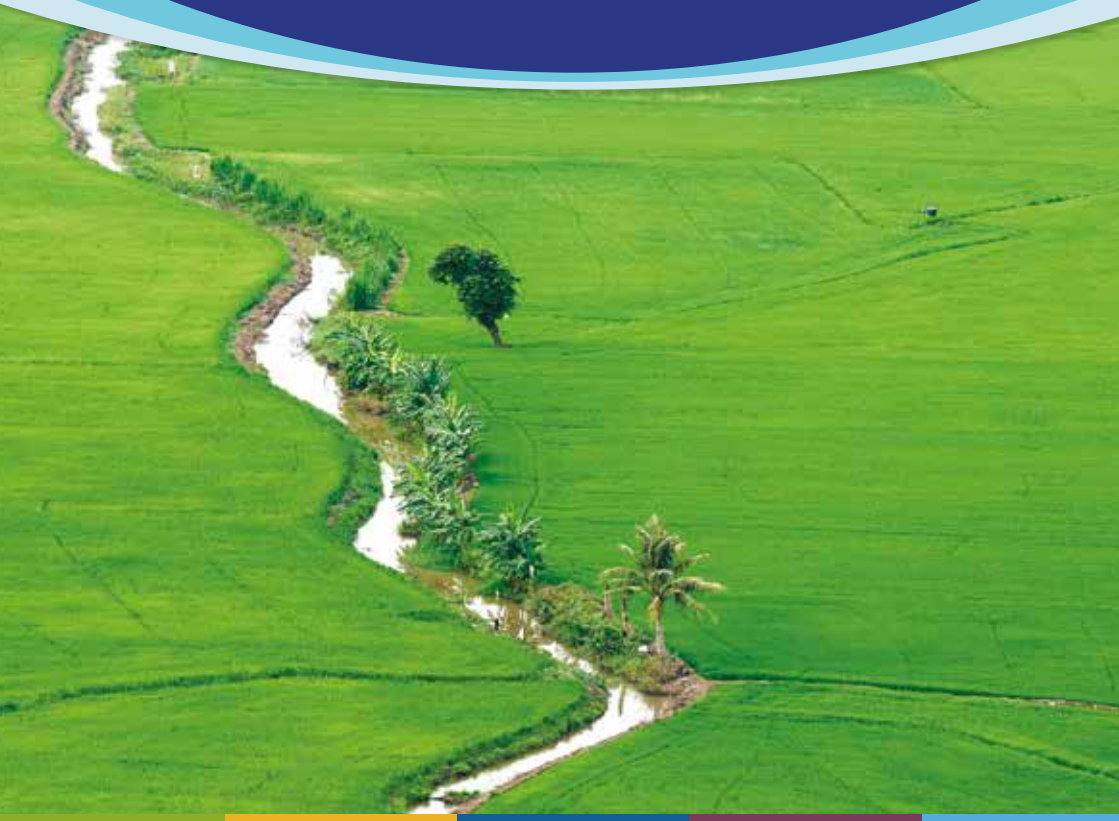
An Introduction to

MRC PROCEDURAL RULES

for

MEKONG WATER COOPERATION



PDIES

PWUM

PNPCA

PMFM

PWQ


Upper Mekong Basin
GREATER MEKONG
CHINA
MYANMAR
Hanoi
LAO P.D.R
Vientiane
Lower
Mekong
Basin
Mekong River
THAILAND
VIET NAM
Bangkok
Phnom Penh
CAMBODIA
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Water cooperation for Mekong's sustainable development

The Mekong River is one of the world's largest rivers flowing 4,900 km through six countries: China, Myanmar, Thailand, Lao PDR, Cambodia and Viet Nam. It is renowned for its rich biodiversity and abundant natural resources that directly support the livelihoods of more than 65 million people living in the lower Mekong basin. Called "Mother of Rivers", it provides a great potential for the region's development.

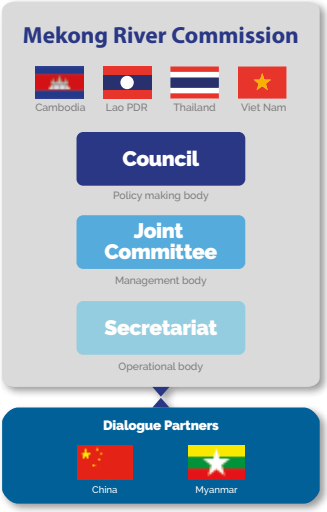
However, from rapid population growth to intensified investments in water infrastructure to severe natural disasters, both human activities and climate change pose serious threats to the management and development of the Mekong's water resources.

