Regional Workshop on IKMP -MRC Discharge and Sediment Monitoring and Geomorphological Tools for the Mekong Basin

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Vientiane, Lao PDR

Report On

Discharge Measurement and Sediment Sampling In Lao PDR

Department of Meteorology and Hydrology
Vientiane, 21 October, 2008

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1. General Information

- Department of Meteorology and Hydrology is responsible for Hydro-meteorological data collection in Lao PDR.
- Before year 2003, The Waterways Administration Division DoR/MCTPC was responsible some station along the Mekong river

1. General Information (Cont)

APPROPRIATE HYDROLOGICAL NETWORK IMPROVEMENT PROJECT

- The organizational structure of the Department of Meteorology and Hydrology (DMH) is composed of two levels: the Central level and the Provincial level
- At the central level is composed of:
  - Administration and Personnel Division

1. General Information (Cont)

- Technical Management Division
- Weather Forecasting and Aeronautical Division
- Meteorological Network and Earthquake Management Division
- Hydrological Division
- Climate Division

1. General Information (Cont)

- The provincial level called the hydro-meteorological provincial services is composed of 16 provinces and 1 special zone
- which manage all hydro-meteorological stations

2. Discharge Measurement

- Discharge measurement along Mekong river has been started since 1960s
- The important of discharge and sediment are for the design, planning, construction and management of the infrastructure in agriculture, irrigation and industrial development projects.

2. Discharge Measurement (cont)

- Method: Convectional
- By using : Mean section method for Mekong River, and
- Mid section method for tributaries

2. Discharge Measurement (cont)

- The measurement of discharge by current meter is of the area-velocity type where both factors, area and velocity, are directly measured at the same time.
- The product obtained by multiplying the area of a cross section and the velocity constitutes the flow discharge of that section.

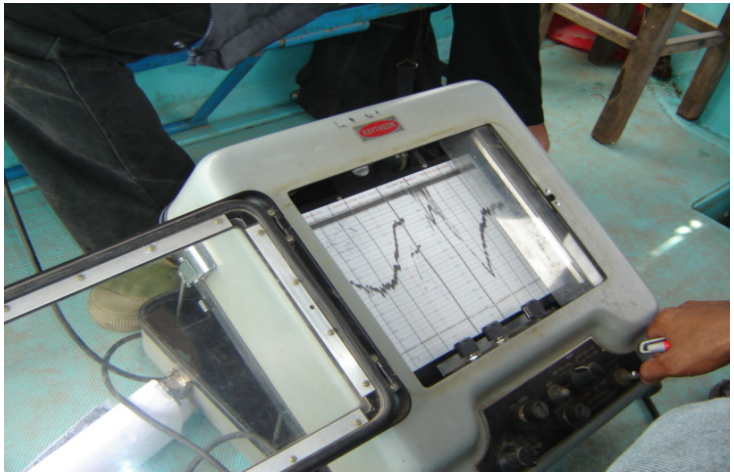
2. Discharge Measurement (cont)

- There are different types of current meters used to measure velocity at vertical points such as the Propeller Type (A-OTT, Valeport, Neyrpic and Scientific) and the Cup Type/Gurley type
- Discharge measurements are made on boat or by wading on the river, or by using a cable.

2. Discharge Measurement (cont)

- Frequency 20 measurements for the tributaries
- Frequency 38 measurements for Mekong river and
- The flow velocity is measured by two methods; i.e., the two vertical points method (0.2 and 0.8 depth)

2. Discharge Measurement (cont)



- and the three vertical points method (0.2, 0.6 and 0.8 depth).
- Depth in vertical is measured by using Echo sounder-Raytheon
- Position of measuring boat in verticals are measured by using a sextant

2. Discharge Measurement (cont)

- Discharge measurement station: 33 stations
- Jion Lao-Thai Discharge measurement: 7 stations
- Totally : 40 stations

