



4th Asia-Pacific Water Summit
Kumamoto Japan 2022

FOURTH ASIA-PACIFIC WATER SUMMIT SHOWCASES AND ROADMAPS

2022



Table of contents

| | |
|---|----------|
| INTRODUCTION | 3 |
| 4TH APWS SHOWCASES | 4 |
| Australia / Australia Aid..... | 6 |
| Water for Women Fund: gender in WASH - impact assessment (Cambodia and Nepal) | 6 |
| Australia / Australia Water Partnership | 8 |
| Driven action together for water security and climate resilience (Indonesia) | 8 |
| Japan / Ministry of Land, Infrastructure, Transport and Tourism (MLIT) | 10 |
| Lake Biwa comprehensive conservation initiatives in Shiga, Japan | 10 |
| National census on river nature environment of over 30 years to contribute to climate change adaptation | 12 |
| Nature-oriented river works..... | 15 |
| Efforts for efficient wastewater treatment under a legal framework | 18 |
| Japan / Japan International Cooperation Agency (JICA) | 23 |
| Capacity enhancement for sustainable agriculture and irrigation development in Mizoram (India) | 23 |
| Participatory agriculture development in Savannakhet Province (Lao PDR) | 25 |
| Participatory irrigated agriculture development project in southern areas along the Mekong (Lao PDR) | 27 |
| Promotion of irrigated agriculture in Terai Plain (Nepal)..... | 29 |
| Sustainable management of water utility through services improvement with Okinawa Water Bureaus (Samoa) | 32 |
| Myanmar | 34 |
| Policy making support for reducing flood disaster risk and poverty in Myanmar | 34 |
| Sri Lanka | 37 |
| Association between socioeconomic features and risk of flood damage: a local-scale case study | 37 |
| Food and Agriculture Organization (FAO) | 39 |
| Efficient Agricultural Water Use and Management Enhancement in Paddy Fields | 39 |
| UN HABITAT..... | 42 |
| GSF (Nepal)..... | 42 |
| Encouraging Climate Adaptation and Mitigation Investments through Private Sector Engagement in Decentralised Wastewater Treatment Systems (DEWATS) and Small-scale Water Supply Infrastructure (Lao PDR)..... | 44 |
| Enhancing the climate and disaster resilience of the most vulnerable rural and emerging urban human settlements (Lao PDR)..... | 47 |

| | |
|--|-----------|
| Waste wise cities: tackling plastic waste in environment (India)..... | 50 |
| Asian Development Bank (ADB) | 52 |
| Januay community-managed water supply system (Philippines) | 52 |
| Karanataka model for sustainable urban water service delivery (India) | 56 |
| Betag Climate Resilient Flood Mitigation Project in the Municipality of La Trinidad, Province of Benguet (Philippines) | 60 |
| Ningxia integrated ecosystem and agriculture development project (PR China) | 64 |
| Wuhan urban environmental improvement project (PR China) | 66 |
| Global Water Partnership (GWP) | 68 |
| Community participation in domestic gray water treatment using constructed wetland (Indonesia)..... | 68 |
| Innovative policy for water conservation in Yangtze river basin: river chief system (PR China) .. | 71 |
| Local community organization for small reservoir safety management (Vietnam)..... | 73 |
| National strategy on water management and development of irrigation 2021-2023 (Uzbekistan) | 75 |
| Promoting women social entrepreneurship through water ATMs in low income communities for safe water access (India) | 78 |
| Sponge city construction promotes high-quality urban development (PR China)..... | 82 |
| International Water Management Institute (IWMI) | 85 |
| Based flood insurance (India, Bangladesh and Sri Lanka) | 85 |
| Stockholm International Water Institute (SIWI)..... | 88 |
| Foundations for source-to-sea management: Vu Gia-Thu Bon case study (Vietnam)..... | 88 |
| 4TH APWS ROADMAPS: PLANS TO PROMOTE QUALITY GROWTH..... | 90 |
| Japan / Cabinet Secretariat | 91 |
| Promoting efforts to maintain or recover sound water cycle..... | 91 |
| Japan / Japan International Cooperation Agency (JICA) | 93 |
| Disaster risk reduction through pre-disaster investment to gradually augment structural measures for supporting whole society and economy..... | 93 |
| Participatory irrigation management..... | 94 |
| Practical integrated water resources management..... | 96 |
| Supporting the growth of water utilities..... | 98 |
| Tajikistan..... | 100 |
| Rogun HPP project implementation for quality growth..... | 100 |

INTRODUCTION

This document gathers case studies from Asia-Pacific countries. They showcase quality growth and infrastructure development (hard and soft) in the Asia-Pacific region that can be shared with other countries. The case studies come from each country and follow a format that was suggested by the 4th APWS Secretariat.

This document also collects roadmaps from each organization. They include plans to promote the quality growth. The concerned organizations are those that are involved in the nine parallel thematic sessions and other national/international organizations. Each government and international organization voluntarily provided the case studies.

This document will be disseminated widely to share the experience and promote the diffusion of good practices throughout the Asia-Pacific region. It will be distributed electronically to the participants at the venue. It will be posted on the website of the 4th APWS. This document will also be introduced at Stockholm World Water Week, UN-Water Decade Mid-term Review Conference, as well as other relevant events.

This document is the result of the collective effort of the participants in the 4th APWS. The organizations involved in the nine parallel thematic sessions were asked to collect the cases during the preparation process of the parallel thematic sessions. In addition to the cases that will be introduced in the parallel thematic sessions, cases that could not be introduced in the parallel thematic sessions are also included. Submissions from organizations not participating in the Summit were also welcome. Embassies were asked to cooperate in these submissions. Countries and international organizations submitted case studies between December 2021 and March 2022.



4TH APWS SHOWCASES

This section gathers case studies from Asia-Pacific countries. They showcase quality growth and infrastructure development (hard and soft) in the Asia-Pacific region that can be shared with other countries. The case studies come from each country and follow a format that was suggested by the 4th APWS Secretariat.

Countries and partner organizations introduced projects to contribute to quality growth in Asia and the Pacific, which is replicable elsewhere in the region. Initiatives were described with graphics, tables, and figures. For each action, the country, a project title and an overview of the project are provided, along with the major sources of financing. For each project, the contribution to quality growth is analyzed in terms of sustainability, resilience, and inclusiveness. Countries and partner organizations also share the points to be proud of projects in terms of governance (participation from multi-stakeholders, transparency, openness, inclusiveness, etc.), investment (life cycle cost, operation & maintenance cost, debt sustainability, investment without business delay, etc.), and science and technology.

List of showcases by 4th APWS thematic session:

- **End-to-End Efforts for Shifting onto a Sustainable and Resilient Path under Climate Change by All**
 - **Japan/MLIT:** National census on river nature environment, of over 30 years to contribute to climate change adaptation
 - **Indonesia:** Driven action together for water security and climate resilience
 - **UN HABITAT:** Enhancing the climate and disaster resilience of the most vulnerable rural and emerging urban human settlements (Lao PDR)
 - **UN HABITAT:** Encouraging Climate Adaptation and Mitigation Investments through Private Sector Engagement in Decentralized Wastewater Treatment Systems (DE-WATS) and Small-scale Water Supply Infrastructure (Lao PDR)
 - **ADB:** La Trinidad (Benguet) Flood Mitigation Project (Philippines)
 - **GWP:** Sponge city construction promotes high-quality urban development (PR China)
 - **GWP:** Local Community organization for small reservoir safety management (Vietnam)
 - **IWMI:** Based Flood Insurance (India, Bangladesh and Sri Lanka)
- **Sustainable Water Management in Agriculture for Asian Region**
 - **Japan/JICA:** Capacity Enhancement for Sustainable Agriculture and Irrigation Development in Mizoram (India)
 - **Japan/JICA:** Participatory Irrigated Agriculture Development Project in Southern Areas along the Mekong (Lao PDR)
 - **Japan/JICA:** Participatory Agriculture Development in Savannakhet Province (Lao PDR)
 - **Japan/JICA:** Promotion of Irrigated Agriculture in Terai Plain (Nepal)
 - **FAO:** Sri Lanka-Zambia Rice
 - **ADB:** Ningxia Integrated Ecosystem and Agriculture Development Project (PR China)
 - **GWP:** National Strategy on Water Management and Development of Irrigation 2021-2023 (Uzbekistan)
- **Achieving universal and equitable access to safe and affordable drinking water for all**
 - **Japan/JICA:** Sustainable Management of Water Utility through Services Improvement with Okinawa Water Bureaus (Samoa)
 - **UN HABITAT:** Access to safely managed Sanitation and Behavior Change (Nepal)

- **ADB:** Karnataka Model for Sustainable Urban Water Service Delivery (India)
- **ADB:** Janiway Community-Managed Water Supply System (Philippines)
- **Toward the realization of appropriate wastewater management to contribute to sustainable development**
 - **Japan/ MLIT-MOE-JSC:** Efforts for efficient wastewater treatment under a legal framework
 - **GWP:** Community Participation in Domestic Gray Water Treatment Using Constructed Wetland (Indonesia)
- **Water and environment from source to sea: Multi-level governance for sustainable natural and social environment**
 - **Japan/MLIT:** Lake Biwa Comprehensive Conservation Initiatives in Shiga, Japan
 - **Japan/MLIT:** Nature-oriented River Works
 - **UN HABITAT:** Waste Wise Cities: Tackling Plastic waste in Environment (India)
 - **ADB:** Wuhan Urban Environmental Improvement Project (PR China)
 - **GWP:** Innovative Policy for Water Conservation in Yangtze River Basin: River Chief System (PR China)
 - **SIWI:** Foundations for source-to-sea management: Vu Gia-Thu Bon case study (Vietnam)
- **Science and policy collaboration to advance on gender equality and reduce poverty related to water sector**
 - **Australia:** Water for Women Fund: Gender in WASH - Impact Assessment (Cambodia and Nepal)
 - **GWP:** Promoting Women Social Entrepreneurship through Water ATMs in low income communities for safe water access (India)
- **Maintaining or recovering a sound water cycle to develop a quality society**
 - **Japan/MLIT:** Multi-layered and tri-purpose river administration of water-related disaster prevention, proper water utilization and environment conservation
 - **Sri Lanka:** Association between socioeconomic features and risk of flood damage: a local-scale case study

For page numbers, please refer to the Table of Contents.





Australia / Australia Aid

Water for Women Fund: gender in WASH - impact assessment (Cambodia and Nepal)

Project overview: Since 2019, the Institute for Sustainable Futures at the University of Technology Sydney has been working with partners in the Water for Women fund to support civil society partners in measuring and exploring connections between gender equality and water, sanitation, and hygiene (WASH). Globally, women and girls often bear the responsibilities for WASH, including water collection, cleaning, cooking, and childcare. And consequently, poor WASH disproportionately affects women and girls. Previous scholarship has shown that transformed gender dynamics are fundamental to inclusive and sustained WASH improvements. Likewise, that improvements in WASH can be a pathway to strengthened gender equality. This project has designed a set of quantitative and qualitative tools to support projects in understanding the connections and evaluating change over time. Quantitative - The team developed the Water, Sanitation, and Hygiene Gender Equality Measure – the [WASH-GEM](#). The WASH-GEM was developed through a collaborative process, informed by a review of relevant literature and engagement with practitioners and specialists in gender, WASH, and international development. The tool has been tested and refined through three rounds of collaborative piloting in Cambodia and Nepal. Qualitative – Creating the [qualkit](#), our team curated a set of eight visual storytelling approaches tailored for exploring gender equality and social inclusion themes in WASH programming. The approaches are supported by 16 techniques for data collection, analysis and sensemaking, including card sorting, journey mapping and personas of change.

Funding: This project is funded under Australian Aid's [Water for Women Fund](#) as a Research, Impact, and Innovation Grant.

Contribution to quality growth

Sustainability and resilience: There is much evidence that women's meaningful engagement in WASH programs can increase the effectiveness, resilience, and sustainability of interventions. This is primarily because women are the traditional managers of WASH for the home. The tools developed and tailored in this project can support programs in evaluating the extent to which women (and men) benefit from and contribute to better WASH outcomes.

Inclusiveness: One of the most interesting aspects of this project is how it 'flips' the standard WASH theory of change upside down. We often think that ensuring gender equality and social inclusion within programs can lead to better WASH outcomes. However, it is also true that improvements in WASH can strengthen gender equality and social inclusion within societies. The WASH-GEM and the qualkit aim to understand this reversed theory of change and how better WASH can support inclusion. This is often because WASH, as a fundamental right and primarily a women's responsibility, is a strong entry point to address forms of inequalities that exist in many societies.

Points to be proud of the project

Participation: This project came about from a voiced need from project partners in Asia and the Pacific to better explore and understand the links between equality and WASH. The measure, approaches and techniques have all been designed and tested in collaboration with teams in Cambodia, Nepal, India, Bangladesh, and Pakistan. Deeper partnerships with teams in Cambodia and Nepal have provided additional space to understand the boundaries and opportunities to use the tools.

Innovations: There are three areas of innovation that we are proud of:

- Promotion of the concept of the 'upside-down theory of change'. That gender equality can be influenced by improvements in WASH.
- Design of the WASH-GEM tool which directly explores how WASH can lead to better gender equality outcomes in societies.
- Curation of the qualkit tools which can foster gender equality both the process of using them and the outputs that come from them.

Other notes

- Learn more about the qualkit [here](#).
- Learn more about the WASH-GEM [here](#).
- Learn more about ISF's Water for Women gender work [here](#).





Australia / Australia Water Partnership

Driven action together for water security and climate resilience (Indonesia)

Overview: There is a growing recognition on the need for joint action on water as practices and compliance to standards on water remain low, and the challenges too vast to be tackled by one stakeholder only. In January 2021 the Indonesia Water Coalition (IWC), a multi stakeholder partnership of leading public, private and other actors with the common objective to actively support the civil society and government in achieving water security and sustainability of the water resources was officially launched through a virtual charter signing event. Yayasan AWS Indonesia, as one of IWC founding members and with support from Water Stewardship Australia and the Australian Water Partnership, has been actively supporting capacity building and sharing on water stewardship including training and strategy development with the rest of IWC members.



Major source of financing: Australian Water Partnership and IWC members' own contribution.

Contribution to Quality Growth

The Indonesia Water Coalition vision is the water security in Indonesia that supports people, environment, and economic development. The Coalition aims to build a movement led by the private sector, with the capacity and commitment to take action on and contribute to the complex water challenges in select high priority basins. In the longer term, the Coalition is a platform for collaboration and ignites participation of a wider scope of water users in these priority basins.

Sustainability: A so-called first mover on water can be a challenging task, and the implementation of the AWS Standard around the world shows that first movers can use the AWS Standard as a practical framework to start understanding and planning for water-related risks and opportunities, both at site and catchment level. Yayasan AWS Indonesia aims to support opportunities for joint and credible action by AWS members. Yayasan AWS Indonesia works with 2 IWC members and AWS Professionally Credentialed consultants from Royal Haskoning DHV Indonesia to explore opportunities for water stewardship implementation and involvement of wider key stakeholders at basin level. The outcomes from this activity will support the IWC members to continuously making informed decisions on the water stewardship program for their sites and to advance their commitment as IWC members to work towards joint action for water security in Indonesia.

Resilience: The IWC members aims to promote the adoption of sustainability standards and implementation of good practices that support sustainable management of water resources. This is through capacity building, strategy development, promotion, and implementation of the AWS Standard as a framework for joint and credible action on water to build climate and water resilience.

Inclusiveness: The IWC members aims to create an enabling environment to build and upscale sustainable management of water resources at basin level, including governance and financial mechanisms.

This is to enable wider participation of more leading private and public sector actors in the priority basins in the future.

Points to be proud of the project

Governance: The founding members of the IWC, Yayasan Konservasi Alam Nusantara, Yayasan Aliansi Wali Sumber Daya Air Indonesia, PT Coca-Cola Indonesia, Global Water Partnership Southeast Asia, PT L'Oréal Indonesia, PT Multi Bintang Indonesia, PT Nestlé Indonesia, PT. Tirta Investama (Danone Indonesia), and PT Unilever Indonesia, Tbk, shared a common ambition to actively and openly support the civil society and government in achieving water security and sustainability of the water resources in Indonesia using collective action on multiple fronts. Establishment of three working groups, they are: Communication & Partnership, Program Management and Advocacy & Knowledge Management. This is to ensure the achievement of its ultimate goal, which is water security that supports people, environment, and economic development in Indonesia. These three working groups were elected through voting by members.

Investment: The IWC programs in 2022 are planned to align with existing government programs and each of the IWC members' own initiatives to ensure effective resource mobilization and contribution of knowledge development in high priority basins.



Science and technology: Individually, the members of IWC have been actively driving innovations and stakeholder engagements to support water security in Indonesia. To raise more awareness on good practices by IWC members and encourage cross-learning among members, a Good Practices Booklet of IWC members are published in 2021. The booklet compiled selected success stories from IWC members such as on-site water circularity, construction of rainwater storage, ground water recharge system, waste trap and recharge wells are compiled into a [Good Practices Booklet](#) launched in 2021. A [report](#) identifying the building blocks for a roadmap on joint action by the Indonesia Water Coalition in western Java in 2021 by Yayasan AWS Indonesia. The Coalition aims to jointly develop a publicly accessible digital platform to host key information related to water stewardship at basin level and research studies in priority basins. The Coalition aims to develop in-depth basin profiles, water risks assessments at basin level and business & economic values from good water stewardship implementation assessments at basin level for high priority basins as a basis for joint action and investment on water.

Other related: The Coalition is open to any organization interested to join as Member so long as such organization has a commitment towards sustainable management of water resources in Indonesia. Applications for new membership shall be formally submitted to Steering Committee for consideration and approval.





Japan / Ministry of Land, Infrastructure, Transport and Tourism (MLIT)

Lake Biwa comprehensive conservation initiatives in Shiga, Japan

Overview: Shiga Prefecture is home to Lake Biwa, freshwater lake, the largest lake in Japan. The water of Lake Biwa supplies not only Shiga, but also Kyoto, Osaka, and Hyogo, to support the daily lives of 14.5 million people and industry across the greater Kansai region. Lake Biwa is also valued as a treasure trove of diverse ecosystems. People living in Shiga have been connected to Lake Biwa since ancient times, reaping the rich bounty of its waters, and living in harmony with the forces of nature. In 2015, the Law on Lake Biwa Conservation and Restoration was enacted, and Lake Biwa gained recognition as a National Asset. Under this Law, all residents of Shiga will take part in initiatives concerning water quality and the conservation and restoration of the ecosystems.



Contribution to Quality Growth



Mother Lake Goals

Lake Biwa, Shiga, Japan

In 2021, Mother Lake Goals (MLGs) were established as SDGs for Lake Biwa. These 13 goals are themed around the lake, and initiatives are in place to achieve SDGs through projects which protect Lake Biwa. Furthermore, Shiga, which is home to Lake Biwa and knows the importance and value of lakes and reservoirs in the global

environment, created and held the World Lake Conference where people who work for lake environments gather. Shiga also collaborates with organizations such as the International Lake Environment Committee to mainstream lakes and reservoirs in the global water agenda.

Sustainability: Enactment of the Ordinance to Reed Colony Conservation, which are home to diverse wildlife, and engage in initiatives to restore reed colonies, which not only create the beautiful original scenery of Lake Biwa, but which also helps naturally purify the lake water. Lake Biwa was registered under the Ramsar Convention in 1993. Continued restoration of attached lakes and biotopes which serve as breeding and development grounds for native fish species and hosting on-site viewing events which allow local residents to become familiar with these environments. Promoting Shigarism: a kind of tourism where people can feel nature through Biwaichi, a bike trip around Lake Biwa, and enjoy meeting other people. Promotion of the Fish Cradle Rice project, which recognizes rice fields as an extension of the breeding and development grounds for native fish, and build canals linking rice fields to Lake Biwa which allow native fish to swim upstream. Accelerated construction of sewer infrastructure to improve water quality through reduction of inflow load. The population penetration of wastewater treatment in Shiga is 99.0%, the 2nd-highest rate in Japan, including combo treatment septic tanks. (2021) Development of the next generation through provision of 2-day overnight boat

trips on the educational vessel Uminoko to give opportunity to every 5th grade student of elementary schools in Shiga to learn about Lake Biwa’s environment through onboard study activities.

Resilience: Construction of embankments in consideration of estimated water levels during flooding, and adjustment and management of Lake Biwa’s water levels using Seta River Weir, Lake Biwa’s only natural outflow river. Publication of the first Local Hazard Map in Japan which considers flooding of smaller rivers and waterways in addition to major rivers, and establishment of the Ordinances on Promotion of Shiga Basin Flood Control in 2015.

Inclusiveness: Development of initiatives which allow all people connected to Lake Biwa to contribute to the achievement of SDGs through MLGs, following the MLGs concept of “Change starts with you and me.” In order to promote the MLGs, many workshops, attended by people of all ages, as well as businesses and NPOs, are held.

Aspects of the project that can serve as a model for Asia-Pacific countries

Governance: In 1977, the first major bloom of freshwater red tide occurred in Lake Biwa. After synthetic detergents containing phosphorus were identified as the main cause, a social movement known as the Soap Movement spread across Shiga, primarily among housewives, and called for residents to “use powder soap and avoid using synthetic detergents.” As a result of this movement, Shiga enacted the Eutrophication Prevention Ordinance in 1979 to regulate phosphorus. Thanks to reduction of inflow load, blooms of red tide have been successfully suppressed. July 1st was designated as Lake Biwa Day in 1980. Every year on this day, cleanup activities are held across every region of the prefecture, residents share their love for Lake Biwa, and projects to help save the environment are put into action. The Mother Lake Forum & Biwa Community Meeting is just one example of other Lake Biwa conservation and restoration initiatives held in cooperation by government agencies, residents of Shiga, and NPOs.



Investment: Shiga is working in partnership with the government of Japan on environmental conservation projects for Lake Biwa. Additional initiatives are already in progress following the enactment of the law on conservation and restoration of Lake Biwa. Embankments and internal drainage facilities are being constructed with funds from local governments downstream which rely on water from Lake Biwa, and sustainable management practices are enforced. Shiga also funds environmental conservation projects with donations received on a prefectural level, including direct donations from people who are passionate about the environmental conservation of Lake Biwa, and donations from private companies which are interested in ESG investment in the form of partial proceeds from sales of products with charity agreements.

Science and technology: Lake Biwa is home to the Lake Biwa Environmental Research Institute and the National Institute for Environmental Studies Lake Biwa Branch Office. These research facilities monitor the most up-to-date status of Lake Biwa, which is reflected in policies. Companies receive government assistance to develop technology and products from aquatic plants that flourish in Lake Biwa. Commodities made from plant-based materials include compost, glass art, and leather goods. Multi-layered and tri-purpose river administration of water-related disaster prevention, proper water utilization and environment conservation.



Japan / Ministry of Land, Infrastructure, Transport and Tourism (MLIT), Public Works Research Institute (PWRI), Japan River Front Research Center (RFC)

National census on river nature environment of over 30 years to contribute to climate change adaptation

Overview: Growing the awareness ecosystem conservation as a whole society, National Census on River Nature Environment, hereinafter simply “Census”, have been comprehensively conducted for over 30 years at all rivers directly managed by Ministry of Land, Infrastructure, Transport and Tourism and principal ones managed by Governors of Prefectures. The Census is conducted by the river administrator for each river. The subjects of the Census are fish, benthic organisms, terrestrial insects, amphibians, reptiles, mammals, birds, plants, and river utilization. The Census is conducted every 5 years, but some items done every 10 years. The Census results are summarized for each river (for rivers with long lengths, for each section), and published on the web.



The results of the Census are used to understand the environmental impact of river planning, design, construction, etc. by grasping and analyzing the actual conditions and impacts in the river environment, and will be used for countermeasures as well as the protection of precious species. It is also used for measures against alien species / domestically imported species. It is also useful for academic research and civic group activities.



The technical manuals on the Census have been prepared, and thanks to this there is little variation between rivers, certain reliability is ensured, and they are comparable to each other. Furthermore, a system has been established to receive the advice of experts who are familiar with the natural environment of the survey area. New technologies are being actively introduced so that more efficient and detailed surveys can be carried out, including surveys of aquatic organisms using environmental DNA. Furthermore, cooperation with environmental surveys at the basin level other than rivers is being promoted.

In the near future, we will grasp the impact of the progress of climate change, provide valuable information for future prediction, and provide important information for studying adaptation measures.

Major source of financing: Mainly budget from Central / Local Government

Contribution to Quality Growth

Sustainability: According to the River Law, "environment" is one of the three purposes of river administration. And a river administrator has responsibility to continuously investigate and grasp the conditions of river environment and preserve good river environment coordinating with river improvement and maintenance.

Resilience: Based on the data accumulated through continuous Censuses of the river environment, it is possible to take appropriate measures against physical changes in rivers such as river improvement and maintenance that affect the river environment and changes in species due to climate change. In particular, environmentally friendly river improvement can achieve both disaster prevention and environment conservation

Inclusiveness: The results of the Census are widely used not only by river administrators but also by a variety of stakeholders such as policy makers, biological researchers, engineering consultants, fishermen, and residents' groups.

Points to be proud of the project

Governance: The fundamental information on the river environment, which has been continuously and comprehensively accumulated for more than 30 years, contribute to the decision-making of river improvement and maintenance work in consideration of the river ecosystem as well as various researchers, residents' groups, private businesses, etc. It is the basis for the participation of various parties in the conservation of the river environment.

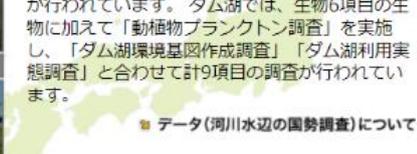
Investment: The Census shall be the basis for that budgeting for the conservation on river environment by river administrators (central or local governments) for natural environment conservation and measurement that take it into consideration. The survey will also be an incentive for citizen groups, private businesses, etc. to provide funds for river environment conservation.

Science and technology: A database that is highly reliable and can be compared with the past and between rivers based on a unified technical manual and expert advice. We will constantly improve research technology and improve efficiency and enhancement by utilizing new technology (including the use of environmental DNA).

Others related: The database, which has been accumulated over a long period of time, provides a benchmark for understanding and forecasting the impact of future climate change, and provides basic information for studying countermeasures.



全国の河川・ダム生物調査データを配信

| 鳥類 | 魚類 | 陸上昆虫類 | 動物プランクトン |
|---|--|---|---|
|  |  |  |  |
| 両生類・爬虫類・哺乳類 | 河川水辺の国勢調査は、河川では、「魚類調査」「底生動物調査」「植物調査」「鳥類調査」「両生類・爬虫類・哺乳類調査」「陸上昆虫類等調査」の6項目の生物調査と、植生図と瀬・淵や水際部の状況等、河川構造物を調査する「河川環境基図作成調査」、河川空間の利用者数などを調査する「河川空間利用実態調査」の計8項目の調査が行われています。ダム湖では、生物6項目の生物に加えて「動物プランクトン調査」を実施し、「ダム湖環境基図作成調査」「ダム湖利用実態調査」と合わせて計9項目の調査が行われています。 | | |
| 底生動物 |  データ(河川水辺の国勢調査)について | | |
| 植物・環境基図 | | | |

河川環境データベースシステム

提供データの一覧とダウンロード
 (地方毎に各種別の確認種の一覧データ(Excel)とGISデータ(シェイプ)をダウンロードします。)

河川水辺の国勢調査の各リンク

| | | |
|----------|-------|---------|
| データ作成基準類 | 生物種目録 | 調査結果の概要 |
| 空間利用実態調査 | 文献一覧 | |

お知らせ・更新情報

- 2022/02/25 「令和2年度河川水辺の国勢調査結果の概要(ダム湖版)(生物調査編)」(プランクトン以外)を公開しました。
- 2022/02/25 「令和2年度河川水辺の国勢調査結果の概要(河川版)(生物調査編)」を公開しました。
- 2021/11/25 2019年魚類調査結果の提供データのうち、富士川と斐伊川の「イソミミズハゼ」を「ミミズハゼ属の一種」と修正しました。

(c)copyright2007: Ministry of Land Infrastructure, Transport and Tourism all right reserved

The URL is the following: www.nilim.go.jp/lab/fbg/ksnkankyo/index.html



Japan / Ministry of Land, Infrastructure, Transport and Tourism (MLIT)

Nature-oriented river works

In 1896, the government of Japan enacted “River Law” for public profit promotion and disaster risk reduction. Under the law, public agencies had been improving rivers in Japan. The law was revised in 1964 to cover water resources management. River authorities had been constructing basic river infrastructure to enhance flood control safety and water use security, and to encourage social-economic activities. At the end of the 20th century, the economic growth gradually changed public attention. Japanese people emphasized qualitative richness rather than quantitative abundance and desired amenity and relaxation in daily life. They required natural environment, beautiful sceneries, historical atmosphere, cultural satisfaction and especially great expectations for precious riverfront open spaces enriched by water and greenery.

Hence the Ministry of Construction (succeeded by the Ministry of Land, Infrastructure, Transport and Tourism (MLIT)) initiated the Nature-oriented River Works. It was river improvement projects intending to respect innate breeding environment of creatures and also preserve or create graceful sceneries of nature. It was started as a trial in river improvement projects and installed into all river works including disaster recovery operations. These efforts transformed former river improvement for flood control and water use into expanded river management to balance flood, resources and environment. It resulted in secondary revival of the River Law in 1997 to internalize “river environmental management”.

