



Sustainable Development
in the Lower Mekong Basin:

Building Forward Better toward COVID-19 Recovery with Water-Energy-Food (WEF) Nexus Approach through South-South and Triangular Cooperation



DISCLAIMER

This paper has been produced with financial contribution from the “Triangular Cooperation Project on Sustainable Development in the Lower Mekong Basin based on the Water-Energy-Food (WEF) Nexus or RoK-UNOSSC Facility (Phase 3)”. The Mekong Institute took full responsibility for conducting this study.

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ACRONYMS

BBB	Building Back Better
BDS	Basin Development Strategy 2021-2030
BFB	Building Forward Better
GMS	Greater Mekong Subregion
LMB	Lower Mekong Basin
MI	Mekong Institute
MRC	Mekong River Commission
SSC	South-South Cooperation
SSTC	South-South and Triangular Cooperation
TC	Triangular Cooperation
ROK	Republic of Korea
SP	MRC Strategic Plan 2021-2025
UNOSSC	United Nations Office for South-South Cooperation
WEF	Water-Energy-Food

ABSTRACT

The Mekong region is richly endowed with natural resources and has some of the most biologically diverse habitats in the world. However, despite rapid economic developments, including increased urbanization and poverty reduction in the past few decades, significant challenges remain. Moreover, the global COVID-19 crisis caused unprecedented socio-economic disruptions in the region, setting back development gains by years and widening inequality gaps. To recover faster from the COVID-19 pandemic while promoting the sustainable development of society, an innovative approach based on the “Building Forward Better” (BFB) concept is required.

The Water-Energy-Food (WEF) nexus is an integrated framework to address multi-sectoral and interconnected challenges by identifying synergies and trade-offs among sectors. As water, energy, and food are fundamental human needs, the WEF nexus can directly or indirectly influence the achievement of all Sustainable Development Goals (SDGs). Working on the BFB concept with the WEF nexus can provide efficient recovery solutions from the COVID-19 pandemic, promote cross-sectoral sustainability, and enhance socio-economic resilience against future crises. Adhering to the principles of South-South and Triangular Cooperation (SSTC), the ROK-UNOSSC Facility-Phase 3 aims to enhance sustainable development and management of water, energy, and food in the Lower Mekong Basin (LMB) while recovering faster from the COVID-19 pandemic as well as improving the resilience of communities to withstand future crises.

Therefore, strengthening SSTC stands as an important mechanism to effectively facilitate this initiative including the implementation of the strategic responses of the Mekong River Basin Development Strategy.

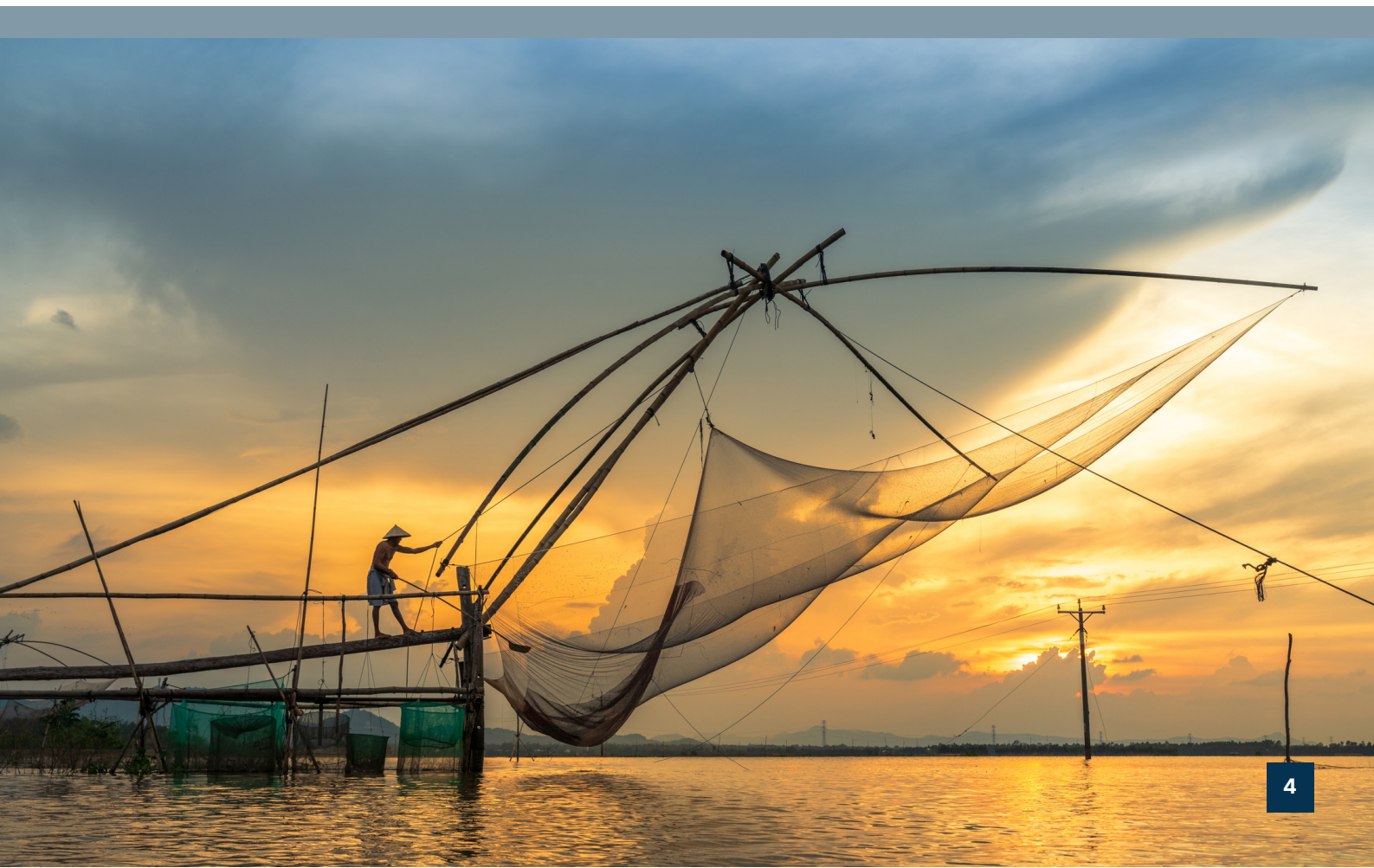
Keywords: WEF nexus, Mekong basin, Building forward better, Sustainable development, South-South cooperation, Triangular cooperation



INTRODUCTION

Water, energy, and food are vital natural resources to sustain life on earth and to support socioeconomic development. Together, they form a WEF nexus of tightly interconnected resource-use issues wherein decisions or pressures in one sector have multiple consequences for the other ones. The scarcity of these resources impedes sustainable and resilient development¹. The COVID-19 pandemic represents a recent crisis that has caused unprecedented socioeconomic disruptions worldwide, setting back development gains by years, rising poverty, and widening inequality².