List of Discharge Measurements

No.	River-Stations	Agency	Equipment			
			Current Meter	Boat	Sextant	Cable
	I. Luangphabang Centre					
1	Mekong-Luangphabang	WAD	AOTT, Nyerpic No.1856	Boat (N/A)	Sextant	
2	Nam Ou-Muang Ngoy	WAD	Gurley 622	Boat (Available)		Cable
3	Nam Suang-Ban Sieou	WAD	Gurley 622	Boat (N/A)		Cable
4	Nam Pa-Kokvan	WAD	Gurley 622	Boat (N/A)		Cable
5	Nam Khan-Pakbak	WAD	Gurley 622	Boat (N/A)		Cable
6	Nam Khan-Ban Mixay	WAD	Gurley 622	Boat (Available)		Cable

List of Discharge Measurements (cont.)

	II. Vientiane					
1	Nam Lik-Kasy	DMH	Gurley 622	Boat		Cable
2	Nam Lik-Hinheup	DMH	Gurley 622	Boat		Cable
3	Nam Song-Vang Vieng	DMH	Gurley 622	Boat		Cable
4	Nam Ngum-Na Luang	DMH	Gurley 622	Boat (Available)		Cable
5	Nam Ngum-Pakkangung	DMH	Gurley 622	Boat (Available)		Cable
6	Nam Sane-Bolikhan	DMH	Gurley 622	Boat		Cable
7	Nam Ngiep-Muang Mai	DMH	Gurley 622	Boat		Cable
8	Nam Thuen-Signo	DMH	Gurley 622	Boat		Cable
9	Sebangfai-Mahaxay	DMH	Gurley 622	Boat (Available)		Cable

List of Discharge Measurements (cont.)

	III.Savannakhet					Cable
1	**SeChamphone-Donghen**	WAD	Gurley 622	Boat (N/A)		Cable
2	**Se ChamphoneKengkok**	WAD	Gurley 622	Boat (N/A)		Cable
3	**Se Xangxoy-Phalane**	WAD	Gurley 622	Boat (N/A)		Cable
4	**Se Thamouak-Highway Bridge**	WAD	Gurley 622	Boat (N/A)		Cable
5	**Sebanghiang-Sopnam**	WAD	Gurley 622	Boat		Cable
6	**Se Banghiang- Ban Kengdone**	WAD	Gurley 622	Boat		Cable
7	**Sepol-Muang Chan**	WAD	Gurley 622	Boat (N/A)		Cable
8	**Se Lanong-Muang Nong**	WAD	Gurley 622	Boat (N/A)		Cable
9	**Se Bangfai-Highway Bridge**	WAD	Gurley 622	Boat (N/A)		Cable

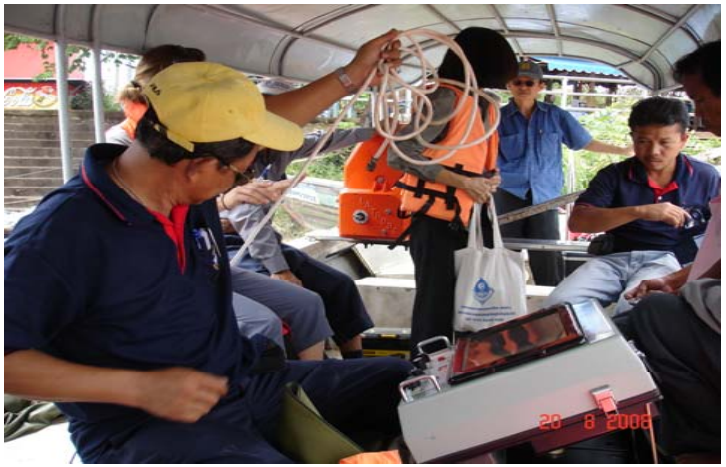
List of Discharge Measurements (cont.)