Under the new legal framework, river authorities have conducted all river works as the nature-oriented type and increased achievements which satisfied both flood control and environmental functions. In the meantime, considerable river works leaved concerns to deteriorate river environment due to incomplete research of specific environmental prosperities, stereotypical planning by a standard cross section, or flattened design of riverbed and riverbank. For that reason, “Review Committee of Nature-oriented River Works” advocated “Activating Nature-oriented River Works” in 2006. The recommendation pointed out questions like absence of the common concept, congestion of technical challenges, insufficiency of support scheme, and luck of human resource development. The key messages are to enhance natural characteristics and mechanisms in order to revive sound river environment and reunite people to rivers.



Kamisaigo River after improvement
(photo by Dr. Hironori Hayashi, 2007)



Kamisaigo River after restoration
(photo by Dr. Hironori Hayashi, 2015)

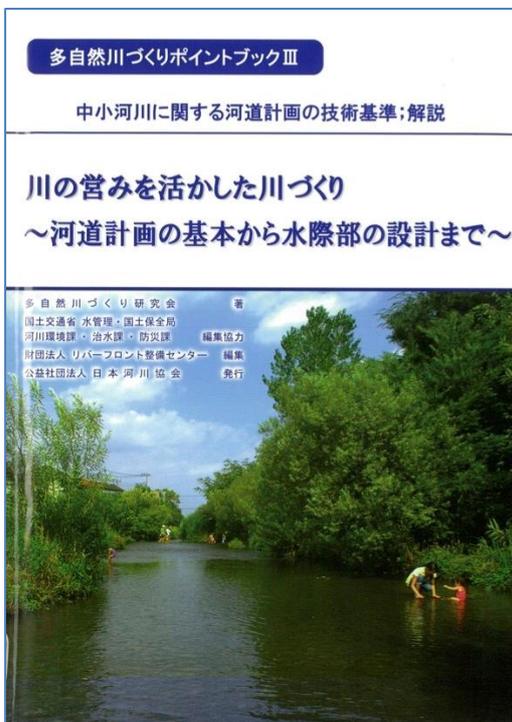
Receiving the recommendation, the MLIT redefines the Nature-oriented River Works as total river maintenance to consider natural behavior of rivers, harmonize with local livelihood, history and culture, preserve innate creature's habitats for settlement, growth and reproduction, and create a variety of river sceneries. River authorities were required to broaden their perspective from river sites to river basins, integrate human activities and natural behaviors, and take adaptive approaches to variable river conditions.

After two decades since the River Law revival, "Promotion Committee of Nature-oriented River Works" indicated "Towards Sustainable and Practical Nature-oriented River Works" in 2017. The recommendation appreciated actual achievements including publication of technical guidelines, utilization of environmental information, scholarly researches in river ecology, and advisory system for river works, and then order suggested river authorities to implement custom-made river maintenance to respect ecological diversity and social, historical and cultural identity.

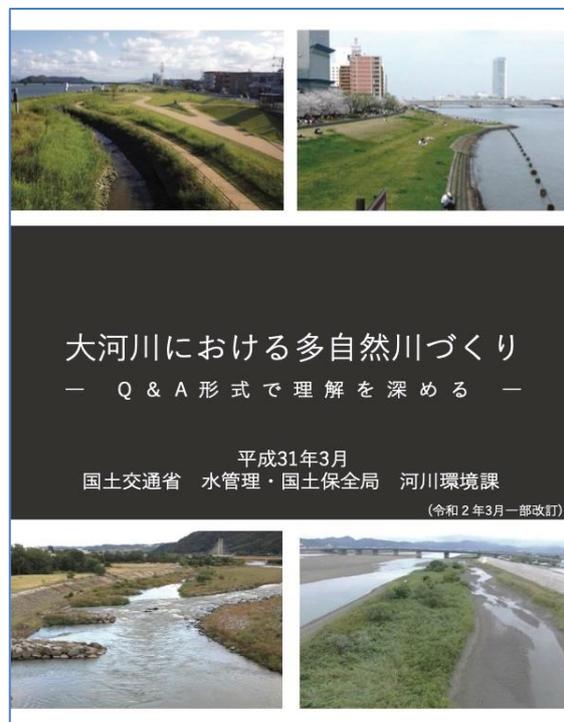
In particular, many critical points are highlighted such as target setting for the whole basin environment, technical development of environmental evaluation methods, field experimentation to leverage natural power in river works, cause analysis of successful/regrettable lessons, cooperation with local residents and collaboration with ecological experts are highlighted. And also personnel training and public awareness, sustainability building with civil/private sectors, chronological review of river improvement and usage, climate change impacts and population decline influence are emphasized.

In order to make social/natural environment sustainable, river authorities should firstly prioritize autonomous maintenance with power of the nature, and secondarily install well-designed maintenance for environmental well-being. River-society relationship and authority-residents partnership becomes more important.

Point Book on Nature-oriented River Works (2011)



Disaster Recovery Works to Build-Back-Better Landscape (2014)



The government of Japan should develop the Nature-oriented River Works, which are one of the principal projects for the Green Infrastructure promotion, towards:

1. Basin-wide approaches to manage more serious and frequent flood/drought events,
2. Total ecological conservation in rivers, catchment areas and flood plains, and
3. Citizen-driven scheme to promote flood/water use/environmental management.

We have mandate to transfer beautiful rivers to the next generation as the common property of Japan.

Environment Management Sheets in practical river management (2019)

- <https://www.mlit.go.jp/river/kankyo/main/kankyou/tashizen/pdf/point3.pdf>
- http://www.japanriver.or.jp/publish/book/tashizen_3.htm

Q&A in the Nature-oriented River Works in large-scale rivers (2020)

- https://www.mlit.go.jp/river/shishin_guideline/kankyo/tashizen/qa.html

Guidelines on Ecological Networking around Rivers (2021)

- http://www.rfc.or.jp/pdf/seitaikei_nw_R2.2.pdf
- https://www.mlit.go.jp/river/pamphlet_jirei/kankyo/gaiyou/panf/seitaikei_network_hyoka.pdf





Japan / Ministry of Land, Infrastructure, Transport and Tourism (MLIT), Ministry of the Environment (MOE) and Japan Sanitation Consortium (JSC)

Efforts for efficient wastewater treatment under a legal framework

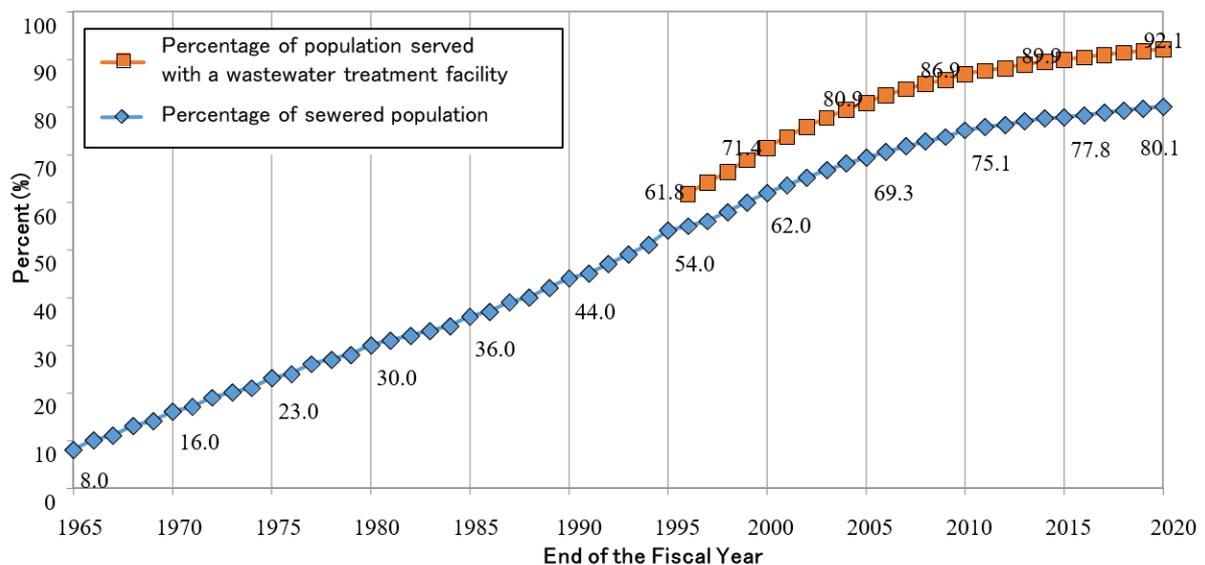
Overview: In Japan, the diffusion of high-quality wastewater treatment facilities is steadily progressing through an appropriate setting of legal targets (environmental standards) and the development and establishment of a legal system, technical standards, and an enforcement system to meet these targets. Financial support and the collection of user fees by the government are stipulated in the law. As a result, a systematic and stable dissemination and operation management of wastewater treatment facilities have been achieved. In order to efficiently disseminate wastewater treatment facilities, local governments formulate a "prefectural concept plan" for selecting efficient and appropriate diffusion methods in accordance with the characteristics of various wastewater treatment facilities, their economic efficiency, social condition changes, etc. Based on this concept plan, projects are implemented in a planned and appropriate manner. Advanced measures are being put into practice using facilities that respond to policy issues such as energy conservation, energy generation, recycled water utilization, and wastewater epidemiological surveillance.

Major source of financing: Project costs are covered by government subsidies based on the law and the establishment and collection of appropriate user fees. Total project cost of sewerage projects in FY 2019, including local independent projects: 1,485.9 billion yen (source: Local Public Enterprise Yearbook, Ministry of Internal Affairs and Communications)

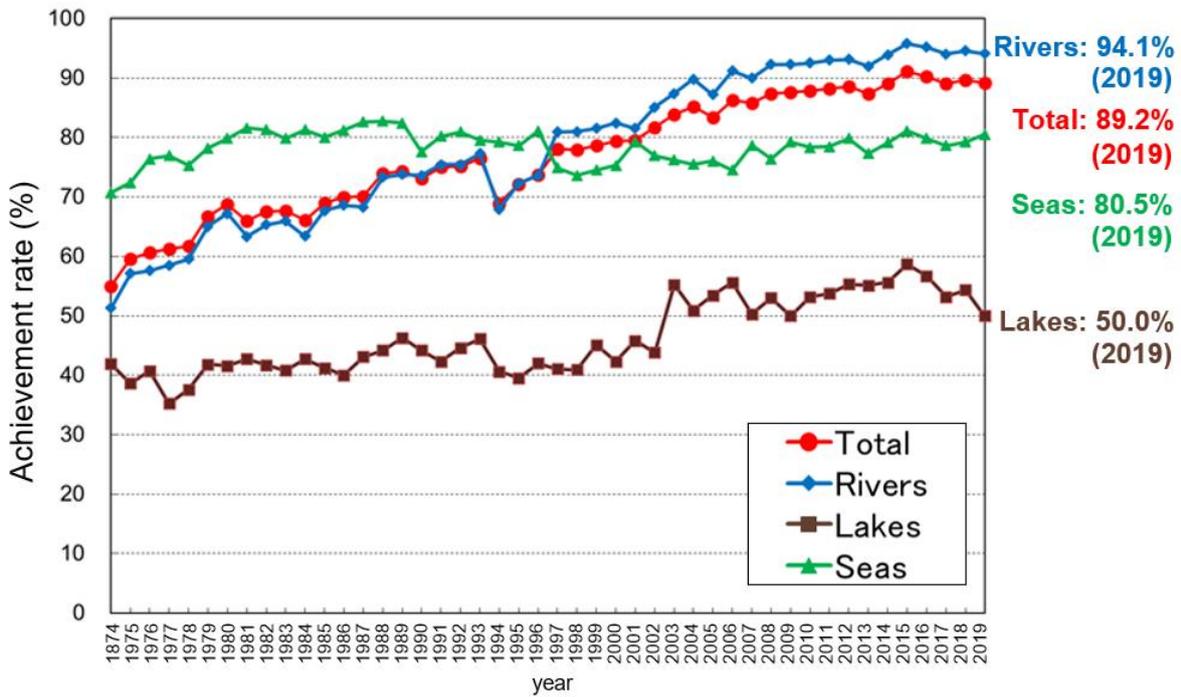
Contribution to Quality Growth

The increase of the population covered by a wastewater treatment facility and the improvement of quality in public waters contribute to the healthy economic growth of Japan.

Transition of the population served with a wastewater treatment facility



Trends in achieving environmental standards (BOD/COD parameters)



Sustainability: The diffusion and management of facilities complying with the effluent standards stipulated in the Water Pollution Control Law, Sewerage Law, and other laws contribute to ensuring public health and protecting the environment of public waters. The obligation to make efforts for the re-use/recycling of wastewater sludge, which is stipulated in the Sewerage Law, contributes to carbon neutrality through energy generation and other initiatives. For example, the "biogas power generation," in which digestion gas, mainly methane, is generated from sludge and used as fuel for power generation, is being conducted. Currently, biogas power generation facilities produce approximately 300 million kilowatts of electricity annually, which is equivalent to the annual consumption of 60,000 average households.

Improvement of water quality in Tama River (Tokyo)



Past view on Tama River (1970s)

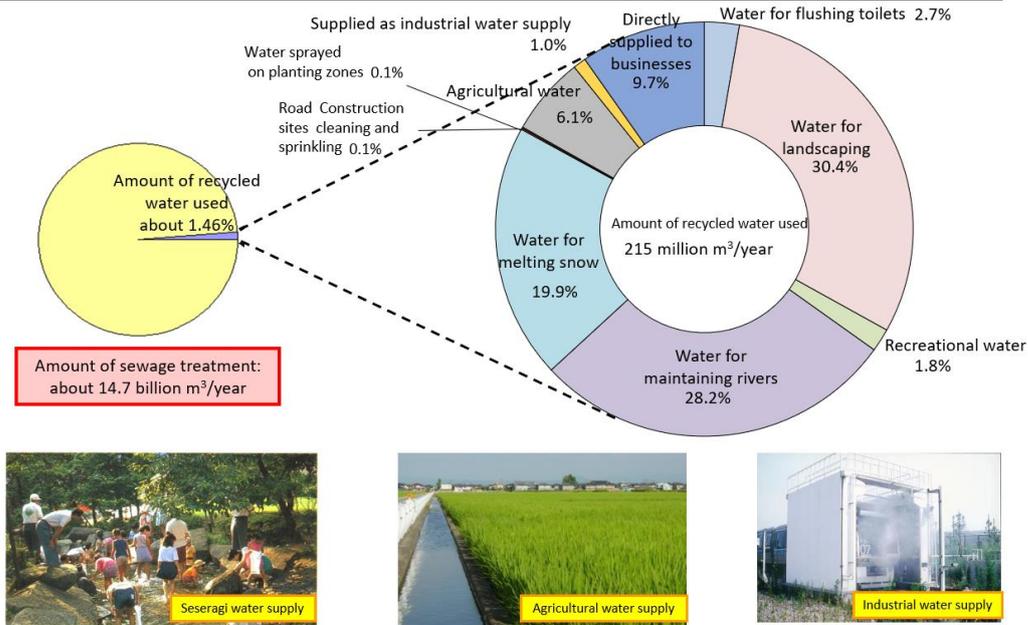


Present-day view on Tama River

Resilience: In recent years, climate change has caused fluctuations in annual precipitation, thereby increasing the risk of droughts. Recycled water obtained through appropriate wastewater treatment is effectively used as a valuable water resource for industrial, agricultural, and landscape purposes. During the COVID-19 Pandemic, wastewater surveillance has been undertaken, utilizing sewer networks as one of the measures against COVID-19 by the government.

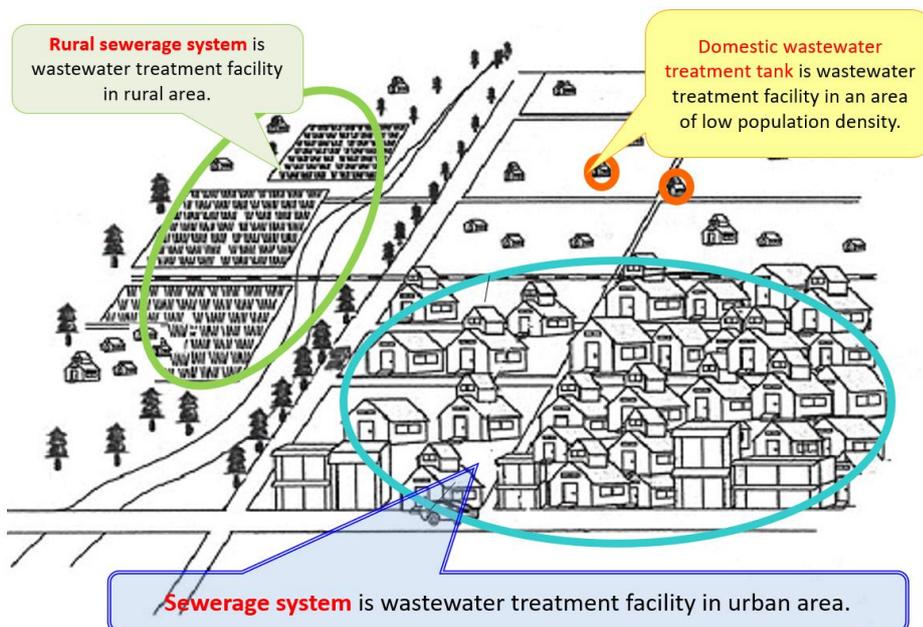
Use of recycled water

- About 1.46%, or about 215 million m³ of the annual amount of sewage treated in Japan (14.698 billion m³) is being recycled. (FY2014)
- About 60% of the recycled water is used as environmental water for purposes such as creating landscapes.



Inclusiveness: The selection of wastewater treatment systems (decentralized and centralized) suited to different regional characteristics based on the prefectural concept plan (master plan) has contributed to improving the diffusion rate of wastewater treatment facilities.

Types of wastewater treatment facilities

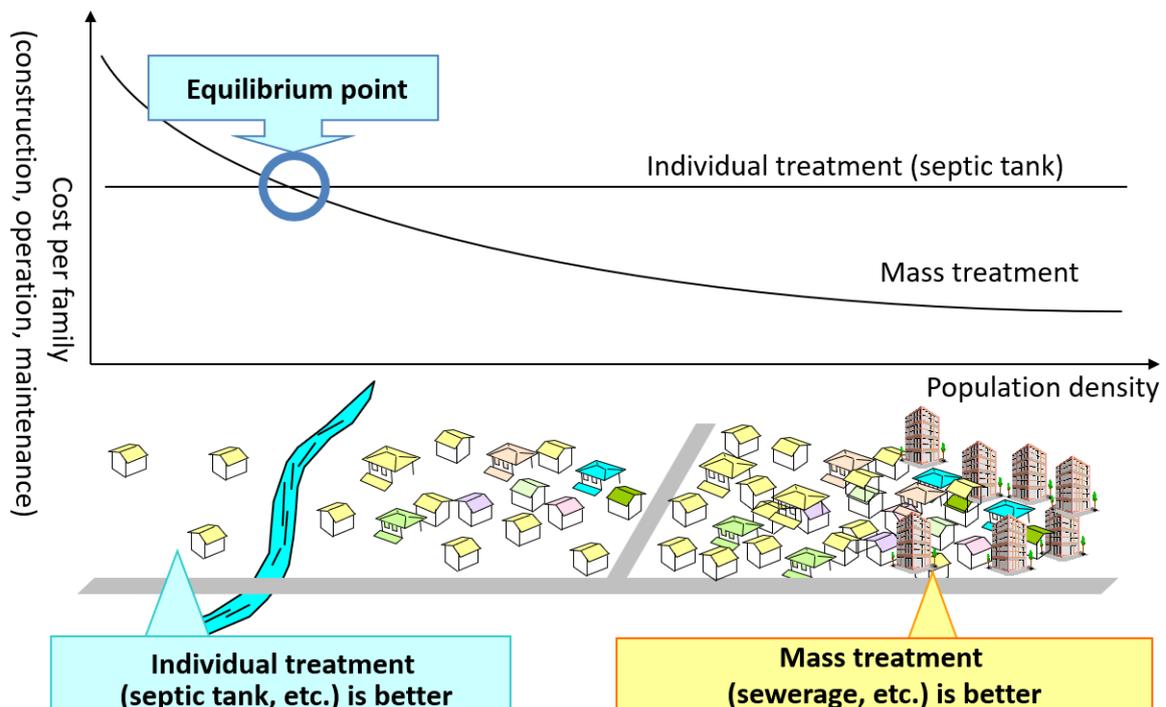


Points to be proud of the project

Governance: The appropriate setting of targets (environmental standards) and the development of a legal system, technical standards, and enforcement systems to achieve the targets are steadily promoting the diffusion of high-quality wastewater treatment facilities.

Investment: The law enables the provision of financial support by the government and the collection of user fees. Through the implementation of the project, an efficient and appropriate diffusion method is selected based on an economic comparison of the construction and maintenance costs combined, while taking into consideration the characteristics of various wastewater treatment facilities and the wishes of local residents.

Cost comparison of individual treatment and mass treatment

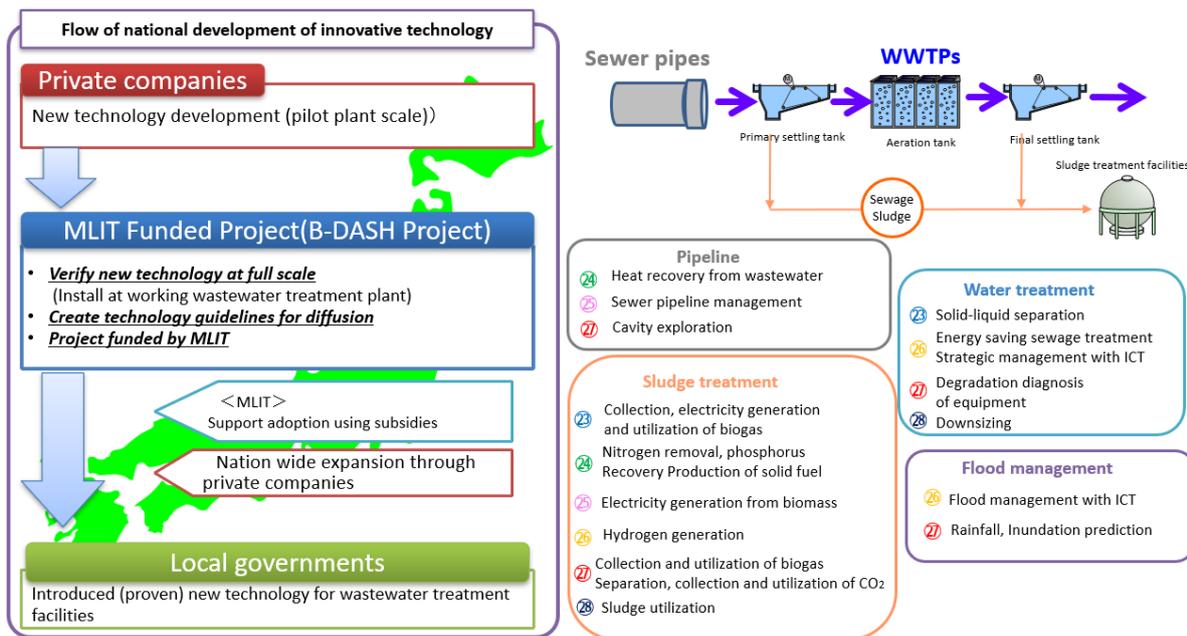


Science and technology: The government is promoting technological demonstrations and installations to address diverse technological issues. Through the B-DASH Project, the Ministry of Land, Infrastructure, Transport and Tourism of Japan (MLIT) is promoting energy generation, energy conservation, flood countermeasures, infrastructure aging countermeasures, and other aspects through sewerage projects by accelerating R&D and the practical application of new technologies. MLIT is also supporting the overseas expansion of the water business by Japanese companies.

B-DASH Project

- Through B-DASH project, the national government is taking the initiative to promote innovative technology for wastewater systems.

(B-DASH Project: Breakthrough by Dynamic Approach in Sewage High Technology Project)





Japan / Japan International Cooperation Agency (JICA)

Capacity enhancement for sustainable agriculture and irrigation development in Mizoram (India)

Overview: Slash-and-burn agriculture called as “Jhum” has long been practiced in the State of Mizoram, where 70% of the land has a slope of more than 35 degrees. As the productivity of Jhum declined due to the decrease in fallow period due to the increase in population, the Government of Mizoram set up a New Land Use Policy and promoted settled agriculture. However, this policy did not involve sufficiently the technological extension and infrastructure development necessary to raise production and profits of farmers under settled farming condition. Under such circumstances, "The Project on Capacity Enhancement for Sustainable Agriculture and Irrigation Development in Mizoram" started in July 2017 for five years, in response to the request of the Government of Mizoram, aiming at improving overall implementation of agriculture development procedure and agricultural extension system to be adopted by state government departments. In order to increase productivity in settled agriculture, it is necessary to supply irrigation water. As one of the activities, the Project is standardizing the irrigation planning and design procedure, the construction supervision and the capacity development of Water User's Association (WUA) based on the participatory irrigation management concept.

Major source of financing: JICA Technical Cooperation

Contribution to Quality Growth

Positive Economic Cycle: The productivity and income of pilot farmers supported by the practice of improved overall implementation of agriculture development procedure and agricultural extension system among state government departments increased.

Sustainability: Soil erosion and deforestation will be prevented through the promotion of settled farming. Environmental load will be reduced with effective utilization of local resources with promotion of orderly development. Proper land use and soil management will be promoted through enlightenment of soil conservation measures in the implementation process.



Resilience: The stable agricultural production against climate changes will be promoted through transition from Jhum to irrigated settled farming by provision of irrigation and other rural infrastructure with management skills. The farmers' adaptability to various risks will increase by receiving proper farm management and cultivation skills. The resilience of the community will increase by strengthening the organizational capacity of village and WUA through the project activities. Proper safety net to farmers will be established through the capacity development of government officials in various aspects of agriculture development.



Inclusiveness: The development needs of the village including vulnerable group will be accurately identified by incorporating a bottom-up approach into the procedure. The gender-balanced development is being practiced by involving many female extension officers and female beneficiaries in project planning and implementation.

Aspects of the Project that can serve as a model

for Asia-Pacific countries

Governance: Transparency in government activities and funding will be created by launching a committee at the development block level and prepare and operate convergence plan. The government services will regularly be improved by conducting mandatory monitoring and feedback meetings based on the concept of project cycle management.

Investment: The WUA's sense of ownership will be fostered through involving them in the planning process and construction activities of irrigation facilities and it will contribute better operation and maintenance of the constructed facilities. Duplicate investment will be reduced and synergistic effects can be expected by formulation and operation of convergence plan with four departments involved in agriculture and irrigation development.

Science and technology: The knowledge on the establishment of Japanese agricultural extension system, advanced farming practice and operation and maintenance system of irrigation system (land improvement district) are transferred through lecture and site visit at local government in Japan (Tokushima Prefecture)





Japan / Japan International Cooperation Agency (JICA)

Participatory agriculture development in Savannakhet Province (Lao PDR)

Overview: In Savannakhet Province, located along the Mekong River, crops are usually sold in the same prices regardless of their variety and quality. Therefore, farmers are not able to improve their productivity and they cannot gain sufficient profit. Under such circumstances, this Savan PAD project was launched to increase farm income by making PIAD model developed and sustainable.



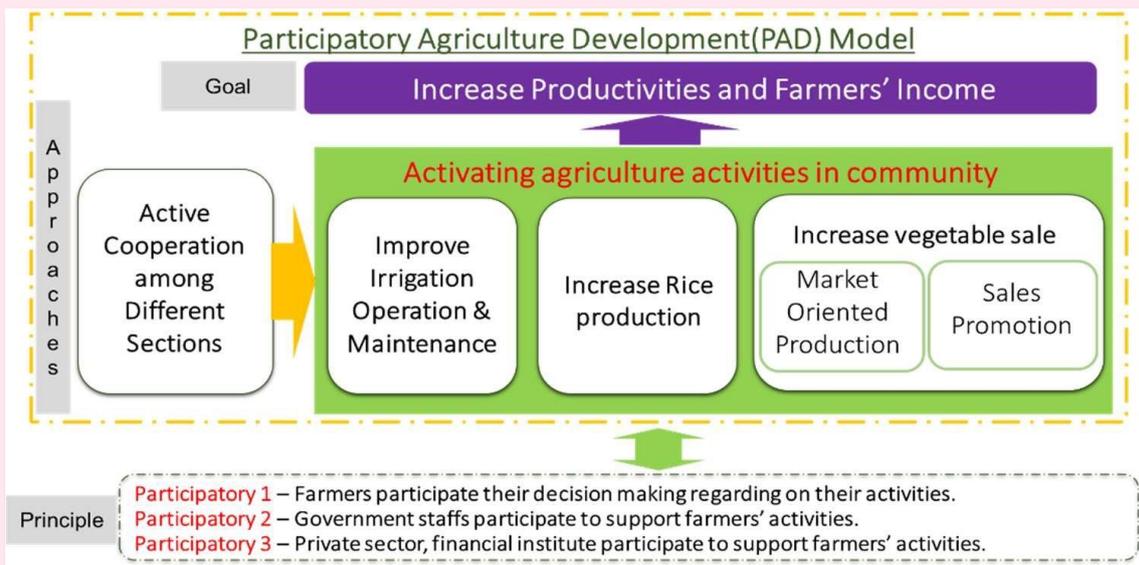
The developed PAD approach seeks to help increase farm income by encouraging farmers' initiatives in improving activities (not only irrigation management, but also production, sales, etc.) with participation of multiple stakeholders. Primarily, the approach pays attention to the following points:

- Farmers' self-consideration in improving farming activities;
- Farmer's active participation in farmers' groups' decision making;
- Government's financial & technical support for farmers' groups to solve difficult issues

Major source of financing: JICA Technical Cooperation

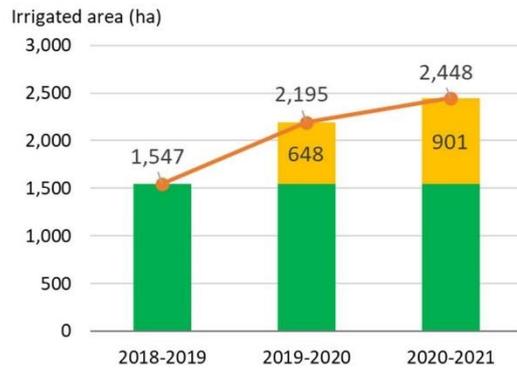
The PIAD Model

The PIAD model was developed in “Participatory Irrigated Agriculture Development project” (JICA, 2010-2015) in Lao PDR, is one of the PIM approaches to encourage farmers to proactively engage in irrigation management.