The pandemic also has substantial effects on resource security and adds further challenges in achieving sustainable development. The BFB, which is built from the “Building Back Better (BBB)” concept, is a critical approach recently used for post-disaster reconstruction and recovery, not only to recover from the encountered disaster but to improve community resilience to withstand future crises³. Therefore, combining the BFB concept and the WEF nexus approach while leveraging SSTC is a key solution to recover faster from the severe impacts of the COVID-19 pandemic while promoting sustainable development of LMB countries.



Water-Energy-Food (WEF) Nexus

The world is increasingly facing a great challenge in securing water, energy, and food, as demand for these vital resources is seen to increase significantly over the next decades under multiple pressures⁴. By 2050, global water demand will increase by 55% due to a combination of the rising global population and economic growth. By then, half of the world's population will live in areas under water stress⁵. Over the period to 2040, the amount of energy used in the water sector is projected to more than double. Global power generation is predicted to increase by almost 60% in the next ten years. Ninety percent (90%) of global power generation is water-intensive. By 2050, global food production will need to increase by 60% to meet the food requirements of a growing global population⁵.

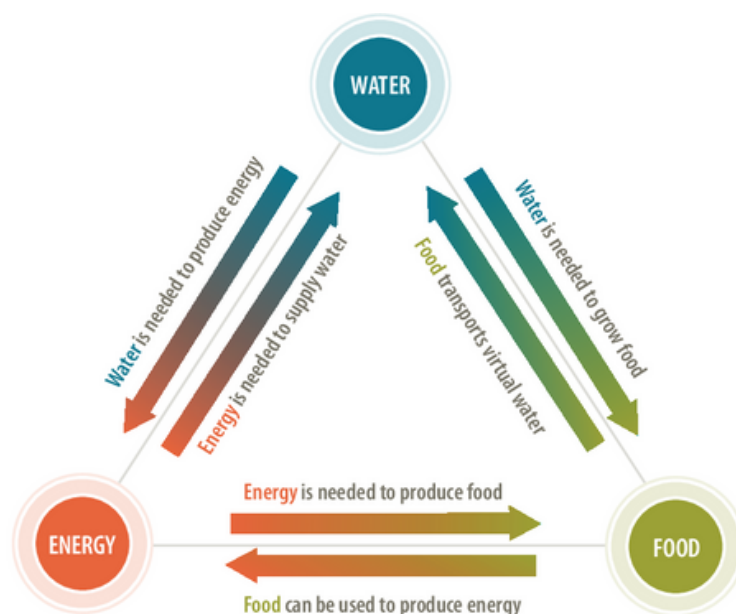
In general, water, energy, and agricultural sectors have been managed singly. As their inextricable interlinkages, actions in one sector have either positive or negative impacts (synergies or trade-offs) on the others⁶. Today's resource governance is insufficiently steered toward achieving balanced water, energy, and food security for humankind.

Therefore, identifying appropriate approaches simultaneously considering interactions among them is the greatest challenge to achieving the SDGs and recovering from the COVID-19 crisis⁴.

The nexus concept has recently become widely used in the international development community. The nexus framework generally considers the complex interlinkages among them to understand synergies and trade-offs and to find good resolutions that can promote higher resource use efficiency, lower production of pollutants and waste, and more coherent policy^{1,4,6}. The WEF nexus approach describes the interdependencies of water, energy, and food with the ultimate goals of identifying potential synergies, minimizing trade-offs between the three sectors, and facilitating a more integrated process, leading to cost-effective policymaking, planning, and implementation. As water, energy, and food are fundamental human needs, the WEF nexus can directly or indirectly influence the achievement of all SDGs by strengthening synergies, reducing trade-offs, and creating cascading effects beyond the food, energy, and water sectors⁶. The WEF interlinkages are shown in Figure 1.

Figure 1: Interlinkages of Water, Energy, and Food

Source: UNU-FLORES.
*The Nexus Approach (2018)*⁷



■ South-South and Triangular Cooperation (SSTC)

The importance of SSTC in international development cooperation has grown significantly. The emergence of middle-income developing countries as the new donors and technical assistance providers at the beginning of this millennium has reshaped the landscape of international development cooperation. Complementary to North-South Cooperation, SSTC have increasingly become important modalities for fostering development cooperation among developing countries within and between regions⁸.

South-South Cooperation (SSC)

SSC is a common endeavor of peoples and countries of the South that contributes to their national well-being, national and collective self-reliance, and the attainment of internationally agreed development goals⁹. SSC is generally defined as a process whereby two or more developing countries pursue their individual and/or shared national capacity development objectives through exchanges of knowledge, skills, resources, and technical know-how, and regional and interregional collective actions for their individual and/or mutual benefit within and across regions^{8,9}. SSC agenda and its cooperation initiatives must be determined by the countries of the South, and guided by the principles of respect for national sovereignty, national ownership and independence, equality, non-conditionality, non-interference in domestic affairs, and mutual benefit^{8,9}. Over the decades, countries of the South have accumulated considerable expertise, experience, lessons, and capabilities in their development processes, which have been shared with other developing countries in the form of technical assistance. Priority areas of SSC span a wide range, including SDGs, environment and climate change, disaster, urban/rural development, agriculture, connectivity issues (transport, trade, and ICT), energy, social development, and gender⁸.

