of the guidelines. A final report was prepared describing the gaps and how to address them, including budget and time plan. This analysis reviews the technical, environmental and social aspects of the DPR for the Dorjilung Project to identify gaps in the DPR compared to what is to be expected to meet international good practice; it identifies major technical and financial risks with the Project; it judges whether the Project is deemed bankable; and it suggests additional preparatory studies and/or investigations that should be conducted before tendering. To strengthen regulatory and standard documents for hydropower project development, international and local experts supported DHPS Guidance for Harmonized Bidding Documents for Works on Hydropower Projects in Bhutan (NBDs) (November 2019). This guidance describes the steps necessary to mitigate issues arising at hydropower projects. They describe how time, cost and quality issues that impact hydropower development can be addressed at each stage of project development, namely project preparation, bidding and management of construction. In addition, and in line with the new hydropower guidelines, the government requested the need for improved dam safety regulations in the country. SAWI-supported experts assisted DHPS and the Bhutan Electrical Authority (which currently has regulatory responsibility for dam safety) to develop national Dam Safety Guidelines (February 2020). These guidelines are intended to be an overarching document for dam safety management in the country, whether the dam is in the development phase or in operation. While it is written for the hydropower sector, almost all the contents are also applicable for dams intended for other purposes. There are three modules to the Dam Safety Guidelines: (1) Dam safety management, which describes the principles and performance criteria fundamental to dam safety; (2) Investigation, design and construction, which provides an overview of the important dam safety considerations during the development and first reservoir filling phases of the dam cycle; and (3) Dam Safety Performance, which covers dam safety practices in operations, maintenance and emergency management. This technical assistance has led to an increased institutional capacity within the main government authorities to apply the new national hydropower guidelines, and has increased awareness of the new hydropower guidelines and international good practice for hydropower among key stakeholders in Bhutan. The guidelines and NBDs will reduce the risk of cost hydropower project overruns and loss of opportunity cost due to delayed dam commissioning. Since the cost of the proposed large hydropower projects are in the order of billions of dollars, the potential savings of 20 percent in cost overruns (an overrun percentage that is a general average for the industry) would be in the order of hundreds of millions of dollars per project. In March 2020, the government requested World Bank technical assistance to support the preparatory work for the Dorjilung Project, demonstrating the value this activity has provided to Bhutan.

FY21 Plan: Completed.

Agriculture-Water Nexus, Resilient Agriculture and Access to Markets in NER

Scope: This activity will support the Government of India and the States of the North East to develop a framework for resilient and commercial agriculture in the North East Region (NER). (1) It will review the stressors and socioeconomic factors influencing climate risks and vulnerabilities in the water and agriculture sectors; address the synergies and trade-offs in the water and agriculture sectors affecting smallholders; analyze the policies and institutions pertaining to climate-resilient agriculture; and identify the key interventional areas to promote climate-resilient agriculture. (2) It will conduct a review of the agriculture sector with special focus on key agri-value chains where NER is already and potentially strategically positioned to derive competitive advantage and economic impact; analyze the constraints and challenges facing the development of these value chains and opportunities for investments, including the potential for their integration in domestic and regional markets; and recommend interventions and investments for agricultural development in NER that focuses primarily on wealth creation for farmers and economic development of the region. (3) It will document good practices and lessons from existing experience in the public and private sector on climate-smart agriculture and market access for small farms. It will conduct consultation workshops with key development partners in NER and with State Governments on status, issues and strategy on agriculture-water management in small farms and on agriculture market access for small farms.

Timeframe: July 2019 – December 2020. **Geography:** India. **Budget Allocation:** \$0.15M

FY20 Progress: This activity has a significant field-based research component to assess the value chains in NER and climate resilience in value chains through stakeholder meetings and consultations; which were planned to be carried out in the second half of FY20 and could not progress due to the pandemic. The field visits would have provided firsthand insights from the communities, who are at the heart of future agribusiness and economic development engagements in NER. Because Covid-19 adversely impacted the design and execution of the study, the activity approach has been adapted to enhance and modify the scope of work to capture the impact of the pandemic on the agriculture value chains in NER; to adapt to the evolving situation by increasing the focus on secondary research and literature review to harness the existing knowledge base, especially in case of value chain studies and climate resilience assessments; and to adopt technology to facilitate engagement with stakeholders through webinars, other online exchanges and telephone interviews. A draft report analyzing the Covid-19 pandemic impacts on agriculture value chains in NER was produced (June 2020). Survey instruments for the value chain analysis and institutional analysis were finalized.

FY21 Plan: Utilizing the Covid-19 impact analysis, the activity team will engage with senior policymakers in central and state governments in NER to discuss the impact of the pandemic and the way forward in strengthening agriculture value chains in the NER (through necessary policy measures and pandemic-sensitive project design). Phone surveys and discussions for the value chain study will be initiated. A high-level webinar to disseminate the emerging findings, in collaboration with the Government of India, State governments and external agencies, is planned.

Practitioner Program on Transboundary Watershed Management in Mountain Economies

Scope: This activity aims to provide a forum for generating and sharing practical knowledge and good practices in sustainable management of watersheds of regional importance. The Program will focus on improving the use of disruptive technologies in water resources management (for gathering information, making things differently and using them institutionally, through the sharing economy). The activity will organize a regional practitioner meeting on integrated watershed management to identify national and regional data and knowledge gaps and take stock of best practices, including on environmentally and socially sustainable hydropower development and watershed management for landslide risk reduction. The activity will create a repository of guidelines, tools and other how-to guidance on integrated watershed management and identify a host for the repository. The activity will also organize a series of knowledge sharing events, including trainings using existing materials and good practices in sustainable watershed management.

Timeframe: August 2019 – April 2021. **Geography:** Regional. **Budget Allocation:** \$0.20M

FY20 Progress: This activity is part of a larger effort to mainstream nature-based solutions in SAR operations. This activity leverages earlier work on watershed management tools for sediment management and landslide risk reduction developed with support of the Korea Green Growth Trust Fund in FY19 and in partnership with Stanford's Natural Capital Project. This stage 1 effort involved developing tools and approaches that can be used to prioritize investments in watershed management to maximize the flow of ecosystem services to benefit different stakeholders. The SAWI activity encompasses Stage 2, with the objective to build a robust knowledge base on South Asia Region watersheds through four components: (1) the development of a knowledge platform of data, tools and literature/resources on watershed management; (2) development of guidance notes on how teams can use the tools to prioritize investments, specifically on sediment reduction and landslide risk reduction; (3) organization of a virtual training session with ICIMOD, including the development of an e-learning module on the tools; and (4) engagement with specific teams to familiarize them with the tools and to identify concrete opportunities to mainstream these tools in their projects and activities. The activity supported the launch of *Valuing Green Infrastructure: Case Study of Kali Gandaki Watershed in Nepal* in December 2019 to relevant stakeholders in Nepal. Prepared in Stage 1, this study applies the developed watershed management tools for sediment and landslide risk reduction, which will be used to inform watershed management practices in the country. The activity team is working on guidance notes that simplify the presentation of the tools for internal and external audiences to provide direction on how the tools can be applied at different levels of sophistication, geographic scale and for different sectors. The team also began work with Stanford to develop an e-learning module from the materials developed, and to bring knowledge to stakeholders (relevant practitioners, policymakers, and academics) in SAR through design of a virtual training in collaboration with ICIMOD to disseminate the e-module. In order to develop the knowledge platform, guidance notes and e-learning module, the team held numerous consultations with Bank colleagues as well as with external partners. These consultations helped the team to compile relevant information and resources, and to design the guidance documents for sediment and landslide risk. In order to develop the landslide risk note, the team held a landslide modeling workshop (more than 30 participants) and associated BBL in December 2019, with options for both in-person attendance at the Bank's HQ and virtual participation. Both events helped to catalyze understanding of landslide risk reduction methods; to identify where landslide risk reduction work was already being implemented in Bank projects; and to identify knowledge gaps that could be filled through the guidance document. At the regional level, this work has helped to inform early prototypes of a Regional Data and Analysis Services platform under the Climate Adaptation and Resilience (CARE) for South Asia Project. Within the knowledge platform component of the activity, the team has completed the data portal, which compiles publicly accessible open source global datasets relevant to watershed management in South Asia.

FY21 Plan: The online knowledge platform (e-book), knowledge portal and guidance notes on the developed tools will be completed. The virtual workshop to disseminate the e-learning module will be designed and implemented in the second quarter of FY21. It will bring together relevant practitioners, policymakers and academics from different countries in SAR, and will prioritize identifying women in fields relevant to watershed management in the region to participate. The activity team will continue to engage with Bank teams to identify points of entry to disseminate the knowledge and tools developed through the activity.

Pillar 3 – Regional Flood Forecasting

No active grants

Pillar 4 – Dialogue Processes

Regional Dialogue

Scope: This activity is designed to open up government-dominated water management to participatory multi-stakeholder processes from the local to the river basin level. It supports a diverse suite of dialogue events and forums to engage a broad set of stakeholders, including new and past dialogue participants, across South Asia to build trust and confidence among riparian countries and create an enabling environment for sustainable management of transboundary water resources.

Timeframe: December 2014 – February 2020. **Geography:** Regional. **Budget Allocation:** \$1.25 M

FY20 Progress: This activity has held a regional dialogue event every two years. The last regional dialogue was held in December 2018. Therefore, no regional dialogue event was held in the reporting year.

FY21 Plan: Completed.

