AWP MONITORING & EVALUATION REPORT MAY 2015 – JUNE 2019

THE AUSTRALIAN WATER PARTNERSHIP

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EXECUTIVE SUMMARY

The Australian Water Partnership (AWP) vision is to enhance sustainable water resource management and water security in the Indo-Pacific region and beyond. Over the past four years, progress towards this vision has been achieved through development of partnerships with and between International and Australian Partners and collaborative implementation of activities to share knowledge, develop capacity and influence water management policies, legislation, regulations, practices and tools.

This Monitoring and Evaluation (M&E) Report aims to capture evidence of how AWP has made progress towards its vision during its Phase 1 period of 15 May 2015 to 30 June 2019.

Monitoring and evaluation framework

The AWP Theory of Change underpins AWP's Monitoring and Evaluation framework by describing a pathway from development of partnerships with Australian, In-country and International Partners, and engagement of these partners through activities, that will lead to the achievement of AWP's vision. To help frame the evaluation, high-level questions have been developed – called Key Evaluation Questions. This report addresses Key Evaluation Questions across three key themes: partnership development; activities and outcomes; and impacts.

The evaluation seeks to answer the Key Evaluation Questions through three types of evidentiary information. Firstly, quantitative and qualitative indicators have been collected across the AWP Activity portfolio and for each Activity. Secondly, Activity narratives have been developed to describe the more complex and longer-term change associated with outcomes and impacts. Thirdly, AWP has begun a program of ex-post evaluations for major activities through which a more in-depth assessment of outcomes, impacts and lessons learned are developed.

Progress towards AWP's vision

Partnership development

The AWP steadily built from no partners at inception (May 2015), to 201 Australian Partners by 30 June 2019. More than 70 Australian Partners have been provided the opportunity to engage and collaborate internationally through being the lead or supporting partners on AWP activities. In addition, Australian Partners participated in more than 71 water dialogue delegations, scoping missions and conferences in more than 17 countries.

In an annual survey of Australian Partners, the majority of respondents in 2018 and 2019 agreed or strongly agreed that being an AWP Partner was worthwhile for their organisation and their organisation had a trusted relationship with AWP.

AWP has increased from no International Partners in May 2015, to five international multilateral partners and three key In-country or regional government partners by 30 June 2019. In a 2019 survey of International Partners, including Department of Foreign Affairs and Trade (DFAT) Posts, the majority of respondents agreed that AWP partnership was worthwhile for their organisation and saw the relationship with AWP as productive and based on trust.

The number of countries requesting Australia's assistance on water issues has been increasing as evidenced by the number of countries and regions in which AWP has engaged – 26 geographies since inception. In addition, AWP engaged with 20 Pacific countries through the regional water and wastewater utility association.

Activities and Outcomes

More than 524 Australian Partner staff and 1,416 International Partner staff have participated in activities focused on sharing knowledge including: i) 81 activities that drew on Australia's water management experience and expertise to respond to In-country Partners demand; ii) 70 activities that developed water management knowledge products or presentations to conferences; and iii) 18 International Partner delegations visiting Australia to see and hear about Australia's approach to water management. From these engagements, Australian Partners reported a total of 289 collaborative relationships developed with International Partners, including with government agencies, NGOs, the education sector and the private sector.

More than 1,297 In-country Partner staff have received targeted capacity development on a broad range of topics through AWP capacity development activities focused on ten countries – Myanmar, Indonesia, India, Nepal, Vietnam, Iraq, Jordan, Iran, Pacific and China. The range of topics includes irrigation modernisation, water utility operations, water trading, basin planning, groundwater management, data quality assurance, modelling (catchment, hydraulic and groundwater), water stewardship, water sensitive urban management, utility governance, Gender Equality and Social Inclusion, Geographic Information Systems and sustainable hydropower.

13 knowledge products sharing Australian expertise have been developed, with 6,137 downloads and 4,575 copies printed for distribution. Increasing active website users and increasing engagement on AWP's social media show growing interaction with the knowledge produced by AWP.

AWP supported 42 activities promoting effective water management policies, legislation, regulations, practices and tools, of which 16 are directly influencing improved water management approaches (listed below).

Regional Indo-Pacific

- Assisted more than 12 major companies (e.g. Country Road, Apple and Dell) in six countries (China, India, Pakistan, Bangladesh, Thailand and Vietnam) to begin adopting the Water Stewardship system which promotes and guides improved water management practices ranging from international corporations to individual farm businesses.
- Developed an Asia-Pacific Irrigation Sector Guidance Note for the Asian Development Bank which is influencing their irrigation investments to be more sustainable.

South-east Asia

- Provided a scientific knowledge base to inform the development of a Basin Master Plan for the Ayeyarwady River Basin (Myanmar) which is home to 37.7M people.
- Published comprehensive groundwater information for the central dry zone of Myanmar to strengthen the effectiveness of water management decisions, reduce costs in establishing water supplies; reduce risks of over exploitation and enable sustainable development of groundwater.
- Facilitated the adoption of asset management, practices for minimising non-revenue water and water safety plans by five water utilities in Vietnam servicing a combined 16,850,000 people.
- Mentored staff and contributed to the development of policies and practices for the Mekong River Commission to guide equitable and sustainable development of hydropower in the Mekong.

- Influenced more efficient designs for eight major irrigation schemes serving 17,000 farms totalling 33,500 ha of high value crops in Vietnam.
- Informed the development of national level policy on irrigation water charging in Vietnam, improving the efficiency of water use for more than 3.5 million ha of irrigated agriculture.
- Supported the development of the Laos PDR National Water Resources Management Strategy which, when adopted, provides a coordination framework for managing the country's water resources to promote shared economic, social and environmental outcomes for its 6.6M people.

South Asia

- Provided Kathmandu Upatyaka Khanepani Limited, Nepal's largest water utility serving more than 2.2M inhabitants, with the processes and tools to improve their asset management systems.
- Improved water and drainage services in India for more than 2.23M inhabitants by shaping the design and operations of two cities, Amaravati and Vijayawada, to be more water sensitive.
- Supported the development of a national system for accessing water data across India, thereby improving the evidence base for operational and investment planning affecting 1.3B people.
- Developed guidance on river basin planning to be adopted for 14 river basins in India that are home to 900M people.

Pacific

- Institutionally strengthened the Pacific Water and Wastewater Association by supporting a full-time professional secretariat, facilitating the development and adoption of a strategic plan, and developing capacity of 59 Young Water Professionals from 30 water utilities across 20 countries.

Other

- Published and applied a dialogue and diagnostic tool, WaterGuide, to structure and stimulate water management discussions and to identify specific areas for improvements in water scarcity management in five countries.
- Through supporting the High Level Panel on Water, influenced the global agenda on water resources to rethink how water is understood, valued and managed, and helped to catalyse change and build partnerships to achieve the water-related goals of the 2030 Agenda for Sustainable Development.

Impacts

Whilst portfolio-wide impacts are difficult to measure at this stage, several flagship activities are already having discernible impact, including:

Enhanced performance and effectiveness of public and private water sector

- By enhancing the performance of the next water leaders in Myanmar through in-depth capacity development of 36 YWPs (including 23 females) the broader Myanmar water sector will be impacted through the development of a highly skilled cohort of next water leaders.
- Supporting a more professional Pacific peak water association is impacting the broader Pacific water sector by delivering more effective capacity development for its member utilities who service a total of 3.1 M people in 20 Pacific Island countries.
- The Water Stewardship Program is impacting on how some of the largest consumer brand factories operate to ensure a catchment-wide perspective is taken, wastewater is treated before release, water use is reduced and alternative water supplies are used.

More equitable, efficient and environmentally friendly water use

- Contributed to the development of policies and practices to make sure the development of hydropower in the Mekong can meet the energy needs of the 60M people living in the basin, whilst limiting the impacts on the environment, fisheries and livelihoods.
- Improved the efficiency of a US$120M irrigation modernisation project serving an estimated 17,000 farms in Vietnam.
- Provided water sensitive city principles, concepts and designs to ensure more equitable, efficient and environmentally sustainable water use in Vijayawada (1.03 M current inhabitants) and in Amaravati (projected to be 1.2 M inhabitants by 2026 if the city is built).

Enhanced water management and governance

- Strengthened water management and governance for the Ayeyarwady Basin by providing a clear framework for how basin development could be managed; enabling more equitable, efficient and environmentally sustainable water use for 37.7M people in Myanmar.
- Supported the drafting of a Laos PDR National Water Resources Management Strategy that provides a coordination framework to balance shared economic, social and environmental outcomes for the country.

Gender Equality and Social Inclusion

AWP's commitment to building awareness of, commitment to, and the implementation of principles of Gender Equality and Social Inclusion (GESI) has steadily grown. This has led to ensuring GESI is integrated into internal processes and activities, development of Australian Partner awareness and capacity in GESI and support for specific activities that have GESI related outcomes. In August 2019, AWP commissioned a review of GESI in Phase 1. The review findings are summarised below, and its 23 recommendations for improved GESI in AWP Phase 2 are being integrated into a Phase 2 GESI implementation plan.

AWP has integrated GESI into its internal processes. The basis for AWP's GESI integration is a GESI Policy adopted in August 2017 which outlines how GESI will be adopted across AWP's operations and activities. Highlights include: the setting of GESI as an essential criterion to be met when assessing all AWP activity proposals; recruitment of two GESI specialists on to the AWP Expert Review Panel; and GESI advisor inputs into proposal development.

The development of Australian Partner awareness and capacity in GESI has included: GESI focused training sessions at the 2018 and 2019 Partner workshops; development of GESI Guidance for Partners which sets out key concepts and definitions as well as the specific expectations AWP has of the submissions it receives; and a GESI Webinar delivered in May 2019 to support the launch of the GESI Guidance.

AWP has placed a strong emphasis on striving for gender parity in the number of people involved in activities. Of the 37 activities where participation of Australian Partner staff was reported disaggregated by sex, a total of 128 female staff were reported as participating, representing 34 percent of the total 381 Australian Partner staff reported as participating in these activities. Similarly, for the 44 activities where participation of In-country Partner staff was reported disaggregated by sex, a total of 472 female staff were reported as participating, representing 35 percent of the total 1,330 In-country Partner staff reported as participating in these activities.

Lessons Learned and Way Forward

Key lessons learned based on the M&E analysis presented in this report include:

Building trusted Partnerships

- Keeping Partners informed, through initiatives such as the CEO monthly email newsletter, AWP Newsletter, social media channels and the Partners Workshop, is building trust in the AWP and should be continued.
- Transparent and open processes are essential to building trusted partnerships and should be continued.

- In-country coordinators have been essential to developing long-term and trusted relationships with Myanmar, India and the ADB.
- Engaging with the Australian public sector requires a different approach than the private sector.
- AWP needs to clearly and consistently communicate its value to its Australian, In-country and International Partners.

Activities, outcomes and impacts

- A key factor of many successful activities has been strong integration with DFAT head office and DFAT Posts.
- The AWP should continue its approach of supporting a mix of large-scale investments, with smaller scale strategic and diplomatic responses to demand.
- AWP's capacity development approach needs a focused strategy that moves past delivering training to ensuring and tracking the influence trainees have on return to their workplaces.
- There is strong interest in Australia's experience and expertise in water management, particularly in countries facing serious water scarcity challenges.
- Assisting water management policies, legislation, regulations, practices and tools to be more effective, sustainable and equitable requires a long-term commitment to individuals, organisations and countries.

Gender Equality and Social Inclusion

- A focus on building the capacity of its Australian Partners in GESI has led to strong interest from Partners and some improvement in submissions, with further improvement still needed.
- In addition to ensuring that GESI is considered in all activities, AWP should support a larger set of gender specific activities to enable a more focused contribution to the issues around water and gender.
- The timing of technical advice on GESI during proposal development needs to be brought forward so it is considered early in proposal development, rather than just at ERP review stage.
- A travel code of conduct is needed to ensure individuals are provided with a safe and respectful environment when travelling with AWP resources.
- Collaboration with non-government organisations and the Water for Women Program could be further developed.
- Frequency and depth of partner training in GESI should be strengthened. There is value in considering a deeper follow on course that looks to the application of GESI in water resource management in more detail, drawing on case studies and examples.
- Short targeted GESI materials that are more likely to be read in full would help communication to partners on the importance of GESI for AWP and how to integrate GESI into their activities.

AWP has been progressing on adopting the recommendations on improvements outlined in the third year M&E report and in this report. This response has been captured in four key initiatives prepared to inform AWP operations in Phase 2: i) a Partnerships Strategy; ii) Knowledge Strategy; iii) Investment Strategies and Plans; and iv) a GESI implementation plan.

INTRODUCTION

The Australian Water Partnership

The Australian Water Partnership (AWP) was established by the Australian Government Department of Foreign Affairs and Trade (DFAT) in May 2015 under a four-year, AU$20M grant agreement between eWater Ltd (eWL) and DFAT. AWP Phase 1 completed on the 30 June 2019 and the program has been extended with a AU$24M Phase 2 grant running from October 2018 to 30 June 2023.

AWP was conceived to respond to the water management needs of developing countries in the Indo-Pacific region and beyond, specifically on topics where Australia has specialist expertise in short supply globally. Growing demand for increased collaboration in the water sector from Governments and multilateral agencies in the Indo-Pacific region was an important driver for the establishment of the AWP.

AWP's Vision Statement

Enhanced sustainable management of water in the Indo-Pacific and beyond

AWP has the vision to enhance sustainable water resources management and water security in the Indo-Pacific region and beyond. This will be achieved by drawing on the breadth and depth of the Australian water sector across government agencies, the private sector, universities, consultancies, and Non-Government Organisations (NGOs), and continuing to grow and learn through implementation.

AWP's Mission Statement

Through trusted partnerships, mobilise Australian water sector expertise to address demand from the Indo-Pacific and beyond, and:

- become a trusted adviser to governments and multilateral agencies;
- provide a world-class incubator and hub for information, modelling and capacity development for Australian and international water sectors;
- share resources, information, and lessons learned; and
- maximise Australia's contribution to the achievement of the Sustainable Development Goals.

Phase 1 Monitoring and Evaluation Report

In August 2018, AWP developed its first Monitoring and Evaluation (M&E) report – the AWP Monitoring and Evaluation Report (May 2015 to Jun 2018) – which provided an assessment of progress made by AWP in achieving its intended outcomes over its first three years of operation (May 2015 to June 2018).

The end of AWP Phase 1 on 30 June 2019 provides the opportunity to update the previous M&E Report to cover the whole period of Phase 1. Therefore, this report revises, updates and replaces the M&E report developed in 2018 to report on the progress made by AWP in achieving its intended outcomes and document lessons learned over its Phase 1 grant period 15 May 2015 to 30 June 2019.

MONITORING AND EVALUATION FRAMEWORK

Evolution of AWP's Monitoring and Evaluation framework

At start-up in 2015, AWP developed a draft M&E Plan and this was revised and subsequently approved by the AWP Advisory Committee (AWPAC) in June 2016, with a revised version approved in January 2017. Subsequently, all M&E information from Phase 1 has been collected based on this plan.

Preparations for AWP Phase 2 provided an opportunity to refine the M&E Plan to better meet the needs of AWP and DFAT. In April 2018, AWP staff met with DFAT representatives including an M&E expert from the Office of Development Effectiveness with considerable experience in the Indo-Pacific as well as on water management initiatives. Based on these discussions, an updated M&E Plan was developed and approved for Phase 2 which slightly revises the Theory of Change, updates indicators, and outlines an Activity narrative approach for better illustrating progress towards outcomes and impacts. The Plan, endorsed by AWPAC and DFAT on 31 October 2018, has been adopted for Phase 2 of AWP.

The M&E framework adopted in this report draws on the Phase 1 M&E Plan as this is the plan for which Phase 1 activity M&E information has been collected. Where possible, elements of the Phase 2 M&E Plan have been incorporated to provide an improved report.

Theory of Change

The AWP Theory of Change underpins AWP's M&E framework. The Theory of Change proposes that the development of partnerships with Australian and International Partners, and engagement of these partners through activities will lead to the achievement of AWP's vision (**Annex A**).

The Theory of Change adopted in the Phase 1 M&E Plan has four key levels:

- **Level 1**. Australian and International Partnerships are developed through outreach and engagement – results expected in year 1;
- **Level 2.** Collaborative activities are jointly undertaken by International and Australian Partners that focus on sharing of Australian water management experiences, policies, practices and tools – results expected from year 1;
- **Level 3.** These activities directly catalyse outcomes in partner countries including cooperation with the Australian water sector; greater capacity of individuals and organisations; and adoption of effective water management policies, practices and tools – results expected from year 3; and
- **Level 4.** Over time, these outcomes lead to positive impacts in partner countries including enhanced water governance; more equitable and sustainable water use; and enhanced performance and effectiveness of water sector organisations – results expected to take more than three years.

Key Evaluation Questions

To help frame the evaluation, the Theory of Change and the Key Result Areas outlined in the Phase 1 M&E Plan have been interpreted as Key Evaluation Questions (KEQs) (Table 1). KEQs are high-level questions that an evaluation of AWP is designed to answer. They help to shape the assessment of M&E information and form the basis for the M&E reporting outlined in this report. Due to the interlinkages between activities and Outcomes, the KEQs for these levels are presented together.

Table 1. AWP Key Evaluation Questions

	Key Evaluation Questions
Partnership development	To what extent are valued and trusted partnerships being developed?
	To what extent do Australian Partners have greater opportunities to engage and collaborate internationally?
	To what extent is there growing international demand for Australia's niche water knowledge, tools and expertise?
Activities and outcomes	To what extent has AWP delivered activities that have led to individuals, organisations and industries having greater capacity to lead and implement water management reforms?
	To what extent has AWP delivered activities that have led to effective water management policies, legislation, regulations, practices and tools being adopted by key public and private sector actors?
	To what extent has AWP delivered activities that share water management knowledge and promote cooperation between Australian and International Partners?
Impacts	How has the AWP enhanced performance and effectiveness of public and private water sectors in the Indo-Pacific?
	How has the AWP supported water use in the Indo-Pacific to become more equitable, efficient and environmentally sustainable?
	How has the AWP supported enhancement of water management and governance in the Indo-Pacific?

Monitoring and evaluation information

To assist in responding to the Key Evaluation Questions, this report draws on three types of evidentiary information.

Indicators

Quantitative and qualitative indicators have been collected across the whole AWP Activity portfolio and for each Activity through Activity Completion Reports and the AWP Program Management System. In addition, partnership indicators have been collected through Partner Surveys undertaken annually since 2017.

Evaluations

AWP undertakes ex-post evaluations to explore outcomes, impacts and lessons learned from major investments. To date, four evaluations have been undertaken:

- Interim evaluation of the Vietnam Water Utility Improvement Program;
- Evaluation of the Myanmar Young Water Professionals (YWPs) program;
- Evaluation of professional development support to PWWA; and
- Evaluation of Gender Equality and Social Inclusion in AWP Phase 1.

Activity narratives

Activity narratives are developed to provide descriptions of the more complex and longer-term change associated with outcomes and impacts. The AWP identifies activities where progress towards outcomes or impacts can be distinguished and develops specific qualitative and quantitative impact/outcome narratives. The M&E analysis presented in this report draws on these detailed narratives and other examples from AWP's Activity portfolio.

To date, ten Activity narratives have been developed which represent a cross-section of types, geography and size of activities undertaken by AWP. The ten Activity narratives, all presented in Annex B, are:

- Industrial Park Water Stewardship, China, AU$210k over two years.
- Capacity development assistance to the Pacific Water and Wastewater Association (PWWA), Pacific region, AU$734k over two years.
- Development and application of WaterGuide – a framework for water management and use under scarcity, Australia, Brazil, Iran, Jordan, Mexico, Senegal and Uzbekistan AU$1.95M over three years.
- Ayeyarwady State of the Basin Assessment, Myanmar, AU$3.1M over 1.5 years.
- Vietnam Water Utility Improvement Program, AU$460k over two years.
- Support to Vietnam Water Efficiency Improvement in Drought Affected Provinces (WEIDAP), AU$870k over 3 years.
- Sustainable hydropower support to the Mekong River Commission, AU$182.5k over 2 years.
- Australia-Andhra Pradesh Water Sensitive Cities Partnership, India, AU$1M (AU$250k AWP funding) over 2 years.
- Supporting river basin planning in India, AU$670k over 3 years.
- Support for UNESCAP Drought Mechanism and Pilot of Australian Tools-Led Capability, Cambodia, AU$525k over 2 years.

ACHIEVING AWP'S VISION

Partnership development

Three Key Evaluation Questions have been established for assessing progress towards valued and trusted partnerships:

- To what extent are valued and trusted partnerships being developed?
- To what extent do Australian Partners have greater opportunities to engage and collaborate internationally?
- To what extent is there growing international demand for Australia's niche water knowledge, tools and expertise?

To what extent are valued and trusted partnerships being developed?

There are two elements to answering this question; the first is an evidence base of increasing Partner numbers and the second is on the quality of those partnerships as evidenced by responses to the annual Partner Feedback Survey and by repeat requests for further assistance.

Increasing partner numbers

The AWP has three types of partners – Australian Partners, In-country Partners and International Partners. Following an initial signup of 106 Australian Partners during AWP's inception in late 2015, there has been a consistent increase to 201 Australian Partners as of 30 June 2019 (Figure 1). This ongoing increase in Australian Partners demonstrates that AWP continues to be an attractive proposition to Australia's water sector.

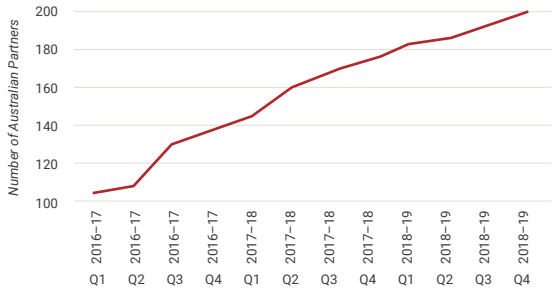


Figure 1. Number of AWP Australian Partners

As evidence of growing demand for Australian expertise, a new international Partner relationship has been formalised through the signing of an Memorandum of Understanding (MOU) each year of Phase 1 (Table 2).

Over the past three years AWP has also built strong partnerships with three governments (In-country Partners) in the region: Myanmar, India and Vietnam. These operate under government-to-government relationships, typically via MOUs managed by DFAT or the Department of Agriculture (DoA, formally the Department of Agriculture and Water Resources). These relationships have been strengthened through AWP activities that have built trust in both Australia's expertise and ease of working with Australian teams. The value of the partnerships to In-country Partners is evidenced through letters of thanks (see below box of evidence of progress) and continued requests for assistance from AWP.

With the addition of Indonesia to AWP's priority geographies, AWP has begun to form closer relationships with Indonesian agencies as well. These relationships will be further built through Phase 2 as AWP's portfolio in the country grows.

Valued and trusted partnerships

To assess whether AWP's relationship with Australian Partners is valued and trusted, an annual Partner Feedback Survey was initiated in 2017 and has been repeated in 2018 and 2019. In 2017, 40 percent of Australian Partners agreed or strongly agreed that being an AWP Partner was worthwhile for their organisation, and this increased to 84 percent in 2018 before a slight reduction to 78 percent in 2019 (Figure 2). In 2017, 20 percent of Australian Partners agreed or strongly agreed that their organisation had a trusted relationship with AWP. This increased to 90 percent in 2018 and decreased to 75 percent in 2019 (Figure 2).

The drastic change in the value and trusted nature of AWP partnerships between 2017 and 2018 reflects a renewed focus placed on AWP relationships with Australian Partners in 2018 including a partner workshop held in February 2018 and the appointment of AWP's first Partnerships and Knowledge Manager in April 2018. Although there has been a slight drop in positive responses between 2018 to 2019, both years are still well above the results of 2017.

Table 2. AWP MOUs with International Multilateral Partners

Partner	Signatories	Commencement
Asian Development Bank (ADB)	ADB, eWater Limited (AWP), DFAT	27 Nov 2015
World Bank (WB)	WB, eWater Limited (AWP), DFAT	30 Aug 2016
United Nations Food and Agriculture Organisation (UNFAO)	UN FAO, eWater Limited (AWP), DFAT	5 Dec 2017
International Water Management Institute (IWMI)	IWMI, AWP, DFAT	26 Apr 2018
International Centre for Integrated Mountain Development (ICIMOD)	ICIMOD, AWP, DFAT	17 Apr 2019

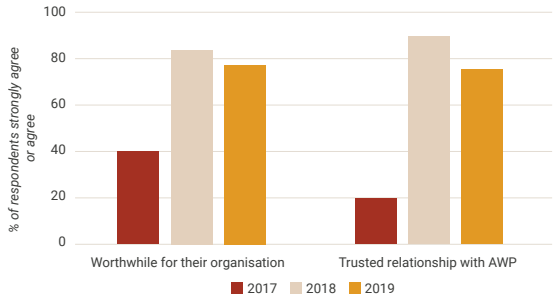


Figure 2. Australian Partner responses to the AWP Partner Survey (2017, 2018 and 2019).

Positive illustrative quotes received in the 2019 survey of Australian Partners are outlined in the box below.

Australian Partner Quotes from the 2019 Partner survey

"The AWP has recognised the capability that we offer and provided an invaluable conduit to partners as well as a strong advocacy role for this capability."

"AWP has been listening to feedback and acting on it in the main."

"Policies and procedures have developed and (in my opinion) improved, more regular communications (i.e. newsletter) and this year's AWP Partner Workshop was more interesting/beneficial than 2018's."

"Our organisation would like to acknowledge and commend the significant improvement in AWP's strategic focus and its organisational support to partners in the last 2 years or so."

"While our engagement has been fairly brief, the AWP have been able to, through continually refining their approach to us, quickly identify the strengths and gaps in our agency's capabilities and work with us appropriately."

"In the last two years I have seen a significant improvement in professionalism. There also has been an improvement in communications and engagement activities."

For International Partners, key findings from the latest Partner survey (undertaken in June 2019) related to valued and trusted partnerships include:

- A very high proportion of international partner respondents felt that the AWP partnership was worthwhile for their organisation.
- Two-thirds of respondents found doing business with the AWP was straightforward and simple.
- International partner respondents were overwhelmingly positive about the frequency and quality of communications from the AWP.
- A smaller majority thought that AWP knowledge products are high quality.
- The responses were mixed regarding the AWP brand, with one third agreeing that it is recognisable, credible and consistent.
- The majority saw the relationship with AWP as productive and based on trust.
- The majority thought that the AWP is continually improving.

Evidence of Progress: Developing valued and trusted partnerships

Building trust with the National Water Resources Committee, Myanmar:
Between 2016 to 2018 AWP supported the Government of Myanmar in undertaking a large river basin assessment. Following this support, Australia received a strong expression of thanks from the Director General of the Directorate of Water Resources and Improvement of River Systems (DWIR) who also acted as the Secretary of the National Water Resources Committee (Myanmar's peak organising body for water resources issues, chaired by the Vice President). In recognition of the trust developed through this ongoing support, on 15 June 2018 AWP and DFAT were invited by the NWRC to support the development of a National Integrated Water Resources Management (IWRM) Long-term Strategy and Plan.

Capacity development as a pathway to partnerships in Myanmar: AWP's ability to provide targeted training for DWIR on issues critical for their everyday work has assisted in maintaining the ongoing partnership. One of AWP's first activities in 2016 was supporting five DWIR engineers to undertake a two-week river hydraulics training course at the UNSW Water Research Laboratory. This initial training led to another request for training in 2017. The second training, with a focus on the HECRAS model, was held in Myanmar so that the trainers could better understand the physical riverine processes in order to focus training onto the most important issues. Further training has since been requested and following further discussions with DWIR to refine the topics, two more training sessions will be undertaken in 2019.

Letter of thanks from the Directorate of Water Resources, Ministry of Agriculture and Rural Development Vietnam: The AWP has been working with the Vietnamese Ministry of Agriculture and Rural Development (MARD) to support a range of irrigation design and policy improvements. On the 27th April 2018, DFAT and AWP received a letter of thanks from the Director General of the Directorate of Water Resources, MARD. The letter thanked DFAT and AWP for its quick response and support in a range of areas and outlined further requests for assistance.

Letter of gratitude from Vietnam's largest water utility: The AWP has been supporting a Water Utility Improvement Program linking Vietnamese water utilities with Australian utilities for knowledge sharing. Following completion of the activity, the primary partner – the Vietnam Water Supply and Sewerage Association – developed a report on the successes of the program titled 'Vietnamese-Australia Water Utilities Partnership for Common Development.' In addition, on 14 June 2019, AWP received a letter of gratitude from the Vice Director General of one of the participating Vietnamese utilities – Saigon Water Corporation (SAWACO) – which is the largest water utility in Vietnam.

Consolidating the relationship with the Mekong River Commission: The AWP has had an ongoing relationship with the MRC since 2017, through the secondment of a water policy adviser and a sustainable hydropower expert to the MRC's Planning Division. Australia's support and the advice provided by the Australian experts are highly regarded by the MRC, as evidenced by a request by MRC to extend the secondment of the sustainable hydropower expert, and by AWP being invited to participate in the First Mekong-Australia Energy Policy Dialogue. In addition, AWP is mentioned as a key partner in the renewed Memorandum of Understanding between the MRC and the Murray-Darling Basin Authority signed in June 2019.

Building a valued partnership with ADB through ongoing technical support: AWP has supported the placement of a groundwater specialist within ADB since January 2018. The specialist works within the ADB's Sustainable Development and Climate Change Department to support ADB projects on groundwater, as well as advising on irrigation, Integrated Water Resources Management (IWRM), and Water, Energy, Food Nexus projects. In this role, the specialist has acted as a team member on 11 projects, peer reviewed the design of two projects, undertaken 36 reviews of technical reports and contributed to 10 ADB knowledge products. The specialist has been noted by AWP's key ADB counterpart as an important contribution from Australia and also plays an important intermediary role in AWP's partnership with the bank. In recognition of his work, the specialist received an ADB Departmental Award for his advice on a project titled Transaction Advisory Service Mandate for New Clark City Water Infrastructure.

