



Mekong River Commission Regional Flood Management and Mitigation Programme

Report on data collection, data transfer and performance of Hydmet for hydro-meteorological data transfer for the 2013 flood season, key issues and actions required prior to the 2014 flood season (Final version)



Prepared by:
Regional Flood Management and Mitigation Center
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for hydro-meteorological data transfer for the 2013 flood season,
key issues and actions required prior to the 2014 flood season
(Final version)

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List of Abbreviation

ARC-	ArcGIS Interface for Soil and Water Assessment Tool
	Consumer buying decision
DHM	Department of Hydrology and Meteorology, Lao PDR
DHRW	Department of Hydrology and River Works, Cambodia
DMP	Drought Management Programme of MRCS
DOM	Department of Meteorology, Cambodia
DTM	Digital terrain models
DWR	Department of Water Resource, Thailand
FAS	Finance and Administration Section of MRCS
Delft-FEWS	Delft-FEWS flood forecast system/tool developed by Deltares
FF	Flood Forecast
FFGS	Flash Flood Guidance System
FFS	Flood Forecast System
FMMP	Flood Management and Mitigation Programme
FS	Flood Season
HRS	Human Resource Section of MRCS
GIZ	Die Deutsche Gesellschaft für Internationale Zusammenarbeit
GIS	Geographical Information System
ICBP	Integrated Capacity Building Programme of MRCS
ICCS	International Communication and Coordination Section of MRCS
IKMP	Information Knowledge and Management Programme
IQQM	A generic integrated water quantity and quality simulation <i>model</i>
ISIS	Institute for Software Integrated Systems
ITA	International Technical Adviser
JRPS	Junior Riparian professional Staff
LMB	Lower Mekong Basin
MC	MRC Members' Country
MOU	Memo of Understanding
MRCS	Mekong River Commission Secretariat
NCHMF	National Centre for Hydrology and Meteorology Forecast, Vietnam
NGOs	Non-Government Organizations
NLA	National Line Agency
NMC	National Mekong Committee
NOAA	National Oceanic and Atmospheric Administration
OM	Operations Managers of the RFFMC, FMMP
OU	Operations Unit of FMMP
PC	Programme Coordinator of FMMP
PDR	People Democratic Republic
QA & QC	Quality Assurance and Quality Control



RFMMC	Regional Flood Management and Mitigation Centre
SWAT	Soil and Water Assessment <i>Tool</i>
TOR	Term of Reference
TRMM	Tropical Rainfall Measuring Mission
US	United State

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1. Background

1.1 Hydro-meteorological network providing data for flood forecast

Hydro-meteorological data collection is a core activity of the Mekong River Commission (MRC) since the establishment of the Mekong Committee in 1957. Under the Flood Mitigation and Management Programme (FMMP), it serves various purposes such as the flood forecast on the Mekong which is one of important issues that MRC Secretariat (MRCS) has been concerned since 1970. After the establishment of the Regional Flood Management and Mitigation Centre (RFMMC) in Phnom Penh, Cambodia in 2006, the flood forecasts and river monitoring have been taken over by the Centre up to now.

Over the past six year from 2007 to 2012, these tasks have been successfully implemented under the prevailing Memorandum of Understanding (MOU) or Terms of Reference¹ (TOR) between MRCS and MRC Member Countries (MCs) for data collection and transfer from National Line Agencies (NLAs) of the MCs to the RFMMC.

The MOUs/TOR was renewable and approved. They provided a formal agreement between MRCS and the MCs for data collection and transfer from the NLAs to RFMMC for flood forecasting and river monitoring. These activities were considered as the routine functions of the RFMMC. Table 1-1 shows the name of NLAs; the effects and terminated date of the MOUs/TOR.

In according to the MOUs/TOR, the data are collected at the observation stations, sent to the national terminal of the NLAs and then transferred to the RFMMC data terminal through the regular update data on the Hydmet database software and e-mail. This software was installed at every NLA of the MCs who signed the MOU with MRCS for the data provision for flood forecasting beginning from 01 June to 31 October² and river monitoring from 01 November to 31 May. The data collection from all stations during the wet and dry seasons help to improve the MRC flood forecasting and river monitoring, as well as to better understand the behavior of rainfall and water levels during the entire hydrologic cycle.