Annex 3: Knowledge Products

Output	Format	Status
Indus Focus Area		
Background paper for Sindh Government as a contribution to water sector reforms	Policy Paper	With Government
Groundwater in Pakistan's Indus Basin: Present and Future Prospects	Report	Public
Ganges Focus Area		
Nepal Water Sector Diagnostic 2020	Report	With Government
Pre-Scoping Note for Investment in IWRM-Based Municipality-Wide Water and Wastewater Management in Nepal	Scoping Note	With Government
Nepal Policies Institutions and Regulations Assessment Pertaining to Provisioning of Water Supply and Sanitation Facilities	Report	With Government
Water Quality Management in Nepal	Report	With Government
Urban/Municipality-Wide WSS Service Delivery	Report	With Government
Status of River Basins in Nepal	Report	With Government
Power Market Assessment	Policy Paper	With Government
List of Prospective Hydropower Projects in Nepal	Policy Paper	With Government
Technical Note on a Stakeholder Analysis to Inform SESA	Policy paper	With Government
Ganges Hydrologic Modelling Report	Report	Public
Brahmaputra Focus Area		
Yarlung-Tsangpo-Siang-Brahmaputra-Jamuna: The Restless River	Report	Not Public
Understanding Plastic Pollution: Focus on South Asia	Policy Paper	Not Public
Re-Interpreting Cooperation in Transboundary Waters: Bringing Experiences from the Brahmaputra Basin	Journal Article	Public
Voices from the Field on the Brahmaputra Dialogue	Video	Public
Sundarbans Focus Area		
Erosion and Accretion of Bangladesh and India Sundarbans: 1904-2016 (Geocoded Database)	Database	Public
Water (Tubewell and River) Salinity in Indian Sundarban: February-May 2019 (Geocoded Database)	Database	Public
Co-Location, Socioeconomic Status and Perceptions of Environmental Change in the Indian Sundarbans	Journal Article	Public
Long-Term Island Area Alterations in the Indian and Bangladesh Sundarban: An Assessment Using Cartographic and Remote Sensing Sources	Research Paper	Public
Discounting Disaster: Land Markets and Climate Change in the Indian Sundarbans	Research Paper	Public
Explaining Regional Variations in Mother-Child Health: Environmental Determinants in India and Bangladesh	Research Paper	Public
Fishing in Saltier Waters: Climate Change, Saline Exposure and Women's Health in the Indian Sundarbans	Research Paper	Public
Policy Brief for High-Level Decision Makers on a Joint Institutional Arrangement to Sustainably Manage the Sundarbans	Policy Paper	With Government
Web-Feature Stories: Drinking Water in the Indian Sundarbans; The Perils of Prawn-Catching for Sundarbans Women; Proactive, crosscutting adaptation measures are needed to reduce climate change impacts on the poor; Mangroves and Coastal Protection: A Potential Triple-Win for Bangladesh	Web Stories	Public

Output	Format	Status
Regional Cross-Cutting Focus Area		
Energy-Water-Agriculture Nexus: Grow Solar, Save Water, Double the Farm Income	Report	Public
National Guidelines for Dam Safety for the Government of Bhutan	Policy Guidelines	With Government
Guidance for Harmonized Bidding Documents for Works on Hydropower Projects in Bhutan	Policy Guidelines	With Government
Review Report for the Dorjilung Project (Nepal)	Report	With Government
Analyzing the Covid-19 Pandemic Impacts on Agriculture Value Chains in NER	Report	Not Public
South Asia Watersheds Dashboard Data Portal	Database	Public
Due Diligence Report of Omkareshwar Reservoir: Global Knowledge and Experience in FSPV	Report	Not Public
Pre-Feasibility Report on Omkareshwar Dam	Report	Not Public
Database on 2173 Water Bodies	Database	Public
List of 100 selected reservoirs for Preliminary Floating Solar Panel Potential	Report	Not Public
Himalayan University Consortium Online Portal	Website	Public

Annex 4: Program and Financial Management

Overview

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 and funds are deposited on agreed schedules outlined in the administration agreements signed with the donors (current deposits total US\$35.4M). Then, in accordance with SAWI’s strategic planning efforts, funding is transferred to specific activities (at the close of FY20, allocations were US\$32.6M). Allocations are approved by the Regional Integration Programs Committee (RIPC). SAWI works with clients (for recipient-executed (RE) activities) and World Bank Task Team Leaders (for Bank-executed (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 are US\$29.4M).

Financial Summary (at June 30, 2020)

*rounded

Focus Area	Transferred to Activities as of June 30, 2020	Actual Expenditure for FY20	Cumulative Expenditure since Inception	Contractual Commitments
Indus	2,772,743	204,678	2,768,303	0
Ganges	7,918,613	326,070	7,574,666	61,536
Brahmaputra	5,346,742	311,517	4,964,691	36,420
Sundarbans	3,205,268	103,508	3,205,267	0
Regional Cross-Cutting	9,963,207	712,175	7,802,348	302,087
Program (including M&E, Communications)	3,373,848	380,967	3,113,160	18,598
TOTAL	\$32,580,423	\$2,038,915	\$29,428,435	\$418,642

Disbursements by Activities Under Implementation in FY20

TF Number	Activity Name	Grant Amount US\$	Expenditure for FY20 US\$	Cumulative Expenditure Since Inception US\$
Program				
TF014265 TF0B2763	SAWI II Program Administration and Management	2,359,145	299,694	2,136,583
TF017869	Strategic Communications	815,000	79,533	776,874
TF0A2363	Achieving Results	199,703	1,740	199,703
Total Program		3,373,848	380,967	3,113,160
Indus Basin Focus Area				
TF018455	Indus Dialogue	852,225	44,620	852,225
TF0A7388	Indus Basin (Pakistan) Groundwater Analysis	295,000	160,058	290,558
Total Indus Basin		1,147,225	204,678	1,142,783
Ganges Basin Focus Area				
TF018129	Sustainable Water Resources Development for HEP in Nepal (BE)	900,000	209,992	863,309
TF018488	Water Resources Management in Transboundary Basins; India	700,000	52,340	580,805
TF018570	Power Sector Reform and Sustainable Hydropower Development Project (RE)	500,000	0	500,000
TF018509	Ganges Dialogue	152,671	1,800	152,671
TF0B1361	Nepal Water Platform	250,000	61,939	61,938
Total Ganges Basin		2,502,671	326,070	2,158,723
Brahmaputra Basin Focus Area				
TF018849	Brahmaputra Dialogue	1,122,000	115,245	1,047,057
TF0A2312	Basin Modelling and Analysis	1,500,000	135,892	1,335,100
TF0A8696	Strengthening Hydro-met Services and DRM in Bangladesh	250,000	60,380	107,791
Total Brahmaputra Basin		2,872,000	311,517	2,489,947
Sundarbans Landscape Focus Area				
TF0A0121	Targeted Environmental Studies	1,049,814	48,913	1,049,814
TF0A0122	Sundarbans Dialogue	949,893	54,594	949,893
Total Sundarbans Landscape		1,999,708	103,508	1,999,708
Regional Cross-Cutting Focus Area				
TF018766	Regional Dialogue	1,125,140	22,799	1,125,140
TF0A2044	Capacity Building for Groundwater Management	854,629	16,704	854,629
TF0A4131	Himalaya University Consortium Grant (RE)	1,220,000	254,692	1,219,995
TF0A7870	Glaciers of the Himalayas	450,000	116,918	311,783
TF0A7575	A Diagnostic Study on Groundwater-Energy-Agricultural Nexus	148,836	48,800	148,836
TF0A8509	HEP Sustainable Planning	213,721	74,896	213,721
TF0B0815	Practitioner Program on Transboundary Watershed Management in Mountain Economies	200,000	86,978	86,978

TF Number	Activity Name	Grant Amount US\$	Expenditure for FY20 US\$	Cumulative Expenditure Since Inception US\$
TF0B0852	TA and Knowledge Sharing Facility for Development of Utility Scale Floating Solar PV	150,000	33,858	33,858
TF0B0702	Agriculture-Water Nexus, Resilient Agriculture and Access to Markets in NER	150,000	28,448	28,448
TF0B2753	Enhancing Ecological Security of Aquatic Environment in G-B Mainstems	500,000	28,082	28,082
Total Regional Cross-Cutting		5,012,325	712,175	4,051,468
Ongoing Activities Total		16,907,777	2,038,915	14,955,789

Closed Activities (Since TF Inception; Not Active in FY20)

