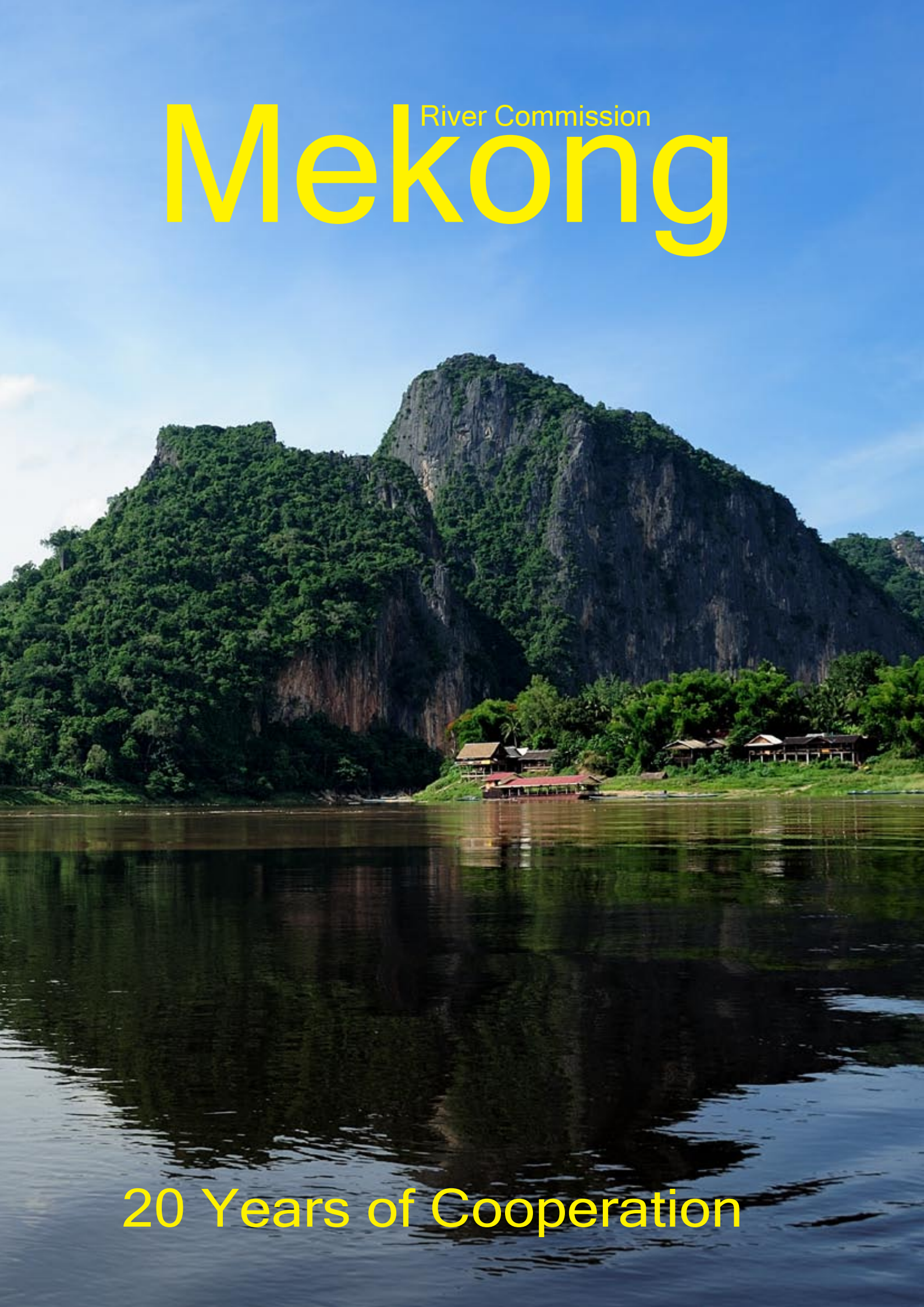
Mekong River Commission



20 Years of Cooperation

MEKONG RIVER COMMISSION FOR SUSTAINABLE DEVELOPMENT
MRC
german cooperation
DEUTSCHE ZUSAMMENARBEIT
giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Message from the Chairperson of the MRC Council for 2015-2016

The year 2015 marks the 20th anniversary of the Mekong Agreement on Cooperation for the Sustainable Development of the Mekong River Basin. Signed in Chiang Rai on April 5, 1995, the agreement between Cambodia, Lao PDR, Thailand and Viet Nam built on an earlier attempt to coordinate activities across the basin dating back to 1957 by providing a solid framework to address water and related issues.

Over the past two decades, the four countries – with the help of our development partners – have extended regional cooperation to China and Myanmar while forging collaborative ties with other river basins. Under the cooperative framework, the four Lower Basin countries have achieved notable successes in areas ranging from forecasting floods, monitoring fisheries and promoting freedom of navigation to assessing water quality, adapting to climate change and ensuring sustainable hydropower. At the same time, water and related issues have risen to the top of the political agenda with prime ministers of the four countries now meeting every four years to discuss matters specific to the Lower Mekong Basin.

The biggest achievement, however, has been five separate rules of procedure for water utilisation since 2001. For the first time, the Lower Mekong countries have rules covering the exchange of information, monitoring water use and how to consult with each other over diversions and other uses of the waters of the Mekong. The procedures also extend to maintaining mainstream flows and water quality. These procedures will determine how we develop, use, conserve and manage the water and related resources of the Mekong in the decades to come.

To celebrate 20 years of cooperation, this publication focuses on some of the transboundary success stories that reflect the evolution of regional cooperation since the MRC was founded. As Southeast Asian economies become more integrated with the launch of the ASEAN Economic Community at the end of 2015, regional cooperation is taking on added importance, heightening the need for integrating the management of water resources as the Mekong Basin develops.

H.E Lim Kean Hor
Minister of Water Resources and Meteorology,
Chairperson of the Cambodia National Mekong Committee,
Member of the MRC Council for Cambodia,
Chairperson of the MRC Council for 2015-2016

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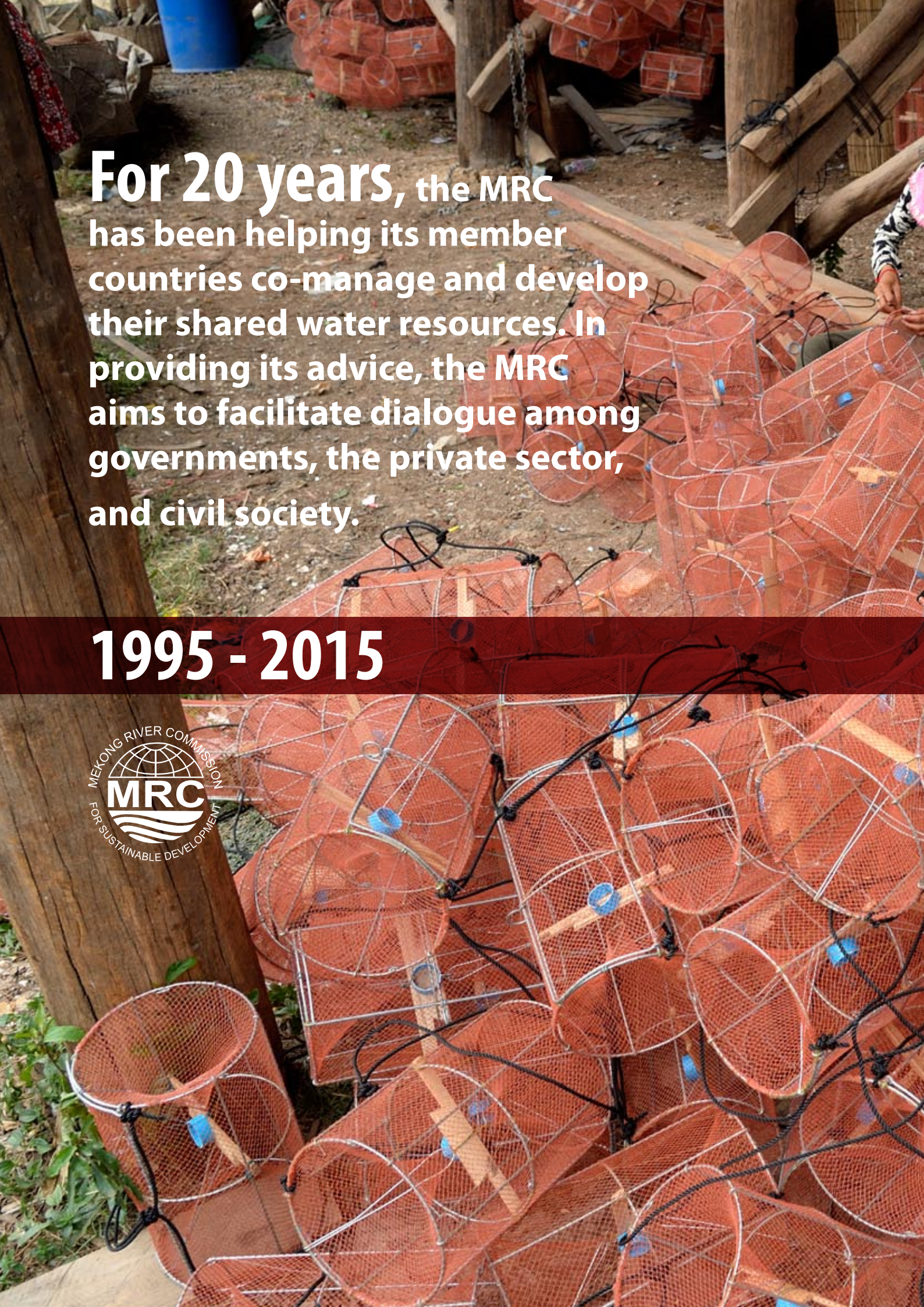
Living on the edge of a rising sea

With half of their land now swallowed up by the ocean, some poor families are trying their best to survive against the continuing seawater intrusion in Viet Nam's Mekong Delta, but their struggle is far from over.