Over the last few decades since the 1950s, four countries of the lower Mekong basin – Cambodia, Lao PDR, Thailand and Viet Nam – have been working together to address those challenges. In 1995, they signed an agreement for regional water cooperation and created the Mekong River Commission (MRC) to jointly manage the river's shared water resources in a more sustainable and equitable manner.

The MRC has since provided a platform for water diplomacy for the four countries to closely collaborate on better use of water resources, despite their differences in national interests and development priorities. Serving as a knowledge hub, it has also accumulated and shared a wealth of scientific knowledge and technical expertise in various water-related sectors, such as fisheries, flood and drought management and navigation, to support better basin development planning.

Mekong Agreement and MRC Procedures set a cooperation framework

The 1995 Mekong Agreement provides a legal framework for the four countries to cooperate for better development and management of water resources that could bring them economic benefits while protecting the environment. It defines the mission and goals of the organisation, and sets out the roles and responsibilities of its three bodies – the Council, the Joint Committee, and the Secretariat – and the strategic objectives of cooperation. Ultimately, the agreement tasks the MRC to promote optimal use of water and well-balanced development of the basin, and support the achievement of the Mekong's full potential through the formulation of a basin development plan.



Over the years, the MRC and its member countries have developed five sets of procedural rules and associated technical guidelines on data sharing, water use monitoring, water use cooperation, flow maintenance, and water quality. The first three establish the process of water cooperation, while the rest set the criteria to assess water conditions. These rules, known as the MRC Procedures, provide a systematic and unified instrument for the implementation of the Mekong Agreement.

Five sets of procedural rules

PDIES

Procedures for Data and Information Exchange and Sharing (PDIES), approved in 2001 to operationalise data and information exchange of vital water-related indicators among the four Mekong countries.

PWUM

Procedures for Water Use Monitoring (PWUM), approved in 2003 to establish an effective monitoring system of water use of the Mekong and tributaries by various sectors, including domestic supply, irrigation and hydropower.

PNPCA

Procedures for Notification, Prior Consultation and Agreement (PNPCA), approved in 2003 to facilitate the cooperation on water use and development with a set of three specific processes for proposed water infrastructure projects.

PMFM

Procedures for the Maintenance of Flows on the Mainstream (PMFM), approved in 2006 to set out assessment criteria and a process to monitor and maintain adequate water flow in the Mekong and Tonle Sap rivers.

PWQ

Procedures for Water Quality (PWQ), approved in 2011 to strengthen a cooperative framework to monitor and safeguard water quality of the Mekong and Bassac rivers with agreed sets of assessment criteria.

This booklet explains these five procedural rules in a simple language, and shows how they are critical for regional water cooperation and the sustainable development and management of the basin.

Procedures for Data and Information Exchange and Sharing

Building a foundation for regional data sharing

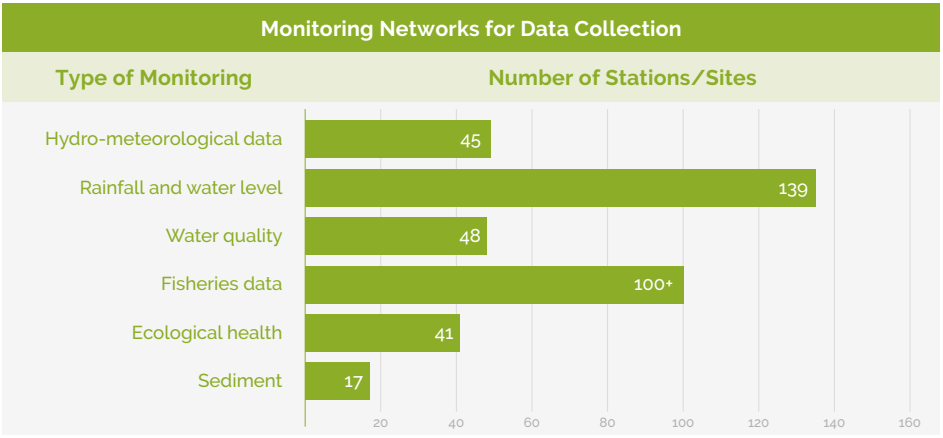
Transboundary water resources management in the Mekong largely depends on the availability of reliable data and information on various sectors. From fisheries to hydrology to water quality, basin-wide field data are crucial for a better understanding of the basin's conditions. However, it is difficult to obtain data on transboundary phenomena, as countries usually place restrictions on how domestic data are shared with other countries for national security and other reasons.