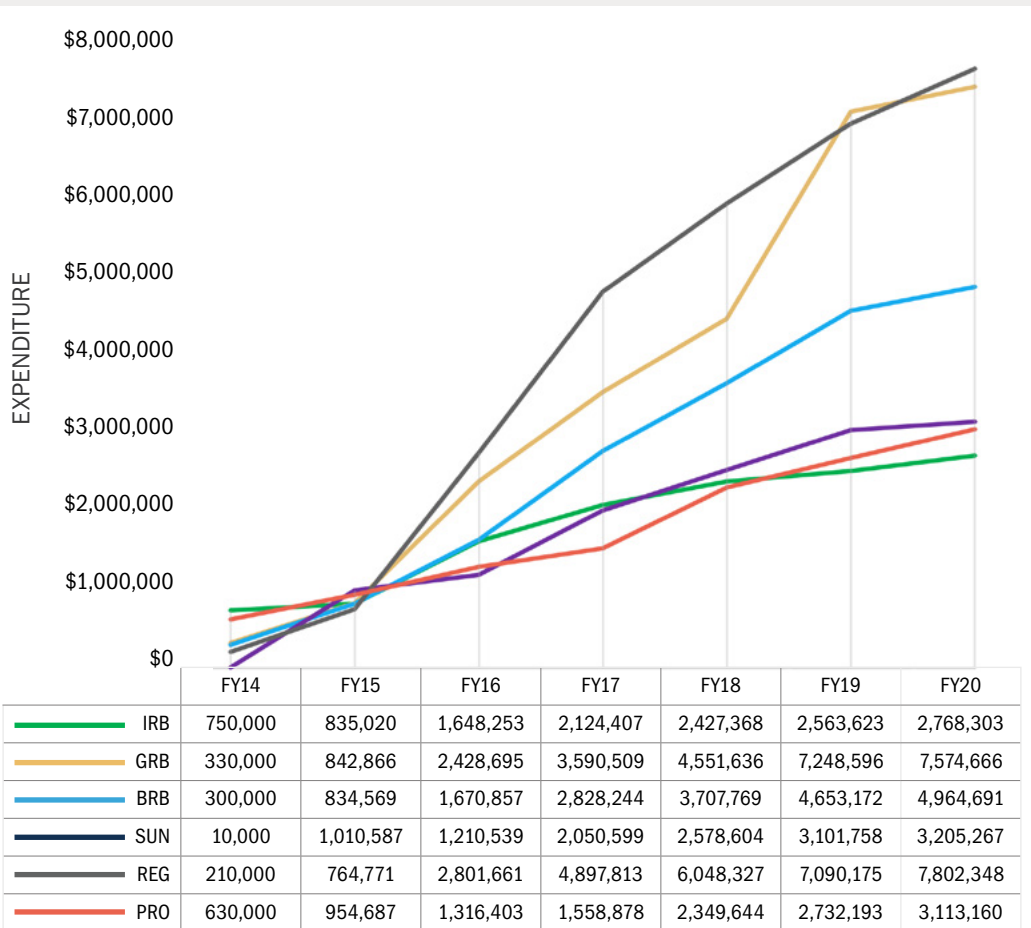
TF Number	Activity Name	Grant Amount US\$	Cumulative Expenditure Since Inception US\$
Indus Basin Focus Area			
TF014935	SAWI Indus FA Engagement	271,735	271,735
TF015737	Project Development: Glacier Monitoring in the Upper Indus Basin	101,825	101,825
TF016290	Learning Innovative Approaches to Glacier Monitoring to Address Climate Change	212,567	212,567
TF016430	Integrated Management of the Kunar River Basin	439,167	439,167
TF0A0640	Kabul/Kunar Basin Development	600,226	600,226
Total Indus Basin		1,625,520	1,625,520
Ganges Basin Focus Area			
TF0A0621	Managing Watersheds to Reduce Upstream Sediment for HEP: Nepal	219,713	219,713
TF015480	SAWI Ganges FA Engagement	348,611.06	348,611
TF018717	Strategic Basin Planning	4,030,627.56	4,030,627.56
TF0A1373	BMIS Flood Forecasting	370,959.06	370,959.06
TF0A1269	Strengthening Flood Modelling Capacity in Water Resources Department	446,031.92	446,031.92
Total Ganges Basin		5,415,943	5,415,943
Brahmaputra Basin Focus Area			
TF016291	Brahmaputra Basin Focus Area	40,218	40,218
TF016429	The Brahmaputra River Basin Assessment	35,526	35,526
TF017496	River Management Improvement: Bangladesh	268,213	268,213
TF017526	Brahmaputra Integrated Water Resources Management Study Tour	183,700	183,700
TF0A0642	Environmental and Social Management for Sustainable HEP: Bhutan	199,169	199,169
TF0A1154	Delta Management Investment Planning and Basin Analysis	798,000	798,000
TF018637	Hydro-met Modernization in the Brahmaputra Basin	243,728	243,728
TF015001	Concept Note Development Brahmaputra FA	195,807	195,807
TF0A3513	Bhutan Hydro-met Services and Disaster Resilience Project	499,857.59	499,857.59
TF0A7705	Non-Monetary Values of Water	10,525	10,525
Total Brahmaputra Basin		2,474,744	2,474,744

Sundarbans Landscape Focus Area			
TF017032	SAWI Sundarbans FA Engagement	327,448	327,448
TF0A1366	Delta Management Investment Planning	178,299	178,299
TF0A0986	Landscape Hydro-met Design	399,839.29	399,839.29
TF0A2516	Landscape Joint Environmental Plan	299,973.19	299,973.19
Total Sundarbans Landscape		1,205,559	1,205,559
Regional Cross-Cutting Focus Area			
TF015757	SAWI Cross-Cutting Knowledge, Dialogue and Consultation	252,366	252,366
TF016326	Transboundary Risk Management and Data Sharing	171,386	171,386
TF017907	Climate Change Impacts on HEP	337,045	337,045
TF018522	Snow/Glacier Contributions to Stream-flows and Climate	147,174	147,174
TF0A3877	Bhutan-HEP Environmental and Social Planning	288,961	288,961
TF0A1491	Climate Change Risks in Water Resources Management	531,854	531,854
TF019090	Capacity Building - WQ Monitoring and Analysis	305,493	305,493
TF018768	Capacity Building - Transboundary Water Governance	363,657	363,657
TF018290	Improving Watershed Management, India	121,118	121,118
TF0A3996	South Asia HEP Resilience Studies	190,862	190,862
TF018731	Improving Flood Forecasting in South Asia	499,493	499,493
TF0A1367	Capacity Building - IWRM in Transboundary River Basin; India	188,022	188,022
TF0A3886	Capacity Building - Water Governance	353,449	353,449
Total Regional Cross-Cutting		3,750,880	3,750,880
Closed Activities Total		14,472,646	14,472,646

Portfolio Spend and Efficiency

There have been 67 activities under SAWI since program inception. In FY20, 22 activities were under implementation and 14 activities were completed. Up to the end of FY20, the cumulative transfer of funds to approved SAWI activities was \$32.6M. Cumulative disbursement stood at \$29.4M. Of this, disbursement in FY20 was \$2.0M, down from a disbursement of \$5.7M in FY19, partially due to implementation delays related to Covid-19. The program had \$0.4M committed in contracts at the end of FY20. A summary graph of expenditure across fiscal years is presented below.

Focus Area Cumulative Expenditure Across FYs (US\$)



Financial Management and Fiduciary Risks

Ethics: All trust fund beneficiaries and bidders are required to observe the highest standard of ethics in World Bank-financed grants and contracts. SAWI grants are subject to the World Bank's Anti-Corruption Guidelines, and its Procurement guidelines.

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 FY19, and is available at: www.worldbank.org/financialresults

For 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.

Annex 5: Gender Mapping (FY20)

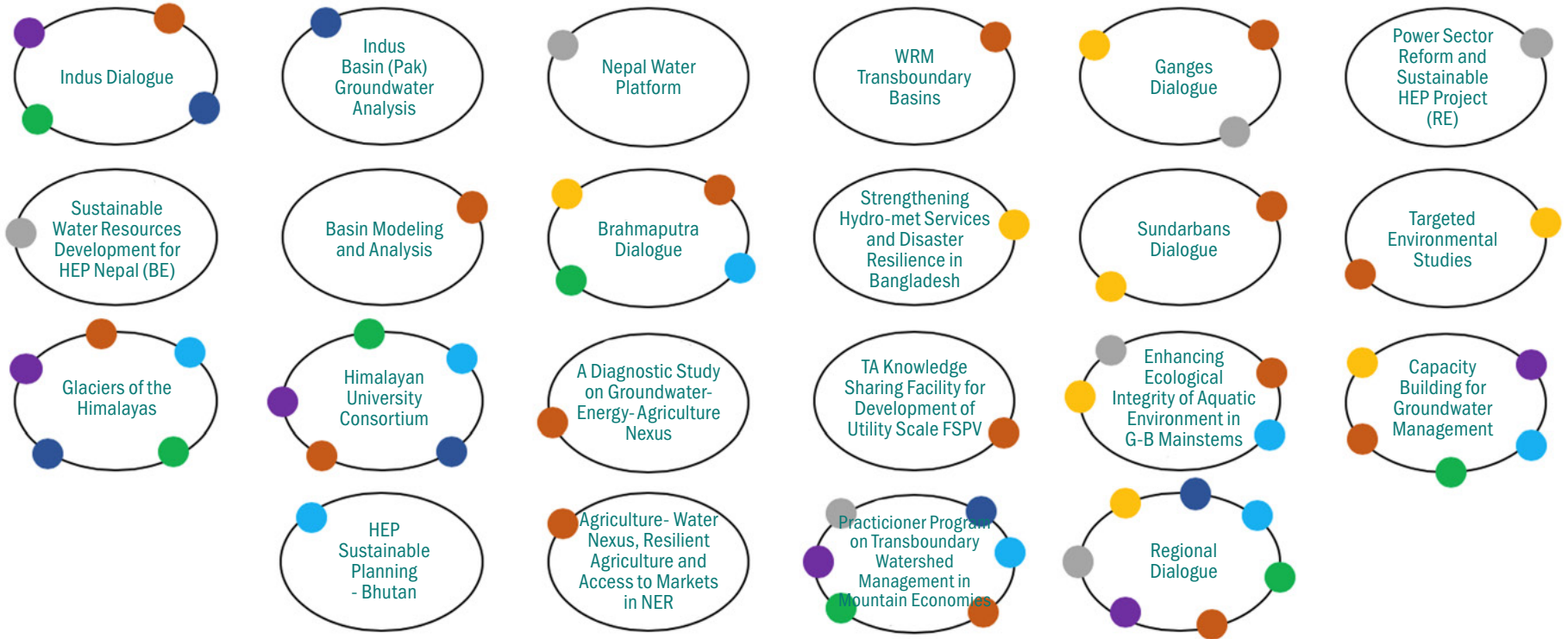
SAWI continues to work at multiple levels to bring greater attention to gender equality and empowerment. Gender has increasingly become integrated across SAWI activities, including through the inclusion of women in community consultations, training, and other events; the consideration of gender impacts in policy and analytical work; and by spotlighting gender issues in regional events and analytical work. This remains incremental, as achieving shifts in mindsets across various stakeholders takes time, analysis and data on the connections between transboundary water resources management and gender are limited.