Keeping floods away from the people and people away from the floods

In little more than a decade, the MRC developed a solid flood forecasting system that has helped member countries reduce flood damage and save lives.

Other content



For 20 years, the MRC has been helping its member countries co-manage and develop their shared water resources. In providing its advice, the MRC aims to facilitate dialogue among governments, the private sector, and civil society.

1995 - 2015

MEKONG RIVER COMMISSION
MRC
FOR SUSTAINABLE DEVELOPMENT

Timeline: highlights of Mekong cooperation

1957
- The Mekong Committee was set up under a statute endorsed by the United Nations

1978
- Thailand, Lao PDR and Viet Nam sign Interim Mekong Committee Statute

1995
- The four member countries: Cambodia, Lao PDR, Thailand and Viet Nam sign Agreement on Cooperation for Sustainable Development of the Mekong River Basin

1996
- China and Myanmar become dialogue partners

1998
- MRC Secretariat relocates from Bangkok to Phnom Penh

2001
- MRC Council adopts Procedures for Data and Information Exchange and Sharing
- MRC starts Strategic Liaison Programme with Murray-Darling Basin Authority
- Mekong Development Series launched

2002
- MRC Technical Paper series launched
- MRC wins Thiess International Services Riverprize for excellence in river management

2003
- MRC Council adopts Procedures for Water Use Monitoring and Procedures for Notification, Prior Consultation and Agreement
- China signs agreement to provide hydrological data during flood season
- MRC Secretariat relocates from Phnom Penh to Vientiane

2005
- MRC establishes Regional Flood Centre

2006

- MRC Council adopts Procedures for the Maintenance of Flows on the Mainstream

2008

- China signs agreement to extend provision of hydrological data during flood season

2009

- MRC Council decides to co-host secretariat between Vientiane and Phnom Penh

2010

- First MRC Summit
- MRC holds prior consultation on Xayaburi Hydropower Project

2011

- Member countries adopt first Mekong Basin Development Strategy
- MRC Council adopts Procedures for Water Quality
- MRC Council agrees on need for further study on impacts of mainstream development
- Roadmap for decentralisation of core functions developed

2013

- China agrees to extend provision of hydrological data
- Lao PDR notifies MRC of proposed Don Sahong Hydropower Project

2014

- Second MRC Summit
- MRC holds prior consultation on Don Sahong Hydropower Project

2015

- 20th anniversary of the signing of the 1995 Mekong Agreement

Our Impact

Capacity building

Improved the capacity of National Mekong Committees and other government agencies in coordinating effective water resources planning.

Trained more than 100 young professionals from the Mekong region under the Junior Riparian Professional Programme (JRP).

Information & knowledge

Collects and manages data & information with member countries and other regional stakeholders.

Created MekongInfo, a platform for information exchange between practitioners from government, research organisations, and non-governmental organisations from within and outside the basin. It seeks to promote greater engagement between stakeholders from different natural resources planning sectors, in line with integrated water resources management.

Gender mainstreaming

Addressed gender inequities and mainstreamed gender issues into the planning of development activities.

Navigation

Upgraded the Hydrographic Atlas of the Mekong River System for navigation in the Golden Triangle and Mekong Delta areas.

Identified sedimentation and morphology problems that posed a risk to shipping in the Mekong.

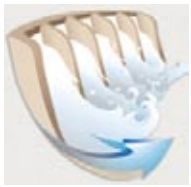
Produced detailed electronic and paper charts of the mainstream and tributaries, including its most dangerous stretches, which have been distributed to local port authorities for the use of shipmasters, pilots and others.

Installed aids to navigation in all four countries and distributed GPS devices to ship captains travelling along the Mekong, thus greatly improving navigation safety.

Formulated the Navigation Agreement for Cross-border Waterborne Transportation between Cambodia and Viet Nam and facilitated the negotiating process.

Completed a risk analysis of the carriage, handling and storage of dangerous goods along the Mekong River.

Produced a manual for the management of dangerous goods, waste, and a Mekong vessel inspection scheme for ports along the river; trained officials from port authorities in the four member countries.



Hydropower development

Initiated the Strategic Environmental Assessment (SEA) of proposed mainstream dams in the basin to understand how member countries can balance opportunities and risks from hydropower development.

Took a leading role in the ongoing debate about the costs and benefits of dams.

Provided preliminary design guidance for the development of dams on the mainstream setting standards of best practice for planning, design, operation, impact and mitigation measures.

Agriculture

Helped develop legal frameworks for water user associations in Lao PDR and farmers in Thailand in the late 1990s.

Expanded knowledge base of types of agriculture and other land-use and established a database of irrigated areas.

Helped identify other uses for rice paddies, such as supplementary fish breeding, to support livelihoods.

Appraised irrigation effectiveness in selected irrigation schemes and produced guidelines for improving irrigation efficiency in paddy fields.

Climate Change

Supported extensive research into the effects of climate change in each member country.

Selected demonstration sites across the basin to work with local farmers in assessing the effects of climate change and to test adaptation measures, particularly to improve water supply.

Raised awareness about the potential impact of climate change among the public and riparian governments through modelling, assessments and participation in regional dialogue.

Fisheries

Monitored fisheries trends and yields, collected data on the size of fisheries production, and overall market value of fish.

Documented migration patterns and importance of key habitats for the life cycles of fish.

Trained fisheries managers in the member countries, which has contributed to regulatory frameworks, and build capacity in national fisheries agencies.

Conducted studies and modelling of potential impacts of hydropower dams on migratory fish, and basin-wide assessment of long-term effects of various development scenarios on fisheries.

Helped train government officials in innovative measures of fisheries management and improved techniques for aquaculture.

Planning

Developed the first Mekong Basin Development Strategy that outlines how the four member countries will share, use, manage and protect water resources equitably and sustainably. It is an Integrated Water Resources Management Strategy that identifies priorities that support the countries to capture development opportunities and minimise risks. It is updated every five years with the involvement of a wide range of stakeholders.

Increased stakeholder engagement through meetings at the regional, national and sub-basin levels, a public submission website and surveys.

Flood forecasting

Provide flood forecasts during the June-October wet season to help authorities reduce the potential effects of flooding.

Signed an agreement with China for sharing hydrological information with the MRC on a real-time basis in the flood season thus improving the accuracy of forecasts.

Provided a set of guidelines and best practices for flood preparedness.

Formalised procedures, norms and rules for mediation and decision-making in transboundary flood management.

Helped improve disaster preparedness in the member countries by upgrading Emergency Management Systems across the basin, through capacity building of provincial disaster management offices, knowledge sharing and public awareness campaigns.

Drought Management

Developed scope assessment as part of basin-wide study of climate change impacts on drought and its severity, aimed at helping member countries mitigate the effects of drought.

Ecology

Classified and mapped watershed and land-use across the Lower Mekong Basin.

Monitored water quality, water composition; tested for a range of chemical parameters regularly to increase understanding of the aquatic health of the basin.

Disseminated monitoring information through easy-to-understand annual Water Quality Report Cards.

Conducted one of the first assessments and monitoring of basin-wide forest cover with the forestry departments of member countries.

Helped member countries conduct their own water quality and aquatic health monitoring, assisted in the establishment of four laboratories for analysis and associated quality assurance procedures.

History of Mekong cooperation

Regional cooperation between Cambodia, Lao PDR, Thailand and Viet Nam dates back five decades to when Indochina was dealing with the post-colonial era. In 1957, three years after the Geneva Agreements ended the anti-French resistance war in Viet Nam, the Committee for Coordination of Investigations on the Lower Mekong Basin (the Mekong Committee) was set up under a statute endorsed by the United Nations.

The Mekong Committee was based in Bangkok and carried out hundreds of surveys and studies across the basin in the ensuing years. But the war in Viet Nam and civil war in Cambodia led to the latter's withdrawal. In 1978, the Interim Mekong Committee, a UN-run provisional body comprising Lao PDR, Thailand and Viet Nam, was established.

In 1991 Cambodia requested readmission into the Mekong Committee and the four countries focused on a new model for regional cooperation that culminated in 5 April 1995 with the signing of the Agreement on Cooperation for Sustainable Development of the Mekong River Basin (the Mekong Agreement), in Chiang Rai, Thailand. The agreement created the Mekong River Commission (MRC) as an inter-governmental organisation that promotes the sustainable development of water and related resources in the Lower Mekong Basin. Areas of cooperation between its member states were to include irrigation, hydropower, navigation, flood control, and fisheries. To address pollution and other harmful impacts from development, the agreement vowed to protect the environment, natural resources, aquatic life and conditions, and ecological balance of the basin. A common thread through all of its work is the facilitation of agreements between the four member countries on water use, water quantity, and water quality.

As a platform for regional cooperation, the MRC has made slow but sure progress towards implementation of the 1995 Mekong Agreement. It started a process for basin development planning in 1997 that takes into account the needs of all people in the basin, particularly the poor and those who rely on water resources for their food and income. The MRC has also developed a consultative process that allows riparian countries to have an input into a range of possible development scenarios including hydropower schemes and the effects of climate change. The MRC member countries acknowledge that transboundary water use is an opportunity for cooperation and improved development across the region. In the past few years, MRC activities have been defined through an Integrated Water Resources Management strategy that has begun to shape a common transboundary understanding of the evolution of long-term planning. This has led the four Lower Mekong Basin governments to adopt an approach to managing the river's resources in consultation with communities affected by development.