Contribution to Quality Growth Positive Outcomes:

Through the activities of capacity development of administrative officers and farmer’s groups, the irrigation area in the target sites have been successfully increased as showed in the graph below. The components of PAD model include market-oriented production, sales promotion, increase productivity and improve farm management. This model also has other various benefits on farmers, such as increase of yield, acquirement of cultivation skills, financial improvement of farmer’s group.



Sustainability: To realize the sustainability of PAD model, the project has focused not on the temporary technical supports but on the capacity development of farmers and administrative officers. In terms of budget, the ratio of the cost owned by C/P has been gradually increased through the project period, so that C/P can sustainably continue the PAD activities even after this project has finished. Through the guidance of cultivation skills, farmers are able to select and utilize seeds and fertilizers properly, which leads to the reduction of the environmental impacts.

Resilience: This project contributes to extend the irrigation area, increase the water use efficiency and finally realize the stable and resilient production through the enhancement of the irrigation management skills. Since the good relationships between farmers and administrative officers have been established, the officers are able to collect the needs of farmers in cooperation and supports them properly when it is required.

Inclusiveness: PAD model encourages farmers to actively join the project activities. As a result, farmers responsibly conduct actions to improve their incomes by themselves. In this project, PAD model has been introduced in 12 sites in Savannakhet province, which includes various types of people and situations.

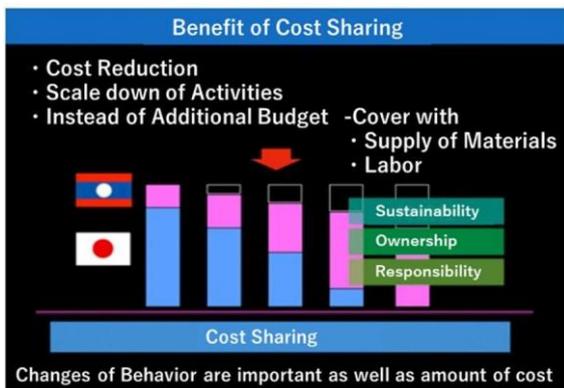
Aspects of the project that can serve as a model for Asia-Pacific countries

Governance: A committee to promote PAD model was established (enhancement of governance). PAD model contributes to the establishment of strong relationships between administrative officers and farmers, and they take on each different role in irrigation managements. The province, not the central government, has been responsible for this project and encourages different related departments to cooperate with each other.



Investment:

Through the capacity development of farmer’s group, the irrigation facilities have become well managed. As for the budget, this project has



adopted the cost sharing approach which is the concept that both project team and C/P own the project cost together. The characteristic is to increase the ratio of C/P cost gradually. In this concept, C/P gain ownership and responsibility in terms of cost reduction.

Science and technology: PAD model does not need any specific innovative or complicated science and technology, which enables the easy introduction to local communities without any difficulties of knowledge and budget.



Japan / Japan International Cooperation Agency (JICA)

Participatory irrigated agriculture development project in southern areas along the Mekong (Lao PDR)



Overview: The Southern part of the Lao PDR along the Mekong has a high potential of agricultural development. There are vast flat agricultural lands close to the East-West Corridor connecting from Vietnam to Thailand. Japan International Cooperation Agency (JICA) has implemented technical cooperation projects since 2010 by dispatching Japanese experts. The project (PIAD project) utilized Participatory Irrigation Management (PIM) Initiative leading by the Department of Irrigation, Ministry of Agriculture, and Forestry with unique approaches.

Major source of financing: JICA Technical Cooperation

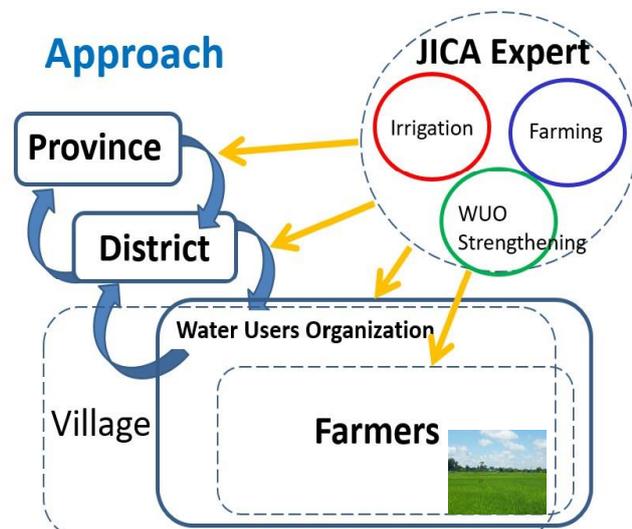
Contribution to Quality Growth

The PIAD project targets the capacity development of government officials and farmers of Water Users Organizations (WUOs). This project extended the irrigated areas by rehabilitating about 3000 meters' irrigation canal for 4 years by farmers themselves, strengthening the WUOs, and improved water management and farming:

- Developing the capacity of Provincial and District government staffs through implementing trainings. Constructing irrigation canal systems by farmers with support of government staffs and teaching them to correct levy for operation and maintenance;
- Strengthening the organization and ability to manage WUOs by utilizing aerial photographs;
- Developing appropriate cropping patterns, including commercial crops such as rice, vegetables and maize, based on the farmers' capacity and the progress of irrigation canal works.

Sustainability:

- The project carried out trainings and government officials and farmers acquired skills to measure, design, construct and manage the irrigation canals.
- WUOs also learned about financial management for sustainable use of their irrigation systems.
- Farmers has utilized the increased capacity after the completion of the project to extend it to other irrigation schemes.



Resilience:

- The WUOs are currently able to collect levy from their members. The rate of the collection reach to almost 100% in 2021.
- The strengthen organizations and farmers' skill can contribute to maintain and rehabilitate of irrigation facilities.
- The irrigation water is able to distribute to more areas in the irrigation schemes and more farmers can grow crops even dry season.



Inclusiveness

- Farmers' participatory to the irrigation canal constructions strengthens the bond of farmers in the irrigated area through more equitable and stabilized water distribution which results in extending coverage of irrigation water.
- The increased irrigation water coverage areas have improved the farmers' well-being by improving their food sufficiency and income.

Aspects of the project that can serve as a model for Asia-Pacific countries

Governance:

- The method developed in this PIAD project was summarized in the PIAD guideline.
- This guideline was drafted in English firstly by the Japanese experts for discussion. After translating it in Lao language, the all of stakeholders including government officials and farmers discussed it and improved for their use based on their experiences in the project.
- The Minister of Agriculture and Forestry certified the Guideline as a Ministerial Guideline in 2017.



Investment:

- Most of the project budget expenses for management of the project and the capacity development of the project counterparts including the farmers.
- The materials for irrigation canal constructions such as bricks and cement were prepared by JICA based on the calculated specifications by Lao counterparts.
- The cost for operation and maintenance of these irrigation canals were able to pay by farmers themselves utilizing the collected levy from their members.

Science and technology:

- To build and strengthen the WUOs, the project utilized the aerial photographs to identify the farmers' plots, which were able to buy in Lao.
- To measure the each of farmers' plots, the project used several methods including the GPS devise. This makes possible to measure the areas and identify each of the areas. Once farmers learned how to use it, they were able to measure by themselves.



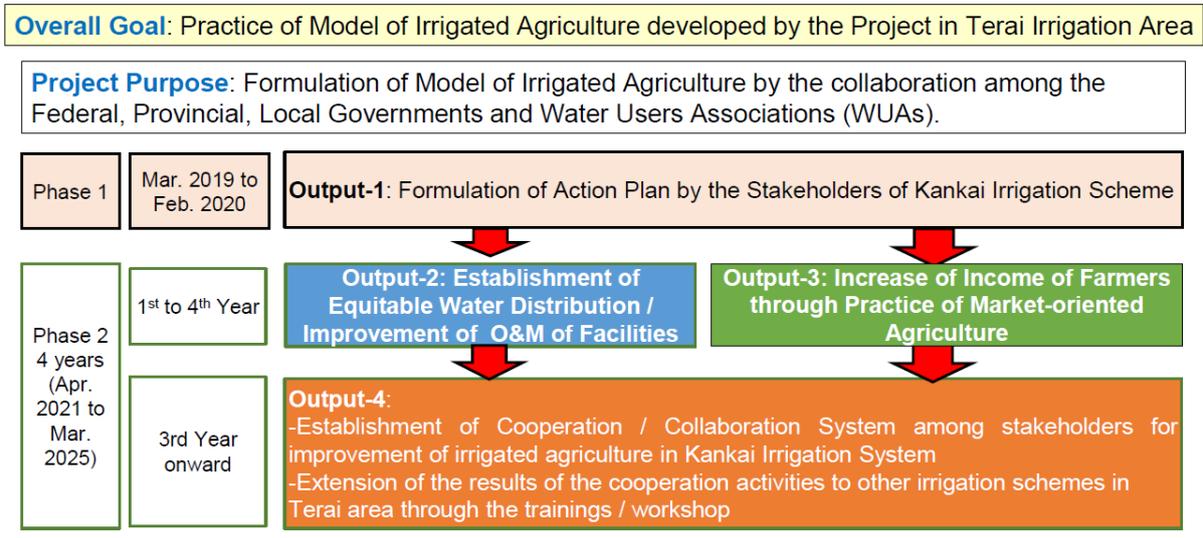


Japan / Japan International Cooperation Agency (JICA)
Promotion of irrigated agriculture in Terai Plain (Nepal)

Overview: In Nepal, agriculture is a key industry that accounts for about two-thirds of the total population and accounts for about 30% of the gross domestic product (GDP). The Nepalese government has been working on the development of irrigation facilities for many years in the Terai Plain, which stretches from east to west on the plains of southern Nepal. However, there is a problem that irrigation facilities cannot fully function due to insufficient of operation and maintenance. Strengthening the capacity of related organizations is an important issue.



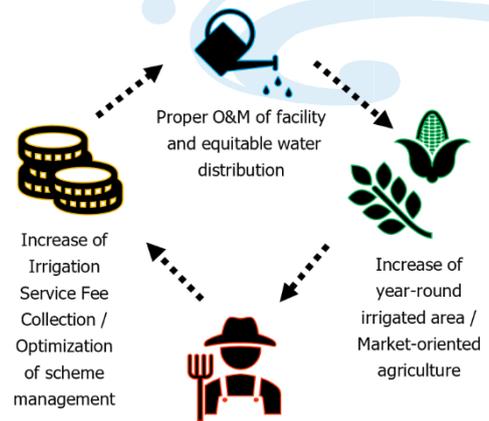
The “Project for the Promotion of Irrigated Agriculture in Terai Plain” (hereinafter referred to as “the Project”) in Kankai Irrigation System was implemented to strengthen the operation and maintenance capacity of irrigation facilities in the Terai Plain. The Project period is divided into two phases and 1st Phase activities were carried out from March 2019 to February 2020 to formulate action plan by the consensus of local stakeholders. The activities of 2nd Phase are to support the local stakeholders in the promotion of irrigated agriculture based on the action plan formulated in 1st Phase. The Project framework is presented as follows:



Major source of financing: JICA Technical Cooperation

Contribution to Quality Growth

Positive Outcomes: The Project aims to 1) establish equitable and efficient water distribution system and 2) increase incomes of farmers in target scheme through the practice of market-oriented agriculture and finally to form the Model of Irrigated Agriculture in Terai Plain by the collaboration among Federal, Provisional and Local government and Water Users Association. It is expected that the model will be disseminated Increase / stabilization of other irrigation scheme in Terai Plain farmers' income.



Sustainability: To ensure the sustainability of the activities for proper operation and maintenance of irrigation facilities and practice of market-oriented agriculture, the Project is focusing on creation of ownership through raising stakeholder's awareness and making common understanding of the role of each stakeholder. In the Project, all decisions are to be made by the Nepalese stakeholders and the budget for maintenance of irrigation facilities and expense of the project activities are to be provided by the Nepalese government.



Resilience: The Project contributes to establish equitable and efficient water distribution in the Kankai Irrigation System, increase the irrigation area and cropping intensity and finally realize the stable and resilient production against climate change such as drought. Since the Project provides capacity development to the farmers for the practice of market-oriented agriculture through applying of "SHEP Approach", the farmers will acquire the capability of resilience of agriculture production and linkage with the stakeholders who supports farmers.

Inclusiveness: The Project has involved the local stakeholders such as the members of Water Users Association (WUA) and the farmers from the planning stage of the Project during the 1st phase. Action plan for the project activities were prepared by the local stakeholders by themselves through problem analysis among them. All project activities for water management and market-oriented agriculture are being implemented by local stakeholders themselves.

Aspects of the Project that can serve as a model for Asia-Pacific countries

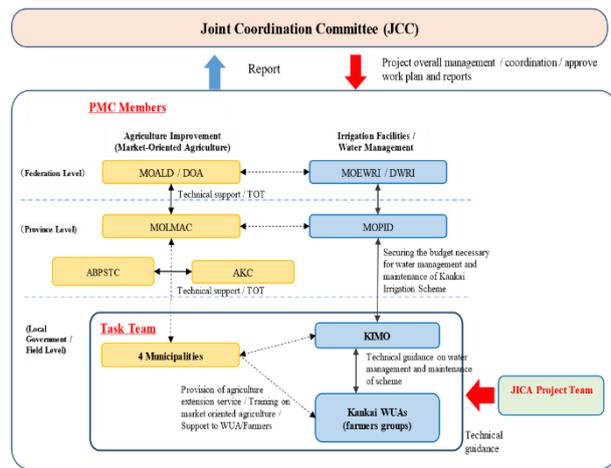
Governance: Project execution and monitoring system are established among irrigation and agriculture related organizations at three layers such as Joint Coordination Committee (JCC), Project Monitoring Committee (PMC) and Task Team. The Project aim to establish the Activity Execution Cooperation System for improvement of irrigated agriculture. The model of irrigated agriculture established in the Project is planned to be disseminated to Chandranahar Irrigation Scheme, which facilities will be rehabilitated by JICA Grand aid.

SHEP (Smallholder Horticulture Empowerment and Promotion) Approach is an agricultural extension approach, which realizes "Market-Oriented Agriculture" and converts farmers mind from "grow and sell" to "grow to sell".

More information: www.jica.go.jp/english/our_work/thematic_issues/agricultural/shep/index.html

Investment: Through the capacity development of Kankai Irrigation Management Office (KIMO) and WUA, the farmer's groups, the irrigation facilities from headworks to on-farm level will be well managed. Through establishment of inventory of irrigation facilities and evaluation of functionality of facilities, KIMO can prepare the mid-term maintenance plan with required budget.

Science and technology: The model of irrigated agriculture does not require specific, innovative and complex science and technology, which is one of the key aspects that make this model easily accepted.





Japan / Japan International Cooperation Agency (JICA)

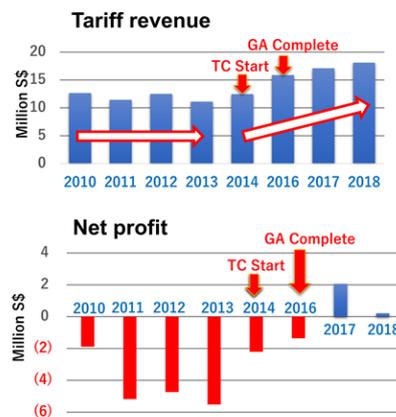
Sustainable management of water utility through services improvement with Okinawa Water Bureaus (Samoa)

Overview: Capacity of Samoa Water Authority (SWA) was improved by implementing integrated cooperation with water utilities in Okinawa Prefecture, through hardware and software development to reduce high non-revenue water (NRW) ratio and improve water supply quality as well as its inadequate water pressure. It evidenced that improving water services can help users' understanding on tariff payments, although the water tariff increased for most consumers due to a shift from fixed to metered tariff.

Major source of funding: Grant Aid (16.9 mil. USD), Technical Cooperation (2.4 mil. USD)

Contribution to Quality Growth

Negative spiral in water supply was converted into positive spiral. As a result of the cooperation, the NRW ratio was reduced from 68 per cent to 36 per cent and water supply with proper pressure was achieved in the targeted area. The quality of the tap water achieved 100 per cent compliance with standards. Consequently, consumer satisfaction has improved and net profit of SWA became positive from negative. This profit enabled to invest further improvement of water services.



Sustainability: SWA developed capacity in sustainable way through the cooperation activities. The cooperation created a cycle of investment for facilities, improvement of services, improvement of consumer's satisfaction, income augmentation and enabling new investments.

Resilience: The construction of the water treatment plant and the strengthening capacity of SWA staff have enabled the water treatment to be carried out properly, even during high turbidity events such as rainfall and typhoons. The raw water transmission pipes were designed to prevent damage from flooding by overtopping the stream crossings. This has reduced leakage and is a measure to adapt against climate change.

Inclusiveness: Many citizens now have access to safe water supply. Water supply duration have become fairer than before the cooperation. Consumers expressed that even children can drink water safely. The cooperation was conducted through a partnership between Samoa and Okinawa's water utilities facing similar problems to provide water services in the islands.

2. Aspects of the project that can serve as a model for Asia-Pacific countries

Governance: Efficient measures were adopted and implemented based on the consideration of existing field data. SOPs were prepared using illustrations and photographs so that SWA field staff could easily understand. Before the cooperation, the water treatment plant operators and plumbers in the field had operated and constructed the water supply systems on their own, without understanding the principles. Thus, proper operation and installation methods were established and implemented through on-the-job training (OJT), based on the developed SOPs.

Finance: Using Japanese ODA as a "lever" with the financial support from EU, SWA aimed at funding based on water tariff revenues.

Science and technology: The technical cooperation improved the operation and maintenance of the water treatment plant based on the scientific knowledge of the principles of the bio-purification method. The cooperation introduced district metered area (DMA) in non-revenue water reduction and prioritized measures based on the field data.





Myanmar

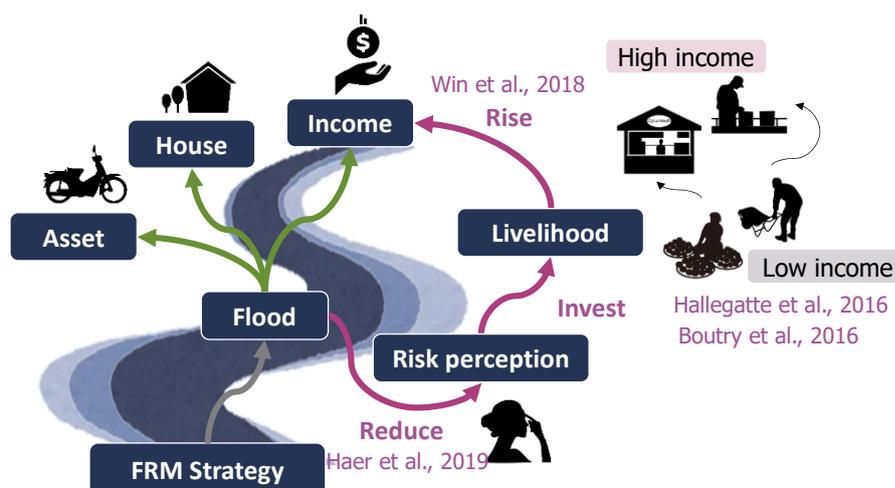
Policy making support for reducing flood disaster risk and poverty in Myanmar

Overview: The benefits of flood control measures have been evaluated mainly in terms of the damage they reduce in general. On the other hand, previous studies have shown that the benefits of improved safety through flood countermeasures are that people's risk perception changes and socioeconomic activities are promoted and accumulated, and there are findings regarding increases in GDP and real estate land prices. Therefore, this project aimed to solve the problem of investment in disaster risk reduction in developing countries by modeling the manifestation of this second benefit and integrating it into the benefit assessment of flood control measures as a new method.

In this project, we gathered knowledge from the field of social hydrological studies and developed a livelihood improvement model to evaluate the manifestation of the second benefit. While floods cause direct damage to houses, household goods, and income, they also affect people's perception of risk. Conversely, when the occurrence of floods is reduced by flood control measures and people are not exposed to floods for a while, their risk perception is mitigated. It has been shown that when risk perception is mitigated, people become more proactive in their choice of livelihood activities.

In Bago, Myanmar, where the case study was conducted, a former mobile peddler opened a retail store in a former flooded area, and a day laborer became a factory worker because he no longer had to worry about being laid off due to absenteeism caused by the floods. As livelihood activities improve, household income also rises. The Livelihood Improvement Model is the first to quantitatively link the previously examined processes of risk perception, livelihood improvement, and income increase depending on whether or not flooding occurs.

Livelihood advancement model: Model the mechanism of secondary benefit with insights from sociohydrological studies

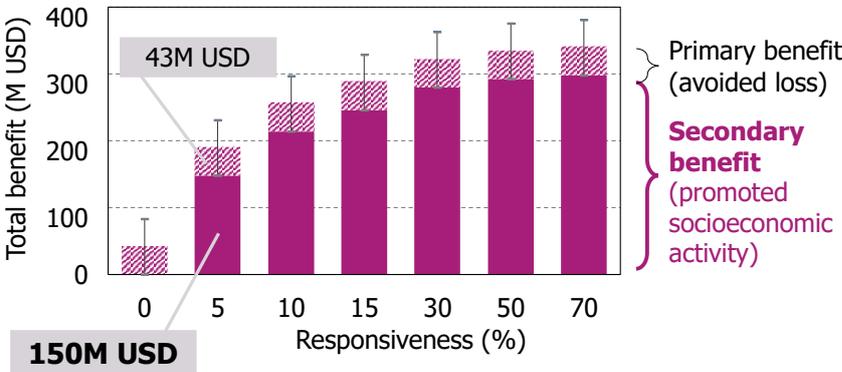


Contribution to Quality Growth

This study concludes that flood damage is not only a function of flood characteristics but also household's socioeconomic and geographical characteristics. Thus, the study encourages policymakers to think about the socioeconomic conditions of communities when addressing flood damage and its

associated impacts. The results of the study further suggest that policymakers should develop policies for educational improvements and livelihood diversification as a means to reduce the losses caused by floods. These suggested policy changes would improve the quality of social life of people and flood loss reduction would then contribute to the economic development.

Change in total amount of benefit: Intensive scenario (RCP8.5-SSP5), Average benefit of 127 FRM strategies (2040-2070) (Source: Yamagami and Kawasaki (2022))



Sustainability: This project demonstrated that the secondary benefit amounts up to approx. 2-5 times of primary benefit. Primary benefit (avoided loss) is only attained when the hazard occurs, yet secondary benefit (promoted socioeconomic activity) could be attained regardless of occurrence of hazards. This result suggests conventional practices had overlooked large amount of benefit.

Inclusiveness: This project had continued discussion with the government officers of the local government in Myanmar for understanding their problems and current situation since 2014. We organized an committee to discuss this issue among the Regional Government based on the strong support from the Chief Minister of the Bago Regional Government at that time. Various scientific methodologies were utilized in this project such as hydrological and inundation simulation and socio-economic modeling approach. In order to deepen the understanding by local governmental officers, professors and students at Yangon Technological University were also participated in this process as felicitators for connecting between academic and practice and also domestic and international experts such as the University of Tokyo and ICHARM.



Aspects of the project that can serve as a model for Asia-Pacific countries

Governance: Perspective of poverty alleviation should be included in the policy making for water-related disaster risk reduction. This means that the socio-economical impact through water-related

disaster risk reduction should be considered not only the direct benefit through disaster loss and damage reduction but also the indirect benefit through socio-economical development.

Finance: DRR investment for resilience that contribute to improving socio-economical status of vulnerable population should be designed considering future climate change and socio-economical and technological changes in the society. For supporting such long-term policy making, academic approach such as modeling and scenario analysis can be utilized. Continuous financial support for enhancing evidence-based policy making through data integration and analysis and facilitators for connecting policymakers and academia should be fostered.

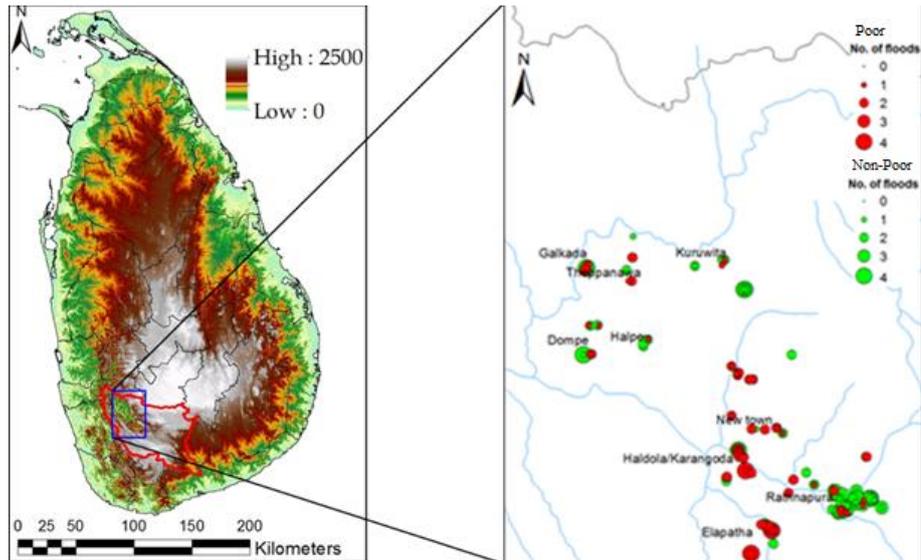
Science and Technology: Understanding the impact of water-related disasters on the livelihoods of socioeconomically vulnerable pupation should be deepen for making an effective policy of disaster risk reduction and climate adaption. More detailed household survey and data collection as for vulnerable pupation is needed for understanding the interlinkage between disaster and poverty. In order to have comprehensive understanding of the inter-linkage between poverty and gender and water, data integration and analysis in the field of water and its related area and socio-economic activities is essential. Technical assistance from academic is needed for promoting evidence-based policy making. Data and model integration and analysis is key for comprehensive policy making. Fostering felicitators and development of data platform is essential for conducting such synthesis analysis for promoting evidence-based policy making through close collaboration between science and policy.



Sri Lanka

Association between socioeconomic features and risk of flood damage: a local-scale case study

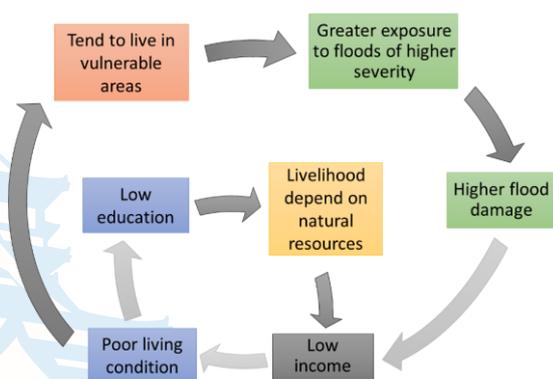
Overview: Sri Lanka is a disaster-prone developing country. There are many evidences to show that the extreme rainfall and floods have become more frequent and hazardous. Kelani, Kalu and Nilwala are such river basins that subjected to frequent flooding. Rathnapura city lies in the flood plain of Kalu river and there are various ethnic communities with different social and economic backgrounds. However, the impacts of floods are not only a function of flood characteristics, but also a function of socioeconomic characteristics of the affected community. Hence, it is worth of investigating the relationship between risk of flood damage and poverty socioeconomic features.



Contribution to Quality Growth

This study concludes that flood damage is not only a function of flood characteristics but also household's socioeconomic and geographical characteristics. Thus, the study encourages policymakers to think about the socioeconomic conditions of communities when addressing flood damage and its associated impacts. The results of the study further suggest that policymakers should develop policies for educational improvements and livelihood diversification as a means to reduce the losses caused by floods. These suggested policy changes would improve the quality of social life of people and flood loss reduction would then contribute to the economic development.

Inter-relationship between socioeconomic conditions and flood vulnerability on a local scale



Sustainability: Development of proper land use practices for hazard prone areas, including the relocation of vulnerable communities is a possible measure to reduce the flood risk. However, this will indirectly contribute for the environmental protection. The findings show that the livelihood based on natural resources are highly vulnerable for floods. Hence, people need to think of alternative livelihoods which indirectly preserve the natural resources for future generation.