	Transboundary	National and Sub-National
M&E	Regular M&E tracking, including monitoring gender disaggregated results, assessing progress and prioritizing gender approaches. All SAWI TTLs are required to report on gender mainstreaming actions.	
Gender Analysis, Public Awareness & Social Marketing	<p>Gender is a prominent theme in the <i>Yarlung-Tsangpo-Siang-Brahmaputra-Jamuna: The Restless River</i> book. Supported by case studies, the book highlights the socioeconomic status of women in the Brahmaputra Basin and their importance to the river system.</p> <p>Aspects of gender and social inclusion are being incorporated into the value chain analysis of agriculture in NER under the Analysis of Agriculture-Water Nexus, Resilient Agriculture and Access to Markets in NER activity.</p> <p>SAWI has continued to encourage women to play leadership roles – for example, four of the six lead authors of the published article “Reinterpreting Cooperation in Transboundary Waters” were respected women experts. The article also notes the development of a gender narrative in the dialogue processes and flags the importance of including women in stakeholder consultations and communications.</p>	<p>Gender is directly addressed in studies produced under the Targeted Environmental Studies activity this year:</p> <ul style="list-style-type: none"> • Findings of an econometric study, which highlights the importance of local differences in the timing and magnitude of water-cycle impacts for regional variations in maternal anaemia and child wasting in Bangladesh and India draws attention to the critical role of environmental conditions on malnutrition. The research suggests that regional and temporal variations in the water cycle through flood and drought conditions affect mother-child health as strongly as the more-commonly cited socioeconomic factors (income, education etc). • Findings of water monitoring highlighted high salinity in monitored water samples collected from tubewells (the sole source of drinking water in populated areas of the Indians Sundarbans). As potable water becomes scarcer, women in poor households will have to spend more and more of their time traveling to distant sources. • Findings of a primary survey provided a better understanding of the lives of poor women who wade waist deep in salty water of rivers and creeks in the Sundarbans for hours to collect wild prawn seedlings. Measures are proposed to improve the health of, and livelihood options for, these women.

	Transboundary	National and Sub-National
Targeting & Participating	<p>At the Indus Basin Knowledge Forum, one of the three key messages that emerged was, “Gender and social inclusion are shared challenges in development priority areas, particularly in the Indus Basin, for making research meaningful and impactful. Adopting inclusive approaches in planning and implementation are essential to ensure that the voices of marginalized communities, specifically women, are included.” To reach this last key message, SAWI, in partnership with ICE WaRM, supported a special session that focused on how researchers can better engage with stakeholders and how gender inclusiveness can enhance research impacts in the Indus Basin. SAWI directly supported the participation of two women from Pakistan and India to attend the event and serve as speakers in this session. This session was well-received and introduced concepts that had not been previously considered in the dialogue (such as consideration of gender requirements when developing river flow models).</p>	
Capacity Building & Organizational Development	<p>Due to the pandemic, planned regional capacity building events could not proceed. Scheduled events are now planned for FY21, with a number moving to a virtual format.</p> <p>The Practitioner Program for Transboundary Watershed Management activity is developing an e-book (online knowledge platform) and guidance notes, under preparation, which will include gender and social inclusion in watershed management components.</p>	<p>Google Earth Engine (GEE) is a technology that has revolutionized remote sensing data inventory, processing and analysis. A major thrust of the activity this year was to promote GEE utilization in water resources planning processes under NHP. Five multi-day training events on GEE and other analytical tools, such as Python, were conducted under the WRM in Transboundary Basins activity. These trainings trained 46 female water professionals.</p> <p>In bolster the next wave of water professionals in Nepal, the Sustainable HEP in Nepal activity supported nine women (half of the eighteen students participating) to attend a one-month fellowship at Wuhan Univeristy in China. The students were enrolled in a number of cross-disciplinary courses, with lectures mainly focused on the ongoing research at Wuhan University. The students were also exposed to various high-tech laboratories and ongoing lab experiments (the Hydraulic Structure Lab, the Hydropower Station Lab, and the Pump Storage Power Station Lab). The students also shared their own research with Wuhan professors to obtain feedback and bolster research outcomes.</p>

Annex 6: Country Mapping

Country Mapping to Activities Under Implementation in FY20



Legend



Annex 7: Partnerships (Cumulative)

SAWI activities are carried out with national, regional and global partners. These partnerships aim to ensure the sustainability of SAWI activities, including beyond the duration of the program. They also help in crowding in knowledge and disseminating knowledge to multiple stakeholder groups. Most events are organized in collaboration with partners. Policy think tanks, civil society organizations and academics are active participants in knowledge generation. Sometimes the modality of this is the execution of an activity through an external implementing agency. In other cases, knowledge institutions are contracted as consultants. Many partnerships are not contractual in nature but through convening partners around common themes and interests. National authorities in SAWI countries are all involved in the respective SAWI activity.

SAWI's Government and Country-Specific Partners

Afghanistan

Inter-ministerial working group on transboundary waters, comprising technical-level staff representatives from the Ministry of Energy and Water, the Ministry of Finance, the Ministry of Foreign Affairs and the National Environmental Protection Agency

Bangladesh

Dept. of Water Resources; Bangladesh Forest Dept; Joint Rivers Commission, Bangladesh; Bangladesh Fisheries Research Institute; Institute of Water Modeling; Bangladesh Soil Research Institute; General Economics Division; Bangladesh Water Development Board; Bangladesh Meteorological Dept.

Bhutan

Dept. of Hydropower and Power Systems; Druk Green Power Co; Bhutan Power Co; National Center for Hydrology and Meteorology; Dept. of Hydro-met Services; Dept. of Disaster Mgmt; Dept. of Agriculture; Royal Society for the Protection of Nature; Ministry of Agriculture and Forests; National Environment Commission; Bhutan Electrical Authority

China

Chinese Academy of Sciences; China Meteorological Division; Shanghai Institute of International Studies; Yunnan University; Fudan University; Beijing Institute of Contemporary International Relations; Wuhan University; China Reform Forum

India

Ministry of Water Resources, River Development & Ganga Rejuvenation; Central Water Commission; Central Groundwater Board; National Institute of Hydrology; Brahmaputra Board; Dept. of Economic Affairs; Central Pollution Control Board; NITI Aayog; Ministry for the Development of the North East; multiple State Governments in Ganges/Brahmaputra Basins; Ministry of New and Renewable Energy

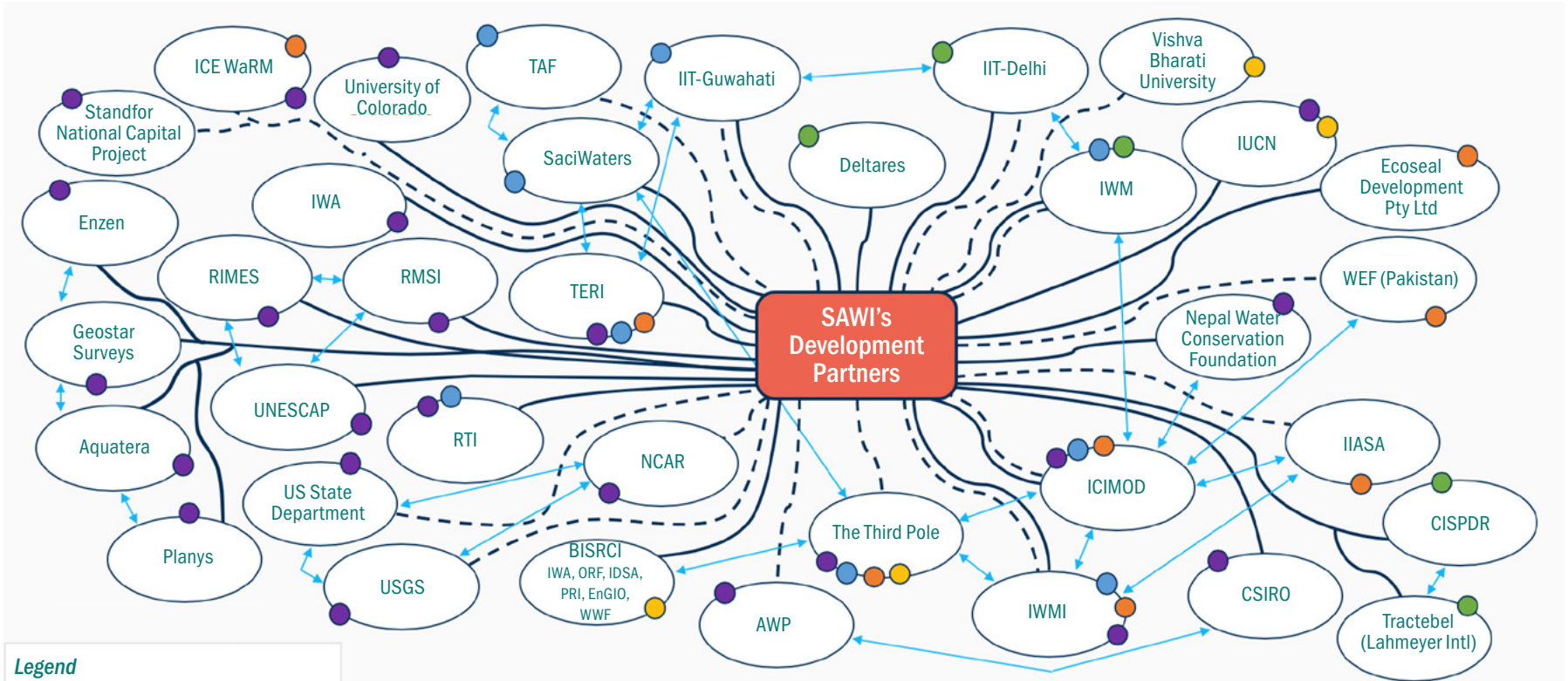
Nepal

Water and Energy Commission Secretariat; Dept. of Soil Conservation and Watershed Management; Nepal Electricity Authority; Independent Power Producers Association of Nepal; Kathmandu University; hydroelectric power authorities; Ministry of Finance; Ministry of Energy, Water Resources and Irrigation; Ministry of Water Supply; Center for Green Economy and Development