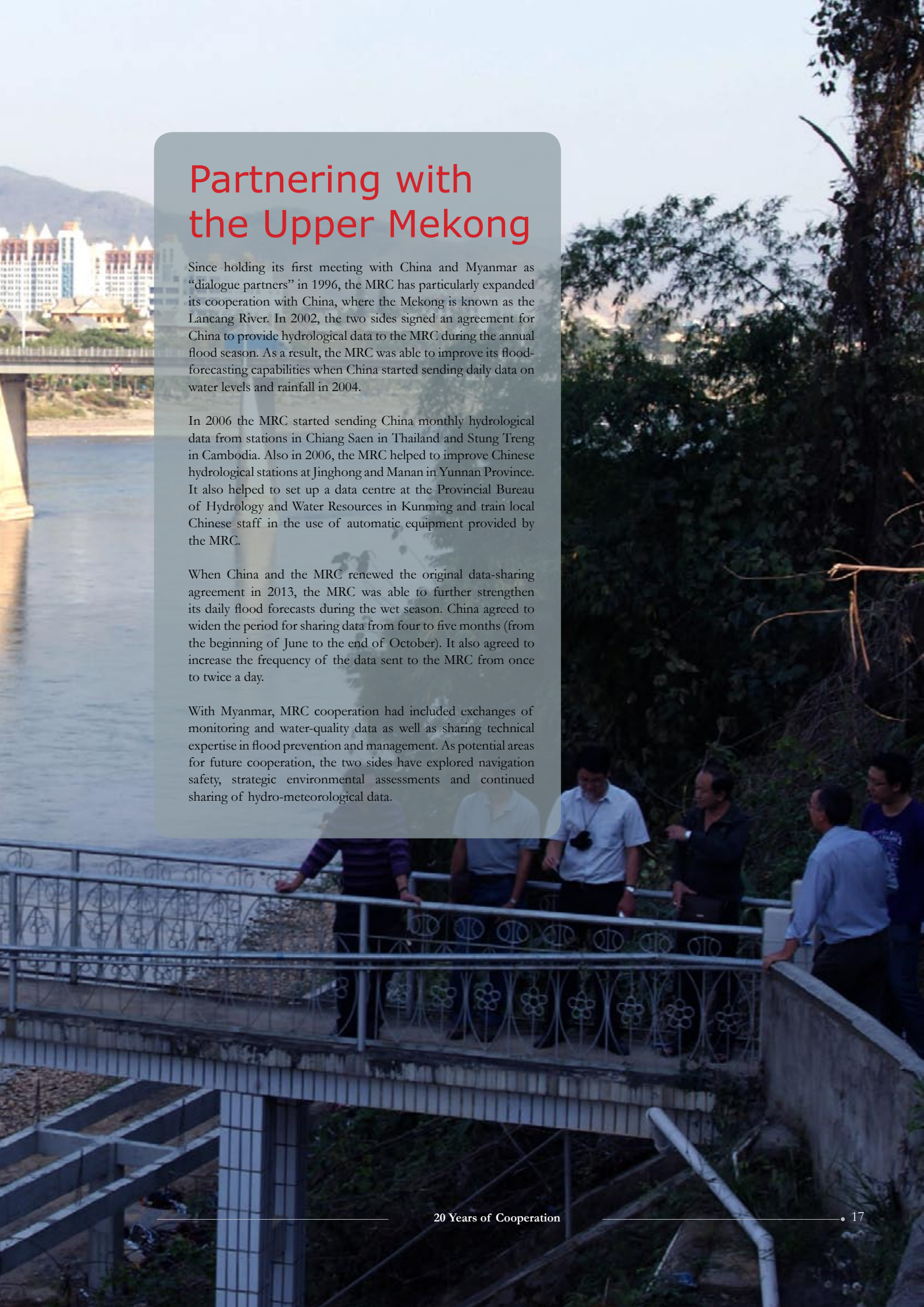
In 2001, the MRC Council adopted the first of five sets of water-related procedures. These were for exchanging and sharing data and information between the four countries. In addition to water resources, the agreement covered a wide range of areas from topography, natural resources, agriculture, navigation and floods, to infrastructure, urbanisation, industrialisation, the environment, administrative boundaries, socio-economic data and tourism. This agreement was fundamental to MRC operations as it supported its ability to develop a knowledge base for integrated water-resource management in the Lower Mekong Basin.

Over the next decade, the MRC Council agreed to another four sets of procedures. In 2003, they adopted two sets of rules for monitoring water use as well as notifying and consulting with other members about diversions and uses of Mekong waters. The second set of procedures, prepared under Article 5 of the Mekong Agreement providing for "reasonable and equitable" water use, created a framework for future hydropower diplomacy between the four countries. These were put to the test in 2010 (see Page 22).

The two others were procedures for maintaining flows along

the Mekong mainstream and water-quality rules, adopted by the Council at separate meetings in Ho Chi Minh City in 2006 and 2011. The latter committed the Lower Mekong Basin countries to making "every effort to maintain acceptable/good quality water on the mainstream."

As they mark the 20th anniversary of the Mekong Agreement ahead of the launch of the ASEAN Economic Community at the end of 2015, Cambodia, Lao PDR, Thailand and Viet Nam are equipped with five sets of concrete rules that will determine how they develop, use, conserve and manage the resources of the Mekong as the economies of the region become more closely integrated.



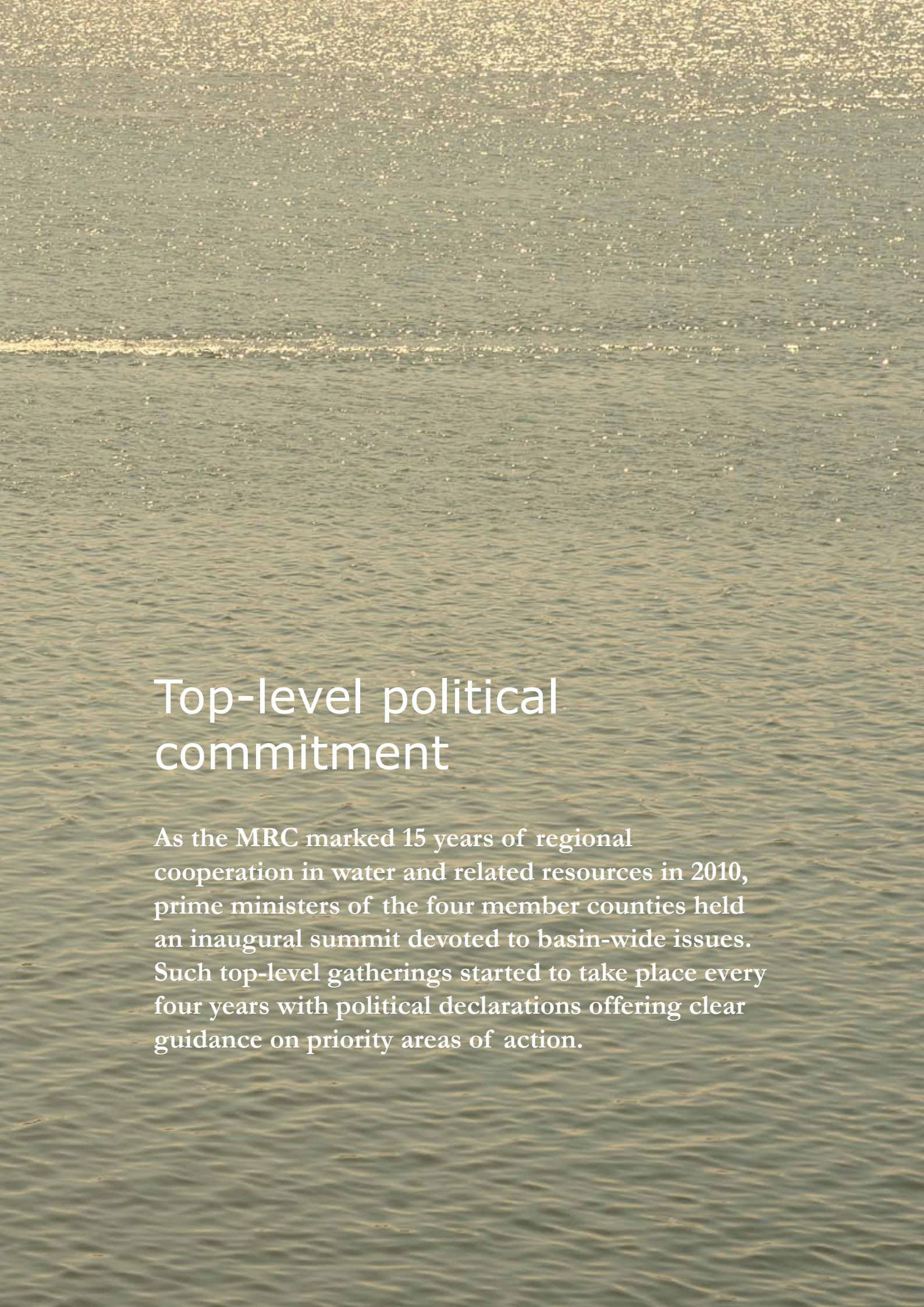
Partnering with the Upper Mekong

Since holding its first meeting with China and Myanmar as "dialogue partners" in 1996, the MRC has particularly expanded its cooperation with China, where the Mekong is known as the Lancang River. In 2002, the two sides signed an agreement for China to provide hydrological data to the MRC during the annual flood season. As a result, the MRC was able to improve its flood-forecasting capabilities when China started sending daily data on water levels and rainfall in 2004.

In 2006 the MRC started sending China monthly hydrological data from stations in Chiang Saen in Thailand and Stung Treng in Cambodia. Also in 2006, the MRC helped to improve Chinese hydrological stations at Jinghong and Manan in Yunnan Province. It also helped to set up a data centre at the Provincial Bureau of Hydrology and Water Resources in Kunming and train local Chinese staff in the use of automatic equipment provided by the MRC.

When China and the MRC renewed the original data-sharing agreement in 2013, the MRC was able to further strengthen its daily flood forecasts during the wet season. China agreed to widen the period for sharing data from four to five months (from the beginning of June to the end of October). It also agreed to increase the frequency of the data sent to the MRC from once to twice a day.

With Myanmar, MRC cooperation had included exchanges of monitoring and water-quality data as well as sharing technical expertise in flood prevention and management. As potential areas for future cooperation, the two sides have explored navigation safety, strategic environmental assessments and continued sharing of hydro-meteorological data.



Top-level political commitment

As the MRC marked 15 years of regional cooperation in water and related resources in 2010, prime ministers of the four member counties held an inaugural summit devoted to basin-wide issues. Such top-level gatherings started to take place every four years with political declarations offering clear guidance on priority areas of action.

