

Briefing Notes Package

6th RTWG Meeting

17-18 December 2015, Phnom Penh, Cambodia

1 NAVIGATION

1.1 Context, and approach and process of data collection/compilation

1.1.1 *Formulation of the Master Plan for Regional Waterborne Transportation in the Mekong Basin, and the Council Study*

The Mekong River Commission continues to stress the importance of investing in the waterborne transport sector to create a better livelihood for future generations. The formulation of a “Master Plan for Regional Waterborne Transport in the Mekong River Basin” is crucial at this stage with the underlying reason to attract investments and realize additional regional trade potential. **The MP formulation exercise is tightly linked to the Council Study in terms of data collection and analysis. Moreover the Development Scenarios for Navigation under the Master Plan were aligned with the Council Study, namely for 2020 and 2040.**

This Briefing Note is a summary of the more extended document “*Navigation: Thematic Data and Map Specifications Document*”, which was submitted to the Council Study on 25 November. Of course it has many references to the Master Plan (MP) for Regional Waterborne Transportation in the Mekong River Basin because the MP is all about the opportunities for trade and transportation (positive impacts), and the (positive and negative) impacts on and from other sectors. They deal with physical and non-physical barriers and potentials. The MP team not only studied the infrastructure but also trade logistics which have a positive impact on the sector, and which also forms an integrated part of the Council Study. All the aspects have been analysed in detail and translated into the Development Scenarios for 2020 and 2040. Moreover, we have 99 Actions in our Implementation Portfolio with dredging activities and channel regulating works specified in detail.

The MP team has adjusted the Master Plan to coincide with the terms 2020 and 2040 as used in the Council Study. The Master Plan process included a thorough assessment, full-blown questionnaires and answers, detailed discipline assessments, national and regional consultations, national and regional workshops, comprehensive strategic planning, and building a portfolio of actions. Altogether more than 30 national and international experts have worked on it for one year, and the result is a 1200 page comprehensive document. The Master Plan is one of the flagship projects of NAP and the main platform for any development strategy, scenario or action plan in the Basin related to navigation.

The Design of the Master Plan was conducted between January and November 2015. The MP was endorsed by the Final regional Workshop on 19 November 2015 and is currently being finalized for consideration/approval by the Joint Committee.

The main objective of the Master Plan formulation was “To design a short term and long term development programme which implementation will rehabilitate and improve the national and international transport network using the Mekong River Basin in the MRC Member Countries”. In view of the multi-modal transport situations, opportunities and prospects, and the importance of including the whole transport network into the strategy, it is given that the essential transport corridors in the Mekong Region also have to be taken into account, even if they are located outside of the Basin.

1.1.2 Presentation and discussion of the methodology used

1. Problem definition:

To obtain agreement from all stakeholders, the approach and methodology for the design of a Master Plan for Regional Navigation on the Mekong River Basin was assessed and discussed before drafting the Inception Report.

2. Data collection and baseline assessment

Economic data were collected, but also for vessels and fleet, waterway design, waterway safety, port development, socio-environmental aspects and legal aspects, data and information on the current situation and on planned and ongoing projects have to be collected.

For all related items (legislation, ports, fleet, waterway design and safety, socio-environment) the current situation was assessed, opportunities and obstacles have to be identified and gaps were analysed.

3. Economic baseline and forecast:

The tools for this phase are the collected data and information on the baseline condition and a transport economy study. The result of this part were a current situation description and a long-term multimodal economic forecast of which the first five years can be considered as short term forecast was used as a basis to plan “short term actions”. Therefore, data collection and transport (forecast) modelling was very important.

4. Development Scenarios

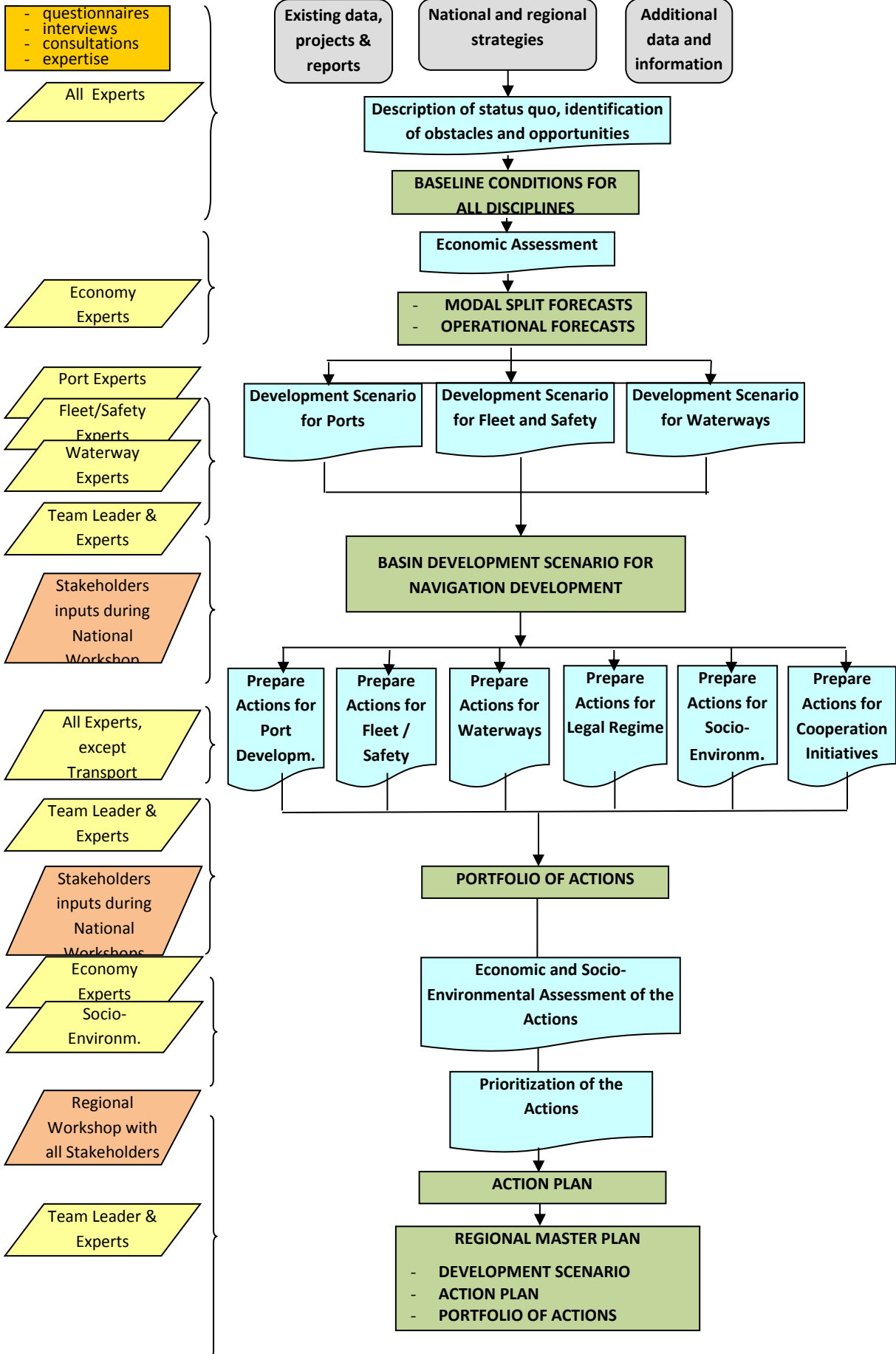
A future situation assessment for waterborne transport activities lead to a *short-term (2020) and long-term (2040) development scenario for all related items.*

5. Action Portfolio, where next to initiatives for regional cooperation, legal and socio-environmental actions, projects and actions were identified for fleet, waterway design, port development and navigation safety in order to achieve the proposed short term and long term development scenarios.

6. Action Plan, where for all actions their feasibility (economic cost-benefit and socio-environmental assessment) was considered and stakeholders involvement should lead to a prioritised action plan and investment programme.

The design of the “Master Plan for Regional Waterborne Transport in the Mekong River Basin” was concentrated on the upper part of the MRB (with special attention of the Quadrangle area between China, Myanmar, Lao PDR and Thailand), while for the lower part of the MRB, the study will be limited to the review, actualisation and harmonisation of the Cambodian Master Plan and Vietnamese Mekong Delta Sector plans.

Flowchart for the design of the Master Plan for Regional Mekong Water



1.1.3 Approaches for the different disciplines under navigation only with direct relevance to the Council Study

1. Economic analysis and forecasts

- Identified the main cargo and passenger routes within the study corridor, by mode (Cross-border Waterway, Road and Railway Transport in the upper part of the Mekong River Basin (China, Myanmar, Thailand, Lao PDR), in the Khone Falls Region (Lao PDR, Cambodia) and in the lower part of the Mekong River Basin (review of Cambodian Master Plan and Vietnamese Sector Plans) and also for domestic and rural transport in the four MRC Member Countries;
- Identified the baseline cargo volumes, number of passengers and transport charges within the study corridor, by mode (both international and domestic);
- Made a forecast of international and domestic cargo volumes and passenger transport within the study corridor (all modes) over 25 years with and without IWT investments;
- Determined the relationship of costs and rates, as well as other competitive factors, between IWT and other transport modes;
- On the basis of this relationship, predicted future modal shares of cargo traffic in corridor – without and with IWT investments;
- Undertook an economic assessment of all projects and actions identified by the team, involving financial and economic appraisals.

2. Fleet and Navigation Safety

- Vessel and fleet conditions and forecasted trends including the study of principal dimensions, design, construction, cargo capacity, fleet classification, etcetera.
- The current rules, regulations and guidelines that address the safety and operations of waterways and vessels, crew, cargo and passengers and the implementation and enforcement of these rules..
- The efficiency of IWT today and how can we increase efficiency? This included the study of Aids to Navigation such as buoys and beacons permitting navigation 24/7 (installation, operation, management and maintenance), marine accidents and Search and Rescue, etc.
- For each of the mentioned items (fleet, navigation safety and efficiency), it had to be studied what are the constraints, limitations and opportunities, which rules, regulations and guidelines that need to be reviewed or are lacking, etc.
- To be complete, the Actions on Vessel Safety from the Regional Action Plan on the Waterborne Transport of Dangerous Goods (RAP PDOCS for vessels) was included in the Master Plan.