	IV. Pakse Centre					
1	Mekong – Pakse	WAD	Neyrpic	Boat	Sextant	Cable
2	Huay gnang – Km8 (Pakse)	WAD	Gurley 622	Boat		Cable
3	Huay champy-Ban Itou	WAD	Gurley 622	Boat		Cable
4	Huay Tomo-Ban Tomo	WAD	Gurley 622	Boat		Cable
5	Huay Bang Khamouane	WAD	Gurley 622	Boat		Cable
6	Se Don - Khong Sedon	DMH	Gurley 622	Boat		Cable
7	Se Don-Souvannakhili	DMH	Gurley 622	Boat		Cable
8	Se Don - Saravan	DMH	Gurley 622	Boat		Cable
9	Se Kong - Attapeu	DMH	Gurley 622	Boat		Cable

Join Lao-Thai discharge measurement Along Mekong River and Nam Huang

1. Mekong at TonePhueng/Chiangsean
2. Nam Huang at Ban KhonePhueng/Ban PakHouei
3. Mekong at Thanaleng/NonKhai
4. Mekong at Sanakham/Chiangkhan

Join Lao-Thai discharge measurement (cont)



5. Mekong at Thakhek/Nakhonephanom
6. Mekong at Savannakhet/Mukdahan
7. Mekong at Mekong at Ban MaiSinsamphane/KhongChiam

Water Level Gauging station
(AWLR)

3. Sediment Sampling

- Method: On 2 points integration
- The two points are the relative depths 0.2 and 0.8 of the vertical.
- The calculation of total water discharge
- The water discharge representing each vertical are recorded on the datasheet

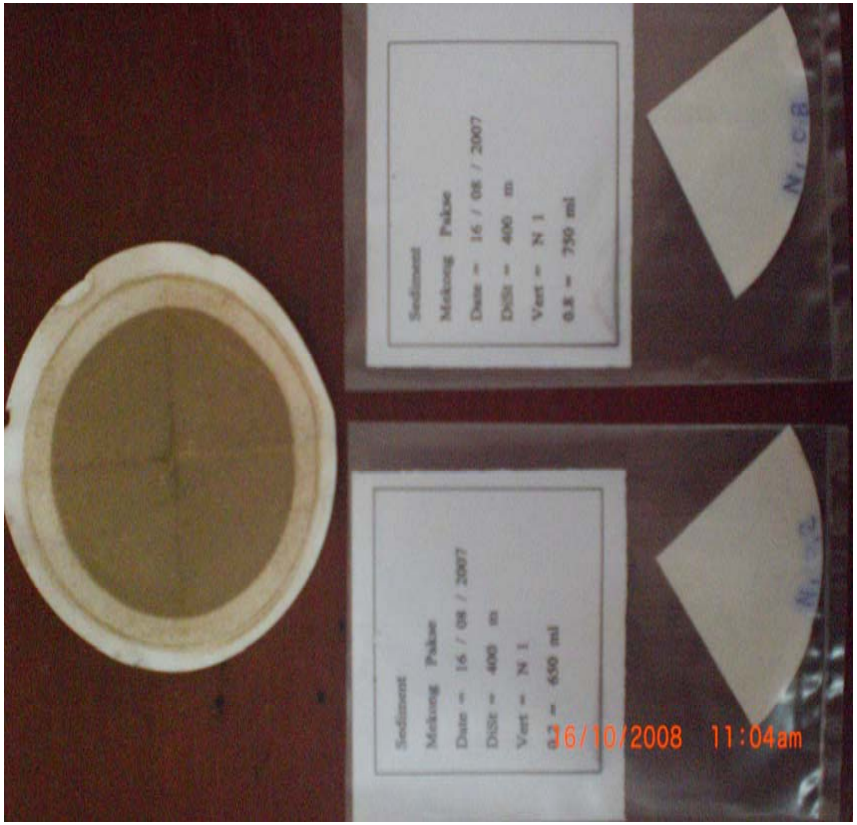
3. Sediment Sampling (cont.)