To what extent do Australian Partners have greater opportunities to engage and collaborate internationally?

The AWP provides Australian Partners the opportunity to engage and collaborate internationally through direct engagements on AWP activities as well as facilitating collaborations so that Partners are able to realise non-AWP opportunities.

Direct engagement of Australian Partners

AWP directly engages Australian Partners on demand-led and knowledge sharing activities. During AWP Phase 1:

- More than 70 Australian Partners have been engaged as lead or supporting partners on AWP activities through 179 contracts with a sum total of more than AU$18M (Figure 3).
- More than 524 staff of Australian Partners have been involved in AWP activities.
- AWP Partners have participated in more than 71 water dialogue delegations, scoping missions and conferences in more than 17 countries, providing an opportunity to develop relationships for future engagement.

Over the past six months, AWP has increased the number of activities that have been put to open tender to Partners. In 2019, a total of nine Calls for Proposals and Call for EOIs have been sent out to Partners with 46 applications received and 11 Partners included in selected implementing teams (with one selection to be completed).

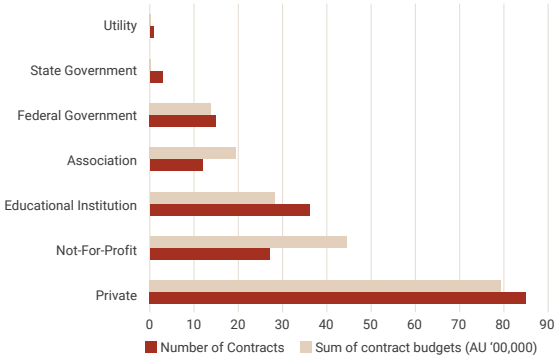


Figure 3. Engagement of Australian Partners as lead partner in AWP Activities segmented by organisation type[1,2]

Facilitating collaborations

AWP facilitates collaborations between Australian and international organisations in two key ways. The first is through Australian Partner involvement in activities with international organisations. Through Phase 1, Australian Partners have reported a total of 289 collaborative[3] relationships developed with international organisations through delivery of AWP activities. These relationships include with government agencies, NGOs, the education sector and the private sector.

The second is through providing information to partners on non-AWP opportunities. Information on non-AWP funded commercial opportunities in the Indo-Pacific are often identified by AWP In-country Coordinators, as well as other sources. Between June 2018 to June 2019, AWP provided this information to Australian Partners through 13 email notifications which has led directly to new market access for Partners.

1 The Associations include the Australian Water Association and Water Services Association of Australia who have a combined membership of more than 200 utilities across Australia

2 A significant number of the private consultants engaged in AWP Activities have previously worked long careers in state and/or federal government, often at high positions. Their involvement represents a stronger engagement and connection to government expertise than what otherwise may appear from numbers provided in the figure.

3 Collaborative relationships were defined as substantive knowledge-sharing, mentoring or capacity building between an Australian Partner staff and a one or more International Partners staff, or between the organisations

AWP's efforts to provide new opportunities to its Australian Partners is having some success. In the 2018 and 2019 Partner Survey, 80 percent of Australian Partners strongly agreed or agreed that new project opportunities had arisen for their organisation as a result of AWP funding. For example, an Australian Partner was awarded a project in the Pacific that they were made aware of through an AWP notification. The project provides them with their first opportunity to work in the Pacific, one that they would not have been aware of without AWP.

Evidence of Progress: Presenting Australian Partners with greater opportunities to engage and collaborate internationally

An insight to the Pacific: Before becoming an AWP Partner, Climate Risk had niche experience in climate risk analysis but limited international experience. In response to a request from the Water Authority of Fiji and the Samoa Water Authority, the AWP supported Climate Risk to incorporate climate/sea level data for the Pacific, provided by CSIRO, into their AdaptWater risk assessment software, which was then provided free of charge to the two Pacific organisations. This Activity provided Climate Risk with the opportunity to work and build relationships in the Pacific and opened further opportunities for engagement by adapting an Australian developed tool for application in the Pacific.

Opening opportunities for Australian utilities and consultants: Through utility twinning programs in Vietnam and Nepal, six Australian water utilities are engaging with Vietnamese and Nepalese counterparts. Productive working relationships between the utilities have been established, leading to improvements in the operations of the Vietnamese and Nepalese utilities, and opportunities for staff from Australian utilities to gain international experience. In addition, several of the Vietnam utilities have requested further engagement with Australian experts on a commercial basis. For example, Australian organisations have been contracted to develop an asset management software tool and to support the design and construction of a drinking water plant in Phu Tho. Refer to Annex B for an Activity narrative on the Vietnam Water Utility Improvement Program.

Promoting Australia's experience in dealing with water scarcity: WaterGuide draws on Australian's experience in dealing with water scarcity and drought to present a framework for improved water management. The Guide was developed by AWP Partner Aither in collaboration with a range of senior water experts. The development and application of WaterGuide has provided Aither and other AWP Partners the opportunity to participate in water dialogues in five countries – Iran, Jordan, Mexico, Senegal and Uzbekistan. Each dialogue has led to the development of proposals to draw on the Australian experience to address water management issues identified in each country. In Jordan, three of these proposals have resulted in activities directly supporting the Government of Jordan. WaterGuide has also enabled engagement with key International Partners such as the World Bank, Asian Development Bank and IWMI. For more information refer to the WaterGuide Activity narrative in Annex B.

Water stewardship opening demand for Australian expertise: Water Stewardship is a system developed in Australia that guides industries to improve their water management practices. AWP has been supporting Water Stewardship Australia (now Alliance for Water Stewardship) to promote and support the adoption of the system by companies across the Indo-Pacific. As companies begin to adopt the system, opportunities are arising for AWP Partners who can support the technical analysis and planning that the system requires. For example, AWP Partner University of New South Wales was contracted by WWF Thailand to review Nestle's groundwater resource assessment process and align it to Water Stewardship certification requirements. The program is now spreading to Indonesia where initial discussions indicate

strong interest in the framework. For more information refer to the water stewardship Activity narrative in Annex B.

Creating water sensitive city opportunities in China: In 2017, AWP supported a trade mission led by the CRC for Water Sensitive Cities to the Chinese City of Kunshan. Eleven Australian Partners were involved in the mission which focused on urban design and architecture, engineering and system modelling, and innovative urban water management tools. As a direct result of the mission, eight organisations obtained contracts totalling more than AU$2M for services and products required to move Kunshan towards being a water sensitive city.

To what extent is there growing international demand for Australia's niche water knowledge, tools and expertise?

Over the past three years, the AWP, and DFAT through Posts and its Senior Water Resources Specialist, have been developing international demand for Australia's niche water knowledge, tools and expertise through development of knowledge products on the Australian experience; engagements with country governments and multilateral partners; and promotion at regional and international conferences. Indications of the increasing demand is outlined below.

Increasing number of countries requesting Australia's niche water knowledge

The increasing number of countries requesting Australia's niche water knowledge, tools and expertise is evidenced by the number of countries and regions in which AWP has engaged – zero at AWP inception to 26 as of 30 June 2019 (Figure 4). This includes Indo-Pacific region, Pacific region, Mekong region, Afghanistan, Brazil, Cambodia, China, Egypt, Fiji, India, Indonesia, Iran, Iraq, Jordan, Kenya, Laos PDR, Mexico, Myanmar, Pakistan, Nepal, Samoa, Senegal, Sri Lanka, Thailand, Uzbekistan and Vietnam. In addition, AWP is engaging with 20 Pacific countries through the Pacific Water and Wastewater Association.

Increasing value of grants being administered by the AWP

The increasing value of grants being administered by the AWP with the purpose of linking Australian expertise to demands from the region is evidence of increasing demand for these services. The original AWP Core Grant was AU$20M over four years which was complemented by AU$4.6M in smaller grants. In Phase 2 the Core Grant increased to AU$24M over four years and is complemented by the new Australian Mekong Water Facility of AU$9.86M over four years and AU$2.4M in smaller grants. This means that in its second four-year tranche, AWP will be managing a total of AU$36.26M in grants compared to AU$24.6M in the original grant period.

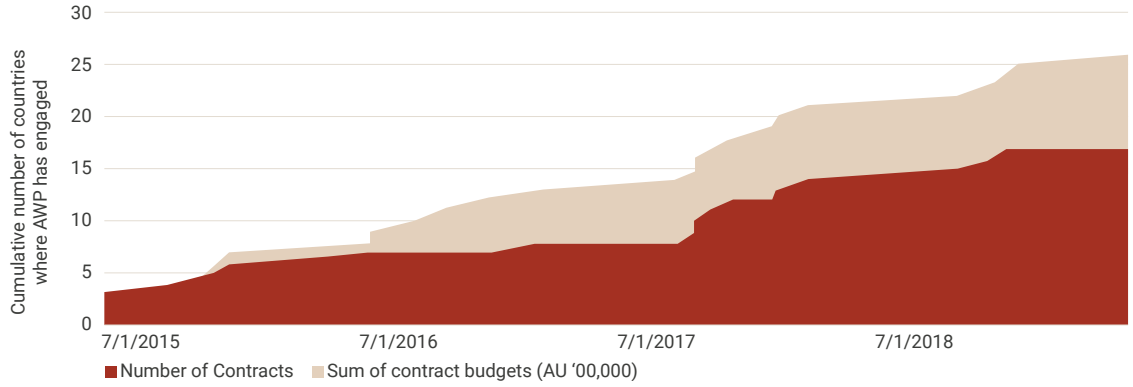


Figure 4. Cumulative number of countries where AWP has engaged (segmented by Indo-Pacific and outside Indo-Pacific)

Evidence of Progress: Growing international demand for Australia's niche water knowledge, tools and expertise

Interest from Iraq: Following a visit to Canberra in May 2017, Iraq's Minister for Water Resources requested capacity development assistance in managing water assets, irrigation planning, drought management, water reform/sharing arrangements, salinity and use of groundwater. In response, the AWP fielded two experts to Iraq to meet with senior water officials and provide preliminary training and develop recommendations for further capacity development. Subsequently a 10-person delegation from Iraq visited Australia to see Australian approaches to irrigation and drainage systems modernisation, water quality, asset management and dam operations. The delegation identified several potential areas for ongoing Australia-Iraq water collaboration.

Responding to Egypt request for modelling support: Following discussions held by the Australian Ambassador in Egypt with the Egyptian Irrigation Department, the Department requested support to learn more about eWater Source and its uses. In response, the AWP supported a capacity development program for the Department on the use of eWater Source for exploring water sharing and trade-off analysis and the development of water management modelling scenarios.

Multilateral Banks recognise the benefits of the Australian experience: In 2016, in recognition of the potential benefit of learning from Australia's experience in managing water in water scarce conditions, the ADB requested AWP support to run Asia-Australia Water Learning Weeks. These study tours aim to share Australian experiences in water management with experts from ADB and its Development Member countries. In 2017, 25 water professionals from five countries (Sri Lanka, India, Vietnam, China and Indonesia) joined ADB staff for the first study tour which focused on management under water scarcity and improving irrigation productivity. Out of this tour, AWP was requested to support a US$100M irrigation modernisation project in Vietnam. In 2018, 23 participants took part in the study tour which focused on managing water quality. The 2019 learning week will take place in August 2019 with a focus on the use of tools to inform water management and policy.

Continued demand from key In-country Partners: In Phase 1, the AWP has had major investments in Myanmar, India and Vietnam. Through each of these relationships, the Government in each country has requested further assistance under Phase 2. In Myanmar the request is for a package of eight activities including contributing to a National IWRM Long-term Strategy and Plan. In India the World Bank and Government have requested ongoing assistance to the National Hydrology Project (NHP) stage III in the areas of basin planning, water resources information centre design and capacity development. In Vietnam, ADB and the Government have requested further assistance with implementing large irrigation modernisation projects across eight drought-affected provinces as well as advice on water charging and water sharing plans.

Growing portfolio of AWP activities in Indonesia: In early 2018, Indonesia was added as a new AWP priority geography. AWP has since been working closely with the Australian Department of Agriculture, who hold the water MOU with Indonesia, and other Australian Partners to grow our Indonesia portfolio. With an initial focus on the priorities identified by the MOU, AWP has supported the development of irrigation modernisation pilots, advised on the development of a water law and begun an Indonesia-Australia Water Utility Improvement Program. AWP is also supporting the promotion and adoption of the water stewardship system in the country. These initial investments have increased the visibility of AWP in the country and has led to further requests for support in relation to irrigation modernisation, dam operations and water supply.

Activities and Outcomes

Three Key Evaluation Questions have been established for assessing progress in the Activity and Outcomes phases of the AWP Theory of Change:

- To what extent has AWP delivered activities that share water management knowledge and promote cooperation between Australian and International Partners?
- To what extent has AWP delivered activities that have led to individuals, organisations and industries having greater capacity to lead and implement water management reforms?
- To what extent has AWP delivered activities that have led to effective water management policies, legislation, regulations, practices and tools being adopted by key public and private sector actors?

To what extent has AWP delivered activities that share water management knowledge and promote cooperation between Australian and International Partners?

Sharing knowledge in demand-led activities

The AWP has supported Australian Partners to share Australian water sector expertise and promoted cooperation between Australian, In-country Partners and International Partners through development activities where the Australian water management experience is drawn upon; delegations and study tours to Australia; and Australian Partners presenting at conferences.

During AWP Phase 1:

- 81 activities have directly drawn on Australia's water management experience and expertise to respond to demand from International Partners.
- 70 activities have developed knowledge products or delivered presentations to conferences related to Australia's water management experience and expertise.
- 18 International Partner delegations and study tours have visited Australia to see and hear about Australia's approach to water management.
- More than 1,416 (including at least 472 women) International Partner staff have participated in activities where Australian water management knowledge has been shared.

Refer to the following Activity narratives presented in Annex B for further descriptions of activities that have shared water management knowledge and promoted cooperation between Australian and International Partners

- B1. Promoting water stewardship in Chinese Industrial Parks.
- B3. WaterGuide: a framework for managing water scarcity.
- B5. Vietnam Water Utility Improvement Program.
- B6. Support to WEIDAP, Vietnam.
- B8. Australia-Andhra Pradesh Water Sensitive Cities Partnership, India.
- B9. Supporting river basin planning in India.
- B10. Drought mechanism and Australian WaterTools pilot, Cambodia.

Sharing knowledge through products

AWP shared Australian water expertise and knowledge through the development of knowledge products. 13 knowledge products were developed and had a combined download total of 6,137 (Figure 5) and 4,575 copies printed for distribution. In the 2018 and 2019

Promoting knowledge sharing through communications

AWP places a strong focus on communications to share its purpose as well as information on activities and knowledge products. As a result of this focus, active website users and engagement on social media have been increasing (Table 3).

In 2019, 83 percent of Australian Partners agreed or strongly agreed that AWP was effective in communicating its purpose and 79 percent agreed that AWP was effective in communicating its activities. International Partner respondents were overwhelmingly positive about the frequency and quality of communications from AWP. These results indicate that AWP communications has increased awareness of AWP's purpose and raised awareness among both Australian and international audiences of AWP activities and Australian water expertise.

Partner Survey, the majority of Australian Partner and International Partner respondents agreed or strongly agreed that the quality of AWP knowledge products is high.

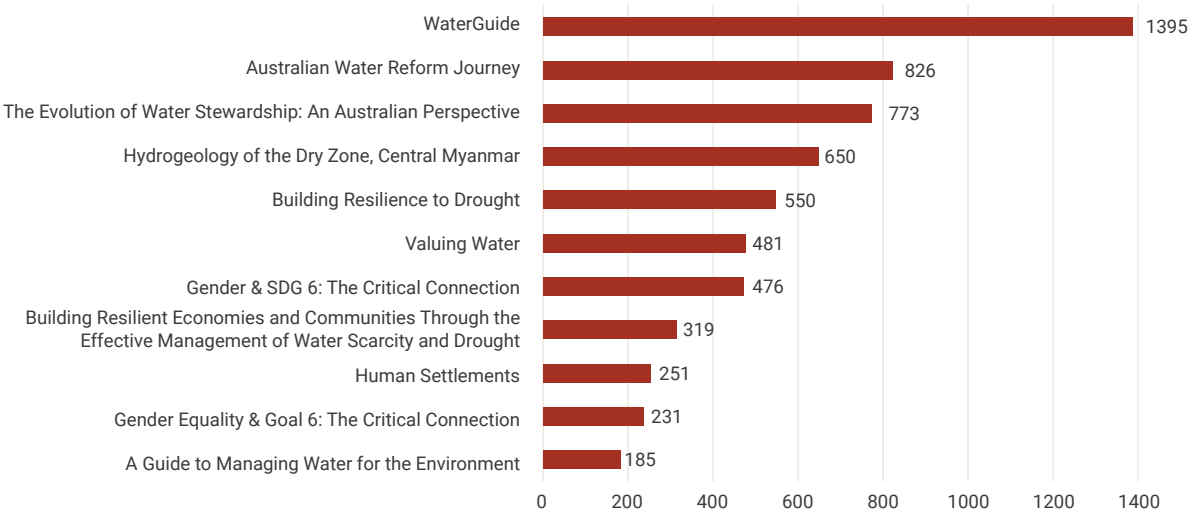


Figure 5. Total Downloads of AWP Publications at 30 June 2019. *Note: The State of the Basin Assessment (SOBA) Report is hosted on an external website (AIRBM) and therefore download statistics are not available.*

Table 3. Change in social media followers and engagement from June 2018 to June 2019

Channel	Followers – June 2018	Followers – June 2019	Engagement* – June 2018	Engagement – June 2019
facebook	2078	2423 (^17%)	12.2%* (organic)	8.7%* (organic) (-29%)
twitter	193	523 (^170%)	65.2K**	75.7K** (^86%)
LinkedIn	216	489 (^126%)	Unknown	9.3% (2% considered good)
AWP Website	16,292 unique visitors	19,190 unique visitors (^85%)	-	-

***Definitions of Engagement:** On Facebook, 'engagement' refers to the number of people our posts reached who then liked, commented, shared or clicked on the post, a general indication of how relevant or interesting the audience finds the content.*
*** On Twitter, 'impressions' refers to the total 'retweets', 'replies', 'likes', user profile clicks, link clicks, URL clicks, detail expands, hashtag clicks, media views and media engagements.*

Evidence of Progress: Sharing water management knowledge and promoting cooperation between Australian and International Partners

Sharing water trading expertise with China: In May 2018, a high-level delegation from the China Water Exchange (CWEX) visited the southern Murray-Darling Basin to learn about Australia's water markets and share their own experiences. The Study Tour was requested by CWEX based on Australia's reputation as a global leader in the development of water markets. The study tour provided direct exposure to Australia's water rights and trading systems and included policy elements of Australian water markets as well as on-the-ground experience in implementation and management. Following the tour, the delegates showed strong interest in ongoing collaboration on water markets and the next stage of engagement is to be explored under the renewed MOU.

Sharing irrigation modernisation experiences with Vietnam: The AWP is providing support to an AU$120M Government of Vietnam and ADB project improving water efficiency in irrigation systems. A key reason for Australia's involvement is our experience in practical examples of modern piped supply systems (and their operations and maintenance) for high value crops. In addition to ongoing design support, the AWP facilitated a tour of 17 high level Vietnamese officials and seven private designers. The tour introduced Australian modernised irrigation systems and the roles and responsibilities for irrigation management across the Murray Darling Basin. Following the tour, the delegation decided to adopt a similar design for the ADB project and made plans for a follow up visit by technical designers to further understand the design details.

Informing the High Level Panel on Water (HLPW): AWP supported the development of a set of framing papers that drew on the Australian experience to inform the HLPW in regards to six key areas: i) improved water management in response to scarcity; ii) management of water for the environment; iii) water and gender equality; iv) valuing water; v) human settlements; and vi) resilient economies and communities. The set of framing papers contributed to the development of the HLPW Outcome Document titled Making Every Drop Count: An Agenda for Water Action, which included a call to action by 11 country leaders including Australia. The framing papers are available on the AWP website and have been downloaded 2,351 times. 1,690 hard copies have been distributed.

Creating online dialogue for solving water problems in the Indo-Pacific: AWP has been creating online knowledge content for water resources management experts. AWP currently hosts interviews with 36 leading water practitioners and 103 blog posts.

To what extent has AWP delivered activities that have led to individuals, organisations and industries having greater capacity to lead and implement water management reforms?

All of AWP's activities involve capacity development through on-the-job capacity development and sharing between Australian and International Partners. In addition, AWP undertakes targeted capacity development through study tours, mentoring twinning; training and education programs and workshops.

More than 1,297 International Partner staff have received targeted capacity development on a broad range of topics through AWP capacity development activities focused on ten countries – Myanmar, Indonesia, India, Nepal, Vietnam, Iraq, Jordan, Iran, Pacific and China. Topics have included a broad range of themes including irrigation modernisation, water utility operations, water trading, basin planning, groundwater management, data quality assurance, modelling (catchment, hydraulic and groundwater), water stewardship, water sensitive urban management, utility governance, GESI, Geographic Information Systems (GIS) and sustainable hydropower.

Refer to the following Activity narratives presented in Annex B for further descriptions of activities that have developed capacity of individuals, organisations and industries to lead and implement water management reforms:

- B2. PWWA: from volunteer-based organisation to professional body.
- B5. Australia-Vietnam Water Utility Improvement Program.
- B7. Sustainable hydropower support to the MRC, Mekong Region.

To improve understanding of the extent to which development participants have applied their new skills in their workplace, AWP has recently contracted a review of the effectiveness of capacity development approaches in Phase 1, with the intent to improve approaches adopted in Phase 2.

Evidence of Progress: Developing capacity of individuals, organisations and industries to lead and implement water management reforms

Building capacity of Young Water Professionals in the Pacific: The Pacific Young Water Professionals training program is the Pacific Water and Wastewater Association's pilot human resources development program. In 2017, the AWP supported the inaugural YWP training program in Samoa with a cohort of 29 participants including 13 female professionals, from across 22 Pacific nations. The event brought together a range of Australian water sector professionals from the private sector, state water agencies, local council and large water utilities to share Australian expertise

and knowledge on climate risk, water quality improvements, potable groundwater and customer relations. The YWP participant exit surveys indicate high approval of the course material, high likelihood of sustained contact between participants and indications from participants that they will apply the skills learned. Further information on this Activity is provided as an Activity narrative in Annex B.

Improving capacity to model the hydraulics of the Ayeyarwady River: AWP was invited by the Government of Myanmar to provide a systematic program of capacity development in river hydraulic modelling. Following initial training in Australia, AWP supported a field mission to Myanmar to survey geomorphological conditions and select an appropriate hydraulic model. The HEC-RAS model was selected, and a training course developed and delivered to eight Government of Myanmar staff. The training aimed to develop capacity to use the HEC-RAS model to predict flows, depths and sediment transport with a focus on the Ayeyarwady River. Further training is being provided as part of Phase 2 support in Myanmar.

Increasing the number of specialists in key water management disciplines in India: Capacity building is a major component of the NHP which aims to increase the number of specialists in key water management disciplines in Indian Government agencies. In 2018, AWP commissioned a scoping study to identify opportunities to support capacity development under the NHP. As a result of the study, the NHP fully funded an Australia-delivered groundwater management training program including a week training session in India and two-week practical session in Australia. Following the successful delivery of the groundwater training program, the NHP has recently requested AWP to assist in identifying four to five training programs to be run by Australian Partners and funded through the NHP. AWP is going through a Call for Expressions of Interest to identify possible programs and will then pass on a shortlist to NHP for final selection and contracting.

To what extent has AWP delivered activities that have led to effective water management policies, legislation, regulations, practices and tools being adopted by key public and private sector actors?

AWP has supported 42 activities (totalling AU$9.9M) that aim to support and promote effective water management policies, legislation, regulations, practices and tools. These activities have included development of guidance and manuals, piloting tools, design support, modelling support and development, information gathering and analysis, twinning and mentoring relationships, knowledge products on the Australian experience, events and development of recommendation reports.

Of these activities, 16 have been identified as directly influencing the adoption of improved water management approaches (see list below and box for examples).

Regional Indo-Pacific

- **Technology (Industrial) Park Water Stewardship and Indo-Pacific Water Stewardship Project** is working with companies across the Indo—Pacific to adopt the Water Stewardship system which promotes and guides improved water management outcomes from industry (see more detailed description in Annex B1. Promoting water stewardship in Chinese Industrial Parks).
- **Development of ADB Irrigation Sector Guidance for the Asia Pacific** has influenced ADB irrigation investments to help make them more sustainable (see more detailed description in box below).

South-east Asia

- **Contributions to and coordination of the Ayeyarwady State of the Basin Assessment** has provided a scientific evidence base for the development of a River Basin Master Plan and a Decision Support System for assessing future water resources development pathways for the Ayeyarwady Basin (see more detailed description in Annex B4. Ayeyarwady State of the Basin Assessment, Myanmar)
- **Groundwater Review of the Central Dry Zone in Myanmar** has made detailed groundwater information available for the central dry zone of Myanmar (see more detailed description in box below).
- **Vietnam and Australia Water Utility Improvement Program** is influencing the adoption of improved management practices by urban and rural water utilities in Vietnam primarily in the areas of asset management, minimising non-revenue water and water safety plans (see more detailed description in Annex B5. Vietnam Water Utility Improvement Program).
- **Support to the Vietnam Water Efficiency Improvement in Drought Affected Provinces Project including water charging** is influencing the design of major irrigation schemes in Vietnam.
- **Water charging manuals development and piloting in Vietnam** is informing the development of national level policy on water charging (see more detailed description in box below).
- **Sustainable hydropower capacity development for the Mekong River Commission (MRC)** is supporting the development and adoption of a new Mekong Sustainable Hydropower Development Strategy and updated MRC Preliminary Design Guidance for Proposed Mainstream and Significant Tributary Dams of the Lower Mekong Basin (see more detailed description in Annex B7. Sustainable hydropower support to the MRC, Mekong Region).
- **Support to the development of a Laos PDR National Water Resources Management Strategy** is supporting the development and adoption of a strategy that guides the development of river basin management plans in all river basins of Laos PDR.

South Asia

- **National Water Resources Information Centre** is developing a national system for Indian water practitioners to access the water data that is essential to forming the scientific evidence base for water management decision making (see more detailed description in box below).
- **Kathmandu Water Operators Partnership** is working with Nepal's largest water utility to improve their processes and tools for asset management.
- **Andhra Pradesh Water Sensitive Cities** is shaping the design and operations of two Indian cities to be more water sensitive (see more detailed description in Annex B8. Australia-Andhra Pradesh Water Sensitive Cities Partnership, India).
- **NHP River Basin Planning and Institutional Strengthening Stage 1** is preparing guidance for undertaking equitable and sustainable basin planning that will be used across 14 river basins (see more detailed description in Annex B9. Supporting river basin planning in India).

Pacific

- **PWWA capacity development program** has facilitated the PWWA to prepare and adopt a five-year strategic plan.

Other

- **Advice and Services on Water Policy to the High Level Panel on Water** helped prepare the HLWP Outcomes Report which is influencing the global agenda on water resources to rethink how water is understood, valued and managed, and helping to catalyse change and build partnerships to achieve the water-related goals of the 2030 Agenda for Sustainable Development.

- **Water Guide Development and Application (Jordan, Senegal, Mexico and Iran)** has provided a dialogue and diagnostic tool that is being used to structure and stimulate water diplomacy discussions and to identify specific areas for improvements in water management (see more detailed description in Annex B3. WaterGuide: a framework for managing water scarcity).

Evidence of Progress: Facilitating adoption of effective water management policies, legislation, regulations, practices and tools

Shaping ADB's irrigation planning: AWP supported the development of an ADB Irrigation Guidance Note for the Asia Pacific. The Note guides ADB and its developing member countries in defining core areas of irrigation support and investments. The Guidance outlines how ADB can move towards a more holistic and outcomes focused approach to irrigation investments.

Enabling improved drought forecasting using Australian WaterTools: AWP Partners eWater, Bureau of Meteorology (BoM) and Geoscience Australia (GA) undertook a pilot in Cambodia to integrate three Australian tools for water management: GA's Data Cube (Digital Earth Australia), eWater Source and BOM's streamflow forecasting techniques. The pilot developed and tested a 'Water Tools' suite for national level assessments of water availability and scarcity in developing countries, providing a pathway to a scientifically robust foundation of information on which policy can be developed and operationalised for on-ground users.

Making groundwater information available in Myanmar: AWP funded the development of a review of the hydrogeology of the dry zone in central Myanmar. The review comprehensively documents the hydrogeological features of 75,700 km^2 and is intended to strengthen the effectiveness of water management decisions, reduce costs in establishing water supplies; reduce risks of over exploitation and enable sustainable development of groundwater. As an indication of adoption: the document has been downloaded from the AWP website 372 times; 100 hard copies have been distributed to Myanmar government agencies; the Irrigation and Water Utilization Management Department has been using it to inform its groundwater use planning; and the Government of Myanmar translated the document at its own expense.

Informing the development of water charging policy in Vietnam: AWP was invited by the Vietnamese Government to undertake pilot studies to inform the introduction of water charging for rural irrigation and drainage schemes in Vietnam. The pilot studies estimated the water charges needed to cover the costs of supplying irrigation water and the ability of users to pay. The results of the pilot studies are being used by the Ministry of Agriculture and Rural Development in the writing of Guidelines for Water Charging that will be distributed as Government decrees and circulars.

A National Water Information Centre (NWIC) for India: AWP has been supporting the development of National Water Information Centre for India. Initially an AWP team from BoM and CSIRO reviewed existing central hydro-informatics system's capabilities and documented a functional and technological overview of these systems to develop a guidance document for the establishment of an Indian NWIC. This guidance has influenced the development of the NWIC and now AWP is supporting the development of a Strategic Operating Plan for Centre.