The operational data for the flood forecasting was daily provided to the RFMMC by the NLAs during the flood season and a weekly (every Monday) during the dry season, preferably before 8.00am. Between 8.00am-10.00am, the RFMMC collected, compiled and analyzed the data for flood forecasting and river monitoring activities

¹ is required by TNMC as a contract/agreement modality

² Flood forecast period can be extended in according to water level and weather conditions in the LMB

and then release the flood forecast and river monitoring bulletins between 10.00am and 10.30am to all concerned MRC programmes, national government agencies and international organizations for those who are working on the flood relief, emergency and management including for various purposes and researches/studies. In 2013 in cooperation with MCs, the lists of recipients were updated.

Table 1-1 Name of National Line Agencies and the start and end dates of renewed MOUs/TOR

No	Name of National Line Agency, Country	Start and end dates
1	Department of Hydrology and River Works (DHRW), Ministry of Water Resource and Meteorology (MOWRAM) in Cambodia, CNMC	01 January 2013 to 31 December 2015
2	Department of Meteorology (DOM), Ministry of Water Resource and Meteorology (MOWRAM) in Cambodia, CNMC	01 January 2013 to 31 December 2015
3	Department of Meteorology and Hydrology (DMH), Ministry of Natural Resource and Environment (MONRE) in Lao PDR, LNMCS	03 April 2013 to 02 April 2016
4	Department of Water Resources (DWR), Ministry of Water Resource and Environment (MOWRE) in Thailand, TNMCS	1 June 2013 to 31 May 2014
5	National Centre for Hydro-Meteorological Forecast of Hydro-Meteorological Service, (NCHMF/HMS), Ministry of Water Resources and Environment in Viet Nam, VNMC	06 June 2013 to 05 June 2016

From the beginning of 2012, the RFMMC in cooperation with the NLAs has been taken several steps to improve the rainfall and water level data collection and transfer from the observation stations to the RFMMC. The recent signed MOUs/TOR had been allocated some budgets for further improvement of the stations networks where data collection and transfer were shown at the level up to 100%. This was also responded to the recommendation from the data collection evaluation report for 2012 flood season. These supports are included the costs for data transfer activities, purchase new mobile phones, prepaid SIM cards for all observers, O&M and the investment cost (i.e. the hydro-meteorological network improvements) in addition to purchase desktop & laptop computers for the NLAs and NMCs and hire a service for the Hydmet's improvement using the GIZ and the RFMMC fund. The improvement of the Hydmet software activities was beginning in February 2014 and will be ended in mid-June 2014 by installing the new system, testing and training to key staff at five NLAs. The schedule of the expert visits to those NLAs was between 1st and 2nd week of June 2014.

Total of 146 stations where the hydro-meteorological data are collected and transferred from NLAs to the RFMMC of which 15, 34, 43, 10 and 44 stations respectively were received from DHRW (Cambodia), DOM (Cambodia); DMH (Lao

PDR); DWR (Thailand) and HMS (Viet Nam). Table 1-2 shows a list of stations and Figure 1-1 indicates the map of locations of stations.

The objective of this report is to a) summary and evaluate the performance of data collection and transfer from the observations stations to the NLAs data terminal and from the NLAs data terminal to the RFMMC FTP data terminal during the flood season 2013; b) describe the stations improvements' implementation progress identified in the 2012 data collection performance evaluation report; c) identify major issues/problems that both NLAs and the RFMMC faced during the flood season 2013 and d) propose the work plan to address those challenges.

Table 1-2 List of Hydro-meteorological stations to be provided the data to RFMMC during the flood season 2013.

No	Hymos ID	Station Name	Type of Data	Basin /River
DHRW, Cambodia (15 stations)				
1	14501	Stung Treng	WL, Rainfall	Mekong
2	14901	Kratie	WL, Rainfall	Mekong
3	19802	Kampong Cham	WL, Rainfall	Mekong
4	33401	Chaktomuk	WL, Rainfall	Bassac
5	20101	P.P. Port	WL	Tonle Sap
6	20102	Prek Kdam	WL, Rainfall	Tonle Sap
7	19806	Neak Loung	WL, Rainfall	Mekong
8	33402	Koh Khel	WL, Rainfall	Bassac
9	20103	Kampong Chnnang	WL	Tonle Sap
10	620101	Kampong Tmar	WL	Tributary Tonle Sap
11	570101	Kampong Kdey	WL	Tributary Tonle Sap
12	600101	Kampong Chen	WL	Tributary Tonle Sap
13	20106	Kampong Loung	WL	Tonle Sap
14	450101	Lum Phat	WL	Sre Pok
15	440102	Veun Sai	WL	Se San
DOM, Cambodia (34 stations)				
1	130322	Bantey Srey	Rainfall	Stung Seam Reap
2	130505	Sadan	Rainfall	Stung Sen
3	120505	Sambo	Rainfall	Mekong
4	120606	Snoul	Rainfall	Prek Chlong
5	130326	Srey Snam	Rainfall	Stung Sreng
6	120309	Talo	Rainfall	Stung Pursat
7	130309	Sre Noy	Rainfall	Stung Seam Reap
8	130202	Sisophon	Rainfall	St. Mongkul Borey
9	130200	O Krieng	Rainfall	Prek Krieng
10	134010	O Yadav	Rainfall	Se San
11	130220	Koh Gneak	Rainfall	Sre Pok
12	134910	Koulen	Rainfall	Stung Sen
13	134813	Tbeng Meanchey	Rainfall	Stung Sen
14	141112	Oudor Meanchey	Rainfall	Sung Sreng
15	110404	Kampong Speu	Rainfall	Prek Thnot
16	110433	Oral	Rainfall	Prek Thnot