It took a decade of river basin diplomacy before leaders of the four Lower Mekong Basin countries held their first summit. The occasion was the 15th anniversary of the MRC in 2010. Meeting in Hua Hin, the four heads of government attending the First Summit of the Mekong River Commission expressed their "highest level of political commitment to the implementation of the Mekong Agreement." At the same time, the leaders ackowledged both opportunities and challenges arising from development pressures including population and economic growth.

In such an environment, the MRC was expected to focus on implementing integrated water resource management; managing risks from floods, drought and rising sea levels; encouraging navigation; addressing climate change; improving water quality; sustaining use of water and related resources as well as biodiversity, wetlands and forests; and identifying and advising on opportunities and challenges of hydropower and other infrastructure development, especially risks related to food security and livelihoods.

The leaders expressed their commitment for the MRC to be "financially sustained" by member countries by 2030. Pointing to models used by other river basin agencies, they also urged the commission to "increasingly explore de-centralised implementation modalities" for its core management functions.

By the time of the Second Summit of the Mekong Commission in Ho Chi Minh City in 2014, hydropower had become the top priority. In their summit declaration, the leaders said they expected the MRC to focus on "expediting the implementation" of a study on sustainable management and development of the Mekong "including the impacts of mainstream hydropower projects."

The Lower Mekong Basin leaders said the so-called Council Study should be carried out in coordination with the Study on the Impacts of Mainstream Hydropower on the Mekong Delta, a separate study initiated by Viet Nam. Together, these studies were expected to provide "sound advice and recommendations" on the sustainable development of the basin.

Cambodia will host the Third MRC Summit in 2018.

The heads of government of Thailand, Lao PDR, Viet Nam and Cambodia at the Second MRC Summit in Ho Chi Minh City, Viet Nam, April 2014

MRC Summits and early regional diplomacy

The First MRC Summit was the culmination of early efforts at regional diplomacy aimed at addressing common issues related to the development of the Mekong River.

As part of a Cambodian initiative, a meeting of Cambodian, Lao and Vietnamese prime ministers in Vientiane in 1999 led to the formation of a Development Triangle Area between the three countries and regular summits every two years. Located at the heart of the Lower Mekong Basin, the area comprised four provinces in northeastern Cambodia, four southern Lao provinces and five in the Central Highlands of Viet Nam. Modelled on similar growth triangles in ASEAN, the trilateral framework covered transport, trade, energy, tourism, human resource training and health.

The first summit devoted to the Mekong Basin took place in 2002 when leaders of the six countries from the Greater Mekong Subregion (GMS) met with the president of the Asian Development Bank in Phnom Penh. That led to an agreement to hold GMS Summits every three years, bringing together not only the Cambodian, Lao, Thai and Vietnamese prime ministers but also leaders from China and Myanmar.

Under a separate Thai initiative in 2003, river basin diplomacy in the Mekong expanded to include the neighbouring basins of the Ayeyawady River in Myanmar and the Chao Phraya River in Thailand. The inaugural summit on the Ayeyawady — Chao Phraya — Mekong Economic Cooperation Strategy (ACMECS) was held in Bagan later that year, with Viet Nam joining the group in 2004. Leaders of the five ACMECS nations (Cambodia, Lao, PDR, Thailand, Myanmar and Viet Nam) subsequently began meeting every two or three years with a focus on trade and investment, agriculture and industry, transport, tourism and human resource development.

Mekong diplomacy took a new turn in 2009 when Japanese Prime Minister Yukio Hatoyama hosted the first Mekong-Japan Summit in Tokyo. In what would become an annual gathering, the leaders of Japan along with Cambodia, Lao PDR, Myanmar, Thailand and Viet Nam adopted a declaration calling for a "more optimized way of effective functioning" among existing mechanisms for regional cooperation in various sectors. With the declaration giving prominence to the MRC among such regional mechanisms, it seemed as though a summit of Lower Mekong leaders would just be a matter of time.

First MRC Summit in Hua Hin, Thailand

MRC Agreement Tested for Regional Hydro Diplomacy

The Prior Consultation process has only been carried out twice in the MRC's 20-year history, but it has led to better understanding of the potential impacts of hydropower development and the value of the organisation as a platform for cooperation.

The Xayaburi Hydropower Project, a run-of-river dam in northern Laos that will generate electricity for consumption in Lao PDR and Thailand, was the first that underwent the prior consultation process under the 1995 Mekong Agreement. It was a test case of the MRC's hydro diplomacy to see whether the agreement of cooperation would work as the four countries envisaged 20 years ago.

The prior consultation is part of the Procedures for Notification, Prior Consultation, and Agreement (PNPCA), one of the five formal procedures the MRC has developed to put the agreement into practice. It is an inter-governmental process for the four countries to assess the benefits and associated risks of any proposed significant water-use project on the mainstream, and to raise concerns on the potential negative effects on their territories in order to seek mitigating measures.

The first prior consultation became a high profile topic that brought lively debates among the neighbouring countries, donors and people in the region.

It began in October 2010, a month after the Lao government submitted the project to the MRC Secretariat for consultation. The MRC's governing body, the Joint Committee (JC) consisting of one senior official of each member country, set up a special working group while the Secretariat formed a separate task group to support the JC working group in its review and assessment of the project. The MRC's 2009 guidelines on dam design, called the "Preliminary Design Guidance for Proposed Mainstream Dams in the Lower Mekong Basin", became a key assessment tool for the technical evaluation of the project's design and operation that looked into issues related to navigation, fish migration, sediment flows, water quality, ecology and safety, among others. In addition, two expert groups were hired specifically to examine fisheries and sediment issues.

For the following six months of the official prior consultation period, the assessment teams conducted desk reviews of all project documents against the guidelines and other international water management tools, and visited the project's site for a physical assessment. Cambodia, Thailand and Viet Nam conducted national public consultations where hundreds of people expressed their concerns. By March 2011, the assessment teams had prepared a consolidated review report on the project for the Joint Committee's consideration. It recommended further collection of baseline data to assist the Committee in its assessment.

A month later, towards the end of the six-month period, the Joint Committee held a special session where Cambodia, Thailand and Viet Nam claimed that more time was needed to study transboundary and cumulative environmental impacts, and requested an extension of the prior consultation. Lao PDR, however, insisted that no extension would be enough to satisfy all parties' concerns, but promised that the project would comply with the MRC guidelines and adopt mitigating measures to address them. As the senior officials of the member countries could not reach a unanimous view on the project, they referred the matter to the MRC Council, the highest body of the organisation consisting of water and environmental ministers of the four countries.

When the MRC Council met in December 2011, it was unable to take a common stance on the case and concluded that a more comprehensive study on the sustainable development of the Mekong River including impacts of Mekong mainstream hydropower projects was necessary. The study, now referred to as the "Council Study", is being conducted by a team of MRC technical experts.

After the end of the prior consultation, some quarters of civil society, neighbouring countries, and donors continued to express their concerns about the project's environmental impacts. The Lao government hired international experts to review and redesign certain features of the project, and began its construction. .

At a workshop held by the Lao government in July 2015, officials and the Xayaburi project's developers talked about the post-consultation work and the technical details of the redesigned dam. The presenters said that they focused on addressing the issues of fish migration and sediment, two of the main concerns raised during the prior consultation. The modifications include the installation of additional fish passages such as fish ladders and fish locks, the addition of more space for the second navigation lock, and the extension of the bottom outlets to flush sediment. The changes have required an additional investment of US $400 million on top of the original US $3.6 billion.

"A prior consultation process under the 1995 Mekong Agreement, with support from the state parties, will enable

the mainstream hydropower development to offer optimal benefits for the people of the region without any major concerns," Deputy Prime Minister Somsavath Lengsavad declared at the workshop. He hoped that the Xayaburi case would be "an exemplary model for future mega hydropower project development under different schemes, and create a great atmosphere to welcome the upcoming ASEAN Economic Community."

It is still unclear whether the redesigned dam will bring benefits without causing massive set-backs on the environment. However, the project's redesign has demonstrated Lao PDR's willingness to adhere to the spirit of cooperation under the 1995 Mekong Agreement. That kind of revision at such additional cost following the prior consultation is extremely rare for any hydropower development around the world.

The prior consultation has only been tested twice, first for the Xayaburi Hydropower Project, and again just last year for the Don Sahong hydropower project, also in Lao PDR. Although they may have not concluded as many would have preferred, the lessons learnt will be valuable for any future consultation. Without the Mekong Agreement and its procedures, none of these consultations and design changes would have taken place. No civil society groups and neighbouring countries would have gained legitimacy to voice their concerns for a national project of another sovereign country without the MRC's framework.

"PNPCA is an exemplar of the continued struggle by MRC to balance 'no right to veto' and 'no unilateral right to develop without due consideration of other rights'," says John Dore, Senior Water Resources Specialist at the Australian Department of Foreign Affairs and Trade, recognising the MRC's institutional role in water governance in the region."The Xayaburi PNPCA process has pushed facts and analysis into the inter-government and public spaces to enable more informed discussions between Lower Mekong countries."

Jon-Martin Trondalen, Executive Chairman of the Geneva-based NGO COMPASS that advocates conflict resolution in the area of international water resources, commends the MRC's hydropower diplomacy. "The riparian countries choose peace and cooperation instead of hostility by committing themselves to a unique international hydro-diplomatic effort. This undertaking is a hope and a model for many other countries in the world, especially in conflict prone regions like in the Middle East," he says.

In the Lower Mekong Basin, more hydropower projects are planned on the Mekong mainstream and more on its tributaries. Hydropower development can generate clean renewable energy and income, but it might adversely affect sediment flow, aquatic life and fish passage. These effects must be considered in the designing and planning of the projects. For sustainable hydropower development in the region, the MRC will remain a central platform for inter-governmental dialogue, cooperation, and technical knowledge for sound decision-making.