Impacts

The progress described in this AWP Phase 1 M&E report shows that through partnership development, activities and outcomes, AWP has established the basis for program-wide impacts. These impacts are becoming evident in some activities and in others clear pathways to impacts are being established.

Three Key Evaluation Questions have been established for assessing the impact phase of the AWP Theory of Change:

- How has the AWP enhanced performance and effectiveness of public and private water sectors in the Indo-Pacific?
- How has the AWP supported water use in the Indo-Pacific to become more equitable, efficient and environmentally sustainable?
- How has the AWP supported enhancement of water management and governance in the Indo-Pacific?

How has the AWP enhanced performance and effectiveness of public and private water sectors in the Indo-Pacific?

AWP has made substantial investments in capacity development, with the aim of enhancing the performance and effectiveness of public and private water sectors in the Indo-Pacific. Several flagship activities are already having discernible impact, as described below.

Enhancing the performance of the next water leaders in Myanmar

As in many countries in the region, the capacity of Myanmar's water sector is relatively low. There is a major need for improved capacity from field practitioners through to policy and decision makers.

The Myanmar YWP program, a flagship capacity development initiative of the Myanmar National Water Resources Committee, is a rolling one-year capacity development program where young people from government and civil society in Myanmar receive mentoring and training in water-resources related subjects. Through AWP support over the last three years, more than 36 YWPs (including 23 females) received training on a broad range of water resources issues including IWRM, GESI, modelling, planning and ecosystem evaluation. In addition, the YWPs received professional development training such as presentation skills, problem solving, project consultation methodologies and cross-organisational collaboration.

A recent evaluation of the program showed that the capacity of the YWPs for IWRM has been developed. 82 percent of the participants indicated that as a result of participating in the YWP program their confidence to work as a young water professional had increased; 84 percent of respondents developed their technical skills in water management; 72 percent of respondents had better opportunities to advance their careers in a professional manner; and 74 percent of respondents had a greater awareness of GESI.

Through this increased capacity, the YWPs have accessed greater professional opportunities. The majority of participants have secured professional employment since completing the program and their employers noted their familiarity with field investigations, use of specific tools, monitoring equipment, GIS and other skills. In addition, the employers noted their improved problem solving and communication skills that represent a 'different way of thinking' in relation to the traditional educational approaches in Myanmar.

By working with YWPs in the early stages of their career to develop capacity in areas such as IWRM and new ways of thinking and problem solving, the broader Myanmar water sector is expected to be impacted through having a highly skilled cohort of next water leaders. In addition, Australia's support of the program, strongly supported by the Government of Myanmar and several NGOs, has helped develop the Australia-Myanmar relationship on water cooperation through building of respect and underlying trust.

Improving the effectiveness of the Pacific's water utilities peak association

With 52 percent of its population with access to improved water sources and 31 percent to improved sanitation, the Pacific needs a significant shift to meet the Sustainable Development Goal 2030 agenda, and specifically Goal 6 - clean and accessible water for all. As the professional association of the water and wastewater utility sector in the Pacific, the Pacific Water and

Wastewater Association (PWWA) needs to play a key role in this shift.

Up until January 2017, the PWWA was managed by a volunteer secretariat staff from member utilities. All PWWA operations were funded by member utilities or through volunteer contributions. Member representatives stated it was valuable to have an organisation through which they could associate, but without regular programs there was little overall action and benefit.

Since 2017, AWP has been supporting the PWWA through a three-pronged governance development program. This support has included: i) direct salary and administration support to the PWWA secretariat; ii) facilitating development of a vision and strategy for the future of PWWA; and iii) development of governance capacity within PWWA to deliver the strategy. AWP also provided support for a successful pilot Young Water Professionals program.

A strong focus has been placed on capacity development as part of the program. The 10 member PWWA Board received training on factors of success for governance in the water sector and the role of the board in ensuring PWWA follows good governance principles. In addition, 59 YWPs have been involved it a YWP training program covering both technical and professional development topics.

As a result of AWP support, for the first time, the primary hub for the Pacific water utility sector has a roadmap for meeting the aspirations of its members. The roadmap outlines key goals, actions, timeframes, responsibilities and scheduling for five key focus areas of communications, capacity building, networking and collaboration, representation and sustainable funding. By developing and adopting a Strategic Plan, PWWA has set a pathway for improving its performance and effectiveness in the five key areas.

With a clear strategic pathway set, initial steps have been taken towards improving the effectiveness and performance of the PWWA. To date it has: i) developed and ratified an amended constitution to improve the efficiency of its governance structure; ii) appointed a communications consultant to help ensure all members are informed of activities and opportunities facilitated by the PWWA; iii) secured funding for a Learning and Development needs analysis to prioritise areas for training based on job responsibilities of the utility members; and iv) developed a communications plan which aims to facilitate knowledge sharing between members.

By the conclusion of the Strategic Plan period in 2023, the PWWA aims to have enhanced financial stability and an established set of professional development programs for its utility members. A more professional PWWA is impacting the broader Pacific water sector by delivering more effective capacity development for its member utilities who service a total of 3.1 M people in 20 Pacific Island countries. Efforts to date have already substantially raised the professional status of the PWWA leading to a growing recognition of the importance and effectiveness of PWWA by major donors in the region.

More information on the impact of AWP support to the PWWA is provided in Activity Narrative B2.

Enhancing the water stewardship performance of industries in the Indo-Pacific

The Asian Development Bank reports that in the Indo-Pacific region, around 80 percent of industrial wastewater is discharged without treatment[4], whilst FAO indicates that industrial water withdrawal in regions such as East Asia are as high as 23 percent of total withdrawals. Untreated wastewater leads to major human health implications when groundwater, rivers, and coasts are polluted, whilst high level of withdrawals can create competition when water is scarce. For example, China's rapid industrialisation has caused environmental degradation, intensifying water scarcity, reducing water quality and increasing water pollution.

4 https://www.adb.org/features/promoting-wastewater-revolution-asia-adbs-plans-progress-and-initiatives

With support from AWP, the Alliance for Water Stewardship (AWS) has been working with companies from apparel, information and communications and food and beverage sectors, covering factories in six countries (China, India, Pakistan, Bangladesh, Thailand and Vietnam) to support them to adopt the Water Stewardship Framework. Water stewardship provides a Standard and Certification system to assist companies to use water in a more socially equitable, environmentally sustainable and economically beneficial way, through a stakeholder-inclusive process that involves site and catchment-based development options.

China has been a strong focus of the program and serves as an example of the approach and adoption. In Kunshan City, a water stewardship pilot and subsequent training program provided 30 companies greater capacity to lead and implement water management and water governance reforms, with nine companies officially adopting the system. The Kunshan City Government is now supporting adoption of water stewardship – in 2018 it announced an incentive payment of AU$20k for companies achieving water stewardship certification.

Through development of relationships, technical training and support to companies and factories across the Indo-Pacific, there has been a shift in water management approach by major brands such as Country Road, Cotton on Group, H&M, Ikea, DesignWorks, Apple, Dell, Inghams, Nestle, General Mills and Olam who have now committed to the Water Stewardship system.

Companies are making good progress toward adopting the framework, for example Nestle has been improving water management in four plants in Thailand, Vietnam and China. Other companies are beginning the water stewardship journey, for example Apple is implementing water stewardship in their supply chain with sites targeted for an initial pilot, and plans being made to expand to all the 1,750 suppliers in their supply chain and to make water stewardship a "pillar" of their global water program.

Through influencing companies using factories in the Indo-Pacific to require improved management of water supplies and wastewater, some of the biggest consumer brands in the world are integrating water stewardship as part of their sustainable supply chain strategies. Through leveraging their reach into the industries and factories of the Indo-Pacific, the Water Stewardship Program is impacting how factories operate to ensure a catchment-wide perspective is taken, wastewater is treated before release, water use is reduced and alternative water supplies are used.

More information on the impact of AWP support for water stewardship in China is provided in Activity Narrative B1.

How has the AWP supported water use in the Indo-Pacific to become more equitable, efficient and environmentally sustainable?

AWP has invested in supporting the development and adoption of policies practices and tools to support water use in the Indo-Pacific to become more equitable, efficient and environmentally sustainable. Several flagship activities are already having discernible impact, as described below.

Ensuring hydropower is developed sustainably in the Mekong

The Mekong River Commission (MRC) recognises that over the past decade, the Mekong has arrived at a crossroads. Hydropower presents great economic and energy gains. Yet concerns have intensified over potential impacts proposed schemes will have on the environment, fisheries and river-dependent livelihoods in the basin[5].

In 2017, the Planning Division of the Mekong River Commission (MRC) Secretariat requested Australia to provide a Sustainable Hydropower Expert with extensive experience in sustainable hydropower to mentor a newly-recruited riparian Hydropower Specialist. In response to this request,

5 http://www.mrcmekong.org/topics/sustainable-hydropower/

over the past three years AWP has supported a Sustainable Hydropower Expert to work with the MRC on a part time basis with a focus on: i) capacity building and mentoring of a young riparian professional appointed as Sustainable Hydropower Specialist; ii) assisting the Planning Division to complete its annual work plans; and iii) assisting with the review and update of the MRC's 2001 Sustainable Hydropower Development Strategy (SHDS) and 2009 Preliminary Design Guidance (PDG) for Proposed Mainstream Dams.

The Activity contributed to developed capacity at multiple scales, with the individual capacity of the Sustainable Hydropower Specialist developed through technical and managerial mentoring; while at the organisational level, capacity development of the MRC in sustainable hydropower took place through supporting the update of two key documents guiding hydropower development in the Mekong. Finally, beyond the MRC, national agencies and hydropower developers were exposed to practices for more sustainable hydropower development.

The final draft of the revised Preliminary Design Guidance (PDG2018) was completed in July 2018, and while in March 2019 the document still had to be officially approved, the Sustainable Hydropower Specialist reported that all four MRC Member Countries see the revised Guidance as a very useful and improved document. In addition, developers and their consultants appear to support the document, as evidenced by their adoption of its content before it is officially approved. The draft Sustainable Hydropower Development Strategy (SHDS2019) was completed in February 2019 and is currently under review before official adoption.

The Activity has directly contributed to the development of policies and practices to make the development of hydropower in the Mekong more equitable and sustainable. Sustainable development of hydropower in the Lower Mekong Basin is critical for meeting the energy needs of the 60M people living in the basin, whilst limiting the impacts on the environment, fisheries and livelihoods.

More information on the impact of AWP support for sustainable hydropower capacity in the MRC is provided in Activity Narrative B7.

Improving the effectiveness of the design of irrigation systems in Vietnam

Water security is a growing concern in Vietnam, particularly in drought affected provinces. Most recently the 2015–2016 El Nino drought and associated saltwater intrusion affected some 400,000 ha of crop land to varying degrees of productivity loss. In response, the Government of Vietnam is taking active measures to improve water use efficiency and water productivity, focusing on the agriculture sector since it is responsible for approximately 95 percent of surface and ground water withdrawals.

AWP has been supporting a Government of Vietnam and ADB US$120M project to modernise irrigation water management in five drought affected provinces (covering eight irrigation schemes), titled Water Efficiency Improvement in Drought Affected Provinces (WEIDAP).

The first stage of AWP's involvement in WEIDAP was providing strategic input into a Feasibility Study for WEIDAP including recommendations on adopting a more modern design using pipes rather than open canals. Initially, not all Vietnam stakeholders were confident of what was being proposed and a study tour to Australia was pivotal in obtaining support from a broad cross-section including Treasury officials, provincial chairman/ vice chairman, agricultural experts and irrigation designers. Following the study tour, the design changes proposed by AWP Partners was adopted across the whole WEIDAP project.

Australia's involvement in this period was transformative to the project as it changed the entire scheme design to a more modern and efficient approach. At ADB's Asia Water Forum 2018, in his opening address the ADB President Takehiko Nakao referred to the WEIDAP project as a notable innovation, focusing on the use of pressured pipes as suggested by AWP.

Through influencing the design to be adopted in WEIDAP, AWP has improved the efficiency of the eight schemes of the project, serving an area of 33,500 ha planted primarily with high value crops and delivering water to an estimated 17,000 farms. It has also had a broader impact, with recognition of the innovation from the top levels of ADB; the approach will be further adopted by ADB supported irrigation projects across the region.

More information on the impact of AWP support for the design of irrigation systems in WEIDAP is provided in Activity Narrative B6.

Developing more equitable and efficient water utilities in Vietnam

Access to clean drinking water and safe disposal of wastewater are major issues facing developing countries. Vietnam is relatively well progressed with 98 percent of the population in 2015 with access to an improved water source and 78 percent with access to improved sanitation. This still leaves more than two million people without access to clean water and 20 million without access to improved sanitation.

From November 2016 to May 2019, the AWP supported the Australian Water Association (AWA) to facilitate water utility twinning relationships between five Vietnamese and five Australian water utilities. Through the program, each set of utility twins developed and implemented action plans aimed at improving the performance of the Vietnam utilities.

Activities undertaken have strengthened internal systems and processes of the participating utilities, leading to improved performance to deliver safe, secure and efficient water supply services. This has included improved planning of resources and capital expenditure, prioritisation of investment in assets, operations and maintenance. For example, Non-Revenue water was reduced by three quarters in Binh Duong and by a half in Son La.

The activities have also led to enhanced decision making, customer communication and ability to attract finance necessary for future upgrades and expansions. Activities undertaken have allowed Vietnamese water utilities to improve the coordination of their Asset Management, water treatment, wastewater treatment and water distribution processes. This has improved the efficiency and effectiveness of the Vietnam utilities delivering customer and community value at least cost. For example, water supply coverage has increased across all the utilities including more than doubling in Binh Duong.

Through the program, AWP has supported the improved capacity of the five Vietnam water utilities to deliver improved water services for over 10,681,765 customers of Ho Chi Minh City, Son La, Hue, Binh Duong and Phu Tho.

To ensure a wider impact of the program, the five Vietnam utilities and the Vietnam Water Supply and Sewerage Association are now delivering training programs across the Vietnam urban water sector extending the lessons learned and tools transferred from the Australian utilities to other utilities in Vietnam. In addition, the WUIP program is being extended into Cambodia, Indonesia and rural Vietnam.

More information on the impact of AWP support for Australia-Vietnam water utility twinning is provided in Activity Narrative B5.

Helping Andhra Pradesh cities become more equitable, efficient and environmentally sustainable

Research and practice in Australia have demonstrated that improvements in urban water management deliver a range of beneficial outcomes that help cities become more sustainable, liveable and resilient to a changing climate. Australian experts supported by AWP are working in the Indian state of Andhra Pradesh to introduce water sensitive city concepts into the greenfield design of the new capital, Amaravati, and retrofitting of an existing city, Vijayawada.

Although still in early stages of implementation, it is expected that an initial focus on drainage services will leverage opportunities in water supply, sanitation and waterways management, as well as influencing urban design to adopt “green infrastructure” that is often a characteristic of water sensitive practices.

The principles, concepts and designs are now being incorporated into the broader designs for buildings, streets, stormwater network and (to a lesser extent) the central green space and city-wide flood canals. Ultimate adoption of these will depend upon an ongoing champion for these features who can promote their inclusion and continue to adapt and revise designs as opportunities arise.

If adopted, these improved practices will lead to more equitable, efficient and environmentally sustainable water use in Vijayawada (1.03 M current inhabitants) and in Amaravati (projected to be 1.2 M inhabitants by 2026). More broadly, the piloting of water sensitive cities principles in India could serve as a proof-of-concept for wider adoption in India's 100 Smart Cities initiative and other progressive cities in the country.

More information on the impact of AWP support for integrating water sensitive city principles into cities in Andhra Pradesh is provided in Activity Narrative B8.

How has the AWP supported enhancement of water management and governance in the Indo-Pacific?

AWP has substantially invested in supporting the sharing of water reform knowledge to support the enhancement of water management and governance in the Indo-Pacific. Several flagship activities are already having discernible impact, as described below.

Informing integrated and inclusive water management and governance in Myanmar

The Ayeyarwady is Myanmar's largest river, the lifeblood of Myanmar society and the nation's most valuable water resource. It supports shipping, agriculture, tourism, healthy ecosystems and communities. Yet the Ayeyarwady Basin is under threat from unsustainable development. Rapid economic and population growth is increasing water demands for irrigation, domestic and industrial use. Energy demands are rising, increasing the push for hydropower dam development. Poor catchment management and mining practices are contributing to river pollution. Most of the rural population do not have access to clean drinking water and improved sanitation.

AWP supported a comprehensive assessment of the Ayeyarwady River Basin, documented in a report titled the Ayeyarwady State of the Basin Assessment (SOBA). Australian Partners coordinated the development of the SOBA and contributed expertise on surface and groundwater, hydraulic and river system modelling, ecosystem services, ecohydrology and pollution.

The SOBA report represents the most comprehensive integrated environmental, social and economic baseline for the Ayeyarwady to date. It sets the foundation for integrated, inclusive planning and is a significant first step in informing an Ayeyarwady Integrated River Basin Management Plan and Decision Support System (DSS).

Once completed, the Basin Management Plan will strengthen water management and governance for the basin by providing a clear framework for how basin development will be managed; enabling more equitable, efficient and environmentally sustainable water use by providing clear guidance for water allocation; and enhancing the effectiveness of Government agencies by providing clear roles and responsibilities for managing water. Once completed, the basin plan and DSS will enhance water management and more equitable, efficient and environmentally sustainable water use for 60 percent of Myanmar's landmass and 70 percent of its population (37.7M people).

More information on the impact of AWP support for the Ayeyarwady SOBA is provided in Activity Narrative B4.

Supporting a framework for water governance and management in Laos PDR

In May 2017, the Lao PDR National Assembly passed the National Law on Water and Water Resources. The law requires a National Water Strategy to be developed to provide a coordination framework to address the priority national water sector challenges of the country.

During early 2019, AWP Partners worked with government counterparts in Lao PDR to develop the National Water Management Strategy. To date, the process has involved supporting DWR to undertake a program of scoping consultations with all water-related sector line agencies in order to understand the priorities and issues to be addressed in the NWMS; commissioning two technical studies (a rapid eco-hydrology assessment and a rapid assessment of the state of water resources in Lao PDR); and leading the drafting and initial review of the NWMS.

Australia's contribution to the strategy placed a strong emphasis on environmental sustainability. Subsequently, the strategy dedicates one out of three management objectives to this and emphasises in principle and in content the equal importance of river conservation with social values and economic development potential. This is the first time the environment has received an equal standing with economic development in Lao PDR.

The Lao PDR Department of Water Resources is currently undertaking national and community level consultations on the strategy with plans to submit it for formal approval as policy endorsed by the National Assembly in late 2019. In addition, the rapid technical studies developed in support of the strategy are already being used to inform a water security assessment that the International Finance Corporation (IFC) is undertaking; and informing the scope and design of a more substantial national surface water resources assessment that World Bank is commissioning within 2019.

By supporting the development of a Laos PDR National Water Resources Management Strategy that provides a coordination framework to address priority national water sector challenges and places importance on the environment and development, AWP is supporting management of the country's water resources to balance shared economic, social and environmental outcomes for its 6.6M people.

GENDER EQUALITY AND SOCIAL INCLUSION

AWP is committed to building awareness of, commitment to, and the implementation of principles of Gender Equality and Social Inclusion (GESI). In August 2017 the AWP Advisory Committee endorsed an AWP Gender Equality and Social Inclusion Policy. The goal of the policy is to ensure that AWP actively supports and makes a positive difference to gender equality and social inclusion.

The policy outlines four interrelated priorities, through which AWP works towards the GESI policy goal and commitments:

1. Systems, processes and people;
2. AWP supported activities;
3. Partner capacity; and
4. Communication, learning and knowledge sharing.

In August 2019, AWP commissioned a comprehensive review of GESI in its operations with the aim of reviewing implementation of the GESI policy and outlining recommendations for GESI in AWP Phase 2. The below section outlines a summary of key findings from the GESI review.

Systems, processes and people

The review found the following key successes of AWP integration of GESI into its systems, processes and people:

- AWP's GESI Policy commitments are clear and remain relevant;
- AWP has been consistent in communicating these commitments;
- Senior staff (CEO included) show leadership and commitment to addressing GESI;
- AWP has ensured that it has GESI expertise available to support implementation of the policy across the four areas;
- AWP staff are consistently engaged and committed to implementing the policy and ten staff (50:50 M/F) including the CEO attended a half day GESI training in February 2019;
- GESI has been included in AWP Annual Reports, Annual Operational Plans, budgets and decision-making processes such as through the GESI Specialist's work plan;
- A specific staff person is now committed to supporting day-to-day GESI efforts within AWP;
- AWP has integrated GESI into the assessment and endorsement process for all activities;
- The overall process for GESI expert review of final proposal submissions and subsequent AWP management revision prior to contracting is appropriate.

The review found that it was appropriate that the efforts of AWP have focused on establishing systems and processes that have GESI embedded in them, and to have supported staff to be able to carry the implementation of the policy. However, it was strongly reflected that it is critical for AWP to now focus on activity implementation – including the development of M&E systems and processes to gather data on outcomes and to facilitate learning from this data.

AWP supported activities

The review found the following key successes of AWP GESI integration into AWP supported activities:

- Employing two GESI experts on the Expert Review Panel (mid-May 2018) has provided input to submissions on GESI integration in AWP supported activities.
- Since the engagement of the ERP GESI experts. advice has been given to 10 submissions, contributing to seven activities being endorsed for funding totalling AU$4,859,877.
- Collaboration with the DFAT Water for Women Program has contributed to shared events and activities.
- Including the GESI policy in the new partner Memoranda of Understanding has ensured that Partners are clear on the importance of GESI.
- Endorsement of GESI specific activities (Food and Agriculture Organisation Gender, water, and food synergies in support of the SDGs in Myanmar, and the Australia Water Association Channelling Change in Vietnam and Indonesia) that can generate documented outcomes.

Key AWP activities that have GESI aspects to highlight are:

Myanmar Young Water Professionals Program, under the auspices of the National Water Resources Committee in Myanmar (NWRC), aims to produce technically competent young water professionals (YWPs) for Myanmar's water sector. A Gender and Water course was developed to improve knowledge and skills of YWPs in gender issues and mainstreaming in water resource projects. The course highlighted the importance of GESI in sustainable water management and identified practical ways in which gender can be mainstreamed in water projects. Twelve YWPs (7 females and 5 males), plus the YWP coordinator (female) participated – as identified in the course evaluations this type of training is rare in Myanmar.

The Pacific Water and Wastewater Association (PWWA) YWP Program is a flagship program for PWWA and focuses on building leadership skills, mentoring with experts from the region, sharing ideas on resolving emerging issues, developing "together" innovative solutions, and promoting and strengthening the roles of gender equality in the sector. GESI was a key topic covered in the 2018 and 2019 YWP programs. The sessions were very well received and have been rated as one of the best of the program. The YWP programs explored challenges women face in the workplace, and gender bias, in the Pacific.

Australia-Vietnam Water Utility Improvement Program (WUIP) was delivered by the Australian Water Association (AWA), in collaboration with the Vietnam Water Supply and Sewerage Association (VWSA). At the start of the WUIP in 2016, GESI was not a Key Performance Indicator. As the activity progressed, AWA and VWSA placed greater emphasis on gender inclusion and actively encouraged all utility 'twins' to strive for gender balance and involve YWPs in the initiatives. At the completion of the program, 84 women had been directly engaged in activities, equating to 41 percent of all program participants.

UN Food and Agriculture Organization Gender, water, and food synergies in the SDGs initiative under the umbrella of the program title 'Next Generation Irrigation and Agricultural Water Management for Asia Pacific'. This recently approved activity will develop knowledge, capacity development and guidance on ways in which water management can be gender transformative and positively influence food and nutrition security in Myanmar.

Partner capacity

The review identified the following areas of success in developing Partner GESI capacity:

- **A GESI Guidance for Partners** was launched in May 2019, which sets out key concepts and definitions as well as the specific expectations AWP has of the submissions it receives. There are practical suggestions relevant to the range of AWP activity types.
- **GESI capability training** was delivered in February 2019 prior to the AWP Partner Workshop in Brisbane. The session was attended by 30 people (50:50 M/F). Feedback was very positive and there was interest in additional and further training to be provided at future events.
- **A GESI Webinar was delivered in May 2019** to support the launch of the GESI Guidance, and attended by 31 partners (51 registrants in total, of which 41 percent were female). The AWP CEO and two GESI Specialists (author of the GESI Policy and Guidance for Partners, and a member of AWP's Expert Review Panel) covered a range of topics that included strategic commitments made by AWP to address GESI; practical AWP and industry examples of GESI outcomes in water resource management; and expectations for ensuring AWP Partner work is GESI sensitive.

Communication, learning and knowledge sharing

The areas of success identified for GESI in AWP communication, learning and knowledge sharing are:

- There is high awareness amongst partners that AWP is focusing on GESI. Responses in the June 2019 Partner Feedback Survey indicated that AWP's commitment to and impact of the GESI Policy is well known by nearly all of the partners that responded.
- Production (and review) of a GESI focused knowledge product (Gender and SDG6: the Critical Connection) provides a rigorous resource to base the AWP approach to GESI in water resource management.
- AWP has been very active in providing a GESI focus in key events and symposia and has been approached numerous times to lead GESI sessions and events.

LESSONS LEARNED AND WAY FORWARD

Lessons learned

Lessons learned based on the M&E analysis presented in this report are outlined below.

Building trusted Partnerships

- Keeping Partners informed, through initiatives such as the CEO monthly email newsletter, AWP Newsletter, social media channels and the Partners Workshop, is building trust in the AWP and should be continued.
- Transparent and open processes are essential to building trusted partnerships and should be continued.
- In-country Coordinators have been essential to developing long-term and trusted relationships with Myanmar, India and the ADB.
- Strong Partnerships have been developed and maintained where there was an existing relationship to build from, for example in Myanmar, where DFAT holds a water cooperation MoU with the GoM, and in India where DoA had laid the foundations through development and implementation of government-to-government MOUs.
- Commitments to large scale and long-term activities, combined with the ability to respond quickly to demand, has been essential in building trusted relationships with in-country governments.
- Knowledge products have been shown to be useful in capturing the Australian water experience especially the procedural elements of sustainable water management that are not captured in the more traditional publication outputs such as scientific journal articles.
- Knowledge products should continue to be commissioned based on demand from in-country partners and governments and designed to be responsive and relevant to the contexts of these demands.
- Engaging with the Australian public sector requires a different approach than the private sector. Government agencies are often not able to prepare proposals and can often urgently be required to attend to other tasks (e.g. Ministerial briefings). A proven way to deal with this is to include private and public sector Partners on activity teams, so that the public sector knowledge can be drawn upon, with the private sector ability to focus and drive to outcomes.
- AWP needs to clearly and consistently communicate its value to Australian, In-country and International Partners.

Activities, outcomes and impacts

- A key factor of many successful activities has been strong integration with DFAT head office and DFAT Posts. They play an important role in providing pathways to engagement and support for AWP that maximise diplomatic and development outcomes.
- The AWP should continue its approach of supporting a mix of large-scale investments, with smaller scale strategic and diplomatic responses to demand. This has been shown to enable AWP to leverage and improve the larger scale investments of development partners whilst achieving ‘quick wins’ when they present themselves. Smaller scale initial investments have also often led to broader and more influential engagements.
- AWP’s capacity development approach needs a focused strategy that moves past delivering training to ensuring and tracking the influence trainees have on improved water management once they return to their workplaces.
- There is strong interest in Australia’s experience and expertise in water management, particularly in countries facing serious water scarcity challenges. Water dialogues are a useful tool to promote Australia’s expertise and identify specific areas for cooperation. Water dialogues can

also provide diplomatic entry points with countries where other topics may be more sensitive, and AWP should continue to support such dialogues to take place providing clear mechanisms are available to follow up on dialogue outcomes either via AWP or DFAT directly.

- There is strong interest in the tools that underpin Australia's water management experience.
- Assisting water management policies, legislation, regulations, practices and tools to be more effective, sustainable and equitable requires a long-term commitment to individuals, organisations and countries.

Gender Equality and Social Inclusion

- A focus on building the capacity of its Australian Partners in GESI has led to strong interest from Partners and some improvement in submissions, with further improvement still needed.
- In addition to ensuring that GESI is considered in all activities, AWP should support a larger set of gender specific activities to enable a more focused contribution to the issues around water and gender.
- The timing of technical advice on GESI during proposal development needs to be brought forward so it is considered early in proposal development, rather than just as ERP review stage.
- A travel code of conduct is needed to ensure individuals are provided with a safe and respectful environment when travelling with AWP resources.
- Collaboration with Non-Government Organisations and the Water for Women Program could be further developed.
- Frequency and depth of partner training in GESI should be strengthened. There is value in considering a deeper follow on course that looks to the application of GESI in water resource management in more detail, drawing on case studies and examples.
- Short targeted GESI materials that are more likely to be read in full would help communication to partners on the importance of GESI for AWP and how to integrate GESI into their activities.

Way forward

AWP has been progressing on adopting the recommendations on improvements outlined in the third year M&E report and outlined in this report. This response has been captured in four key initiatives prepared to inform AWP operations in Phase 2: i) a Partnerships Strategy; ii) Knowledge Strategy; iii) Investment Strategies and Plans; and iv) GESI implementation plan.

Partnerships Strategy

In March 2019, the AWP adopted its first Partnerships Strategy. The primary purpose of this Partnerships Strategy is to describe how AWP will maintain and strengthen its Australian, In-country and International partnerships to enhance sustainable water management in the Indo-Pacific and beyond. The strategy, to be implemented over the next four years, focusses on providing different pathways for AWP to form trusted relationships with International and Australian Partners.
For example, through providing market intelligence, exposure to potential overseas collaborations, access to knowledge and networking opportunities. The Partnerships Strategy responds to many of the recommendations outlined in the third year M&E report and in this report.
As this strategy has only recently been adopted, its implementation is in the initial stages and its effect is not expected to be evident until further into AWP Phase 2.