Resilience: As per the research findings, flood damage is higher for low income families who lives in the vicinity of the river banks, having lower education level and depending more on natural recourses for their livelihood. Hence, policy makers can encourage people for better education, so that they can have more stable livelihood and better income. Therefore, they will be able to afford higher amount of money to better place for their residencies which makes them more resilience against frequent floods.

Inclusiveness: Since the research findings demonstrate that low income people live in the vicinity of flood plain suffer more due to floods. Hence, the government can take initiatives to resettle the poor people who lives closer to the river banks. Further, landuse planning also be an effective measure to reduce the risk of flood damage.

Aspects of the project that can serve as a model for Asia-Pacific countries

Governance: This study provides insights to the policy makers to think beyond the traditional structural mitigation and adaptation measures to reduce the risk of flood damage. Hence, the policies can be implemented to restrict the permanent constructions within the high risk area. Further, the quality of education can be improved while including the disaster management as an essential component for teaching learning process even for elementary school level.

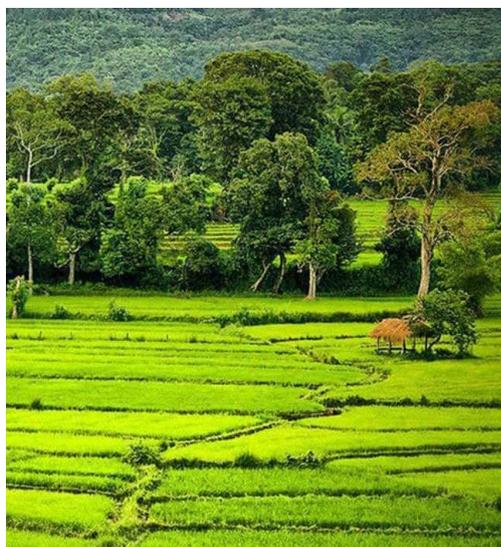
Investment: Since this study suggests nonstructural strategies to cope with the risk associated with the flood damage, implementation can be done with a low investment budget. However, educating and making people aware about disaster management would be one of the main activities to focus.

Science and technology: Use of community observations collected through questionnaires to develop a model to represent the relationships between socioeconomic conditions and flood vulnerability on a local scale is not a common practice to handle the risk associated with the flood damage. However, this study develops a cycle to represent the inter-relationship of socioeconomic factors and flood characteristics with the flood damage.



Food and Agriculture Organization (FAO)

Efficient Agricultural Water Use and Management Enhancement in Paddy Fields



Overview: Increased water use efficiency and water productivity is crucial for sustainably increasing agricultural productivity globally and especially in project countries, Sri Lanka and Zambia. Paddy field systems are especially water demanding, though products such as rice is not only a staple food, but also constitutes a major social and economic activity, providing public goods and a key source of employment and income to the rural population both in Sri Lanka and Zambia. The project has been implemented by the Land and Water Division (NSL) of the Food and Agriculture Organization of the United Nations (FAO) in collaboration with national authorities and research centers in both in Sri Lanka and Zambia. During the current phase, the project contributes to increase knowledge on the status of water use efficiency and productivity in paddy field systems and identification of best practices in Sri Lanka and Zambia.

tus of water use efficiency and productivity in paddy field systems and identification of best practices in Sri Lanka and Zambia.

Financing: Ministry of Agriculture, Forestry and Fisheries (MAFF) - Government of Japan (USD 675,000)

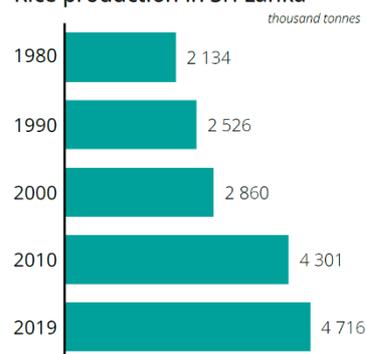
Quality Growth contribution

Rice is one of the most important food security crop both in Sri Lanka and Zambia and water is an essential resource in both the countries. The project findings will enable policy makers and water managers to understand the current status, limits and potential of paddy field systems, and identify the best practices to enhance water use efficiency and water productivity in paddy fields for sustainable production and water use. The project, thus, will assist the governments of the two countries in determining how to improve the efficiency and effectiveness of future investment strategies and policies aiming at improving the productivity and sustainability of paddy fields.

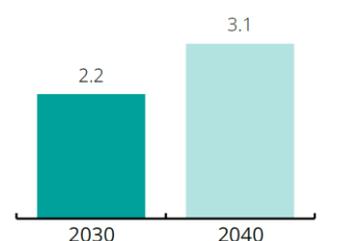
During the current phase of the project, four outputs have been achieved:

1. National outlooks and Handbooks on best practices on water use efficiency in paddy fields for Sri Lanka and Zambia are developed
2. Policy action matrixes for improved water use efficiency and water productivity in Sri Lanka and Zambia are developed
3. Investment portfolio and Concept Notes of potential projects in Sri Lanka and Zambia are produced.
4. Analytical framework of multi-functional roles of paddy fields and improved water use efficiency is produced.

Rice production in Sri Lanka



Climate related estimated loss in agriculture in Zambia



5. Policy framework for sustainable multi-functionality of paddy fields and improving water use efficiency is produced.

Sustainability: The project ensured that all stakeholders involved in paddy field systems improvement and development in the two countries are fully engaged at all stages of implementation, especially at roundtables and workshops organized. Such activities helped to improve and share the knowledge for improving the productivity and sustainability of paddy fields. The project addressed the best practices with the potential to be scaled-up and the likelihood to be successful. Efficient use of water in paddy fields helps in achieving sustainable production by conserving water resources, improving soil quality, reducing methane emissions, and controlling groundwater levels. Stakeholders' engagement and ownership of the project results is key for sustainability.

Resilience: In the project countries, Sri Lanka and Zambia, climate change is a serious challenge to agriculture, rice production as well as food security. Through its outputs, the project will help to ensure resilience of farmers' livelihood as well as agriculture in Zambia billion USD continuity and upscaling of project interventions

Inclusiveness: In Sri Lanka and Zambia there are large gender disparities and gaps in access to and control over resources (e.g. land, water and input), access to markets and access to skills and trainings, all of which are critical for agricultural production and livelihoods' resilience. In addition, women have less institutional support, i.e. access to credit and extension services. The unemployment rates are also high among women as compared to men. Furthermore, wage rates of women are lower as compared to men. In Zambia and Sri Lanka about 37 and 23 percent of the population consists of youth, respectively. Youth participation in agriculture is limited due to inadequate access to affordable agricultural finance and insurance, reduced access to land rights and inadequate training in agri-business. Poor income prospectus really makes it difficult for the agriculture sector to attract youth with better skills. The current project documented the current situation and proposed potential policy measures for youth and gender engagement in agricultural activities through sustained access and ownership of resources, including land and water in Sri Lanka and Zambia.



Points to be proud of the project

Governance: The project is fully aligned to FAO's Four Betters and Programme Priority Areas, i.e. Better Production and BP2: More efficient, inclusive, resilient and sustainable blue food systems and to the Country Programming Framework (CPF). The project targets the topic of paddy rice production in two

continents, i.e. Asia and Africa. Since the start of the project, various stakeholders have been engaged at various levels including researchers, engineers, scientists, extensionists and policy makers in both Sri Lanka and Zambia. The project focused on rice and water use efficiency, key issues to achieve food security and water resources conservation both in Sri Lanka and Zambia. Multidisciplinary research teams in both countries were composed of nationals



from Sri Lanka and Zambia. Gender balance was at the core of the project to ensure sustainability. While developing the national outlooks, the project ensured to identify the needs, priorities and constraints of both women and men in paddy farming. Gender balance was also ensured within the project research teams. Two roundtables were successfully conducted, one per target country. A significant number of stakeholders attended the events, also covering different areas of expertise and representing diversity in experience, age, and gender. During the two roundtables, the project and its accomplishments were well recognized by the government representatives, policy makers, managers, and researchers of the two countries. The sustainability and social inclusiveness have been key element of current project, as it is well documented in the project outreach products, i.e. reports. The project focused on ensuring resilient livelihoods and food security, while keeping in view the changing climatic conditions. The project monitoring, management and reporting was regularly conducted. The project products (outlook on agriculture, best practices, and policy measure documents) will be published on international channels and will benefit a large number of farmers. The project generated several concept notes, validated by its various stakeholders in Sri Lanka and Zambia, that will be the basis for its 2nd phase, as they play a catalytic role. The project provided a basis for the next phase in which the identified best practices and technologies will be piloted and scaled out to benefit a large number of farmers and other stakeholders.

Science and Technology: In terms of science and technology, the project products have identified many technologies and best practices as well as policy measures that will contribute to sustainable production and food security.

Best Practices/Technologies identified in Zambia:

- Alternate wetting and drying (AWD) technology to save excessive use of water in rice
- Crop rotation to reduce water usage
- Row planting for maximum plant population
- Collective and timely planting (planting with the onset of the rains)
- Soil fertility improvement through the addition of the organic matter
- Adoption and upscaling of drought and heat tolerant varieties to mitigate the climate change challenge

Best Practices/Technologies identified in Sri Lanka

- The project had minimal or no adverse environmental impacts
- Effective utilization of rainwater
- Adaptation of on-farm water management practices and fertilizer application
- Crop rotation for reduction in water use
- Introduction to tariffs for reduction in water use
- Promotion of high yielding climate resilient varieties
- Promotion of organic manure application for reduction in water use
- Introduction of the insect pest resistant varieties

Others related: The project developed an investment portfolio based on the priority areas identified in the project outputs. The portfolio includes concept notes that will support future projects to address the gaps identified in the priority areas. Such project's outputs will help the wider adoption and up-scaling of multi-functional roles of paddy fields in rice producing countries around the globe.



UN HABITAT

GSF (Nepal)

Overview: Access to safely managed Sanitation and Behavior Change

| Year | Milestones |
|------|---|
| 2010 | <ul style="list-style-type: none"> GSF Programme Launched led by Government of Nepal in presence of all the sector stakeholders with commitments of fund from WSSCC for two years for sanitation campaign for ODF attainment and behavior change reaching people Launched in October 2010 |
| 2010 | <ul style="list-style-type: none"> Institutional structure set up, conceptual clarity, coordination, and collaboration with sector partners, planning and legal approvals & preparatory phase Preparatory phase |
| 2012 | <ul style="list-style-type: none"> People accessed with Improved Sanitation: 47,590 No. of local authorities declared ODF: 0 Country coverage: 62% Implementation of the Programme started in 6 districts with NGOs and local government as implementing partners The key major components reaching households / people, institutions and school |
| 2013 | <ul style="list-style-type: none"> People accessed with Improved Sanitation: 392,133 No. of local authorities declared ODF: 53 Country coverage: 62% Expansion of Programme in leadership of the NSHCC to reach the left behind Terai in terms of sanitation and hygiene whereas progressing towards ODF results in 6 districts where Programme started to implement |
| 2014 | <ul style="list-style-type: none"> People accessed with Improved Sanitation: 759,559 No. of local authorities declared ODF: 144 Country coverage: 70.28% Terai Sanitation Campaign initiated in leadership of the NSHCC and WSSCC agreed for the additional funding to gear this priority |
| 2015 | <ul style="list-style-type: none"> People accessed with improved Sanitation: 1,402,100 No. of local authorities declared ODF: 237 Country coverage: 72% GSF Programme completed the Phase I covering 6 districts and expanded to 13 districts covering the most challenging districts of Terai bordering to India. Where India is with totally subsidized approach and Nepal with no subsidy principles. And this boarder zone is the area with highest rate of open defecation in South Asia region. |

| Year | Milestones |
|------|---|
| 2016 | <ul style="list-style-type: none"> People accessed with improved Sanitation: 2,186,694 No. of local authorities declared ODF: 327 Country coverage: 82% The acceleration of sanitation coverage in most challenging districts of Terai increased from 13% improved sanitation coverage baseline to 80% in average. GSF Programme facilitated the sector to develop and endorse the "Total Sanitation Guideline" by Government of Nepal for clarity in approach and support beyond ODF. |
| 2017 | <ul style="list-style-type: none"> People accessed with improved Sanitation: 2,884,722 No. of local authorities declared ODF 474 Country coverage: 95% 12 districts covered by GSF Programme achieved the ODF status as per the verification by WASH Coordination Committees at three tiers (VDCs, Districts and regional). National coverage reached 95% by end of 2017 missing the target by 5%. |
| 2018 | <ul style="list-style-type: none"> People accessed with improved Sanitation: 3,519,835 No. of local authorities declared ODF 640 Country coverage: 99% Crossing the national target to achieve country ODF by 2017, GSF expanded the support for completion of the final miles in Terai districts where all remaining districts are with 95+ coverage and the challenging final miles are left for completion |
| 2019 | <ul style="list-style-type: none"> People accessed with improved Sanitation: 3,556,586+ No. of local authorities declared ODF 726 Country coverage: 100% GSF Programme commitment accomplished but supported the sector for country ODF with technical backstopping and expanding the scope. Finally, the country declared ODF by Prime Minister of Nepal Mr. KP Oli in 30th September 2019 with all 77 districts validated as ODF in various tiers. GSF contributed with 6 million population of Nepal now living in open defecation free area with directly accessing improved sanitation of 3.5 million plus population of Nepal GSF Programme proceeded the support towards Total Sanitation |
| 2020 | <ul style="list-style-type: none"> People with access to safely managed sanitation 2,567,697 (cumulative) No. of local authorities supported for total sanitation beyond ODF : 64 Municipalities Municipal WASH Plans as the WASH governance initiatives in 64 municipalities out of which 51 municipalities prepared and endorsed the plan. Capacity building at municipal levels in WASH institutionalization in 64 municipalities for planning and budgeting prioritizing WASH System strengthening with information portal and its monitoring and regular update mechanisms at municipal level. |

Major Source of Financing: Water Supply and Sanitation Collaborative Council (WSSCC)

Contribution to Quality Growth

Sustainability:

- Around 6 million of people get access to safely managed sanitation
- Contribution on institutional structure of WaSH from last decade (2010-2020 A.D)
- Country ODF Declaration and moving to meet the parameters of total sanitation

Resilience:

- Individual starts to use toilets
- Access of basic sanitation to Households and community
- Encourage in behavior change of WaSH



- Institutional intervention through WaSH plan, programs and allocation of budget
- Strengthening the capacity of local officials and concerned stakeholders.

Inclusiveness:

- Include and engage the poor marginalized community, women, elder citizens and differently abled people.
- Disseminate the WaSH and BCC message to the target audiences prioritizing the vulnerable people
- Promote the “ WaSH for All, anywhere, all the time” and leaving no one behind

The points to be proud of the project

Governance:

- Directly work with the 726 local government of 19 districts for ensuring the better WaSH specific to access to improved sanitation facility.
- Assist to meet the Sustainable Development Goal 6 as “Ensure access to water and sanitation for all by 2030”
- Manage WaSH facilities in schools, health care facilities and public spaces

Investment:

- 68 plus implementing partners with 135 grants
- Assist in CoVID-19 Response by providing foot operated touchless hand washing stations
- The interventions of the GSF Programme in Nepal reached around 6 million population of 1.2 million households.

Science and technology:

- Promote the latest technology of hand washing stations
- Use of information technology for timely dissemination of information

Others related: GSF program promotes hand hygiene and mensuration hygiene behavior among people from different walks of life.





UN HABITAT

Encouraging Climate Adaptation and Mitigation Investments through Private Sector Engagement in Decentralised Wastewater Treatment Systems (DEWATS) and Small-scale Water Supply Infrastructure (Lao PDR)

Overview: Lao PDR is one of the most climate vulnerable countries in the world due to its high dependence on climate-sensitive natural resources and low adaptive capacity. To enhance local climate resilience, the project focused on climate adaptation and mitigation investment through private sector engagement in Decentralised Wastewater Treatment Systems (DEWATS) and small-scale water supply infrastructure in Sekong and Attapeu, two of the highly vulnerable provinces. The project connected at least 100 households to two DEWATS (one in each province) and provided 1200 households with access to water supply systems based on innovative underground rainwater harvesting systems, gravity-fed systems, and solar pumps. These systems not only contributed to increasing water availability and decreasing health hazards through improved sanitation environment, but also reducing climate-induced water stresses and Greenhouse Gas (GHG) emissions generated by wastewater.



Major source of financing: Nordic Climate Facility (NCF)

Contribution to Quality Growth

Sustainability: The project contributed to sustainability in terms of economic growth, livelihoods, and natural resource management. First, the project promoted rural development and poverty reduction through improved water system and infrastructure. Second, better access to water supply provided the opportunities for vulnerable people to engage in gardening and small-scale animal husbandry, which not only improved the livelihoods but also contributed to augmenting some income. Third, DEWATS and small-scale water supply systems instilled environmental sustainability as they rely on techniques and technologies, such as biogas digesters, that use clean and environmentally friendly energy, reduce pollution, GHG, and generate fewer wastes. The project also promoted local sustainability through the community-level assessment of climate change resilience and adaptation to respond to local needs and vulnerabilities.

Resilience: The project improved climate change resilience of vulnerable communities through investing in climate change resilient water infrastructure and systems to improve environmental sustainability and socioeconomic resilience to extreme climatic events such as floods and droughts. In addition to improved sanitation and water systems, the project delivered significant impacts in building resilience against diseases outbreak or public health emergencies such as the ongoing Covid-19 pandemic through improved access to hand-washing stations and sanitation and hygiene practices.

Inclusiveness: The project promoted inclusiveness through fostering gender equality and local ownership. Improved access to water supply significantly reduced workload and time for women and girls in each target community to collect water. The construction of DEWATS and bio-digester in an ethnic school in Attapeu province, for example, provided about 50 teachers and 638 students access to gender-separated bathrooms, in addition to shower facilities and public hand-washing stations, for the safety, security and wellbeing of women and girls. The project also ensured local ownership through capacity building of relevant local authorities, community participation, and partnership development to enhance awareness and capacity to replicate the activities in the future.

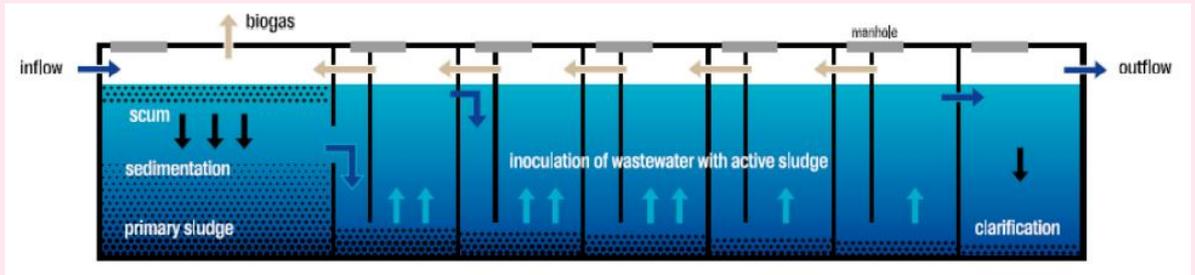
Relevant points for the 4th APWS

Governance: Good governance was one of the key factors in the successful implementation of the project, and activities conducted were aligned with the development plans of provincial and district governments. The project also aligned with the “Sam Sang” (3-build) policy, established in 2012 which aims at strengthening local capacity and devolving responsibilities to lower levels. Moreover, the establishment of the Water Supply Public Private Partnership Consortium (WSPPC) mechanism, together with Nam Papa State-Owned Enterprise (NPSE) in Sekong and Attapeu, the key implementing partners of the project, paved the way for setting a multi-stakeholder platform, mutual expectations and instilling importance and collective benefits of investing in good governance.

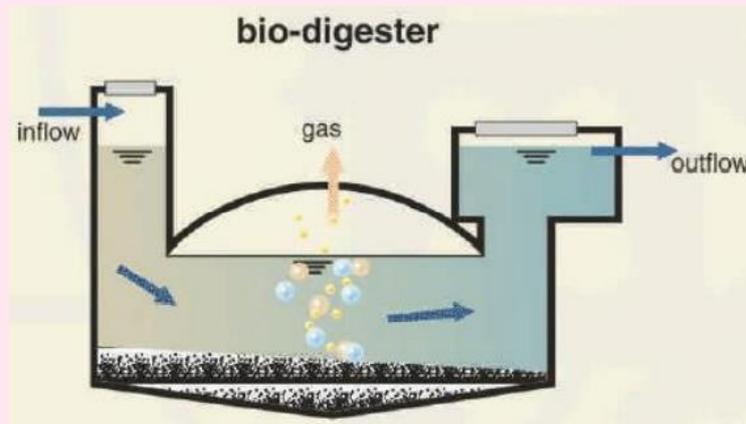
Investment: Cost-efficiency played one of the key roles in ensuring success and sustainability of the project. The DEWATS system and small-scale water infrastructure were built using simple construction methods and minimum resources, and DEWATS treats wastewater in a low-maintenance and affordable way, which offers great replicability in the future. The establishment of WSPPC also set the basis for private sector participation, which will broaden the funding and investment opportunities in the future. The project is debt-free as it was financed by NCF.

Science and technology: The use of innovative techniques and technologies to promote climate change resilience was the most integral part of the project. The DEWATS system enables water reuse for agriculture and biogas production as energy source, which also contributes to climate change mitigation. Biogas digesters also contribute to pollution reduction, and therefore reduce the ecological footprint of the communities through reduction of wastewater and pollution discharged in adjacent water bodies and the atmosphere. Based on the impact analysis, DEWATS, when in full capacity, will contribute to 2 per cent reduction in GHG emissions.

DEWATS system: DEWATS is designed with a treatment capacity of 18 m3 per day, which can be translated into 60 litre per person per day. It consists of several treatment modules such as settler, anaerobic baffled reactor, and anaerobic filter, and sanitation systems such as toilets/wash facilities are connected to a simplified sewer system, leading to DEWATS. Treated water is discharged to the nearest water body. Meanwhile, a biogas digester gives the opportunity to generate biogas from solid waste.



Biogas digester: Capacity of biogas digester is designed for the inlet of black water from about 50 users from the ethnic school, for example, which is estimated 1m³/day. The estimated production of biogas is 0.4m³/day (146m³/year), which is equivalent of 0.18 kg/day (65.7kg/year) of liquefied petroleum gas.





UN HABITAT

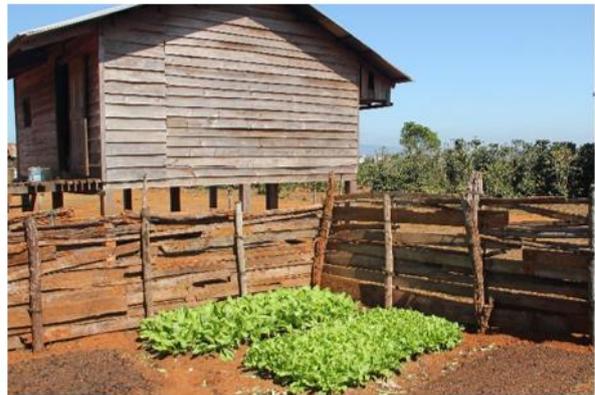
Enhancing the climate and disaster resilience of the most vulnerable rural and emerging urban human settlements (Lao PDR)

Overview: Lao PDR is one of the most climate vulnerable countries in the world due to its high dependence on climate-sensitive natural resources and low adaptive capacity. To enhance the climate and disaster resilience of most vulnerable communities, the project focused on 1) institutional strengthening of relevant local stakeholders; 2) capacity building at community levels; and 3) construction of climate and disaster resilient small-scale infrastructures in three southern provinces of Sekong, Saravane and Attapeu. The project reached approximately 47,000 direct beneficiaries in a total of 189 vulnerable settlements where 60 per cent of the population is impoverished, including many ethnic minorities.

Major source of financing: Adaptation Fund (4.5 million USD)



Community water tanks © UN-Habitat



Gardening made possible with constant supply of water © UN-Habitat



Children line up to collect water © UN-Habitat



Ethnic minority women and children gain access to water © UN-Habitat

Contribution to Quality Growth

Sustainability: The project provided forward-looking and sustainable solutions to 189 vulnerable communities in terms of economic, social, and environmental benefits. For example, the project improved existing infrastructure and provided new resilient infrastructure, such as water storage and irrigation system, to provide secure water supply and management, enhanced food security and economic conditions, which, in turn, will reduce poverty. Moreover, the development of environmentally sensitive and resilient land use, water resource, infrastructure and community plans will increase the

sustainable use of natural resources, which will improve ecosystem resilience in the target communities for the generation to come. The project also focused on knowledge management, such as recording and storing the technical design of infrastructure implemented in the government archives or database, to ensure sustainability and replicability of the skills and knowledge acquired.

Resilience: Enhancing the community-level resilience against climate change and natural disasters such as storms, floods, droughts, landslides, and disease outbreaks was the main objective of this project. This was achieved through improved sustainable access to climate and disaster resilient infrastructure systems, such as treatment plants and piped water supply systems, services, and natural livelihood capital such as land and water against the future shocks. The resilience of local authorities was built through the development of local-level master plans, which integrate climate change adaptation into infrastructure, spatial planning and land-use management, and a capacity building workshop on vulnerability and risk assessment. Community-level resilience was built through community participation in construction, capacity building on local action planning and maintenance of infrastructure, as well as awareness raising on improved hygiene standards.

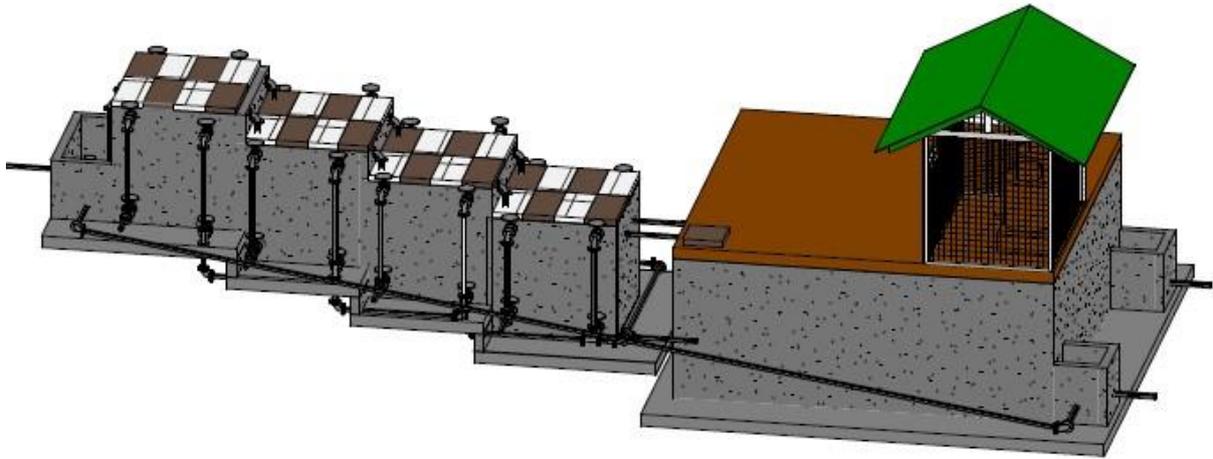
Inclusiveness: The project promoted climate-resilient and socially inclusive solutions to climate change and natural disasters. The project is gender inclusive as women have reported economic and social empowerment through their engagement in quality control and monitoring of the infrastructure. The project also brought socioeconomical benefits as women and girls now spend less time and travel less distance to collect water, compared to walking on average one to three hours per day to do so before. Improved access to safe water sources, increased hygiene and reduction of waterborne diseases are also expected to improve the health and wellbeing of the most vulnerable people.

Relevant points for the 4th APWS

Governance: Good governance was in place through clear division of labour and implementation arrangements. UN-Habitat signed the Agreement of Cooperation with Nampapa State-owned Enterprise in respective province as the direct implementation partners, who worked in collaboration with the district authorities and communities in close consultation with the provincial departments of Ministry of Public Works and Transport and Ministry of Natural Resources and Environment. Specific needs of women and youth were considered through consultation with NGOs such as Lao Women's Union and Lao Youth Union. A Project Management Unit was established comprising of seconded provincial government personnel at district level as a focal point for coordinating and implementing day-to-day activities in the target areas.

Investment: In terms of debt sustainability, the project is debt free and financially sustainable as it was funded by the Adaptation Fund. The project also has good life cycle cost as it focused on constructing climate-resilient infrastructure and trained relevant local authorities and local communities on proper maintenance to ensure sustainability and ownership. Moreover, the project established institutional arrangements among ministries, local governmental bodies and communities concerned to ensure sustainable infrastructure maintenance, including formal agreements for the operation and maintenance of infrastructure at provincial level and user fees at the community level.

Science and technology: Different types of small-scale water infrastructures were built using simple construction methods and minimum resources to ensure low-maintenance and affordability, which offers great replicability in the future.



Innovation for rural areas: Small-scale 24/7 metered water supply with slow sand filter and chlorination unit, which provides the same quality standard of water as the one provided in many other provincial and district towns of Lao PDR.