3. River Design

- Investigation of Channel Conditions in the upper part of the Mekong River Basin;
- Investigation and actualisation of the “Master Plan for Waterborne Transport on the Mekong River Basin in Cambodia” and the Vietnamese “Transportation Sector Plans”;
- Review of previous situations [dangerous areas for navigation] in case there is reasonable doubt about possible substantial morphology changes (see also the action on Geographical zoning in the Regional Action Plan on the transportation of dangerous goods);
- Actual and future channel classification (including actual and future wanted LRD and LAD);
- Problem of the Khone Falls;
- Short term and long term development scenario and River Design actions to achieve it, including an investment programme;
- Draft an action plan to achieve the development scenario including River Design Safety Actions (Regulate the interference from other waterway users such as dredgers, fishing vessels and their nets, ferries crossing the river, high speed pleasure crafts, etc., regulate anchorage of pontoons and floating loading and unloading equipment in the navigation channel if any, etc., regulate in the identified narrow sections the passage of crossing vessels, etc.).

4. Port Development

- Assessment of the existing domestic and regional river ports, terminals, landing stages, dry ports, Inland Container Depots (ICD), freight villages, Container Yards and Container Freight Stations, their present condition and maximum capacity.
- Identification of Port development and management actions and projects, including among others, the study of forecasted trends for the development of ports, terminals and landing facilities (berths, wharves, jetties, pontoons, etcetera), Inland Container Depots (ICD), Container Yards (CY), etc.
- Measures to enhance the efficiency of port operations including Maintenance Systems, Custom procedures and inspections, Cargo handling equipment, Indoor and outdoor storage capacity, Connections to other local transport network(s), etc.
- For each of the mentioned items (port infrastructure, port management, port efficiency), it had to be identified what are the constraints, limitations and opportunities, which rules, regulations and guidelines that need to be reviewed or are lacking, what is the scope for physical and non-physical improvements and initiatives and what is the feasibility and timing to implement or execute pending and future improvements and activities.
- To be complete, the Actions on Port Safety from the Regional Action Plan on the Waterborne Transport of Dangerous Goods (RAP PDOCS for ports) will be included in the Master Plan.

5. Socio-Environmental aspects

The socio-environmental study focussed on the social and environmental impacts of Inland Waterway Transport. The current environmental conditions, including water quality, ecologically sensitive areas and important wetlands will be assessed in relation to the potential impacts of inland navigation.

The future development of IWT in the Mekong region is essential to contributing to the goals of poverty reduction. IWT provides economic opportunities (Agricultural and industrial production, markets and tourism) and administrative opportunities (access to education, health, cultural and social services) in the Mekong region. The current socio-economic conditions and the opportunities to improve rural inland waterway transport will be explored in this component.

Why is inland navigation so important to rural communities was addressed extensively.

6. Legal regime

The main objective is to study the adequacy of the current legal regime, constraints and opportunities, the scope for improvements and new legal initiatives and the feasibility and timing of pending and future legal activities. In this framework, it is proposed to focus on three topics:

- a. The implementation of bilateral and regional agreements
 - The implementation of the Agreement between Cambodia and Viet Nam on Waterway Transport,
 - The implementation of the Quadripartite Tachileik Agreement between China, Lao PDR, Myanmar and Thailand
 - The need for additional regional and/or bilateral instruments or the modification of the existing ones.
- b. Development of harmonised rules and regulations
- c. Recommendations on institutional aspects

1.2 Summary of collected data, and summary of data gaps

1.2.1 Summary of collected data

1.2.1.1 Collected Data and forecasting under the ECONOMIC Assessment

The Economic Assessment contains the regional transport demand forecasts which provided the basis for the formulation of Development Scenarios and Action Plans. Transport Demand Forecasts covering the 25 year forecasting timeframe (2015-2040) adopted for the Master Plan were prepared for passenger and cargo transport flows along the Mekong in the four MRC riverine member countries (Lao PDR, Thailand, Cambodia and Viet Nam).

A/ Demand for Transport to trade Agricultural, Commercial, Industrial and Tourism Resources in the four MRC Member Countries

Agriculture and forestry

1000 metric tons, milled basis		1999-2001 Average (tons)	Annual growth	2009-2011 Average (tons)	Annual growth	2019-2021 Estimation (tons)
Thailand	Production	17,019	1.8%	20,327	1.5%	23,545
	Export	6,916	3.1%	9,105	4.3%	13,012
Laos	Production	1,170	1.8%	1,395		NA
	Export	NA		NA		NA
Cambodia	Production	2,555	5.1%	4,186	3.8%	6,089
	Export	0		805	6.5%	1,329
Viet Nam*	Production	20,812	2.2%	25,940	0.8%	27,964
	Export	3,771	6.2%	6,094	1.5%	7,033

* About half of the Viet Nam rice production is produced in the Mekong Delta.

Fisheries

Estimates of the total catch made by the fisheries in the MRB have increased dramatically in recent years and are presently topping more than 2,5 million tons annually with a value exceeding US\$ 2 billion. These figures are based on per capita consumption of all freshwater fish and other aquatic animal products and exclude the fish produced in aquaculture and in reservoirs, estimated at some 750,000 tons. In northeastern Thailand aquaculture and reservoir fisheries are relatively important, as is aquaculture in the Vietnamese Mekong Delta.

Industrial development

According to the CIA World Fact Book, in **Thailand** the industry represents 45% of the GDP and textiles and garments, food processing, beverages, cement, computers, furniture and plastics represent the largest portion of Thailand's industry. Only a small part is exported within the Mekong River Basin.

In the **Lao PDR**, the industry represents one third of the GDP and is mainly composed of agricultural processing, garments and cement. Within the MRB, Thailand, China and Viet Nam count for 70% of all exports and 90% of all imports in the Lao PDR.

In **Cambodia**, the garment industry represents the largest portion of Cambodia's manufacturing sector, accounting for 80% of the country's exports. In 2012, the exports grew to \$4.61 billion up 8% over 2011. The sector employs 335,400 workers, of which 91% are female.

In **Viet Nam**, the Mekong Delta is not strongly industrialised, and most of the industry is agro related. The region's industry accounts for 10% of Vietnam's total as of 2011. Almost half of the region's industrial production is concentrated in Cần Thơ, the economic center of the region and more industrialised than the other provinces.

Minerals and energy

The region has a large potential for hydropower development, with several dams already in operation, in commission or in the planning phase. In addition to hydropower, energy resources include fuel wood, oil,

natural gas, coal and lignite. Oil, natural gas and coal occur in Myanmar, Cambodia and the Yunnan province but all MRC Member Countries still need to import oil products. Fuel wood is a vital resource in most areas of the MRB and is used in 80-90% of the households in Cambodia.

There are high geological and economic potentials for the development of mineral commodities in the region (ADB/UNEP 2004). Mineral resources include gemstones, alluvial gold, alluvial cassiterite, silica, bauxite, copper, calcite and construction materials.

In the southern part of the **Lao PDR**, copper mining produced some 100,000 tons of copper in 2014, transported by road to Viet Nam, while in January 2015, Yunnan Aluminum agreed to purchase a 51% stake in Sino Lao Aluminum Company Limited, holding the mining rights for 148 km² of bauxite mine in southern Laos.

According to official statistics of the Department of Geology and Mines, the mining activities in **Cambodia** during the past 2 years involved the production of laterite blocks (red soil), limestone for cement manufacturing, sand and gravel, and crude stone for construction material.

Tourism

Tourism makes a strong contribution to the GDPs of all MRB countries, dominating their exports of goods and services. In 2010 they attracted 27 million international visitors, some 2.5% of all international tourist trips.

Though much of **Thailand's** tourism is centered around marine/beach environments and the allures of Bangkok, other popular destinations include Chiang Mai and Chiang Rai in the north where much of the tourism is nature based and which are located either on or adjacent to the Mekong River or its tributaries. In **Lao PDR**, where backpackers predominate, the most popular destinations are along the Vientiane/Luang Prabang/Huay Xay Corridor, including the World Heritage site of Luang Prabang and the Siphandone region known as the 'Four Thousand Islands'.

In **Cambodia**, most tourism is centered on the capital Phnom Penh, Siem Reap's ancient Angkor Complex and the Tonle Sap Great Lake, although also the upper part of the Mekong River (Phnom Penh to Stung Treng) receives more and more eco-tourism.

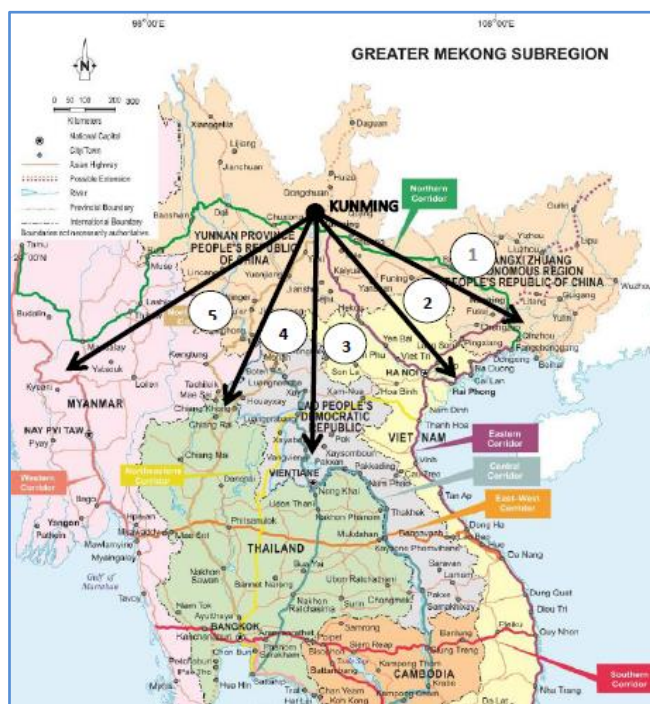
Viet Nam is similarly varied, with a wide range of attractions and hotels, especially in Ho Chi Minh City. The Mekong Delta, an area of great natural beauty is an attractive and developing tourist destination.

B/ Major Traffic Flow Directions and Transport Corridors

B/1 UPPER PART OF THE MEKONG RIVER BASIN

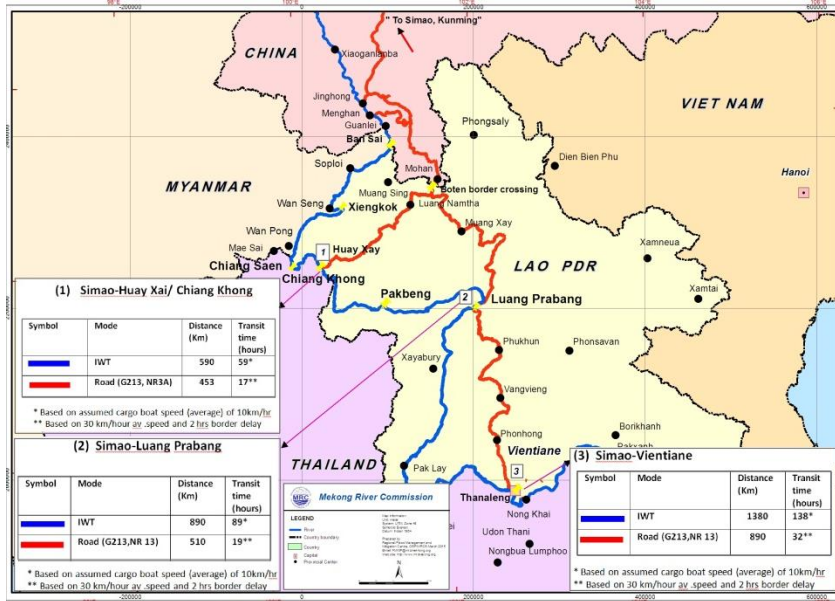
The Upper part of the Mekong Basin encompasses the stretch of the Mekong between the Lao PDR / PR China border and the Khone Falls.