Knowledge Strategy

In February 2019, the AWP adopted its first Knowledge Strategy, which describes AWP's approach to knowledge sharing and exchange, that articulates and promotes sustainable water management. The Knowledge Strategy responds to many of the recommendations outlined in the third year M&E report and in this report. A key aspect of the Knowledge Strategy is a renewed focus on the production of Knowledge Products and improved use of the AWP website to distribute knowledge products and activity information. These priorities are being acted on in the early stages of Phase 2.

Investment Strategies and Plans

A significant portion of AWP's Phase 1 investments were developed based on ad hoc approaches from Australian Partners. To enable more strategic development of AWP investments, AWP has advised Australian Partners that unsolicited proposals will not be accepted and has taken a more strategic approach to investment planning.

In preparation for AWP Phase 2, AWP developed a Strategic Plan (2018–2023). AWP is also, over time, developing specific country and regional strategies for its five priority geographies. The India Investment Strategy and Myanmar Investment Strategy have been completed and approved. To date these have been our two largest programs.

With the new Strategic Plan in place and country strategies in development, AWP has developed a rolling Investment Plan for Phase 2 that captures larger programs being developed in collaboration with AWP International Partners and the smaller scale activities that have been endorsed. The intent of the Investment Plan is to provide an overview of the planned major programs and activities that align to and underpin the Strategic Plan, enabling AWPAC to guide the overall balance and focus.

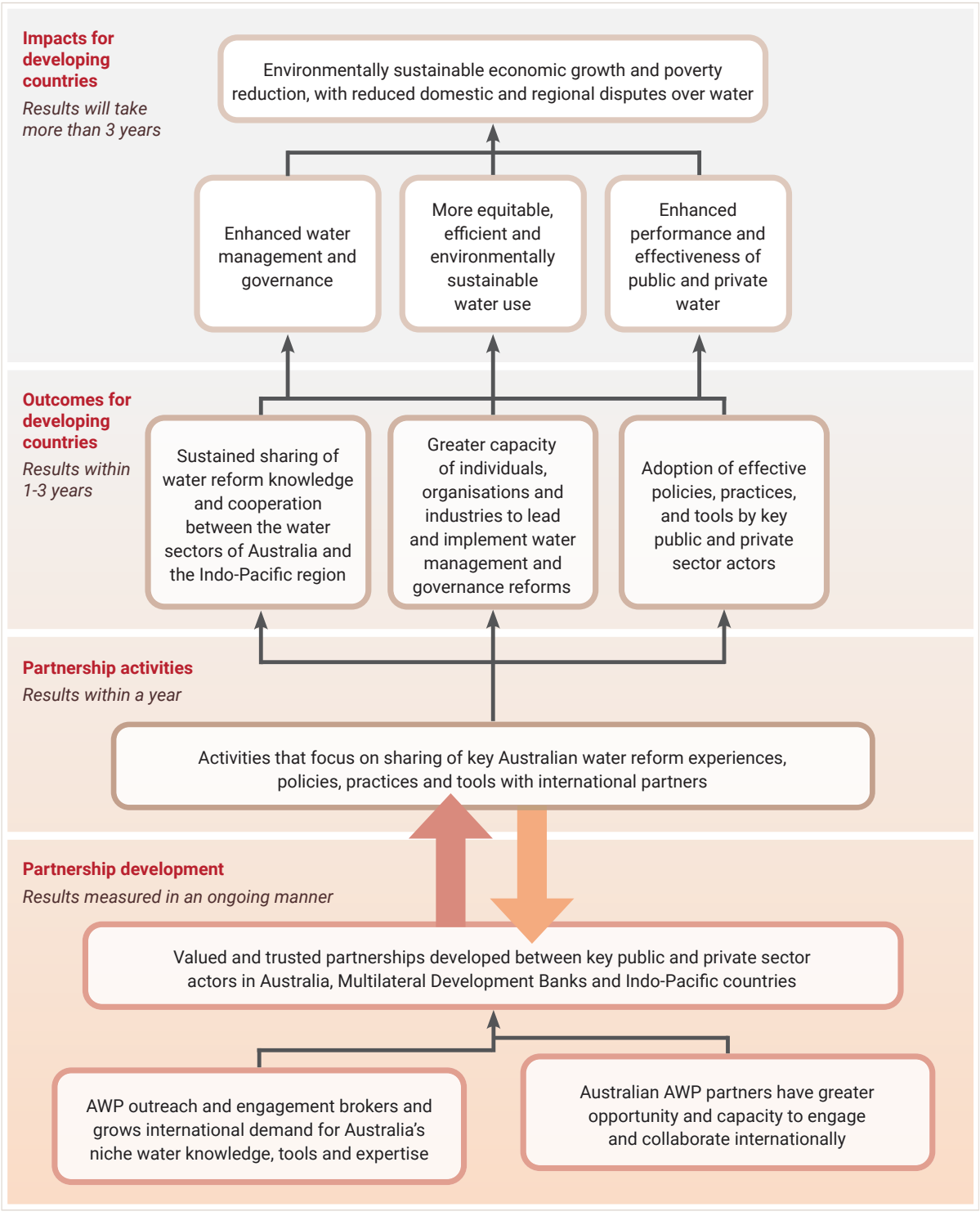
As part of the Investment Plan, AWP is improving its ability to report on outcomes and impacts across its activity portfolio. To improve its ability to show contributions to broader global agendas, for Phase 2 AWP will begin to categorise its activities in terms of contributions to the SDGs.

AWP will also continue its approach of supporting smaller scale strategic and diplomatic responses to demand in addition to its larger investments. Smaller scale initial investments enable AWP to leverage and improve the larger investments of International Partners and often lead to broader and more influential engagements.

GESI implementation plan

The AWP is developing a GESI implementation plan for Phase 2. This plan will address the 23 recommendations made in the Phase 1 GESI review and ensure that implementation of AWP's GESI policy is improved for Phase 2. This plan will be completed by the end of 2019.

ANNEX A: AWP'S THEORY OF CHANGE (2016–2018)



ANNEX B: ACTIVITY NARRATIVES

B1. Promoting water stewardship in Industrial Parks in China

B2. Pacific Water and Wastewater Association (PWWA): improving essential services to communities across the Pacific

B3. WaterGuide: a framework for managing water scarcity

B4. Establishing a scientific evidence base for planning in the Ayeyarwady Basin, Myanmar

B5. Australia-Vietnam Water Utility Improvement Program

B6. Support to Water Efficiency Improvement in Drought Affected Provinces (WEIDAP), Vietnam

B7. Sustainable hydropower support to the MRC, Mekong Region

B8. Establishing Water Sensitive Cities in Andhra Pradesh, India

B9. Supporting river basin planning in India

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B1. Promoting water stewardship in Industrial Parks in China

Summary

The Alliance for Water Stewardship (AWS) has been working with industries across China to support them to adopt water stewardship. Water stewardship provides a Standard and Certification system to assist companies to use water in a more socially equitable, environmentally sustainable and economically beneficial way, through a stakeholder-inclusive process that involves site and catchment-based development options.

In Kunshan, a water stewardship pilot and subsequent training program have given 30 companies greater capacity to lead and implement water management and water governance reforms, with nine companies officially adopting the system and achieving certification. The Kunshan city government is now supporting adoption of water stewardship – in 2018 it announced an incentive payment of AU$20k for companies achieving water stewardship certification.

In Tianjin Industrial Park, AWS is formulating a series of policy recommendations for the Park management committee that will promote the adoption of the water stewardship Standard across more than 330 factories in the Park.

Location	China
Dates	August 2016 – July 2018
Total budget	AU$210k
International partners	Environmental Protection Bureau of Kunshan City; World Wildlife Fund for Nature (WWF) China; and Environmental Protection Bureau of Tianjin Economic-Technological Development Area, Municipality of Tianjin
Australian Partners	Alliance for Water Stewardship (AWS)

By the numbers

12 pilot factories undertook stewardship training, Standard self-assessment and development of site plans

139 factories received water stewardship training

30 top industrial polluters in Kunshan engaged in awareness raising and water stewardship technical training

9 companies in Kunshan committed to achieving water stewardship Certification

1 Industrial Park with 330 factories working on policies to promote adoption of water stewardship across the Park

$20,000 incentive for water stewardship certification announced by Kunshan's city government

Activity context

China's rapid economic growth has led to a multitude of environmental issues. Industrialisation is causing environmental degradation, intensifying water scarcity, reducing water quality and increasing water pollution. Many industries are located within 'Industrial Parks', zones developed specifically for industrial development and one of the largest contributors to national GDP. These zones use large volumes of water in a range of production processes and release polluted water.

The Chinese Government has in recent years adopted strong policies to turn around this environmental crisis. It now emphasises development that balances economic growth with environmental protection and remediation and has initiated legal action against polluters. This political pressure has driven many industries to look for better models of water management such as water stewardship.

The concept of water stewardship emerged in Australia during the Millennium Drought, in response to pressure on industries to demonstrate sustainable water management. The system is designed to recognise and promote sustainable water management and help businesses and governments collaborate to improve their water use. Key pillars of the system are a Standard which outlines what good water stewardship is and Certification for recognising and rewarding good water stewards. The evolution of water stewardship from an Australian concept to a global system for managing water risk has recently been captured in AWP publication titled 'The evolution of water stewardship: an Australian Perspective' – available on the AWP website.

The convergence of China's move to improve water management within Industrial Parks, and the framework that water stewardship provides to do this was recognised through Australia's established relationship with China on environmental issues. In 2015, AWS established a water stewardship partnership with World Wildlife Fund (WWF) China, with support from the Department of Foreign Affairs and Trade (DFAT). Initial work focused on adoption of the water stewardship Standard and Certification by Ecolab, a company that provides water, hygiene and energy technologies.

This Activity builds on the momentum of the AWS-WWF collaboration to extend the adoption of water stewardship to more areas of China, with a focus on:

- Supporting the development and adoption of the water stewardship framework in the Tianjin Economic-Technological Development Area (TEDA).
- Supporting the development, adoption and implementation of the water stewardship framework in Kunshan City Industrial Clusters.

Activity implementation

Tianjin Industrial Park

Located near Beijing, TEDA is one of China's earliest Industrial Parks and is known for its unmatched economic scale and investment environment. It is committed to pursuing sustainable development and has steadily worked towards improving its environmental management. The collaboration between TEDA and AWS aims to use the water stewardship framework to change the way that water is understood, used, and disposed of by industries in the Park.

AWS worked with the TEDA management committee to launch a long-term water stewardship Certification and recognition scheme in TEDA. To facilitate adoption of the system, AWS conducted three studies: an assessment of the current management practice of TEDA against the water stewardship Standard; research on applying natural capital accounting frameworks for water stewardship; and an assessment of the corporate drivers for water stewardship.

Based on these studies, AWS is formulating a series of policy recommendations for the TEDA management committee that will promote the adoption of the water stewardship Standard across the whole Industrial Park.

Qiandeng Industrial Park

AWS and WWF have also been collaborating in the Kunshan municipality. Located in Jiangsu province upstream of Shanghai, Kunshan has been ranked as the most developed county-level city in China. In the south-eastern part of Kunshan City lies Qiandeng, home to manufacturers primarily of electronic materials and high-end automotive components. Under a cooperation framework involving WWF and the Jiangsu Development and Reform Commission, Qiandeng Industrial Park's

'Water Management Innovation Expert Group' was established with AWS as key member.

In August 2016 the first Industrial Park Water Stewardship pilot was initiated in Qiandeng. The AWS project team selected 12 pilot sites covering printed circuit boards, textile and chemical manufacturing. A range of activities were undertaken with the pilot sites including water stewardship training, standard self-assessment, development of site plans and a seminar with attendees from 139 factories.

In 2017, the pilot extended to the Kunshan City Level, engaging the 30 top industrial polluters (with a daily wastewater discharge volume over 300 m^3), in awareness raising and technical training on water stewardship. In addition to training and site visits, multi-stakeholder meetings have been held on topics such as sustainability strategies, supply chain policies, key water and pollution challenges and how these challenges can be addressed.

Assessment of outcomes

The promotion of water stewardship in Chinese Industrial Parks has established a clear pathway to enhanced water management and governance, and initial steps have been taken along this pathway in Tianjin and Kunshan.

In Tianjin, AWS's support to the TEDA management committee has enabled the sharing of Australian water knowledge on water stewardship to help shape the Park's water management policies. Policy recommendations are being drafted for TEDA which will adopt the water stewardship framework for the Park. Adoption of the recommendations would lead to improved water management by more than 330 factories including improved quality of wastewater discharge and higher proportions of wastewater reuse. These factories provide components for major brands such as Motorola, Samsung, Toyota and Nestle.

In Kunshan, the pilot and subsequent training has led to water stewardship site plans for 12 pilot sites. These plans include a range of actions seeking to improve water management and reduce pollution including:

- Evaluations of water risks and challenges.
- Creating policies and incentives for industries to invest in water efficiency, ecological protection, pollution reduction, water reuse and alternative water sources.
- Development of centralised wastewater treatment facilities.
- Training on industry water use, catchment context and shared challenges around water governance, water balance and water quality.
- Development of mechanisms and infrastructure to support the water stewardship framework, such as policies, data systems and communication platforms.

Through targeted water stewardship training, Kunshan's 30 top industrial polluters have greater capacity to lead and implement reforms in how they use, treat and pollute water. Nine companies are officially adopting the water stewardship system and achieved certification. Once certified, the factories run by these companies will have improved water management practices, typically including more efficient water use, better water quality outputs, cost savings, and improved worker and public health. Additionally, in Jiangsu Industrial Park, Province Engineering Consulting Centre have signed a joint MOU with AWS and WWF focused on improving industrial management based on the water stewardship standard.

In an important recognition by local government of the importance of water stewardship, in 2018 Kunshan's city government announced an incentive payment of AU$20k for achieving water stewardship Certification. The initiative is part of a package of measures in line with 'Beautiful China' initiatives to clean up air, water and improve industrial water management. Adoption by the Chinese local government highlights their commitment to water and environmental reforms and has made the benefits of water stewardship more advantageous for industries.

Based on the water stewardship work in China and Indo-Pacific, global brands are increasingly becoming involved. AWS is engaging with major microelectronics brands committed to improving water stewardship in their supply

Water Stewardship China Network

chains. For example, since 2013, Apple has been partnering with its suppliers through their Clean Water Program which AWP has contributed to with recommendations on how to progress with improved water stewardship and water management. Participating Apple suppliers are trained to reduce their water use, promote water recycling, ensure high-quality wastewater discharge, and prevent water pollution. The program also provides suppliers with tools for identifying long-term environmental and financial benefits. To date, Apple's program has resulted in cumulative water savings of more than 50,000 megalitres and an average reuse rate of 37 percent among the 113 participating factories in China.

Lessons learned

Key lessoned learned from the water stewardship work in China include:

- While government has a vital role to play, it cannot be completely relied upon for resolving all water and environmental problems. Local organisations and industry also have an essential role to play in improving water management.
- Economic incentives can encourage business and industry to invest more in improved water management practices. While many are exploring reforms for their environmental footprint, a monetary incentive from the government highlights the importance of action.
- Partnerships and certification systems are a useful approach to encourage private enterprises to improve their water management practices and to work together to learn from each other.
- A long-term view is needed when working with Industrial Parks of this scale. Whilst companies and Industrial Parks are moving towards implementing the framework, a realistic time frame is necessary to reach official certification, and for beneficial outcomes to be measured.

B2. Pacific Water and Wastewater Association (PWWA): improving essential services to communities across the Pacific

Summary

The Pacific Water and Wastewater Association (PWWA) is a not for profit membership body established in 1994 operating in the water and wastewater sectors. It is a regional association of 30 Pacific Island water and wastewater utilities from 21 nation states in the Pacific. The PWWA has been based in Samoa since 2007 with voluntary secretariat services provided by KEW Consult including that of the Executive Director Latu Kupa.

The Board of PWWA in 2015 recognised the changes to the external environment under which the PWWA operates and that changes necessitated a review of the organisation's operations. A Sustainability Committee was established with the funding assistance from Asian Development Bank to develop a transition plan and transform the PWWA into a more professionally run, responsive and proactive organisation which is ultimately financially sustainable with minimal external support.

The AWP added its support to this revised mission of PWWA in 2016 by supporting its institutional strengthening to enable it to provide improved water and wastewater services across 20 countries with the Pacific region.

Location	Pacific region including utilities from American Samoa, Cook Islands, Federated States of Micronesia (FSM), Fiji, French Polynesia, Guam, Kiribati, Marshall Islands, Nauru, New Caledonia, Northern Marianas, Niue, Palau, Papua New Guinea (PNG), Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu, Vanuatu, Wallis & Futuna
Dates	December 2016 to ongoing
Total budget	AU$734k
International partners	PWWA and member utilities, ADB
Australian partners	Hunter H2O; Department of Environment, Water and Natural Resources South Australia; MidCoast Council; Sydney Water; McCoullough Robertson & Associates Ltd; Climate Risk Consulting; EightyTwenty Communications; International Water Centre Alumni Network; Commonwealth Scientific and Industrial Research Organisation; and Grampians Wimmera Mallee Water

By the numbers

38 staff from Pacific Water utilities participated in the PWWA capacity building program

28 member utilities of the PWWA have ratified the new Strategic Plan

8 PWWA Board Members participated in a Governance workshop

59 Young Water Professionals from Pacific utilities participated in professional development training

30 Pacific utilities have a strengthened Association representing their interests regionally

Activity context

The PWWA is the professional association of the water and wastewater sector whose mission is to act as the regional voice for water matters in the Pacific and support Pacific Water Ministers in carrying out their agenda. Improving the delivery of water related services will enhance the wellbeing of people throughout the Pacific region. The membership comprises 30 Pacific Island water and wastewater utilities across 20 countries as well as government departments, 71 allied

members and interested individuals. Up until November 2016, the member utilities all governed the PWWA through voting control. The member utilities desired an improved system of governing the PWWA without the need to involve all the member utilities' CEOs.

Up until January 2017, the PWWA was managed by a volunteer secretariat staff from member utilities. All PWWA operations were funded by member utilities or through volunteer contributions. Member representatives stated it was valuable to have an organisation through which they could associate, but without regular programs there was little overall action and benefit.

The objective of the 'Capacity Development Assistance to the PWWA' program was to assist PWWA in moving towards a strong regional organisation that improves the performance and effectiveness of the member water utilities and their ability to deliver equitable and efficient water services.

Activity implementation

Direct support to the PWWA secretariat involved provision of an initial three years funding for CEO and Secretariat costs. Where before the PWWA had been managed by a CEO (in 2007 the PWWA moved from Fiji to Samoa and Latu Kupa acted as CEO on a pro bono basis with support of his wife Kisa and support from their company Kew Consult Ltd) and volunteer staff, this new funding enabled the appointment of a full time CEO to oversee the ambitious upscaling of the PWWA. Full-time management was essential to the extensive work required to develop the PWWA from an organisation which provided an ad hoc forum for members to an association which actively coordinates collective action, knowledge and resource sharing. Through AWP support, the PWWA now has a full time CEO supported by a three-person team including an administration assistant, finance officer and development project coordinator.

Supporting development of a vision and strategy for the future of PWWA involved bringing together a range of Australian water sector experts and Pacific utility members to exchange knowledge and discuss how the PWWA could develop into a vibrant and beneficial association. Hunter H2O assisted in the coordination of a two-day workshop held in Brisbane in November 2017 in which 28 member utilities came together to draft the PWWA Strategic Plan 2018–23. The workshop was facilitated by PWWA management and Eighty20 Communications to enable a lively discussion between members in which they defined the goals and benefits for the Pacific water utility sector collaborating through the PWWA. The resulting Strategic Plan includes a roadmap for financial stability and the provision of programs designed around four key themes: communications; capacity building; networking and collaboration; and representation.

Development of governance capacity within PWWA to deliver the Strategic Plan. AWP responded to PWWA's request for enhanced governance capacity in two ways. Firstly, the funding of a full-time Secretariat staff for three years enabled them to propose and ratify an amended constitution with a refined governance structure. The previous constitution stated that all CEOs of member utilities were board members, while the new constitution instead states that all CEOs of member utilities are a 'council of chiefs' who elect a ten-member board from among themselves and allied organisations. The board is comprised of six utility CEOs and four representatives from either utilities or PWWA allied organisations. The smaller board is able to operate more effectively and efficiently.

Secondly, the new board has received training support on good governance. In April 2017, Hunter H2O and the PWWA Secretariat arranged a governance development workshop in which eight members of the new board and Australian executive leadership consultants, two of which are AWP Australian Partners, discussed factors of success for governance in the water sector and the role of the board in ensuring PWWA follows good governance principles.

Support for a pilot Young Water Professionals (YWP) training. The Pacific Young Water Professionals training program is the PWWA's pilot human resources development program. YWP training is a professional development course tailored for promising, early career water sector employees to develop their competencies and leadership potential. The PWWA has planned two pilot YWP training programs in which Australian water sector experts provide training to participants from member utilities. The first program took place in 2017 in Apia, Samoa with 29 participants including 13 female professionals, from 22 Pacific nations. The event included a range of Australian water sector professionals from the private sector, state water agencies, local council and large water utilities to share Australian expertise and knowledge with the YWP cohort.

The second program took place in August 2018 in Noumea, New Caledonia, at the time of the PWWA annual meeting. The second YWP event included 30 YWPs (16 female) who shared knowledge and expertise on a range of topics. A highlight from this program was the interaction between the water utility CEOs and the YWPs regarding gender equality and career development.

Assessment of outcomes

With PWWA membership increasing and water challenges become more intense, it was time for the PWWA to have a full-time professional CEO and Secretariat and to develop a Strategic Plan to guide the organisation. The PWWA was increasingly aware of the need to provide comprehensive professional development opportunities to its member utilities.

Through a series of workshops, executives from the PWWA member utilities have established links with key Australian water sector specialists. Australian experiences in utility management and good governance have been shared with PWWA Board members, who are drawing on these resources to develop their own road map for improving the performance and effectiveness of the PWWA.

As a result, for the first time, the primary hub for the Pacific water utility sector has a roadmap for meeting the aspirations of its members. The roadmap outlines key goals, actions, timeframes, responsibilities and scheduling for five key focus areas of communications, capacity building, networking and collaboration, representation and sustainable funding. By developing and adopting a Strategic Plan, PWWA has set a pathway for improving its performance and effectiveness in the five key areas.

The PWWA has already made progress towards implementing the plan. To date it has:

- Developed and ratified an amended constitution to improve the efficiency of its governance structure;
- Appointed a communications consultant to help ensure all members are informed of activities and opportunities facilitated by the PWWA;
- Secured funding for a Learning and Development needs analysis to prioritise areas for training based on job responsibilities of the utility members;

- Developed a communications plan which aims to facilitate knowledge sharing between members (still to be adopted); and
- Undertaken governance training for the board to improve oversight and strategic positioning.

In addition, the Young Water Professionals program is the first PWWA program to promote professional development tailored to individual utility needs. The YWP participant exit surveys indicate high approval of the course material, high likelihood of sustained contact between participants and intention by participants to apply the skills learned through the program in their workplaces. These results provide evidence of the usefulness of the planned improvement of capacity of individuals and organisations through future PWWA training programs being identified by the Learning and Development needs analysis.

In its 2017 Annual Report, the PWWA lists AWP as among its top development partners and acknowledges the key contributions made to the PWWA's professional development program. With a clear strategic pathway set, initial steps have been taken towards improving the effectiveness and performance of the PWWA. By the conclusion of the Strategic Plan period in 2023, the PWWA aims to have enhanced financial stability, sufficient human resources and an established set of professional development programs for its utility members.

Lessons learned

Key lessons learned from the PWWA support include:

- Critical to the effective operation of an association like PWWA is having a full-time professional CEO and Secretariat and a plan agreed by the members to strengthen the capacity of organisation to enhance the effectiveness of the members. By providing a facilitation and support role, AWP can help ensure these plans are implemented.
- A pathway to sustainable funding is essential. In this case the AWP has provided short-term support to the PWWA. This has been essential to enable PWWA to sustain its improved governance effectiveness. Yet this funding is not guaranteed in the future, so PWWA have identified a pathway towards sustainable funding.
- The collaborations and knowledge sharing have been two-way. Several of the AWP Australian partner organisations have reported that the Activity has provided them with an opportunity to obtain deeper understanding of, and build relationships in, the Pacific water sector.
- A focus on the next generation of water professionals and leaders is essential to sustaining long-term improved management water outcomes.
- Whilst the YWP professional development program focused on the annual PPWA conference has been successful in training two cohorts of YWPs, there is an opportunity to strengthen the interactions and outcomes by providing support for the program to continue throughout the year (i.e. to include activities between conferences).

B3. WaterGuide: a framework for managing water scarcity

Summary

WaterGuide – a guide to achieving more sustainable, equitable and efficient water management in a water scarce context – was published by DFAT and the AWP in 2017 as an Australian contribution to the High Level Panel on Water (HLPW). The guide provides an organising framework for decision-makers on the fundamental elements of improved water management under conditions of water scarcity.

WaterGuide has been used to share Australian experiences in managing water under scarcity with international audiences. In addition to being presented at international conferences and being available online, the guide has been piloted in five countries (Jordan, Iran, Mexico, Senegal and Uzbekistan) as a dialogue and diagnostic tool to identify and help address drought and water scarcity challenges, as well as broader water management and governance issues.

Through its adoption and use, WaterGuide has been proven as a useful dialogue and diagnostic tool to structure and stimulate discussion and to identify specific areas for improvements in water management. This activity narratives covers only up to June 2018. Since June 2018, application of WaterGuide has continued through application of three WaterGuide aligned projects in Jordan, workshops with key international partners such as World Bank and ADB and a new engagement in Uzbekistan beginning in June 2019.

Location	Jordan, Mexico, Senegal, Iran, and Australia, Hungary, Philippines, USA, Brazil, Sweden
Dates	September 2016 to June 2018
Total budget	AU$910k up to June 2018
International partners	Jordan Ministry of Water and Irrigation; National Association of Water and Sanitation Utilities of Mexico (ANEAS); Urmia Lake Restoration Program (Iran); Senegal Ministry of Water and Sanitation; and Ger Bergkamp (ARCOWA)
Australian partners	Aither; Global Change Advisory; Hydrology and Risk Consulting (HARC); and Tony Slatyer (DFAT Water Adviser)

WaterGuide by the numbers

5 missions to **4** countries undertaken using WaterGuide to frame water dialogues

Water diplomacy relationships formed with **4** countries (Jordan, Mexico, Senegal and Iran)

276 water experts directly involved in water policy dialogues in Jordan, Mexico, Senegal, Iran

6 project scopes developed based on the WaterGuide framework

3 on the ground activities shaped by the framework undertaken in Jordan

Aither meeting with officials from the Government of Jordan, Aug 2017

Activity context

In April 2016 the UN Secretary General and World Bank President convened the HLPW, a two-year initiative to accelerate progress towards the Sustainable Development Goals (SDGs) and in particular SDG6 – 'ensure availability and sustainable management of water and sanitation for all'. The HLPW, which comprised 11 Heads of State and Government including Australia's Prime Minister, concluded in March 2018.

As a contribution to the HLPW, AWP Australian Partner Aither Pty Ltd was commissioned by DFAT and AWP to prepare a guide on steps to achieving more sustainable, equitable and efficient water management in a water scarce context. The objectives of the guide were to: i) draw on Australia's experience managing water in scarce conditions to outline steps to improved water management; ii) make the case for establishing water balances in a basin/geographic region and for a system of entitlement/ allocations; iii) advocate for a science-to-policy-to-institutions pathway to improved management; and iv) provide a diagram/graphic outlining the steps to improved water management.

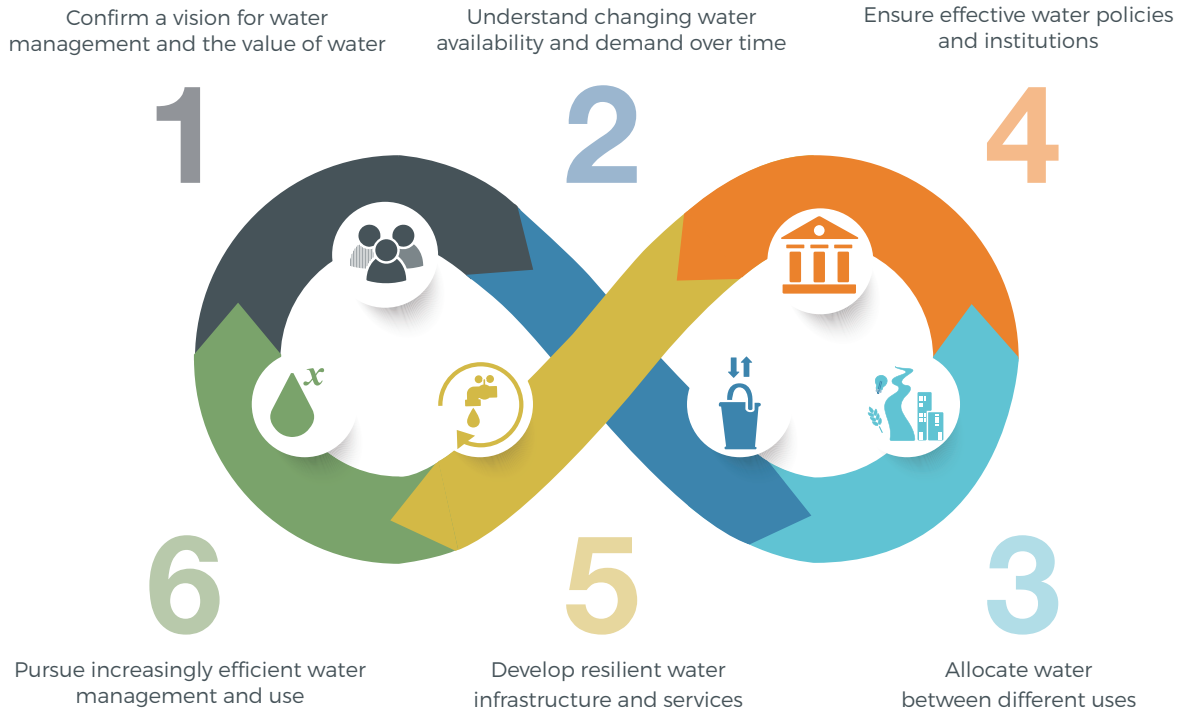
Activity implementation

Developing, refining and socialising WaterGuide

WaterGuide was developed in 2016–17 through a highly collaborative approach, with the document's content and objectives discussed with a range of senior Australian and international experts. WaterGuide was introduced to key stakeholders in the international water policy and management community through presentations at global water events in 2016, and feedback from conference presentations, workshops and discussions was incorporated in drafting and finalising the document.