Triangular Cooperation (TC)

TC involves Southern-driven partnerships between two or more developing countries supported by a developed country(ies)/or multilateral organization(s) to implement development cooperation programs and projects based on the principles of SSC^{8,10}. TC, which usually operates through the provision of funding, training, management, and technological systems as well as other forms of support, has widened the scope of international development cooperation⁸. In many instances, Southern partners in development cooperation require the financial and technical support and expertise of multilateral and/or developed-country partners in the course of assisting other developing countries⁹. Northern partners also benefit by being able to take advantage of increased institutional capacity in the South, thereby amplifying the impact of their aid disbursements through leveraging the resources of multiple Southern partners. TC plays a major role in fostering collective action to achieve the SDGs in the area of science, technology, and innovation, where it can contribute to reducing global imbalances between the North and the South and promote more equitable international relations across many fronts⁸. Examples of SSC/TC-based projects are shown in Table 1.

Table 1. Examples of SSC/TC-based projects

Projects	Countries/ Development Organizations Involved	Interregional / Intraregional	Theme	Description	Funding Source
Cooperation for Adaptation and Resilience to Climate Change in the Caribbean ¹¹	Antigua and Barbuda, Barbados, Jamaica, St. Kitts and Nevis	Interregional	WEF nexus	Objectives: To assist countries by piloting resilience-building solutions in: a) the WEF nexus; b) school feeding programs; and c) resilient aquaculture. SSC: Mexico supports small island developing states/ countries to efficiently use water and climate data to inform WEF cross-sectoral decision-making.	Mexico
Effective South-South Cooperation in Agriculture to Unleash the Transformative Power of the Agriculture Sector for Inclusive Development in Pakistan ¹²	China and Pakistan	In-country	Agriculture	Objective: To establish an effective knowledge generation and sharing platform to assist Pakistan to unleash the transformative power of the agriculture sector for the country's inclusive development. SSC: The project increases the use of technology from China to improve the agriculture sector in Pakistan.	Ministry of Agriculture and Rural Affairs of China
Agricultural Development in the Tropical Savannah of Mozambique ¹³	Japan, Brazil, and Mozambique	Interregional	Agriculture	Objective: To build new models of sustainable agricultural development with reference to the experience gained from a scheme in the 1970s that turned Brazil's own savannah area into an agricultural breadbasket in the Tropical Savannah of Mozambique. TC: Starting in the 1970s, Japan has provided technical and financial assistance for agricultural development in the Cerrado, which has helped transform it into a farming bonanza producing huge harvests of soybeans, corn, beans and other crops. Many examples of agricultural techniques used in Brazil are transferred to Mozambique.	Japan

Building-Forward-Better (BFB)

BFB is an ideal reconstruction and recovery process that delivers resilient, sustainable, and efficient recovery solutions to disaster-affected communities. BFB covers a holistic approach toward recovery, encompassing risk reduction of the built environment, psychosocial recovery of affected people, and economic revitalization, all executed in an effective and efficient manner³. Post-disaster reconstruction and recovery require effective management of stakeholders and the use of post-disaster legislation and regulation to build back better.

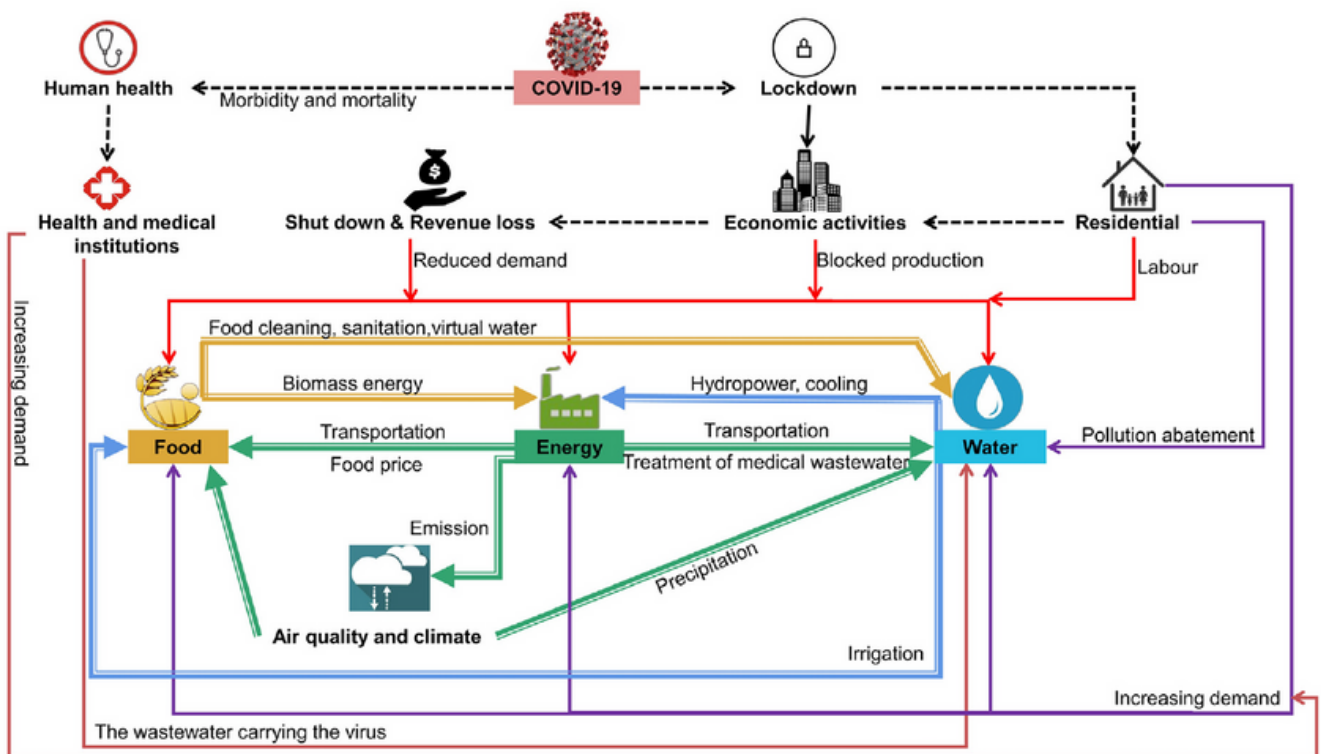
While the COVID-19 pandemic has posed unprecedented economic and developmental challenges, it has also substantially exacerbated pre-pandemic vulnerabilities. Throughout 2020, the developing Asia-Pacific region experienced a 1.0 percent contraction in gross domestic product and lost the equivalent of 140 million full-time jobs, pushing 89 million people back into extreme poverty². The International Monetary Fund (IMF) estimates that low-income countries will need about \$200 billion between now and 2025 to respond to the pandemic and an additional \$250 billion to return to their pre-crisis convergence with advanced economies¹⁴.