- Sediment samples are collected at the same time with the measurement
- at three verticals by using a depth-integrating suspended sediment sampler

3. Sediment Sampling (cont)

- Samples are taken with US D-49, US P-46 and P-61 equipments
- Taken samples were send to Laboratory office in Vientiane for analysis

3. Sediment Sampling (cont)

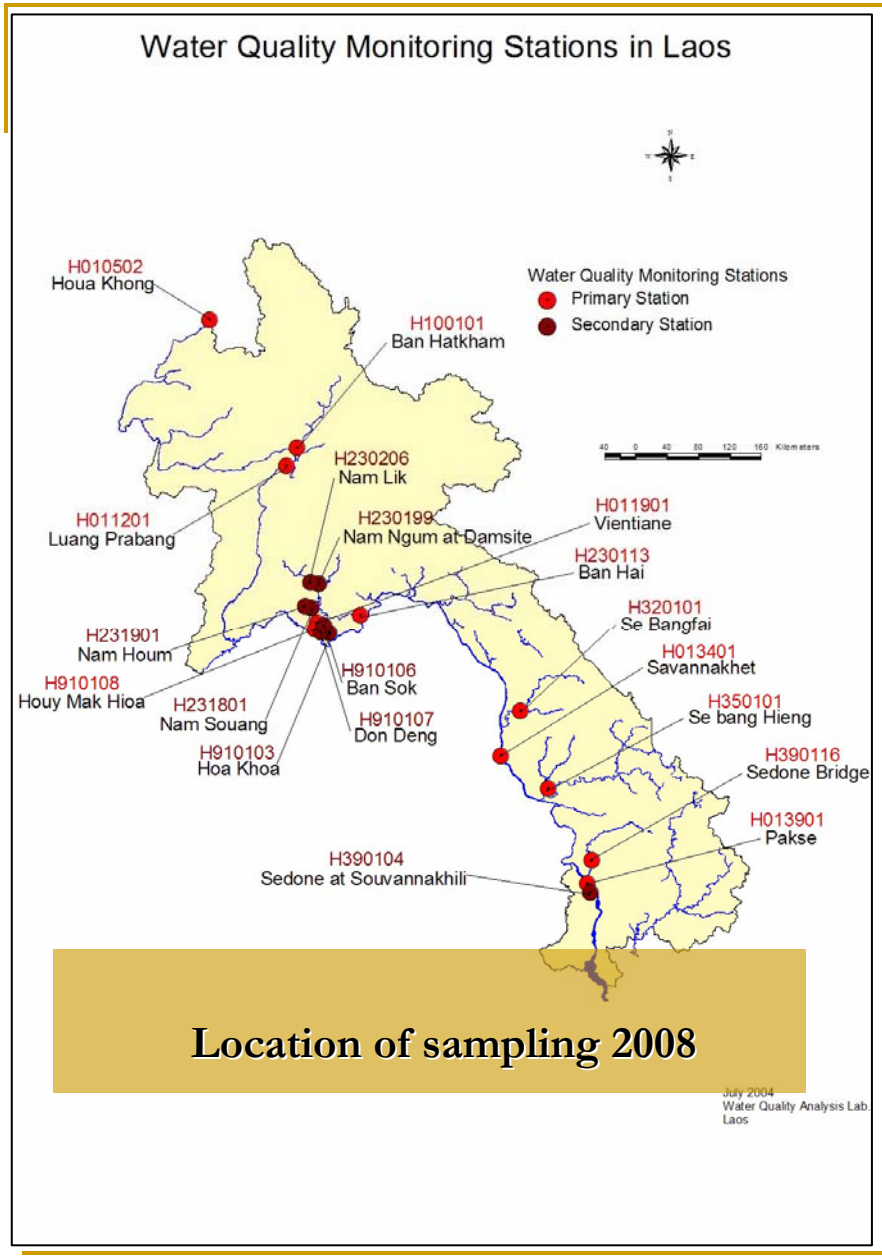


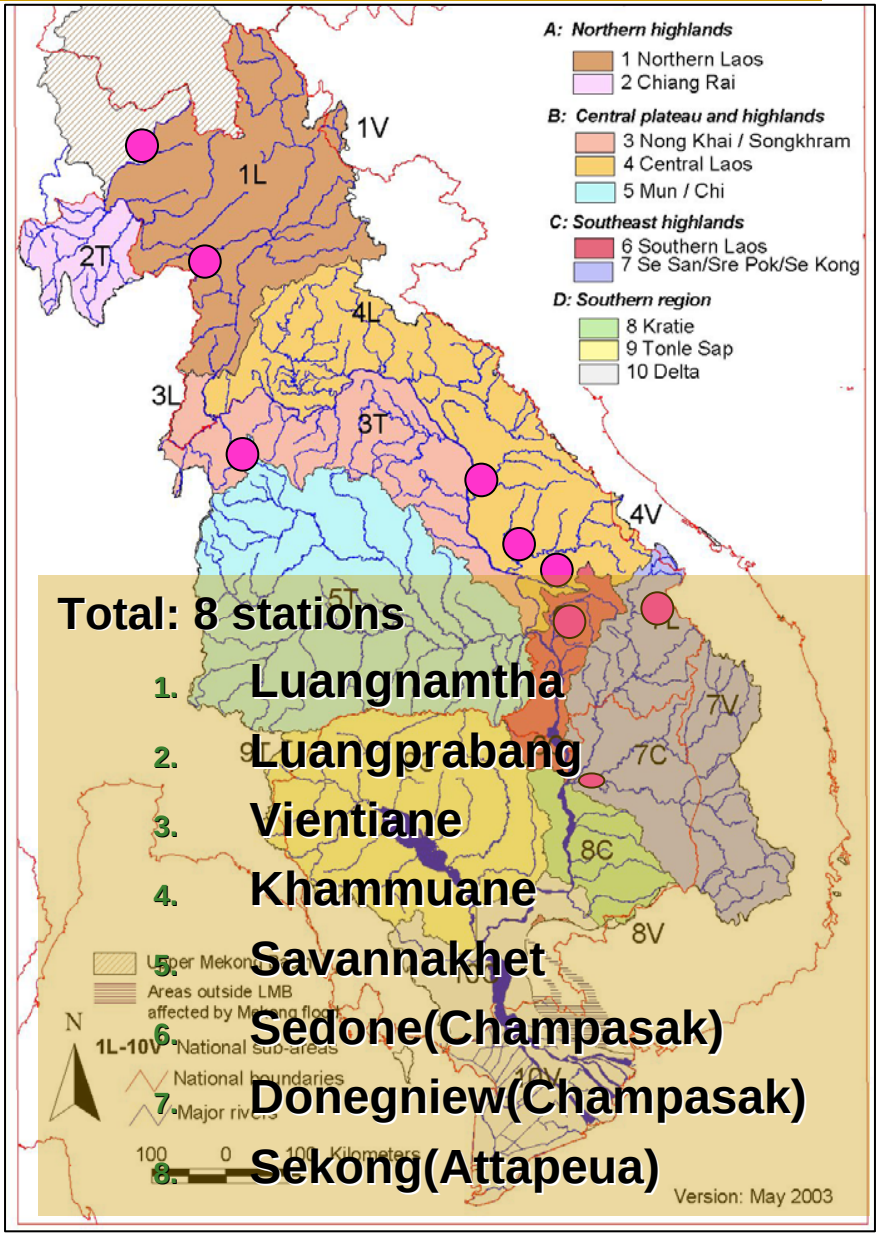
List of sediment sampling station and frequency

River-Station	Agency	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Total
Mekong-Luangphabang	WAD	1	1	1	1	2	2	2	1	1	1	13
NamOu-Muang Ngoy	WAD	1	1	1	5	5	12	5	3	1	1	35
Nam Khan-Pakbak	WAD	1	1	1	1	2	2	2	1	1	1	13
Nam Ou-Ban Fai	WAD	1	1	1	1	2	2	2	1	1	1	13
NamNgum-Pakkanhung	DMH	1	1	1	1	2	2	2	1	1	1	13
Nam Lik-Hinheup	DMH	1	1	1	1	2	2	2	1	1	1	13
NamNgum-Naluang	DMH	1	1	1	5	5	12	5	3	1	1	35
Sebangfai-Mahaxay	DMH	1	1	1	5	5	12	5	3	1	1	35
Nam Theun-Signo	DMH	1	1	1	5	5	12	5	3	1	1	35
Sechamphone-Kenkok	WAD	1	1	1	1	2	2	2	1	1	1	13
Sebanghiang-Kengdone	WAD	1	1	1	1	2	2	2	1	1	1	13
Mekong-Savannakhet	WAD	1	1	1	1	2	2	2	1	1	1	13
Mekong-Pakse	WAD	1	1	1	1	2	2	2	1	1	1	13
Sedon-Souvannakhili	DMH	1	1	1	1	2	2	2	1	1	1	13