Transport linkages to Kunming



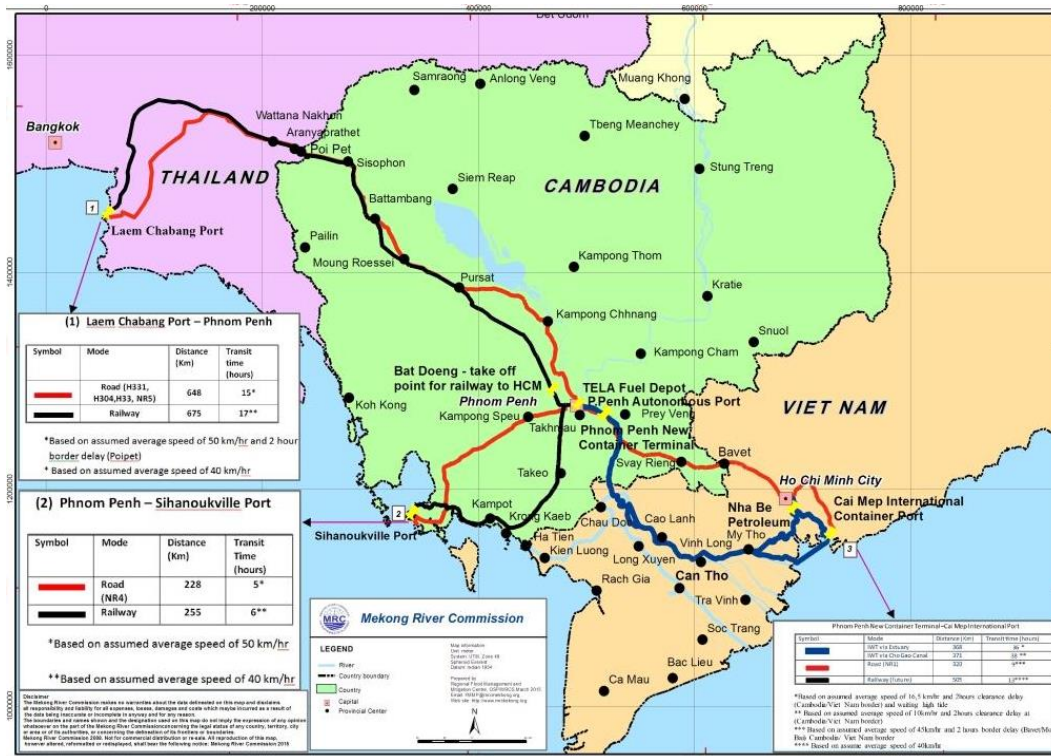
Detailed description of transport corridors related to the upper part of the Mekong Basin

Three corridors comprising existing road and waterway transport routes have been identified as being relevant for the analysis of current and future transport flows in the upper region of the Mekong basin.



B/2 LOWER PART OF THE MEKONG RIVER BASIN

The Lower region of the Mekong Basin encompasses the stretch of the Mekong between the Khone Falls and its exits to the Sea. Three corridors comprising existing road, waterway and, where relevant railway transport, routes have been identified as being relevant for the analysis of current and future transport flows in the lower region of the Mekong basin.



C/ Transport Forecasts

(1) Upper Mekong

IWT tourist traffic Huay Xay – Luang Prabang (No.passengers)

Ref. year	Forecast 1	Forecast 2	Forecast 3
	Low growth (status quo)	Medium growth (@GDP growth)	High growth (IWT invest.)
2014 (Base Year)	47,824	47,824	47,824
2015	49,628	51,282	49,628
2020	55,146	73,621	95,251
2025	67,362	103,258	269,448
2030	80,321	141,472	589,019
2035	96,010	184,899	1,152,119
2040	114,418	235,983	1,961,450
AARG			
2014-2020	2.4%	7.5%	12.2%
2014-2040	3.4%	6.3%	15.4%

IWT cross border passenger traffic (No. passengers)

Northern Lao PDR-China and Thailand

Ref. year	Forecast 1	Forecast 2
	High growth (regression)	Low growth (GDP growth)
2015	44,367	44,390
2020	79,067	68,081
2025	127,498	95,488
2030	198,906	130,826
2035	290,306	170,985
2040	409,727	218,225
AARG		
2014-2020	12.3%	8.9%
2014-2040	9.3%	6.6%

IWT cross border cargo traffic, Northern Lao PDR-China and Thailand

Ref. year	Forecast 1 (status quo IWT 100 DWT)			Forecast 2 (investment case IWT 500 DWT)		
	Cargo volumes ('000 tonnes)			Cargo volumes ('000 tonnes)		
	Road	IWT	Total	Road	IWT	Total
2014 (Base Year)	302	216	518	302	216	518
2015	392	214	606	392	214	606
2020	802	207	1,009	713	296	1,009
2025	1,153	202	1,355	897	458	1,355
2030	1,617	202	1,819	1,078	741	1,819
2035	2,156	202	2,358	1,198	1,160	2,358
2040	2,802	202	3,004	1,245	1,759	3,004
AARG						
2014-2020	17.7%	-0.7%	11.7%	15.4%	5.4%	11.7%
2014-2040	8.9%	-0.3%	7.0%	5.6%	8.4%	7.0%
Mode share						
2014	58.4%	41.6%	100.0%	58.4%	41.6%	100.0%
2020	79.5%	20.5%	100.0%	70.7%	29.3%	100.0%
2040	93.3%	6.7%	100.0%	41.5%	58.5%	100.0%

(2) Lower Mekong

Passenger and cargo forecasts for five year reference periods within the Master Plan forecast timeframe are given in the following tables for IWT services between Cambodia and Viet Nam, together with an indication of forecast average annual growth rates over the periods to 2020 and 2040.



IWT regional passenger traffic, Viet Nam-Cambodia-Viet Nam

Ref. year	Forecast 1 (Higher growth, based on regression of tourist arrivals)				Forecast 2 (Lower growth, based on real GDP growth)			
	No. passengers				No. passengers			
	PNH-SRP	PNH-CHAU DOC SPEEDBOATS	TOUR BOATS VN-PNH-SRP	TOTAL	PNH-SRP	PNH-CHAU DOC SPEEDBOATS	TOUR BOATS VN-PNH-SRP	TOTAL
2014 (Base Year)	16,133	22,338	24,341	62,812	16,133	22,338	24,341	62,812
2015	10,503	25,844	26,259	62,606	10,503	23,972	26,121	60,596
2020		54,294	66,199	120,492		34,340	37,419	71,759
2025		110,943	155,320	266,262		48,164	52,482	100,646
2030		212,581	297,613	510,194		65,988	71,905	137,894
2035		388,012	543,217	931,229		88,307	96,226	184,533
2040		642,180	899,052	1,541,231		112,705	122,811	235,516
AARG								
2014-2020	-100.0%	16.0%	18.1%	11.5%	-100.0%	7.4%	7.4%	2.2%
2014-2040	-100.0%	13.8%	14.9%	13.1%	-100.0%	6.4%	6.4%	5.2%

IWT regional cargo traffic, Vietnam-Cambodia-Viet Nam

Forecast 1 (Higher growth based on regression against GDP)

Ref. year	Containers		Petroleum	Gen. cargo	Agric.ex Kpg Cham	Total cargo
	'000 TEU	'000 tonnes	'000 tonnes	'000 tonnes	'000 tonnes	'000 tonnes
2014 (Base year)	133.7	1025	605	267		1898
2015	128.6	986	966	286	36	2274
2020	164.1	1259	1657	410	62	3388
2025	256.6	1968	2745	575	114	5402
2030	375.8	2882	4054	788	150	7875
2035	525.1	4028	5816	1055	188	11087
2040	688.3	5279	7869	1346	225	14720
AARG						
2015-2020	5.0%	5.0%	11.4%	7.4%	11.6%	8.3%
2015-2040	6.9%	6.9%	8.8%	6.4%	7.6%	7.8%

Forecast 2 (Lower growth based on application of GDP growth)

Ref. year	Containers		Petroleum	Gen. cargo	Agric.ex Kpg Cham	Total cargo
	'000 TEU	'000 tonnes	'000 tonnes	'000 tonnes	'000 tonnes	'000 tonnes
2014 (Base year)	133.7	1025	605	267	0	1898
2015	136.3	1045	966	286	36	2333
2020	143.8	1103	1657	410	62	3233
2025	201.7	1547	2521	575	114	4757
2030	276.4	2120	3723	788	150	6781
2035	369.9	2837	5342	1055	188	9421
2040	472.1	3621	7226	1346	225	12419
AARG						
2015-2020	1.1%	1.1%	11.4%	7.4%	11.6%	6.7%
2015-2040	5.1%	5.1%	8.4%	6.4%	7.6%	6.9%

Conclusions

A strong correlation between aggregate transport demand and real GDP was identified in the case of all four riverine countries covered in the Master Plan. Thus transport demand forecasts were primarily based on (but were not necessarily matched with) the forecast growth of real GDP. In most cases, GDP growth defined a lower bound for transport demand growth. With long term GDP growth settling at around 5% per annum, IWT transport volumes forecast for 2020 are at least 125% of their baseline levels while those forecast for 2040 are at least 250% of their baseline levels.