Waste wise cities: tackling plastic waste in environment (India)

Overview: The project aims to help implementing solutions towards a circular economy, creating businesses and livelihood opportunities while enhancing resource recovery. The project focuses to strengthen engagement with Mangaluru Municipal Corporation (MCC) and other key stakeholders for capacity building of cities to assess MSW status and define sustainable interventions; map waste flows and plastic leakages to prepare the waste flow diagrams by training of on-ground volunteers/ municipal staff/ others to conduct the survey; using waste wise cities tool (WaCT); conduct stakeholder meetings to discuss the existing challenges and recommendations for strengthening plastic waste management; prepare an action plan for effective plastic waste value chain management in order to ensure decrease in plastic leakages and subsequently prepare proposals focussing on circular interventions for funds mobilization.

Major source of financing: Alliance to End Plastic Waste

Contribution to Quality Growth

Sustainability: Around 600000 people get access to safely managed waste. Reduced plastic leakages and pollution on land and water resources. Reduced dependence on land for disposal by shifting to sustainable resource management and circular systems

Resilience: Identifying the high-priority sources of plastic pollution to make informed interventions translating in an action plan and priority intervention areas. Contribution to SDGs related to waste (majorly SDG 11 and 12). Enhancing waste data inventory of the city.

Inclusiveness: Include and engage the marginalized community, waste workers, women as part of action area to improve waste management system - Inclusive approach to ensure participation of local informal groups and citizen groups in the workshops conducted to share assessment results and finalize the action plan.



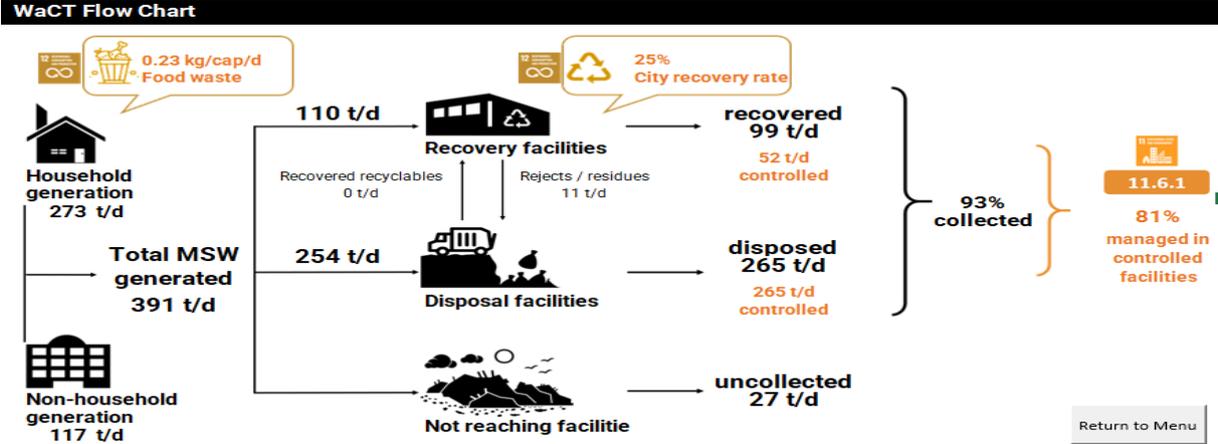
Points to be proud of the project

Governance: The project involved direct engagement and coordination with local city municipality (Mangaluru City Corporation) for carrying the assessment, and project development and assist to meet the Sustainable Development Goal 11.6 and improve reporting for Swachh Survekshan. Further, it is enabling better management of plastic waste leakages to land and water system by implementation of action plan.

Investment and fund mobilization: Further, as a part of the project, UN-Habitat India with support from local implementing partners, investment ready proposal has been developed on Clean Coastal Mangaluru: Closing the loop on low value plastics (LVPs). The local implementing partners have pitched in 50 per cent of the contribution to the project funds and additionally the proposal development was done keeping in context circular financing.

Innovation & science and technology: Under the project, UN-Habitat India is promoting state of art upcycling technology to ensure low value plastics are not littered and re-enter into the stream for

making long-term sustainable products. (D) Enabling data intensive decision making in MSW management the application of WaCT in Mangaluru India has immensely supported the intervention in strengthening evidence-based MSW planning and implementation to reduce GHG emissions to create sustainable, carbon-neutral, inclusive cities and towns. Additionally, as a result of this city, action plans on strategic MSW implementation have been developed based on priority intervention areas that were finalised as a result of the WaCT application.



National level engagement: Strong support from Ministry of Housing and Urban Affairs is extended to enable data intensive decision making in its processes on MSW. UN-Habitat India office is coordinating with MoHUA (Swachh Bharat Mission (SBM)) to support replication of WaCT tool in other cities to ensure better action plans and implementable strategies on MSW. A briefing meeting was also held with Joint Secretary, SBM, Ms. Roopa Mishra on Training of Trainers and capacity building on WaCT. Ms. Mishra mentioned that the ongoing project is in direct alignment with the goals of the phase 2 of SBM, focusing on strengthening city level action plans and implementation on MSW by utilizing data.





Asian Development Bank (ADB)

Janiuay community-managed water supply system (Philippines)

Overview: Janiuay is a first-class municipality located 33 kilometers northwest of Iloilo City. The pilot community, Barangay San Julian, is located in the urban center of the municipality and is one of the main catchment basin barangays of the municipality as two rivers coming traverse the Municipality: Suage River which divides the town into half and its upstream tributary Magapa River which provides natural irrigation for the town's agricultural lands. The community experiences several development issues and challenges, including the lack of services and facilities, water shortage, poverty and unemployment, and risks from natural disasters and the impacts of climate change. The lack of reliable water supply, which will be exacerbated by climate change, affects the overall growth and development of the community.



In 2018, Philippine Atmospheric, Geophysical & Astronomical Services Administration (PAGASA) released updated climate change scenarios and the mid-21st century projections show an increase of between 9.5 to 28% rainfall during Dec-May. This is normally within the dry season of Janiuay. A slight increase in rainfall during this time would be beneficial, as there is usually no rain in February, which causes problems for water supply. During the normal rainy season there will be an increase in the amount of rainfall of between 7-10%. This could lead to increased incidents of floods, and rain induced landslides. All projections show an increase in mean temperature of between 1-2.2 degrees centigrade. This would impact water supplies, health, agriculture, environmental biodiversity etc.

Potential climate change adaptation options considered for inclusion in the CLP include the following:

- Rainwater harvesting
- Protection and Conservation of the remaining watershed
- Tree planting of water retaining native trees

Major source of financing: USD 190,000 Technical Assistance from Asian Development Bank - Urban Climate Change Resilience Trust Fund

Contribution to Quality Growth

The lack of reliable water supply, which will be exacerbated by climate change, affects the overall growth and development of the community. An increase in water as projected during the dry season will be beneficial for water table replenishment but too much during the rainy season as projected in the upper bound ranges would lead to increased incidents of floods, and rain induced landslides. However, the lower bound ranges of the climate change scenarios show a decrease in the amount of rainfall between Sep-Nov (within the rainy season) of between 20-22%. This would have an impact on agriculture and irrigation, together with water supplies, water table replenishment and quality of water and may undo the gains of water table replenishment with the slight increase in rainfall during the dry season. Temperature increase will also increase demand for water and increase evaporative rate of storage facilities especially if these are open e.g. natural springs. By improving the water supply system

and developing a rainwater harvesting facility the project will contribute to quality growth by enhancing water security with a well maintained and accessible supply. The level III water supply system (piped distribution water supply system) is assessed to be the most appropriate water supply system design for Brgy. San Julian compared to a Level I (common well) and Level II (communal tap stand). In a level III water system, all households covered by the system will have individual piped water supply connection through the main or secondary lines from the storage tank/reservoir.

The community-led project shall provide the following benefits to the community:

- Improve the access of the residents of San Julian especially for Zones 2, 3 and 4 to potable water and water for household use, especially the vulnerable sectors – the poor, senior citizens, women and physically-challenged;
- Reduce the monthly household expenditures for water consumption especially the overwhelming majority of the households which spend an average of P500 per month for drinking (around P325.66 on the average) and an average monthly billing of P464.09 for household use, e.g., washing, cleaning and sanitation, which sums up to around P964.09 per month;
- Increase the economic leverage of women and other vulnerable sectors by reducing their time in fetching water for household chores, thus allowing them to pursue other meaning economic and social activities

Community-Led Approach



Sustainability: Sustainability will come in two-fold: sustainability of the project management and sustainability of the water supply. In terms of sustainability of the project management: the project undertook a community led approach with the development of a community stakeholders group – a diverse range of members representative of the specific vulnerable sectors in the community together with local government unit and private sector representatives. Participatory methodologies were utilized for an inclusive planning and decision making approach to develop the community led project which included both hard and soft elements: construction of the project’s infrastructure together with capacity development of the community stakeholders group to enhance the social infrastructure to implement and sustain the project. In terms of sustaining and conserving water sources and replenishment of the water table, the project also includes planting of water-retaining trees at the hilly portions and within the watershed area to provide replenishment and recharge support to the underground water table. The use of rainwater harvesting systems during the wet season will lessen groundwater depletion and allows for some replenishment in the aquifers by reducing the amount of water extracted. This sustainability approach is linked to the Provincial Government’s Tanum Iloilo Program; a regular tree planting activity in support of its sustainable Rural Water System project. And at the local

front; the involvement of the Saint Julian Academy; one of the rainwater feeders of the Rainwater Harvesting Facility, the West Visayas State University – Janiuay Campus and the Janiuay Pilot Elementary School.

Resilience: To understand how to build resilience in a particular context, it is important to know what key hazards, stresses and issues are posing a threat to people, the environment and overall ecosystem they live in. It is also important to know what capacities people must have to adapt and how they are adapting to changes now and in the past. Initiatives that aim to build resilience must be based on people's knowledge, needs and aspirations, and stakeholders need to consider resilience building measures that combine hard (e.g. infrastructure) measures with soft (e.g. governance) approaches, if resilience is expected to be built in the long term. In this endeavor, the community becomes the focus not only as beneficiary, but more importantly as active participant and game changer in reducing their vulnerabilities to hazards, stresses and shocks and building their resilience to climate change. This community-centered approach affirms people's right to determine their own futures by enhancing the capacities of people and institutions to address the causes of risk, vulnerability, and inequality. This community-led project will reduce the impacts of climate change by minimizing the social vulnerabilities and increasing the capacities of communities and peoples' organizations through enhanced coping and adaptation capacities. These involves diversifying sources of water and enabling water replenishment during times of plenty for use during the dry seasons to provide a sustainable supply of water.

Inclusiveness: The construction of a community-operated and maintained level III water system shall provide a supply of potable water a total of 134 households of Brgy. San Julian located in Zone 2, 3 and Zone 4 with no service connection with the local water district. An initial vulnerability assessment was conducted to select the project location and beneficiaries of which members were also selected from the most vulnerable groups to join the Community Stakeholders Group who, with guidance from Oxfam and the local implementing partner PRRM (Philippine Rural Reconstruction Movement), identified the main shocks and stresses, together with possible solutions and designed (together with inputs from a feasibility study), implemented, managed and will sustain the project.

Aspects of the project that can serve as a model for Asia-Pacific Countries

Governance: Community Stakeholders Group (CSG) established that is multi-sectoral and represents the most vulnerable in the community together with local government units and private sector. The CSG was involved from the very beginning of the project that employs a community led and centered approach and will implement, manage and sustain the project. Contractors for the construction phase and consultants for the feasibility study and capacity development phase were selected through competitive bids. Dialogues and consultations during the feasibility study involved the CSG and a wider representation of beneficiaries. The Local Water District was involved during the whole process from the very first consultation to their handover to a water provider from the private sector. The latter was also consulted during the process to ensure the maximization of resources.

Investment: The project is on-going, with a project extension due to the impact of the pandemic on the supply chain and the limitations of conducting a community led project in a virtual world. The local government units have already contributed to the costs of the project whether in monetary terms or in kind through labor, provision of land and permit costs. The local government units have secured a sustainable budget for maintenance and operations by inclusion of the community led project within the local development planning and budgeting processes covered by local ordinances. A cost-benefit analysis was conducted during the feasibility study and this will be enhanced during the capacity development sessions with the CSG into a working business style model for the project.

Science and Technology. Technical assessments were combined with local knowledge to develop the area for a sustainable water source and previous experiences in the area. These were integrated into the climate risk assessment matrix where the climate scenarios were explained and analyzed as to the impacts on existing stresses and shocks and processes in the area





Asian Development Bank (ADB)

Karnataka model for sustainable urban water service delivery (India)

Overview: A major challenge of urbanization in South Asia is the provision of continuous water supply with 100% coverage of households, and ensuring sustainable water service delivery. In most of the cities in the region, the urban population suffers from intermittent water supply services with partial coverage, limited connection to households, and water quality issues. Poor water supply services create a downward spiral, leaving customers unwilling to pay water tariffs, insufficient revenue for scientific system maintenance and improvement, and further service deterioration. Even new infrastructures often fail to sustain quality water services because of the service provider's lack of technical, institutional, and financial capacity, and limited social support. To address these challenges, the State Government of Karnataka, India and the Asian Development Bank (ADB) have been working on urban water infrastructure development projects. ADB started its urban support to the State of Karnataka in 1995. ADB-supported programs have expanded across the state through three consecutive urban programs, reaching 43 towns with 4.7 million people benefited in improved water supply.



Major Source of Financing: ADB loan: total \$645 million (8 loans from 1995 to present)

- Karnataka Urban Infrastructure Development Project (\$80 million)
- Karnataka Urban Development and Coastal Environmental Management Project (\$145 million)
- North Karnataka Urban Sector Investment Program (4 loans: \$270 million)
- Karnataka Integrated Urban Water Management Investment Program (2 loans: \$150 million)

Contribution to Quality Growth

Resilience: Ilkal Model for Achieving 24/7 Water Supply. Ilkal, a small town in North Karnataka suffered from intermittent water supply services. Public water supply coverage reached only 57% of residences with intermittent water service. Karnataka Urban Infrastructure Development Finance Corporation (KUIDFC), under an ADB-supported project, introduced good water supply practices to the local municipality and Ilkal became the first municipality in India to achieve 100% water supply coverage all day, every day in every household. The Ilkal model provided service connections to individual houses, imposed district-metered areas to reduce water losses, introduced an innovative contract modality (performance-based construct and operate contract), used participatory planning, and conducted rigorous community development.

Impact of 24/7 Water Supply Project in Ilkal Town

| Parameter | Before Project | After Project |
|---|---|---|
| Hours of supply | 2–4 hours in alternate days | 24/7 supply |
| Average pressure in distribution system | 0–1.5 meters | 14.0 meters average pressure |
| Population served | No household connections; only through 230 public stand posts | 100% population with individual house service connections |
| Physical losses | 50% | 8% |
| Metering | No individual connections | 100% metered connections |
| Customer complaints response time | Not applicable | Complaints addressed within 24 hours |
| Collection efficiency | Not available | More than 90% |

Inclusiveness: Participatory Approach. One of the key features of the Ilkal model is extensive participatory planning and enhanced community awareness programs to facilitate inclusion and behavioral change of customers, sensitizing communities on hygiene, water supply, and waste management aspects, and encourage a willingness to pay and the adoption of volumetric tariffs. Community involvement in the program from its inception made planning process grounded, established local ownership, generated an enabling environment that addressed stakeholders' concerns about metering and volumetric tariffs, and clarified the role of the private operator.

Sustainability. KIUWMIP Model for Building a Robust Virtuous Cycle in Water Services. Building on the Ilkal model, the Karnataka Integrated Urban Water Management Investment Program (KIUWMIP) is designed to ensure sustainable water service delivery over the long term. The KIUWMIP approved in 2014 is developing a robust virtuous cycle for sustainable water service delivery strive to (i) build high-quality infrastructure that are able to provide 24/7 water supply, with 100% coverage in direct connections to houses, less nonrevenue water, and asset management and operation monitoring technologies; (ii) improve water services, with incentives for operators, real-time monitoring of service delivery and operator performance, and incentives for water utility to implement reform actions; (iii) conduct community awareness activities to improve people’s understanding of project benefits; and (iv) provide adequate financial sources through lower costs and appropriate user charges, ultimately achieving full cost recovery of O&M.

The points to be proud of the project

The project is a replicable model for Asia-Pacific Countries.

Investment: Innovative Contract Modality. In both the Ilkal model and KIUWMIP model, the performance-based construct and operate contract was designed to ensure optimal risk allocation between the public sector for project design and a private operator for project construction and operation, and a performance-based payment to encourage the private operator to complete construction in a timely manner and deliver a better quality of service to the customers. The private operator carries out construction after validation of the detailed designs provided by the public sector and operates the system for 4 to 8 years before transferring operations and maintenance back to the public authority. This model works well for water supply improvement as it holds a single contractor responsible for both construction and operations and maintenance. The arrangement ensures that contractors deliver high-quality infrastructure because their future remuneration depends on their performance during the operations and maintenance phase. While ADB initially provided operation and maintenance cost support, this expenditure was fully covered by user charges by 2019, and the contract has been extended

between the municipality and the contractor. High tariff collection efficiency ensured full recovery of the operation and maintenance expenditures.

Governance: Interactive Partnership for Institutional Transformation. Project interventions in urban Karnataka have evolved in the last 25 years, reflecting lessons from previous projects and innovations in new project design and scope to improve urban water services, and operation and maintenance arrangements. The partnership started with sector analysis and capacity building through technical assistance, followed by policy dialogues that identified required investment interventions and policy actions. Lessons learned from past programs were shared during consultations held for designing the ensuing interventions. The success of project-specific interventions has been scaled up and institutionalized to bring broader changes in subsequent phases. Building on these interactive partnerships, the KUIWMIP includes transformative policy and institutional reforms at the state level to ensure sustainable water service delivery. In addition to state-level policy reform, the initiative introduced innovative implementation mechanisms in project towns such as an incentive fund which was set up to motivate urban local bodies to implement reforms and become efficient and responsive municipal service providers. Eligible expenditure under the reform activities and incentives allocated are given upon successful accomplishment of the reform actions.

Science and technology: IT Module Development to Implement Local Body Reforms. Under the KUIWMIP, enhanced information technology modules is being developed to help the urban local bodies operate their water services sustainably. The modules are designed to improve information management—with enhanced data capture, including establishment of comprehensive customer database, analysis, benchmarking, dissemination, and monitoring—and management decisions on water services. The integrated modules enable the urban local bodies to make timely management and planning decisions in asset management through the digitalization of property-linked customer databases, GIS mapping, and supervisory control and data acquisition.

Key Lessons for Sustainable Water Service Delivery:

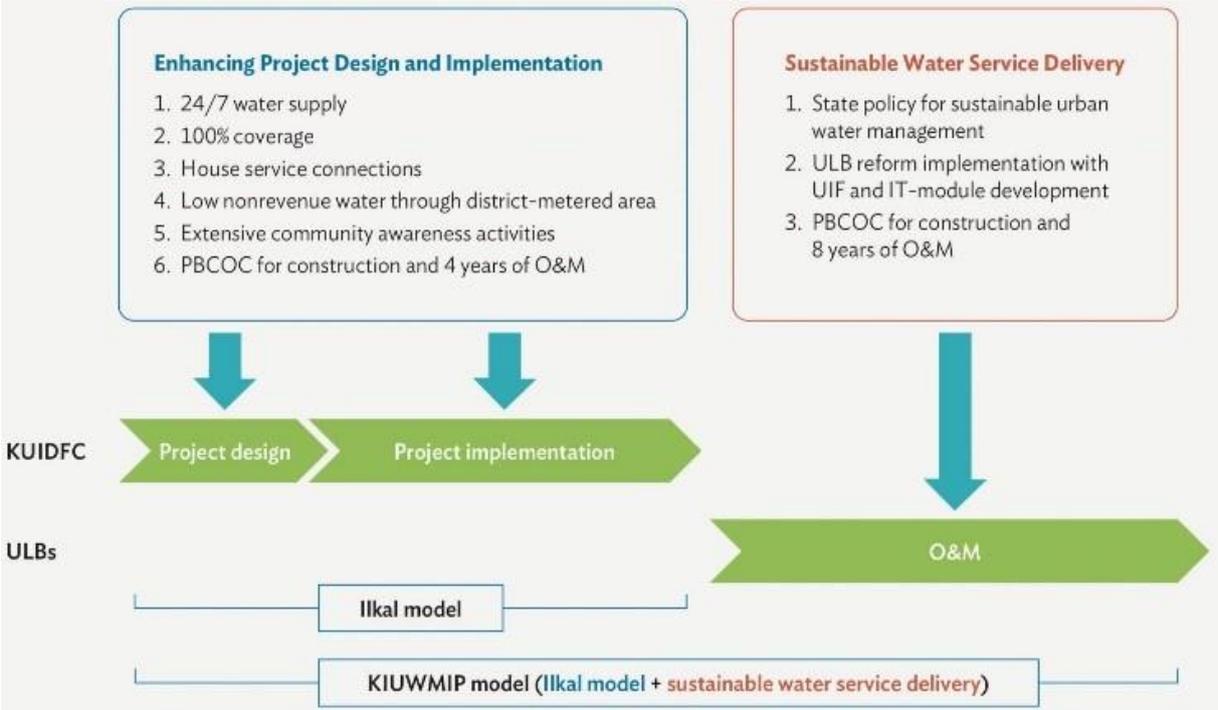
Access to high-quality services must be an explicit target of water projects. Maximizing project impact to beneficiaries and providing a complete solution should be the top priority and the first round of a virtuous cycle for water services.

Extensive community awareness programs are essential for making the planning process grounded and inclusive. Technical interventions aided with community engagement are key factors for bringing success and inclusivity in water projects.

Institutions matter. Continuous institutional transformation and business process reengineering of project interventions help ensure sustainable water service delivery at a larger scale.

A virtuous cycle cannot be built in a day. Interventions have evolved over decades through constant interactions among stakeholders and establishment of trust-based development partnerships. Development partners should learn from past experiences, adopt a programmatic approach, and continue to reach out to beneficiary communities to ensure sustainable service delivery.

How the Ilkal Model Evolved into the Karnataka Integrated Urban Water Management Investment Program Model



IT = information technology, KIUWMIP = Karnataka Integrated Urban Water Management Investment Program, KUIDFC = Karnataka Urban Infrastructure Development and Finance Corporation Limited, O&M = operation and maintenance, PBCOC = performance-based construct and operate contract, UIF = urban local body incentive fund, ULB = urban local body. Source: Asian Development Bank.





Asian Development Bank (ADB)

Betag Climate Resilient Flood Mitigation Project in the Municipality of La Trinidad, Province of Benguet (Philippines)

Overview: La Trinidad's strawberry fields is the main tourist attraction and the biggest parcel of farmland in the municipality. The area is owned by the Benguet State University (BSU). The land is subdivided into smaller 250-500 square meter garden plots that are allocated and rented to low income farmers for cultivation of high-value crops (HVCs) such as strawberries, lettuce, broccoli, and herbs. Production of high-value crops, primarily strawberries, is the main source of income for these farmers and their families. HVC production also generates secondary economic activities through farm tourism and selling of products around strawberries. Barangay Betag is traversed by several rivers and creeks that originate from the surrounding mountainsides and flows to the valley. Bolo Creek flows directly across the strawberry fields before converging with the Balili River. During strong rains, the rivers and creeks swell rapidly and flooding the valley of Betag, including the neighboring areas of Pico and Poblacion. Floods can be up to two meters deep and inundate the whole valley floor for up to 12 hours before receding. In 2018, Philippine Atmospheric, Geophysical & Astronomical Services Administration (PAGASA) released updated scenarios. The updated mid-21st century projections show an increase in rainfall amounts of between 36% to 38% during the dry season (peak season for harvesting and selling strawberries) to 6-18.5% increase in rainfall during the wet season – a period of seed replacement and flowering. In the worst-case scenarios, there is also the potential for the planting area to be submerged by floods greater than previously experienced during this critical time. Protecting the strawberry fields from regular, annual and the projected extreme forms of inundation due to climate change was identified by community stakeholder groups as the priority community-led project for Barangay Betag. This involved developing larger reinforced climate resilient box culverts designed not only to hasten the flow of flood waters from the strawberry fields to reduce not only the height of the floods but also the duration but also to prevent backflow of waters from Bolo Creek into the strawberry fields. The design of the climate resilient flood mitigation system takes into account the projected increase in rainfall and flood volume levels for the next 50 years.



Major source of financing: USD 190,000 Technical Assistance from Asian Development Bank - Urban Climate Change Resilience Trust Fund

Contribution to Quality Growth

Regular flooding events cause serious damages and losses to small vegetable and strawberry gardeners in Betag and widely affects the chain of enterprises, trade and commerce and tourism industry linked to strawberry and vegetable gardening, and affects the whole municipal economy of La Trinidad as well. These events are becoming annual in nature. In terms of tropical cyclones, it has also been seen that the predominant crops have been severely impacted by the increasing intensity of tropical cyclones in the region, in particular, increasing wind speeds and increasing intensity of winds, putting even more pressure on fragile agricultural systems. The climate change scenarios also show an increase

in rainfall by 18.5% and 26.3% from current precipitation levels in the months of June to August and September to November, respectively by mid-century (2036-2065). Calculating the worst-case scenario of annual disaster events of the intensity of impact at a minimum as that of Typhoon Ompong (international name: Mangkhut), of which the MDRRMO has the most complete damage assessment data. The area would be looking at direct damage rehabilitation costs of Php3.3M each year at a minimum with no flood mitigation measures in place. For 50 years this would amount to Php165M and for 75 years Php247.5M. Without this project for flood mitigation, these losses and damages are expected to increase with the projected increase in agricultural production and the value of assets and the anticipated increase in frequency and severity of flooding events in the barangay due to climate change. Through this community-led project, the damages and losses will be reduced to ensure more protected, resilient and sustained livelihoods for community members.

The community-led project shall provide the following benefits to the community:

- Improved flood mitigation measures, systems and capacities through enhanced flood drainage
- Established community-managed flood drainage system

As of July 2021, construction of the climate resilient concrete box culverts in 3 key sites along the Benguet Agri-Pinoy Trading Complex (BAPTC) road has been completed, opening up drainage outflow points for the strawberry fields' three main tributary areas. During the week of 23 July 2021, typhoon Fabian's (international name: In-fa) enhanced the southwest monsoon brought continuous rainfall in the La Trinidad province and the rest of the Cordillera Administrative Region (CAR). According to the Office of Civil Defense 400mm of rainfall was recorded on 23 July 2021 in La Trinidad alone. 700mm of rainfall is the normal monthly average so in 1 day they received more than half of the monthly average. This tested the efficiency of the newly-constructed climate resilient box culverts in reducing the negative impacts of flooding in Barangay Betag. According to emergency responders from the night of 23 July 2021, when there was heavy downpour, the lateral canals, including the Bolo Creek, overflowed. However, the newly-constructed climate resilient box culverts facilitated the outflow of the floodwaters. Flooding was short lived and the farmers are harvesting the crops with no damage to crops reported.

Sustainability: In terms of sustainability of the project management: the project undertook a community led approach with the development of a community stakeholders group – a diverse range of members representative of the specific vulnerable sectors in the community together with local government unit and private sector representatives. Participatory methodologies were utilized for an inclusive planning and decision making approach to develop the community led project which included both hard and soft elements: construction of the project's infrastructure together with capacity development of the community stakeholders group to enhance the social infrastructure to implement and sustain the project. The community organizations will lead the operations and maintenance of the flood drainage improvement project through systems monitoring, clearing of debris and improved solid waste and agri-waste management, silt, erosion and debris management.

Resilience: To understand how to build resilience in a particular context, it is important to know what key hazards, stresses and issues are posing a threat to people, the environment and overall ecosystem they live in. It is also important to know what capacities people must have to adapt and how they are adapting to changes now and in the past. Initiatives that aim to build resilience must be based on people's knowledge, needs and aspirations, and stakeholders need to consider resilience building measures that combine hard (e.g. infrastructure) measures with soft (e.g. governance) approaches, if resilience is expected to be built in the long term. In this endeavor, the community becomes the focus not only as beneficiary, but more importantly as active participant and game changer in reducing their

vulnerabilities to hazards, stresses and shocks and building their resilience to climate change. This community-centered approach affirms people's right to determine their own futures by enhancing the capacities of people and institutions to address the causes of risk, vulnerability, and inequality. This community-led project will reduce the impacts of climate change by minimizing the social vulnerabilities and increasing the capacities of communities and peoples' organizations through enhanced coping and adaptation capacities. This involves a flood mitigation project that incorporates climate change scenarios and not just historical flood events to be able to take into account the projected increase in rainfall and thereby mitigate the impact of flood events in the future for up to 50 years.

Inclusiveness: The construction of the climate resilient box culverts to mitigate flood events within the main tributary areas of the strawberry fields of Brgy. Betag shall benefit around 100+ small holder farm-gardeners. It will also benefit the downstream industries of strawberry jelly/jam and wine production, tourist visits and its attendant contribution to the local economy. An initial vulnerability assessment was conducted to select the project location and beneficiaries of which members were also selected from the most vulnerable groups to join the Community Stakeholders Group who, with guidance from Oxfam and the local implementing partner PRRM (Philippine Rural Reconstruction Movement), identified the main shocks and stresses, together with possible solutions and designed (together with inputs from a feasibility study), implemented, managed and will sustain the project.

Aspects of the project that can serve as a model for Asia-Pacific Countries

Governance: Community Stakeholders Group (CSG) established that is multi-sectoral and represents the most vulnerable in the community together with local government units and private sector. The CSG was involved from the very beginning of the project that employs a community led and centered approach and will implement, manage and sustain the project. Contractors for the construction phase and consultants for the feasibility study and capacity development phase were selected through competitive bids Dialogues and consultations during the feasibility study involved the CSG and a wider representation of beneficiaries.