COVID-19 has also disrupted basic supply and environmental sectors through a range of channels, and WEF insecurity is one of the manifestations^{15, 16}. COVID-19 transmission and socioeconomic stagnation posed multiple challenges to food-energy, food-water, energy-water, and the WEF nexus during the pandemic (Figure 2). Direct impacts include virus transmission leading to issues like food and water contamination, while indirect impacts, stemming from lockdown measures, have triggered a domino effect across society (e.g., social unrest, “stay at home” orders, unemployment), economics (e.g., blocked supply-demand chain and international trade), and the environment (e.g., reduction of air, soil, and water pollution and increased medical waste)¹⁶.



The term BFB emerged as a response to the challenges posed by the COVID-19 pandemic and the need for a sustainable recovery that would promote resilience. This concept is not only focusing on leaving no one behind but also prioritizing the people living in poverty to be at the forefront. To build forward a better future, multilateral cooperation not only matters but also is essential to ensure all countries with financially constrained economies have

adequate access to international liquidity^{2,14}. For example, the IMF has approved loans to 86 countries of more than \$110 billion since the onset of the COVID-19 crisis, bringing the IMF's total lending commitments to more than \$285 billion. A post-COVID-19 transformation in the macroeconomic policy landscape is urgently needed, not defined by a narrow and short-sighted focus on economic growth alone but by taking climate change and other critical environmental issues into consideration^{2,14}.



■ Figure 2: Effects of COVID-19 on the WEF nexus.

Source: Yin et al (2022)¹⁶

The dotted lines denote the indirect influence of COVID-19 on the WEF nexus, while the solid lines represent COVID-19's direct impact on the WEF nexus. The thicker lines represent the nexus between food, energy, and water. The thinner lines show the connections between WEF and external factors.

CHALLENGES IN THE MEKONG RIVER BASIN

Geography

The Mekong River is a transboundary river, running approximately 4,900 km from the Tibetan Plateau in China to the South China Sea in southern Viet Nam. The Mekong region consists of Cambodia, Lao PDR, Myanmar, Viet Nam, Thailand, and two Chinese provinces, namely Yunnan and Guangxi Zhuang Autonomous Region. Geographically, the region is divided into the Upper Mekong Basin (Myanmar and China) and LMB (Cambodia, Lao PDR, Thailand, and Viet Nam) (Figure 3). Approximately 72 million people live in the Mekong River Basin and depend strongly on its rich natural resources and biodiversity for their livelihoods and local socioeconomic development¹. The LMB has been steadily changed as economic development, urbanization, and industrialization are transforming the region¹⁷.

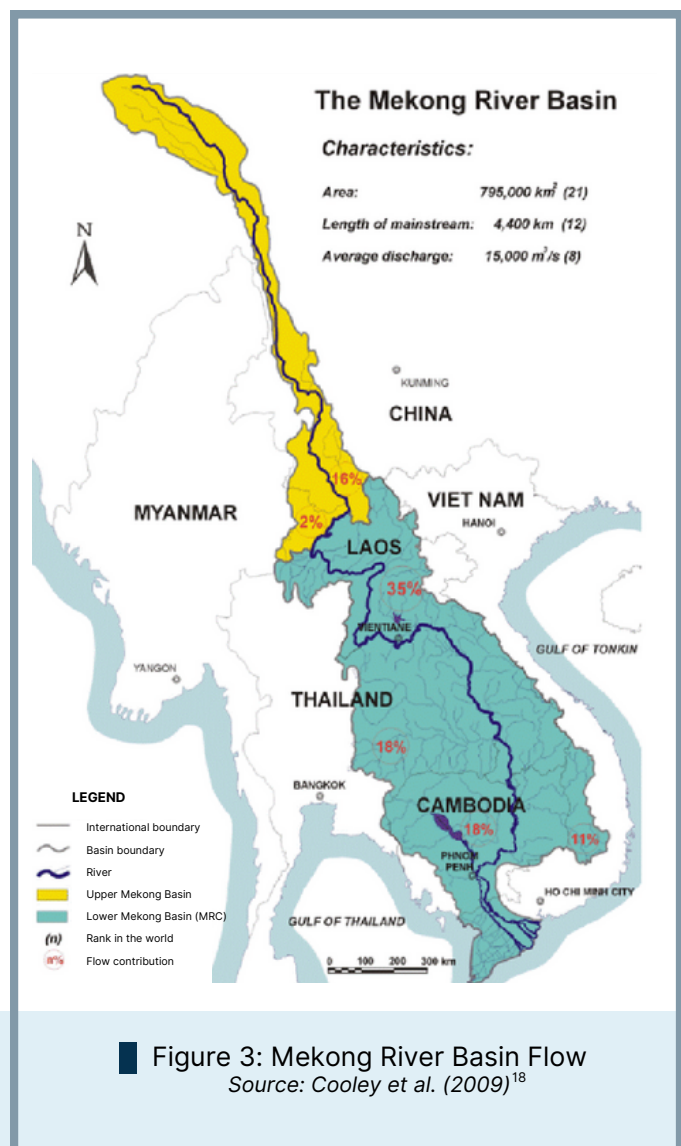


Figure 3: Mekong River Basin Flow
Source: Cooley et al. (2009)¹⁸

Current Challenges

A summary of important challenges based on the analysis of the Mekong River Commission (MRC) in the Basin Development Strategy (BDS) 2021-2030 and the MRC Strategic Plan (SP) 2021-2025 is given below¹⁹.