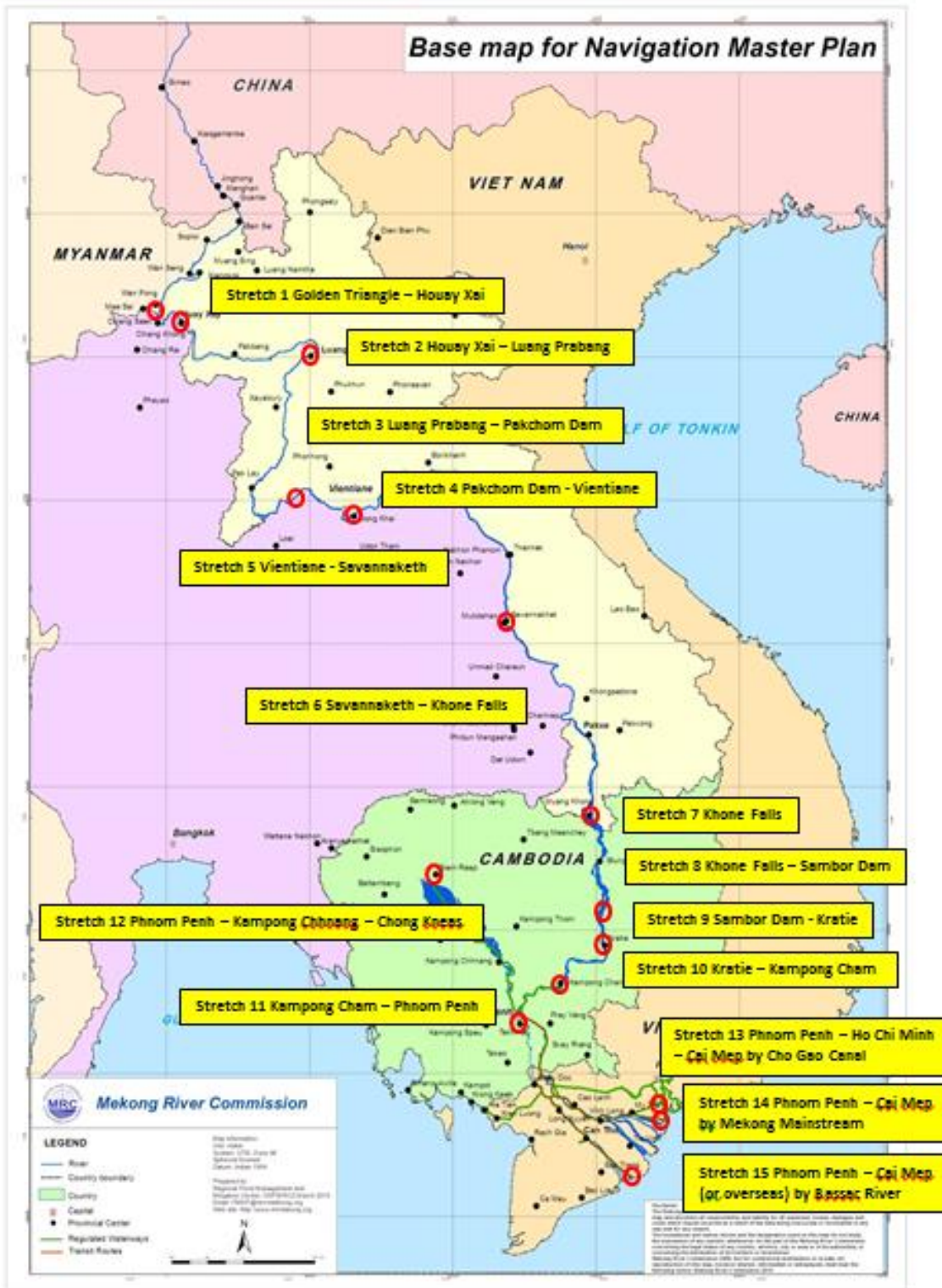
Relatively strong IWT cargo growth has been achieved in all riverine countries, with the exception of Lao PDR, where IWT growth is restricted by the poor condition of boats and port infrastructure, as well as by increasing competition from road transport which has benefitted from improved highway infrastructure. However, the progressive increase in cargo boat capacity from about 100 DWT now to 500 DWT in future will reduce IWT operating cost and increase IWT competitiveness and modal share against road transport in Lao PDR, thereby boosting its growth prospects.

The growth of IWT tourist traffic between Viet Nam and Cambodia has been very robust over the past decade and its future rapid growth will be assured by investments in upgraded passenger terminal facilities in Ho Chi Minh City, Chau Doc (Viet Nam), Phnom Penh and Chong Kneas (Siem Reap).

1.2.1.2 Collected Data under the WATERWAY CHARACTERISTICS, PHYSICAL BOTTLENECKS AND OPPORTUNITIES

1. The Mekong River System, River stretches and Canals considered in the Council Study relating to Navigation

To develop short term (2020) and long term (2040) development scenarios for Regional Waterborne Transport in the Mekong River Basin, the River has been subdivided into 15 stretches.



1.2.2 Identification of gaps

MISSING DATA ON WATERWAY DESIGN AND WORKS ALONG THE RIVER THAT IMPACT NAVIGATION	
1	ONGOING WORKS, NATIONAL PLANS AND PROJECTS
1.1 ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR DREDGING <ul style="list-style-type: none"> Special note: Sand Mining for construction and landfill is being conducted at a much higher scale than Dredging for Navigation. Since Sand Mining is not a part of the goals of Navigation, this is not considered by the Navigation Thematic Area 	
<p><i>Detail all known ongoing dredging works, national plans and project proposals for the period 2010-2040 for the 15 stretches + quantification of how much.</i></p> <p><i>It should also be stated when it is capital dredging and when it is maintenance dredging</i></p>	
Stretch 1: Green Triangle – Huay Xay	Some data available under The Lancang-Mekong Navigation Development Plan led by PR China – no past or current data
Stretch 2: Huay Xay – Luang Prabang	Some data available under The Lancang-Mekong Navigation Development Plan led by PR China– no past or current data
Stretch 3: Luang Prabang – Pak Chom Dam	No data on past and current dredging works, no data for plans
Stretch 4: Pak Chom Dam - Vientiane	No data on past and current dredging works, no data for plans
Stretch 5: Vientiane - Savannakhet	No data on past and current dredging works, no data for plans
Stretch 6: Savannaketh – Khone Falls	No data on past and current dredging works, no data for plans
Stretch 7: Khone Falls	No data on past and current dredging works, no data for plans
Stretch 8: Khone Falls – Sambor Dam	No data on past and current dredging works, no data for plans
Stretch 9: Sambor Dam - Kratie	No data on past and current dredging works, no data for plans
Stretch 10: Kratie – Kompong Cham	No data on past and current dredging works, some references for future work on the KOICA project are given
Stretch 11: Kompong Cham – Phnom Penh (PPAP NTC LM17)	Some data of ongoing dredging at Sdao Channel received
Stretch 12: Phnom Penh (Chaktomuk) – Chong Kneas	Only some reference to dredging for ferry services in Kampong Hau Commune, Kampong Leng District, Kampong Chnang Province
Stretch 13: Phnom Penh (PPAP NTC LM17) – border - Ho Chi Minh – Cai Mep by Cho Gao Canal	To the border quite detailed dredging volumes and locations are provided here, including plans.
Stretch 14: Phnom Penh – Cai Mep, via the Mekong	Details on (1) Co Chien Estuary construction project are given. (2) The project on upgrading the Ham Luong River, section from Tien river confluence to Ham Luong estuary.

Stretch 15: Phnom Penh – Cai Mep, via the Vam Nao and Bassac	<p>Details given on</p> <ol style="list-style-type: none"> 1. Quan Chanh Bo channel project are given. 2. Package 6A: Tat channel dredging and embankment works Km0-650 Km3 ÷ + 628 3. Package 6B: Tat channel dredging and embankment works Km3+628 ÷ Km8+175 4. Package 10A – South wave protection dyke 5. Package 10B: sea channel section construction and embankment 6. Package 11: Quan Chanh Bo channel dredging và channel section of Hau river
1.2 ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR RIVER REGULATING WORKS (GROYNES – OVERFLOW DIKES ...)	
<i>Details of all known ongoing river regulating works, national plans and project proposals for the period 2010-2040 for the following stretches + quantification of the works</i>	
Stretch 1: Green Triangle – Huay Xay	Data on Groynes received from the Thai Marine department
Stretch 2: Huay Xay – Luang Prabang	No data on past and current activities Plans for dredging, rock removal and river regulating works are detailed in the Chinese navigation Development Plan to accommodate 500 DWT vessels
Stretch 3: Luang Prabang – Pak Chom Dam	Some information received on planned bank protections
Stretch 4: Pak Chom Dam - Vientiane	Some information received on planned bank protections
Stretch 5: Vientiane - Savannakhet	Some information received on planned bank protections
Stretch 6: Savannaketh – Khone Falls	Some information received on planned bank protections
Stretch 7: Khone Falls	No data
Stretch 8: Khone Falls – Sambor Dam	No regulating works or plans are known
Stretch 9: Sambor Dam - Kratie	No regulating works or plans are known
Stretch 10: Kratie – Kompong Cham	No data on past or existing works. Some plans on the KOICA project
Stretch 11: Kompong Cham – Phnom Penh (PPAP NTC LM17)	Some plans for the Sdao Channel
Stretch 12: Phnom Penh (Chaktomuk) – Chong Kneas	No regulating works or plans are known
Stretch 13: Phnom Penh (PPAP NTC LM17) – border - Ho Chi Minh – Cai Mep by Cho Gao Canal	No regulating works or plans are known
Stretch 14: Phnom Penh – Cai Mep, via the Mekong	No regulating works or plans are known
Stretch 15: Phnom Penh – Cai Mep, via the Vam Nao and Bassac	No regulating works or plans are known, except Quan Chan Bo Canal

1.3 ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR BRIDGES AND POWER LINES	
<i>Detail all known ongoing bridge construction works or power cables over the river, national plans and project proposals for the period 2010-2040 for the following stretches + give height above Highest High Water Level + Main span, air clearance, reduction of wet section under the bridge, velocity increase of the current compared to the pre-construction period.</i>	
Stretch 1: Green Triangle – Huay Xay	Data of existing bridges supplied
Stretch 2: Huay Xay – Luang Prabang	Data of existing bridges supplied but clearance heights and proposed Highest Operating levels of the dams are not always correct.
Stretch 3: Luang Prabang – Pak Chom Dam	Data of existing bridges supplied but clearance heights and proposed Highest Operating levels of the dams are not always correct. Power lines missing ?
Stretch 4: Pak Chom Dam - Vientiane	Data of existing bridges supplied but clearance heights and proposed Highest Operating levels of the dams are not always correct.
Stretch 5: Vientiane - Savannakhet	Data were supplied
Stretch 6: Savannaketh – Khone Falls	Data were supplied
Stretch 7: Khone Falls	Past, current and planned information unknown
Stretch 8: Khone Falls – Sambor Dam	All details on the existing bridges are known but not all the plans
Stretch 9: Sambor Dam - Kratie	All details on the existing bridges are known but not all the plans
Stretch 10: Kratie – Kompong Cham	All details on the existing bridges are known but not all the plans
Stretch 11: Kompong Cham – Phnom Penh (PPAP NTC LM17)	All details on the existing bridges are known but not all the plans
Stretch 12: Phnom Penh (Chaktomuk) – Chong Kneas	All details on the existing bridges are known but not all the plans
Stretch 13: Phnom Penh (PPAP NTC LM17) – border - Ho Chi Minh – Cai Mep by Cho Gao Canal	Down to the border, all details on the existing bridges are known but not all the plans. From the border to the sea all details on the existing bridges are known but not all the plans.
Stretch 14: Phnom Penh – Cai Mep, via the Mekong	Down to the border, all details on the existing bridges are known but not all the plans. From the border to the sea all details on the existing bridges are known but not all the plans.
Stretch 15: Phnom Penh – Cai Mep, via the Vam Nao and Bassac	Down to the border, all details on the existing bridges are known but not all the plans. From the border to the sea all details on the existing bridges are known but not all the plans.