To facilitate close collaboration on data exchange, the MRC and its member countries developed the Procedures for Data and Information Exchange and Sharing (PDIES), which provide a framework for the Mekong countries to operationalise regional data sharing for better water resources management. Adopted in November 2001, the PDIES became the first set of rules to support cooperation among the Mekong's four governments.

PDIES strengthen basin-wide data management

The PDIES and associated technical guidelines define the scope of regional data management, and set out the roles and responsibilities of the MRC and its member countries, and the modalities of data acquisition, storage and dissemination. These rules are designed to strengthen the management of reliable information across borders.

Under the PDIES, the countries are required to collect and share various information such as hydrology, meteorology, topography, irrigation, navigation, flood management, hydropower, environment, socio-economy and tourism, among others. Those data are shared with the MRC Secretariat for consolidation, analysis and public dissemination.



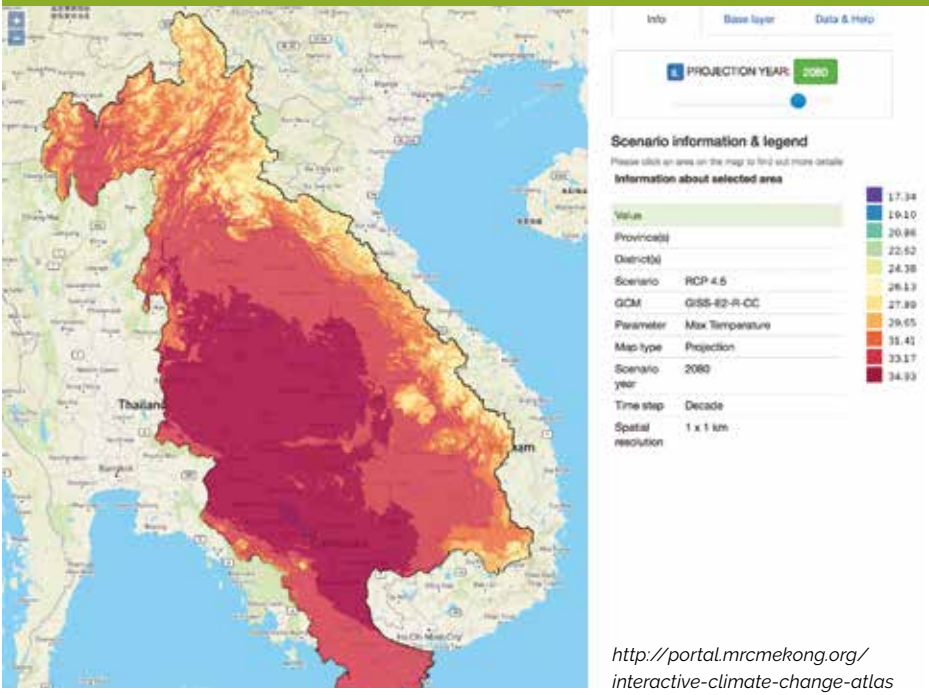
Over the years, the MRC has accumulated extensive data and information crucial for sustainable management and development of the basin, including both historical data as early as 1900 and real-time data on various water sectors. These data are collected through extended monitoring networks that include 45 automated hydro-meteorological stations, 139 traditional stations for rainfall or water level monitoring, 48 water quality sampling stations, and over 100 fisheries monitoring sites.

PDIES make vital information accessible

The processed data are accessible through several data management and sharing platforms under the MRC Information System. The main gateway for technical data is the **Data and Information Services Portal**, or simply Data Portal, which allows users to check a master catalogue, and search, discover and download various data on hydrology, flood forecasting, water quality, climate change, and others. Sector-based databases on irrigation, hydropower and socio-economic indicators are also available online for internal and external users.