The new generation of Mekong professionals

The Junior Riparian Professional Programme (JRP) was designed to equip young professionals from the Mekong Basin countries with expert knowledge and skills in water resource management. The programme's first three phases ran from 2002 to 2015. Among the 111 trainees who took part in the first three phases, 26 were from Cambodia, 26 from Lao PDR, 24 from Thailand, and 25 from Viet Nam. Another ten came from the MRC's dialogue partners: six from China and four from Myanmar.

"There is a lot of MRC work requiring GIS analysis. MRC is the place you can equip yourself with advanced skills as well as contribute your solid technical background for regional benefit." - Aekkapol Aekakkararungroj, Thailand (2009-2010)

"It is a splendid programme for junior staff. This programme not only contributes the fundamental knowledge about the MRC (structure, activities, mandates), but also create an environment for junior staff to share cultures, experiences, customs among riparian countries." - Le Viet Minh, Viet Nam (2013-2014)

"Networking with professionals in the field also helped me for future job connection opportunities as well as to gain practical experience not only by being hands on but also benefitting from seeing what those colleagues were doing." - So Manine, Cambodia (2013-2014)

"I have gained both professional skills (by enhancing my technical knowledge on hydrological modelling and effective use of natural resources) personal skills (by enhancing my leadership skills and broadening my vision on the sustainable development of the Mekong River Basin). Moreover, the JRP project's experience was fundamental for me to get a scholarship to continue my studies." - Soytavanh Mienmany, Lao PDR (2009-2010)

"Before I arrived, I didn't know much about the Lower Mekong Basin, but by the time I returned home, I learnt enough to conduct comparative analyses on the Mekong and the Yellow River basins. Both our basins need more information on sediments. Without this data, we know little on the river's fluvial processes. My time as JRP allowed me to dedicate time developing knowledge on just this topic alone." - Sun Gaohu, China (2011-2012)

"Before I came to the MRC, I lacked knowledge specifically in project management and facilitation. By the time I left, I felt confident enough to share my knowledge with my peers at the ministry and to directly apply my experiences to my everyday work. I realised during my time at the MRC how much Myanmar can learn from the rest of the region, and what we can, in exchange, offer to them." - Toe Aung Lin, Myanmar (2011-2012)

Managing dangerous goods, keeping the river safe

Training and management systems developed for a port in Thailand could be applied to other inland ports in the Lower Mekong Basin. Many of these ports have limited capacity for managing dangerous goods and waste, protecting the environment or responding to emergencies such as oil spills.

On the evening of 4 May 2014, a Vietnamese oil tanker suddenly exploded when it was pumping its load at a port in the southern province of Dong Nai. Two people died aboard and two others were injured at the port. The ship was carrying about 630 cubic metres of oil, some of which leaked into the river, causing huge flames on its surface. A few months later, on 8 November, a Lao boat carrying 46,000 litres of gasoline exploded on Thai territory, seriously burning two crew members.

These are just two recent examples of serious incidents involving the transport of dangerous goods along river waters, and they highlight the need for a common set of guidelines to save lives and cargo. Navigation safety is at the core of the MRC's work and in 2012 the commission launched a pilot project for managing petroleum products and other dangerous goods at the newly-opened Chiang Saen Commercial Port, in Thailand.

The project focused on assessing risks, especially in port operations and vessel management, and developing a comprehensive waste management plan. Working with port staff, national Thai experts and international consultants, the MRC produced a Dangerous Goods Management Manual, Waste Management Guidelines and a Mekong Vessel Inspection Scheme for the port area.

The first manual covered petroleum products as well as fireworks, ammonium nitrate, liquid petroleum gas cylinders, pesticides and coal. The MRC subsequently helped to provide training for 60 officials from Lao and Thai port authorities as well as separate training for staff at test ports and terminals in Cambodia and Viet Nam.

The pilot project and training for navigation officials was well timed – the MRC was in the process of completing a Risk Analysis of the Carriage, Handing and Storage of Dangerous Goods along the Mekong River (Phase 1). It found that numerous inland ports and terminals in the Lower Mekong had limited capacity to manage dangerous goods and waste, protect the environment or respond to emergencies such as oil spills. The design of vessels transporting such goods was found to be "lagging" in the MRC countries with insufficient protection for cargo in case of accidents.

Two crew members were injured when Lao vessel Sokphaxay No. 0120 exploded in Thai territorial waters on November 8, 2014. The boat was transportring 46,000 litres of gasoline.

Chiang Saen Commercial Port, a new hub for trade with China located in the Golden Triangle area where the Lao, Myanmar and Thai borders converge.

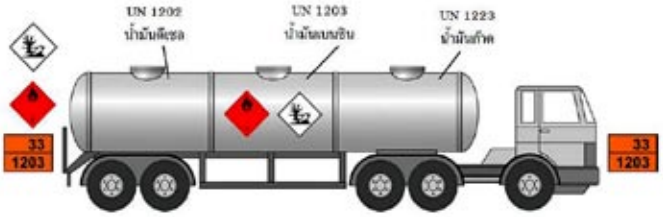
"If not managed properly, the increased transport of dangerous goods along the Mekong could have considerable negative environmental impacts," the analysis warned. At the same time, the countries had "limited" awareness of dangerous goods, environmental protection, impacts of oil spills and safety requirements. The analysis highlighted the need for greater awareness and understanding of how dangerous goods should be treated in terms of port management and worker safety.

To address risks associated with dangerous goods, the MRC recommended developing management systems as well as further training for managers and workers. After consulting with the four countries, it developed a Regional Action Plan for the Sustainable Transport of Dangerous Goods along the Mekong in 2013 (Phase 2) with national and cross-border projects to be carried out between 2015 and 2020 (Phase 3).

Vessel Inspection Scheme

The scheme developed for the Chiang Saen Commercial Port area in 2012 was for Chinese, Lao, Myanmar and Thai-flagged vessels but could also be applied to any vessel calling at an inland port in the Lower Mekong Basin. Inspections covered the following standards and regulations:

1. Vessel certificates and documents
2. Vessel manning certificates held, training and knowledge
3. Health and safety
4. Drug and alcohol policy
5. Firefighting and lifesaving equipment
6. Environmental protection
7. Cargo transfer operation
8. Wheelhouse and navigation
9. Mooring and anchoring
10. Engine room
11. Operational safety
12. Vessel appearance
13. Cargo measurement



Cambodia and Viet Nam formally open-up cross-border river trade on the Mekong

Cambodia and Viet Nam formally opened up cross-border trade on the Mekong River System after signing a treaty that implements the principle of 'freedom of navigation' on Mekong waterways between the two countries and access to the river system by foreign vessels. The Treaty on Waterway Transportation was signed by both countries in Phnom Penh on 17 December 2009. Through its Navigation Programme, MRC facilitated the project of establishing the Agreement which legally binds Cambodia and Viet Nam easing the official restrictions that existed for cross-border navigation. The move will free-up regional and international trade, help avoid delays and make river-based customs and immigration procedures straight-forward. Investors can now be confident that cross-border shipping is based on a sound legal structure.

The Regulated Waterways on the Mekong, Tonle Sap, Bassac and Vam Nao rivers, and selected canals which are colored in green on the insert map can be used by Cambodian and Vietnamese vessels under the Agreement. The Transit Routes which are colored in orange are destined for maritime traffic and can be used by all sea-going ships under foreign flag under the Agreement.

"This is a historical step that will not only improve the quality and efficiency of waterborne transport in the Mekong Region, but will enable us to realise the full potential of the Mekong River by transporting goods directly to the United States, Europe and Australia through Cai Mep Port, in a reliable manner." Mr. Hei Bavy, CEO of Phnom Penh Port, stated during the signing ceremony.

The Mekong River System presents an excellent opportunity for waterborne transport and trade. Waterborne trade in Cambodia and Vietnam has experienced significant recent growth; with trends in container traffic at Phnom Penh Port and general cargo through Can Tho Port both showing steady increases. Rehabilitation of the most important ports, improvement of inland waterways, development of modern aids to navigation that now allow 24-hour navigation, fast growth of food production, water-related tourism and foreign trade will require expansion of the transport capacity of the river.

Formulation of the agreement and facilitation of the process was done under the MRC Navigation Programme which aims to implement Article 9, Freedom of Navigation, of the 1995 MRC Agreement. The MRC facilitated the agreement by assisting a legal task force in both countries, with funding provided by the Governments of Belgium and Australia. A Mekong Navigation Facilitation Committee (MNFC) has been established to implement and monitor the Agreement. Under the Agreement, the MNFC will also put in place a range of measures for ensuring river traffic safety and regulating the transportation of dangerous goods by river. By harmonising rules and regulations, there will be a considerable improvement to the safety of the shipping of oil and hazardous liquid cargoes, port services and safe navigation.

GPS vessel guidance system improves safety for boat passengers and crew

With the new digital system, captains no longer have to rely on physical aids to navigation or their memories to steer vessels through difficult stretches where hazards like rocks and sandbars often lurk beneath the surface

Whenever he travelled on his boat on the Mekong River's stretch between Luang Prabang and Huay Xay in Lao PDR, captain Bounphaeng Khumsawad relied mostly on his life-time of experience and intricate knowledge of the water's many treacherous twists and turns.

"During the rainy season it's much easier to navigate the boat, but in the dry season I have to follow the main flow of the river where is deeper and there are no rocks underneath", he says.

Physical aids to navigation usually worked well in Cambodia and Viet Nam where the Mekong flowed at a relatively slow pace. Along Lao and Thai stretches of the river, however, currents were strong enough to uproot aids to navigation, which could also be damaged by logs and other debris being swept downstream. Apart from routine maintenance and costly upgrades, ensuring safety along these stretches would therefore come with the additional expense of replacing lost or damaged equipment.

To help captains navigate courses along these stretches and identify submerged hazards such as rocky outcrops and shallow sandbars, the MRC turned to digital technology. Similar to car navigation systems, the devices used the Global Positioning System (GPS) that allowed captains to follow exactly the safest path along the river, which was pre-routed on GPS maps through intensive depth surveys. By steering a vessel along a line on a digital chart, a captain would know he was safe. The best paths for the dry and wet seasons provided visual tools for navigators to ensure they were on course – and aware of approaching hazards.