Pakistan

Ministry of Climate Change; Provincial Governments of Sindh and Punjab

SAWI's Development Partners



Legend	
Contracted Partnership	—
Knowledge Partnership	- -
Inter-relationships	↔
Indus Basin FA	●
Ganges Basin FA	●
Brahmaputra Basin FA	●
Sundarbans Landscape FA	●
Regional Cross-cutting FA	●

AWP	the Australian Water Partnership
BISRCI	Bangladesh India Sundarban Region Cooperation Initiative
CISPDR	Changjiang Institute of Survey, Planning, Design and Research
CSIRO	Commonwealth Scientific and Industrial Research Organisation
EnGIO	Environment Governed International Organization
ICIMOD	International Centre for Integrated Mountain Development
IDSA	Institute for Defence Studies and Analyses
IUCN	International Union for the Conservation of Nature
IWA	International Water Association
IWM	Institute of Water Modeling
IWMI	International Water Management Institute

NCAR	National Center for Atmospheric Research
ORF	Observer Research Foundation
PRI	Principles for Responsible Investment
RIMES	Regional Integrated Multi-Hazard Early Warning System for Africa and Asia
TAF	The Asia Foundation
TERI	The Energy and Resources Institute
UNESCAP	UN Economic and Social Commission for Asia and the Pacific
USGS	United States Geological Survey
WEF	Water Environment Forum Pakistan
WWF	World Wildlife Fund

Annex 8: New Activities (Beginning in Late FY20 and FY21)

Overview

Demand for SAWI funds remains strong as the program enters its final year. Aligned with the SAWI Think Piece presented in 2018—which draws on lessons learned from SAWI implementation and explores key trends and emerging entry points in cooperation in transboundary waters in South Asia as a basis for increased adaptive management of the SAWI program (see Box 1)—six new activities were approved by the RIPC in FY20. These activities are designed to complete and close by end of June 2021.

Box 1

THEMATIC ENTRY POINTS FOR SAWI ENGAGEMENT

The SAWI Think Piece identified four emerging thematic entry points for SAWI engagement (in addition to **Power and Trade (access to markets)**):

- (1) **Groundwater Management:** There is massive storage capacity in the region, but groundwater is currently poorly managed, overexploited and seriously degraded. There is rising appreciation of the need for improved groundwater management as a key to future drought and climate resilience.
- (2) **Inland Navigation:** There is regional interest in reviving inland navigation in South Asia. Transport connectivity is currently extremely low, and it is costs more to ship within the region than to outside the region. No major continental-size region of the world has developed economically without inland riverine transport. There are cost and efficiency gains of riverine transport over other means, and environmental benefits.
- (3) **Disaster Risk and Climate Resilience:** The South Asia Region is highly prone to weather-related hazards, such as droughts, floods, tropical cyclones and thunderstorms that cut across national boundaries. Hydrological and hydrometeorological forecasting capacity needs to be strengthened, as does delivery of weather and water-related information services. Because weather patterns are transboundary in nature, collaboration in monitoring, understanding and predicting events is required at the sub-regional and regional scales.
- (4) **Ecological Integrity:** There is regional realization that improved management of ecological assets (mountains, river basins, oceans, biodiversity, etc.) that connect countries can create new shared growth opportunities and manage water-related threats, including water extremes. New, innovative approaches are needed to properly manage the ecological asset base.

Approved Activities

Monitoring Transboundary Water Quality in Bangladesh

Scope: This activity aims to examine transboundary water quality monitoring issues from the perspective of Bangladesh. A rapid assessment will be performed to understand the current operating status of the water quality monitoring system (WQMS) of the Department of Environment (DOE) of Bangladesh and to identify gaps and deficiencies of this system in monitoring transboundary water pollution. The activity will also support the design and implementation of a pilot water quality monitoring program at selected entry points of the Padma, Teesta and Jamuna rivers. Based on the assessment and results of the pilot program, the activity will help develop a proposal to update Bangladesh's existing WQMS, based on international best practices and wide stakeholder consultations. A workshop will be organized to disseminate findings of the pilot monitoring program and to discuss potential regional cooperation on regular exchanges of water quality information on key transboundary rivers between DOE and its counterparts in upstream countries. Findings from this activity will directly contribute to the preparation of the Bangladesh Environmental Sustainability and Transformation (BEST) Project.

Budget Allocation: US\$200,000

SAWI Think Piece Linkage: Ecological Integrity

Developing Regional Waterways in South Asia

Scope: This activity will support developing a substantive body of knowledge through focused technical assessments on regional trade and transit policy-related constraints impeding the growth of waterborne transport, gaps in operational standards, and the limitations to an integrated network of river and maritime transport in the BBIN countries. It will also support evolution of a regional waterway framework through establishment of an embryonic institutional structure and inter-country data and information exchange architecture. The activity will undertake studies in a number of policy/operational areas to this end: (i) public policy on bilateral trade and transit across countries in the region; (ii) harmonization of standards across waterway transport infrastructure and services; (iii) integration of waterway and short sea (coastal) shipping; and (iv) developing the broad architecture of a digital platform for regional waterway operation. Recommendations from these studies will feed into the development of an overarching regional institutional structure to develop a collaborative framework on regional waterway operation. The activity will also nurture a small group of multi-country waterway professional groups, duly nominated by the respective countries, to start acting as the secretariat for such a structure. The activity aims to enhance the intended socio-economic and regional integration benefits of ongoing waterway development programs in India and Bangladesh and associated sector reform initiatives in Nepal.

Budget Allocation: US\$500,000

SAWI Think Piece Linkage: Inland Navigation

Rivers and Plastics: Addressing Transboundary River Pollution

Scope: This activity aims to build a shared understanding of transboundary river pollution flows in South Asia, especially plastics pollution, and to identify challenges and opportunities for stronger regional coherence of ongoing and future World Bank programming to improve pollution management. The sub-activities will be undertaken through a coherent program of work coordinated across multiple countries to help fill key analytic gaps to bring the currently fragmented set of national level actions onto a more common footing, through analytic work, stakeholder engagement and information exchange. The activity will undertake rapid monitoring and carry out analyses to understand plastics pollution flows and volumes in the transboundary rivers (pilot areas) of South Asia and plastic pathways into the rivers. It will identify interventions and opportunities for reducing plastic usage and managing plastic waste through identifying shared elements toward a policy/institutional framework for plastic use and transboundary plastic management; documenting best practices for plastic use and river pollution reduction; identifying specific investment options for leveraging transboundary pollution reduction in IDA and IBRD investments across participating countries; and identifying opportunities for plastic waste management and future action research. The activity will conduct a multi-stakeholder set of outreach, communications and knowledge sharing events on transboundary plastic pollution and plastic waste management, with participation of key decision makers, practitioners, private sector stakeholders and community leaders, to discuss experiences and lessons learned and to develop a way forward in plastic management for the region. The activity will also carry out a stock taking and prioritization consultative process to develop a World Bank South Asia Region programming framework (2020-2025) for addressing transboundary river pollution, especially plastics.

Budget Allocation: US\$1,530,000

SAWI Think Piece Linkage: Ecological Integrity

Price of Water (SARCE Regional Flagship Study)

Scope: This activity will produce a regional flagship study to fill key knowledge gaps that will help South Asian governments design and implement more effective policies to increase water efficiency and address the growing water crisis in the region, while promoting economic growth and poverty reduction. This activity will provide an assessment of the impacts of a range of policies that increase efficiency of water use, both on the demand side and on the supply side, and both upstream and downstream, along the water utilization pathway. In addition to other potential policies, the activity will also examine the role of water markets in the South Asian context. This will include assessing institutional arrangements that are critical for improving water-use efficiency, including defining and enforcing property rights, coordinating different water uses within shared river basins, internalizing externalities, resolving conflicts, and monitoring compliance. The study will mainly answer the following: What are the regions/basins in South Asia that have the favorable pre-conditions

for introducing water markets? What are the economic benefits (including potential water savings and increased water-use efficiency) across various sectors from introducing water markets in these regions/ basins? What will be the economy-wide and distributional impacts of introducing water markets in the South Asian countries?

Budget Allocation: US\$400,000

SAWI Think Piece Linkage: Disaster Risk and Climate Resilience

Improving Water Resources Management in Northeast India and Assam

Scope: This activity aims to improve water resources management and management of water-related disaster risks in the Brahmaputra Basin, with a focus on Northeast India and Assam. It will build on earlier grants by supporting NE governments and Assam to address current challenges through AIRBMP. AIRBMP is currently under preparation, so SAWI support comes at a critical time for informing its design. The activity will support Assam to scope and develop analytical tools to conduct river basin planning towards the identification, prioritization and sequencing of investments in water resources management and disaster risk management. It will undertake a rapid review of potential institutional reforms and capacity building needs, with a focus on Assam. Specifically, a rapid institutional landscape assessment will be conducted to better understand the current institutional set up, mandates, and functions of various agencies working in the area of disaster risk management. The activity will support Assam to design and initially plot an operational flood forecasting system and recommendations for future enhancement of forecasting services. This activity will review the existing flood forecasting system, and support Assam in designing and piloting an online cloud-based flood forecasting system in one sub-basin. The activity will also assess where the flood forecasting system should be housed, including supporting the design of a flood forecasting and hydrologic modeling center. The activity will conduct multi-stakeholder consultations in the NE and within Assam on integrated river basin management and disaster mitigation in the Brahmaputra Basin. Stakeholders will include government and other key decision makers, practitioners, academia and civil society, among others.