Following the extensive consultations, *WaterGuide – Setting a path to improved water resource management and use under scarcity* was published by AWP in March 2017. Following insights gained from applying the guide in four countries, and feedback from Australian and international experts, a second edition of WaterGuide was published by AWP in March 2018.

A simple representation of the WaterGuide framework is below.



Representation of WaterGuide Framework

Following publication of the guide, a set of technical and branding tools and materials was developed to support the framework's socialisation and uptake outside Australia. These were expanded and refined as international interest in WaterGuide gathered pace.

WaterGuide has been presented at several international events including the 8th World Water Forum in Brazil in March 2018; and the Stockholm World Water Week in August 2018. These events provided opportunities to promote and socialise the guide with the international water community and to pursue existing WaterGuide dialogue relationships and discussions with Country Partners and Multilateral Partners such as the WB and ADB.

Applying the WaterGuide framework through piloting activities

The framework has been piloted through structured dialogues with Jordan, Mexico, Iran and Senegal. In addition, the guide has been briefly introduced to delegations to Australia from a range of other countries such as Nepal, India, Sri Lanka, Argentina, China and Singapore.

Jordan-Australia WaterGuide dialogue (Phases I and II)

Jordan, one of the eleven HLPW member states, was the first country to seek WaterGuide framed assistance through a request from the Jordan Ministry of Water and Irrigation in April 2017. The Ministry sought to establish a dialogue drawing inspiration from the WaterGuide to define a set of potential activities focused on policy priorities and innovative approaches to water scarcity.

AWP responded to the Jordanian Government's request, with delivery of a Jordan-Australia WaterGuide Dialogue mission convened in Amman, Jordan in August 2017. The mission's overall objective was to undertake a structured dialogue on water scarcity and drought between Jordanian officials, other Jordanian stakeholders and an Australian delegation. The dialogue was guided by a set of pre-agreed topics:

- sharing Australian, Jordanian and international experiences in the management of water scarcity and drought;
- using WaterGuide to identify areas for collaboration between Australia and Jordan, reflecting on Jordan's water policy and management priorities;
- identifying where Australian skills and experience could contribute to the implementation of Jordan's roadmap for improving water management; and
- modelling a WaterGuide-inspired approach to collaboration that Australian and international partners could adopt to advance practical action under the HLPW, and beyond.

The dialogue identified fourteen potential areas for collaboration organised around the six steps of the WaterGuide framework and led to the formalisation of the Jordan-Australia Water Reform Collaboration, which was endorsed by the Jordanian Cabinet. Three months after the inaugural Jordan-Australia WaterGuide Dialogue, Jordan's Ministry of Water and Irrigation requested further assistance via Australia's Ambassador to Jordan to follow up priority areas for collaboration.

A second mission to Amman took place in February 2018 to agree on a small number of areas for ongoing collaboration, and to develop pilot project proposals for activities under the following themes prioritised by Jordanian partners:

- developing a compelling narrative for reform of water allocation and use, including the value of water;
- drawing on Australia's experience of sustainable yield assessments to help clarify current and future risks to water supply;

- economic return and reallocation of water to competing sectors; and
- designing and implementing a water trading pilot in the Jordan Valley.

Based on input from Jordanian counterparts received during the mission, three project scopes were prepared by the Australian delegation (themes 3 and 4 listed above were combined into one). Shortly after this, at the 2018 World Water Forum, Australia facilitated introductions between senior Jordan and World Bank officials to enable initial conversations regarding World Bank funding for Jordan's priority projects.

Discussions between Jordan and Australia on identifying and securing sources of funding for the priority projects are ongoing. In addition, further Australian support was provided to progress initial project activities under the three agreed priority work areas and to prepare full proposals for external funding, including from the World Bank.

Baja California-Australia WaterGuide dialogue

A second dialogue was initiated by a request from the National Association of Water and Sanitation Utilities of Mexico (ANEAS) and the State Water Commission of Baja California (CEA-BC), to scope the potential use of WaterGuide in Baja California, Mexico. A briefing mission to Mexico took place in January 2018 and followed a broadly similar approach to the one used for the Jordan-Australia WaterGuide dialogue.

Three potential areas for collaboration between Mexico and Australia were identified during the mission: water data collection and information sharing; enhancing system efficiency and effectiveness; and formalising water markets through strengthening of water management fundamentals.

There is strong interest in further WaterGuide activities in Mexico. The new Director of CEA-BC recently reviewed WaterGuide materials and reports to identify opportunities for further collaboration. The Governor of Durango State has also expressed interest in WaterGuide to frame responses to the state's water allocation problem in the La Laguna area, and CEA-Durango is now reviewing WaterGuide materials.
In June 2018 and at the request of ANEAS, the Baja California-Australia WaterGuide Dialogue was featured in the ANEAS official publication Water and Sanitation Magazine No. 78.

While there is continued interest to explore areas of WaterGuide framed collaboration in Mexico, discussions have been delayed due to national elections being held.

Iran-Australia WaterGuide dialogue

Sharif University (Tehran) and the University of Melbourne have a long-term collaboration on water issues. Through this collaboration, and with support from AWP, a delegation from the Iranian Urmia Lake Restoration Program (ULRP) visited Australia in early 2017. The delegation was introduced to WaterGuide, and subsequently requested a WaterGuide policy dialogue in Tehran.

The Iran-Australia WaterGuide dialogue took place in January 2018, with an Australian delegation travelling to Tehran. The structured dialogue between Australia and Iran officials and stakeholders broadly followed the model established by the Jordan-Australia dialogue.

Various potential areas for further collaboration were identified during the mission, with the most viable being a pilot for an improved approach to water management and use in the Urmia Lake basin. A sub-catchment of the basin was suggested as a pilot location for an integrated set of WaterGuide activities with the purpose of demonstrating the practical application of WaterGuide in a local context.

A proposal for the pilot project was subsequently developed by the Australian delegation.
The proposal focusses on substantive knowledge sharing, mentoring, capacity building and other collaborative activities taking place between Australian and Iranian experts from the water resources management and policy sector.
Iranian partners have already committed to fund 50 percent of the project costs and Australian funding is being explored.

Senegal-Australia WaterGuide dialogue

Senegal, a member of the HLPW, will host the next World Water Forum in 2021. In October 2017, the Senegalese Ministry of Water and Sanitation requested assistance from AWP in support of its efforts to improve water management with a focus on water scarcity and drought.

The Senegal-Australia WaterGuide Dialogue mission took place in February 2018 in Dakar. Drawing on the WaterGuide steps, the dialogue identified several areas for further collaboration between the two countries. While Senegal is still to advise on which areas will be prioritised and taken forward, further opportunities for collaboration are likely to eventuate in the lead up to the 9th World Water Forum in Dakar in 2021.

Assessment of outcomes

Sustained sharing of water reform knowledge and cooperation

Investment in WaterGuide has succeeded in making Australia's knowledge on managing water in scarce conditions accessible internationally. Four WaterGuide policy dialogues were initiated in the first year of the guide's publication, focusing on sharing the Australian water planning steps encapsulated in the guide with countries experiencing drought and water scarcity. Over 270 water experts have been directly involved in the four policy dialogues (an additional 380 have remotely participated in the sessions). In addition, by 30th June 2018 the WaterGuide publication had been downloaded from the AWP website 208 times, and 650 hardcopies distributed.

In the four locations where WaterGuide has been used as the foundation for high-level water policy dialogues, it has contributed to raising awareness, capability and enthusiasm for improved water management. The range of areas identified for collaboration demonstrate that there is a need for Australian support and expertise and provide a base on which to develop and nurture cooperation with each partner country. Further progress towards collaboration however will depend on local counterparts setting clear priorities, and on the availability of funding, both from local and donor sources.

Tools such as WaterGuide can support Australian diplomatic efforts. In Iran, Jordan and Mexico for instance, Australia's Ambassadors and other DFAT staff have been consistently supportive of greater engagement on water issues, including through WaterGuide, as a means of broadening Australia's diplomatic activities in-country.

Adoption of effective policies, practices, and tools

As of 30 June 2018, the WaterGuide framework had been adopted and used as a diagnostic and dialogue tool in four locations with drought and water scarcity issues. Through this adoption and use, the guide has been proven as a useful tool to structure and stimulate discussion and to identify specific areas for improvements in water management.

There are encouraging signs that the WaterGuide framing can assist water managers to move towards more effective policies, practices and tools. In Jordan for instance, the three policy areas identified for further work represent a first step toward the adoption of improved policies in stakeholder engagement, sustainable yield and allocation planning, and economic instruments to improve water use efficiency. For example, completing a rapid sustainable yield assessment and developing an allocation planning tool could lead to improved short-term drought response, system optimisation, stakeholder communications and salinity management actions.

Lessons learned

Key lessons learned from the development and piloting of WaterGuide include:

- There is strong interest in Australia's experience and expertise in water management, particularly from countries facing serious water scarcity challenges.
- Water dialogues can provide diplomatic entry points with countries where other topics may be more sensitive.
- Leveraging the international process of the HLPW has provided WaterGuide an high-level entry point to begin bilateral dialogues on water issues.
- The use of a clear framework to frame water dialogues enables identification of follow-on activities that sit within a broader water reform setting;
- WaterGuide-inspired dialogues with Iran, Jordan, Mexico and Senegal have revealed considerable similarities across jurisdictions with regards to how water scarcity impacts economies, communities and the environment; and
- Future application of WaterGuide requires a clear strategic plan and funding for activities identified in the bilateral dialogues to ensure collaboration outcomes are realised.

B4. Establishing a scientific evidence base for planning in the Ayeyarwady Basin, Myanmar

Location	Yangon, Myanmar
Dates	June 2015 – December 2017
Total budget	AU$2.37M
International partners	National Water Resources Committee (NWRC), Directorate of Water Resources and Improved River Systems (DWIR), Department of Meteorology and Hydrology (DMH), the Hydro-Informatics Centre (HIC), Irrigation and Water Utilization Management Department (IWUMD), IWMI and WB
Australian partners	Alluvium, ALS Hydrographics, Australian National University, Australian Rivers Institute, Aqua Rock Konsultants, Bureau of Meteorology, CDM Smith, Commonwealth Scientific and Industrial Research Organisation, eWater, Fish Matters, Hydronumerics, International Centre for Environmental Management, Murray Darling Basin Authority, Natural Capital Economics, Australian National University, Paul Wywroll Consulting, Robbins Consulting, Sustineo, Truii, University of New South Wales and Unlimited Energy Australia

Summary

Under the Government of Myanmar's Ayeyarwady Integrated River Basin Management Project (AIRBMP), the AWP has provided support for the design and implementation of the Ayeyarwady State of the Basin Assessment (SOBA) – the first comprehensive environmental, social and economic assessment of the Ayeyarwady River Basin.

Australia's support for the Ayeyarwady SOBA has helped set the foundation for integrated, inclusive and informed river basin planning and is a significant step in the development of an Ayeyarwady River Decision Support System (DSS) and Basin Master Plan (BMP). Once completed, the DSS and BMP will enhance water management and more equitable, efficient and environmentally sustainable water use for 60 percent of Myanmar's landmass and 70 percent of its population (37.7M people).

By the numbers

1 SOBA Synthesis Report and **6** technical assessment reports providing the first comprehensive integrated environmental, social and economic baseline for the Ayeyarwady Basin

Collaboration between **31** Australian experts from **22** AWP Partner organisations with more than **100** international and Myanmar experts from over **17** organisations

160 Government of Myanmar staff with improved capacity for water management

Capacity development of **23** Young Water Professionals

Trusted and valued partnerships strengthened with **4** Myanmar Government agencies

37.7 million basin inhabitants will benefit from more sustainable use of the basin's water resources

Activity context

The Ayeyarwady is Myanmar's largest river, the lifeblood of Myanmar society and the nation's most valuable water resource. It supports shipping, agriculture, tourism, healthy ecosystems and communities. Yet the Ayeyarwady Basin is under threat from unsustainable development. Rapid economic and population growth is increasing water demands for irrigation, domestic and industrial use. Energy demands are rising, increasing the push for hydropower dam development. These developments will impact the water resources of the Ayeyarwady River, and the people and biodiversity that depend on it.

On 6 November 2015, the Republic of the Union of Myanmar signed a water management focused Memorandum of Understanding (MoU) with the Australian Government. The purpose of the MoU is to facilitate long-term cooperation between the two countries in the field of Integrated Water Resources Management (IWRM), specifically to assist development of Myanmar's river basins to be managed for the sustainable benefit of all facets of Myanmar society. The MoU recognises the importance of knowledge and information management as critical ingredients for effective IWRM implementation.

Recognising Australia's water management expertise, the Government of Myanmar (GoM) requested support from the AWP to support river basin planning, as well as technical and professional capacity building activities as part of the AIRBMP, a five-year US$100M initiative financed by the WB. Specifically, AWP was requested to support coordination for, and contribute to the Ayeyarwady SOBA.

The SOBA establishes a comprehensive environmental, social and economic baseline to inform the development of an Ayeyarwady BMP. In addition, datasets collected through the assessment have been standardised and incorporated into a Water Information System for Data Management (WISDM) that forms the basis of a DSS for the basin. .

Activity implementation

The SOBA was implemented by the HIC and DWIR. Development of the SOBA was divided into six technical packages (Table 4). AWP's support included assisting design and coordination of the six packages; technical contributions to three of the packages (as outlined in Table 4); capacity development; and review and synthesis of the six packages into a summary report. In addition to the AWP teams, the GoM and WB contracted teams to work on packages 2 to 6.

Table 4. SOBA technical packages and associated AWP areas of support

SOBA Package	Scope	Supporting AWP Activity
1	Surface water resources	Hydrological data audit Surface water resource assessment including development of a Source model for the Basin Basin water pollution survey
2	Groundwater resources and WISDM	Hydrogeological review of the Central Dry Zone
3	Geomorphology and sediments	
4	Biodiversity and fisheries	Rapid ecohydrological assessment
5	Demographics, sectoral development and macro-economics	Basin ecosystem services valuation
6	Local consultations and participatory 3D physical mapping	

SOBA Coordination Support

As the first initiative under AWP's SOBA support, Tarek Ketelsen was appointed as AWP's SOBA Coordinator from December 2015 to July 2018. The SOBA Coordinator was responsible for working directly with the GoM to assist in designing and managing the overall SOBA process, coordinating Australia's support and reviewing technical and synthesis reports. Most importantly, the Coordinator played a vital role in maintaining a close working relationship between Myanmar and Australia.

The Coordinator played a key role managing both the Australian teams and the international organisations contracted by the WB to successfully implement the SOBA. In collaboration with GoM stakeholders, the Coordinator developed Terms of Reference (ToRs) for each area of Australian support. Six ToR were developed by the SOBA Coordinator, and in turn, 21 Australian organisations were mobilised. The Coordinator facilitated the implementation of each Activity, ensuring that the teams linked to Myanmar counterparts and providing technical review of outputs.

SOBA coordination support added value to the SOBA through: enhancing the GOM understanding of river basin planning as a process, not just a technical report; showcasing the iterative and inclusive approach needed for river basin planning; consolidating understanding of the biophysical and socio-economic systems before exploring the development options and starting the basin planning process; and ensuring the Australian Partners could contribute to enhancing the SOBA process.

Technical Contributions

Under the four SOBA packages where AWP provided support, Australian Partners contributed expertise on surface and groundwater, hydraulic and river system modelling, ecosystem services, ecohydrology and pollution. Each of the activities also contributed to capacity development of GoM staff including Young Water Professionals (YWPS).

Hydrological Data Audit

The datasets needed for informed evidence-based decision making in the Ayeyarwady Basin were dispersed across several agencies, stored in various formats and were of unknown quality. Therefore, as an initial task, AWP Partners ALS Hydrographics, Alluvium and Hydronumerics completed an audit and quality assurance of hydrological, meteorological, water quality and sediment data of the Basin. A database of more than 1,000 quality assured hydrological time series datasets for the Basin were compiled and installed within the Hydro-Informatics Centre.

As part of the data quality assurance process, an assessment of rating curves used in the basin was undertaken. Acoustic Doppler Current Profiler (ADCP) gauging and cross-section surveys were conducted at five pilot sites and used to conduct rating curve reviews. The finding that four out of five of the sites have erroneous rating curves led to the recommendation that a broad program of rating curve review and revision is required to ensure that accurate and consistent discharge datasets are available for the Basin.

Surface Water Resource Assessment

Prior to the SOBA, there was no integrated hydrological model for the Ayeyarwady Basin. AWP Australian Partners eWater and the Commonwealth Scientific and Industrial Research Organisation (CSIRO) developed a hydrological model for the basin to inform a comprehensive hydrological baseline and to understand hydrological impacts of development scenarios.

The assessment developed a Source model to simulate the basin's hydrology and fill critical spatial and temporal gaps in available hydrometric data, as well qualitative descriptions of hydro-physical processes. Using this model, a comprehensive baseline of the status and trends of surface water resources, hydrological processes and water use for the basin was developed. The model was also used to undertake scenario analysis to understand the possible hydrological impacts of development scenarios such as land use change and hydropower development.

Basin Water Pollution Survey

Water pollution is a growing issue for the Ayeyarwady basin and a highly visible concern for local communities due to the increasing scale of industry, mining and agriculture. However, with only ad hoc pollution monitoring in the basin, understanding of the fate and transport of chemical pollutants in the surface and groundwater system was poorly understood.

To fill this information gap, AWP Partners, Hydronumerics and CSIRO, in collaboration with DWIR and HIC, undertook a spatio-temporal assessment of pollution risks across the basin, particularly in major industrial and peri-urban zones. The survey assessed the presence of microbiological, chemical, nutrient and heavy metal pollutants to identify and understand the types of water pollution issues currently faced by the basin, and to identify pollution hotspots.

Basin Ecosystem Services Valuation

Ecosystem services and products remain vital to the livelihoods of millions of people living within the Ayeyarwady Basin. Recent estimates indicate that between 1995 and 2010, Myanmar has lost 35 percent of its Natural Capital, effectively eroding the natural systems underlying communities. In part, these losses result from a poor understanding of the economic value of ecosystem services.

To assist in improving the understanding of the value of ecosystem services in the basin, AWP Partners Natural Capital Economics and Alluvium assisted Myanmar's DWIR and HIC to conduct an economic valuation of ecosystem services. The assessment used a range of economic valuation approaches to assess the value of six ecosystem services in the basin: agricultural; inland water transport; fisheries; potable water supply; biodiversity and ecotourism. The team determined an aggregate valuation of basin ecosystem services in the range of USD 2.5 billion to USD 6.9 billion per annum, up to 10 percent of Myanmar GDP in 2016.

Hydrogeological Review of the Central Dry Zone

Between 1978 to 1988 the Australian Government's Aid Agency supported Myanmar's Irrigation Department to undertake a Groundwater Resource Assessment for the Central Dry Zone (CDZ) that remained the most comprehensive groundwater assessment in the country. As an input into the SOBA Report, AWP provided support for the original groundwater specialist to update the 1988 report.

AWP Partners, AquaRock Consultants and ICEM, in collaboration with the Ministry of Agriculture, Livestock and Irrigation (MOALI), IWMI and HIC updated the 1988 report with recent monitoring data and analysis of the status and trends of groundwater resources in the CDZ of Myanmar. The review, titled *Hydrogeology of the Dry Zone, Central Myanmar*, comprehensively documents the hydrogeological features of 75,700km2 and is intended to strengthen the effectiveness of water management decisions, reduce costs in establishing water supplies; reduce risks of over exploitation and enable sustainable development of groundwater. The report informed groundwater components of the SOBA and was also published as a stand-alone document.

Rapid Ecohydrology Assessment

During a SOBA progress review workshop in October 2017, a critical need was identified for a short ecohydrology paper to supplement existing hydrological analysis and to integrate information from the SOBA surface water assessment with information on aquatic habitats and ecology.

To address this request, AWP Partners, Griffith Australian Rivers Institute and Truii, undertook a rapid ecohydrology assessment. The ecohydrology assessment characterises status and trends in key attributes of the flow regime of the Ayeyarwady River that are likely to be of importance to biodiversity and fisheries. In addition, the assessment explores the associated risks to these environmental assets from water infrastructure, for example, through the loss of connectivity due to in-stream barriers or impoundment of key habitats. Establishing information on the interactions between water and ecosystems in the Basin will help to ensure consideration of environmental values in future planning and management initiatives.

Capacity development

Each of the Activity teams contributing technical assessments to the SOBA also undertook capacity development of GoM staff, including YWPs. Capacity development was delivered through on-the-job training, workshops, seminars, training courses and practical field courses with staff from several agencies including DWIR, HIC and DMH.

Topics covered include:

- **Data audits** – hydrology time series database operations; quality assurance of hydrology time series; and use of GIS analysis to inform water resources management.
- **Hydrographic surveys** – geomorphology analysis to inform rating curve reviews; risk assessment and hierarchy of controls; water safety and rescue techniques; hydrographic surveys; and rating curve reviews.
- **Modelling** – water system modelling using Source and the use of scenarios to inform basin planning.
- **Pollution** – identifying pollution hotspots; water sampling; and water quality sample preservation, processing and analyses.
- **Ecosystems** – social, economic and geospatial analysis of ecosystems and social dependence on services provided by these ecosystems; ecology relationships, ecological impacts of flow alterations; and environmental flow management.
- **River basin planning** – drawing on the Murray-Darling and Mekong experience, Australian experts provided seminars on river basin planning processes, the role of consultation and impacts of water infrastructure on river systems.

SOBA Review and Synthesis

The SOBA process culminated in detailed technical assessment reports comprising hundreds of pages for each of the six packages. Several AWP Partners contributed to peer-review of the SOBA draft package reports including the Australian Centre for International Agricultural Research, Australian National University, Bureau of Meteorology, CDM Smith, Murray Darling Basin Authority and University of New South Wales.

Following review, AWP Partner, Sustineo, was engaged to consolidate and synthesise the SOBA technical reports into a Synthesis report which focuses on the key findings, conclusions and recommendations from each package whilst harnessing this information into a logical, practical, evidence-based baseline of the Ayeyarwady Basin. The SOBA Synthesis Report Vol. 1 was launched publicly by Mr U Htun Lwin Oo, Director General of DWIR and Secretary of the National Water Resources Committee, at the Asia Pacific Water Summit in Myanmar in December 2017 and was also published on the AIRBMP website.

Assessment of outcomes

The Ayeyarwady SOBA has achieved several outcomes aligned with the AWP Theory of Change including the sharing of Australia's water expertise, capacity development and supporting the adoption of effective tools for water management. Partnership development has been an equally important outcome for the Ayeyarwady SOBA and will be a driver for sustained cooperation with Myanmar in the future.

Australia's investments in the Ayeyarwady SOBA have set the foundation for integrated, inclusive and informed river basin planning and is the first significant step in the development of an Ayeyarwady BMP and DSS. The BMP and DSS will strengthen water management and governance for the basin by providing a clear framework for how basin development will be managed; enabling more equitable, efficient and environmentally sustainable water use by providing clear guidance for water allocation; and enhancing the effectiveness of GoM agencies by providing clear roles and responsibilities for managing water. Once completed, the basin plan and DSS will enhance water management and more equitable, efficient and environmentally sustainable water use for 60 percent of Myanmar's landmass and 70 percent of its population (37.7M people).

Establishing an evidence-based process for decision making

The SOBA has made an important contribution to the Ayeyarwady river basin planning process by establishing an evidence-based process. By focusing effort and resources on an integrated environmental, social and economic baseline, SOBA has ensured that there is an evidence base publicly available before major decisions on the development of the Ayeyarwady are made. It also established a phased approach to planning, creating the opportunity for the AWP to implement an Ayeyarwady Basin Exploratory Scoping Study (BESS) in 2018 to bridge between the SOBA and the DSS/BMP project, the initial Basin Master Plan (to be completed in 2019) and the final Basin Master Plan (to be completed in 2020).

Sharing knowledge and expertise on water management

AWP's support for the Ayeyarwady SOBA has shared Australian knowledge and expertise on water management across several thematic areas. Through engagement in technical studies alongside GoM counterparts, knowledge has been shared in areas such as: basin modelling, pollution surveying, valuation of ecosystem services, groundwater analysis, eco-hydrology and data quality assurance and management. For example, Australia's extensive experience with informing water management through the use of the hydrological model, eWater Source, was shared through the co-development of a Source model of the Ayeyarwady and the initial trialling of scenarios to illustrate how the model can be used to guide basin planning decisions.

Developing capacity for water resources management

Through the SOBA, AWP has assisted in developing capacity for water management individuals and organisations in Myanmar. Over 14 on-the-job training, seminars, training courses and practical field courses were delivered to a total of 160 GoM staff across three government departments (HIC, DMH and IWUMD).

For example, hydrographic surveys and rating curve capacity was developed at several levels. Firstly, staff of the HIC and DMH were taught the theory and use of rating curves to develop discharge time series for a site based on water levels, as well as an introduction to geomorphology to understand how erosive processes can affect the accuracy of rating curves. Secondly, the staff were taught practical skills through in-the-field training on undertaking hydrographic surveys as well as how to assess the geomorphological processes at a site. Finally, through the finding that four out of the five rating curves were inaccurate, and a recognition by HIC and DHM that a program of review of rating curves in the basin is needed, the capacity of organisations to accurately measure river discharges has been improved.

Australia's capacity development support to the SOBA also placed a strong emphasis on the HIC's YWPs program which aims to prepare the future water leaders of Myanmar to implement sustainable water management. Between mid-2016 to mid-2018, 23 YWPs were trained in various aspects of sustainable water management. Five out of the six Activity teams supported by AWP contributed to YWP capacity development through seminars, training courses and practical field courses. The SOBA technical packages were used as pedological resources and it is expected that the SOBA Synthesis Report Vol. 1 will be used for future YWP cohorts.

Adopting effective tools for water management

Through adopting the SOBA Synthesis Report and technical reports, the GoM is informed of the issues, opportunities, risks and uncertainties, and trade-offs that will need to be addressed to ensure effective water resource management of the Basin. The SOBA findings, data, maps and diagrams have been utilised in the early outputs produced by the consultant team implementing the Ayeyarwady BMP/DSS, including in the:

a. Inception Report delivered in May 2018;

b. DSS Detailed Design delivered in July 2018; and

c. Detailed work plan for BMP delivered in July 2018.

In terms of dissemination, in addition to the 100 printed copies distributed at the SOBA Synthesis launch, the SOBA reports were uploaded to the AIRBMP webpage in June 2018. From 29 September 2018 to 28 October 2018 the SOBA landing page was visited 86 times and 22 reports were downloaded. As further evidence of interest in the reports, on required from GoM, the AWP is supporting for a follow-on activity to translate the Synthesis Report into Myanmar language and print another 500 hard copies to disseminate to key actors in Myanmar's water sector.

The reports also serve as a reference tool for anyone working on water issues in the basin. For example, they have been referenced in an Australia-funded Strategic Environmental Assessment (SEA) of the hydropower sector in Myanmar, and WWF produced a report titled Rivers in the Economy.

In addition to the SOBA reports, several other tools have been developed:

- **A Source model of the Ayeyarwady** handed over to HIC, training on its use provided and, on the request of HIC and the World Bank, a follow-on Activity undertaken to use the model to understand the hydrological impact of several additional scenarios with a focus on irrigation and hydropower development.
- **A database of more than 1,000 quality assured hydrological datasets** installed in the HIC, used by many of the SOBA theme packages and incorporated into the WISDM which forms a basis for the DSS currently being developed.
- **Pollution hotspot mapping products** being used by the DMH as an initial high-level assessment of water quality across the basin to guide prioritisation of pollution mitigation activities.
- **Hydrogeological review of the CDZ report** which has been downloaded from the AWP website 372 times and 100 hard copies distributed. The Irrigation and Water Utilization Management Department has been using it to inform its groundwater use planning; and the GoM is currently translating the document with planned dissemination of up to 1,000 hardcopies.

Developing worthwhile and trusted partnerships

Through consistent and long-term engagement, the SOBA support has contributed to Australia becoming a trusted and valued development partner for water resources management in Myanmar. The SOBA support built on relationships developed by DFAT with In-country Partners which led to the 2015 signing of the MOU on water management. AWP's engagement in Myanmar has continued to build on and strengthen the relationships with four key government partners (DWIR, HIC, DMH and IWUMD) and has also raised the profile of Australian water expertise in the region. In an expression of the importance both Myanmar and Australia place on its diplomatic engagements on water, a revised MOU was signed on 4 December 2019.

The strengthened partnerships are evidenced by several examples. Australia received a strong expression of thanks from the Director General of DWIR who also acts as the Secretary of the NWRC (Myanmar's peak organising body for water resources issues, chaired by the Vice President). In addition, on 15 June 2018 Australia was invited by the NWRC to support the development of the

National Integrated Water Resources Management (IWRM) Long-term Strategy and Plan – one of the most important water policy documents currently being prepared in Myanmar.