In 2013, the MRC started giving GPS devices to the captains of vessels traveling between the former royal Lao capital of Luang Prabang and the northern Thai province of Chiang Rai. The MRC used to install physical markers to improve safety along these stretches, among the Mekong's most dangerous for water transport. With the GPS devices, pilots could navigate more safely at night and during heavy rains without having to rely on physical markers or their memory.

Boat trips between Luang Prabang and Huay Xay are particularly popular with foreign tourists. "In the dry season, the level drops low and causes problems," said Saysana Boupha from the Navigation Office in Pakbeng, a Lao village where tourists taking the river cruise typically stopped to stay overnight. "Many sandbars appear and others are just below the surface," the navigation official said. "It's difficult to navigate a boat through these rocky waters." Indeed, a British tourist died during the dry season in early 2015 when a boat carrying 10 tourists capsized near Pak Beng, reportedly after hitting a rock. The vessel was not equipped with a GPS guidance system.

As tourism demand grows, tour companies are working with experienced operators to develop ways to train new pilots while maintaining safety for passengers. Manop Weera, a Thai cruise operator, said his company tested the GPS system to see how it compared with manual piloting. "It yields better results for us and for many other people who now want to get a GPS," he said. "A GPS system helps us to make judgments because humans do sometimes fail (and) to confirm which path we can go and cannot go."

The digital technology was also applied at Chiang Saen Commercial Port, a new port in Chiang Rai that opened in 2012 to accommodate Thailand's booming trade with China. "The new port is ready to handle the volume that we expect for the next 10 years," port manager Weera Jinnikorn said. "We agreed that in the future, every trade boat has to install radio communications and be equipped with a GPS guidance system from departure until the destination port."

According to Li Jian Bin, a Chinese ship captain whose vessel called at Chiang Saen, increased safety was a welcome addition as profit opportunities arose with increased trade. "We use walkie-talkies to communicate with people on land when we travel to pick up cargo," Li said. "It's a dangerous business. But I must not be afraid because it's a way to make more income."

By recording an ideal route with outer limits for safety and overtaking, the GPS system is able to provide an accurate route and allow for a margin of error, letting the navigator keep the vessel on a pre-determined track. In the future, the MRC plans to combine collected data with other geographical information that could be uploaded to handheld GPS devices for greater convenience and mobility.

Fish larvae bring together experts from Thailand and Viet Nam

Extensive sampling in a Vietnamese province bordering Cambodia leads to one of the most comprehensive studies of larvae and juveniles ever undertaken in a tropical river

In 1999, Vietnamese fish biologist Vu Vi An had just started working at the Research Institute for Aquaculture No 2 (RIA2) in Ho Chi Minh City when he found himself involved with the first study of fish larvae in the Mekong Delta since the 1930s. Over a 45-day period, An and other Vietnamese researchers took 1,600 samples from the Mekong River and the Bassac River in An Giang, a Vietnamese province on the border with Cambodia. The samples formed the basis of one of the most comprehensive studies of fish larvae and juveniles ever carried out in a tropical river.

To identify the species, the MRC invited three leading regional experts on fish taxonomy to work with scientists at RIA2, which oversees fisheries in the Mekong Delta in Viet Nam. The taxonomists, two from the Department of Fisheries in Bangkok and one from the University of Hanoi, identified larvae and juveniles of 122 species over a period of two weeks in early 2000. They also trained local staff how to identify young fish, which do not yet have the colour and anatomical features of adults (to which almost all literature and identification keys refer).

In 2003, the MRC published the Mekong Fish Database with information on 898 native and 24 exotic fishes in the Lower Mekong Basin, putting the basin alongside the Amazon and the Congo River in Africa in terms of species richness. The database included common names in Khmer, Lao, Thai and Vietnamese – as did a field guide to 363 of the most common species in the Mekong Delta in Cambodia and Viet Nam that the MRC published in 2008.

To take into account changes in scientific classification since the database was produced, the MRC published a revised estimate in 2009. This indicated that about 850 freshwater species had been recorded in the Lower Mekong Basin or about 1,100 species if marine "visitors" to the delta were included.

Accurate identification of fish larvae and juveniles became increasingly important in assessing the potential impact of hydropower and irrigation dams in the Mekong Basin, especially in studies of migration and spawning. To improve the quality of research, the MRC published a field guide to larvae and juveniles of 65 common fish species in 2013. The guidebook included detailed drawings of the stages of development — from early larvae to pre-larvae through post-larvae to juvenile fish — along with basic information on classification, size, ecology, biology and conservation status for each species.

As for the Mekong Fish Database, An said it was still a "useful" tool after 12 years. "There's a lot of information such as identification features and species distribution for a thousand species ," the Vietnamese fish biologist said. "Many people use the information."

Living on the edge of the rising sea

With half of their land now swallowed up by the ocean, some poor families are trying their best to survive against the continuing seawater intrusion in Viet Nam's Mekong Delta, but their struggle is far from over.

Along a muddy and windswept beach in a remote seaside village in the south-western province of the Mekong Delta, a one-lane dirt road divides the green arable land on one side and a beach-front on the other. It seems like any other road, but for villagers here, this is simply a much-needed lifeline, a buffer that prevents the rising seawater from swamping their homes.

Those who live behind the dyke, built by the Vietnamese government, have seen their rice fields and houses rescued from saltwater intrusion. Not so fortunate are the families whose houses and lands are sandwiched between the wall and the sea.

"If the salty sea water goes into rice fields for even just one night, it would seem like you poured boiling water onto the rice crops, instantly killing them," said Danh Huong, 75, who is among a number of people in Binh Giang village whose compounds are located outside 'the safe zone', and who have few options to live elsewhere.

Many years ago, they planted mangroves as natural protection against the saltwater.

"Now the sea comes closer and has claimed the mangroves first, and then the eucalyptuses. Now, they are all gone," said Mr. Huong.

Beach-front residents here said they lost some of their farms to the accumulated 100-metre sea intrusion. Threatened by the rising tide, locals have invented home-grown strategies to cope.

Danh Hau, a 33-year-old shrimp farmer, who had lost half of his land and shrimp to the insatiable sea, decided to build two-tier dykes around fish and shrimp compounds located next to his one-storey house, where he lives with his wife and child.

"I have to make this secondary dyke because I am afraid that the waves will come back (and break the first dyke)," he said, adding that he was not sure whether this method would work out in the long run.

Dykes and mangrove forests give shelter for now. But Mr. Huong and his neighbours said they live with uncertainty, fearing that they will soon be defeated by higher tides.

"We have some solutions, but the sea now is more powerful than before," he said. "In the past during the high-tide season the sea water was much lower. Now the sea is higher and higher."

Home to more than 18 million people, the low-lying Mekong Delta, Viet Nam's rice bowl, is one of the world's most vulnerable areas to rising sea levels caused by climate change. Kien Tran-Mai, a climate change specialist at the Mekong River Commission, points out that without effective solutions, the sea level would increase by 0.8 to one metre by 2100, in which up to 38% of the Mekong Delta could end up under water. As a result, around 30% of the population will be affected and many will be forced to migrate to other areas, he said.

"These predictions are quite conservative and moderate with a certain extent of uncertainty. Other forecasts afford much worse scenarios," he said.

The Mekong River Commission is working with international and regional experts, national and local authorities, affected communities and other partner organisations in the Lower Mekong Basin to gather lessons learnt and local wisdom – how people manage to deal with more storms, floods and higher sea levels. This will enable all parties to consider applying such practical knowledge in their towns and villages.

Ky Quang Vinh, a climate change specialist of Can Tho City's Department of Natural Resources and Environment (DONRE) and a researcher at Can Tho University, is among academics who share insights regularly with the MRC. He points out that the region is becoming much more vulnerable than before. There are now more storms and stronger typhoons and increasing erosion on the sea side.

The area is already exposed to other threats, such as rapidly growing development and urbanisation, which will likely change river flow routines, he said.

Water fluctuation changes combined with salt water intrusion will negatively affect rice farming and fishing activities, said Mr. Vinh.

"The majority of people in the Mekong Delta are rice farmers. If we don't have solutions to actively catch up with the (growing) impact, productivity will be reduced and poverty increased," said Mr. Vinh, adding that this will trigger increased migration from affected areas to cities.

Methods that local people are applying to deal with rising sea level and unusual floods are very basic, he said. People in this area, for example, lift their houses off the ground by attaching poles to the foundations.

"In the past there was fresh water flooding and this was a food resource for the people. But now there's saltwater flooding, and with this, things will become very different and very negative," he said.

Transboundary cooperation in fisheries advances sustainable development

Integrated fisheries management approaches promote cross-border dialogue.

For many of the more than 60 million people living along the mighty Mekong, fish is not only their main source of food, but also of income. About four million tonnes of fish and other aquatic products are produced annually in the Lower Mekong Basin, host of the world's largest inland fishery. That may sound like more than enough fish to go around. But just as in the case of any abundant natural resource, close monitoring and cooperation is needed to ensure sustainability because these resources are increasingly under pressures from large-scale development, illegal fishing, and climate change.

The Mekong River Commission has evolved its fishery initiatives over the years from the delivery of knowledge-base to national policy- makers, to the coordination of cross-border fisheries management at local community levels. These newer transboundary initiatives aim to harmonise fishing regulations between neighbouring provinces along the borders, and jointly manage the resources to improve livelihoods in the communities in three border areas within the region.

Cambodia – Lao PDR border

The latest transboundary initiative set off in late 2014 in the border provinces of Cambodia and Lao PDR along the Mekong River and its tributary Sekong River, as part of the MRC's basin-wide Integrated Water Resources Management Project. The Mekong-Sekong project covers four provinces of the two countries where a variety of important species, such as the Irrawaddy dolphins and the Mekong giant catfish *Pangasianodon gigas*, and other aquatic resources are threatened by environmental impacts from development and unsustainable fisheries practices.