Inequality Development

Over recent decades, rapid economic gains with steep reductions in fertility rates and increasing urbanization have contributed to higher incomes, reduced poverty, improved food security, and greater access to improved water sources, sanitation, and electricity in the Mekong River Basin.

These gains have yet to be equally distributed and substantial challenges to the sustainable development of the region remain (Table 2). Despite a significant reduction in national poverty rates, a large number of poor, natural resource-dependent communities are likely to persist for some time, along with improving but still present gender inequalities in paid and unpaid work. Water-related development operations are expected to have an increasing impact on the livelihoods of vulnerable communities.

Table 2. Summary of basin conditions, trends and outlook for key issues identified in the 2018 State of the Basin Report and recent MRC scenario assessment work²⁶

Selected Strategic Indicators	Key Issues	Condition	Outlook
Water flow conditions	<ul style="list-style-type: none"> Change in long-term flow regime Rapid water level fluctuation 	SSC SSC	SISD ED
Water quality and sediment conditions	<ul style="list-style-type: none"> Risks to water quality Reduced sediment transport 	NIC CC	ED
Status of environmental assets	<ul style="list-style-type: none"> Loss of wetlands Fish populations 	CC SSC	ED ED
Living conditions and well-being	<ul style="list-style-type: none"> Household food and water security Inequality of access 	SSC ID	SISD SISD
Employment in MRC water-related sectors	<ul style="list-style-type: none"> Employment Gender equality 	ID ID	SISD SISD
Economia value of MRC water-related sectors	<ul style="list-style-type: none"> Agriculture Hydropower Fisheries and aquaculture Navigation 	ID ID ID ID	EI EI SISD EI
Climate trends and extremes	<ul style="list-style-type: none"> Temperature increases More severe floods and droughts 	SSC SSC	CC SISD

Condition:

NIC = No immediate concerns

SSC = Some significant concerns to address

CC = Considerable concern

ID = Insufficient data

Outlook:

EI = Expected to improve

SISD = Some improvement and some decline, or uncertain

ED = Expected to decline

Change in Hydrology

In the upper part of the basin, dry season flows are increasing and flood season flows are decreasing because of growing storage for hydroelectricity generation throughout the year. The construction and uncoordinated operation of hydropower facilities are altering river flow dynamics, impacting water quality and suitable habitats for aquatic organisms. Hydropower operations are increasingly playing a role in rapid river level fluctuations as projects are commissioned and respond to electricity demands and grid stabilization requirements. The modification of the flow on the mainstream is expected to continue with further development of mainstream and tributary hydropower. Lower flood season flows may reduce connectivity with wetlands and the productivity of the floodplain. These fluctuations can in turn have negative impacts on downstream communities, including the viability of traditional riverbank agriculture and other livelihood activities. The change in flow regime means potentially more water available during the dry season. Determining the equitable and sustainable use of these additional flows will be an essential consideration for regional cooperation over the next ten years.

Sediment transport has dropped precipitously since the construction of the Upper Mekong hydropower cascade and other industrial activities such as sand mining, with attendant risks to wetland and floodplain productivity, riverbank erosion, and delta-forming processes. The implications of this reduction in sediments are increased erosion and riverbank failure, potentially less productive fisheries and floodplains, and reduced replenishment of the delta, which is affected by subsidence and sea level rise.

Climate Change

The LMB is one of the most vulnerable regions to climate change¹⁹. Some factors making the LMB countries particularly vulnerable to climate change include high levels of poverty in some countries, heavy dependency on climate-sensitive sectors for livelihoods, long coastlines, and low-lying areas, and the existence of multiple climate-related disasters. According to the Global Climate Risk Index (CRI) 2020, countries such as Myanmar, Thailand, and Viet Nam were in the top 10 most affected by extreme climate events during 1999–2018²⁰. The LMB region is already experiencing significant climate change impacts with the growing intensity and magnitude of extreme weather events and increasing economic, environmental, and social damage. The priority impacts reported are in the sectors related to agriculture, water resources, fisheries, coastal zones, urban infrastructure, forests and biodiversity, and human health²¹. These climate-related factors interact with pre-existing socioeconomic vulnerabilities, leading to significant impacts that the LMB countries are poised to face in the future. These impacts have the potential to undermine decades of development progress. Therefore, the region needs to prioritize resiliency as well as adaptation interventions. Food and agriculture, water resources, forestry and biodiversity, and health are the most common key adaptation sectors for all LMB countries.



Increasing Pressures on the Environment

The Mekong River Basin supports one of the world's most diverse freshwater environments, with around 1,200 fish species recorded. However, over the past century, fish populations have significantly declined due to various factors. These include agricultural land development, such as a massive expansion of rice farming and deforestation, intensive fishing pressure, hydropower development, sediment extraction, urbanization and industrial development, and associated pollution. Moreover, wetlands, which are vital components of the ecosystem, have also declined in the area, and those that remain are increasingly degraded. The ecosystem services they provide, including habitat, floodwater storage, and protection against coastal erosion, are under threat. Watersheds and floodplains face pressures from land use changes driven by population and economic growth.

Robust Economic Growth across all Water-related Sectors

Agriculture, fisheries, and forestry are a declining share of the overall economy of basin countries but still employ large numbers of people. Rising global demand for food and large inflows of foreign direct investment in these sectors support strong growth in agricultural product value. Capture fisheries and aquaculture, hydropower production, and navigation have all shown strong growth in recent years. Based on current national plans, hydropower, irrigated agriculture, navigation, and aquaculture sectors are likely to continue growing strongly but will need an integrated basin-scale approach to ensure long-term sustainability and inclusive growth, particularly in the face of climate change.



Multi and Acute Risks of the Mekong Delta

The Mekong Delta grapples with pressing concerns, including reduced sediment replenishment from upstream sources, subsidence due to groundwater extraction, sediment extraction that deepens channels and exacerbates the impacts of tides on erosion, and increased salinity intrusion. These issues demand immediate and concerted efforts. Further compounding these challenges is the increased risk of major floods and droughts due to climate change and the reduced floodwater storage capacity of the Mekong Delta.