Lessons learned

Key lessons learned from AWP support to the Ayeyarwady SOBA in Myanmar include:

- Drawing on existing relationships formed by DFAT has opened opportunities for higher level, transformative impacts, linking our technical and capacity building efforts to institutional reform within GoM.
- Strong support from DFAT regional offices (Yangon and the Greater Mekong Water Resources Program) has helped maintain Government to Government engagement which has been essential in maintaining high-level collaboration.
- The presence of an AWP Coordinator regularly in-country ensured the program was designed to pick up on the nuanced needs of our three main GoM partners, and also facilitated effective implementation of the program.
- Australia's Myanmar program is heavily dependent on the personal relationships between key individuals from Australia and Myanmar. Significant effort is invested in maintaining these relationships; however effort should also be expended on expanding Australia's engagement with more government actors in the water space, including other ministries and departments.
- AWP's Myanmar program has been designed based on in-depth consultation with GoM officials, which resulted in a nuanced understanding of the partner's need. Often this has meant a very specific scope for which there are few recognised leaders.

B5. Australia-Vietnam Water Utility Improvement Program

Summary

Access to clean drinking water and safe disposal of wastewater are two of the major issues facing developing countries today. Working towards excellence in the water utility sector is a highly effective way for developing countries to strive towards achieving Sustainable Development Goal 6.

Between 2016 to 2019, the AWO supported the Australian Water Association (AWA) to facilitate water utility twinning relationships between five Vietnamese and five Australian water utilities. Over the three-year period mutually beneficial relationships were formed and capacity developed within both the Vietnamese and Australian twins.

The Water Utility Improvement Program (WUIP) has shown progress towards achievement of AWP impacts including improved water planning through transfer of water safety planning approaches; and enhanced performance and effectiveness of water utilities in a range of areas including asset management, non-revenue water, engineering design, human resource management, business strategy and Public-Private Partnerships.

Whilst the WUIP was not commercially geared, there has also been commercial opportunities emerge for Australian companies including for design engineers, laboratory analysis companies, technology providers and academic institutions.

Location	Vietnam
Dates	November 2016 – June 2019
Total budget	AU$803,808
International partners	Government of Vietnam, Vietnam Water Supply and Sewerage Association (VWSA); Binh Duong Water Company; Hue Water Company; Phu Tho Water Company; Son La Water Company, Saigon Water Corporation; and ADB
Australian partners	AWA, Cairns Regional Council, Coliban Water, Wannon Water, Western Australia Water Corporation; Seqwater; University of New South Wales – Global Water Institute; and GHD

By the numbers

5 ongoing twinning relationships established between Australian and Vietnamese utilities

39 Vietnamese utility staff worked closely with **61** Australian utility staff

27 tools adopted by Vietnamese utilities

Developed capacity of **1,036** Vietnam water utility staff

Improved delivery of water services for over **10,681,765** water utility customers

Over **110** Vietnamese water utilities provided training materials and informed of WUIP outcomes

Activity context

In 2016, the Australian Water Association (AWA) received a request from the Vice Minister of Agriculture and Rural Development, the Vice Minister of Construction and the CEO of the Vietnam Water Supply and Sewerage Association (VWSA) for capacity development of Vietnamese water utilities through establishment of twinning relationships with utilities from Australia. Specific interest was identified in the areas of

asset management, water technology, operator accreditation, minimising non-revenue water, water safety plans, business management and public-private partnerships.

Activity implementation

The AWA was selected as the lead AWP Partner to implement the Activity and worked closely with their Vietnamese counterpart, VWSA. The Activity was implemented in four stages:

1. Call for expressions of interest and selection of twins;
2. Introductions, development of action plans and signing ceremony;
3. Implementation of action plans; and
4. Sharing experiences and monitoring and evaluation.

Call for expressions of interest and selection of twins

To identify utility twins, the AWA and the VWSA undertook a national, open call across the Vietnam and Australian water utility sectors for expressions of interest to participate in the twinning. The twins were then selected based on common characteristics such as utility size (staff and customers), water and wastewater services, technologies, delivery challenges, skills, motivations for taking part in the program and likelihood of successful program participation. Selected twins are listed in Table 1.

Introductions, development of action plans and signing ceremony

During VietWater'16, the AWA facilitated introductions between the twin sets. The introductions involved: i) introductory workshops; ii) sharing Australia's water utility experiences in water quality management, Public Private Partnerships (PPP) and twinning; and iii) site tours to utilities and treatment plants.

Following the introductions, each twin set scoped areas for collaboration and developed twinning Action Plans. The Action Plans and agreements outlined the themes of focus for each twin and included activities to be completed, roles and responsibilities, administration arrangements and financial commitments. Themes included asset management, water technology validation, operator accreditation, minimising non-revenue water, operationalising water safety plans, business management and contract management for PPPs. Activities outlined in the action plans included training needs assessments, two-way exchanges of information sharing, workshops and site tours.

Table 5. Vietnamese and Australian water utility twins

ID	Australian Utility	Staff	Customers	Vietnamese Utility	Staff	Customers
1	Cairns Regional Council	264	161,557	Son La Water Company	270	195,000
2	Seqwater	756	3,200,000	Saigon Water Corporation	3,000	7,950,000
3	Wannon Water	188	84,172	Binh Duong Water	1,066	1,028,771
4	Western Australia Water Corporation	2,746	1,293,887	Hue Water Company	500	1,169,694
5	Coliban Water	193	48,906	Phu Tho	300	338,300

WUIP Action Plan signing ceremony

At Ozwater'17 a signing ceremony was held to commit each twin set to the long-term twinning program. In a sign of commitment to the program, the CEOs and Chairs of each twinning utility attended the signing ceremony and welcome reception.

Implementation of action plans

Following Ozwater'17, a number of missions were completed in which Australian utilities visited their Vietnamese twin utilities and vice versa. The missions provided an opportunity for the Australian twins to deliver training workshops and support the operationalisation of water safety plans and asset management.

Sharing experiences and monitoring and evaluation

The five twin sets were brought together at Vietwater'17, Ozwater'18 and Ozwater'19 to encourage exchange of knowledge and experiences. This involved a twinning workshop that summarised outcomes achieved from each of the action plans, one-to-one meetings to discuss program progression and interviews to inform a mid-term monitoring and evaluation (M&E) report.

As part of the Australian delegation to Vietwater'17 a mid-term monitoring and evaluation assessment was undertaken by the University of New South Wales Global Water Institute. The purpose of the monitoring and evaluation assessment was to encourage adaptive management within the program and to identify lessons learned that can be used to improve similar initiatives in the future.

The twin sets were united again at Ozwater'18 and Ozwater'19 where the focus of interactions was centred on several workshops, site tours, networking events and business introductions. A closed workshop was held for all five utility pairs to discuss lessons learned and share outputs among the larger twinning group. An open workshop was also held for all Ozwater attendees to share experiences and insights and was attended by over 80 conference participants each year.

Assessment of outcomes

The twinning arrangements supported through the WUIP have achieved sustained sharing of water management knowledge and cooperation between the Australian and Vietnamese water industries; greater capacity of individuals, organisations and industries to lead and implement water management and governance reforms; and adoption of effective practices and tools.

Sharing of knowledge

The Australian twins have shared expertise and knowledge on water quality, efficiency, sustainability and security through a range of methods such as workshops, focused seminars, skill sharing and on-the-job training. Importantly, knowledge exchange between the twin sets was two-way, with Australian twins reporting increased knowledge across several thematic areas.

In addition to the twin sets, Australian water utility knowledge has been shared across the Vietnamese water sector through a strong emphasis placed on disseminating information to the networks of the VWSA. Regular updates on the twinning progress and lessons learned have been documented in AWA and VWSA journals, magazines, media and events. To date, 15 articles, three videos and presentation materials have been translated and disseminated across VWSA networks, raising the profile of the Australian Water sector in Vietnam and reaching more than 110 Vietnamese water utilities as well as various Vietnamese Ministries.

Capacity development

As demonstrated in M&E interviews and surveys as well as in presentations from participating twins and the Vietnam Water Supply and Sewerage Association, all utilities involved have indicated improved capacity of individuals and organisations in respect to the focus areas established in the action plans. These findings were supported by the independent M&E reviews undertaken by the University of New South Wales and the Vietnam Water Supply and Sewerage Association.

At the individual level, capacity has been developed through training needs analysis, delivery of short courses, workshops, on-the-job training and utility site visits that directly involved 1,036 utility staff across the five Vietnam utilities. In addition, over 1,000 VWSA members were provided training materials generated through the program. As a result of the capacity development, in video interviews Vietnam utility employees and VWSA members reported increased job satisfaction and motivation as well an appreciation for cultural learning and leadership opportunities.

At the organisational level, the capacity of the five Vietnam utilities to efficiently deliver safe drinking water to their customers has been increased through a focus on key technical areas identified by the utilities. This has included, for example; managing water quality incidents, identifying asset criticality and undertaking condition assessment; asset management; validated approaches to improve water quality; automation or SCADA systems; enhanced human resource management, customer services and business strategy, understanding of labour safety and non-revenue water management.

The capacity of Australian utility staff and organisations has also been developed through their engagement with the WUIP. For example, Wannon Water has increased its capacity to reduce non-revenue water (NRW), including the introduction and trialling of technologies used by Binh Duong Water Company.

Adoption of tools and practices

The WUIP has supported the adaptation of at least eight types of Australian utility tools and practices to the Vietnamese context and adoption of more than 27 separate tools by water utilities in Vietnam (see annex A for list and description). The Vietnam utilities have confirmed through interviews, post mission reports and workshops at Vietwater and Ozwater, and site inspections by Australian utilities, AWA and DFAT post, their ongoing use of the tools and practices transferred under the program and the subsequent improvement of their systems and operations. A knowledge sharing portal has been established by AWA for wider sharing for the tools developed across the utilities involved and subsequently for wider sharing across the Vietnam water sector. Examples of adopted tools and practices include:

- All utilities have developed and adopted Asset Management Registers to document the condition of assets and improve planning for asset upgrades and renewals;
- BIWASE established a staffed Asset Management Unit which has resulted in the registration of all BIWASE water assets into an Asset Management Register and

improvements in asset performance such as non-revenue water which has decreased by 2.5 percent in 2017/18;

- Each utility has adopted water quality risk assessment tools which has improved their detection and management of water quality risks at major treatment facilities;
- All utilities have improved the operation of existing treatment plants through adoption of water quality risk management frameworks;
- All water utilities have adopted approaches to support their targets for 'equitisation' (or privatisation) by 2019, enabling greater capacity to attract capital for expanding service areas; and
- All utilities have adopted merit-based recruitment practices.

Commercial outcomes

Whilst the WUIP was not commercially geared, there have been commercial opportunities emerge for Australian companies involved in the Australian delegations to Vietwater and the Vietnam delegations to Ozwater including for design engineers, laboratory analysis companies, technology providers and academic institutions. Surveys of companies involved indicate a reported value of contracted and forecast contracts to be more than AU$40M. For example:

- Technology pilots such as trialling of an Australian treatment technology developed to address calcium provided by Hydramet Australia to Son La Water Company;
- Training services such as accredited asset management training for water operators;
- Engineering design such as 3D design for Son La Water Companies intake pipe provided by GHD;
- Monitoring support such as verification monitoring of advanced treatment technology provided by ALS and Symbolab; and
- Eight Australian companies have been contracted to provide equipment and other technology to water utilities and four are currently in discussions on major supply opportunities.

The collective asset investment portfolio of the five Vietnam utilities totals approximately AUD3.2 billion over the next 3 years. To build on the relationships developed through the WUIP, the VWSA and AWA are preparing a framework and roadmap for creating a pool of trusted Australian water utilities expertise that can be drawn from under a fee for service request by the Vietnamese utilities, thus creating an ongoing commercial opportunity for Australian Partners. This concept is being driven by the Vietnam utilities to align to their undergoing process of 'equitisation' (or privatisation) and subsequent need for expert assistance to lift service standard to meet performance targets set by the Vietnam Government.

Assessment of impacts

The WUIP has shown progress towards achievement of AWP impacts including: i) improved water planning; and ii) enhanced performance and effectiveness of water utilities.

Improved water planning

The WUIP has led to the transfer of water safety planning approaches to assist the Vietnamese water utilities assess, manage and communicate their water quality risks. This has focused on improvements in the organisational commitment to water safety planning and the development and implementation of water quality risk management plans. Whilst all water utilities involved in the program have focused on supporting water safety planning, two notable outcomes include:

- Coliban Water has supported Phu Tho Water develop and implement a Water Safety Plan for Viet Trinh City's water treatment plant so it delivers drinking water to the customers tap. This has been supported with the donation of water quality analytical equipment from Coliban to Phu Tho Water to verify implementation of the treatment plant.

- Seqwater and Saigon Water worked together to translate and contextualise Seqwater's water safety plan to fit the operation procedures of Saigon Water. The plan is now being used by Saigon Water. Seqwater have also provided lab tours and training on water quality sampling and analytical procedures, leading to adoption of these practices in Saigon Water

Risk management is now the central mechanism for water quality management in the five Vietnam utilities and most have been adopting procedures and approaches developed in Australia through the transfer of tools to support implementation of the Australian Drinking Water Guidelines. Most utilities are well advanced in the implementation of risk management processes, and a higher quality of drinking water supplies has been achieved over the course of the program. This has directly supported the Vietnam utilities to implement targets set by the national government that all water utilities deliver clean drinking water to all customers by 2025.

Enhanced performance and effectiveness of water utilities

All the Vietnamese utilities performance and effectiveness have been enhanced in the areas identified in the twin Action Plans. This has been demonstrated through interviews, feedback and reports from the utilities, VWSA and the Vietnam Ministry of Construction.

The Son La Water Company performance has been improved in managing water quality incidents, identifying asset criticality, undertaking condition assessments and engineering design of Son La City Water Treatment Plant intake.

Collectively, Binh Duong, Hue Water, Son La, Saigon and Phu Tho water have enhanced performance in asset management. The Asset management improvements have included the development of asset management registers and operational strategies for the upgrading and renewal of aging assets. BIWASE has now developed an Asset Management Register and created a dedicated Asset Management Team to manage the register.

With support through the WUIP, Hue Water developed a business strategy which is now being implemented across the organisation with a specific focus on enhancing the organisation's asset management capabilities and human resource policies and procedures. One key outcome from this strategy is that Hue Water now has improved human resource management practices such as a merit-based recruitment system and staff benefits such as annual leave.

Lessons learned

Key lessons learned from the support to the Australian-Vietnam WUIP include:

- Selection of appropriate twins must ensure that the pairs are well matched in terms of size and expertise requirements, and that twins are committed upfront to contribute time, knowledge, and appropriate personnel.
- Having the VWSA (AWA MoU Partner) as in-country facilitators for the Vietnam twins proved essential to ensuring issues are resolved and smooth communications are maintained.
- Each utility pair needs to be focused on two or three tangible, realistic outcomes to ensure that a practical work plan is produced, and outcomes are achieved. The development and mutual agreement on action plans and priority areas as an early step was critical.
- Flexibility in program delivery should be maintained as plans can change over time.
- A clear separation between knowledge sharing and commercialisation is needed. Given the Australian utilities are government owned and bound by strict procurement rules, AWA and the VWSA put in place a process by where commercial opportunities that emerged were provided to AWA and VWSA who then promoted these across the wider Australian water sector in a fair and transparent manner.

B6. Support to Water Efficiency Improvement in Drought Affected Provinces (WEIDAP), Vietnam

Location	Central Highlands of Vietnam
Dates	January 2017 to June 2019
Total budget	AU$870k
International partners	ADB, Vietnam Ministry of Agriculture and Rural Development (MARD), IDH (The Sustainable Trade Initiative)
Australian partners	RMCG assisted by Jacobs, Coleambally Irrigation Trust, Central Irrigation Trust, Australian Water Association, Water NSW

Summary

The AWP has been supporting a Government of Vietnam and ADB US$120M project to modernise irrigation water management in five drought affected provinces (covering eight irrigation schemes), titled Water Efficiency Improvement in Drought Affected Provinces (WEIDAP).

The first stage of AWP's involvement in WEIDAP was providing strategic input into a Feasibility Study including recommendations on adopting a more modern design using pressurised pipes rather than open canals. Initially, not all Vietnam stakeholders were confident of what was being proposed and a study tour to Australia was pivotal in obtaining support from a broad cross-section including Treasury officials, provincial chairman/vice chairman, agricultural experts and irrigation designers. Following the study tour, the design changes proposed by AWP Partners were adopted across the whole WEIDAP project.

Australia's involvement in the project design was transformative as it changed the entire scheme design to a more modern and efficient approach. At ADB's Asia Water Forum 2018, in his opening address the ADB President Takehiko Nakao referred to the WEIDAP project as a notable innovation, focusing on the use of pressured pipes as recommended by the AWP.

Through influencing the design to be adopted in WEIDAP, AWP has improved the efficiency of the eight schemes of the project, serving an area of 33,500 hectares (ha) planted primarily with high value crops and delivering water to an estimated 17,000 farms. It has also had a broader impact, with recognition of the innovation from senior officials of the ADB, the approach will be adopted by future ADB supported irrigation projects across the region.

By the numbers

10 workshops ranging from **10** people up to **30** people

9 technical working sessions with Vietnam

7 field trips on irrigation systems, groundwater, water management

2 study tours to Australia with **60** Vietnamese professionals

Influencing the design for a **US$120M** loan funded irrigation project to be more efficient

17,000 farmers served by my more efficient irrigation schemes

15 Vietnam Irrigation designers involved in modernised design

5 Province chairman/vice chairman visited Australia and engaged in the process

8 young Vietnam women engaged in water resource planning and design

Activity context

With support from the ADB the Government of Vietnam has commissioned an investment project of US$120M to modernise irrigation water management in five drought-affected provinces in Central Southern Vietnam. The planning and preparation for the project entitled Water Efficiency Improvement in Drought Affected Provinces (WEIDAP) started in 2016 with detailed design commencing in late 2019. The project consists of 3 components:

1. Improving the delivery of irrigation management services
2. Modernising selected irrigation management systems
3. Improving on-farm water management practices

Australia's involvement in WEIDAP evolved from a history of working with ADB and the Mekong countries on water related issues. This specific activity arose from WEIDAP representatives that were part of AWP's Asia-Australia Water Learning Week in December 2016, recognising that Australia could provide practical assistance.

AWP has provided strategic support to Vietnam in implementing WEIDAP's 8 sub-projects on irrigation modernisation, mainly through a series of 12 discrete pressurised pipe supply systems – each system covering 300–3,000 ha. The proposed modernisation will provide a secure water supply for High Value Crops (e.g. coffee, dragon fruit, cashews, mangoes, vegetables). The proposed design and management of the supply system is new to Vietnam and the ADB and will adopt many of Australia's experiences and learnings about modernising irrigation schemes within a 'water scarce' environment. It will also provide the opportunity for Vietnam to utilise groundwater conjunctively with surface water.

While Vietnam and ADB had existing capability to construct and operate a standard canal-based irrigation system, the design and operations of the proposed piped systems is something new and will be considerably enhanced by the provision of strategic input from AWP. The project is being staged over 6 years, i.e. Stage 1 '*Feasibility and Approvals*' (2016–2019) and Stage 2 '*Detailed Design and Implementation*' (2019– 2022).

In addressing water scarcity and water use efficiency, Vietnam is also implementing the 2017 '*Hydraulic Works Law*'. This law calls for the introduction of 'full cost reflective charging' and '*Hydraulic Works Plans*'. AWP has provided parallel input into the development of the '*2018 decree on water charging*' and associated manuals (2019) to implement the law along with providing input into the '*National Standard on Hydraulic Work Planning*' (2018). This strategic support will assist WEIDAP in meeting its requirements under the new Law in a practical way.

Activity implementation

Learning tour and a study tour on water policy sparked interest

During the Asia-Australia Water Learning Week in December 2016, WEIDAP project officers learned about Australia's experience in water management and the role of different institutions including the possibility of private entities. This initiated an activity to provide advice during the feasibility stage of the project on the various options. A core lesson was that the institutional arrangements should reflect the type of service and system that was being developed.

Similarly, a study tour of Vietnam officials to Australia in January 2017, where they engaged with various Australian experts and institutions including AWP, raised interest around water policy and water charging. This was the start of AWP's engagement with Vietnam on water charging.

These activities demonstrated that "*from little things bigger things grow*", as in-depth workshops on both aspects were held in Vietnam shortly after the tours following requests from Dr Tinh Director of Water Resources, MARD demonstrating AWP's ability to respond to and service requests for assistance across a wide range of issues.

Modernised and cost-efficient design recommended by Australia

Upon investigating the proposed system, AWP was able to identify that the proposed design would not be considered a modernised system in Australian terms and that the proposed design would exceed its budget. Further, it was identified that if a modernised system was adopted then the cost would be significantly lower and would better meet the project's objectives.

The key change proposed by AWP was to provide a pressurised pipeline supply that was directly connected to each individual farm irrigation system without any additional pumping required. The farmers supply points were to be grouped in a 'manifold' serving an area of 5 ha and 3–6 farmers. Continuous 'on-demand' supply is provided to each hydrant and the groups of 3–6 farmers organise their times of access.

Despite the feasibility design being almost complete, both ADB and Vietnam responded immediately to AWP's suggestion and with AWP's help investigated the proposed alternative modernised approach. Working with the local designers, ADB and Vietnam WEIDAP project staff, AWP provided the technical exchange that formed the basis of a modernised approach to design of the irrigation scheme.

Gaining acceptance

This was the first time Vietnam had considered adopting a 'pressurised pipeline supply system' for high-value horticulture and this required acceptance and understanding at numerous levels. The project involves five Provinces and is managed by each provincial government. Gaining acceptance and understanding of what a modernised system could deliver was paramount to the project's success. Thus, the activities to date have concentrated on helping Vietnam design and adopt a modernised system.

Learning from the Australian Riverland and Sunraysia districts

The Australian Riverland and Sunraysia districts are comparable in many ways to the WEIDAP project areas, for example block sizes for irrigation management, high-value horticulture, all spray/drip irrigated, with pressurised pipeline, and on-demand water supply to each farmer, in the same way that WEIDAP is proposing. In fact, the Central Irrigation Trust in South Australia has about 10 separate systems of similar size to the WEIDAP project areas, each of which could be considered in many ways a 'carbon copy'.

A study tour of the Australian districts was organised for a Vietnamese delegation to look at the various systems in the Riverland and Sunraysia. The delegation included senior decision makers as well as representatives from diverse Government of Vietnam departments and the private sector, including ADB project and technical officers. The study tour concluded with the group agreeing that they wanted to copy the Central Irrigation Trust's systems.

Design criteria

AWP worked with ADB technical experts and Vietnam's technical staff to prepare a background document that could form the basis of TOR for the detailed design component.

Groundwater management

The WEIDAP project delivers surface water to existing irrigation areas that have historically relied predominantly on groundwater. The 'conjunctive use' of surface water and groundwater will be a key component of project implementation. AWP identified that this conjunctive use had initially been overlooked in the feasibility study and that inclusion of this approach resulted in significant changes and improvements to the proposed scheme. AWP was able to mobilise Greg Holland (formerly at Jacobs) to work with the Vietnam groundwater expert Associate Professor Nguyen Van Hoang to identify the extent and role of groundwater in WEIDAP.

What next – detailed design and implementation

AWP will be assisting WEIDAP in the detailed design process by attending workshops to describe to prospective tenderers the principles of a 'modernised pressurised irrigation pipeline supply system'. This will be followed by AWP facilitating a study tour for the selected designers to the Riverland and Sunraysia in the later part of 2019. AWP will also be available to assist the designers during the detailed design stage and construction.

AWP is also proposing to assist WEIDAP establish the operating framework to enable the modernised systems to be successfully implemented. This includes the implementation of water charging, asset management, water planning etc.

Assessment of outcomes

AWP has delivered major outcomes that will have immediate and long-term impacts, including:

a. Application of shared knowledge on water planning, allocation and governance by governments, industries and civil society.

The AWP contribution to the WEIDAP project was responsible for a major change in the approach to the design and management of irrigation systems and the adoption of best practice modernised systems and charging practice. This has involved a change from a traditional, canal based gravity supply system to pressurised piped supplies. This allows a higher level of service to the end user which encourages production of higher value crops that require 'water-on-demand'. The innovative nature of the piped design for the WEIDAP project was specifically mentioned by the ADB President at the ADB Water Forum 2018. The design then allows adoption of water charging policies that seek an increased contribution from those users who gain the most benefit from the system.

The AWP engagement and support for the WEIDAP project has led to the further involvement of a rich team of AWP experts in the development and exchange of shared knowledge relevant to the full range of water planning, allocation and governance

functions. Those activities involved collaborative exercises through extensive visits to Vietnam and in Australia through study tours between AWP experts and Vietnamese partners.

The credibility, consistency and commitment of the AWP team over a lengthy period was essential in changing the attitudes of officials and practitioners across provinces and departments and in winning acceptance of a revised approach that adopts best practice in irrigation modernisation for high value horticulture. This will allow Vietnam to advance financially-viable, irrigated production.

The quality of this work has also led to continued and expanded demand for advice across issues and locations. For example, AWP has been requested and provided advice at the National level on water charging and hydraulic work plans, design advice to another ADB project in the Central Highlands and advice on system operations to the World Bank on their Mekong Delta Integrated Climate Resilience and Sustainable Livelihood (MD-ICRSL) project.

b. Greater capacity of individuals, organisations and industries to implement sustainable water management.

The WEIDAP program has been based on developing and expanding the capacity of individuals, organisations and industries to implement sustainable water resource management programs. This development and exchange have taken place across a wide

range of groups and institutions. These include, for example:

- Multiple officials and engineers now have practical experience of what is involved on the design of pressurised modernised pipeline systems;
- Groundwater resource managers, including academics, now better understand conjunctive use;
- Institute of Water and Environmental Management now better understand water resource planning and hydraulic work plans;
- ADB staff have also been party to the exercise and now have a much more developed appreciation of the full range of water resource management issues; and
- Support staff within MARD, Department of Agriculture and Rural Development (DARD), The Department of Treasury, Department of Agriculture and their provincial staff now understand what is possible in water resource planning and designing.

The highly collaborative approach adopted in the WEIDAP project has had the explicit objective of developing and enhancing the skills and experience of regional and national partners across entities. Individuals and organisations have gained practical experience and confidence in alternative, best practice approaches that were initially considered innovative and unfamiliar. This will leave a lasting impact through the greater skills and competence of the water sector professional cadre.

c. Adoption of more equitable, efficient and environmentally sustainable policies, practices and tools by public, private and civil society water actors.

The WEIDAP project and related initiatives supported by AWP have been targeted to deliver more equitable, efficient and sustainable processes and outcomes across institutions and players. Examples include:

- Development of a conjunctive regime for groundwater and surface water resources to minimise the impacts of irrigation on valuable river systems;
- Redesign of an irrigation delivery system to provide higher levels of service at a lower cost; and
- Development of project development, implementation and management regimes that make the most efficient use of all players including government entities, private companies and regional civil agencies.

d. Trusted and valued partnerships between the Australian water sector and national, regional and/or multilateral water related institutions in the Indo-Pacific region and beyond.

The WEIDAP project has established and reinforced existing and new partnerships between AWP, the Australian water sector and a wide range of governmental and non-governmental water-focused agencies and institutions in the region. The consistent, credible and committed AWP team has won the personal and professional trust of senior staff and officials across departments and entities at all scales. This includes:

- The ADB
- Provincial Vietnamese governments in 5 provinces
- The Department of Water Resources in MARD
- The Central Project Office (CPO) in MARD
- The Vietnam Academy of Water Resources (VAWR) – various groups
- Private design consultants
- The Department of Treasury and Finance
- World Bank

The continued and expanded demand from the Vietnam Government and other regional governments for support and advice from AWP demonstrates that the services delivered and the professional approach adopted have met and exceeded needs and expectations.

Beyond the core clients in national governments, the AWP's programs and practices have also had extensive influence over the skills, experience and approach of the Asian Development Bank and the World Bank.

Lessons learned

The experience of developing and implementing the WEIDAP project and related initiatives has generated extensive insights and lessons for similar future AWP projects and programs. The following are a few of those lessons:

1. *"Putting on a display".* An accessible public display, such as the Asia-Australia Water Learning Week, enables people to see what the Australian water sector has to offer. This then empowers them to ask for what they want.
2. "*Prior experience".* We have much to offer based around our work and experience of water reform programs from the 1970s onwards. This includes cost reflective water charging, metering, piping supply systems for horticulture, water ordering systems that can be combined with the latest technology particularly around smart phones and SCADA.
3. "*Being in the right spot at the right time*". Being in the country and establishing good personal and professional relationships with contacts across entities means that you are better placed to sense their needs and make suggestions. For example, the proposed change in the basic irrigation design of the WEIDAP project was a by-product of other engagement.
4. "*One step at a time*". It is often important just to take a small first step. Partners find change challenging and will be more amenable to suggestions if they can understand and accept a staged process rather than being asked to adopt a major holistic package at the start. For example, in the irrigation design field, we started by just sharing our experience, we then suggested some design options, assisted in feasibility design and then were available to support detailed design issues.
5. "*Credible experience*". Matching appropriate Australian skills to the need. Credibility is critical and that comes from being able to demonstrate real life, past experience that is directly relevant to the issue in hand. For example, AWP was able to draw on a team that included personal experience at Coliban Water which had automated old style meters, Central Irrigation Trust which had modernised piped supply system, George Warne and Rob Rendell who both had experience of the introduction of cost-reflective charging.
6. "*Being flexible*". It is important to remain flexible and reactive as circumstances change. It is easy to come with expectations and assumptions and to stick with prior plans and programs. Often we discover that the client's needs and priorities are different from our assumptions. It is important to be able to respond quickly with the right skills often at short notice.

B7. Sustainable hydropower support to the MRC, Mekong Region

Summary

As part of its engagement in the Mekong region, the Australian Water Partnership (AWP) has been supporting an Australian sustainable hydropower expert to work with the Mekong River Commission (MRC).