No	Hymos ID	Station Name	Type of Data	Basin /River
17	110434	O Taroat	Rainfall	Prek Thnot
18	110445	Trapang Cho	Rainfall	Prek Thnot
19	120202	Pailin	Rainfall	Stung Sanker
20	120302	Pursat	Rainfall	Stung Pursat
21	120303	Moung Russey	Rainfall	Stung Dauntry
22	120304	Dap Bat	Rainfall	Stung Pursat
23	120312	Kravanh	Rainfall	Stung Pursat
24	120420	Tuk Phos	Rainfall	St. Boribo
25	120423	Stung Chinit	Rainfall	Stung Chinit
26	120520	Chambac	Rainfall	Mekong
27	120602	Peam Te	Rainfall	Prek Te
28	120607	Svay Chreas	Rainfall	Prek Chhlong
29	120611	Kantout	Rainfall	Prek Te
30	130506	Seambok	Rainfall	Mekong
31	130507	Tala Boriwat	Rainfall	Mekong
32	140605	Se San	Rainfall	Se San
33	140603	Seam Pang	Rainfall	Sekong
34	130208	Bovel	Rainfall	St. Mongkul Borey
DMH, Lao PDR (43 stations)				
1	10402	Xieng Kok	WL	Mekong
2	10901	Pak Beng	WL, Rainfall	Mekong
3	11201	Luang Prabang	WL, Rainfall	Mekong
4	11401	Paklay	WL	Mekong
5	11901	Vientiane	WL, Rainfall	Mekong
6	12703	Paksane	WL, Rainfall	Mekong
7	13102	Thakhek	WL, Rainfall	Mekong
8	13401	Savannakhet	WL, Rainfall	Mekong
9	13901	Pakse	WL, Rainfall	Mekong
10	230101	Bang Pakkanhoung	WL, Rainfall	Nam Ngum
11	250101	Moung Mai	WL, Rainfall	NamNhiep
12	270101	Ban Phonsi	WL, Rainfall	Nam Cadin
13	260101	Moung Keo(Borikan)	WL, Rainfall	Nam Sane
14	320107	Mahaxai	WL, Rainfall	Se Banfai
15	390102	Khong Sedone	WL, Rainfall	Se Done
16	390103	Saravanne	WL, Rainfall	Se Done
17	430106	VeunKhen	WL, Rainfall	Sekong
18	430105	M. May(Attapeu)-Veunken	WL, Rainfall	Sekong
19	100102	Moung Ngoy	WL, Rainfall	Nam Ou
20	120101	Ban Mixay	WL,	Nam Khan
21	190103	Sayaboury	Rainfall	Nam Houng
22	190205	Xieng Ngeun	Rainfall	Nam Khan
23	180207	Vang Vieng	WL, Rainfall	Nam Ngum
24	230113	Phiengluang	WL, Rainfall	Nam Ngum
25	200204	Oudomxay	Rainfall	Nam Ou
26	210201	Phonsaly	Rainfall	Nam Ou
27	200101	Moung Namtha	Rainfall	Nam Tha
28	270903	Ban Signo	WL, Rainfall	Nam Cadine
29	190302	XiengKhoung	Rainfall	Nam Nhiep
30	14301	Ban Chan Noi	WL	Mekong