3. Sediment Sampling (cont)

- Total of Sediment sampling station: 14





Total: 8 stations

1. Luangnamtha
2. Luangprabang
3. Vientiane
4. Khammuane
5. Savannakhet
6. Sedone(Champasak)
7. Donegniew(Champasak)
8. Sekong(Attapeua)

4. Data archiving and analyzing

- **All data received at DMH are checked and input into computers for archiving and for analyzing;**
  - **Using of HYMOS 3.1 and HYMOS 4.50**
  - **Data are stored in a Sub-database MEKO.CAT**

4. Data Transmission

- The transmission of data from stations and regional center to Vientiane head office are by:
  - Manual collection;
  - Manual by public post, telephone
  - Or HF radio transceiver
  - Email, Mobile phone
  - HYDMET software

6. Conclusion and Recommendations

1. Conclusion

- Management and operation of hydro-meteorological network under the Department of Meteorology and hydrology (DMH) are satisfactory, and capable of carrying out the activities by their own personnel.

- In the field work , some have experience in station installation, survey and discharge measurement and sediment sampling.

- We were closely cooperation with Thailand in discharge and Sediment sampling along the Mekong River.

6. Conclusion and Recommendations (cont.)

1. Conclusion (cont.)

In conclusion, some main problems are still remaining as follows:

a) Financial support for field operation
b) Personnel training
c) Equipment and logistic facilities

6. Conclusion and Recommendations (cont.)

2. Recommendations

   For improving of discharge and sediment monitoring we are recommended:

   1. Technical Assistance in using of high technology

   2. Training on data analysing and processing

6. Conclusion and Recommendations (cont.)

3. Equipment needs

- Full set of measuring equipment for each center, Luang phabang, Vientiane, Thakhek, Savannakhet, Pakse.
- Boat and boat engine
- Logistics facilities
- Computer and Hardware
- ADCP (Aquatic Doppller Current Profiler) for Luang phabang and Pakse
- Laboratory (Sediment and Water quality)

Station-Name	River	Proposed equipment			Remark
		Name	Type	Qty	
Luang Phabang	Mekong	Current meter	OSS B1	1	
		Winch (automatic)	LATROBE	1	
		Counter meter	Valeport	1	
		Echo-sounder	RayTheon type	1	
			OTT	1	
			ROTERDAM	1	
		Aluminium boat		1	
		Boat Engine	YAMAHA 55 hp	1	
		Battery	70 AMP	1	
		Sediment Sampler		1	

Station-Name	River	Proposed equipment			Remark
		Name	Type	Qty	
Thakhek (Join Discharge Meansurement)	Mekong	Current meter	OSS B1	1	
		Winch (automatic)	LATROBE	1	
		Counter meter	Valeport	1	
		Echo-sounder	RayTheon type	1	
		Single weigh 68 kg	OTT	1	
		Sextant positioning	ROTERDAM	1	
		Battery	70 AMP	1	

Station-Name	River	Proposed equipment			Remark
		Name	Type	Qty	
Pakse	Mekong	Current meter	OSS B1	1	
		ADCP		1	
		Winch (automatic)	LATROBE	1	
		Counter meter	Valeport	1	
		Echo-sounder	RayTheon type	1	
		Single weigh 68 kg	OTT	1	
		Sextant positioning	ROTERDAM	1	
		Battery	70 AMP	1	
		Sediment Sampler		1	

THANK YOU FOR YOUR
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