The Activity has directly contributed to the development of policies and practices to make the development of hydropower in the Mekong more equitable and sustainable including updates of the MRC Preliminary Design Guidance (PDG) for Proposed Mainstream Dams and Sustainable Hydropower Development Strategy.

The Activity is also building capacity at multiple scales. The **individual capacity** of a new riparian sustainable hydropower specialist has been developed through mentoring on both the technical and management requirements of his role. **Organisational capacity** development of the MRC in sustainable hydropower is taking place through support for updating two key documents guiding hydropower development in the Mekong region. **Beyond the MRC**, national agencies and hydropower developers have been exposed to more sustainable development practices.

Location	Mekong River Basin
Dates	June 2017 – December 2018
Budget	AU$182,583
Australian partners	Simon Krohn Consulting Pty Ltd.
International partners	MRC

Activity context

Hydropower is rapidly developing in the Mekong Basin with 40 planned projects in 2017 and an additional 14 anticipated by 2020 (compared with 17 in 2001). Given the rapid pace of development, there is a critical need for leadership in promoting strategic and sustainable development of hydropower in the basin.

Promoting sustainable hydropower in the Mekong is one of the roles of the Mekong River Commission (MRC). The MRC was established in 1995 by the Agreement on Cooperation for Sustainable Development of the Mekong River Basin (the Mekong Agreement) to support shared management and sustainable development of the Mekong River. The four MRC country members are Cambodia, Lao PDR, Thailand and Vietnam, while China and Myanmar are Dialogue Partners. The MRC works across a range of thematic areas including, but not limited to, fisheries, drought and flood management, river navigation, climate change, ecosystems preservation and conservation, and sustainable hydropower.

The MRC Secretariat is the operational arm of the organisation which is tasked with delivering core technical and administrative river basin management services to the MRC Council and Joint Committee. The Secretariat formulates an annual work program and prepares strategies, guides, plans, project and program documents, studies, and assessments required for basin development. In 2016, structural reforms aiming to see the Secretariat financially sustained by the four member countries by 2030 led to a reduction in staff numbers and a reorganisation into four divisions (Administrative, Environmental Management, Planning and Technical Support) under a cross-cutting Office of the CEO.

Within the Planning Division of the MRC Secretariat, a capacity building need was identified following the appointment of a new Sustainable Hydropower Specialist (SHS). Difficulties in recruiting a suitable expert meant that the new SHS, a young riparian professional, did not join the MRC Secretariat until after the incumbent had retired. To address this, the MRC's Planning Division sought support from Australia regarding the appointment, for a limited period of time, of a Sustainable Hydropower Expert (SHE) with extensive experience in sustainable hydropower as well as policy, guideline and strategy development, to provide capacity building and mentoring of the new SHS.

Activity implementation

The SHS and SHE developed a common work plan towards achieving, by 2019, a review and update of the MRC's 2001 Sustainable Hydropower Development Strategy (SHDS) and 2009 Preliminary Design Guidance (PDG) for Proposed Mainstream Dams.

Activities to achieve this ambitious target include the drafting of concept notes for the two outputs and the preparation of detailed terms of reference for the recruitment of consultants to assist in their development. The SHE is mentoring and supporting the SHS in these activities both from within the MRC office in Vientiane and remotely.

By the end of 2017, good progress had been made on the update of both documents, with a set of concept notes and terms of reference developed for each. The process involved not only consultations with MRC member countries, but also significant collaboration, knowledge sharing and capacity building across and within the MRC's four divisions and with hydropower developers in the region.

In early 2018, at the request of the MRC Secretariat and with support from the DFAT Greater Mekong Water Resources Program, the secondment of the SHE was extended to provide further support to the Planning Division. The extension enables the SHE to support the division in the implementation of its 2018 work plan, and to continue mentoring the riparian SHS. A further extension request was received and implemented for 2019 (not covered in this activity narrative).

Assessment of outcomes

Greater capacity of individuals, organisations and industries to lead and implement water management and governance reforms.

This Activity increased and strengthened capacities to lead and implement water management and governance reforms at several levels.

At the **individual level**, mentoring by an experienced SHE has allowed the young male engineer who was appointed as SHS to not only be exposed to both the technical and management requirements of his role, but also to gain in knowledge and confidence. More specifically, over the first twelve months of the Activity, the SHS has been guided through important elements of sustainable hydropower development, including:

- the geopolitical complexities of major development on shared rivers;
- the broad range of aspects of sustainable hydropower practice;
- the importance and process of strategic planning for hydropower;
- hydropower impact assessments and impact mitigation in the Mekong;
- the siting and design of sustainable hydropower;
- the role and importance of practical guidelines for sustainable hydropower that are supported by subjective information and research; and
- consultant procurement and management including task specification, terms of reference and contract drafting.

At the **organisational level**, the MRC Secretariat Planning Division has been closely engaged in building internal knowledge on the important elements of sustainable hydropower, with cross-division knowledge sharing and capacity building taking place. In addition, through support to the consultation process with MRC member countries, the MRC has also been conducting strategic water diplomacy discussions related to hydropower and the delicate balancing between hydropower technical support and the development of strategies to influence improved development approaches.

Beyond the MRC, a number of stakeholders have been extensively engaged in discussions on the guidelines and tools provided by the MRC's Initiative for Sustainable Hydropower. Developers and non-government organisations have been consulted at formal stakeholder meetings and related forums arranged by the MRC Secretariat and facilitated with the guidance of the SHE (such as the August 2017 Sustainable Hydropower Practice Forum). The consultation process has allowed communication barriers with developers to be overcome, and feedback and suggestions on the Strategy and Guidance to be gathered. Importantly, it has helped ascertain that there is support for review of the Guidance from hydropower developers and all four member countries.

Table 5 below illustrates the broad range of capacity development achieved through the Activity.

Table 6: Capacity developed achieved through sustainable hydropower support to MRC

	Sustainable Hydropower Specialist	Mekong River Commission Secretariat	National agencies	Private sector hydropower developers
Type of capacity built				
Greater awareness of management approaches and methods	✓	✓	✓	✓
Knowledge of how to use new tools, plans and instruments to manage water	✓	✓	✓	✓
Introduction to new data, business models, tools and assessments for managing water	✓	✓		
New professional relationships or networks to draw on in managing water	✓	✓	✓	
Nexus between water and energy	✓	✓	✓	✓
Number of staff involved in capacity building (numbers only include individuals directly involved in consultations)				
Male (est.)	1	8	8	15
Female (est.)	0	2	5	3

Adoption of effective policies, practices, and tools by key public and private sector actors

Policy and strategic advice provided to the MRC under the Activity is directly supporting the development of policies and practices to make the development of hydropower in the Mekong more equitable and sustainable.

The new Sustainable Hydropower Development Strategy aims to explore optimal and sustainable hydropower pathway alternatives. It will be an input to the Mekong Basin Development Plan from 2021 onwards and National Indicative Plans for improving the basin's sustainable development.

The draft Strategy was completed in February 2019 and was under review at the time of writing.

The update of the MRC Preliminary Design Guidance for Proposed Mainstream and Significant Tributary Dams of the Lower Mekong Basin (DG2018) was completed in July 2018. The new Guidance – which provides developers of proposed dams with an overview of the issues considered by the MRC during the process of prior consultation – provides contemporary and research-based performance standards, design and operating principles and cover mitigation measures, monitoring and adaptive management. Whilst at the time

of writing, the guidance is still to be approved, the Sustainable Hydropower Specialist reported that all four MRC Member Countries see the revised Guidance as a very useful and improved document. In addition, developers and their consultants appear to support the document, as evidenced by their adoption of its content before it is officially approved.

Achievement of impacts

Enhanced water management and governance

Engaging with the energy sector in preparing the Strategy has led to a better understanding, on both sides, of the drivers, impacts and issues related to Mekong hydropower. Intensive hydropower development is expected to take place on the Mekong River and its tributaries, so bringing the water and energy sectors together at a senior level (ministries and line agencies) during the consultation process with MRC member countries and at fora such as the 2017 Sustainable Hydropower Practice Forum has been crucial to enabling broader thinking on national energy strategies and regional strategy and planning. Drawing on the various consultations, the updated Strategy promotes better and well-informed decisions on how much, where and how future hydropower is developed.

More equitable, efficient and environmentally sustainable water use

Throughout the Activity the capacity building of the SHS has emphasised the broad social, economic and environmental aspects that sustainable hydropower development must consider. These principles feature in the revised Guidance, with new sections on hydropower socio-economics, impacts on livelihoods and transboundary environmental impact assessment. The revised document outlines technical planning, design and construction considerations for hydropower development that include ensuring that individual hydropower reservoirs are designed to provide equitable, efficient and environmentally sustainable water use.

Enhanced performance and effectiveness of public and private water sectors

Key individuals and public and private organisations in the Mekong region have gained knowledge and capacity on sustainable hydropower (see table for details). Once the revised Strategy and Guidance are adopted and implemented, they will have new and improved tools at their disposal to guide their actions. For the MRC in particular, this is likely to translate into a greater ability to deliver its overall mandate of working towards the sustainable and equitable development of the Mekong River Basin.

Lessons learned

Key lessons learned from the support to the MRC Secretariat include:

- Due to personnel changes in large organisations, institutional memory can easily be lost. Succession planning is critical to an organisation's sustainability and human resources capacity.
- Issues such as sustainable hydropower development are long-term and need continuity of personnel (local and international).
- Embedding partners in organisations such as the MRC Secretariat is a valuable way to develop capacity and enhance sustainable water management.
- Commitment to long-term engagement is essential to building trust between individuals (e.g. the SHE and SHS) and organisations (e.g. MRC, DFAT and AWP).
- Partnering with influential regional and governmental organisations to improve their processes and tools can leverage a large impact through modest investment.

B8. Establishing Water Sensitive Cities in Andhra Pradesh, India

Summary

The Australia-Andhra Pradesh Water Sensitive City Partnership created a platform to share Australian's urban water management expertise in two cities in the Indian state of Andhra Pradesh (AP). The first is through a stormwater management strategy for the greenfield city of Amaravati, the second to retrofit 'nature-based' drainage technologies in the existing city of Vijayawada.

The project focused on urban drainage, in recognition of the city-wide benefits that can be achieved when nature-based solutions are adopted as the preferred technology. It also builds on the experience of the Cooperative Research Centre for Water Sensitive Cities (CRCWSC) that innovation and transformation of urban water practices often begins with the drainage elements of the urban water cycle, before being replicated in water supply and wastewater elements.

The project has delivered a range of technical outputs that each have a clear pathway to implementation by the AP partners. The AP Capital Region Development Authority (AP CRDA) manages the planning of Amaravati while the Vijayawada Municipal Corporation (VMC) is responsible for stormwater drainage in Vijayawada.

Capacity building was a major focus of the project. During the project we found that there was already a high level of awareness of 'integrated urban water management' as practiced in Australia. This awareness had been built from prior partnerships with the government of Singapore and from renewed interest in traditional rainwater harvesting practices in India. Despite this, there was a lack of skills and experience to implement these approaches on the ground and institutional barriers that got in the way. As a result, these principles were largely absent in the draft plans and designs for both Amaravati and Vijayawada when the project began.

Despite the successful delivery of the project tasks, uncertainty about ongoing implementation remains. Since the submission of deliverables to AWP, Amaravati city planning and construction has been halted by the AP Government. The city building project has become a political issue and it remains unclear if, and how, work will be reinitiated. Work on the Vijayawada project continues until late 2019, and unlikely to be affected by the politics surrounding Amaravati.

Location	Andhra Pradesh, India
Dates	January 2018 – April 2019
Total budget	AU$1M ($250k AWP funding)
International partners	Government of Andhra Pradesh; Andhra Pradesh Capital Region Development Authority; Vijayawada Municipal Corporation.
Australian partners	Alluvium Consulting; Realm Studios; Morphum Environmental; E2DesignLab; Cooperative Research Centre for Water Sensitive Cities (CRWSC).

By the numbers*

16 million future population of Amaravati that will benefit from improved water security and urban liveability if the recommendations are implemented.

1 million current population of Vijayawada who could benefit from cleaner waterways and improved sanitation if the demonstration project leads to wider practice change.

10 missions to Andhra Pradesh for in-country engagement.

6 in-country design workshops (for Amaravati and Vijayawada).

2 attendances/presentations at Happy Cities conferences (Happy Cities is the AP Government's international conference for Amaravati, held in 2017 and 2019).

3 meetings with the (then) AP Chief Minister.

5 briefings on the projects to Government Ministers, Chief Secretary to the AP Government and Principal Secretaries of the AP Government.

40+ professionals from different disciplines and organisations participated in co-design workshops.

1 water sensitive strategy and suite of implementation designs prepared for the Amaravati Government Complex.

1 water sensitive demonstration project designed for Vijayawada to showcase on-ground technologies and planning in an Indian context.

32 Indian water, planning, and design professionals participated in training (19% female, 81% male)

70% reduction in total suspended solid loads from urban runoff (Reductions apply to the Amaravati Government Complex)

10% reduction in Krishna River extractions if rainwater harvesting is implemented (Savings apply to the Amaravati Government Complex).

17% reduction in Krishna River extractions if stormwater reuse is adopted (Savings apply to the Amaravati Government Complex).

9% reduction in 1:100 year flood volumes if the project recommendations are implemented (Reductions apply to the Amaravati Government Complex).

* (Vijayawada final outcomes will be determined in late 2019).

Activity context

India is the fastest growing large economy in the world. This economic growth is driven in part by growth of its cities. However successful urbanisation is constrained by growing urban water insecurity. Indeed, major cities such as Chennai have recently begun carting water supplies to meet basic needs. Other critical challenges facing Indian cities include inequality, waste management, energy transition, climate change and heat waves.

The two projects are located in the southern state of Andhra Pradesh, home to 49 million people.

The first is the greenfield city of Amaravati. In 2014, Andhra Pradesh was bifurcated into two states – Andhra Pradesh and Telangana (which inherited the capital city of Hyderabad). The government of the new Andhra Pradesh state decided to create a new capital city – Amaravati. Amaravati will span 217 square kilometres, host 16 million people and cost US$6.5B. It aims to become a global example for sustainable cities. The project coincided with an opportunity to influence the design of water infrastructure and urban master plans in the first development precinct of the city: the Amaravati Government Complex (AGC).

The second is the existing city of Vijayawada which is undertaking renewal of its major drainage infrastructure. Vijayawada is the second largest city in the state and is currently the commercial and administrative capital of Andhra Pradesh. This existing city provided an opportunity to pilot retrofit approaches of water sensitive city principles. Three large irrigation canals flow through the city. During dry months, these divert water from the Krishna River to downstream villages and irrigators. Local stormwater systems also discharge into these canals, causing pollution which is particularly noticeable during the non-irrigation months. Pollution of these canals became the focus of the Vijayawada project.

Activity implementation

Both projects demonstrated the value of applying Australian urban water principles to Indian cities. The framework of a water sensitive city was adopted in both cities, with the following principles:

- **Cities as water supply catchments** – harnessing water occurring with the city as a resource rather than a waste, and thus reducing reliance on regional water resources and waste sinks;
- **Cities providing ecosystem services** – applying nature-based solutions so that water infrastructure creates, and benefits from, ecosystem services to be more sustainable; and
- **Water sensitive communities** – ensuring the community has the knowledge and is able to play an active role in the urban water cycle management.

Amaravati

This project aimed to influence the urban master plan for the AGC, the design guidelines for buildings and design of the public realm including streetscapes and a major green park that runs through the AGC. Importantly, the AGC is the first of numerous city precincts to be developed and will set the tone for future stages of the city.

The project had a specific focus on urban stormwater and used this as a platform to influence the urban water cycle more broadly. For instance, designing drainage infrastructure using water sensitive principles can improve water quality outcomes in waterways, secure additional water sources, reduce flooding and enhance the amenity by creating a 'green city'.

What the activity did:

- Assessed macro-scale site challenges to develop a **city scale strategy for the water cycle.** This proposed a vision that articulated the role of stormwater management and urban greening in improving water security, flood resilience, heat island mitigation and waterway pollution.
- Proposed specific **stormwater quality targets** to guide detailed infrastructure design of drainage systems to achieve the vision.
- Designed **lot scale rainwater harvesting** and drainage, such as green roofs. These solutions were embedded into the AGC Design Guidelines as mandatory building requirements.
- Designed **street scale biofilters, linked to passive watering of street trees for urban cooling**. These recommendations were adopted in the AGC master plan and streetscape designs.
- Designed a **wetland system for the AGC central park**. This recommendation was incorporated into the landscape plans prepared by Singapore-based landscape architect STX.
- Proposed a series of **designs for the city's temporary flood canals** to activate these assets as green corridors (these floodways are known as vagus).
- A **Design Manual** summarised the technical recommendations into actionable targets, process steps and design typologies that are useful to both engineers and urban planners. This was written for the AGC but is intended to be a resource for all of Amaravati.
- A four-day **training program** was delivered in partnership with Centre for Sustainable Environment (https://www.cseindia.org/). This training was provided for water and planning professionals across India, and 12 full scholarships were arranged for AP Capital Region Development Authority staff (the scholarships were funded by CSE).
- **Briefings and presentations** were provided to build political support for the project. These included briefings to the Chief Minister of Andhra Pradesh.

- **Collaborations were developed with the major international design teams** working on Amaravati, as pathway to gain influence and to implement the final outputs of the project. These international partners included the Singapore Government, Fosters+Partners, Hafeez Contractor and STX Landscape Architecture.
- The CRCWSC **delivery team utilised Australian partner organisations** to build capacity and to create pathways to markets in India.

Vijayawada

The Vijayawada project demonstrated how water sensitive technologies could be retrofitted in Indian cities.

The city features three irrigation canals that carry water from the Krishna River, through the city to downstream villages and irrigation areas. During the monsoon, this system is well flushed with flows from the Krishna River. But during dry season, flows are dominated by local stormwater runoff which is mixed with wastewater, creating highly polluted conditions. In addition to amenity and ecological issues, this fouling can impact the delivery of water to downstream users.

The project focused on one irrigation canal to demonstrate a practical solution. This solution employs nature-based approaches that are integrated into the urban form and canal landscapes and offers solutions that can be easily replicated on the other irrigation canals or cities.

What the project did:

- **Site assessments** were undertaken, in collaboration with In-country Partners, to build understanding of context and problem.
- **A demonstration site** was selected and designs were completed as proof-of-concept. This work is underway at time of reporting and will be resolved by late 2019 to a stage that will enable implementation by the VMC.
- **Design workshops** were facilitated with In-country Partners to develop tailored water sensitive urban design solutions. This provided exposure to the interdisciplinary design process required for such approaches.
- **Briefings and presentations** were provided to build political support for the project. These included briefings to the District Collector of Vijayawada and Commissioner of the VMC.
- A **catchment strategy** and **training activities** to support the demonstration site will be delivered after May 2019 to support the technical design.
- The CRCWSC **delivery team utilised Australian partner organisations** to build their capacity and to provide pathways to markets in India.

Assessment of outcomes

The AWP Amaravati project, if implemented, would:

1. Improve water quality in open water bodies within the capital city, improving public and health and amenity.
2. Improve water quality in the downstream receiving waters.
3. Diversify water supplies, reducing dependence on the over-allocated Krishna River.
4. Increase flood resilience.
5. Reduce the urban heat island effect.
6. Enhance capacity in local industry to adopt and implement water sensitive approaches.

The AWP Vijayawada project will:

1. Improve water quality in the irrigation canals, improving ecological and public health.
2. Improve amenity, liveability and biodiversity along the banks of the canals.
3. Activate near-canal environments, with public toilets to improve public health outcomes.
4. Establish a case study and a demonstration project to support capacity building activities.
5. Enhance capacity in local industry to adopt and implement water sensitive approaches.

Application of shared knowledge on water planning and governance

The project created new knowledge by presenting an alternative to traditional, siloed disciplines of drainage, sanitation and waterways.

Key to this were the high-level visions for each city and an accompanying narrative on the role of nature-based solutions and decentralised technologies in realising this vision. The visions and narratives were co-developed between the VMC, the AP CRCDA and the Australian partners.

"This project has helped (to) develop the concept design for the water features within Amaravati. This has involved shifting the original designs for water in the central park blocks from traditional European layouts of structured, open water bodies, to more a water sensitive layout inspired by wetland ecosystem services."

– CRCWSC team member

The visions and narratives helped to secure high-level support for the projects. For instance, in Vijayawada we found that the vision was able to 'pull people back' to an agreed goal at various stages of the project. Similarly, the hierarchy of actions emphasised the long-term nature of the transformations required. This allowed space to address the more culturally challenging aspects of the vision whilst demonstrating value and applicability through lower order actions.

"The blue-green grid narrative proved important as the high level concept … was able to secure support for the project and was used during the project to bring people back to 'vision' at various stages when refocusing was needed."

– CRWSC Lead project designer

The Amaravati strategy presents a city-scale proposal for water security that uses stormwater as a source of supply to build climate resilience. This strategy has influenced the plans and design guidelines for buildings, main roads and large parks in the AGC and has created a template to influence future stages of the capital city design. This link between water planning and urban design is critical new knowledge for these two disciplines.

"The Amaravati Blueprint recommends that water be managed at a range of scales – building, street, central park and flood canal – using an approach that harnesses soil and plants to treat and infiltrate stormwater. This provides a wide range of benefits to cities. Examples include green roofs and lot-scale biofilters which are being mandated through the AGC Sustainability Guidelines and biofilters along major roads will be incorporated into the detailed streetscape masterplans."

– CRCWSC team member

The Vijayawada vision and narrative connected the context at the top of the canal sub-catchment to neighbourhood streets, local sanitation and drainage issues, and at-source control at the canals. From this, a hierarchy of issues and actions was developed. This hierarchy resulted in a typology of solutions at the catchment, neighbourhood, lot and at-source scales.

Each of these approaches are consistent with Australian practice, but differ from current knowledge and practice in Indian cities which relies on end-of-pipe solutions that are easily overwhelmed by poor practices in the catchment.

Strengthened capacity of individuals and organisations

We found that the concept of water sensitive cities was understood by the partners in Amaravati, but there were capacity gaps around how to implement these approaches.

Both projects utilised co-design workshop processes to strengthen the capacity of in-country partners. The team engaged practitioners at the VMC and AP CRDA through a series of co-design workshops. Over 40 staff from different disciplines and organisations were involved in these workshops across the two projects. These participants included senior officials. For example, the July 2019 co-design workshop was attended by Commissioner of the VMC. He attended for the full duration of the workshop and embraced the concepts of raingardens, biofilters and water sensitive urban design. This visible support created an authorising environment for the VMC engineers and planners, and confidence that the ideas would be further developed.

"The level of (water sensitive urban design) skills before the CRCWSC project was 'moderate'. These skills are now better, to the extent of the theory. This was achieved through interactive sessions. The practical implementation of (these theories) … still need to be verified … by seeing/experiencing the ground implemented projects."

– Sri Gowri Shanti Medisetty, Associate Planner (Infrastructure), AP CRDA

Although the water sensitive approach has achieved high level political support, practitioners do not yet have a mature understanding and there remains some scepticism as to the applicability of these solutions. One of the tasks in strengthened capacity was to identify and empower local champions at the practitioner level. These are local practitioners who will actively advocate for the new approaches.

"These guidelines have embedded water sensitive thinking in the design work of all the consultants working in Andhra Pradesh. (Now) everyone is on the same page."

– CRCWSC Team member

In the Amaravati project, capacity building also included a Design Manual and a capacity building program. In August 2019, a four-day training program was delivered to AP Capital Region Development Authority and water professionals from other cities. The training was delivered in partnership with the Centre for Sustainable Environment and had a focus on building the capacity of water engineers, scientists, architects and urban planners to utilise water sensitive urban design. Amaravati was used as a learning case study, and members of the CRCWSC team

participated as expert trainers. Participants came from a number of Indian States, including a cohort from the AP Capital Region Development Authority. By the end of the training, attendees were able to demonstrate their understanding of the principles, approaches and technology. Notably, the AP CRDA participants reported that they now had a greater appreciation of the CRCWSC project and the value of its recommendations. Participants from other cities reported an interest in water sensitive approaches, and the course has resulted in an active, ongoing WhatsApp network amongst participants.

"The overall experience and training agenda was excellent ... It is very good that we had national and international perspective."

– Madhura Joshi, Partner, Lab A+U Design Studio

"Excellent work by CSE."

– T. Srinivasulu, Sr. Architect, AP CRDA

"The workshop really helped me a lot... The best thing was CSE invited people who are specialist for all parts of the world."

– Shivon Mehta, Civil Engg. Student at Manipal University, Jaipur

Adoption of more equitable, efficient and sustainable policies, practices and tools

The adoption of more efficient and sustainable practices has been an outcome of both projects.

In Amaravati these have been embedded across multiple design guidelines and designs. The Strategy for Amaravati provides water quality objectives, infrastructure and urban design recommendations and technical justifications. The outcome is a clear strategy with a vision, numerical targets to define what success looks like, concept designs to deliver these targets and technologies that deliver benefits for runoff quality, flooding, water resource security and city greening.

Lot scale recommendations (rainwater tanks, green roofs) are being embedded in the AGC Sustainability Guidelines. Street scale biofiltration is being incorporated in street cross section designs and master plans being delivered by Hafeez Contractors. The wetland design has been integrated with the central water body masterplan proposed by STX landscape architects.

"The CRCWSC (has) proposed to have biofilters in the medians of the road where it is practically possible to implement and also suggested to have green roof and planter box with climbing plants for biofiltration. (These) components like bio filtration at building level and streetscape level will be incorporated in the AGC Sustainability Guidelines which are not yet finalised."

– Sri Gowrie Shanti Medisetty, Associate Planner AP CRDA

The Vijayawada project emphasised the adoption of gender equitable outcomes. It achieves this by respectfully challenging traditional cultural perspectives on the role of sanitation services inside the house. Traditionally, the largely patriarchal view is that toilets within houses are unhygienic. This perspective is not necessarily shared by women. If the water sensitive concept is accepted, lot-scale sanitation services will be delivered as part of the overall catchment solution. As part of the proof-of-concept for the benefits of sanitation services connected to sewers, siting public toilets closer to the canals has been placed higher in the hierarchy of actions.

Development of trusted and valued partnerships

Partnerships were developed at multiple levels, and this was critical to the successes achieved.

At a government-to-government level, partnerships were fostered through co-funding by the Australian and Andhra Pradesh Governments. The project MoU and contracts were signed in front of the Chief Minister.

To leverage this, further partnerships were fostered within the AP Government. These included the departmental Principal Secretaries, as well as the Vijayawada District Collector and the VMC Commissioner. This was further leveraged when the VMC Commissioner agreed to participate in the full day design workshop in July 2019 (see above).

While this approach established strong partnerships at a political level, at times it also meant that the partnerships were more 'push' than 'pull' at a practitioner level.

"One of the first tasks in supporting strengthened capacity was to identify and empower local champions at the practitioner level. This is not yet done. If local champions are not empowered in the medium term it will present a risk to the project."

– CRCWSC team member

"Extensive engagement with women has been difficult. In-country Partners have been male dominated. The aim of the project is that better sanitation outcomes for women, and the ensuing wider environmental and health benefits, will be provided as a result of the larger blue-green grid concept being accepted."

– CRCWSC team member

For the Amaravati project, partnerships extended to other international consultants working on the project, including Fosters+Partners and STX. Both recognised the innovative approach to urban water developed by the CRCWSC and invited collaboration. The STX proposal for the central park area made to the March 2019 AGC landscape workshop reflected this collaboration.

"I have enjoyed our collaboration and hope that there are other opportunities for us to work together in the future."

– Sherman Stave, Principal, STX Landscape Architecture

The CRCWSC team enlisted a number of its own partner organisations to help deliver the projects. This resulted in business opportunities to continue the work in Amaravati (with Alluvium), in other AWP bids (with Alluvium) and domestic project partnerships (Realm Studios and E2 DesignLab). As a result of the Amaravati project, Alluvium's Indian partner Terracon was engaged to provide technical advice to the Vijayawada project.

"Pleasingly the project has contributed to establishing valued partnerships between two of our CRCWSC partners – Realm Studios and Alluvium – and public and private sector actors in Andhra Pradesh. The team members from Realm and Alluvium were quickly recognised and valued for their expertise in water sensitive practice. This has further enhanced the reputation of Australian water sector expertise in India."

– CRCWSC team member interview

Lessons learned

Several lessons can be drawn from the two projects.

- Water sensitive city approaches are in demand in Indian cities. These approaches work both in the planning of new cities, and for retrofitting in existing cities.
- Australian urban water expertise is valued by partners in India (and international consultants). The project teams were quickly recognised as experts and this helped the teams quickly gain trust.
- The Vijayawada project has highlighted the inertia in current practice, with institutional arrangements being identified as a barrier to better outcomes. Additionally, there is variable recognition of the scale of existing water pollution problems across the city by responsible municipal and departmental staff.
- The high level visions and narratives are useful to gain political buy-in and provide an 'anchor point' when introducing new concepts and practices.
- Practical guidance materials help to identify, and lock in, implementation pathways across disciplines.
- Collaborative working models have further scope for urban water management in India where the institutional framework is otherwise hierarchical and fragmented. Such models enable water to be leveraged into broader city shaping disciplines of sanitation, waterway management, amenity, and urban design.
- Political support provides legitimacy and ensures that new ideas can be put on the table. But a network of practitioner champions is still needed to ensure innovation is implemented.
- Collaborating with other international consultants builds influence and provides integrated proposals to the client. This was not part of the original AWP Agreement scope but proved invaluable when implementation pathways were being developed.
- The ultimate success of the project relies on trusted relationships with the client organisation and local stakeholders. This trust was developed quickly with higher ranking officials in the AP Government, and was maintained throughout the project. Building similar levels of trust with officers in different organisations took longer. Upon reflection, the operating model of 'fly-in, fly-out' can be a barrier to trust building. Future projects would favour fewer but longer missions.
- Payment by the Indian Government can be problematic. At time of reporting, we continue to experience payment issues and have enlisted diplomatic support from DFAT. We recommend that AWP actively discusses risk mitigation strategies in agreements with the Indian Government.