Investment: The project is on-going, with a project extension due to the impact of the pandemic on the supply chain and the limitations of conducting a community led project in a virtual world. The local government units have already contributed to the costs of the project whether in monetary terms or in kind. The local government units have secured a sustainable budget for maintenance and operations by inclusion of the community led project within the local development planning and budgeting processes covered by local ordinances. A cost-benefit analysis was conducted during the feasibility study and this will be enhanced during the capacity development sessions. There will be no potential income from the project but rather the prevention and mitigation of damages. As the farmers simply put it, if their crops were destroyed by the flooding, they will have no income for at least three or four months.

Science and technology: Technical assessments were combined with local knowledge to develop the flood mitigation project. These were integrated into the climate risk assessment matrix where the climate scenarios were explained and analyzed as to the impacts on existing stresses and shocks and processes in the area. To develop a climate-resilient flood mitigation project the design of the box culverts takes into account the worst-case data for rainfall utilizing existing data of flood events together with the latest climate change scenarios from PAGASA for mid-century. Rainfall projections during the wettest months of June to August are used which is 2,055.2 mm over a three-month period. The rainfall intensity baseline provided by PAGASA was 900.7mm in 8 hours for the month of September 2019. Precipitation levels in La Trinidad are expected to increase by 18.5% and 26.3% from current precipitation levels in the months of June to August and September to November, respectively by mid-century. The design parameters for the box culverts were taken from the rainfall intensity baseline

provided by PAGASA as of September 2019. The projected seasonal rainfall due to climate change provided by PAGASA was also integrated. These figures were incorporated into the calculations for the necessary dimensions of the culverts to facilitate the flow of future flood waters. Another parameter needed for the computation of the design discharge of each of the culverts was the corresponding estimated tributary. The largest tributary area was considered in the computation for each of the areas covered per culvert and the result of which will be applied in the three individual structures. The technical design which is wider, bigger and thicker reinforced box culverts will considerably improve the flow and discharge of flood water out of the field's catchment area into Bolo Creek.





Asian Development Bank (ADB)

Ningxia integrated ecosystem and agriculture development project (PR China)

Overview: Ningxia Hui Autonomous Region used to be the PRC's priority targets for poverty alleviation due to the high rural poverty attributed to water scarcity, poor agricultural infrastructure, and unsustainable farming practices. The project joined the government efforts to improve agriculture productivity and farmers' income through demonstrating integrated approaches for agriculture development and sustainable livelihoods.

Major source of financing: ADB loan \$99.57 million and GEF grant \$4.34 million

Contribution to quality growth

About 150,000 rural people benefitted from from transition to higher-value rural industries. Agrochemical fertilizer usage in the project area was reduced by 69.5% and water use decreased by 60%. Water balance—between compensated volume and storage capacity—has been achieved in the Yinchuan wetlands and Sand Lake, two major water bodies in the project area. The water quality of monitored lakes has been maintained at Class IV of the National Surface Water Standards, in line with the water function zoning.



Sustainability: Land management practices demonstrated under the project are applied as standard practices for irrigation and fertilizer application, which were authorized as the government technical guidelines. Integrated approaches were widely applied in the local government policies and regulations for agricultural development. Local farmers and officials' capacity were improved through the extensive training provided by the project and sustained with the field farmer schools established under the project.

Resilience: Grapes, one of major cash crops promoted, grew well with reliable irrigation systems, regardless of extreme low rainfall (about 200 millimeters) in recent years. Farmers' incomes were not affected and were steadily increased in fact. The water quality of the wetlands were maintained at good level and biodiversity mainly birds were increasing.

Inclusiveness: The number of poor small households linked to commercial enterprises rose from 210 to 3,500 from 2008 to 2020. The number of project beneficiaries grew by 5.3 times to 104,120 people in 2016 from 2009, of which 40% were Hui minority people. The annual growth rates of rural farmers' incomes per capita ranged from 10.4% to 15.0% from 2008 to 2020.

The points to be proud of the project

Governance: The Yinchuan City was accredited as the first group of the international wetland cities by the Ramsar Convention in 2018 thanks to improved wetland management. Integrated ecosystem management was mainstreamed into the government policy formulation and programming. Farmer field schools provided continuous training and technical services for land and water management. Water-

saving irrigation and improved fertilizer application were adopted as the local farming standards followed and applied by farmers.

Investment: All the planned project activities were completed adequately and are operated effectively, particularly water-saving irrigation systems, wetlands management, and rural livelihoods (i.e. grape growing and dairy farms). Operation and maintenance are budgeted under the government water-saving irrigation programs mainly for equipment and materials, while local farmers provide labors. Wetlands management became one of the government’s priorities for ecological protection in the region.

Science and technology: One of vineyards supported under the project became a research base for China Agricultural University focusing on soil and water management for high-quality grapes. Vineyard manager showed soil testing and monitoring instruments, which decides when and how much the water and fertilizer would be dripped to the vines. The system ensures a high-quality grape growing, which thus provides a higher value of the end products such as grapes and wine.





Asian Development Bank (ADB)

Wuhan urban environmental improvement project (PR China)

Overview: The project was the third ADB loan to support urban development and environment improvement in Wuhan City. The project addressed the environmental challenge of effectively managing sewage sludge created and generated by the two previous ADB wastewater treatment projects; restored natural hydraulic circulation, increased water system resilience, and promoted integrated surface water management to reduce the risk of flooding and improve urban environment and urban development.



Major source of financing: ADB loan \$98.1 million, local government \$213.4 million, and local bank loan \$186.9 million

Contribution to quality growth

The project directly benefited about 2,800,924 residents from improved water quality, enhanced public health, and an improved urban environment in Wuhan. The improved urban environment contributed to increased investment and business opportunities, with gross domestic product in the project area rising by 8.8%, 9.2%, 12.6%, 10.7%, and 9.3% annually from 2015 to 2019. The living standards and quality of life in Wuhan City have been raised.

Sustainability: Urban wastewater treatment plant sludge is reused as planting soil, cement-plant material, building material, or power-plant carburant, contributing to economically and environmentally sustainable urban development, and extending the life of the city's landfills. The project raised social environmental awareness to ensure the sustainability of infrastructure investments and maximize long-term social benefits. The average per capita net income of affected households increased by 345.0% from 2011 to 2019.

Resilience: The water quality of all project lakes and channels has been improved. Of which, the water quality of Yangchun Lake was improved from Class Low V to IV or III.¹ The incidence of waterborne infectious diseases has been mitigated to zero within Wuhan since 2017. The project unblocked channels connecting the lakes, supported the construction of wetlands and promoted integrated surface water management to increase water regeneration and flood retention capacities. No disruption or damage caused by local stormwater flooding and no pollution incidents have been reported in Wuhan since 2017.

Inclusiveness: The project has contributed to improved water quality, enhanced public health, and an improved urban environment for Wuhan, raising living standards, quality of life, and the business investment environment. Local residents reported that their living conditions and public health status

¹ PRC water quality standards have five classes covering 24 basic quality parameters. Class I is pristine; class II is for high-value fish production areas and spawning habitats; class III is suitable for urban water supply; class IV is suitable for irrigation and recreation; and class V is polluted and not recommended for human consumption or agricultural use.



have been improved because of the cleaner, more pleasant urban environment, which enables a happier life. Trainings on work safety, contract law, technical skills, and prevention of communicable diseases were delivered for women and men to support their employment and enhance their future employability. The project created 17,022 jobs during construction and operation, 5,410 (31.8%) of which went to women.

The points to be proud of the project

Governance: The project has been a model for lake rehabilitation and integrated surface water management for Wuhan and the entire country. The project comprehensive sludge solutions have been fully recognized and benchmarked by the government. The project has contributed to improving national sludge-management policies. The beneficiary use of sludge provided a model for managing wastewater treatment plant sludge, extending the operational life of landfills, reducing sludge-transportation costs, and reducing greenhouse gas emissions, among other environmental benefits. Responsibility for operation and maintenance of constructed subprojects has been transferred to relevant local government agencies in a timely manner.

Investment: In 2020, the poorest 10% of Wuhan households on average spent less than 3% of household income on water and wastewater bills, which indicates that the water tariff is affordable. Wastewater services, inclusive of sludge treatment, have achieved full cost recovery since 2015. The project's annual operation and maintenance costs and debt-servicing costs were 0.02% of the municipal annual revenues. Adequate fiscal budget has been and will be allocated annually to ensure good operation and maintenance.



Science and technology: The project-supported water quality model and intelligent watershed integrated management system will assist local government in long-term planning on water management including water quality assurance and forecast, promoting water balance, and emergency response.



Global Water Partnership (GWP)

Community participation in domestic gray water treatment using constructed wetland (Indonesia)

Overview: In Indonesia, gray water contributes 85% of polluting waters. The target of Sustainable Development Goals (SDGs) no 6 is that increasing access to clean water requires major changes in the water and sanitation sector. Until now, the SDGs target has not been met, due to the lack of socialization of regulations related to wastewater to the community and the lack of knowledge about technology that can be implemented in the community. Constructed wetland is a technological intervention in the field of wastewater treatment without ignoring ecological functions. Constructed wetlands can accept organic waste loads of 250-300 kg/ha.day and hydraulic loads of 0.2-0.3 m³/m².day. The efficiency of the artificial wetland to reduce pollutant $\geq 90\%$ with a residence time of 1-2 days. The constructed wetlands in this showcase were built in Srengseng Sawah Village, South Jakarta and Cislak Village, Depok City.



Major source of financing: Constructed wetland in Srengseng Sawah Village, South Jakarta, is funded by Indonesia Power in collaboration with the Ministry of Environment and Forestry Rp 70.000.000,-; Constructed wetland in Cislak Village, Depok City is funded by the Directorate General of Higher Education, Research, and Technology - Ministry of Education, Culture, Research and Technology of the Republic of Indonesia Rp 70.000.000,-.

Contribution of quality growth

Constructed wetland is a waste treatment that can be applied to treat gray water from settlements on a communal scale. Constructed wetlands can answer water and sanitation problems to reduce the burden of pollution in the waters. Constructed wetland is a waste treatment unit based on bioprocess, easy to implement, energy-efficient and provides aesthetic value.

Sustainability: Gray water treatment using constructed wetlands can reduce the pollution load by $\geq 90\%$. By reducing the pollutant load due to gray water, it will improve the ecological function of receiving water bodies. It is a solution for sustainable wastewater treatment, supports the conservation of water resources and can be developed into a tourist and educational place.



Resilience: Constructed wetland is an effective treatment, energy-efficient because it does not use electricity and relies on media as a filtration function and microbes to degrade pollutant compounds and the function of aquatic plants as phytoremediation. Lower cost with high design flexibility because it is based on bioprocess so that the design can be adjusted to the type and loading of the

wastewater to be treated. In addition to reducing organic pollutants, constructed wetlands are also effective in reducing pathogens.

Inclusiveness: Constructed wetlands can be managed as ecotechnology by paying attention to the plants that exist in the area, community-based and has environmental benefits. Implement regulations and increase public perception and participation in sanitation. Cooperation with the government and the private sector in terms of funding for unit procurement.

The points to be proud of the project

Governance: Program sanitasi masyarakat (Sanimas) is the driving force behind the implementation of the wastewater treatment program. Positive perceptions about wastewater treatment and community participation are needed in the implementation of communal wastewater treatment.

Investment: The costs consist of the construction of the wetlands as well as the cost of filling the media and plants. Meanwhile, operational and maintenance costs consist of labour costs. Community participation in the implementation of constructed wetlands is planning, implementation, monitoring, utilization and the results of the performance of the applied units. The environmental benefits consist of the value of cleanliness and the reduction of water-related diseases. The community is willing to do self-help such as providing public facilities for placement, development carried out in mutual cooperation, but it is also hoped that there will be cooperation with the government and other parties to support the success of the program.



Science and technology: The design criteria for the constructed wetland system consisting of hydraulic residence time, pond depth, pond geometry (length and width), BOD loading level and hydraulic loading level. The design of the wetland to be built refers to the existing criteria by taking into account the available land area. The design of the constructed wetland uses the Emergent Aquatic Macrophyte-Based System with the sub-surface flow. Wastewater that will flow into the wetlands comes from the drainage canals of the surrounding community. Wastewater entering the constructed wetland is passed to a collection tank which functions as a deposition.



Constructed wetland technical specifications

| No. | Specification | Size | Description |
|----------------------------|---|---------------|---|
| Collection tank | | | |
| 1 | Lenght | 0,5 m-1 m | |
| 2 | Widht | 0,5 m | |
| 3 | Depth | 0,5 m | |
| Constructed wetland | | | |
| 1 | Lenght | 3 m-4 m | |
| 2 | Width | 1 m | |
| 3 | Pool depth | 0,7 m-1 m | |
| 4 | Water depth (from the bottom of the pool) | 0,5 m | |
| 5 | Flow type | | Subsurface flow system |
| 6 | Base layer (from bottom to top layer) | | |
| | Gravel | 0,2 m | |
| | Sand | 0,15 m-0,2 m | |
| | Dirt (topsoil 90%+sand 2,5% +compost 5%+mud 2,5%) | 0,15 m-0,25 m | |
| 7 | Type of plant | | Vetiver (<i>Chrysopogon</i> sp), Bulrush (<i>Thypha</i> sp) |
| Effluent reservoir | | | |
| 1 | Length | 0,5 m | |
| 2 | Width | 0,5 m | |
| 3 | Depth | 0,5 m | |

Source: Hendrawan (2013), Hendrawan (2021)

Contributor: Dr. Ir. Diana Irvindiaty Hendrawan and Dr. Melati Ferianita Fachrul, MS, Faculty of Landscape Architecture and Environmental Technology, Universitas Trisakti



Global Water Partnership (GWP)

Innovative policy for water conservation in Yangtze river basin: river chief system (PR China)

Overview: The Yangtze River, the longest river in Asia (6,300 km), rises from the Qinghai–Tibetan Plateau in the west and crosses the country through 11 provinces. The ecological environment of the Yangtze River Basin is directly related to the development of the Yangtze River Basin economic belt and people's health. River Chief System (RCS), an important innovation for the protection and management of rivers and lakes in China, by implementing local governments' entity responsibility for protection and management of rivers by appointing government's principal leader as the river chief, but still facing challenges in basin level integrated management. In order to further explore the effective implementation of the RCS throughout the Yangtze River basin to promote ecological protection, a research project have been launched.



Major source of financing: Grant aid

Contribution to Quality Growth

Sustainability: The effective implementation of River Chief System promotes water resource management, water quality and ecological restoration in the Yangtze River Basin, improve people's health along the river bank, facilitate the sustainable development of Yangtze River Basin economic belt.

Resilience: The River Chief System build up the negotiation mechanism in solving disputes within the basin. Compared with strict laws and regulations, the mechanism under RCS framework is more flexible in dealing with conflicts in adjacent areas, and be able to solve problems by establishing dialogues between multi-stakeholders in upstream and downstream.

Inclusiveness: Public participation is one of the core principles of the river chief system. Efforts have been made to guide the people along the Yangtze River to improve the awareness of river protection, and to form a good atmosphere of common participation and common governance.

Points of the project that can serve as model for basin integrated management in other countries

Governance: There is a five-level organizational form of River chiefs, which are: provincial, city, county, township and village in descending order of power. River chiefs at different level are assigned to take

responsibilities for the management and protection of rivers and lakes in their jurisdictions. Its “six main tasks” include strengthening the following: water resource protection, river and lake shoreline management and protection, water pollution prevention, water environment governance, water ecology restoration, and law enforcement and supervision. The clear responsibility of each river chief ensures the effectively implementation of the RCS in improving water ecological environment in the Yangtze River basin.

Investment: At the beginning of the project, a clear contract framework and financial budget were established, and progress meetings were held regularly to monitor the implementation of the project. The project completed all the research contents on schedule with good financial execution.

Science and technology: Based on basin water quantity, water quality, aquatic habitat, the flood period, the influence factor of the Yangtze river basin water resources comprehensive management research, project take chishui river basin (the Yangtze river tributaries) as an example, a monitoring index system and evaluation method of chishui River chief system based on cross-provincial cross section monitoring and coordination were formulated, as well as monitoring index and threshold of river chief system in transboundary section.



Summary of results for the Chishui River, indicator categories, and indicator categories.

Contributor: GWP Yangtze River



Global Water Partnership (GWP)

Local community organization for small reservoir safety management (Vietnam)



Overview: For the last decade, there have been over 70 incidents of dams and reservoirs in Vietnam causing serious damage to dams or threatening dam safety. Most of the dams that are broken or have major problems are of small and medium scale, located in the mountainous and central region and managed, operated by local communities. While there are many factors leading to reservoir incidents, the project focuses on clarifying Strength and Weakness of local community's institution, for small scale reservoir dam

management, and the gap in dissemination of information on disaster forecasting and warnings, where by providing solutions/measures for sustainable and effective management of reservoir/dam, to make the community more proactive in reservoir management for both agricultural production and natural disasters prevention and mitigation in three districts in remote area of the central part of Vietnam

Major source of financing: 200,000 USD (Vietnam government fund)

Contribution to Quality Growth (how the project contribute to quality growth?)

Sustainability: Local community's capacity building and establishment of a reservoir safety subcommittee, under the Commune's Steering Committee for Natural Disaster Prevention and Control, with detail regulations, clearly defining the roles and responsibilities of commune, the state lowest level administration, and WUO, the dam owner, in management of dam before, during and after rainy season, improves the sustainability for the dam safety management



Resilience: Closing the gap in disaster warning and response and strengthening the institution and capacity of local communities involving participation of local people, water users and local administration making the communities gain more agricultural production and more resilience in prevention and response to disaster caused by natural disaster, including dam incident.

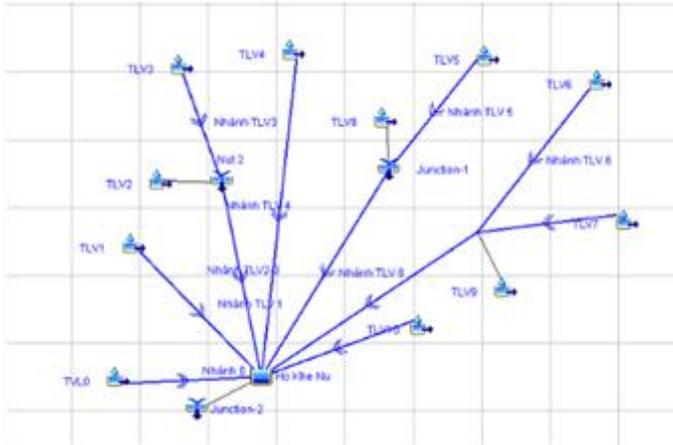


tion making the communities gain more agricultural production and more resilience in prevention and response to disaster caused by natural disaster, including dam incident.

Inclusiveness: The project focusing on improving the capacity for reservoir/dam management and preparedness for reservoirs/dam incident of the communities located in remote mountainous and central area that are usually poorer than other area of Vietnam, not only because of remoteness but also because of frequent flooding and land slice

Points to be proud of the project

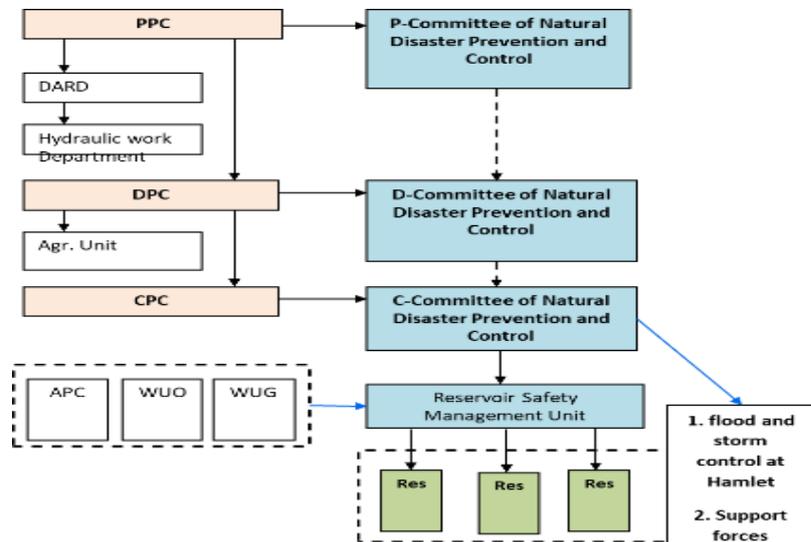
Governance: Identification and providing solutions for closing the gap in disaster warning and response related to reservoir incident in remote area. Sustainable and effective local community institution, with participation, coordination of local people, water users and local administration for reservoir operation for agricultural production and dam safety management.



Investment: Effective support to local communities in term of capacity building, adopting participatory co-learning and co-doing approach, in risk assessment, disaster prevention and mitigation planning and local communities co-sharing of the resources for the provision of basic tool/facilities for disaster prevention and mitigation (road access to the dam, dam guarding house, emergency water level at the dam, people rain gauge implementation, reservoir operation rules).

Science and technology: Clarification of the gap between the state management forecast, warnings & responses and local, rural Community's need in disaster warning and responses where, by providing local community with Participatory Disaster risk assessment, Mapping of Natural disaster and disaster prevention planning and action. Investigation catchment area, making reservoir operation rules for irrigation and flooding prevention. Local people rain gauge, providing information on the ground for dam operation.

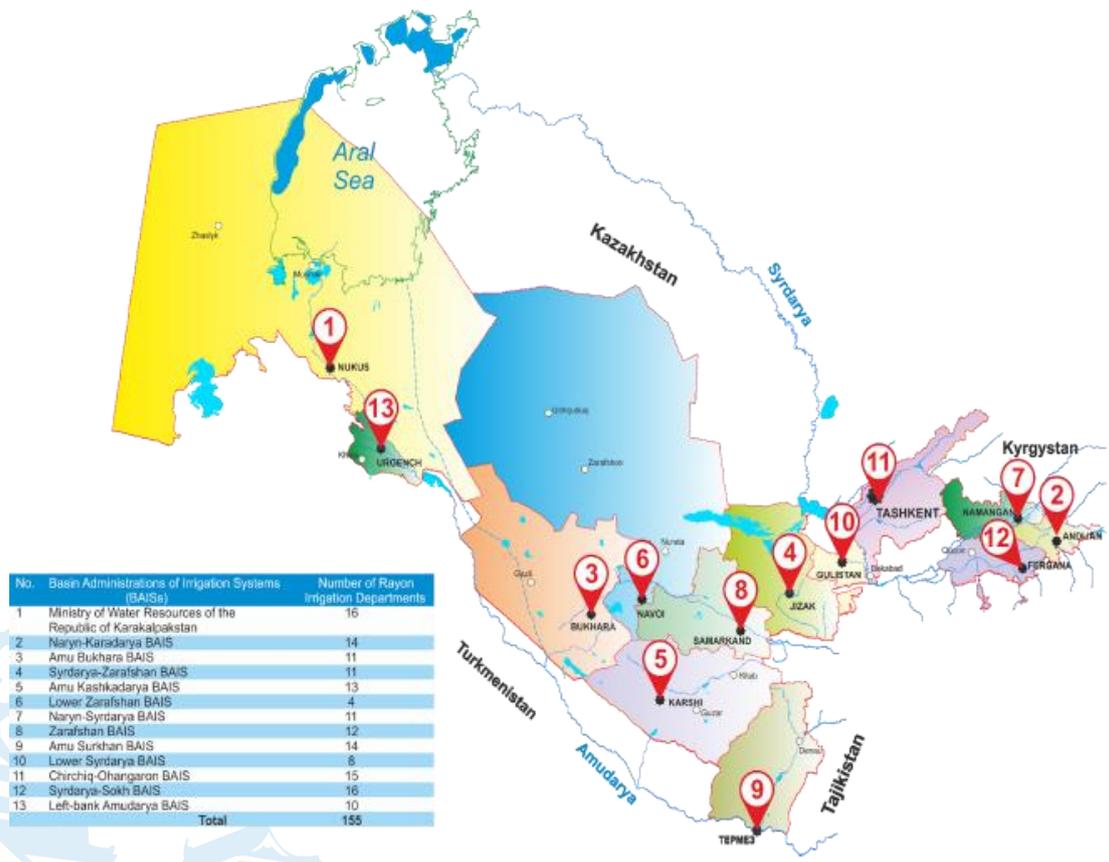
Contributor/writer: Doan Doan Tuan, Ph.D, Associate Professor at Center for Participatory Irrigation Management of Vietnam and Country Coordinator of Global Water Partnership (GWP) Vietnam



Global Water Partnership (GWP)

National strategy on water management and development of irrigation 2021-2023 (Uzbekistan)

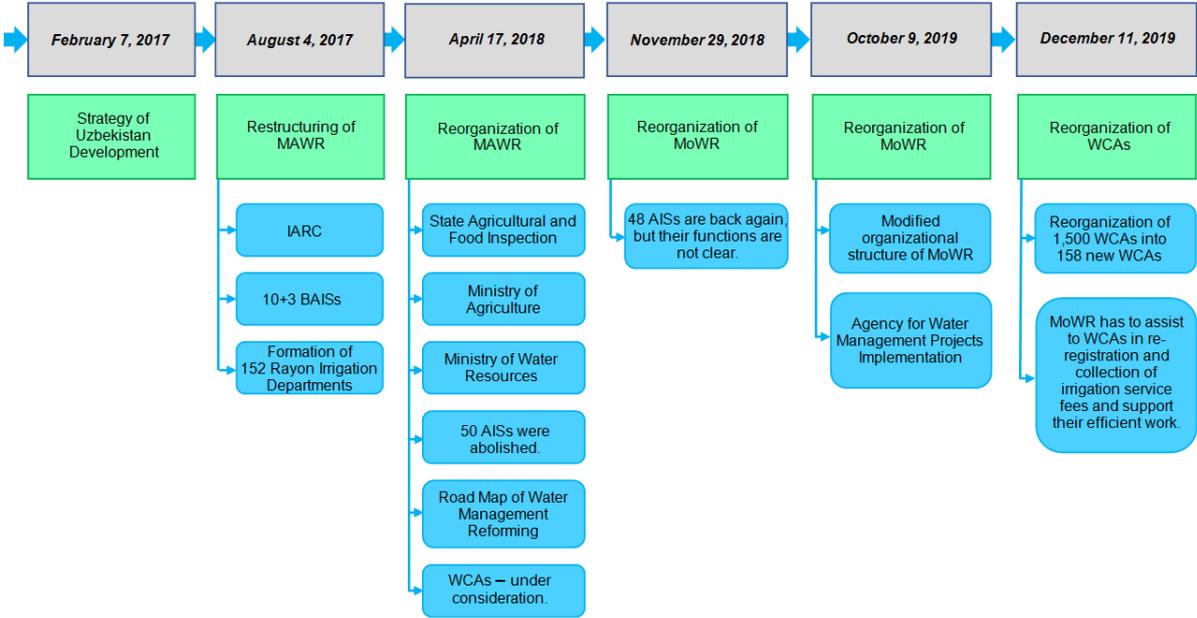
Overview: About the only 10% of total volume of water resources available for use is formed on the own territory of Uzbekistan and about 90% are water coming from transboundary sources, originated in upstream neighboring countries. The territory of Uzbekistan belongs to the arid zone, with influence of air and soil droughts, which are basis for ecosystems degradation and desertification processes. After gaining independence in 1991 the government of Uzbekistan has started reforming the water and agricultural sectors. A lot of efforts were addressing to the maintenance and development of the enormous water management complex inherited from the past. Up to 2016 efficiency of water use (especially for irrigation) in Uzbekistan remained at very low level (FAO Report, 2021). In February 2017, following concern among population and broad public consultation, President of Uzbekistan approved the Action Strategy on five priority areas of country's development for 2017-2021. This document is serving as a roadmap for achievement of the 2030 UN Sustainable Development Goals. In line with this Strategy there were started specific huge reforms in water sector of Uzbekistan. The major source of financing: Long way of sectorial reforms towards new Water Strategy was supported by the National Water Resources Management Project in Uzbekistan financed by the Swiss Agency for Development and Cooperation (SDC). According to the official request of the Government of Uzbekistan, the Mandate for NWRM Project implementation was directly awarded in November 2016 to the Agency of IFAS (Host Institute for CWP-Uzbekistan). Grant aid from Switzerland (phase 1 (2016-2019) - 1,57 million USD; Phase 2 (2020-2023) – 3,99 million USD)



Contribution to Quality Growth

The principal step for reforms was done on February 12, 2018, when President of the Republic of Uzbekistan decided to separate water and agricultural sectors. Decree of the President of the Republic of Uzbekistan № UP-5418 from 17.04.2018 "On measures to radically improve the system of public management of agriculture and water resources", the Ministry of Water Resources and the Ministry of Agriculture were established separately. The newly established Ministry of Water Resources (MoWR) became responsible for implementation of the unified national policy in the field of water resources management, as well as coordination of all activities in the field of rational use and protection of water resources, prevention and elimination of harmful impacts of water, raising the level of water use culture.