On the Data Portal, for example, visitors can view daily or weekly water levels at various hydrology stations in the Mekong on an interactive map, and examine weekly flood situation reports from 2008 onwards on the flood-forecasting site. On climate change, the latest interactive climate change atlas allows users to investigate various climate parameters, such as rainfall and mean temperatures, on an interactive map, and see the assessment of climate change impacts on different future scenarios.

MRC Data Portal – Interactive Climate Change Atlas



http://portal.mrcmekong.org/interactive-climate-change-atlas

To date, the Data Portal has more than 700 registered users, including policy makers, practitioners, commercial users, researchers and students, who frequently access the MRC databases. In 2017 alone, nearly 40,000 visitors from more than 30 countries accessed the Data Portal, with 685 requests made for specific data.

Separate from these technical databases, a high volume of knowledge products based on data analysis and other communication products about the organisation are available on the MRC's official website. In addition, the MRC maintains two other information gateways: the **MekongInfo**, a platform to showcase Mekong-related news and knowledge products from external organisations; and the **Community Forum**, a gateway for water practitioners and researchers to communicate and share experiences.

As part of the efforts to improve the user experience on the Data Portal, the MRC will soon introduce a new time-series database management system to allow users to easily navigate time-stamped data and visualised data with interactive maps and diagrams. It will also provide more satellite images and data to complement field data. The renewed MRC Information System will strengthen MRC's role as a knowledge hub, allowing researchers, practitioners and policy makers to access scientific data and easily understand the current basin status, trends and hotspots in water issues, and provide further opportunities to collaborate with other research institutions and organisations.

Supporting future water resources utilisation

In the Mekong Basin, millions of rural people rely on its vast natural resources for their food security and livelihoods, while the governments and investors look for opportunities to capitalise on its potential for economic development and broader poverty reduction with water infrastructure projects such as hydropower, irrigation and flood control. It is therefore important to monitor how the Mekong countries use water resources to ensure the sustainable development of the basin, as data on water use would provide valuable information to support basin planning and management.

To address this challenge, the MRC and its four Mekong countries have developed the Procedures for Water Use Monitoring (PWUM), a framework to support effective monitoring systems for the use of water resources that might impact the mainstream significantly. Adopted on 30 November 2003 together with the Procedures for Notification, Prior Consultation and Agreement (PNPCA), the PWUM calls for the establishment of a water use monitoring system for the Mekong's mainstream and major tributaries.

PWUM build a baseline for water development

The PWUM define the scope of work, the role and responsibility of the MRC bodies and its member countries, and the modality of water use monitoring. Under the PWUM scheme, any use of water resources within the Mekong Basin (intra-basin use) and between the Mekong and another basin (inter-basin diversion) with potential significant impact should be monitored. While the member countries are required to collect and supply monitoring data, the MRC Secretariat is tasked to consolidate data, prepare reports and make recommendations for better usage.

The 2006 technical guidelines for the PWUM further require the four Mekong countries to first establish a baseline of current water usage within the existing schemes, and to define a set of indicators to monitor intra-basin water use, including rainfall data, water quality parameters and the type of water use; and another set of indicators for water diversion monitoring such as location of diversion, design specifications and diverted water volume. The guidelines also require a comprehensive water use monitoring system to be set up at the MRC Secretariat for data consolidation and storage. Under this framework, monitoring of inter-basin diversion is required daily in the dry season, and at least weekly during the wet season.

Since the adoption of the procedures and guidelines, however, limited work has been done on the ground due to difficulties over its implementation. It is particularly challenging to record the cumulative impacts of many small water users such as family-scale farmers, and to establish a regional water use monitoring system when national legislations on water rights systems, such as licensing, and water use report requirements are absent.

PWUM prompt monitoring experiments

Despite these limitations, the MRC has supported each member country to conduct a pilot study on water use monitoring, each selecting one river catchment to monitor any of the three types of water use: irrigation, hydropower or domestic use. Cambodia conducted a pilot study at the Pursat River, Lao PDR at the Xedone River, Thailand at the Nam Kam River, and Viet Nam at the Srepok River.

During the pilot implementation in 2014-2015, national data were collected and verified, using the agreed modelling tools and approaches. The pilot study teams noted that data on some water uses were relatively easy to obtain while others were not. They also reported some limitations of the methodology.