Aiming to improve fisheries management in the bordering provinces of Stung Treng and Kratie in Cambodia, and Champasak and Attapeu in Lao PDR, fisheries officials and other representatives of the two river basins have designed steps to achieve that goal. Among others, the project teams are working on identifying common issues of transboundary fisheries management such as overfishing, impacts of hydropower development and conservation of rare species. Within the life cycle of the three-year project, the project teams are expected to set up a joint fisheries management body to oversee cross-border dialogue and a management action plan. These outcomes would eventually help support sustainable development of the river basins and improve the livelihoods of the basin communities.

Similar efforts are taking place in other borders between Cambodia and Viet Nam as well as between Lao PDR and Thailand.

Cambodia – Viet Nam border

The very first transboundary project was born in 2011 between Cambodia's Prey Veng Province and Viet Nam's Dong Thap Province along a major tributary of the Mekong, called the Tonle River in Khmer and the So Thuong River in Vietnamese. Some of the challenges were a limited understanding of Cambodian fishing regulations among Vietnamese fishermen, including those who lease fishing grounds across the border; and overfishing and the use of illegal fishing gear in Cambodian waters. Fishermen in Cambodia had expressed their desire to learn more about aquaculture techniques in Viet Nam, while the Vietnamese requested more information about Cambodian fisheries regulations.

Seeing the needs for transboundary dialogue and cooperation, the MRC brought national, provincial and district authorities together for the first time with commune officials and fishermen from both sides of the border to discuss concrete steps for cooperation. Meetings in Cambodia and Viet Nam later led to an agreement to consider including fisheries on the agenda of annual meetings between the Governor of Prey Veng Province and the Chairman of the People's Committee of Dong Thap Province. This was later extended to existing quarterly meetings between district chiefs with the ultimate aim of placing fisheries issues on the agenda of joint monthly meetings of border commune officials.

Lao-Thai border in Golden Triangle

The MRC did similar work in the Golden Triangle area, where the Lao and Thai borders converge with Myanmar in the northern part of the Lower Mekong Basin. The focus was fishing communities on both sides of the Mekong in Chiang Kong District in the Thai province of Chiang Rai, and Huay Xay District in the Lao province of Bokeo. This was the area where the MRC had seen opportunities for cross-border cooperation as early as 2008. The area was believed to be the spawning ground of the Mekong giant catfish, a critically endangered species that could grow to three metres in length.

In 2013, the MRC launched the Lao-Thai project that included studies of the local fishing communities, the diversity of important species, technical aspects of fishing gear, changes in land use along riverbanks and socio-economic factors related to fishing households. The studies also examined the impact of development on fish abundance and institutional arrangements for fisheries management.

The project selected eight pilot villages that shared fishing grounds — four on each side of the river — to coordinate management and identify common problems such as illegal fishing operations. Villagers meanwhile took part in studies on local fish abundance and diversity, critical fish habitats and socio-economic conditions. Following agreement at the community level, the transboundary fisheries plan was to be adopted at the district and provincial levels with the MRC providing assistance for a bilateral agreement at the national level.

Through these transboundary fisheries management projects between Cambodia and Viet Nam, and between Lao PDR and Thailand, fisheries officials and those involved in the projects are now trying to strengthen local fisheries organisations and to link local fisheries management plans into a broader co-management up to the transboundary level.

The MRC has supported these local transboundary management development efforts. It has provided dozens of skills training courses on local fisheries co-management,

transboundary management and capture fisheries monitoring in order to strengthen the local institutions. Participants from the local communities have provided positive feedback on such capacity-building support. The MRC is finalising a comprehensive Regional Fisheries Management and Development framework and strategy for the fisheries sector. It is expected to provide strategic guidance to the national fisheries agencies and local communities for better management and regional development.

Keeping floods away from the people and people away from the floods

In little more than a decade the MRC developed a solid flood-forecasting system that has helped member countries reduce flood damage and save lives.

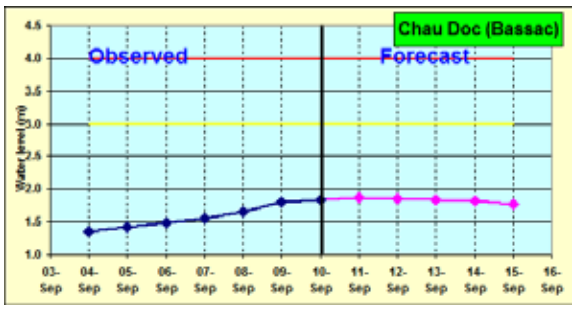
In 2000, the Mekong came close to bursting its banks in Phnom Penh for the first time in living memory. In Phum Thom, about 20 kilometres downstream from the Cambodian capital, the village was flooded for three months. "The water came up to my waist," recalled village chief Ruos Chan. "The main problem was people getting to work." At the same time, he said, the long duration of the flood delayed planting of crops such as corn and vegetables for two months.

For Cambodia and Viet Nam, the exceptional flood of 2000 was the biggest natural disaster for decades, causing several hundred million dollars in damage. Some eight million people were affected, with more than 700 deaths and hundreds of thousands losing their homes. Scientists blamed the severity of the flood on the early onset on rains and prolonged typhoons off the eastern coast of Viet Nam.

At their annual meeting, ministers of the four Lower Mekong Basin countries asked the MRC Secretariat to develop a flood management strategy as an urgent priority given the potential for further loss of life and uncertainty over the recurrence of such extreme events.

In 2001 the MRC launched daily five-day flood forecasts during the wet season. The new system involved gauges at 21 locations across the basin sending information on water levels by telephone, two-way radio or email to national centres in the four countries. Staff in each country sent the information every morning to the secretariat, which integrated the data into daily forecasts that were sent to around 100 agencies, government departments and individuals. The forecasts were also uploaded to the MRC website. The MRC led the first of a series of annual flood forums in 2002 and by the end of the year, the ministers had approved a new Flood Management and Mitigation Programme, including the establishment of a regional flood centre.

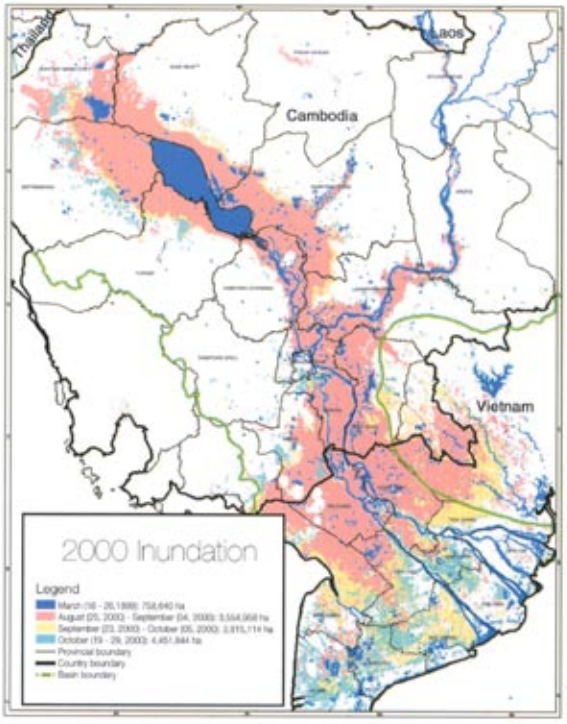
The Regional Flood Management and Mitigation Centre opened in 2008 in Phnom Penh, Cambodia. H.E. Mr. Lim Kean Hor, the country's Minister of Water Resources and Meteorology, and Chairman of the MRC Council, called it "another milestone in the history of cooperation in the Lower Mekong Basin" that demonstrated "the solidarity and will of Cambodia, the Lao PDR, Thailand and Viet Nam to continue their cooperation in the development and preservation of water resources and natural resources in the Mekong River Basin".



Five-day flood forecast for the Vietnamese city of Chau Doc on the Bassac River with yellow showing the alarm situation and red indicating the flood stage

How good were the MRC's flood forecasts over the years? Tom Pagano, senior flood hydrologist at the Bureau of Meteorology in Melbourne Australia, undertook the first evaluation of the entire history of operational forecasts by the MRC. The study was intended not only as an external and independent investigation into forecasts accuracy but also as a basis for further improvements to the system. Pagano analysed 13 years of data from 2002 to 2012 and concluded that the MRC forecasts had "very low error, particularly in the region downstream of Phnom Penh." Moreover, "when measured by standard skill scores, the forecasts perform exceptionally well, although a substantial part of this apparent skill is due to the strong seasonal cycle and the narrow natural variability at certain locations. Pagano's analysis suggested that the MRC could be "reasonably confident" in extending forecasts beyond five days.

Today, during the June-October flood season, the Regional Flood Management and Mitigation Centre issues daily flood forecasts and warnings. During critical situations, warning information is shared with the disaster management agencies in the member countries. Data from 138 hydro-meteorological stations is used to predict water levels at 22 forecast points on the Mekong River system. A flash flood guidance system detects flash flood risks in districts and villages, and disseminates alerts aimed at helping member countries prepare and react to potential emergencies.