WEF NEXUS IN THE MEKONG BASIN

Past and Ongoing Initiatives

The WEF nexus is not a new concept for the Mekong basin. The First Mekong Forum on Water, Food, and Energy in 2011 and the Mekong2Rio Conference in 2012 provided opportunities for policymakers, governments, academia, civil society, the private sector, and development practitioners to examine the interdependencies of natural resources in the context of the Mekong.

The discussions covered case studies from other parts of the globe. The events also served as a platform to discuss future joint actions in terms of research, programing, and policy recommendations. Since then, a wide range of WEF nexus initiatives has been introduced in regional and national development work supported by investment banks, research institutes, and development agencies²² (Table 3).



Table 3. Summary of Past and Ongoing Initiates for WEF Nexus in the Mekong River Basin

No.	Organizations	Year	Program Information
1	Asian Development Bank (ADB) ²³	2012	Accelerating regional green investment under its Greater Mekong Subregion (GMS) program.
		2019	The GMS Sustainable Agriculture and Food Security Program (SAFSP) supported all six countries of GMS to implement the Siem Reap Action Plan 2018-2022 and GMS Strategy for Promoting Safe and Environment-Friendly Agro-Based Value Chains. SAFSP helped to create enabling conditions and to strengthen capacities for leveraging knowledge and investments in three priority areas: i) climate-smart, inclusive and gender-responsive agri-food value chains; ii) food safety and quality systems; and iii) climate-adaptive agriculture in the context of the WEF security nexus.
2	Australian Agency for International Development (AusAID) ²⁴	2011	The first Mekong Forum on Water, Food, and Energy.
		2012-2021	AusAID carried out the flagship programmes, facilitating knowledge sharing and capacity building as well as providing technical assistance on integrated water management and cross-cutting development issues through the WEF nexus approach.
3	World Wide Fund for Nature (WWF) ²⁵	1980	“WWF-Greater Mekong” initiative implemented in the LMB as a comprehensive, large-scale conservation program covering 600,000 km ² of the most biologically diverse, economically important, and seriously threatened forests and rivers of the Greater Mekong region.
		2014	Mekong Nexus Project investigated key relationships, conflicts, and benefits between biodiversity conservation in response to climate change and the supply of energy, food, and water.
4	Mekong – U.S. Partnership ²⁶	2009-2020	The Lower Mekong Initiative (LMI) prioritized water, energy, food, and environment nexus as one of the two pillars of programming. Several projects on the WEF nexus were carried out under this cooperation platform.
		2016-2018	The “LMI Nexus Futures Program” created a water, food, energy, and environment nexus assessment of the 3S tributaries of the Mekong (Sesan, Srepok, and Sekong Rivers).
5	United States Agency for International Development (USAID) ^{27, 28}	2011-2016	The “Mekong Adaptation and Resilience to Climate Change” project was to identify the environmental, economic, and social effects of climate change in the LMB and to increase their ability to adapt to climate change impacts on water resources, agricultural and aquatic systems, livestock, and ecosystems. One project component focused on establishing a nexus between climate science and on-the-ground community-led responses to changing climate.
		2014	A five-year “SERVIR-Mekong” program aimed to enhance the estimation and predictability of water resources for integrated water management by codeveloping tools that empower decision makers to reach informed decisions to create and/or implement adaptation strategies, including the WEF nexus approach.
6	German Agency for International Development (GIZ) ²⁹		“Integrated Resource Management in Asian Cities: The Urban Nexus” was a project with the urban development framework focused on five dimensions (urban planning, science, technology and innovation, governance, inclusive decision-making, and finance/business) to mainstream the WEF nexus approach in resilient urban development.



Triangular Cooperation Project (RoK-UNOSSC Facility – Phase 3)

Building on the achievements of Phase 2 and aligned with the outcome document of the Second High-level UN Conference on South-South Cooperation (BAPA+40), the Republic of Korea's Ministry of Science and ICT (MSIT) and the UNOSSC have agreed to extend their partnership in support of Regional Project on Sustainable Development in the Mekong Basin based on the Water-Energy-Food (WEF) Nexus and South-South and Triangular Cooperation (RoK-UNOSSC Facility – Phase 3)²². Implementation parties are Mekong Institute, the MRC Secretariat, and the Science & Technology Policy Institute. The modality of the project is SSTC.

The project's main objective is to strengthen water, energy, and food for vulnerable communities living in LMB.

This is to be achieved through strengthening development approaches and management in these sectors; increasing access to safe water, energy, and food while ensuring an integrative approach in policymaking, planning, and implementation to benefit communities living in the Basin, especially the vulnerable resource-reliant communities²². The RoK-UNOSSC Facility (Phase 3) outcomes and outputs are partly derived from the MRC's BDS and SP.

WEF CASE STUDIES

Thai Rice NAMA (Nationally Appropriate Mitigation Action)

The Thai Rice NAMA project was funded by the NAMA Facility, an initiative of Germany, the UK, Denmark, and the European Union (EU) to develop a low-carbon rice farming approach^{30,31}. The main implementing partners were the Thai Ministry of Agriculture and Cooperative (MoAC), the Ministry of Natural Resources and Environment (MoNRE), the Bank of Agriculture and Agricultural Cooperatives (BAAC), and the Sustainable Rice Platform (SRP). This project was launched in July 2018 and ended in August 2023. It aimed to support 100,000 irrigated rice farmers in Central Thailand to implement low-emission rice farming and provide them access to mitigation services and technologies^{30,31}.

The main mitigation-productivity co-benefit technologies promoted in this project focused on water management through Alternative Wetting and Drying (AWD) and Laser Land Levelling (LLL) (Figure 4). The program also promoted a financial incentive mechanism to facilitate a sector transformation to mitigate rice sector emissions by scaling the adoption of the SRP Sustainable Cultivation Standard (SRP Standard). The main results achieved so far and key successful factors and lessons learned are summarized in Table 4.