Due to the MRC's recent institutional reform, the work on the PWUM was postponed for 2016-2017. A new technical team has been formed to complete all the pilot studies, review their monitoring data, methods and tools to draw further lessons, and explore a tested methodology to be applied for a basin-wide water use monitoring. When the monitoring system is eventually established, it will provide vital information for decision makers and water users alike to improve water development planning and management.

Procedures for Notification, Prior Consultation and Agreement

Guiding regional cooperation on water development

Harnessing the Mekong's full potential for development, the Mekong countries have begun building bridges, large-scale irrigation and flood control structures, and hydropower dams along the mainstream and tributaries. These projects would bring economic benefits to many, but may also cause adverse transboundary impacts on the ecosystems and livelihoods of people relying on the rivers.

To find a balance between development and protection, the MRC and its four member countries created the Procedures for Notification, Prior Consultation and Agreement (PNPCA), which established a regional cooperation mechanism over planned water development. Adopted in November 2003, the PNPCA require any member country proposing a major water infrastructure project on the Mekong River system to go through a specific cooperation process to ensure more sustainable and equitable water use in the region.

PNPCA call for three processes to facilitate water diplomacy

The PNPCA and its 2005 technical guidelines specify the three specific processes for regional cooperation on water development, the determining factors for the application of those processes, and the roles and responsibilities of the proposing country, the notified countries and the MRC's three bodies. Under the PNPCA framework, any water development project in the region, which may significantly alter water flow or quality of the Mekong mainstream, should undergo one of the three processes: Notification, Prior Consultation, or Specific Agreement.

Notification requires a country proposing a project to notify its details to other member countries before it commences the proposed use.

Prior Consultation involves a six-month process of technical assessment and formal consultations on the proposed project before its implementation by a proposing country.

Specific Agreement requires a thorough negotiation to achieve a consensus on terms and conditions of the proposed project among all member countries prior to the proposed use of water.

These processes are applied to certain water infrastructure projects, based on three determining factors: river type, season and water use scope.

Application of PNPCA Cooperation Processes			
Type of River	**Season**	**Scope of water use**	**Required process**
Mainstream	Dry	Inter-basin (from the Mekong basin to another basin)	Specific Agreement
		Intra-basin (within the Mekong basin)	Prior Consultation
	Wet	Inter-basin (from the Mekong basin to another basin)	Prior Consultation
		Intra-basin (within the Mekong basin)	Notification
Tributary	Both	Both inter and intra-basin	Notification

The processes are designed to facilitate water cooperation among the four countries to optimise the use of water resources for development while minimising potential adverse transboundary impacts on the environment and livelihoods of riverine communities. None of the processes are intended to approve or reject a proposed project.

For example, in the prior consultation process, the MRC Secretariat and the notified countries assess potential transboundary impacts of a proposed project on various water sectors, including fisheries, hydrology and navigation, and recommend measures to mitigate the potential adverse impacts. If needed, the presiding Joint Committee can extend the six-month period for more consultation. Any unresolved case can be further referred to the MRC Council for resolution.

PNPCA support regional consultations on development plans

Since 1995 until the end of June 2018, the MRC has received 59 submissions of water infrastructure projects. Fifty-five were submitted for Notification, four for Prior Consultation, and none yet for Specific Agreement.

Among the 55 Notification cases, 50 are on the tributaries and five are on the mainstream, 80 per cent of which are for hydropower projects, and the rest are for irrigation, flood control

and other infrastructural development projects. They include Cambodia's hydropower project proposed on the Sesan tributary in 2010; Thailand's 1995 proposal to study a plan to divert water from the Kok and Ing tributaries of the Chao Phraya river basin; and Viet Nam's large-scale irrigation project in the central province of Dak Lak proposed in 2005.

All four Prior Consultation cases concern hydropower projects on the Mekong mainstream within Lao PDR: Xayaburi (2010); Don Sahong (2013); Pak Beng (2016); and Pak Lay (2018). Three completed the six-month prior consultation with thorough technical assessments and public consultations. In the first two cases of Xayaburi and Don Sahong, no formal resolution was reached at the end of the process. In the third case of Pak Beng, the four countries issued an agreed joint statement calling for the Lao government to make every effort to avoid, minimise, and mitigate potential adverse transboundary impacts on water flow, sediment, fish passage, navigation and socio-economic conditions, and requesting the MRC Secretariat to prepare an action plan for the post-consultation process. Prior consultation of Pak Lay is expected to follow after its submission in June 2018.