1.4 ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR PIERS EXTENDED” INTO THE NAVIGATION CHANNEL, KNOWN SHIP WRECKS INSIDE THE CHANNEL

Detail all known piers that extend into the river, ship wrecks inside the channel.

Stretch 1: Green Triangle – Huay Xay	No data on past and current activities Plans for dredging, rock removal and river regulating works are detailed in the Chinese navigation Development Plan to accommodate 500 DWT vessels
Stretch 2: Huay Xay – Luang Prabang	No data on past and current activities Plans for dredging, rock removal and river regulating works are detailed in the Chinese navigation Development Plan to accommodate 500 DWT vessels
Stretch 3: Luang Prabang – Pak Chom Dam	No data
Stretch 4: Pak Chom Dam - Vientiane	No data
Stretch 5: Vientiane - Savannakhet	No data
Stretch 6: Savannaketh – Khone Falls	No data
Stretch 7: Khone Falls	No data
Stretch 8: Khone Falls – Sambor Dam	No data
Stretch 9: Sambor Dam - Kratie	No data
Stretch 10: Kratie – Kompong Cham	No data on piers, but believe the wrecks have been removed
Stretch 11: Kompong Cham – Phnom Penh (PPAP NTC LM17)	No data on piers, but believe the wrecks have been removed
Stretch 12: Phnom Penh (Chaktomuk) – Chong Kneas	No data on piers, but believe the wrecks have been removed
Stretch 13: Phnom Penh (PPAP NTC LM17) – border - Ho Chi Minh – Cai Mep by Cho Gao Canal	No data on piers, but believe the wrecks have been removed
Stretch 14: Phnom Penh – Cai Mep, via the Mekong	No data on piers, but believe the wrecks have been removed
Stretch 15: Phnom Penh – Cai Mep, via the Vam Nao and Bassac	No data on piers, but believe the wrecks have been removed

2	ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR HYDROPOWER
2.1 ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR HYDROPOWER	
<p><i>Give the following details:</i></p> <ul style="list-style-type: none"> - exact location (in UTM coordinates, and river km marker) - Dam crest - Exact Highest Operating Level - Exact Medium Operating Level - Exact Lowest Operating Level - Extent of the Tailwater upstream 	
Stretch 1: Green Triangle – Huay Xay	No data
Stretch 2: Huay Xay – Luang Prabang	Data supplied but still some uncertainties regarding the High, Mean and Low Operating ;levels of the dams
Stretch 3: Luang Prabang – Pak Chom Dam	Data supplied but still some uncertainties regarding the High, Mean and Low Operating ;levels of the dams
Stretch 4: Pak Chom Dam - Vientiane	No data
Stretch 5: Vientiane - Savannakhet	Data supplied but still some uncertainties regarding the High, Mean and Low Operating ;levels of the dams
Stretch 6: Savannaketh – Khone Falls	Data supplied but still some uncertainties regarding the High, Mean and Low Operating levels of the dams
Stretch 7: Khone Falls	No data
Stretch 8: Khone Falls – Sambor Dam	Data on the Stung Treng Run-of-River Dam
Stretch 9: Sambor Dam - Kratie	Data on the Sambor Dam
Stretch 10: Kratie – Kompong Cham	No hydropower plans
Stretch 11: Kompong Cham – Phnom Penh (PPAP NTC LM17)	No hydropower plans
Stretch 12: Phnom Penh (Chaktomuk) – Chong Kneas	No hydropower plans
Stretch 13: Phnom Penh (PPAP NTC LM17) – border - Ho Chi Minh – Cai Mep by Cho Gao Canal	No hydropower plans
Stretch 14: Phnom Penh – Cai Mep, via the Mekong	No hydropower plans
Stretch 15: Phnom Penh – Cai Mep, via the Vam Nao and Bassac	No hydropower plans
2.2 ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR HYDROPOWER SHIP LOCKS	
<p><i>Give the following details:</i></p> <ul style="list-style-type: none"> - Number of locks - Exact dimensions (Length, beam, depth) - how many per dam - will there be a means to transport small boats over/next to the dam ? 	
Stretch 1: Green Triangle – Huay Xay	No data

Stretch 2: Huay Xay – Luang Prabang	Data supplied
Stretch 3: Luang Prabang – Pak Chom Dam	Data supplied
Stretch 4: Pak Chom Dam - Vientiane	No data
Stretch 5: Vientiane - Savannakhet	No data
Stretch 6: Savannaketh – Khone Falls	Data supplied
Stretch 7: Khone Falls	No data
Stretch 8: Khone Falls – Sambor Dam	Hydropower shiplock, data are not available
Stretch 9: Sambor Dam - Kratie	Hydropower shiplock, data are not available
Stretch 10: Kratie – Kompong Cham	No hydropower plans
Stretch 11: Kompong Cham – Phnom Penh (PPAP NTC LM17)	No hydropower plans
Stretch 12: Phnom Penh (Chaktomuk) – Chong Kneas	No hydropower plans
Stretch 13: Phnom Penh (PPAP NTC LM17) – border - Ho Chi Minh – Cai Mep by Cho Gao Canal	No hydropower plans
Stretch 14: Phnom Penh – Cai Mep, via the Mekong	No hydropower plans
Stretch 15: Phnom Penh – Cai Mep, via the Vam Nao and Bassac	No hydropower plans

3	OTHER OBSTRUCTIONS TO NAVIGATION
3.1 Provide detailed information on fixed fishing nets which are obviously intruding into the navigation channel Which authority is in charge and responsible? Which authority is controlling the authorization? Who is responsible for law enforcement?	
Stretch 1: Green Triangle – Huay Xay	No data
Stretch 2: Huay Xay – Luang Prabang	No data
Stretch 3: Luang Prabang – Pak Chom Dam	No data
Stretch 4: Pak Chom Dam - Vientiane	No data
Stretch 5: Vientiane - Savannakhet	No data
Stretch 6: Savannaketh – Khone Falls	No data
Stretch 7: Khone Falls	No data
Stretch 8: Khone Falls – Sambor Dam	data are not available
Stretch 9: Sambor Dam - Kratie	data are not available
Stretch 10: Kratie – Kompong Cham	Mekong Dolphin conservation area is located in this river stretch

Stretch 11: Kompong Cham – Phnom Penh (PPAP NTC LM17)	Data on fishing zones supplied
Stretch 12: Phnom Penh (Chaktomuk) – Chong Kneas	Data on fishing zones supplied but not in detail
Stretch 13: Phnom Penh (PPAP NTC LM17) – border - Ho Chi Minh – Cai Mep by Cho Gao Canal	Data on fishing zones supplied but not in detail
Stretch 14: Phnom Penh – Cai Mep, via the Mekong	No data
Stretch 15: Phnom Penh – Cai Mep, via the Vam Nao and Bassac	No data

4	MORPHOLOGICAL CHANGES
4.1 List and document all important and significant changes in river morphology and bathymetry since the completion of the UHA project	
Stretch 1: Green Triangle – Huay Xay	No data
Stretch 2: Huay Xay – Luang Prabang	No data
Stretch 3: Luang Prabang – Pak Chom Dam	No data
Stretch 4: Pak Chom Dam - Vientiane	No data
Stretch 5: Vientiane - Savannakhet	No data
Stretch 6: Savannaketh – Khone Falls	No data
Stretch 7: Khone Falls	No data
Stretch 8: Khone Falls – Sambor Dam	No data
Stretch 9: Sambor Dam - Kratie	No data
Stretch 10: Kratie – Kompong Cham	No data
Stretch 11: Kompong Cham – Phnom Penh (PPAP NTC LM17)	No data
Stretch 12: Phnom Penh (Chaktomuk) – Chong Kneas	No data
Stretch 13: Phnom Penh (PPAP NTC LM17) – border - Ho Chi Minh – Cai Mep by Cho Gao Canal	No data
Stretch 14: Phnom Penh – Cai Mep, via the Mekong	No data
Stretch 15: Phnom Penh – Cai Mep, via the Vam Nao and Bassac	No data

MISSING DATA ON PORT DEVELOPMENT

1 ONGOING WORKS, NATIONAL PLANS AND PROJECTS

1.1 ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR CONSTRUCTING OR IMPROVING NEW PORTS, TERMINALS AND LANDING FACILITIES

Detail all known ongoing new port development works, national plans and project proposals for the period 2010-2040 for the following stretches in the following detail:

- Year built or year to be built ?
- Name of the port or terminal
- exact location
- link with road or rail ?
- expected annual cargo throughput
- specify what kind of cargo
- size of the port ?
- how far protruding in the river ?

Stretch 1: Green Triangle – Huay Xay	Extensive details on the ports provided
Stretch 2: Huay Xay – Luang Prabang	Extensive details on the ports provided
Stretch 3: Luang Prabang – Pak Chom Dam	No data
Stretch 4: Pak Chom Dam - Vientiane	No data
Stretch 5: Vientiane - Savannakhet	Extensive details on the ports provided
Stretch 6: Savannaketh – Khone Falls	No data
Stretch 7: Khone Falls	No data
Stretch 8: Khone Falls – Sambor Dam	There is no port or terminal planned to be developed at this part.
Stretch 9: Sambor Dam - Kratie	PPAP’s plan to develop a sub-feeder port in Kratie (details information is not available at the time being.)
Stretch 10: Kratie – Kompong Cham	Extensive details on the ports provided
Stretch 11: Kompong Cham – Phnom Penh (PPAP NTC LM17)	Extensive details on the ports provided Port size – a Jetty of 200 m x 22 m, on the land area of about 10 ha
Stretch 12: Phnom Penh (Chaktomuk) – Chong Kneas	Extensive details on the ports provided
Stretch 13: Phnom Penh (PPAP NTC LM17) – border - Ho Chi Minh – Cai Mep by Cho Gao Canal	Extensive details on the ports provided
Stretch 14: Phnom Penh – Cai Mep, via the Mekong	Extensive details on the ports provided
Stretch 15: Phnom Penh – Cai Mep, via the Vam Nao and Bassac	Extensive details on the ports provided

1.2 ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR OIL OR CHEMICAL TERMINALS

Detail all known ongoing new port development works, national plans and project proposals for the period 2010-2040 for the following stretches in the following detail:

- Year built or year to be built ?
- Name of the port or terminal
- **what specific dangerous cargo: diesel oil, gasoline, chemicals ?**
- exact location
- link with road or rail ?
- expected annual cargo throughput
- size of the port ?
- how far protruding in the river ?