The whole process of water reforms in Uzbekistan during 2017-2019 are shown below:



Sustainability: In the end of 2019 it became clear that the lack of a long-term concept for development of the water sector creates the barriers for efficient use of water resources, the widespread introduction of investments in the sphere, the development of scientific and innovative potential in the water sector, the introduction of scientific achievements and know-how, as well as the widespread use of modern information and communication technologies and innovative solutions. That is why appeared Decree of the President of the Republic of Uzbekistan, dated July 10, 2020 № UP-6024 “On the approval of the concept of the development of the water sector of the Republic of Uzbekistan for 2020–2030”. In order to consistently implement the tasks and ensure achievement of the main target indicators defined in the Concept for Development of the Water Resources in Uzbekistan for 2020–2030 there was adopted Decree of President of the Republic of Uzbekistan No. PP-5005 "On approval of the strategy for managing water resources and developing the irrigation sector in the Republic of Uzbekistan for 2021–2023" dated February 24, 2021.

Resilience: These restructuring efforts have had implications on the implementation of the Integrated Water Resources Management (IWRM) principles in the country, which has been promoted by Swiss Cooperation (SDC) for many years. Approval of the Water Strategy developed with Project support is an important milestone in the reform of the water sector of Uzbekistan. It contains a set of priority measures aimed at the implementation of fundamentally new ideas and ways of further development

and modernization of the sector, the introduction of IWRM principles, market mechanisms and information technologies, as well as strengthening of regional cooperation to ensure the efficient and sustainable use of water resources in Uzbekistan. Its proper implementation depends on availability of sufficient financial and human resources.

Inclusiveness: End users (farmers) have been a key target of agricultural and water reforms and the Project's role is to facilitate improved level of water management and water productivity. An important recent change in agriculture has been the introduction of so-called Agricultural Clusters to add value by private investments in processing, spinning, weaving and, finally, garment production. Cluster owners (private business) invest for farmers substantial financial, organizational and human capacities to adopt best practices in modern water management and agricultural practices to increase water productivity. Consequently, they do and will continue to put pressure on the entire water management system to perform better and allow for more efficient crop production.

Aspects of the project that can serve as a model for Asia-Pacific countries

Governance: It is very rich experience when in line with elaboration of National Water Strategy the governance role of the national authority in IWRM implementation process has been reinforced. The Ministry of Water Resources (MoWR) is now responsible for implementation of a unified national policy in the field of water resources management (in the past this role belonged to Parliament and Cabinet of Ministers), formation of accounting, reporting and balance of water, as well as coordination of the activities of the public bodies and other organizations in the field of rational use and protection of water resources, prevention and elimination of the negative impact of water disasters. MoWR is now an authorized governmental body for accounting of all water resources, coordination of relevant measures to improve the efficiency of water use and consumption, as well as the formation of the water balance of the Republic of Uzbekistan.



Investment: The system of financing the water sector in the Republic of Uzbekistan still lacks a mechanism for economic relations between water management organizations and water users, there is no national "water market" as the main lever for the redistribution of water resources from low-efficient water users to highly efficient ones. The Strategy provides for a step-by-step increase the budget and its items for the operation and development of infrastructure, as well as for the implementation of IWRM components, especially for the lower levels of the water management hierarchy.

Science and Technology: The Strategy foresees to increase practical research and development work, scientific achievements will be introduced and know-how in the field of water management, aimed at supporting the implementation of the Strategy and solving the priority problems in the field of water management. Special program will be addressing to modern methods and technologies, including digital technologies and other innovative technologies, in determining the demand for irrigation water, monitoring the distribution and efficiency of water use.

Contributor: Dr. Vadim Sokolov, Head of Agency of IFAS for Aral Sea Program and GEF Projects (Agency of IFAS) and Regional Council Member at Global Water Partnership Central Asia and Caucasus (GWP CACENA).

Global Water Partnership (GWP)

Promoting women social entrepreneurship through water ATMs in low income communities for safe water access (India)

Overview: Women’s role in water resource management is critical and recognized, yet the implementation of methods and strategies to get beyond gender-based obstacles to women’s equal participation in water resource management remain a challenging task. Thus, empowerment of women in managing water assumes high priority. In India 600 million people suffer from moderate to severe water stress, more than 140,000 children under the age of five die every year due to diarrhea and about two lakh people die every year due to inadequate access to safe water. The crisis is worsening and women and especially the girl child are typically disproportionately burdened not only with water collection spending four to six hours but also caring for sick family. To mitigate this problem increasingly decentralized safe water enterprises or Water ATMs are being set up and have proven to be a complementary solution to the piped water supply. These enterprises are resilient, safe drinking water solutions during climate change and pandemic, less capital intensive, and quick to install compared to the piped water supply. They fill in the much-needed gap of servicing the underserved, the bottom of the pyramid population, and the consumer on the go in urban and rural regions. Rapid, cost effective decentralized water purification systems owned and operated locally by social entrepreneurs provide affordable safe drinking water. Usually they are managed by men as they are considered more skilled and better at financial management but are now increasingly managed by women. There exists a myth that women have a technology barrier and lack business skills, especially at the unskilled grass root level. Safe Water Network India (SWNI) has imparted skill training to women entrepreneurs and Self Help Groups (SHGs) who manage iJal Stations that provide affordable, reliable access to safe water. The program is globally replicable and has been tested in Ghana Africa. In India under the USAID grant it has been replicated with SEWAH Alliance partners in 12 States and 25 cities of India.



Major source of financing:

- CapEx: Japanese Grassroot Grant + IWP + Corporate CSR funds Pentair + Safe water Network + In Kind from local government
- OpEx: Local level operating costs from daily water sale revenue and cluster costs through subsidies based on result framework

Contribution to Quality Growth

The initiative provides affordable safe water access, availability and security. The consumers have self reported health benefits as decrease in incidences of diarrhea and jaundice, especially amongst children. Benefits to women and girl child by reduction in drudgery for women from daily water collection.

The Water collection is usually done by men on motorcycles or boys by bicycle releasing women’s time. WASH Activities hand wash hygiene education imparted to school children. There has been improvement in the practice of hand-wash observed before eating food and after toilet. Local community is working as Water ATM entrepreneur, operators, distributors and earning their livelihoods.

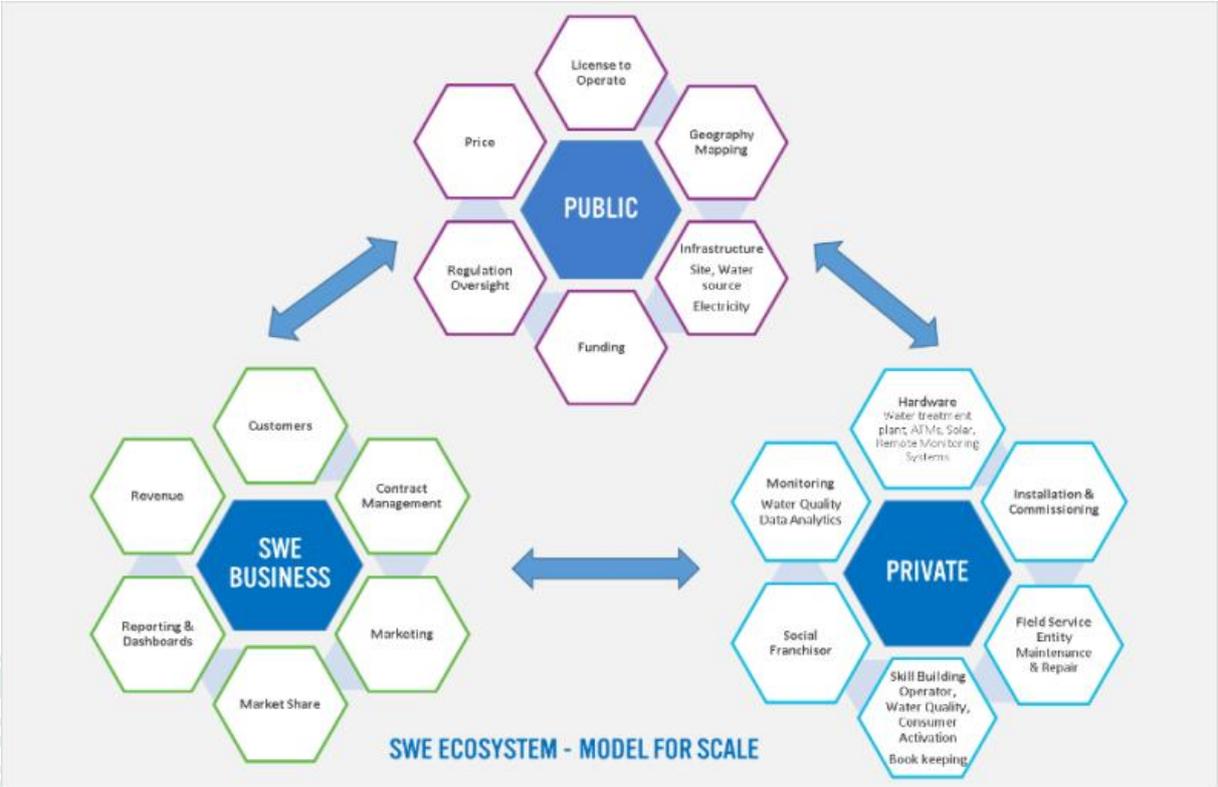
Sustainability: Revenues generated from daily sale of water from Water ATMs cover the costs at the local operating level, including operator’s salaries, electricity, chemicals and consumables, and cost of regular repair and maintenance, the cluster management costs associated with ensuring sustainability are not covered by revenues. Therefore, many such SWEs need viability gap funding support, both direct and indirect.

Resilience: The oldest Water ATM set up in village Nizampally, Telangana is working since last 10 years.

Inclusiveness: Water ATMs provides equitable and inclusive safe water access to all as the consumer collects their water in their own water bottle or plastic reusable can. It provides water to most vulnerable and special needs citizens too.

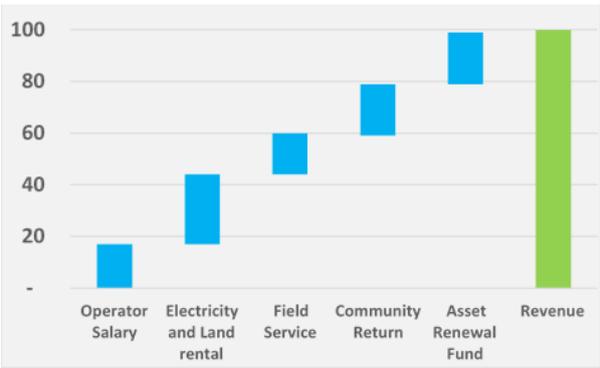
Points to be proud of the project

Governance: Safe Water Enterprises are a perfect example of a successful PPP model implemented with various governance models that bring together the communities, public sector, and the private sector to offer a complementary solution for safe and affordable drinking water. Correct siting of SWEs in high footfall areas helps the users access the services while making the operations financially viable. It provides equitable and inclusive safe water access as the consumer collects their water in their own water bottle or plastic reusable can.

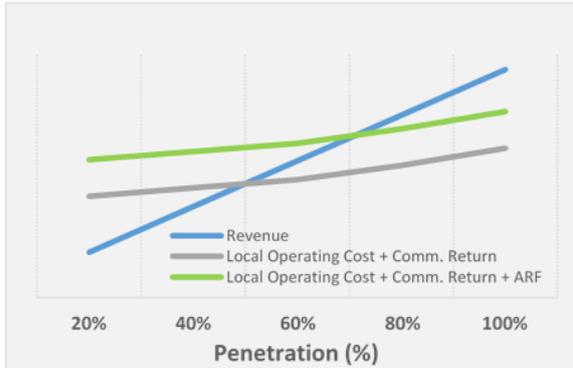


Investment: Water ATMs complement the piped water supply and provide quick access to the 163 million Indians who lack safe drinking water. Approximately 50,000 Water ATMs in India are set up by more than 30 SWE implementers across several states. The government, private sector, and philanthropic organizations have tested various operating and funding models for SWEs to attract private capital, including Public-Private Partnerships (PPPs), Company Owned and Operated (COO), and Company Owned, Community Operated (COCO). With Capex and startup costs ranging from \$20-40K to serve the population of 3-5K, they are cost-effective solutions providing affordable, reliable, and safe drinking water at ~\$1/person/year or \$15/per person. While the revenues cover the costs at the local operating level, including operator’s salaries, electricity, chemicals and consumables, and cost of regular repair and maintenance, the cluster management costs associated with ensuring sustainability are not covered by revenues. Therefore, many such SWEs need viability gap funding support, both direct and indirect. A portfolio approach helps cross-subsidize support weaker SWEs with locations with low demand due to lack of awareness. The life of a Water ATM is ~7-10 years.

Share of Revenue for stakeholders with optimized operations



Sensitivity of Financial sustainability to penetration*



Science and technology: The Water ATMs have State of art six stage water purification plants that are equipped with a Remote Monitoring System (RMS) that feeds live data on plant operations, water quality and consumer participation every 15 minutes. Water is made available to the consumer 24x7 through automatic dispensing at the drop of coin or flash of pre- paid RFID cards or using digital money by scanning the QR code. At specified times in the morning and evening, and is paid for monthly using RFID cards. Thus we are able to supply safe drinking water that conforms to the national drinking water quality norms and give reliable services <2% technical downtime. Our Water ATMs have proven their resilience despite Covid. For scale up we have a digital suite of tools in the iSWEET (Safe Water Enterprises Entrepreneur Toolkit) toolkit to build capacities of the grass-root entrepreneur. Training them using easily digestible micro- modules with flexible learn at your own pace online, classroom and field training.



The program is globally replicable and has been tested in Ghana Africa. In India under the USAID grant it has been replicated with SEWAH Alliance partners in 12 States and 25 cities of India.

The water treatment technology involves a six-step purification process:

1. sand filter,
2. carbon filter,
3. micron filter,
4. reverse osmosis membrane,
5. ultraviolet treatment and
6. residual chlorine dosing.

There are three separate dosing pumps for anti-scaling, pH and chlorination. The treated water conforms to the national water quality standards and is stored in a 5,000 liter tank. Water quality reports of raw water (twice a year), treated water (twice a year) and reject water (once a year) are monitored and displayed at the station site.



Others related:

Universal safe water access for improved public health for all through the power of Alliance: We founded the Small Water Enterprises Alliance that brings together SWE implementers, WASH practitioners, urban local bodies, academia, government representatives, civil society and community to facilitate safe drinking water to those beyond the pipe. It provides convergence to the fragmented sector, builds self-sustaining ecosystem where water entrepreneurs own and operate the safe water source in villages and urban slums earning livelihoods and promoting public health.

Recommending policy changes to the Centre and State for scale up of SWEs: We work with government at the Centre - Ministry of Housing and Urban Affairs and the State governments to bring policy changes for funding and inclusion of Water ATMs as complimentary solution to piped water. We support in development of model tender documents, Service level agreements etc. We work with Bureau of India Standards in FAD 30 (Water Purification Systems) developing the Water Quality standards of water from ATMs and technology selection. Working with Ministry of Environment and Forest and Climate Change for developing water purification solutions, alternative to reverse membrane technology to prevent huge rejection of water.

Attracting private sector investment for scale up of SWEs: We work with domestic and large multinational companies to facilitate private sector engagement and funding through 2% CSR grants for SWE scale up.

Accelerator promoting Water Entrepreneurship at the grass-root level: Promote knowledge, provide products and services – digital applications and cross learnings amongst WASH practitioners, sector implementers, youth and women through a self-supporting ecosystem. We provide the necessary resources, access to capital, skilling, and technology to provide safe water from Water ATMs. We conduct regular workshop and peer to peer exchange to foster fraternity and build confidence.



Global Water Partnership (GWP)
Sponge city construction promotes high-quality urban development (PR China)

Overview: Sponge city is a new concept of urban development proposed by China in 2013. It is widely implemented especially in the field of urban water management. It draws on advanced foreign water governance concepts and is in line with China conditions. Sponge city emphasizes the promotion of nature-based solutions (NBS). The core concept is to allow rainwater to accumulate, permeate, and purify naturally. In response to the existing problems of lack of water resources, severe water security situation, worrying water environment and degradation of water ecology, a coastal city in southeast China (Xiamen) relies on mountains, streams, and coasts to form a construction pattern combining "points, lines, and areas" to build a natural and ecological spatial pattern of "mountains, rivers, forests, fields and lakes". Xiamen adopted six major systems of sponge city construction: pollution prevention and control, river-lake networks, garden and green space, drainage and waterlogging prevention, road traffic and sponge community. There are six categories of engineering measures with the function of "infiltration, stagnation, accumulation, purification, utilization, and drainage", small sponge facilities such as permeable pavements, rainwater gardens, grass-planting ditches and green roofs, and large sponge facilities such as river and lake water systems have formed a sponge facility system of different scales, which is accompanied by a series of non-engineering measures, such as monitoring system and management related regulations. After nearly five years of implementation and operation, the construction of Xiamen sponge city has played a significant role in runoff control, ecological conservation, water conservation, and waterlogging control, which contribute to quality growth of the city.



Major source of financing: financial funds from the government

Contribution to Quality Growth



Sustainability: Solving urban water problems with ecological concepts and measures. The construction of Xiamen sponge city adheres to the principle of ecological priority, and minimizes the disturbance to the urban ecological background as much as possible. When constructing new engineering facilities, nature-based solutions (NBS) are applied. For the reduction of runoff sources, green infrastructure such as green roofs, rain gardens, ecological retention ponds, and ecological revetments are prioritized. In terms of facility maintenance, the solar

photovoltaic water extraction technology is used to achieve ecological water replenishment and reduce energy consumption. Based on the ecological concept, ecological measures are taken to restore the natural water circulation function of the city to the maximum extent, so as to achieve the sponge city construction goal of "no waterlogging in heavy rain, no inundation in light rain, no black and odorous water bodies, and alleviation of heat islands".

Resilience: Slow-release regulation of rainwater of the whole city. Sponge city construction requires cities to be able to store water in normal times and release water in times of drought. Xiamen regards the city as a "three-dimensional" structure, and leave full space for stagnant rainwater. With various facilities such as green roofs, rain gardens, and underground pipe networks, it realizes the three-dimensional interception, storage and regulation of rainwater. The idea of reducing runoff from the source, transferring it in the middle-process, and adjusting and storing at the end, tries to disperse and store rainwater in different links as much as possible, so as to achieve the goal of building a sponge city with urban three-dimensional space as the carrier and slow-release and regulation of rainwater.

Inclusiveness: Implement sponge city policies by various sponge facilities. Sponge city is not a simple engineer project, this concept is combined with different urban infrastructure construction projects to form different sponge facilities, such as sponge roads, sponge communities, sponge schools, sponge parks, ecological water systems in Xiamen., are all examples of combining sponge city concepts with concrete projects. In order promote sponge city effectively, it is necessary to make the concept of "natural accumulation, natural penetration, natural purification" and nature-based solutions (NBS) deeply rooted in all the people through demonstration construction and publicity.



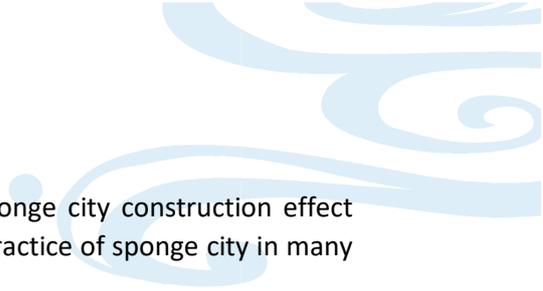
are all examples of combining sponge city concepts with concrete projects. In order promote sponge city effectively, it is necessary to make the concept of "natural accumulation, natural penetration, natural purification" and nature-based solutions (NBS) deeply rooted in all the people through demonstration construction and publicity.

Points to be proud of the project

Governance: After sponge city construction of recent years, the goal for sponge city construction of Xiamen has been basically achieved. The ability of cities to resist extreme disasters and carbon sinks has been enhanced to some extent, ecological and social benefits have continued to emerge, and the sense of achievement and happiness of urban residents has been improved.

Science and technology: Sponge city is a new strategy in China. With identification of basic urban water-related problems, we illustrated the scientific connotation of the sponge city, and proposed the protocols of sponge city construction. Through a systematic implementation, we proposed three substantial contents, three diagnosis items, three basic approaches and three balance equations of the sponge city, based on the work we have done in Xiamen. A systematic formula that covers all elements and all processes of general sponge city construction is presented, the idea may provide the foundation for research, planning and implementation of the sponge city. At the same time, we have also proposed some new technologies, such as urban rainwater slow-release





regulation technology, urban water system simulation technology, sponge city construction effect evaluation technology. These technologies have been supporting our practice of sponge city in many cities in China.

Contributor: GWP China / China Institute of Water Resources & Hydropower Research



International Water Management Institute (IWM)

Based flood insurance (India, Bangladesh and Sri Lanka)

Overview: The IBFI project

Major source of financing: CGIAR Research Programs on Water, Land and Ecosystems (WLE) and Climate Change, Agriculture and Food Security (CCAFS).

Contribution to Quality Growth

Sustainability: As noted below in more detail, the sustainability of climate insurance as a whole remains in question due to its transaction costs, the scale at it needs to be applied for significant impact and the potential dissonance between the profit motive of private sector insurers and the social good function of climate insurance.

Resilience: The project's ability to help pure tenants, socially marginalized, illiterate individuals and women heads of household's access to insurance contributed the recovery of their losses due to flood-induced crop damages. A less acknowledged and visible but important benefit to women is that an ability to offset losses to some extent may also mean that they are less likely to have to forego dietary protein in favour of male members of their households (applicable to pure tenant households), given the tendency for marginal households to reduce food intake as a coping strategy, with women particularly impacted.

Inclusiveness: The project has improved inclusivity on the ground and increased awareness of barriers to inclusion and possible solutions amongst government, private sector and practitioner stakeholders globally, and especially in Asia. At the ground level, the project was able to include the coverage of landless (pure tenant) farmers and women who are household heads in the insurance scheme implemented in Bihar, India, by IWM and partners under the CGIAR Research Programs on Water, Land and Ecosystems (WLE) and Climate Change, Agriculture and Food Security (CCAFS). These two groups represent two of the most vulnerable and marginalized cohorts in the project's operating environment (e.g. women-headed households constitute 10-12% of households). In this case, the challenge for the pure tenants was the requirement of evidence of a tenancy agreement as a criterion for eligibility to purchase insurance. Yet in the project's operating context, verbal agreements are the norm partly due to low levels of literacy and landlords' desire to keep land-sharing informal. This problem was overcome by the project by negotiating with the local government representatives to provide written confirmations of such informal tenancy arrangements, which the insurer accepted as evidence. In the case of female heads of households, insufficient understanding of particular mobility and literacy challenges amongst this cohort were rectified through focused efforts to identify, engage and support these women who expressed interest in the insurance to successfully purchase it. This resulted in 13.5 percent of insurance beneficiaries being women; 12.5 percent being landless farmers, and 6 percent being marginal farmers. These solutions demonstrated that some challenges can be easily overcome with minimal transaction costs if sufficient and timely social engagement occurs.

Contributions to the broader discourses around inclusion in climate insurance included open-access peer-reviewed content and technical briefs presenting learning from assessing different insurance mechanisms in Bangladesh, Sri Lanka and India through national collaborations. At the global scale, [Aheeyar et al. \(2019\)](#) take stock of experiences with index insurance covering especially Asia and Africa

and multiple commodities including crops and livestock. The paper combined primary data collected by IWMI in Bangladesh and India with the literature review findings to propose a framework for building in inclusion from the outset. Awareness of challenges and potential solutions was further created through a Webinar in December 2020 involving multiple CGIAR centers implementing climate insurance schemes ([web](#)) and national partners where experiences and solutions were shared, and then through an Asia Regional Dialog with government representatives, insurance companies, NGOs and practitioners held in October 2021 ([web](#)) that sought perspectives from different stakeholders on the feasibility of implementing the proposed framework for inclusion.

While the Asia regional Dialog with stakeholders highlighted a number of fundamental structural challenges (such as the dearth or nuanced social datasets), the above experiences demonstrate that several other contextual challenges can be solved if insurance initiatives provide for sufficient skilled social mobilizers.

Points to be proud of the project

Governance: As details presented above indicate, the project has been able to directly benefit both marginal pure tenants and women heads of households in Bihar, India by finding local solutions to contextual barriers to accessing insurance experienced by these two stakeholder groups. The solutions, moreover, utilized existing governance structures (local government) in the case of pure tenants, and the active mobilization to reach and include these marginalized women, taking into account the gender norms that limit their spatial mobility and levels of literacy (access to finance was not an issue as the insurance was free of charge given it was a pilot scheme). These actions thus ensured greater climate justice was achieved in the project. The key message from this work in the context of inclusion is the critical need for insurance initiatives to provide financing and time for a strong and ideally locally sourced social science team that understands the highly fragmented and nuanced social strata and norms, which will significantly increase an initiative's ability to identify the full diversity of stakeholders, especially those most vulnerable, yet leasable to access insurance, and to find solutions that enable their ability to benefit from these schemes. While IWMI social scientists played this role in India, IWMI's cases studies from Bangladesh suggest that a well reputed local NGO such as a microfinance institution can play this role effectively given its embeddedness in the target communities, their understanding of who the vulnerable and marginal groups are and the level of trust amongst these groups.

Investment: The project's interventions in Bihar, India suggest that costs can be minimized if skilled social scientists are mobilized, especially at the outset of insurance scheme design. This will minimize the need to retrofit solutions (likely to be more expensive and less effective), and improve the returns on investments for the project by optimizing the project's impacts across diverse social groups. The sustainability of index insurance however remains a significant issue, given most schemes past and current are highly subsidized. This begs the question of whether such insurance is financially sustainable at a large scale, given that many schemes are/have been pilots and hence small in scale. A key need in several countries as noted in the Asia Regional Dialog that could help address this core uncertainty is the need for clear regulations and guidelines by governments that could facilitate longer-term commitments on the part of insurance financiers. Concurrently, there is a need for pilot schemes to more clearly demonstrate the value of insurance to clients, and investments in inclusion is central to this given that in many parts of Asia, small and marginal producers represent the vast majority of potential clients.

Science and technology: There is significant scope for the transaction costs and effectiveness of insurance schemes to be improved through the adoption of ICT. Development of more nuanced digital data sets on social stratification and specific preferences and challenges amongst each group can be

potentially sourced through the use of mobile phone surveys as smartphone technology adoption increases. The transaction costs of payouts for both insurers and clients can also be eased through direct cash transfers aided by mobile phone networks, that do not even require smartphones. This in fact presents a low hanging fruit, whilst social data collection remains more complex and investment-heavy.

Others related: An overarching message is that these experiences with climate insurance re-enforces the urgent need to better combine technical approaches with strong social science to ensure that the results frameworks guiding solutions are not limited to bio-physical outcomes (e.g. resilient production), but concurrently support the multiple social outcomes around equity that are fundamental if climate adaptation is to avoid social injustice. It must also be acknowledged that framing climate adaptation are the United Nations Sustainable Development Goals as global benchmarks for the quality of human development. As such, the question “Insurance for whom?” should resonate as a fundamental challenge to be met by future climate insurance investments.



Overview: The Vu Gia-u Bon River Basin is in central Viet Nam and covers an area of 10,350 km², including mainly Quang Nam Province and Da Nang City. Da Nang City is known as the “worth living city”. Hoi An, an ancient town and UNESCO World Heritage site, is near the mouth the Vu Bon River and the Cu Lao Cham islands are just offshore, these are both important tourist destinations. Plastic pollution has skyrocketed on the political agenda at the national level as well as in Da Nang City and Quang Nam Province, making the situation ripe for applying the Source-To-Sea Framework for Marine Litter Prevention



Major source of financing: “Foundations for Source-to-Sea Management” was a project carried out by SIWI from September 2019–May 2020 and funded by the German Federal Ministry of Economic Cooperation and Development (BMZ) . The authors and SIWI wish to thank BMZ and Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ) for their support. Activities conducted in this pilot were supported by IUCN Viet Nam.

Contribution to Quality Growth

Sustainability: A study was conducted to identify land-based sources of plastic pollution and understand their impacts from a source-to-sea perspective. With more than 5 million visitors to Hoi An and 7,2 million to Da Nang in 2019, plastic litter is both an impact to the tourism sector by making the area less attractive to tourists and a challenge for the municipality to collect and manage. Obtaining a source-to-sea perspective of plastic waste generation, collection and recycling rates, and potential for leakage to the riverine and marine environments is key to developing strategies for reducing plastic leakage and addressing the crisis of marine litter. Quick action is needed and characterizing the sources of plastic pollution as outlined here can direct investments to solutions with the greatest impact.

Inclusiveness: Solving the problem of plastic pollution in the Vu Gia-Thu Bon River Basin requires the involvement of a broad range of stakeholders from government and business, non-governmental organizations and academia and citizens who represent interests and activities across the source-to-sea system. A workshop was held in Hoi An with 85 participants during which stakeholders shared their knowledge of solid waste management in the basin, their concerns about the failures that have led to plastic litter in waterways, coasts and in the sea, and their hopes for the future. The interactive and inclusive stakeholder engagement process enabled participants to craft a more complete picture of existing strengths and weaknesses of current solid waste management in the Vu Gia-Thu Bon basin. It also created a common understanding of the sources of plastic pollution and the challenges faced in solid waste management.

Points to be proud of the project

Governance: As mentioned previously workshop with 85 representatives from different stakeholder groups was held in Hoi An to share their knowledge, concerns and goals regarding plastic litter in the waterways of the basin. The workshop was followed by a two-day training in applying the source-to-sea approach for teams from DONRE from Quang Nam and Da Nang which were assigned subsequent homework with the purpose of the strengthening the capacity of the DONRE staff to address the issue of plastic leakage through the application of the source-to-sea approach.