These prior consultations are test cases for the MRC's water diplomacy. The process offers opportunities for the notified countries to sit together and address their concerns over transboundary effects based on scientific analysis, and for other interested parties to voice their opinions and suggestions. With the PNPCA and other water diplomacy mechanisms, the MRC remains instrumental to achieve balanced and sustainable development of the region.

Procedures for the Maintenance of Flows on the Mainstream

Keeping river flow healthy in the Mekong and Tonle Sap

The Mekong River's seasonal flow fluctuations are vital to the basin's ecosystems and the livelihoods of riparian countries. Without its annual flood pulse, fish would not migrate from deep pools to floodplains for spawning. Stored floodwaters support irrigation in the dry season while flood-deposited sediments improve soil fertility. Floods also flush out stagnant and polluted waters. It is essential for the Mekong's ecosystems and livelihoods to maintain these natural flow patterns, particularly against pressures from intensive water investments and climate change.

As a response, the MRC and its member countries developed the Procedures for the Maintenance of Flows on the Mainstream (PMFM), which set out a framework for how to maintain minimum or maximum levels of river flow of the Mekong mainstream and reverse flow of Cambodia's Tonle Sap River, which connects the mainstream and the Tonle Sap Lake. The reverse flow is a unique phenomenon that happens during the flood season where the Tonle Sap river flows backwards and pushes its excess water into the lake, causing its expansion to six times its size. Adopted in June 2006, the PMFM define technical criteria to assess adequate levels of water flow in order to safeguard the unique seasonal river flow against water diversions, storage releases from reservoirs and other actions that may significantly affect the mainstream.

PMFM assist water flow maintenance with new assessment criteria

The PMFM and relevant draft technical guidelines specify three types of seasonal flow to maintain:

- Mekong's minimum monthly natural flow in the dry season (Dec–May)
- Mekong's maximum daily peak flow in the flood season (Jul–Oct)
- Tonle Sap's reverse flow in the wet season (Jun–Nov)

These guidelines further require the countries to: (1) monitor daily water flow; and (2) assess water flow change for proposed water development plans.

The PMFM framework has established six criteria to assess water flow, three for monitoring, and three others for planning.

Criteria on Water Flow				
River	Season	Type of Flow to maintain	Flow Assessment Criteria for Monitoring	Flow Assessment Criteria for Planning
Mekong River	Dry	Minimum monthly flow	A set of minimum daily flow	A set of minimum monthly flow
	Flood	Maximum daily peak flow	A set of maximum daily flow	A set of maximum monthly flow
Tonle Sap River	Wet	Reverse flow	A range of historical daily flow at Prek Kdam	A range of seasonal flow at Kratie

PMFM monitoring enables early warnings

The PMFM require the four member countries collect daily data on water flow such as discharge, level and volume at 12 hydrological stations along the Mekong and Tonle Sap rivers. During the wet season, the data are sent to the MRC Secretariat daily for consolidation and analysis, where the daily situations of water flow are classified as "normal", "stable", "unstable" or "severe", and published online on the MRC's **PMFM website** for public view. During the dry season, water flow data are collected daily but sent to the MRC Secretariat weekly.

If the situations become "unstable" or "severe", the MRC alerts the countries concerned for necessary actions, and provides technical support to mitigate impacts, if required.

Classification of Flow Conditions			
Normal	*Stable*	*Unstable*	*Severe*

Hydrological Stations for Flow Monitoring

To date, the river flow of both the Mekong and Tonle Sap rivers remain mostly normal and stable throughout the year. Only one incident was recorded as severe situation. It occurred in early 2010 when the 2009 monsoon ended six weeks earlier than normal and the 2010 monsoon started four weeks later than usual. Severe drought conditions were observed at most of the monitoring stations. An assessment indicated that water control at the cascade of hydropower dams in the upper Mekong may have contributed to the regional drought. The four countries were alerted to take mitigating actions.

PMFM prompt planning compliance of water flow

The PMFM framework also supports better water development planning. When a development plan is proposed, water flow change is predicted by calculating water storage, discharge and release out of the proposal, and assessed against the water flow criteria. If the predicted water flow is not acceptable, solutions to mitigate the potential impact are recommended to the proposing country.