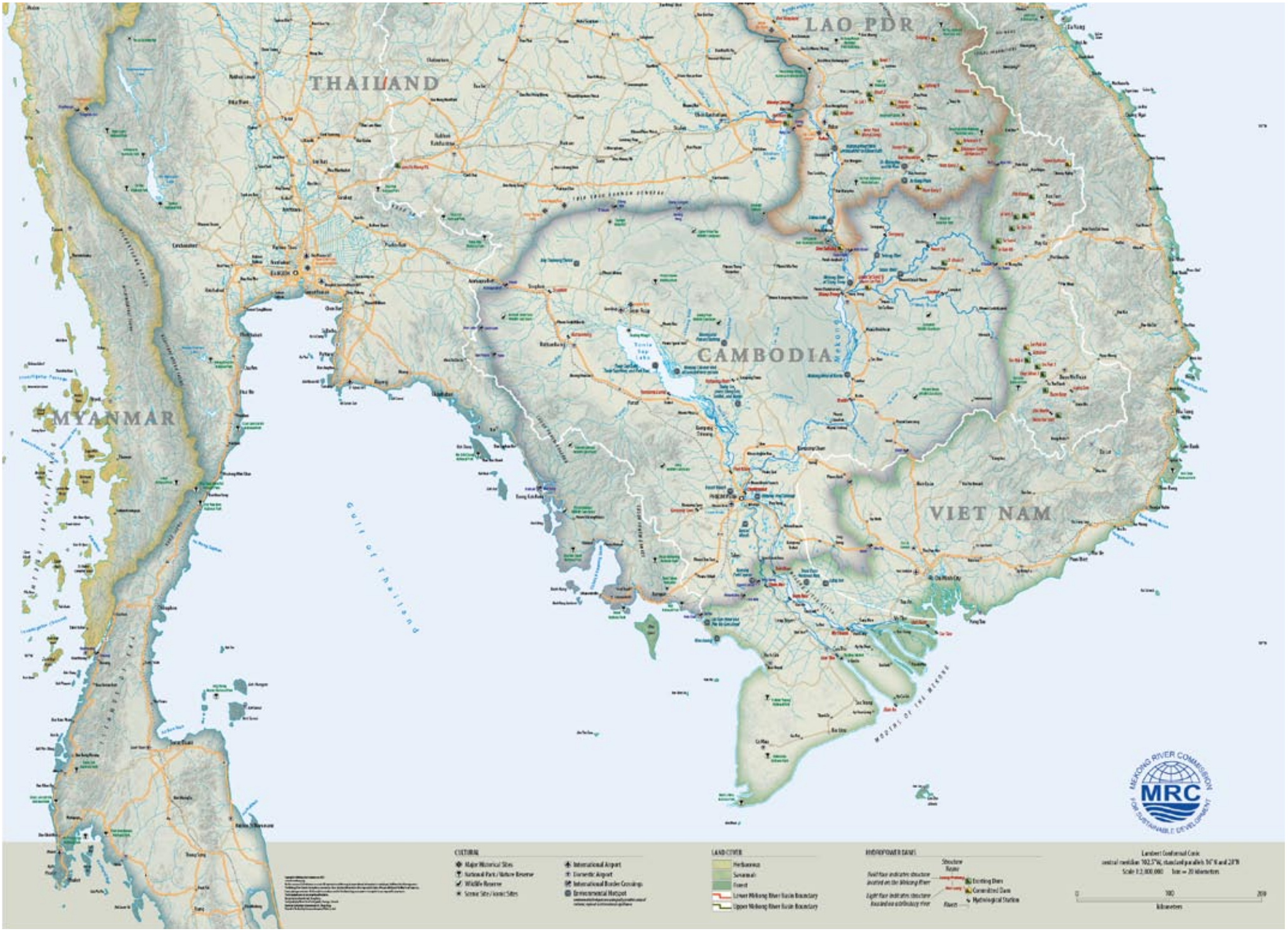


The extent of the Great Flood of 2000, which prompted ministers to call for the development of a flood management strategy

Previous efforts at regional flood management

- In 1989 the Interim Mekong Committee drew up plans to address the urgent need to rehabilitate the hydro-meteorological network in Cambodia, damaged by two decades of war.
- The Interim Mekong Committee's project proposed in 1989 got underway in 1995, a few months after the Mekong Agreement was signed.
- The need to improve the regional network was highlighted by severe Tropical Storm Linda in late 1997, which left hundreds dead in the Mekong Delta.
- By 1998, when the MRC Secretariat moved from Bangkok to Phnom Penh, a new flood forecasting system combining radio and internet communications was able to collect data from 50 hydro-meteorological stations across the basin every day.


LOWER MEKONG BASIN
CHINA
MYANMAR
LAO PDR
VIET NAM
Gulf of Tonkin
HAINAN ISLAND


LAO PDR
THAILAND
CAMBODIA
MYANMAR
VIET NAM
Gulf of Thailand
MEKONG
MRC
MEKONG RIVER COMMISSION FOR SUSTAINABLE DEVELOPMENT
CULTURAL
Major Historical Sites
National Park / Nature Reserve
Wildlife Reserve
Scenic Site / Iconic Sites
International Airport
Domestic Airport
International Border Crossings
Environmental Hotspot
LAND COVER
Herbaceous
Savannah
Forest
Lower Mekong River Basin Boundary
Upper Mekong River Basin Boundary
HYDROPOWER DAMS
Structure
Reservoir
Existing Dam
Committed Dam
Hydrological Station
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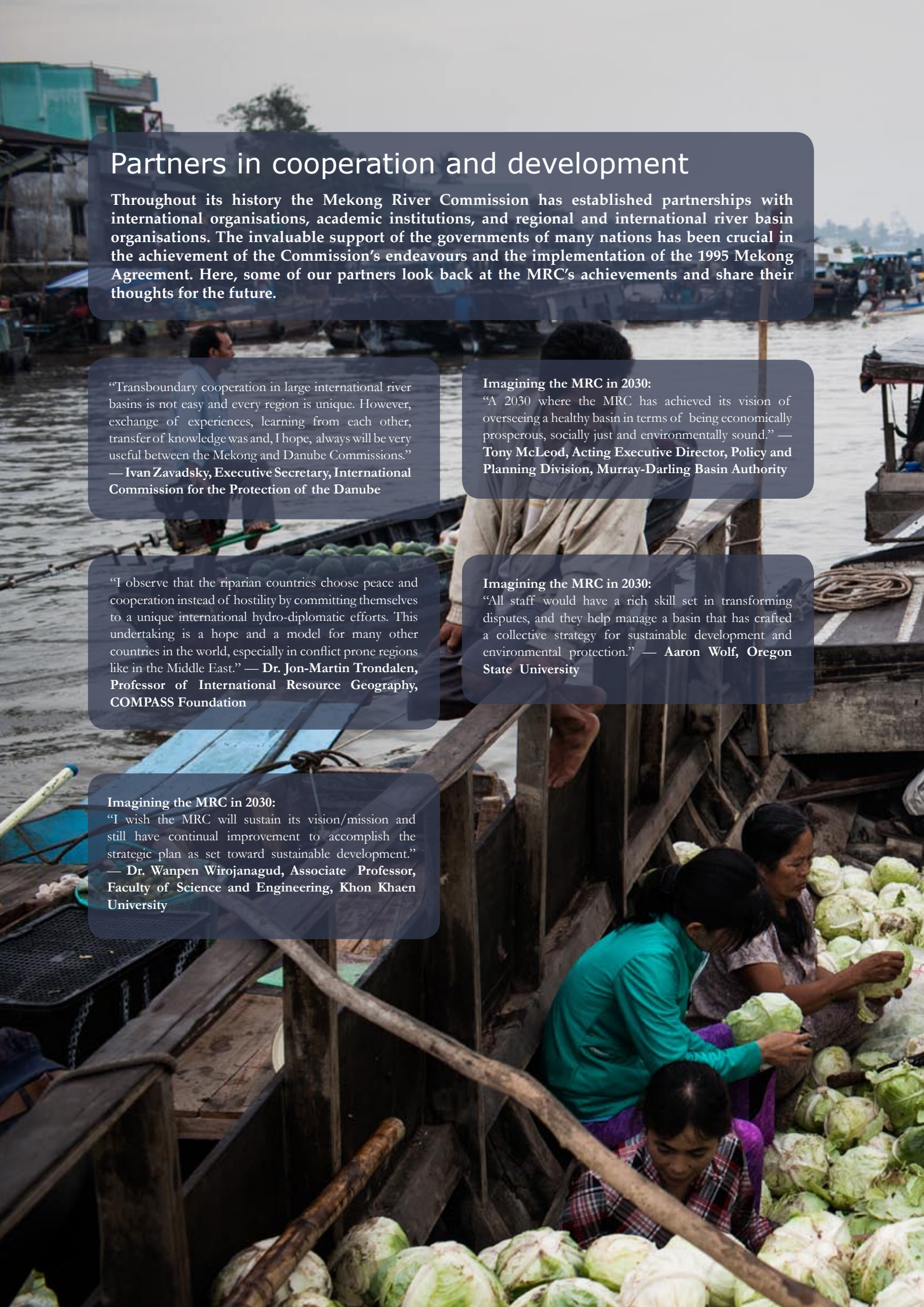

Partners in cooperation and development

Throughout its history the Mekong River Commission has established partnerships with international organisations, academic institutions, and regional and international river basin organisations. The invaluable support of the governments of many nations has been crucial in the achievement of the Commission's endeavours and the implementation of the 1995 Mekong Agreement. Here, some of our partners look back at the MRC's achievements and share their thoughts for the future.

"Transboundary cooperation in large international river basins is not easy and every region is unique. However, exchange of experiences, learning from each other, transfer of knowledge was and, I hope, always will be very useful between the Mekong and Danube Commissions." **— Ivan Zavadsky, Executive Secretary, International Commission for the Protection of the Danube**

Imagining the MRC in 2030:
"A 2030 where the MRC has achieved its vision of overseeing a healthy basin in terms of being economically prosperous, socially just and environmentally sound." — **Tony McLeod, Acting Executive Director, Policy and Planning Division, Murray-Darling Basin Authority**

"I observe that the riparian countries choose peace and cooperation instead of hostility by committing themselves to a unique international hydro-diplomatic efforts. This undertaking is a hope and a model for many other countries in the world, especially in conflict prone regions like in the Middle East." — **Dr. Jon-Martin Trondalen, Professor of International Resource Geography, COMPASS Foundation**

Imagining the MRC in 2030:
"All staff would have a rich skill set in transforming disputes, and they help manage a basin that has crafted a collective strategy for sustainable development and environmental protection." — **Aaron Wolf, Oregon State University**

Imagining the MRC in 2030:
"I wish the MRC will sustain its vision/mission and still have continual improvement to accomplish the strategic plan as set toward sustainable development." **— Dr. Wanpen Wirojanagud, Associate Professor, Faculty of Science and Engineering, Khon Khaen University**

We would like to thank our current and former Development Partners whose support has been crucial to the work of the MRC in the past 20 years.

www.mrcmekong.org

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