Stretch 1: Green Triangle – Huay Xay	No data
Stretch 2: Huay Xay – Luang Prabang	No data
Stretch 3: Luang Prabang – Pak Chom Dam	No data
Stretch 4: Pak Chom Dam - Vientiane	No data
Stretch 5: Vientiane - Savannakhet	No data
Stretch 6: Savannaketh – Khone Falls	No data
Stretch 7: Khone Falls	No data
Stretch 8: Khone Falls – Sambor Dam	No data
Stretch 9: Sambor Dam - Kratie	No data
Stretch 10: Kratie – Kompong Cham	No data
Stretch 11: Kompong Cham – Phnom Penh (PPAP NTC LM17)	No data
Stretch 12: Phnom Penh (Chaktomuk) – Chong Kneas	No data
Stretch 13: Phnom Penh (PPAP NTC LM17) – border - Ho Chi Minh – Cai Mep by Cho Gao Canal	No data
Stretch 14: Phnom Penh – Cai Mep, via the Mekong	No data
Stretch 15: Phnom Penh – Cai Mep, via the Vam Nao and Bassac	No data

1.3 ONGOING WORKS, NATIONAL PLANS AND PROJECTS FOR PASSENGER AND CRUISE TERMINAL

Detail all known ongoing new port development works, national plans and project proposals for the period 2010-2040 for the following stretches in the following detail:

- Year built or year to be built ?
- Name of the port or terminal
- exact location
- link with road or rail ?
- expected number of passengers throughput
- tourists or local passengers ?
- size of the port ?
- how far protruding in the river ?

Stretch 1: Green Triangle – Huay Xay	Some data supplied
Stretch 2: Huay Xay – Luang Prabang	Some data supplied
Stretch 3: Luang Prabang – Pak Chom Dam	No data
Stretch 4: Pak Chom Dam - Vientiane	No data
Stretch 5: Vientiane - Savannakhet	No data
Stretch 6: Savannaketh – Khone Falls	No data
Stretch 7: Khone Falls	No data
Stretch 8: Khone Falls – Sambor Dam	No data
Stretch 9: Sambor Dam - Kratie	No data
Stretch 10: Kratie – Kompong Cham	No data
Stretch 11: Kompong Cham – Phnom Penh (PPAP NTC LM17)	No data
Stretch 12: Phnom Penh (Chaktomuk) – Chong Kneas	Some data supplied
Stretch 13: Phnom Penh (PPAP NTC LM17) – border - Ho Chi Minh – Cai Mep by Cho Gao Canal	No data
Stretch 14: Phnom Penh – Cai Mep, via the Mekong	No data
Stretch 15: Phnom Penh – Cai Mep, via the Vam Nao and Bassac	No data

2	ENVIRONMENTAL ASPECTS AND EMERGENCY RESPONSE
2.1 ENVIRONMENTAL CONSIDERATIONS	
Are the ports and terminals in this area equipped with proper like waste reception facilities ?	
Stretch 1: Green Triangle – Huay Xay	Some data supplied, but not in detail
Stretch 2: Huay Xay – Luang Prabang	Some data supplied, but not in detail

Stretch 3: Luang Prabang – Pak Chom Dam	No data
Stretch 4: Pak Chom Dam - Vientiane	No data
Stretch 5: Vientiane - Savannakhet	No data
Stretch 6: Savannaketh – Khone Falls	No data
Stretch 7: Khone Falls	No data
Stretch 8: Khone Falls – Sambor Dam	No data
Stretch 9: Sambor Dam - Kratie	No data
Stretch 10: Kratie – Kompong Cham	No data
Stretch 11: Kompong Cham – Phnom Penh (PPAP NTC LM17)	No data
Stretch 12: Phnom Penh (Chaktomuk) – Chong Kneas	No data
Stretch 13: Phnom Penh (PPAP NTC LM17) – border - Ho Chi Minh – Cai Mep by Cho Gao Canal	No data
Stretch 14: Phnom Penh – Cai Mep, via the Mekong	Some data supplied, but not in detail
Stretch 15: Phnom Penh – Cai Mep, via the Vam Nao and Bassac	Some data supplied, but not in detail
2.2 EMERGENCY RESPONSE	
Have the ports and terminals in this area developed a system to manage emergency response and water quality incidents, including notifications and coordination with national/local authorities? What kind of equipment ?	
Stretch 1: Green Triangle – Huay Xay	Some data supplied, but not in detail
Stretch 2: Huay Xay – Luang Prabang	Some data supplied, but not in detail
Stretch 3: Luang Prabang – Pak Chom Dam	No data
Stretch 4: Pak Chom Dam - Vientiane	No data
Stretch 5: Vientiane - Savannakhet	No data
Stretch 6: Savannaketh – Khone Falls	No data
Stretch 7: Khone Falls	No data
Stretch 8: Khone Falls – Sambor Dam	No data
Stretch 9: Sambor Dam - Kratie	No data
Stretch 10: Kratie – Kompong Cham	No data
Stretch 11: Kompong Cham – Phnom Penh (PPAP NTC LM17)	No data

Stretch 12: Phnom Penh (Chaktomuk) – Chong Kneas	No data
Stretch 13: Phnom Penh (PPAP NTC LM17) – border - Ho Chi Minh – Cai Mep by Cho Gao Canal	Very detailed data supplied, especially in Viet Nam part
Stretch 14: Phnom Penh – Cai Mep, via the Mekong	
Stretch 15: Phnom Penh – Cai Mep, via the Vam Nao and Bassac	

1.3 Thematic Scenarios and Sub-Scenarios for Navigation

1. Goal of the Master Plan

“The goal of the Master Plan for Regional Waterborne Transport in the Mekong River Basin is to increase waterborne transport in the MRB to at least 125% of the actual waterborne transport volume in 2020 and to at least 250% of the actual waterborne transport volume in 2040 and to make navigation safer and more sustainable for the people and for the environment.”

This goal should be achieved by:

- The use of larger ships used over the total length of the Mekong River and over the whole year, including the use of sea-river ships in the Mekong Delta;
- The improvement of safety of all types of ships, including the use of more save passenger ships and ships carrying dangerous goods;
- The promotion of the concept of “clean” river transportation, focusing on strategic prevention of environmental damage from waterway infrastructures or from shipping or port accidents;
- The development of safe and efficient passenger ports and multimodal nodal points in the main cargo ports and dry ports;
- The creation of a safe navigation channel, able to accommodate the larger ships over the whole year;
- The coordination of a regional river information service and waterborne transport marketing;
- The establishment of education and training courses on all aspects of inland waterway transport;
- The full implementation of cross-border agreements and harmonization of standards, rules and regulations;
- The integration of Strategic Environment Assessment (SEA)/Environmental Impact Assessment (EIA) into IWT planning to effectively manage social and environmental impacts, including the predicted impacts of climate change;
- The creation of socio-economic opportunities to link local IWT transport with national and regional routes; and
- The creation of positive social and environmental impacts in the global MRB transport sector.

1.3.1 Scenarios 2020 and 2040 for Navigation including the two subscenarios for 2040

As mentioned before, the scenarios are developed with the assumption that, in the long term, all planned dams in the PR China and five dams in the Huay Xay - Vientiane stretch of the River will be built.

But there are 2 Sub-scenarios:

Between Savannakhet and Kratie two long term scenarios are proposed: one subscenario with all dams in this reach built, one subscenario in case one of these dams is not built.

Example of one stretch: Stretch 6 Savannakhet – Khone Falls (390 km)

	CURRENT SITUATION – BASELINE CONDITIONS (2015)	SHORT-TERM SCENARIO (2020)	LONG-TERM SCENARIO 1 (2040) without all 5 dams	LONG-TERM SCENARIO 2 (2040) with all 5 dams

FLEET	80 DWT seasonal 20 DWT whole year No vessel classification. No government fleet policy.	80 DWT seasonal 20 DWT whole year Standardized vessel classification system that is in harmony with the Chinese vessel classification system. Short-term government fleet policy promoting and facilitating IWT.	80 DWT seasonal 20 DWT whole year Standardized vessel classification system that is in harmony with the Chinese vessel classification system. Short-term government fleet policy promoting and facilitating IWT.	500 DWT whole year National or regional vessel construction and shipyard government policy. Long-term government fleet policy promoting and facilitating IWT.
WATERWAY DESIGN	Upstream of Pakxe, a few dangerous areas (Keng Chong Yai and Hin Han Don Sa) are strong limitations to safe navigation. Downstream of Pakxe, the waterway is very wide and with many islands criss-crossed by channels, mostly shallow. This is the tourist-area known as "Siphandon".	This river stretch is mostly wide riverbeds with lots of islands and sand banks which have to be properly surveyed. A full-scale channel design needs to be prepared including river training works in the area of Siphandon. Ongoing environmental screening is needed.	Status quo. No physical works and/or upgrading of the navigation channel.	Ban Khoum dam creates an impounded area, and downstream of Pakxe the Latsua dam will create another impounded area, substantially improving the navigation conditions in these dam-reservoirs. Together with substantial river training works and some dredging, a sustainable channel that needs no further intervention to remain navigable will be created for boats of 500 DWT.
NAVIGATION SAFETY	Dangerous goods transport is not safe. Regulations for safety of navigation, ships, crew, waterway environment, cargo and passengers: Lao PDR: very limited national regulations; Thailand: limited national regulations (Act on navigation in Thai waters B.E.2456 and regulation on ship survey B.E. 2534). No implementation, no law enforcement.	Increased safety of inland waterway transport, especially regarding safe transport of passengers and safe carriage and handling of dangerous goods. Regulations implemented and law enforcement conducted by Department of Waterways in Lao PDR and Marine Department in Thailand. Contingency plan available, with efficient emergency response and search and rescue units installed.	Increased safety of inland waterway transport, especially regarding safe transport of passengers and safe carriage and handling of dangerous goods. Regulations implemented and law enforcement conducted by Department of Waterways in Lao PDR and Marine Department in Thailand. Contingency plan available, with efficient emergency response and search and rescue units installed.	Approved vessel construction standards are implemented. Well-designed, safely constructed and environmentally friendly inland waterway vessels according to fleet demands. Efficient, safe and smooth waterway transport and cargo flow monitoring and guidance with ENC, AIS and RIS installed.
AIDS TO NAVIGATION	Only daytime navigation. Navigation in this stretch still remains an issue because there are only limited and old French markers available. Accidents occur because of this.	Navigation will become easier because French markers are rehabilitated over the whole stretch and low water alert gauges are installed at critical places.	Navigation will become easier because French markers are rehabilitated over the whole stretch and low water alert gauges are installed at critical places.	Still only daytime navigation but much more efficient and safe because of the introduction of A GPS Navigation Guided System, compulsory for all commercial boats.