Budget Allocation: US\$250,000

SAWI Think Piece Linkage: Disaster Risk and Climate Resilience

Nepal River Basin Planning and Sustainable Hydropower Development in a Regional Context

Scope: This activity aims to support integrated river basin development planning and sustainable hydropower development in a regional context for major rivers in Nepal. It will support preparation of integrated and sustainable basin plans through integrated water resources management principles, supported by a publicly-accessible information repository. It will prepare hydropower development master plans for all the major river basins, which will recommend optimal development of hydropower, including identifying site, capacity and storage type for each development. The activity will undertake an integrated Strategic Environmental and Social Assessment to ensure the integration of environmental and social dimensions into the river basin plans and hydropower development plans from their inception to post evaluation. The activity will provide technical advice on strengthening climate resilience in the planning, design and construction of one-to-two hydropower projects under preparation. The activity will also develop the capacity of WECS and provincial and local governments in carrying out integrated water resources development and management planning, including in developing and maintaining a Decision Support System.

Budget Allocation: US\$1,000,000

SAWI Think Piece Linkage: Power and Trade

Annex 9: World Bank Investments / Operations Linked to SAWI (Cumulative)

Focus Area	SAWI-II Grant	Grant (\$USD)	World Bank Investment/ Operation Informed	Development Objective of World Bank Investment/Operation	Duration	Bank Investment/Op (\$USD million)
Indus	Indus Basin Dialogue	700,000	1. Pakistan Water Sector Capacity Building and Advisory Services Project – Additional Financing (P155226)	To improve the country's management and investment planning of water resources in the Indus River system through: a) capacity building of and support to federal institutions in water resources planning and management, b) improvement in water resources management and development in Water and Power Development Authority and c) project management and additional studies.	Jun 2008 to Jun 2021	\$35M
	Kabul / Kunar Basin Development	600,000	2. Afghanistan Irrigation Development and Rehabilitation Project – Additional Financing (P152892)	To improve access to irrigation in targeted areas and strengthen capacity for water resources management.	Apr 2011 to Dec 2020	\$70M (plus \$1M Counterpart)
	Indus Basin (Pakistan) Groundwater Analysis	295,000	3. Sindh Water Sector Improvement Project Phase I (P084302)	To improve the efficiency and effectiveness of irrigation water distribution in Ghotki Area Water Board (AWB), Nara AWB, and Left Bank AWB, all in the Province of Sindh, particularly with respect to measures of reliability, equity and user satisfaction.	Sept 2007 to Dec 2019	\$150M (plus \$25M Counterpart)
			4. Punjab Rural Water Supply and Sanitation project (P169071)	To provide safe, sustainable and continuous water supply for drinking and sanitation in select districts of rural Punjab.	Pipeline	\$200M (plus \$50M Counterpart)
			5. Sindh Water and Agriculture Transformation Project (P167596)	To boost the rural economy and promote sound water resources management for agricultural development, economic growth, and environmental sustainability.	Pipeline	\$350M (plus \$130M Counterpart)
Ganges	Strategic Basin Planning for the Ganges in India	4,000,000	6. India National Ganga River Basin Project (P119085)	To support the National Ganga River Basin Authority in: (a) building capacity of its nascent operational-level institutions, so that they can manage the long-term Ganga clean-up and conservation program; and (b) implementing a diverse set of demonstrative investments for reducing point-source pollution loads in a sustainable manner, at priority locations on the Ganga.	May 2011 to Dec 2019	\$1B (plus \$556M Counterpart)
			7. India National Hydrology Project (P152698)	To improve the extent, quality, and accessibility of water resources information and to strengthen the capacity of targeted water resources management institutions in India.	Jan 2017 to Nov 2024	\$175M (plus \$175M Counterpart)
			8. India Uttar Pradesh Water Sector Restructuring Project Phase II (P122770)	To strengthen the institutional and policy framework for integrated water resources management for the entire State and increase agricultural productivity and water productivity by supporting farmers in targeted irrigation areas	Aug 2013 to Oct 2020	\$360M (plus \$155M Counterpart)
	Power Sector Reform and Sustainable Hydropower Development Project (RE)	2,500,000	9. Nepal Power Sector Reform and Sustainable Hydropower Development (P150066)	To strengthen the capacity of the power sector agencies to plan and prepare hydropower transmission line projects following international standards and best practices. To improve the readiness of the power sector agencies for regulatory and institutional reforms	Apr 2014 to Jun 2020	\$20M (plus \$1.5M Counterpart)
			10. Nepal Energy Sector Development Policy Credit (P154693) and (P170248)	To support the government's efforts in improving the financial viability and governance of the electricity sector.	Sept 2018 to Mar 2019	\$100M (plus \$150M Counterpart)
	Sustainable Water Resources Development for HEP in Nepal (BE)	1,200,000	As above	As above		
	Managing Watersheds to Reduce Upstream Sediment for HEP	220,000	11. Nepal Kali Gandaki A Hydropower Plant Rehabilitation Project (P132289)	To improve the reliability of power supply of Kali Gandaki A Hydropower Plant through rehabilitation and safety measures and to and improve the response capacity of Nepal in case of an emergency.	Aug 2012 to Jun 2017	\$27M (plus \$3M Counterpart)

Focus Area	SAWI-II Grant	Grant (\$USD)	World Bank Investment/ Operation Informed	Development Objective of World Bank Investment/Operation	Duration	Bank Investment/Op (\$USD million)
	Water Resources Management in Transboundary Basins	500,000	India National Hydrology Project (P152698)	See earlier		
	Strengthening Flood Modelling Capacity in Bihar (RE)	475,000	12. India Bihar Kosi Basin Development Project (P127725)	To enhance resilience to floods and increase agricultural production and productivity in the targeted districts in the Kosi river basin, and to enhance Bihar's capacity to respond promptly and effectively to an eligible crisis or emergency.	Dec 2015 to Mar 2023	\$250M (plus \$126.5M Counterpart)
	WRM in Transboundary Basins	500,000	13. India's West Bengal Major Irrigation and Flood Management Project	To strengthen Irrigation and Flood Management capacity in West Bengal	Under Preparation	\$145M
	Bihar FMIS Flood Forecasting	500,000	As above	As above	--	--
	Nepal Water Platform	250,000	14. NP Modernization of Rani Jamara Kulariya Irrigation Scheme - Phase 2 (P158364)	To improve the irrigation service and to strengthen farmer organizations in the irrigated areas of the Rani Jamara Kulariya Irrigation Scheme.	Mar 2018 to Dec 2023	\$66M (plus \$6M Counterpart)
			15. NP Rural Water Supply and Sanitation Improvement (P143036)	To (i) increase sustainable access to improved water services and promote improved sanitation and hygiene practices in rural areas; and (ii) develop and implement a long-term support mechanism to promote the sustainability of water supply schemes in selected districts.	May 2014 to Dec 2020	\$72M (plus \$18M Counterpart)
			16. Nepal Urban Governance and Infrastructure Project (163418)	To expand municipal infrastructure and strengthen institutional & financial systems in participating urban local governments in Nepal.	Pipeline	\$150M
			17. Building Resilience to Climate Related Hazards (P127508)	To enhance government capacity to mitigate climate-related hazards by improving the accuracy and timeliness of weather and flood forecasts and warnings for climate-vulnerable communities, as well as developing agricultural management information system services to help farmers mitigate climate-related production risks.	Jan 2013 to Nov 2020	\$31M
Nepal Power Sector Reform and Sustainable Hydropower Development (P150066)			See earlier	--	--	
		18. Kabeli A Hydro Electric Project (P122406)	To add hydropower generation capacity to supply the Nepal electricity authority (NEA) grid through public private investments.	Jul 2014 to Dec 2019	\$46M (plus \$62M Counterpart)	
Brahmaputra	Basin Modeling and Analysis; India	1,200,000	India National Hydrology Project (P152698)	See earlier	--	--
			19. Assam Integrated River Basin Management Program (P174593) ³⁶	To improve water security in Assam.	Pipeline	\$500M
	Hydromet Modernization in the Brahmaputra Basin	250,000	20. Hydro-met Services and Disaster Resilience Regional Project (P154477)	To strengthen the Royal Government of Bhutan's capacity for improved weather and hydrological forecasting and disaster related early warning systems.	Sept 2016 to Jun 2020	\$4M
	Bhutan Hydro-met Services and Disaster Improvement (RE)	500,000	As above	As above	--	--

³⁶ This project will be implemented in a multi-phase approach, of which the first phase will include an approx. US\$120M World Bank investment