This compliance test was used for the hydropower projects of Xayaburi, Don Sahong and Pak Beng in Lao PDR during the prior consultation process. The predicted flow levels were all found acceptable, because the water storage capacities are limited due to their run-of-the-river type of dam design and operation. The test has also been applied to basin-wide development scenarios with a cascade of planned development projects. The PMFM have contributed to the standardisation of basin-wide flow assessment.

Safeguarding Mekong's water quality

Poor water quality can threaten the health of people and ecosystems. Preserving the Mekong River's good water quality is essential for people in the riverine communities and the river's aquatic life, as over 65 million people rely on the lower Mekong's water resources for food and income.

In response to the need to monitor and safeguard the quality of water throughout the lower Mekong basin, the MRC and its member countries developed the Procedures for Water Quality (PWQ), a cooperative framework that ensures the maintenance of acceptable water quality of the Mekong River and its main tributaries. Adopted in January 2011, the PWQ and associated technical guidelines establish assessment criteria to manage water quality.

PWQ strengthen water quality management

The PWQ defines two types of actions to keep the quality of water acceptable for humans, flora and fauna: (1) water quality monitoring, and (2) emergency response. The PWQ call for the four Mekong countries to regularly monitor the water quality throughout the basin, and prepare response mechanisms for water pollution emergencies, such as oil spills and toxic wastewater discharges, to protect the river and minimise impacts on its ecology and surrounding communities.

On water quality monitoring, the PWQ and technical guidelines specify the location and frequency of water sampling, and set the assessment criteria and target values of water quality for human health and aquatic life. This routine water quality monitoring is a successor of the basin's monitoring activities that began in 1985 with a network of sampling stations across the lower Mekong basin.

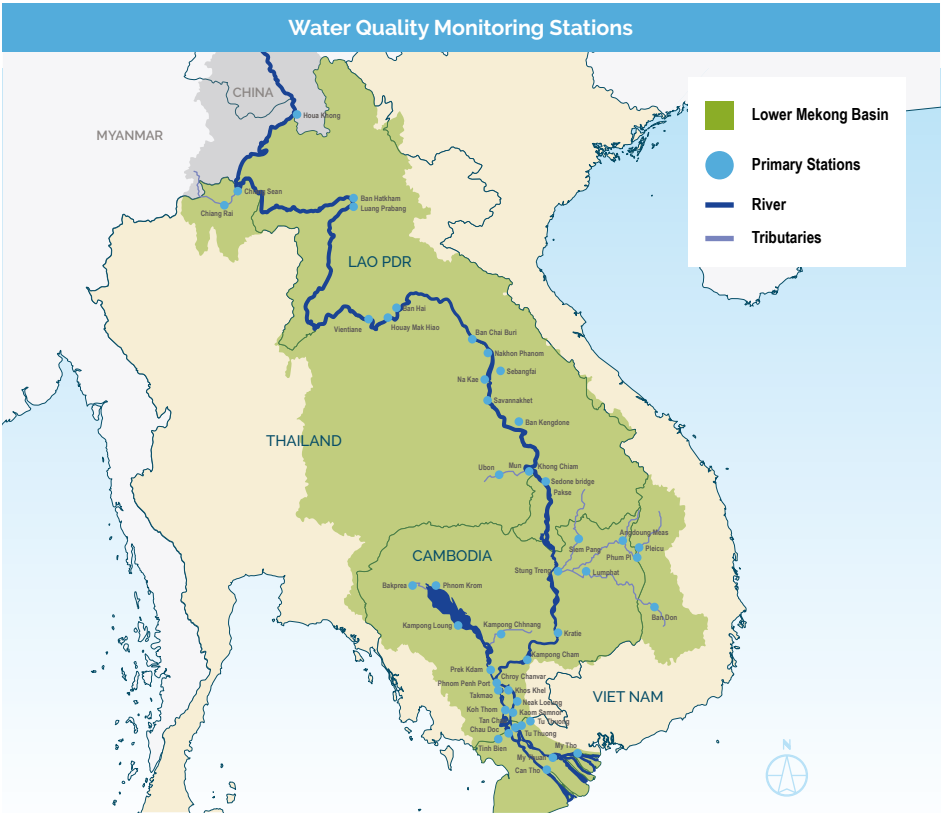
PWQ provide quality score

Under the PWQ framework, the four Mekong countries currently collect surface water quality samples at 48 sampling stations, including 17 on the mainstream, five on the major tributary Bassac River, and the remaining stations on other tributaries. At each station, 12 water quality parameters (temperature, pH, salinity, acidity, etc.) are analysed on a monthly basis, and another