	The old French markers form an additional danger when submerged.			
PORTS	<u>Pakxe</u> No information received.	Port with adequate and well-maintained infrastructure for the efficient and safe handling of passengers. Port to be compliant with the forecasted passenger throughput. Port managed with a focus on: <ul style="list-style-type: none"> ◆ Safety of both port users and port workers ◆ Security ◆ Environmental protection ◆ Efficiency. 	Port with adequate and well-maintained infrastructure for the efficient and safe handling of passengers. Port to be compliant with the forecasted passenger throughput. Port managed with a focus on: <ul style="list-style-type: none"> ◆ Safety of both port users and port workers ◆ Security ◆ Environmental protection ◆ Efficiency. 	Port with adequate and well-maintained infrastructure for the efficient and safe handling, storage and transfer of both cargo (including dangerous goods where applicable) and passengers. Port to be compliant with the forecasted cargo and passenger throughput. Port managed with a focus on: <ul style="list-style-type: none"> ◆ Safety of both port users and port workers ◆ Security ◆ Environmental protection ◆ Efficiency.
REGULATORY ASPECTS	No multi- or bilateral agreements in place.	Common safety rules adopted and implemented by Lao PDR and Thailand.	Common safety rules adopted and implemented by Lao PDR and Thailand.	Comprehensive, fully harmonized and effectively implemented legal framework.
ENVIRONM. ASPECTS	Phou Xieng Thong National Protected Area (NPA).	EIA for new port or waterway projects.	IEIA and/or EIA completed for new port developments or waterway improvements,	EIA and EMP incorporated into integrated planning for IWT sector.
SOCIAL ASPECTS	Limited economic opportunities for IWT.	Socio-economic opportunities for rural IWT identified.	Local IWT transport for local products.	IWT integrated with hydropower, agricultural, mining, industrial and other sectors. Landing facilities installed.

1.3.2 ACTION PLAN FOR NAVIGATION ACTIVITIES UNDER THE 2020 AND 2040 SCENARIOS

No	Title	Lao PDR		Thailand		Cambodia		Viet Nam		Loan		Grant		Total
		Public	Private	Public	Private	Public	Private	Public	Private	Regional	Internat.	Regional	Internat.	
<i>Short term Fleet Actions</i>														
SFL1	Standardize the vessel classification	40,000 2017-2018		40,000 2017-2018		40,000 2017-2018		50,000 2017-2018				120,000 2017-2018		290,000 2017-2018
SFL2	Conduct feasibility study on the use of reinforced sea-river barges				US\$ Year(s)		100,000 2017		100,000 2017			180,000 2017		380,000 2017
SFL3	Development of short and long term fleet policy											130,000 2016		130,000 2016
SFL4	Implement Fleet Projects of the RAP for Transport of Dangerous Goods	1,324,000 2016-2020	1,324,000 2016-2020	1,168,250 2016-2020	1,168,250 2016-2020	1,257,000 2016-2020	1,257,000 2016-2020	1,232,250 2016-2020	1,232,250 2016-2020					9,963,000 2016-2020
<i>Short term Waterway Design Actions</i>														
SWD1	Condition survey of the dangerous areas for navigation	400,000 2017-2018				55,100 2017-2018							4,100,000 2017-2018	4,555,100 2017-2018
SWD2	Standardize waterway classification in the Upper Part of the MRB											98,000 2018		98,000 2018
SWD3	Standardize waterway classification in the Lower Part of the MRB											51,600 2018		51,600 2018
SWD4	Design of river training works at the Sdao Canal in Cambodia					30,000 2016-2017							270,000 2016-2017	300,000 2016-2017
SWD5	Experimental test dredging in the Tonle Sap / Great Lake					150,000 2018-2019	150,000 2018-2019					370,000 2018-2019		670,000 2018-2019
<i>Short term Navigation Safety Actions</i>														
SNS1	Introduce a vessel inspection system	100,000 2017-2020		100,000 2017-2020		100,000 2017-2020		100,000 2017-2020			880,000 2017-2020			1,280,000 2017-2020
SNS2	Establish a framework for reporting marine accidents	60,000 2018-2019		30,000 2018-2019		45,000 2018-2019		80,000 2018-2019				140,000 2018-2019		355,000 2018-2019
SNS3	Development of a contingency plan	20,000 2018		10,000 2018		15,000 2018		30,000 2018				110,000 2018		185,000 2018
SNS4	Implement search and rescue units on the Mekong River	170,000 2018-2019		50,000 2018-2019		125,000 2018-2019		200,000 2018-2019				150,000 2018-2019		695,000 2018-2019
SNS5	Introduce safety books on safety issues and safe working practices	57,000 2018		57,000 2018		57,000 2018		57,000 2018						228,000 2018
SNS6	Introduce the obligation of AIS and VHF in the whole MRB	100,000 2017-2018		100,000 2017-2018		100,000 2018-2019		100,000 2018-2019				1,415,000 2017-2019		1,815,000 2017-2019
SNS7	Improve passenger safety between Huay Xay and Luang Prabang	100,000 2016	100,000 2016											200,000 2016
<i>Short term Aids to Navigation Actions</i>														
SAN1	Reconstruction and rehabilitation of the concrete French markers	4,000/y 2016-2020		4,000/y 2016-2020		5,000/y 2017-2021					265,000 2016-2017	50,000 2016		380,000
SAN2	Construction of clearly visible low water alert gauges	25,000 2016-2017		25,000 2016-2017		25,000 2018-2019		25,000 2018-2019			880,000 2016-2019	180,000 2016&2018		1,160,000

No	Title	Lao PDR		Thailand		Cambodia		Viet Nam		Loan		Grant		Total	
		Public	Private	Public	Private	Public	Private	Public	Private	Regional	Internat.	Regional	Internat.		
SAN3	Install a compulsory GPS System from Green Triangle to Huay Xay												395,000 2018	395,000 2018	
SAN4	Improve compulsory GPS System from Huay Xay to Luang Prabang	30,000 2016						US\$ Year(s)					150,000 2016	180,000 2016	
SAN5	Install Lights and marks at Mekong, Bassac and Tonle Sap bridges	30,000 2017		30,000 2017		30,000 2017							200,000 2017	290,000 2017	
SAN6	Upgrade ATN from Kompong Cham to mouth of the Mekong River					70,000 2018-2019		80,000 2018-2019		2,500,000 2018-2019			130,000 2018-2019	2,780,000 2018-2019	
SAN7	Upgrade ATN in Vam Nao Pass and Bassac River							80,000 2018-2019		1,250,000 2018-2019			60,000 2018-2019	1,390,000 2018-2019	
Short term Port Development Actions															
SPD1	Development of a port maintenance system	150,000 2016		50,000 2016		150,000 2016		50,000 2016						452,000 2017-2018	852,000 2016-2018
SPD2	Development of a port HSEM system	78,333 2018-2019	78,333 2018-2019	98,333 2018-2019	98,333 2018-2019	100,000 2018-2019	100,000 2018-2019	111,667 2018-2019	111,667 2018-2019				388,334 2018-2019	1,165,000 2018-2019	
SPD3	For ports handling DG, implement the RAP for Transport of DG	454,000 2017-2020	454,000 2017-2020	481,667 2017-2020	481,667 2017-2020	452,000 2017-2020	452,000 2017-2020	551,667 2017-2020	551,667 2017-2020				155,000 2017-2020	1,939,334 2017-2020	5,973,000 2017-2020
SPD4	Rehabilitation and/or reconfiguring of 2 existing passenger ports			10,000 2017		10,000 2017								20,000 2017	
SPD5	Construction of 10 new passenger ports and landing facilities										18,700,000 2017-2020			18,700,000 2017-2020	
SPD6	Establish standards and organize audit for L, T, C - oil ports		27,000 2017		27,000 2017		27,000 2017						200,000 2017	281,000 2017	
SPD7	Expansion of New Phnom Penh Container Terminal – NCT LM 17										45,000,000 2016-2020			45,000,000 2016-2020	
SPD8	Rehabilitation of existing petrochemical transfer ports in Viet Nam							646,000 2016-2020	646,000 2016-2020		646,000 2016-2020	646,000 2016-2020		2,584,000 2016-2020	
SPD9	Rehabilitation of existing cargo ports in Viet Nam							646,000 2016-2020	646,000 2016-2020		646,000 2016-2020	646,000 2016-2020		2,584,000 2016-2020	
SPD10	Update "Master Plan for Viet Nam Inland Waterway Sector"							646,000 2016-2020	646,000 2016-2020		646,000 2016-2020	646,000 2016-2020		2,584,000 2016-2020	
Short term Regulatory Actions															
SRE1	Implement the Cambodian-Vietnamese Agreement					144,000 2016-2018		144,000 2016-2018						288,000 2016-2018	
SRE2	Enforce harmonized rules under the Quadrangle Agreement	66,000 2016-2017		66,000 2016-2017										132,000 2016-2017	
SRE3	Enforce harmonized safety rules for Lao PDR and Thailand	90,000 2016-2017		90,000 2016-2017										180,000 2016-2017	
SRE4	Adopt plans/procedures for port safety and emergency response												156,000 2016-2017	156,000 2016-2017	
SRE5	Policy/recommendations to enhance legal protection of passengers												84,000 2016-2017	84,000 2016-2017	

No	Title	Lao PDR		Thailand		Cambodia		Viet Nam		Loan		Grant		Total
		Public	Private	Public	Private	Public	Private	Public	Private	Regional	Internat.	Regional	Internat.	
SRE6	Ensure effective law enforcement	30,000 2016-2018		30,000 2016-2018		30,000 2016-2018		30,000 2016-2018				96,000 2016-2018		216,000 2016-2018
<i>Short term Environmental Actions</i>														
SEN1	Develop SEA, EIA, EMP and monitoring guidelines for IWT											125,000 2016		125,000 2016
SEN2	Conduct SEA for Lancang Mekong Development Plan						US\$ Year(s)					350,000 2016		350,000 2016
SEN3	Optimisation study of dredging sand from the Mekong River											200,000 2017		200,000 2017
SEN4	Determine oil spill pollution from ports, terminals and vessels											80,000 2017		80,000 2017
SEN5	Start awareness campaigns on IWT pollution by vessels and ports											150,000 2017		150,000 2017
SEN6	Inventory air emissions cargo ports											100,000 2018		100,000 2018
SEN7	Study energy efficiency vessels and most sustainable route PHN to the Sea											200,000 2018		200,000 2018
<i>Short term Social Actions</i>														
SSO1	Analysis of Social Impact Monitoring Vulnerability Assessment											100,000 2017		100,000 2017
SSO2	Further surveys of passengers, boat owners and rural communities											150,000 2017		150,000 2017
SSO3	Identify and promote the eco-tourism and river-related tourism	25,000 2016	25,000 2016	25,000 2016	25,000 2016	25,000 2016	25,000 2016	25,000 2016	25,000 2016	25,000 2016				200,000 2016
<i>Short term Capacity Building Actions</i>														
SCB1	Plan and implement IWT education and training actions	100,000 2016-2018		100,000 2016-2018		100,000 2016-2018		100,000 2016-2018				600,000 2016-2018	400,000 2016-2018	1,400,000 2016-2018
<i>Short term Institutional Actions</i>														
SIN1	Establish a "Regional Mekong Navigation Center" to implement MP											111,400/y 2016-2020		557,000
SIN2	Setting up "Navigation Data Management Centers"	11,000/y 2016-2020		11,000/y 2016-2020		11,000/y 2016-2020		11,000/y 2016-2020						220,000 2016-2020
SIN3	Setting up "Mekong IWT Promotion and Marketing Agencies"	25,000/y 2016-2020	30,400/y 2016-2020	25,000/y 2016-2020	30,400/y 2016-2020	25,000/y 2016-2020	30,400/y 2016-2020	25,000/y 2016-2020	30,400/y 2016-2020			50,000/y 2016-2020		1,358,000 2016-2020
SIN4	Study the need for cooperation on hydrodynamic research											126,000 2018		126,000 2018