Investment: That project was successfully executed according to the contract with BMZ/GIZ. Its results led to a follow up project to continue to implement the source-to-sea approach but with a focus in Hoi An.

Science and Technology: The project served as a pilot of the first three steps of the source to sea approach. The project helped gather information about the sources and the extent of plastic pollution in the Vu-Gia Thubon River basin.

Others related: This pilot of the source-to-sea approach is a step toward preventing marine litter from the Vu Gia-u Bon River Basin. It clearly demonstrates the need for source-to-sea management: plastic leakage will not be prevented without cooperation between upstream and downstream stakeholders and success relies on strengthening coordination across different government agencies, the private sector and individuals residing in or visiting the area. The foundation for source-to-sea management is built through developing a shared knowledge base on the geography of land-based sources of plastic pollution, as well as its causes and impacts. This pilot has led to a follow up project to continue to implement the source-to-sea approach and the marine litter framework in the city of Hoi An to address plastic pollution.



4TH APWS ROADMAPS: PLANS TO PROMOTE QUALITY GROWTH

This section also collects roadmaps from each organization. They include plans to promote the quality growth. The concerned organizations are those that are involved in the nine parallel thematic sessions and other national/international organizations.

The 4th Asia-Pacific Water Summit Collection of roadmaps from each organization are plans to promote quality growth. The 4th APWS secretariat requested to introduce the programs that would contribute to the water-related SDGs and quality growth. The organizations introduced programs in Asia and the Pacific that would promote the achievement of the water-related SDGs and ensure quality growth in line with Sustainability, Resilience, and Inclusiveness principle. A format was provided.

Regarding the theme areas, organizations selected the topics in line with the nine parallel thematic sessions and three integrated sessions (Science & Technology, Governance, Finance).

List of roadmaps by 4th APWS thematic sessions:

- **End-to-End Efforts for Shifting onto a Sustainable and Resilient Path under Climate Change by All**
 - Tajikistan: Rogun HPP project implementation for quality growth
- **Sustainable Water Management in Agriculture for Asian Region**
 - Japan/JICA: Participatory Irrigation Management
- **Achieving universal and equitable access to safe and affordable drinking water for all**
 - Japan/JICA: Supporting the growth of water utilities
- **Maintaining or recovering a sound water cycle to develop a quality society**
 - Japan: Promoting Efforts to Maintain or Recover Sound Water Cycle
 - Japan/JICA: Disaster Risk Reduction through Pre-disaster Investment to gradually augment structural measures for supporting whole society and economy
 - Japan/JICA: Practical Integrated Water Resources Management

For page numbers, please refer to the Table of Contents.



Japan / Cabinet Secretariat

Promoting efforts to maintain or recover sound water cycle

1. Theme area

Sound Water Cycle Management including Groundwater Management

2. Organization's name

Secretariat of the Headquarters for Water Cycle Policy, Cabinet Secretariat, Japan

3. Program title

Promoting Efforts to Maintain or Recover Sound Water Cycle

4. Concept and the Goal

Although some progress has been made in solving serious issues in the water cycle such as floods, droughts, water pollution and land subsidence, many issues still remain. There are also concerns over the increased risk of drought and flooding from abnormally low rainfall and wide fluctuations in precipitation due to global warming, as well as the fact that new issues may arise. Another point of concern in the water cycle process is that implementing a measure to solve one problem may negatively affect another aspect of the environment. For this reason, when clarifying the effects and impacts of any measure, it is essential that wide stakeholders related to a river basin are involved in considering the ideal state of a community's water cycle, and that actions for its realization are taken in a comprehensive and integrated manner.

Implementation of activities for maintaining and recovering sound water cycle contribute to the sustainable development of the world socio-economy and the stable improvement in people's livelihood.

5. Details of activities

Enactment of Basic Act on Water Cycle Policy: In terms of water cycle measures, various measures had been implemented separately. However, there had remained needs for implementing them in a coordinated form for the shared goal of "maintaining or restoring sound water cycles," and the debate had been intensified on the necessity of comprehensive actions to be taken by all levels of government. This circumstance led to clarifying the basic doctrine on water cycle related policy in April 2014, and the enactment of "Basic Act on Water Cycle Policy" in July of the same year as a means to promote sound water cycle policies in a comprehensive and integrated manner. At the same time as Basic Act on Water Cycle Policy came into force, the Headquarters for Water Cycle Policy was established to promote water cycle related measures. The Prime Minister was appointed as the Director General with all the Cabinet Ministers appointed as members.

Formulation of Basic Plan on Water Cycle: In July 2015, about a year after the enactment of Basic Act on Water Cycle Policy, the Cabinet approved the Basic Plan on Water Cycle to serve as a guideline for water cycle measures. In July 2020, New Basic Plan on Water Cycle was enacted. Part 1 of Basic Plan on Water Cycle describes the basic policy on water cycle measures. In its first paragraph, it states the need for "river basin management in a comprehensive and integrated manner." Part 2 sets forth nine specific measures to be comprehensively and systematically implemented and Part 3 describes items necessary to promote measures in a comprehensive and systematic manner.

Promoting Water Cycle Management in River Basins: Water-related measures have implemented to date have had their own independent objectives and goals, and have succeeded in achieving their aim with some degree. However, in some cases that information is not adequately shared with other relevant parties carrying out measures. From this point of view, it is important to implement cross-sectoral measures based on comprehensive and integrated

management of the river basin in order to ensure efficient and effective implementation through coordination with all stakeholders involved. In the Basic Plan on Water Cycle, "Water Cycle Management in River Basins" refers to activities carried out in coordination between river basin stakeholders by implementing water cycle measures intended to improve or maintain human activity, water volume, water quality, and favorable conditions in the natural environment surrounding water, especially in forests, rivers, farmlands, cities, lakes, and shore areas.

Formulation of River Basin Water Cycle Plans: In Basic Plan on Water Cycle, "River Basin Water Cycle Council" is established to a size appropriate to the goals and based on the basin scale, followed by formulation of a River Basin Water Cycle Plan. River Basin Water Cycle Council is formed by bringing together people from local government, local branch offices of national institutions, businesses, organizations, and residents who work together to formulate a comprehensive River Basin Water Cycle Plan cross-functioning individual measures while sharing current issues, future challenges and goals. As for the various water cycle measures aimed at forests, rivers, farmland, sewerage, environment and the like, stakeholders cooperate with each other to ensure organic cooperation under the basic policy set forth in River Basin Water Cycle Plan.

6. Time Table

2014 Enactment of Basic Act on Water Cycle Policy

2015 Formulation of Basic Plan on Water Cycle

2020 Formulation of New Basic Plan on Water Cycle

7. Reference information (homepage, flyer, publication, etc.)

Secretariat of the Headquarters for Water Cycle Policy, Cabinet Secretariat, Japan

https://www.kantei.go.jp/jp/singi/mizu_junkan/english/index.html



Japan / Japan International Cooperation Agency (JICA)

Disaster risk reduction through pre-disaster investment to gradually augment structural measures for supporting whole society and economy

1. Theme area

Disaster Risk Reduction

2. Organization's name

Japan International Cooperation Agency

3. Program title

Disaster Risk Reduction through Pre-disaster Investment to gradually augment structural measures for supporting whole society and economy

4. Concept and the Goal

It is important to reduce disaster risk before it happens, not after. The primary cause of disasters is natural hazards. As such, it remains a challenge for us to predict the timing and the magnitude of disasters with precision. Sometimes natural phenomena catch us unprepared. However, this does not mean that we should just be reactive to every disaster. There are things that we can do in advance to understand and reduce risk based on scientific knowledge and to minimize the impact of disasters. DRR can also protect economically and socially vulnerable populations against the risk of falling into the negative spiral of poverty as a result of disasters.

5. Details of activities

We will implement model projects of expected results and high-priority investments in advance disaster prevention, such as disaster risk reduction and basic structural measures in metropolitan areas where population and capital are concentrated, with the aim of disseminating and spreading the concept of disaster prevention appropriate to the country.

In addition to investment in disaster prevention infrastructure such as rivers, erosion control and coastal facilities, investment in the design and implementation of critical infrastructure such as lifeline facilities for transportation, electricity, water supply and communication, and educational and medical facilities is necessary to maintain their functions in the event of a disaster. The organizations in charge of these infrastructures must be able to take responsibility for themselves. They need to strengthen their ability to implement structural countermeasures in a self-sustaining and developmental manner with their own budgets.

6. Time Table

By 2030, we strive to substantially reduce the number of deaths, victims, and economic losses caused by natural hazards. In order to "contribute to substantially reducing the number of mortality, affected people and economic losses through the promotion of prior investment in disaster risk reduction, and to shift to a substantial downward trend in damage caused by natural hazards by 2030," the necessary prior investment on disaster risk reduction is assumed to be 80% of the amount of damage, which each country aims to achieve.

7. Reference information (homepage, flyer, publication, etc.)

[Disaster Risk Reduction | Our Work | JICA](#)



Japan / Japan International Cooperation Agency (JICA)

Participatory irrigation management

1. Theme area

Water and Food

2. Organization's name

Japan International Cooperation Agency

3. Program title

Japan's Participatory Irrigation Management (PIM) initiatives

4. Concept and the Goal

Sustainable irrigated agriculture and stable irrigation water utilization by promoting Participatory Irrigation Management based on the Japanese experiences

5. Details of activities

Since rice is the main staple in Japan, irrigation for paddy rice is quite important from ancient time. Therefore, irrigation systems have been developed in local communities historically. This means that in Japan, there are many irrigation schemes, farmers' Water Users' Organizations and know-hows which have been established mainly since 17th century. JICA has been carried out Technical Cooperation based on these

Japanese unique experiences through the following:

1. Implementing Technical Cooperation Project
 - a. Dispatch Japanese long term and short-term experts to developing countries.
 - b. Provide Equipment to the implementation organization in the project.
 - c. Conduct "Knowledge Co-Creation Program (Training Program)" to deepen understanding of PIM through Japanese cases.

In addition to above, JICA has started a new type of cooperation in Japan and examination in 2022.

2. Strengthen partnership among developing partners including private companies in Japan, on the Platform, called JiPFA, aiming at exchanging information about the climate change and PIM, and building networks in Japan.
3. Examine the PIM Initiative and consider how to improve it.

Japan's irrigation management system is mainly run by farmers' Water Users' Association (WUAs) called as "Land Improve Districts (LIDs)" from 1949. There are currently more than 4,000 LIDs in Japan and they operate and manage their irrigation facilities and distributing irrigation water by collecting levy from farmers(members). Known as a model for PIM, this Japanese system and experiences are sharing and demonstrating worldwide through conducting JICA's Technical Cooperation Projects.

This graph illustrates Japan's cultivated land area and population changes. Around 1600, an era in which the country's governing body was unified, there was an upsurge in new rice field development. In the space of one century, the area under cultivation went from 1.5 million hectares to double that figure. And population also rapidly increased along with the expansion of cultivated land.

In contrast, around the world after the introduction of irrigation facilities, maintenance and management became a heavy burden resulting in increasing cases where these facilities are not used properly. This has turned to focus increasingly towards PIM where farmers play a major role in managing facilities instead of government. JICA promotes various approaches to maximize the synergy effect of our measures as following:

- JICA undertakes technical cooperation by dispatching long term and short term experts with knowledge of Japanese historical background, experiences and techniques.

- JICA provides equipment within Technical Cooperation. In addition, JICA improves irrigation facilities through such as grant aid in cooperation with a Technical Cooperation Project.
- JICA also conduct knowledge Co-Creation Program in order to deepen understanding of Japanese experiences in terms of PIM. In this program, trainees are invited to Japan, and create action plans that they can utilize when they return to their own countries.
- JICA continue to strengthen partnership to contribute to raising knowledge regarding the sustainable irrigated agriculture and stable water utilization through PIM by announcing and discussing the outcomes of PIM Initiatives at JIPFA and international conferences etc..
- Furthermore, since PIM can be considered to be one of effective measures toward the climate change, JICA has started to examine the possible improvement of PIM taking consideration of the impact of the climate change.

6. Time Table

JICA continues to implement and improve PIM through experiences of both JICA's Technical Cooperation Project and policy results in Japan.

| | 2021 | 2022 | 2023 | 2024 | 2025 |
|-------------------------------|------|------|------|------|------|
| Technical Cooperation Project | → | | | | |
| Knowledge Co-Creation Program | → | | | | |
| Strengthen Partnerships | | → | | | |
| Examine the PIM Initiative | → | | | | |
| Improve the PIM Initiative | | → | | | |

7. Reference information (homepage, flyer, publication, etc.)

JICA-Net : Sustainable Irrigated Agriculture -Participatory Irrigation Management initiatives:

<https://youtu.be/14OgwpOvxQ0> (Full ver.), <https://youtu.be/vgG7xbbCPgl> (Digest ver.)

The Evolution of Agricultural Development in Japan "4. Land Improvement":

<https://www.youtube.com/watch?v=pWRL-4Raxcl>





Japan / Japan International Cooperation Agency (JICA)

Practical integrated water resources management

1. Theme area

Integrated Water Resources Management

2. Organization's name

Japan International Cooperation Agency

3. Program title

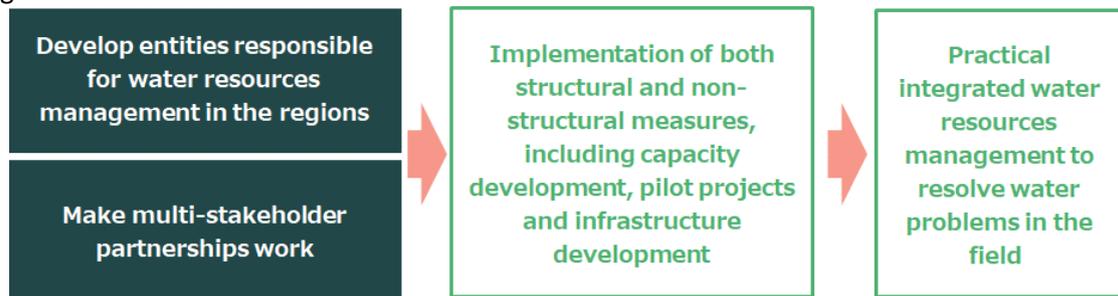
Practical Integrated Water Resources Management

4. Concept and the Goal

In order to conserve limited water resources and utilize them in a sustainable manner, JICA will develop entities responsible for the management of water resources in each region. These responsible entities will accumulate scientific data and coordinate interests of stakeholders based on scientific and technical grounds.

As in many cases, water projects' planning and implementation are related to various entities and many stakeholders, consensus building through meaningful discussion is extremely important. Therefore, JICA will establish multi-stakeholder partnerships as a democratic consultative body to resolve water-related issues based on the consensus of all stakeholders.

In this way, JICA will aim to implement practical integrated water resources management in each region and resolve each issue.



5. Details of activities

First, develop the entities responsible for water resources management in the region. They need to have the authority and capacity to monitor the status of water intake through water rights and other systems, and to regulate and supervise water abstraction. There is also a need for an entity that is responsible for the development and conservation of water resources. The entities will be strengthened by (a) Clarification of the authority of responsible entities through the development of legal systems, (b) Strengthening of organizational capacity to enable the collection of data on water resources and water use, social scientific and technical analysis and goal setting, formulation of water resources management plans, decision making based on stakeholders' consensus building, and execution of administrative measures based on legal systems, and (c) Development of human resources to execute administrative measures.

Second, to solve regional water problems through a democratic process that includes stakeholder participation and consultation, a consultative body of stakeholders (multi-stakeholder partnership) will be made to function. The purpose and role of the consultative body, its legal status, the governing body, how various stakeholders can participate and what role each of them should play, and the design of the process to lead to consensus building will be clarified, and the capacity to design and manage the process for consensus building will be strengthened through supporting the actual operation.

Third, while keeping the above responsible entities and consultative bodies functioning, JICA will implement projects that provide both structural and non-structural solutions, and by accumulating "quick wins" that lead to tangible results, we will improve the capacity of the responsible entities and the motivation of the people involved. In doing so, JICA, which provides external support, will strive to respect and understand the local context (history, culture, society, people's lives and livelihoods, environment, people's interests and concerns, etc.), collect and analyze scientific data (natural science and technology), and conduct stakeholder analysis, interest analysis, and other activities to solve local water problems. Based on this analysis, scenarios for countermeasures will be discussed in collaboration with related parties, social consensus building and action planning will be conducted to set goals for solutions, and the ability to design and manage processes for social consensus building will be strengthened to lead to solutions to regional water resource problems one by one.

Collaborating with partners including development partners, the private sector, and other actors in the water sector is essential to solving water challenges and expanding achievements. In Japan, JICA will promote collaboration with local governments, ministries and agencies, and private companies that have accumulated experience and knowledge. JICA is also creating materials for knowledge sharing with developing countries to introduce Japan's development experience.

The use of innovation is also important. JICA will make active use of digital transformation (DX), including remote sensing using satellite data, and geographic information systems (GIS).

6. Time Table

By 2030, JICA will contribute to resolving water-related issues in several regions in Asia and the Pacific where water issues are important.

7. Reference information (homepage, flyer, publication, etc.)

JICA Web site: https://www.jica.go.jp/english/our_work/thematic_issues/water/overview.html





Japan / Japan International Cooperation Agency (JICA)

Supporting the growth of water utilities

1. Theme area

Achieve universal and equitable access to safe and affordable drinking water for all

2. Organization's name

Japan International Cooperation Agency (JICA)

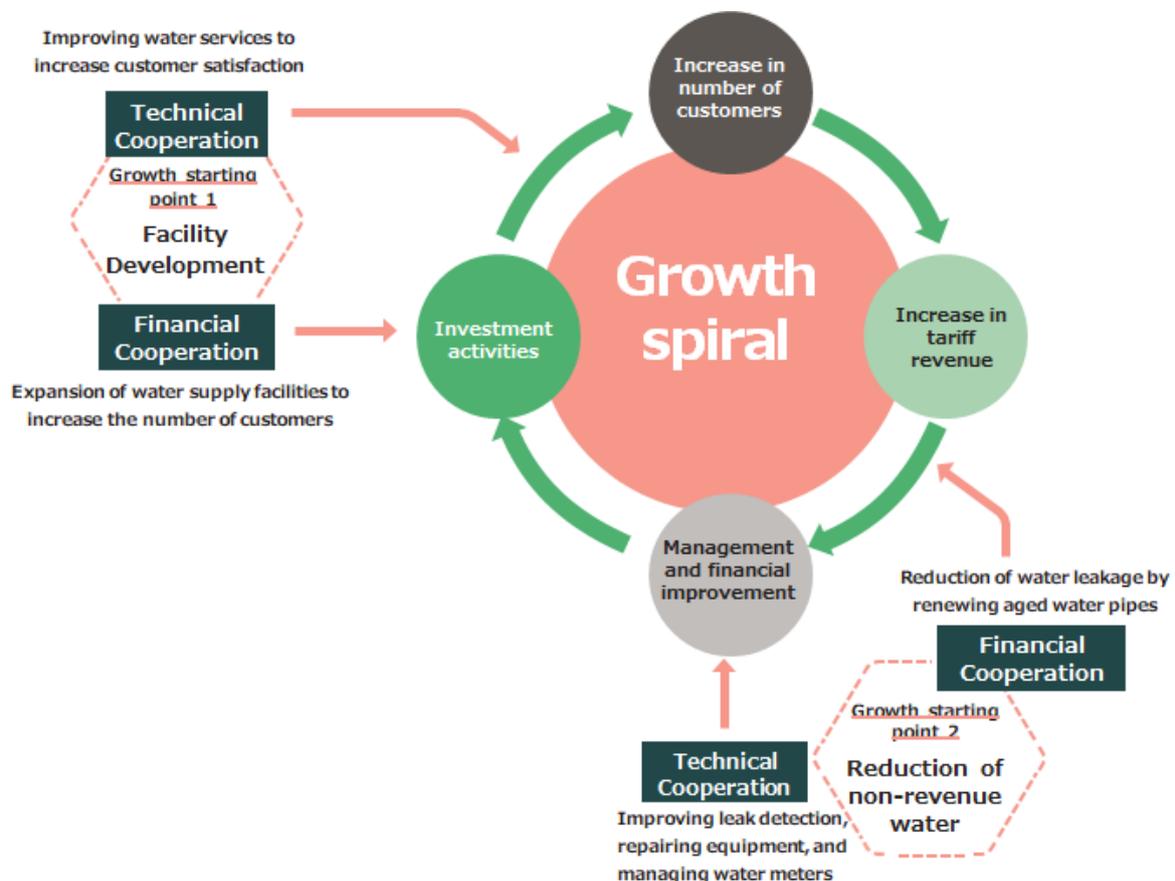
3. Program title

Supporting the growth of water utilities

4. Concept and the Goal

Water supply services in developing countries are suffering from a negative chain of factors, such as low service standards, people's dissatisfaction with the service, lack of trust in the water utilities, inefficient business operations, and insufficient funds, resulting in a vicious cycle. The growth spiral of the water supply service shown below is a structure-based review of this vicious cycle. JICA will put the water supply service on a growth trajectory by shifting to a virtuous cycle of improving services, increasing operational efficiency, expanding tariff revenue, and securing investment.

The first point of growth is "to expand the tariff revenue base and improve services by expanding and upgrading water supply facilities". The second starting point for growth is "to reduce non-revenue water that cannot be billed for, such as leakage or illegal connections".



Creating a growth spiral in this way, JICA will aim to improve water supply services in more than 20 cities in Asia and the Pacific regions in the next 10 years.

5. Details of activities

JICA contributes to the achievement of the SDGs in 2030 and realizes the principles that Japan aims to achieve through development cooperation, such as "human security," "quality growth," and "addressing global issues". We set global goals based on our analysis of the issues we face, and work to improve the results of our development cooperation projects. In addition, we will promote communication and collaboration not only with developing countries but also with a variety of domestic and international partners, aiming to maximize the results of development cooperation.

For the water supply sector, JICA will provide technical and financial cooperation to the target countries based on the above concept and goal, and disseminate the knowledge and lessons learned through forums, publications, and so forth. The technical and financial cooperation will be carried out according to the developmental stages of water utilities and countries, such as utilities for which it is important to improve basic water supply services, utilities for which water supply services have been improved and it is important to improve the business management and finance, and countries for which model utilities already exist in the country and dissemination to other cities is required. Collaborating with partners including water utilities, development partners, the private sector, and other actors in the water sector is essential to solving water challenges and expanding achievements. JICA will hold forums in Asia to share our knowledge with executives from water utilities and ministries with jurisdiction over water supply.

In Japan, JICA will promote collaboration with local governments, ministries and agencies, and private companies that have accumulated experience and knowledge. JICA is also working on scholarship programs in cooperation with universities (JICA Development Studies Program) and creating materials for knowledge sharing with developing countries to introduce Japan's development experience.

In addition, the use of innovation is also important. JICA will make active use of digital transformation (DX), including remote sensing using satellite data, geographic information systems (GIS), smart meters, and artificial intelligence (AI).

6. Time Table

By 2030, JICA will increase the number of people served in developing countries and improve water supply services in more than 20 cities in Asia and the Pacific regions.

7. Reference information (homepage, flyer, publication, etc.)

JICA Web site: https://www.jica.go.jp/english/our_work/thematic_issues/water/overview.html





Tajikistan

Rogun HPP project implementation for quality growth

1. Theme area

Water Resource Management/Reneable Energy/Disaster Risk Management

2. Organization's name

Government of the Republic of Tajikistan

3. Program title

Rogun Hydropower Plant Project

4. Concept and the Goal

On 9 September 2019 Tajikistan commissioned the second unit of the Rogun Hydro Power Plant on Vakhsh river, one of the tributaries of Amudarya - the biggest river in Central Asia. The Rogun HPP's history stretches back to 1976, when initial construction began. Progress on the Rogun dam has been stalled at various junctures by different reasons. In 2007, the Government of the Republic of Tajikistan appealed to the World Bank for an international feasibility study of the project, taking into account modern requirements and safety standards. The process of negotiation and preparation of documents for this process took more than 3 years.

Evaluation studies on the Feasibility Study (TEAS) and the Environmental and Social Impact Assessment (ESIA) were launched in 2011 under the auspices of the World Bank, with the participation of international companies and two Independent Expert Panels - on engineering and dam safety issues.

The main objective of these studies was to determine the feasibility of the proposed Rogun HPP project and conduct an independent and objective assessment of the proposed project, taking into account technical, economic, social and environmental factors.

All interim and final evaluation research reports for Rogun HPP were published on September 1, 2014, which marked the end of the assessment process. According to these estimates, the construction of the Rogun HPP was recognized technically possible, economically feasible, and compliant with international safety standards, both from a technical and environmental point of view.

5. Details of activities

Having this results of the internationally recognized feasibility study the Government of Tajikistan started to rehabilitate the construction works and in 2016 the Vakhsh river at the Rogun dam site had been diverted and on November 2018 the first unit of the power plant had been launched.

The Rogun HPP with six hydraulic units with a capacity of 600 MW each and the total capacity of 3600MW after completion will be the biggest HPP in Central Asia. The average annual electricity generation in the Rogun HPP will be more than 17.0 billion kWh per year.

The dam of Rogun HPP with a height of 335 meters will be the tallest rockfill dam in the world. It forms the Rogun reservoir with a total volume of 13.3 km³ and a useful volume of 10.3 km³. The Rogun HPP is planned to be used as a multi-purpose dam, including generating electricity, regulating water, reducing the risk of floods and mitigating droughts.

The Rogun HPP is planned to be used as a multi-purpose dam, including generating electricity, regulating water, reducing the risk of floods and mitigating droughts.

It is well known that energy is the engine of any development, and the demands for it are increasing because of population growth and economic development. Generating more than 17,0 bln.kW per year electricity, Rogun HPP will be the biggest producer of clean and green energy in Central Asia and regions around. Affordable, environmentally friendly and renewable energy produced here will fully satisfy Tajikistan's demands in electricity and will give a

serious impetus to the country to export electricity to other neighboring countries, which use mostly the fuel resources to produce electricity to cover their economy and population's demands.

It is also well known that hydropower can reduce greenhouse gas emissions by reducing the amount of fossil fuels (coal, oil and gas) burned for producing electricity in thermal power plants, and thus the emission of CO₂. So to produce the same amount of electricity (as Rogun HPP provides) in coal-fired power plant the CO₂ emissions will equal to 13.67 million tons. In case of petrol use it makes 9.95 million tons and in case of LNG – 6.71 million tons. Thus Rogun HPP will have very valuable contribution to reduction of the CO₂ emissions to the atmosphere. On the same time, it will help with more rational use of fossil fuels. Using the renewable and environmentally friendly as well as cheaper electricity from Rogun HPP, the neighboring countries are able to reduce the use of fossil fuels, which are non-renewable, costly and with huge GHG emissions.

One of the most important role of the Rogun dam in climate change conditions is its capability to manage water resources in sustainable manner. Water shortage regularly causes severe problems in dry years, especially in the lower reaches of Central Asian rivers. This situation could worsen in the future, given the fact that climate change is expected to have some negative effects. Rising temperatures will lead to an increase in evapotranspiration, the expected higher irregularity in precipitation could lead to an increase in the number of extremely wet and extremely dry years, and earlier snow melt will mean more water in spring and less in summer. Given this situation, a good resource management will be even more important than it is today.

Rogun dam with capacity of 13.3 km³ and a useful volume of 10.3 km³ was planned also for adding regulating capacity to the entire system, and especially for reducing problems in dry years by making additional water available under such conditions. Rogun jointly with Nurek reservoir (the total volume is 10.5km³ and useful capacity is 4.5km³) would have this potential and will provide additional water for irrigation and other needs in dry years. So Rogun HPP could benefit all downstream water users in the Amu Darya basin.

Rogun HPP with its big reservoir also offers important flood control benefits, which have positive effects on the entire downstream area. For the last decades the magnitude of floods and mudflows has been increased in Central Asia region. Adding Rogun HPP to the cascade would considerably reduce risks related to floods of high magnitude (e.g. PMF) and also reduce risks during floods of lower magnitude, but higher probability of occurrence (like one in ten or one in one hundred year floods), thus offering the potential to reduce inundations in the downstream areas.

Thus, Rogun HPP being designed to generate electricity and to manage water resources will address also climate change and a number of climate related issues such as floods and draughts serving as good basis for adaptation to and mitigation of these challenges. It will also have valuable contribution to reduction of the CO₂ emissions to the atmosphere, which is one of the tasks of the international community in line with Paris agreement.

In addition to this, producing affordable electricity, Rogun HPP will provide an opportunity to create tens of new industrial enterprises providing thousands of new jobs and helping to develop economies and improving the social situation. It will help Tajikistan as well as other neighboring countries to make significant progress to achieve a number of SDGs.

6. Time Table

2016-2032

7. Reference information (homepage, flyer, publication, etc.)

<http://rogunges.tj/en/>

www.worldbank.org/en/country/tajikistan/brief/final-reports-related-to-the-proposed-rogun-hpp



4th Asia-Pacific Water Summit
Kumamoto Japan 2022

This publication was prepared by the 4th APWS Secretariat with the support of contributing countries, organizations and experts. Therefore, the information contained in this document is the sole responsibility of its authors and does not necessarily reflect the opinion of the relevant countries and organizations, as well as of the APWF and the JWF.