Classification of Water Quality					
Aquatic Life	*High*	*Good*	*Moderate*	*Poor*	*Very poor*
Human Health	*Excellent*	*Good*	*Moderate*	*Poor*	*Very poor*

six parameters (calcium, magnesium, sodium, etc.) are examined during the wet season from April to October. The biochemical oxygen demand, another parameter, is assessed monthly at a few selected stations throughout the year. After the quality assessment, the samples are classified as "excellent", "good", "moderate", "poor" or "very poor" for human health, and another similar five classifications for aquatic life. The samples are also analysed for irrigation use.

These sampling data are submitted to the MRC Secretariat annually to verify and store in the database for public access. The MRC Secretariat further prepares a consolidated annual report, entitled the *Lower Mekong Regional Water Quality Monitoring Report*, based on data from the main 22 stations of the Mekong and Bassac rivers..



Over the years, the MRC has accumulated real-time datasets of water quality of the Mekong and its tributaries. These data allow the Mekong countries to detect any changes in water quality for preventive or remedial actions, and easily identify transboundary water pollution. The data also offer a useful baseline database to study potential impacts of developments. According to the annual reports, the overall quality of the Mekong's water has remained good throughout the basin, except some isolated problems in highly populated areas, and no compelling evidence of transboundary pollution has been detected.

PWQ seek unified responses to pollution emergencies

On the management of water pollution emergencies, the PWQ require the four Mekong countries to develop contingency plans to respond to transboundary emergency situations and to set up basin-wide mechanisms to coordinate actions. Although there have been no transboundary pollution incidents so far, the Mekong countries see the importance of developing basin-wide unified responses to effectively manage disasters.

Since the adoption of the PWQ, the four Mekong countries have negotiated national and regional processes to manage water pollution emergencies, and developed the 2016 technical guidelines for the establishment of an emergency response and management system. The guidelines recognise existing mechanisms for emergency responses to natural disasters under the Association of Southeast Asian Nations (ASEAN), and note that an expansion of the mechanisms is underway to cover human induced disasters such as water pollution. To avoid establishing two parallel emergency responses for the basin, the MRC is seeking to collaborate with the ASEAN to develop standardised regional emergency response mechanisms that would meet national, transboundary and regional needs for water quality disaster control.

For more information

MRC Procedural Rules page 3

- 1995 Mekong Agreement and MRC Procedures (full text): *www.mrcmekong.org/assets/Publications/MRC-1995-Agreement-n-procedures.pdf.pdf*

PDIES page 5

- Data and Information Services Portal: *portal.mrcmekong.org*
- MekongInfo: *www.mekonginfo.org*
- Community Forum: *community.mrcmekong.org*
- MRC Socio-Economic Database: *sedb.mrcmekong.org*

PWUM page 8

- Procedures for Water Use Monitoring (PWUM): *www.mrcmekong.org/assets/Uploads/Tech-Guidelines-PWUM.pdf*

PNPCA page 10

- Procedures for Notification, Prior Consultation and Agreement: *www.mrcmekong.org/assets/Publications/policies/Guidelines-on-implementation-of-the-PNPCA.pdf*
- PNPCA Brochure: *www.mrcmekong.org/assets/Publications/PNPCA-brochure-11th-design-final.pdf*
- PNPCA Prior Consultation: *www.mrcmekong.org/topics/pnpca-prior-consultation*

PMFM page 13

- Procedures for the Maintenance of Flows on the Mainstream (PMFM): *www.mrcmekong.org/assets/Publications/policies/Procedures-Maintenance-Flows.pdf*
- PMFM website: *pmfm.mrcmekong.org*

PWQ page 16

- Procedures for Water Quality: *www.mrcmekong.org/about-mrc/mandate/procedures-for-water-quality*
- Water quality database: *portal.mrcmekong.org/waterquality_map*
- Annual Water Quality Reports: *www.mrcmekong.org/assets/Publications/2016-Lower-Mekong-Regional-Water-Quality-Monitoring-Report-14June18-L-Res.pdf*

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