B9. Supporting river basin planning in India

Summary

In 2016, the Government of India Ministry of Water Resources, River Development and Ganga Rejuvenation (now Ministry of Jal Shakti) asked the AWP to develop a User Guide for River Basin Planning in India, as a contribution to the National Hydrology Project (NHP). The AWP established an expert team to develop the Guide and to work with Central and State Indian water resources agencies, drawing on Australian experience in the Murray-Darling Basin, and Indian experience in the Krishna Basin. Development of the User Guide was informed by a Policy and Regulatory Review of river basin management, planning and institutional arrangements in India, with a focus on the Krishna Basin.

Between 2016 and 2019, five sets of meetings and four capacity building workshops were held in India at New Delhi, Pune, Bengaluru and Mumbai, with officials from Central and state water resources agencies. In November 2018, senior officials from Krishna Basin states undertook a Technical Visit to the Murray-Darling Basin. The officials visited water infrastructure on the River Murray, irrigation farms and infrastructure in the Murray and Goulburn River valleys in New South Wales (NSW) and Victoria. The activity included discussions and workshops with officials, scientists and leaders from the Australian, NSW, Victorian and South Australian governments. This was a very successful activity in catalysing interest in Australia's experience and how it may apply in India. The User Guide for River Basin Planning in India (and accompanying distilled guide) and the Water Policy and Regulatory Frameworks Review will be published in late 2019.

Location	India
Dates	June 2016 – August 2019
Total budget	AU$670,233.78
International partners	Government of India Ministry of Jal Shakti (MoJS), Central Water Commission (CWC), World Bank, Water Resources and Irrigation Ministries in Indian states of Maharashtra, Karnataka, Telangana and Andhra Pradesh
Australian partners	Alluvium, Access Water Management, Institute of Sustainable Futures University of Technology Sydney. (Contributors to the Technical Visit to the Murray-Darling Basin are also gratefully and warmly acknowledged but too numerous to list here).

By the numbers

Integrated river basin planning could benefit many of India's **1.3 billion** people. India is home to 17.5 % of the world's population and has 4% of the world's freshwater resources, across **24** river basins and **101** sub-basins.

47 participants took part in **4** workshops and multiple meetings in India

8 senior officials from **4** Indian states from the Krishna River Basin visited the Murray-Darling Basin and met with **32** experts from **21** Australian government and private sector organisations

3 knowledge products were developed, including a Policy and Regulatory Review, a User Guide for River Basin Planning in India, with **28** case studies, and a shorter Distilled Guide

Activity context

The pressures on Indian river systems and groundwater resources are increasing as population increases, urbanisation accelerates, food production needs increase, fisheries are impacted and water quality declines. Addressing these pressures, alongside emerging climate change enhanced extreme events, will require acquisition and effective use of data and information, clear governance and responsibility for decision-making, engagement with agricultural and urban communities and other water user interests, and a framework to make choices about distribution of water resources and the associated costs and benefits.

The Government of India's (GOI) NHP aims to address water management challenges in India by strengthening the institutions and water information required for integrated water resources management. The NHP, with US$750M comprising lending from the World Bank and contribution of the GOI, involves 49 implementing agencies across all states and union territories of India with components aimed at enabling improved decision making for water resources planning and operations: A) Water Resources Data Acquisition System; B) Water Resources Information System; C) Water Resources Operations and Planning; and d) Institutional Capacity Enhancement. Through these components the NHP aims to build both improved water information products (components A and B), as well as the institutional capacity – technical, policy and planning capacity – of state and federal agencies to use the collected data for river basin planning and groundwater planning (components C and D).

In support of the NHP, the Ministry of Jal Shakti (formerly known as the Ministry of Water Resources, River Development and Ganga Rejuvenation and hereafter referred to as 'Ministry') and the World Bank, asked the AWP to undertake a review of policy and regulatory settings in India and to identify and recommend potential options for reform to support River Basin Planning and the NHP. The Krishna River Basin, covering areas of Maharashtra, Karnataka, Telangana and Andhra Pradesh states, was selected as a focus for the activity.

The Krishna River flows for 1400km, the Basin covers 258,948 km^2 with a population greater than 70 million and per capita water resource availability of 1,133m^3. As the project evolved, the team were asked to ensure the project incorporated states from other river basins.

Activity implementation

The initial consultation took place in June 2016 in New Delhi with the Ministry, CWC and the World Bank. The (then) Secretary of the Ministry asked AWP to develop a practical User Guide for Indian River Basin Planning and Implementation, drawing on Australian experience in the Murray-Darling Basin, and Indian experience in the Krishna Basin.

Research and development of a Policy and Regulatory Review was undertaken in mid–late 2016, drawing on global best practice literature from river basin planning, experience in the Murray-Darling Basin and review of legislation and policy in the Krishna Basin. In November 2016, the AWP team attended and presented at an International Seminar *Towards Reliable Data Acquisition Systems* after centenary celebrations at the Centre for Water and Power Research Station in Pune, Maharashtra. Following the conference, the state of Maharashtra hosted a workshop attended by officials from the Central government water agencies, the World Bank and the states of Maharashtra, Karnataka, Telangana, Andhra Pradesh, Chhattisgarh and Odisha. The draft Review was circulated, and officials discussed common issues of concern in river basin management.

Workshop with Central and State agencies November 2016

During 2017 a draft User Guide was developed, which described a process of the key stages and elements for an iterative and adaptive river basin planning process, together with discussing a range of tools and case studies for river basin planning. Planning was undertaken for a visit to the Murray-Darling Basin and Australia by senior Indian officials, but this was deferred by the Indian authorities for administrative reasons.

In March 2018, the AWP team was invited by the Ministry and World Bank to host a participatory workshop with Central and state agency officials. This workshop, held in New Delhi on 16 March 2018, was considered successful in gaining attendance and a highly engaged dialogue with the Ministry, CWC, National Institute of Hydrology (NIH), and the state water agencies of Maharashtra, Telangana and Chhattisgarh.

AWP (with cooperation, facilitation and support from the Ministry) invited senior executives to attend a Technical Visit to the Murray-Darling Basin. 8 senior executives attended the Technical Visit from 18–24 November 2018, from Maharashtra, Karnataka, Telangana and Andhra Pradesh. The Visit began in Canberra, with presentations and discussions with AWP, DFAT and researchers from Geoscience Australia (GA) and the Commonwealth Scientific and Industrial Research Organisation (CSIRO). The visitors then travelled to Albury to inspect the Hume Dam, Mulwala Canal, Yarrawonga Weir and various sites of river and irrigation infrastructure. This included an overview of water sharing and water management between states and the Murray-Darling Basin Agreement. Visitors heard about the Australian experience of water reform and engagement in river basin planning, as well as pollution control and regulatory compliance and enforcement. In Shepparton, Indian river and irrigation developments and groundwater management case studies were discussed. Rubicon hosted the visitors at their headquarters, discussing water delivery and irrigation infrastructure, together with a tour of their factory.

Indian Technical Visit delegation at Yarrawonga, Victoria, November 2018

At Tatura, Goulburn-Murray Water demonstrated the operation of irrigation delivery technology, together with Supervisory Control and Data Acquisition (SCADA) systems. A highlight was a visit to a large irrigation farm, where the officials met with the farmer and were able to discuss how the farm and the business operated in the context of Australia's water market. The visitors were particularly impressed with how few people were able to operate a large irrigation property, as well as with the degree of control the farmer had over his own decisions on planting, irrigation, crop sales, water portfolio and water trading. The visit concluded with a day in Melbourne and active discussions on management of groundwater and the interconnection with surface water. A session on the Murray-Darling experience of river basin planning included Australian hydrological modelers, lead state negotiating officials and Karlene Maywald, former South Australian Minister for the River Murray. Early in the week, delegates requested fact sheets regarding Murray-Darling Basin surface and groundwater resources, water development and water users, as well as the drivers and development of the Murray-Darling Basin Plan. These were developed rapidly in response to the request and were used by delegates for their visit reports.

In March 2019, capacity building workshops and other meetings were held in Bengaluru, Karnataka, Pune and Mumbai, as well as in New Delhi and were attended by 47 Indian participants.

Feedback was received from participants on the User Guide and later through circulation of the draft User Guide.

The team is currently finalising the User Guide for River Basin Planning in India (in concise and extended versions) and a Water Policy and Regulatory Frameworks Review, to be published in late 2019. The User Guide describes the planning and implementation pathway broadly as a cyclic process with six key stages, focused around ongoing and inclusive community engagement, as shown below.

Key elements and stages described in the User Guide for RBP in India

Assessment of outcomes

Application of shared knowledge on water planning, allocation and governance by governments, industries and civil society

During the capacity building workshops and the Technical Visit to the Murray-Darling Basin, as well as through the preparation of the User Guide, the team was able to participate in a two-way knowledge exchange with Indian water resource managers, policy makers and engineers. This included discussion of the Murray-Darling Basin river basin planning and water policy reform experience, Australian state water policy reform and water planning, establishment of river system needs, sustainable groundwater management, limits to extraction, shares in the available water, allocation arrangements and supply and demand management tools. Governance arrangements were discussed, the process of negotiating trade-offs in developing river basin plans, together with arrangements for implementation and compliance.

It is envisaged the User Guide will be directly applicable and relevant to current developments in water resources management in India. At the time of writing, India's draft River Basin Management Bill 2018 was undergoing consultation processes with states and Non-Government Organisations. The Bill provides for the establishment of River Basin Authorities to regulate and develop interstate rivers and river basins. The Bill seeks to enhance participation and cooperation among the basin states and interbasin water management and at the same time allow equitable and sustainable utilisation of water. The Bill promotes conjunctive and integrated management of water resources, and defines integrated river basin management (IRBM) as 'a process which promotes the coordinated development and management of water, land and related resources in a river basin, in order to optimise the river basin's resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems'.

Intended outcomes from the User Guide for River Basin Planning in India

The User Guide can be applied by water resources planners in Central and state government agencies, as well as stakeholders in water planning and management. If adopted, application of the suggested stages and strategies will enable engagement, negotiation and resolution of disputes on water sharing. The strategies described will enable decision-making on management of rivers

for multiple benefits across jurisdictions and for multiple water users, including agriculture, urban water, fisheries, power, navigation, as well as addressing water quality, pollution and regulation issues.

Implementation of the User Guide's six key stages will assist Indian water policy and management practitioners to gain momentum in river basin planning by rising above the detailed technical information to focus on key strategic elements, focused around ongoing and inclusive community engagement throughout the process of developing, implementing, learning and reviewing a river basin plan.

The User Guide recommends an initial focus on establishing policy, legislation and governance arrangements, followed by an inclusive process to develop a vision and objectives that encompass all values, uses and users of the river basin. A situation assessment is a key step to establish baseline information, shared issues of concern and the case for an integrated plan. Continuing from the situation assessment, the application of information, data, models and ongoing engagement is used to develop the long-term strategies and plan elements and tools to address the issues. The User Guide canvasses a number of strategies to address common issues of concern for river basin planning. Once strategies are selected and a river basin plan is established, it is important to focus on ensuring implementation takes place, accountabilities and responsibilities are clear and that progress on actions is publicly reported. A further important part of both planning and implementation is a program of monitoring, evaluation, reporting and learning, that will support operations and compliance, together with review at the appropriate time. This leads to adapting the river basin plan to build on what is learned from implementation and ongoing community engagement.

AWP intends to launch The User Guide for River Basin Planning in India, the Distilled User Guide and the Water Policy and Regulatory Frameworks Review at the 2nd International Conference on Sustainable Water Management, in Pune, Maharashtra, India, in November 2019.

Lessons learned

Key lessons learned from the activity include:

- While water infrastructure development for food security in India is a current priority, there is significant interest in Australia's experience in establishing river system needs, sustainable surface water and groundwater management. There is significant interest in how Australia has established its entitlement systems and in Australia's allocation processes that can respond to varying water availability and in Australia's water management regulatory frameworks.
- A key event fostering engagement and dialogue was the Technical Visit to the Murray-Darling Basin by Indian state officials. The opportunity to spend time with water resources managers and Australian farmers and to assess water infrastructure and technology in action stimulated positive dialogue. Preparing key statistics and fact sheets on Australian water resources can also assist dialogue.
- Establishing a local, in-country representative with strong networks (Mr Vijay Kumar) made a significant difference to the project by fostering engagement and facilitating project activities. Prior to this appointment the project was challenged by lack of continuity in engagement with key officials in India, particularly as there is regular turn-over of senior officials in the Indian central and state governments.
- Engagement with India will be more successful if there are champions in India to drive the partnership at the Indian end. Therefore, establishing professional relationships with people in Central and state government agencies, at less senior levels who understand and want the engagement, is critical to a project's success, and complementary to engagement at senior executive levels. Engagement with India on water resources management projects will be benefitted by a commitment to long-term partnerships given the need to develop relationships and for deep understanding of context.

- It is important for projects to have clear and well understood GESI guidelines and expectations – in terms of the number of women/minorities involved, as well as *how* they are supported to participate, in line with the AWP GESI guidelines. It is key that in-country representatives are aware of these commitments and help to drive compliance with the AWP GESI policy given their understanding of the local context.
- Future engagement in India would benefit from a gap analysis and a needs and demand assessment to target Australian engagement/efforts (so offerings meet needs of stakeholders and In-country Partners). AWP investments would benefit from increased integration with existing programs/ priorities (e.g. NHP) and clear lines of sight about how AWP projects will be used by, and integrated into, existing initiatives and larger scale programs (such as those enabled by the World Bank finance). It was not entirely clear to the project team how this project connected to the NHP.
- The project found that technical visits are best done in smaller groups (especially if senior personnel are involved) so that higher level sign off is not required, thereby avoiding administrative hurdles and the risk of cancellation. Technical visits should consider the range of staff that might benefit from such visits, including early career public servants, women, and other minorities who may not get such opportunities in other ways due to being overlooked / discrimination / norms. Where AWP is funding or co-funding the visit, it is reasonable for AWP to insist on appropriate visitor diversity.
- Some examples of river basin planning were found at the sub-basin level, and for the Ganga, but little evidence of whole of catchment planning and coordination was found elsewhere. India is currently managing water at the state level (along political boundaries), and so engagement with India needs to start from there, and build towards more integrated, transboundary watershed management. It will be interesting to see where the Draft Bill on river basin organisations get to, as this could be a policy game changer, if it is enacted.
- Engagement with India would benefit from multi-stakeholder partnerships including NGOs, academics and the multiple relevant agencies from Central and state government in order for policy engagement and recommendations to be more holistic and meeting the needs of a broader range of stakeholders and fulfilling the intention for river basin planning to follow an integrated water resources management approach.

B10. Australian WaterTools: A pilot project to support the UN ESCAP Drought Mechanism

Location	Australia, Cambodia
Dates	September 2017 to May 2019
Total budget	AU$525k
International partners	UNESCAP
Australian partners	eWater, GA, BOM

Summary

AWP is committed to supporting the application of Australia's National water tools that can be readily and rapidly applied at a national scale to assist sustainable water management and water use. In this activity, AWP provided support for a project led by eWater for the integrated application of three key Australian WaterTools, eWater Source, Open Data Cube Technology and the Bureau of Meteorology (BOM) water forecasting tools to trial an innovative approach for developing national-level assessments of water availability and water scarcity to support the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) Regional Drought Mechanism Program pilot project in Cambodia.

The Regional Drought Mechanism is part of the UNESCAP Regional Space Applications Programme for Sustainable Development, it provides governments and farmers with a toolbox of space-based products, information and services to support evidence-based, proactive decision-making in response to drought. The initiative also provides training and technical support in the use of the available products and information.

The activity integrated three of Australia's key water management tools to integrate satellite rainfall, in situ data and global climate data sets to develop new water availability metrics and communications products for the Drought Mechanism:

- eWater Source – Australia's National Hydrological Modelling Platform
- BOM – Streamflow Forecasting Systems
- Geoscience Australia (GA) – Digital Earth Australia Open Data Cube.

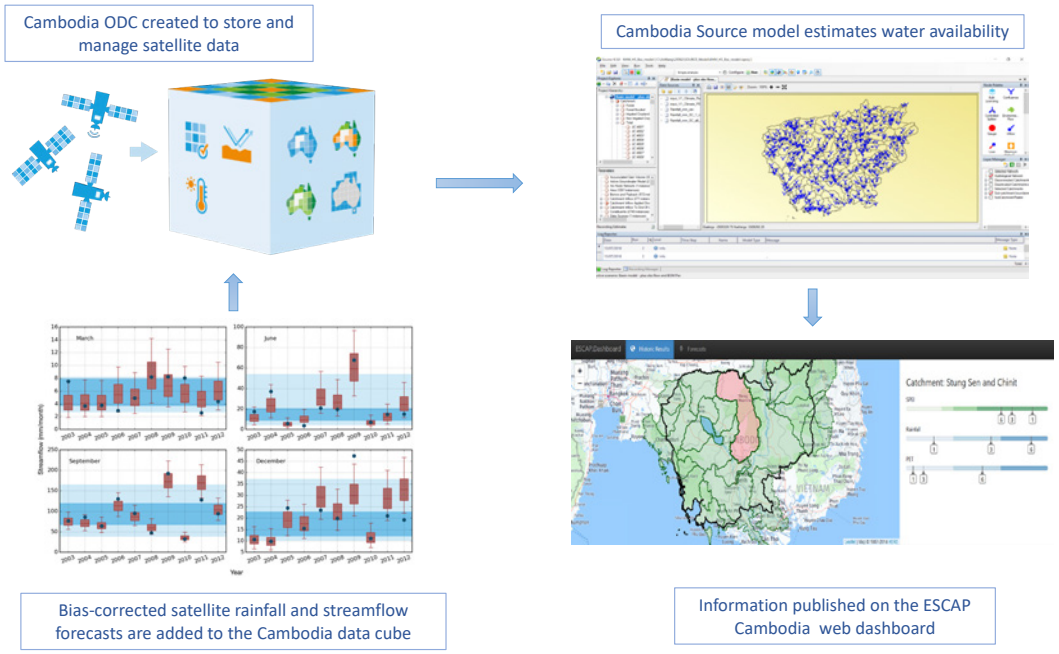
The project successfully demonstrated that it is technically possible to integrate the three tools to increase data reliability through the blended approach in data sparse areas. If fully adopted, the approach used in the pilot project could provide water managers and users access to better information, and lead to improved water management and governance in activity locations.

The activity is described in AWP's knowledge piece *WaterTools: A guide to three national level platforms to support the management of Australia's scarce water resources* (https://waterpartnership.org.au/wp-content/uploads/2019/08/WaterTools.pdf). WaterTools showcases the three tools; eWater Source, Open Data Cube technology and the BOM's water forecasting tools and includes the UNESCAP pilot as a case study to highlight the potential benefits of using the tools together.

Activity context

Drought has significant social, economic and environmental impacts, on individuals and countries alike. The UNESCAP Regional Drought Mechanism (Drought Mechanism) provides governments and the broader community with information to help them prepare and plan for drought. The technology uses remotely sensed information to generate drought maps and drought metrics, such as a Crop Water Stress Index and a Soil Moisture Index.

The Drought Mechanism currently focuses on meteorological drought which is drought caused by the lack of rainfall and the associated impact on soil moisture. The mechanism is currently unable to estimate the impact of low water availability or the lack of access to water (also referred to as hydrological drought). Low water availability can also have significant impacts on water



Project workflow, showing how the three tools work together to produce water availability metrics

users and communities. Including metrics for hydrological drought would enhance the Regional Drought Mechanism.

This project sought to develop additional metrics for the Drought Mechanism to reflect low water availability. Due to the lack of on-ground streamflow gauges in Cambodia, the project trialled an innovative approach that uses satellite data to estimate rainfall and stream flow, that are then used as inputs to a Source model to estimate water availability.

Activity implementation

The project had four key components:

1. Building a Cambodia Open Data Cube to manage space-based water information.
2. Data processing, by connecting the data cube with the BOM's tools for improving rainfall estimates and streamflow forecasting. The improved information is returned to the data cube for use in the Source model.
3. eWater Source connects to the data cube, to extract the information needed to build a simple hydrological model. The model estimates water balance and water availability.
4. A series of hydrological drought metrics are generated from the eWater Source model and processed and presented in a user-friendly format, available at http://escap.ewater.org.au/

Assessment of outcomes

Hydrological drought metrics, such as low water availability estimates traditionally rely on information from extensive on-ground rainfall and streamflow gauging networks. Such networks do not exist in many countries where hydrological drought can be a significant issue, such as Cambodia. The pilot project demonstrated that hydrological drought metrics can be produced from space-based data, supplemented with on-ground rainfall and streamflow gauging networks, thus providing more reliable information for water managers and water users.

The focus of the activity was to demonstrate the feasibility of producing the information. If taken further and adopted operationally, the approach could make available a range of new information to support more sustainable water management, by governments, industries, individual water users and help communities respond to water scarcity. For example:

- One month in advance streamflow forecasts support farmers to take early action to prepare for forecast low water levels, such as pumping to farm dams, for use on crops when stream flows fall below pumping levels.
- Reduce the time taken to collect water, by providing information on where river flows are best for collecting water.
- Information comparing current streamflow with past years can help water managers and water users plan their activities, based on their previous experiences, for example if a rice crop failed under similar conditions in the past, farmers might decide to plant something else.

The integrated product provides a way to overcome data limitations. Despite this, effective on-ground networks will continue to be important; the new information can help water managers prioritise areas for investing in on-ground networks. For example, it would be logical to first invest in areas where the integrated technique did not produce results of an appropriate quality.

An additional benefit of the integration of data cube technology with the Source software was that it increased the climate and streamflow data available to support the eWater Source model but also dramatically improved the efficiency of gathering data. This could potentially open up the benefits of hydrological modelling to areas where data availability and/or quality has been an issue.

The outcomes thus far suggest that the integrated tool suite could produce hydrological drought metrics in circumstances where limited on-ground data would previously have prevented such analysis. Suggesting, that if made operational, the approach would increase the water data and information available to support more sustainable water management, by government water managers, water users and the general community. Further, the development of an online dashboard and simple graphics to communicate the information makes the results more accessible and would support broader adoption.

By both sharing the tools and by looking at innovative ways of applying the tools outside the Australian context, the pilot highlights Australia's commitment to being a trusted and valued partner in water resources management in the Indo-Pacific and beyond.

Lessons learned

The most significant lessons learned from the project were around the challenges of availability of, and access to data and of trying to work within the broader priorities of other partners.

The project was dependent on components of the Drought Mechanism's existing drought metrics. These metrics were unavailable in the timeframes originally advised by the producers of the information. Fortunately, the problem was identified early, and changes to the methodology were made to develop an alternative approach. It highlights the challenges of working within broader initiatives, where smaller projects have limited influence on priorities and timeframes. Ensuring a full understanding of the overall project, maintaining good communications and being adaptive are vital when working on a small component of a broader initiative.

Access to data is a common problem with modelling projects. In this activity, demonstrating a technique to overcome data limitations was a key component of the work. However, the activity still had some data-dependencies, due to the need for some on-ground data to verify the accuracy of the method. Delayed access to this data affected the choices of test catchments. Unfortunately, this meant that communication products were unable to be tested with water managers and water users, due to the final catchments not matching with those of interest to our In-country Partner, the Cambodian Agricultural Value Chain Program (CAVAC). Potentially, this may have been avoided through a more detailed understanding of the work of CAVAC

or identifying a wider range of In-country Partners at the start of the project. While user testing would have provided insights into the most appropriate type and format of the information, the activity demonstrated the feasibility of producing publicly available hydrological drought metrics.

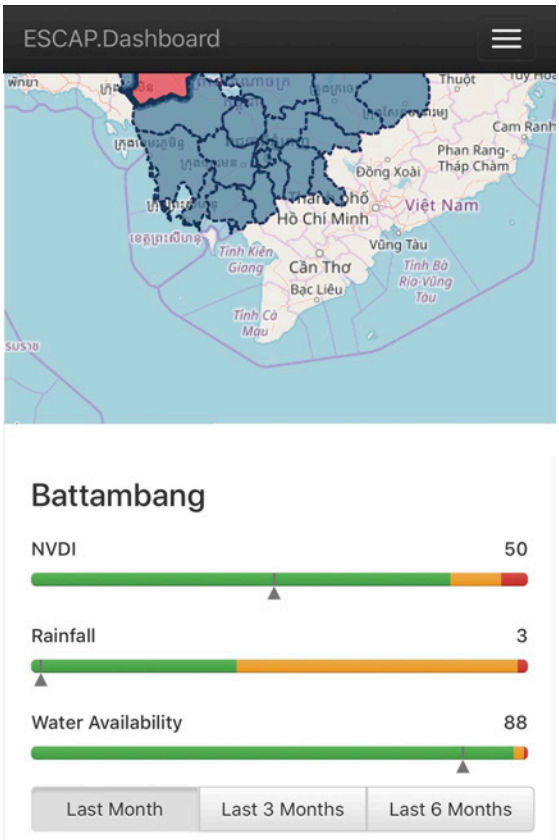
Despite good project planning, both of the problems described above were difficult to foresee. This highlights the importance of flexibility and recognising the overall benefits of a project, rather than a 'tick the box' approach to deliverables.

Tools trialled under this activity

Hydrological drought metrics: An interactive Standardised Precipitation-Evaporation Index (SPEI) shows the drought conditions experienced at a certain time and how that compares to other times. SPEI is a measure of drought severity, based on intensity and duration. It can help identify the onset of drought, the end of drought and comparison of droughts over time.

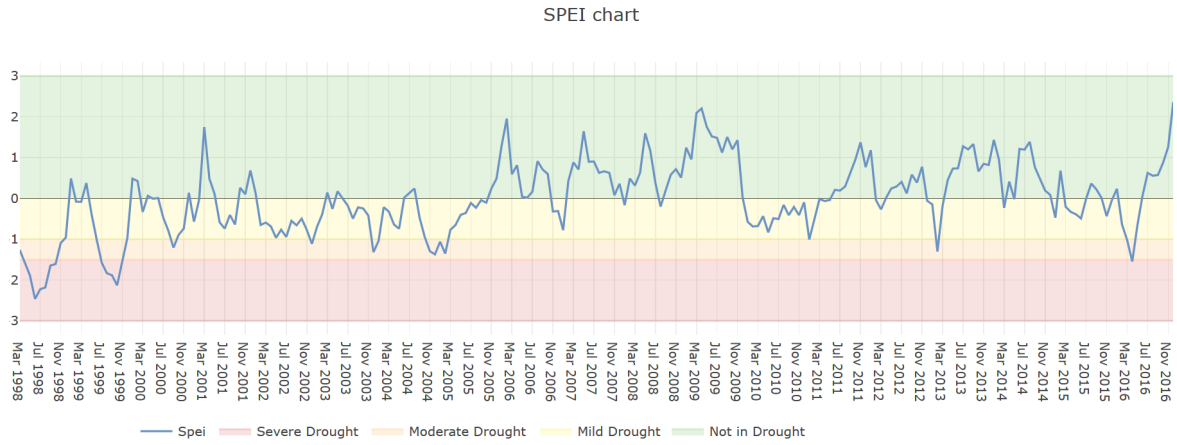
Another example of the information available, this shows the mean monthly flow, and how it compares to the mean monthly flow in specific years. It shows the range of possible flows, helping water managers and users understand how the flow could change, how it compares to flows at other times of the year or to past conditions.

The dashboard can be accessed via smartphones, potentially increasing both the number of people that will access the information and how the information is used.

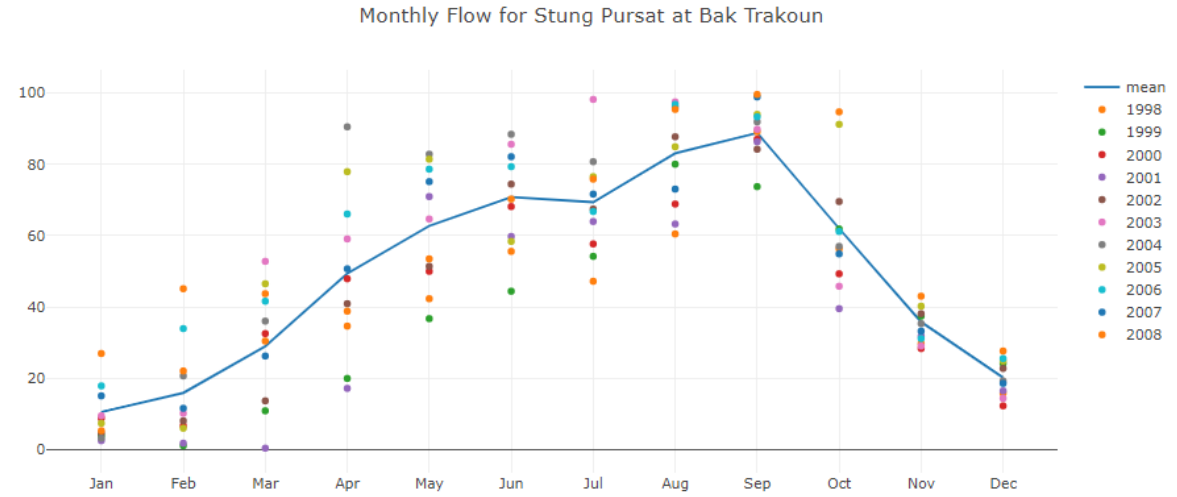


Example of ESCAP smartphone dashboard

NB: Normalised Difference Vegetation Index (NVDI), is a measure of plant health



Interactive Standardised Precipitation-Evaporation Index



Monthly flow for Stunt Pursat at Bak Trakoun

Australia

water partners for development

waterpartnership.org.au