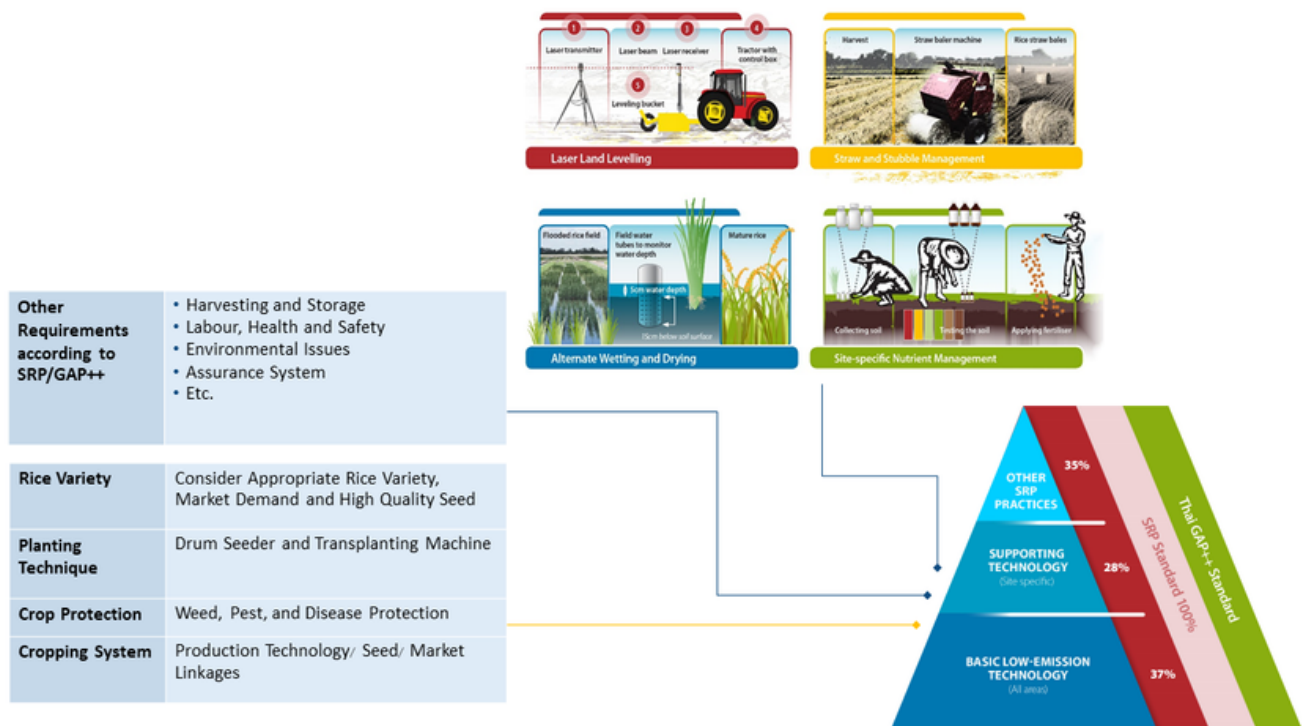


Figure 4: Main mitigation-productivity co-benefit technologies and important components of Thai Rice NAMA

Source: Climate & Clean Air Coalition. (2021)³⁰

Table 4. Main results achieved so far and key successful factors and lessons learned from the Thai Rice NAMA Project^{30, 31, 32}

Main results achieved so far

- Developed implementation strategy and model for four basic mitigation-productivity co-benefit technologies (AWD, LLL, Site Specific Nutrient Management, Straw/Stubble Management) and Integrated Pest Management.
- 4,600 SMART (lead) farmers trained in more than 2,500 villages.
- 6,000 rice farming households trained and implemented basic low-emission practices on 320,000 ha.
- Rice farmers have reduced GHG (CH₄) emissions of ca. 915,000 tonCO₂ by the end of 2022.
- Developed sustainable rice market strategy and market matching strategy.
- Organized capacity-building activities on sustainable and low-carbon rice practices.
- Built capacity of local/central government staff related to MRV for GHG emissions in the rice sector.
- Developed and adopted a Thai National Voluntary Standard for Sustainable Rice.

Key successful factors and lessons learned

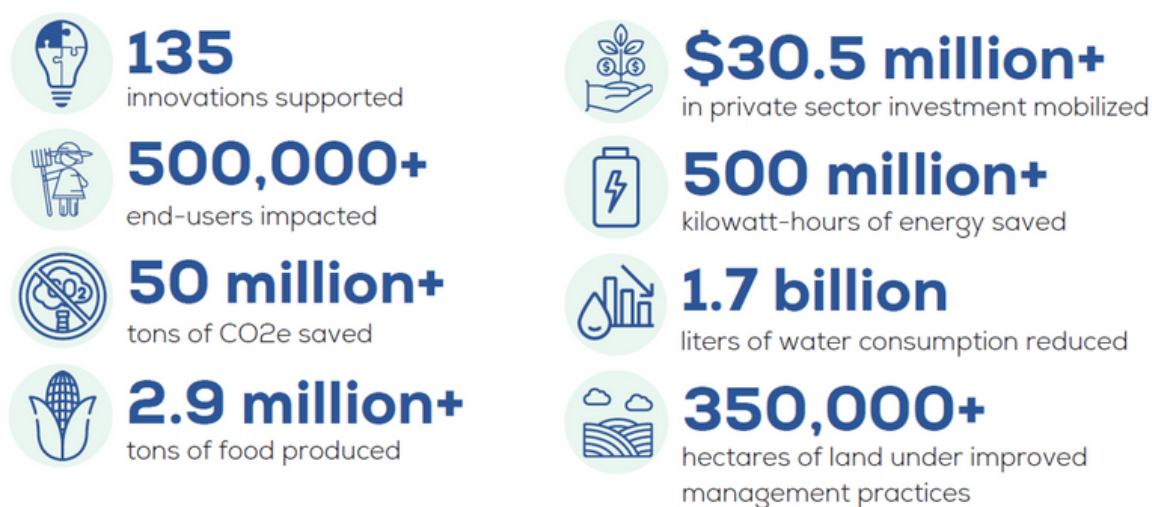
- Key stakeholders (including international organizations, policymakers, responsible ministries, and line departments) closely collaborated, and rice farmers, the private sector, and local organizations actively participated in the implementation of the project.
- Concept of co-benefits (mitigation vs productivity) and scalable business model and strategies.
- The project was designed based on the principles and processes of country ownership and needs, aligned well with national and industry policies and priorities.
- The selected low-emission agricultural practices and technologies were proven mitigation practices with additional co-benefits in climate change adaptation, resource efficiencies, air pollution, and best farming practices.
- There were signs that the project contributed to the Theory of Change, enabling systematic change which would catalyze additional GHG savings, including through the introduction of new technologies, market linkages, and institutional changes.
- Public-private investment in low-emission rice production was promoted.
- Introducing new technology in agriculture was likely to need more time for uptake than anticipated in project design.
- Access to finance in agriculture (both farming and agricultural services) needed to be based on a thorough analysis of the creditworthiness and credit willingness of farmers.
- On-site support by the MoAC to the Thai rice sector appeared complex due primarily to limited extension staff and overlapping mandates of the Departments working in the rice sector. Involving private sector-led initiatives and rice farmer organizations (including their networks) could complement such policy implementation.