Total 2016-2020	3,649,333	2,160,333	2,761,250	1,952,250	3,315,100	2,263,000	5,164,584	4,110,584	0	71,413,000	17,096,266	113,885,700
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Long-term actions (2021-2040)

No	Title	Lao PDR		Thailand		Cambodia		Viet Nam		Loan		Grant		Total
		Public	Private	Public	Private	Public	Private	Public	Private	Regional	Internat.	Regional	Internat.	
<i>Long term Fleet Actions</i>														
LFL1	Development of ship construction and ship yard policy												160,000 2021	160,000 2021
LFL2	Implementation of standards for construction of new vessels.	105,000 2029-2032		105,000 2029-2032		105,000 2029-2032		100,000 2029-2032					300,000 2029-2032	715,000 2029-2032
<i>Long term Waterway Design Actions</i>														
LWD1	Min. 500 DWT channel between Green Triangle and Vientiane	7,000,000 2029-2036		7,000,000 2029-2036								125,326,000 2029-2036		139,326,000 2029-2036
LWD2	Improved channel in the Vientiane-Savannakhet stretch	600,000 2029-2030		600,000 2029-2030			US\$ Year(s)					10,980,000 2029-2030		12,180,000 2029-2030
LWD3	(Scenario 2) Improved channel in Savannakhet- Khone Falls stretch	5,960,000 2037-2040										88,000,000 2037-2040		93,960,000 2037-2040
LWD4	(Scenario 2) Bypass canal at the Khone Falls including ship locks											469,000,000 2033-2040		469,000,000 2033-2040
LWD5	(Scenario 2) Improved channel in Khone Falls-Kratie stretch					884,000 2037-2040						16,796,000 2037-2040		17,680,000 2037-2040
LWD6	Improved channel Kratie-Kompong Cham stretch to 2,000 DWT					1,470,000 2025-2028						27,960,000 2025-2028		29,430,000 2025-2028
LWD7	Improved 3,000 DWT channel from Kompong Cham to PPAP NTC					643,500 2025-2027						12,226,500 2025-2027		12,870,000 2025-2027
LWD8	Improved 500 DWT channel in Phnom Penh-Chong Kneas stretch					1,137,625 2028-2032	1,137,625 2028-2032					43,229,750 2028-2032		45,505,000 2028-2032
LWD9	3,000 DWT Channel from PPAP NTC to Cai Mep via Cho Gao canal											6,594,000 2021-2022		6,594,000 2021-2022
LWD10	10,000 DWT Channel from PPAP NTC to Quang Chanh Bo Canal.					532,455 2021-2022		299,640 2021-2022				15,809,805 2021-2022		16,641,900 2021-2022
LWD11	Morphology study in the areas between Phnom Penh and the sea					100,000 2028		200,000 2028					180,000 2028	480,000 2028
<i>Long term Navigation Safety Actions</i>														
LNS1	Development of ENCs for the whole Mekong River												911,000 2025-2027	911,000 2025-2027
LNS2	Implementation of RIS over the total length of the Mekong River	450,000 2024-2028		150,000 2024-2028		350,000 2024-2028		500,000 2024-2028					820,000 2024-2025	2,270,000 2024-2028

No	Title	Lao PDR		Thailand		Cambodia		Viet Nam		Loan		Grant		Total
		Public	Private	Public	Private	Public	Private	Public	Private	Regional	Internat.	Regional	Internat.	
<i>Long term Aids to Navigation Actions</i>														
LAN1	Compulsory GPS System Luang Prabang to Savannakhet								US\$ Year(s)				1,190,000 2029-2030	1,190,000 2029-2030
LAN2	(Scen. 2) Compulsory GPS System from Savannakhet to Kratie												760,000 2037-2039	760,000 2037-2039
LAN3	Compulsory GPS System along the Tonle Sap River and Lake												410,000 2024-2025	410,000 2024-2025
LAN4	Install buoys and beacons from Kratie to Kompong Cham					60,000 2035-2036					530,000 2035-2036			590,000 2035-2036
LAN5	Maintain AtN from Kompong Cham to Cai Mep incl. Cho Gao Canal						104,000/y* 2023-2032			188,000/y* 2023-2032		*Channel fees		2,920,000 2023-2032
LAN6	Maintain the AtN on the Vam Nao Pass and the Bassac River									168,000/y* 2029-2038				1,680,000 2029-2038
<i>Long term Port Development Actions</i>														
LPD1	Development of a long term port strategy and policy	200,000 2021-2024		100,000 2021-2024		200,000 2021-2024		100,000 2021-2024					1,600,000 2021-2024	2,200,000 2021-2024
LPD2	Construction 5 new passenger ports and landing facilities		2,000,000 2025-2028									4,200,000 2025-2028		6,200,000 2025-2028
LPD3	Construction 7 new port infrastructures for 500 DWT cargo											20,400,000 2029-2040		20,400,000 2029-2040
LPD3	(Scen. 2) Construction 2 new port infrastructures for 500 DWT cargo											2,400,000 2037-2039		2,400,000 2037-2039
LPD4	Study ports to handle containers (Green Triangle to Savannakhet)												100,000 2031	100,000 2031
LPD5	Expansion New Container Terminal – NCT LM 17											45,000,000 2021-2024		45,000,000 2021-2024
LPD6	Kratie - Development of a 2,000 DWT cargo port											3,000,000 2025-2028	100,000 2024	3,100,000 2024-2028
LPD7	Kompong Cham - Development of a 3,000 DWT + domestic cargo port											5,850,000 2025-2028	100,000 2024	5,950,000 2024-2028
LPD8	Kompong Chhnang - Development of a 500 DWT cargo port											3,450,000 2022-2024	100,000 2021	3,550,000 2021-2024
LPD9	Chong Kneas – Construction of a new passenger + cargo terminal											20,300,000 2023-2026	1,500,000 2021-2022	21,800,000 2021-2026
<i>Long term Regulatory Actions</i>														
LRE1	Full implementation of the Cambodian-Vietnamese Agreement												156,000 2021	156,000 2021
LRE2	Full implementation of the Quadripartite Agreement	7,600/y 2021-2040		7,600/y 2021-2040										304,000 2021-2040
LRE3	Harmonise regulations for IWT from Luang Prabang to Khone Falls	7,600/y 2021-2040		7,600/y 2021-2040										304,000 2021-2040
LRE4	Develop a regulatory framework for ports												250,000 2021-2024	250,000 2021-2024

No	Title	Lao PDR	Thailand	Cambodia	Viet Nam	Loan	Grant	Total
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		Public	Private	Public	Private	Public	Private	Public	Private	Regional	Internat.	Regional	Internat.	
LRE5	Ensure effective enforcement of rules and regulations	60,000 2025-2028		60,000 2025-2028		60,000 2025-2028		60,000 2025-2028		US\$ Year(s)				240,000 2025-2028
<i>Long term Environmental Actions</i>														
LEN1	Trans boundary environmental management/monitoring systems												100,000 2026	100,000 2026
LEN2	Further SEA to determine zones for IWT or port restrictions												100,000 2021	100,000 2021
LEN3	Climate change adaptation within regional and national strategies												250,000 2021	250,000 2021
<i>Long term Social Actions</i>														
LSO1	Develop 10 landing facilities for local passenger transport	125,000 2021-2024				125,000 2021-2024								250,000 2021-2024
<i>Long term Institutional Actions</i>														
LIN1	Study the need for a "Mekong River Navigation Commission"												168,000 2033-2034	168,000 2033-2034
LIN2	Setting up of a water monitoring and management body in Laos		264,000/y* 2031-2040				*hydropower companies							2,640,000 2021-2040
LIN3	Setting up a "Mekong Navigation Data Management Centre"	16,025/y 2021-2040		16,025/y 2021-2040		16,025/y 2021-2040		16,025/y 2021-2040						1,282,000 2021-2040
LIN4	Establishment of a "Mekong River IWT Promotion Agency"	10,000/y 2021-2040	19,800/y 2021-2040	10,000/y 2021-2040	19,800/y 2021-2040	10,000/y 2021-2040	19,800/y 2021-2040	10,000/y 2021-2040	19,800/y 2021-2040					2,384,000 2021-2040
LIN5	Establishment of a "Hydrodynamic and Nautical Research Centre"	87,000/y 2021-2040		87,000/y 2021-2040		87,000/y 2021-2040		87,000/y 2021-2040					950,000 2021	7,910,000 2021-2040

Total Scenario 1 2021-2040	11.104.500	5.036.000	10.579.500	396.000	7.044.080	2.573.625	3.520.140	3.956.000	530.000	344.856.055	9.445.000	398.510.900
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Total Scenario 2 2021-2040	17.064.500	5.036.000	10.579.500	396.000	7.928.080	2.573.625	3.520.140	3.956.000	530.000	920.522.055	10.205.000	982.310.900
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these tables, it can be concluded that :

- The total cost of **long-term scenario 1** is approximately 500,000,000 US\$, or an average of 20,500,000 US\$ per year;
- Each country should contribute 3 to 4 percent of this amount from its own public and private budgets;
- About 81 percent of these costs should be funded by international or regional loans;
- About 5 percent of these costs should be funded by international or regional grants.

- The total cost of **long-term scenario 2** is approximately 1,100,000,000 US\$ (of which more than 50percent are investments in the 2033-2040 period), or an average of 44,000,000 US\$ per year;
- Each country should contribute 1.5 to 2.5 percent of this amount from its own public and private budgets;

- About 91 percent of these costs should be funded by international or regional loans;
- About 2.5 percent of these costs should be funded by international or regional grants.