Focus Area	SAWI-II Grant	Grant (\$USD)	World Bank Investment/Operation Informed	Development Objective of World Bank Investment/Operation	Duration	Bank Investment/Op (\$USD million)
	Hydromet Modernization in the Brahmaputra Basin	250,000	21. Bangladesh Weather and Climate Services Project (P150220)	To strengthen Bangladesh's capacity to deliver reliable weather, water, and climate information services and improve access to such services by priority sectors and communities	Jun 2016 to Dec 2022	\$113M
	BD: Strengthening Hydromet Services and Disaster Resilience	250,000	As above	As above	--	--
Brahmaputra and Sundarbans	Delta Management Investment Planning	800,000	Bangladesh Delta Plan 2100 ³⁷	To realise a sustainable delta vision, long term strategy and plan, agreed with all stakeholders, for an optimum level of water safety and food security as well as economic growth and a framework for its implementation.	Jun 2015 to N/A	\$4B in total
	Delta Management Investment Planning	800,000	22. Climate-Smart Agriculture and Water Management Project (P161534)	To enhance productivity and climate resilience of irrigated agriculture, improve water management, build institutional capacity for water and agriculture service delivery, and improve market opportunities for farmers small-holder farmers, especially women.	Pipeline	\$120M
Sundarbans	All Sundarbans Activities	--	23. Bangladesh Sustainable Coastal and Marine Fisheries Project (P161568)	To increase coastal and marine fisheries' contribution to the economy, poverty reduction, and environmental stability.	Jul 2018 to N/A (in prep)	\$240M (plus \$42M Counterpart)
			24. Sustainable Forests and Livelihood Project (P161996)	To improve collaborative forest management and increase benefits for forest dependent communities in targeted sites.	Oct 2018 to Sept 2023	\$175M (plus \$4M Counterpart)
			25. Bangladesh Regional Waterway Transport Project 1	To improve Inland Water Transport (IWT) efficiency and safety for passengers and cargo along the Chittagong-Dhaka-Ashuganj Regional Corridor and to enhance sector sustainability.	Jun 2016 to Dec 2025	\$360M (plus \$40M Counterpart)
			Bangladesh Weather and Climate Services Project (P150220)	See earlier	--	--
			India National Hydrology Project (P152698)	See earlier	--	--
			26. Coastal Embankment Improvement Project (P128276)	To (a) increase the area protected in selected polders from tidal flooding and frequent storm surges, which are expected to worsen due to climate change; (b) improve agricultural production by reducing saline water intrusion in selected polders; and (c) improve the Government of Bangladesh's capacity to respond promptly and effectively to an eligible crisis or emergency.	Jun 2013 to Dec 2020	US\$375M (plus \$25M Counterpart)
			27. Integrated Coastal Zone Management - India (P097985)	To assist Government of India in building national capacity for implementation of comprehensive coastal management approach in the country, and piloting the integrated coastal zone management approach in states of Gujarat, Orissa and West Bengal.	Jun 2010 to Mar 2020	US\$220M (plus \$60M Counterpart)
			28. National Cyclone Risk Mitigation Project (P144726)	To reduce vulnerability to cyclone and other hydro-meteorological hazards of coastal communities in project states, and increase the capacity of the state entities to effectively plan for and respond to disasters.	May 2015 to Mar 2021	\$310M (plus \$80M Counterpart)
			29. Multipurpose Disaster Shelter Project (P146464)	To reduce the vulnerability of the coastal population in selected coastal districts of Bangladesh to natural disasters.	Dec 2014 to Sept 2020	\$375M

³⁷ Note: This is not a WB lending operation / loan (as is the case of the others). It is a plan that totals \$4 billion. The SAWI-financed Delta Management and Investment Plan activity supported the preparation of a shorter-term investment plan for the Bangladesh Delta Plan 2100.

Focus Area	SAWI-II Grant	Grant (\$USD)	World Bank Investment/Operation Informed	Development Objective of World Bank Investment/Operation	Duration	Bank Investment/Op (\$USD million)
Regional Cross-Cutting	Capacity Building – Water Quality Monitoring and Analysis	310,000	30. IN Punjab Rural Water Supply and Sanitation Project (P150520)	To improve water and sanitation service levels, reduce open defecation, and strengthen service delivery arrangements in targeted villages in Punjab.	Mar 2015 to Mar 2021	\$248M (plus \$106M Counterpart)
	Capacity Building – Water Quality Monitoring and Analysis	310,000	India National Ganga River Basin Project (P119085)	See earlier	--	--
	Capacity Building – IWRM in Transboundary River Basins	200,000	India National Hydrology Project (P152698)	See earlier	--	--
	Capacity Building for Groundwater Management	400,000	31. Atal Bhujal Yojana - National Groundwater Management Improvement Program (P158119)	To improve management of groundwater resources in selected states of India.	Jun 2017 to Jun 2022 (in prep)	\$450M (plus \$550M Counterpart)
	Improving Watershed Management	125,000	32. India Neeranchal National Watershed Project (P132739)	To support the watershed development component of PMKSY through technical assistance to improve incremental conservation outcomes and agricultural yields for communities in selected sites, and adoption of more effective processes and technologies in participating states.	Aug 2012 to Mar 2022	\$178.5M (plus \$178.5M Counterpart)
	Improving Flood Forecasting in South Asia	500,000	India Bihar Kosi Basin Development Project (P127725)	See earlier	--	--
	HEP Sustainable Planning	220,000	33. South Asia Electricity Markets Program (P167971)	To support regional cooperation in the power sector and regional electricity market in South Asia. It will comprise advisory, analytical and capacity building and knowledge sharing activities that will enhance country client readiness for power trade and energy cooperation; develop options for regional power market trade and development and foster the authorizing environment for regional power market trade and development.	Oct 2018 to Jan 2022	\$3.7M
	Practitioner Program on Transboundary Watershed Management in Mountain Economies	200,000	34. Nepal: Investing in Forests for Prosperity at a Time of Transformation (P170798)	To improve sustainable forest management; and increase benefits from forests and to address climate change in selected landscapes in Nepal.	Pipeline	\$24M
	Diagnostic Study on Groundwater-Energy-Agriculture Nexus	150,000	35. Rajasthan Agricultural Competitiveness Project (P124614)	To establish the feasibility of sustainably increasing agricultural productivity and farmer incomes through a distinct agricultural development approach by integrating agriculture water management and agricultural technology, farmer organizations and market innovations in selected locations across the ten agro ecological zones of Rajasthan.	Mar 2012 to Jun 2020	\$109M (plus \$87M Counterpart)
	TA and Knowledge Sharing Facility for Development of Utility Scale Floating Solar PV	150,000	36. Innovation in Solar Power and Hybrid Technologies Project (P160379)	To demonstrate the operational and economic feasibility of utility-scale innovative renewable energy technologies and battery energy storage solutions, and to strengthen institutional capacity to facilitate scale-up of such technologies on a commercial basis in India.	Mar 2019 to Dec 2024	\$150M (plus \$50M Counterpart)
37. IN Dam Rehabilitation and Improvement Project (P089985)			To improve the safety and operational performance of selected existing dams in the territory of the participating states.	Jun 2010 to March 2021	\$350M (plus \$87M Counterpart)	
38. Second Dam Rehabilitation and Improvement Project (P170873)			To increase the safety of selected dams and to strengthen dam safety management in India.	Pipeline	\$500M (plus \$215M Counterpart)	

SAWI is Linked to 38 World Bank Investments/Operations (Valued at Approx. US\$8B)

Annex 10:

SAWI and Covid-19

(Impacts on FY20 and FY21 Implementation)

Activity	Planned Activity Deliverables by Closing Date	Extension Required	Changes to Activity Delivery Due to Covid-19	Can Activity Respond to the Covid-19 Crisis? If so, is Restructuring Needed?
Indus Basin (Pakistan) Groundwater Analysis Closing Date: Closed May 2020	The final report, <i>Groundwater in Pakistan's Indus Basin: Present and Future Prospects</i> , and report dissemination workshops at the provincial and national levels.	No. Dissemination of report will be handled under a new World Bank project.	Although the final report was delivered, there were delays to the final edits, as essential contributors were occupied with COVID-19 emergency response. Dissemination workshops will be held via videoconference under a new project.	No. However, once the report is disseminated, some of the findings may support the case for essential reforms to bolster future resilience to COVID-19 and similar situations.
Indus Basin Dialogue Closing Date: Closed May 2020	Support to the Indus Basin Knowledge Forum 4, which took place in August 2019.	No.	The final outputs of this activity completed before the onset of the COVID-19 pandemic.	No. Activity implementation completed near the onset of the pandemic.
Power Sector Reform and Sustainable HEP Nepal (RE and BE) Closing Date: Closed December 2019 and May 2020	WECS' implementation of integrated water resource planning and management to guide sustainable hydropower development using a basin-wide approach. The preparation of river basin plans and hydropower masterplans for all rivers of Nepal, and a strategic environmental and social assessment to support the basin-wide approach. Through student-faculty exchange, training the next-generation of hydropower and water management professionals in Nepal.	No.	SAWI will support completion of the river basin and hydropower master plans under a separate activity, which will begin and complete in FY21. The training components were completed before the onset of the COVID-19 pandemic.	No. Activity implementation completed before the COVID-19 pandemic arose.
Water Resources Management in Transboundary Basins Closing Date: April 2021	In-person trainings on Google Earth Engine (GEE) and Python applications for water professionals implementing the National Hydrology Project. These tools are revolutionizing remote sensing data inventory, processing and analysis.	Yes. The activity was extended to April 2021	Most of the planned trainings were delivered before the COVID-19 pandemic arose. The activity team will now build a virtual training course on the GEE and Python tools to enable NHP stakeholders to complete the planned trainings at their own pace.	The activity will not directly respond to the pandemic.
Nepal Water Platform Closing Date: April 2021	A Water Sector Diagnostic on the challenges facing the water sector in Nepal. A pre-scoping analysis on IWRM principles for municipality-wide water and wastewater management, which is informed by other analytical pieces produced under the activity. Stakeholder dialogue and consultations to support the transition of water and sanitation services delivery under a federalized Nepal.	Yes. The activity was extended to April 2021.	The activity components are now being implemented utilizing virtual technologies to the extent possible (i.e., for multi-stakeholder consultations and sector dialogue). Analytical pieces will be reviewed virtually to ensure quality control.	Yes. The activity assisted the Government of Nepal in its preparation of a COVID-19 response strategy. Through the Water Sector Diagnostic, the activity has raised the criticality of clean water supply and sanitation in medical facilities during the response phase and overall hygiene improvement in households during the resilience phase. The activity facilitated inter-agency coordination among ministries in change of water supply, schools and medical facilities in their efforts to improve sanitation policies and