Water and Energy for Food (WE4F) Initiative

WE4F is a joint international initiative of the German Federal Ministry for Economic Cooperation and Development (BMZ), the EU, the Ministry of Foreign Affairs of the Government of the Netherlands, the Swedish International Development Cooperation Agency (Sida), and the U.S. Agency for International Development (USAID)^{33,34}. This initiative promotes the development and dissemination of climate-friendly, energy-efficient, and water-efficient technologies and innovations for more productive and environmentally sustainable food production³⁵. WE4F, through its Regional Innovation Hubs (Eastern Africa, Middle East, and North Africa, South and Southeast Asia, Southern and Central Africa, and Western Africa), provides financial support, technical assistance, and investment facilitation to water-food, energy-food, and water-energy-food innovations^{33,34}. The project concentrates on five fields of action: (1) strengthening the skills of the selected innovators; (2) developing the skills of end users and multipliers; (3) improving access

to suitable financing; (4) improving political and sectoral framework conditions; and (5) strengthening exchange among specialists at the regional and global levels³⁵. Through innovations, farmers and food companies can enhance their climate resilience and reduce CO₂ emissions. Thus, supported innovations impact smallholder farmers, helping them unlock missing input, finance, technology, and market.

The South and Southeast Asia Regional Innovation Hub (S/SEA RIH) supports the scaling-up of climate-friendly and environmentally sustainable, energy and/or water-efficient innovations in the water-energy-food (WE4F) nexus across the region, with a focus on women and the poor³⁶. Innovations include technologies, business and finance models, and new modes of cooperation. Based in Bangkok, Thailand, the RIH supports innovators in 15 countries³⁶. The WE4F 2022 Impact is shown in Figure 5, while key successful factors and lessons learned are summarized in Table 5.



■ Figure 5: The WE4F 2022 Impact

Source: *Water and Energy for Food Global - Factsheet*³⁴

Table 5. Key successful factors and lessons learned from WE4F Project ^{20, 21, 22}

Key successful factors and lessons learned

- WE4F initiative works with key players at the local, national, regional, and international levels to connect farmers, businesses, investors, researchers, governments, and other interested parties.
 - WE4F is broadly aligned with nine of the SDGs, and is also of relevance to partner countries' development strategies.
 - WE4F program adopts decentralized approach through the Regional Innovation Hub, allowing the hubs to become firmly established in their own areas to facilitate regional exchange and encourage local activities.
 - A network of innovators, investors, donor partners, and other stakeholders is built through the regions of the WE4F operation.
 - The Regional Innovation Hubs work with innovative SMEs in the WEF nexus through calling for innovations and public-private partnerships, which help them scale their businesses and expand operations.
 - Following a holistic approach that brings social, economic, and environmental aspects into local settings, WE4F is unique in international cooperation and worthy of replication in development cooperation.
 - Broad adoption of new technologies by end-users (e.g., smallholders and farmers) can be accelerated by supporting the core business activities of companies in WE4F innovations.
 - The overuse of water by certain technologies and how that may contribute to falling water tables is the biggest challenge highlighted in the midterm evaluation.
 - Women's participation in the nexus, innovations, and business models that can be easily adopted by women farmers are still important barriers.
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RECOMMENDATIONS

In the anthropogenic-driven global change era, water, energy, and food in many regions are increasingly interdependent. The situation is particularly true for the LMB, where significant challenges related to the water, energy, and food sectors remain. A recent crisis caused by the COVID-19 pandemic further adds substantial impacts on the three increasingly interlinked sectors. After the COVID-19 outbreak, water-energy-food security became a critical issue for policymakers. The WEF nexus is an integrated framework to address cross-sectoral and interconnected challenges. In addition, the WEF nexus planning is a novel transformative response to the unprecedented impacts posed by the COVID-19 pandemic. If it is combined with the BFB concept, this integrated approach will provide efficient recovery solutions from the COVID-19 pandemic and cross-sectoral sustainability and enhance socioeconomic resilience against future crises. However, some issues need to be further considered when applying the WEF nexus:

- Key successful factors and lessons learned from the WEF case studies should be further systematically captured through evaluating mid-term/final reports and having conversations with key staffs responsible for the projects to put in place a more flexible and adaptive approach to learning rather than responding to unexpected challenges on an ad-hoc basis.
- Existing and new approaches (policies, innovations, and interventions) that empower women's leadership and access to resources in the development and implementation of WEF nexus initiatives should be further emphasized.
- Global agenda contribution should be more highlighted through participating in international and high-level events concerning the WEF nexus and climate change.
- Political multi-sectoral partnerships and donor cooperation especially in identifying and engaging with potential partners at the global and regional levels should be further strengthened.
- Cross-regional exchanges for WEF nexus initiatives should be organized to promote interactive conversations and discussions that could help identify synergies, form alliances, integrate gender approaches, and exchange experiences.
- Past and ongoing WEF nexus initiatives carried out in the Mekong basin should be additionally reviewed to get insight into key successful factors, good practices, barriers, and challenges.
- Building on the previous experience and achievements and adhering to the principle of SSTC, the integrated BFB concept and WEF nexus should be implemented on the ground in the LMB.

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