Activity	Planned Activity Deliverables by Closing Date	Extension Required	Changes to Activity Delivery Due to Covid-19	Can Activity Respond to the Covid-19 Crisis? If so, is Restructuring Needed?
				services following the onset of the pandemic. Furthermore, the activity brought development partners working on water and sanitation services in the country together to align assistance activities during the pandemic.
Basin Modeling and Analysis Closing Date: May 2020	Discussions with the Government of India on a lending TA to support improving water resources management in the NER of India.	No.	This activity did not include a component that was affected by the onset of COVID-19. A new SAWI grant will support preparation of the AIRBMP, which is closely related to the lending TA under discussion.	No. Activity implementation completed near the onset of the pandemic.
Brahmaputra Dialogue Closing Date: May 2020	Preparing a book on perspectives of the Yarlung-Tsangpo-Siang-Jamunaa-Brahmaputra River Basin and a white paper on plastics and plastics pollution in South Asia. A second dialogue event in China and related conference on Asian International Rivers hosted by Tsinghua University, during which the activity planned to hold a side event for the Brahmaputra Dialogue.	No.	The second conference and side event could not proceed due to the pandemic. Travel to NER and China to complete the perspectives publication and field work to supplement the plastics desk study were not possible due to the onset of COVID-19. The completion of the work on plastics will be undertaken under a new SAWI grant.	No. Activity implementation completed near the onset of the pandemic.
Strengthening Hydro-met Services and Disaster Resilience in Bangladesh Closing Date: April 2021	Documenting and applying regional and global good practices related to hydrological monitoring and forecasting in Bangladesh. Building capacity through regional training, twinning and consultative activities.	No.	The planned cross-border training with the India NHP to allow for intensive knowledge sharing was delayed due to Covid-19 constraints. The activity is exploring the possibility to take this training virtual.	No.
Targeted Environmental Studies Closing Date: December 2019	Two databases and five studies focusing on understanding implications of changes in the quality, availability and productivity of water resources for women's and children's health and nutrition in a change climate in the Sundarbans.	No.	The final outputs of this activity completed before the onset of the COVID-19 pandemic.	No.
Sundarbans Dialogue Closing Date: February 2020	Finalizing the report, <i>Institutional Structure for Joint Action in the Sundarbans Region</i> . High-level discussions and announcement (in-person) of a joint commission for sustainable management of the Sundarbans (March/April 2020)	No.	While the final report was completed on time, the high-level event announcing momentum toward a joint commission was postponed due to the pandemic. A future event would take place outside support under this activity.	Activity implementation completed near the onset of the pandemic.

Activity	Planned Activity Deliverables by Closing Date	Extension Required	Changes to Activity Delivery Due to Covid-19	Can Activity Respond to the Covid-19 Crisis? If so, is Restructuring Needed?
Himalayan University Consortium Closing Date: December 2019	Support to the implementation of the Indus Basin Knowledge Forum 4. Support to the HUC Working Group meeting to facilitate discussion on the way forward for the joint research proposal on climate change for the Indus Basin.	No.	The final outputs of this activity completed before the onset of the COVID-19 pandemic.	No. Activity implementation completed before the COVID-19 pandemic arose.
A Diagnostic Study on Groundwater-Energy-Agriculture Nexus Closing Date: February 2020	Completion of the report, <i>Energy-Water-Agriculture Nexus: Grow Solar, Save Water, Double the Farm</i> . A national-level workshop to disseminate the report findings and to share experiences in managing water-energy-agriculture nexus issues and to explore the possibilities of leveraging the full potential of the KUSUM scheme.	No.	The final outputs of this activity completed before the onset of the COVID-19 pandemic.	No. Activity implementation completed before the COVID-19 pandemic arose.
Glaciers of the Himalayas Closing Date: March 2021	Completion of the study analyzing the impact of climate change and black carbon on glacier melt across the entire Himalayan Region and assess the implications for water resources in the Indus, Ganges and Brahmaputra. Report dissemination at a follow-on workshop to the 2018 HKH Regional Conference.	Yes. This activity was extended to March 2021	While the overall study was completed, the final report was delayed due to the onset of COVID-19. The regional conference could not take place in the reporting period due to the pandemic. A virtual event is being considered for the October-December 2020 timeframe.	No.
TA and Knowledge Sharing Facility for Development of Utility Scale Floating Solar PV Closing Date: November 2020	A Floating Solar Mapping study and database and preparation of a pre-feasibility due diligence assessment for a floating solar project at Omkareshwar Dam, Madhya Pradesh.	Yes. This activity was extended to November 2020.	Due to restrictions in movement of people and equipment, the completion timelines for the floating solar mapping study and due diligence of Omkareshwar Dam have been extended. A further extension to the end of the trust fund may be necessary should restrictions not lift in the initial quarter of FY21.	Renewable Energy targets set by the Government of India have not been diluted given the lockdown, which reiterates the fact that the Government of India will continue to push clean energy sources in the country. Hence, no restructuring is required.
Enhancing Ecological Integrity of the Aquatic Environment in the G-B Mainstems Closing Date: March 2021	Facilitation of a multi-stakeholder platform for conservation of aquatic habitat in the G-B Mainstems. An analysis of key risks to aquatic biodiversity in the two rivers. A stakeholder engagement and outreach program, with campaigns tailored to different aquatic biodiversity challenges and targeted stakeholders.	No.	The terms of reference for studies identifying and assessing the key risks to the aquatic diversity of the Ganges and Brahmaputra was finalized following consultation with relevant stakeholders. COVID-19 delayed the identification and evaluation of a suitable consultant with global expertise and experience, qualified to carry out the studies. The studies and stakeholder engagement program are expected to commence in September 2020 and will complete by March 2021 should the pandemic and lockdown limitations improve.	No.

Activity	Planned Activity Deliverables by Closing Date	Extension Required	Changes to Activity Delivery Due to Covid-19	Can Activity Respond to the Covid-19 Crisis? If so, is Restructuring Needed?
<p>Agriculture-Water Nexus, Resilient Agriculture and Access to Markets in North East India</p> <p>Closing Date: March 2021</p>	<p>Develop a framework for resilient and commercial agriculture in the NER of India. A preliminary draft institutional analysis and capacity building identification of key institutions working on agriculture-water and climate change; and a draft literature review and secondary research on key agriculture value chains in NER. Consultation workshops with key development partners in NER and with State Governments on status, issues and strategy on agriculture-water management in small farms and on agriculture market access for small farms.</p>	<p>Yes. This activity was extended to December 2020.</p>	<p>The study will be delayed due to the nationwide shutdown and travel restrictions. The study will be done remotely as the consultants will not have the opportunity to go to the field and meet the value chain stakeholders to collect information. Rather they will now be leveraging their existing relationships and professional networks to arrange interviews and obtain relevant and necessary information. If the situation improves after July 2020 the consultants will travel to NER.</p>	<p>Yes. While the original objectives are retained, the scope is expanded to cover the impact of COVID-19 on the value chains in North East India. The revised study covers COVID-19 responsiveness, value chain analysis and institutional analysis on key agriculture value chains in the North East Region of India.</p> <p>Yes. Activity redesigned to incorporate an analysis of impact of the pandemic on agriculture value chains in NER. Activity will also be engaging with the senior policymakers in central and State governments to discuss the impact of the pandemic and way forward in strengthening agriculture value chains in NER.</p>
<p>Practitioner Program on Transboundary Watershed Management in Mountain Economies</p> <p>Closing Date: April 2021.</p>	<p>Develop a knowledge platform of data, tools, and case studies on watershed management; develop guidance notes on how teams can use the tools to prioritize investments; familiarize teams with the tool and to identify concrete opportunities to mainstream these tools in their projects/activities; organize a regional workshop with ICIMOD to share knowledge on these approaches among mountain countries in SAR and to generate client buy-in.</p>	<p>Yes. This activity was extended to April 2021</p>	<p>Activities have been adjusted to fit the new timeframe and transition to a virtual workshop and virtual dissemination of the material. The in-person virtual workshop for Nepal in April 2020 had to be moved to a virtual event in fall 2020.</p>	<p>This grant can help respond to the pandemic by helping clients and partners have better information on data, analytics and global good practices in this new world and to better leverage tools and technology to continue building capacity and resilience in this new world.</p>
<p>Capacity Building for Groundwater Management</p> <p>Closing Date: January 2020</p>	<p>Finalization of the report, <i>Managing Groundwater for Drought Resilience in South Asia</i>, and supplemental case studies.</p>	<p>No.</p>	<p>The final outputs of this activity completed before the onset of the COVID-19 pandemic.</p>	<p>No. Activity implementation completed before the COVID-19 pandemic arose.</p>
<p>Regional Dialogue</p> <p>Closing Date: February 2020</p>	<p>This activity has held a regional dialogue event every two years. The last regional dialogue was held in December 2018. Therefore, no regional dialogue event was scheduled in the reporting year.</p>	<p>No.</p>	<p>No regional dialogue event was scheduled in the reporting year.</p>	<p>No. Activity implementation completed before the COVID-19 pandemic arose.</p>
<p>HEP Sustainable Planning – Bhutan</p> <p>Closing Date: February 2020</p>	<p>Preparation of dam safety guidelines; an assessment of the Dorjilung Hydropower Project; preparation of guidance for harmonized bidding documents for works on hydropower in Bhutan.</p>	<p>No.</p>	<p>The final outputs of this activity completed before the onset of the COVID-19 pandemic.</p>	<p>No. Activity implementation completed before the COVID-19 pandemic arose.</p>