No	Hymos ID	Station Name	Type of Data	Basin /River
31	170505	Kuanpho	Rainfall	Se Banfai
32	350101	Ban Keng Don	Rainfall	Se Banhieng
33	350106	Highway Bridge	WL, Rainfall	Se Banhieng
34	160505	Kengkok	Rainfall	Se Banhieng
35	390104	Souvanna Khill	WL	Se Done
36	160506	Phalan	Rainfall	Se Banhieng
37	160605	Moung Phil	Rainfall	Se Banhieng
38	150604	Laongam	Rainfall	Se Done
39	160602	Moung Nong	Rainfall	Se Done
40	150607	Nikum 34	Rainfall	Sekong
41	160601	Moung Tcheraphon	Rainfall	Se Done
42	150609	Sekong	WL, Rainfall	Sekong
43	160504	Ban Donheng	Rainfall	Se Banhieng
DWR, Thailand (10 stations)				
1.	10501	Chiang Saen	WL, Rainfall	Mekong
2.	10801	Chiang Khong	WL,	Mekong
3.	11903	Chian Khan	WL, Rainfall	Mekong
4.	13801	Khong Chiam	WL, Rainfall	Mekong
5.	12001	Nong Khai	WL, Rainfall	Mekong
6.	13101	Nakhon Phanom	WL, Rainfall	Mekong
7.	13402	Mukdahan	WL, Rainfall	Mekong
8.	70103	Thoeng	WL, Rainfall	Nam Mae In
9.	50104	Chiang Rai	WL, Rainfall	Nam Mae Kok
10.	290102	Ban Tha Kok Daen	WL, Rainfall	Nam Songkhram
NCHMF, HMS, Viet Nam (44 stations)				
1	19803	Tan Chau	WL, Rainfall	Mekong
2	19804	My Thuan	WL, Rainfall	Mekong
3	39801	Chau Doc	WL, Rainfall	Bassac
4	39803	Can Tho	WL, Rainfall	Bassac
5	980601	Vam Nao	WL, Rainfall	Vam Nao
6	451305	Ban Don	WL, Rainfall	Srepok
7	440201	Kon Tum	WL, Rainfall	Sesan
8	220201	Moung Te	Rainfall	
9	220303	Tam Duong	Rainfall	
10	220302	Sin Ho	Rainfall	
11	220301	Lai Chau	Rainfall	
12	210305	Tuan Giao	Rainfall	
13	210301	Dien Bien	Rainfall	
14	210303	Quynh Nhai	Rainfall	
15	160611	Khe Sanh	Rainfall	
16	210304	Son La	Rainfall	
17	180505	Houng Khe	Rainfall	
18	180504	Ha Tinh	Rainfall	
19	180601	Ky Anh	Rainfall	
20	170603	Tuyen Hao	Rainfall	
21	170601	Ba Don	Rainfall	
22	170602	Dong Hoi	Rainfall	
23	160706	Dong Ha	Rainfall	
24	160705	A Luoi	Rainfall	Sekong
25	160704	Hue	Rainfall	



No	Hymos ID	Station Name	Type of Data	Basin /River
26	140715	Dak To	Rainfall	Sesan
27	140703	Pleiku	Rainfall	Sesan
28	130803	An Khe	Rainfall	close to Sesan
29	130804	Ayunpa	Rainfall	Srepok
30	120801	Boun Me Thuoc	Rainfall	Srepok
31	120806	Mdark	Rainfall	Srepok
32	120712	Dak Nong	Rainfall	close to Srepok
33	120805	Buon Ho	Rainfall	Srepok
34	180506	Houng Son	Rainfall	
35	220401	Pha Din	Rainfall	
36	220402	Yen Chau	Rainfall	
37	220403	Mai Chau	Rainfall	
38	220404	Tuong Duong	Rainfall	
39	220405	Con Cuong	Rainfall	
40	220407	Tay Ninh	Rainfall	
41	220406	Phuc Long	Rainfall	
42	220408	Dong Xoai	Rainfall	
43	220409	Ialy	Rainfall	
44	450701	Duc Xuyen	WL, Rainfall	



Figure 1-1 Map of locations of stations using the SMS for data sending for flood forecasting in flood season 2013

1.2 Description of method used for evaluation of data transfer

There are two ways of data transferred to the RFMMC: 1) by means of sending by e-mail to the RFMMC which addresses to both hydrodata@mrcmekong.org and hydrodata@gmail.com in an agreed format and 2) through the data exchange software package (i.e. Hydmet). In some particular time and day, data can be collected through phone call.

1.2.1 Introduction of method for transferring data in Hydmet

In Hydmet, there are two steps to transfer the hydro-meteorological data from the observation stations to the FTP, which is described in the following paragraphs:

- Data transfer from the observation stations to the data terminal of NLAs
- Data transfer from the data terminal of national line agencies to the RFMMC FTP.

a) **Step one** - data transfer from observation stations to national line agencies:

The observers collect the rainfall and/or water level data in regular basis and then use the mobile phone every morning at between 7.00am and 8.00am to send the data by the SMS, to the SMS modem, which is connected to the Hydmet computer at national line agencies. After receiving the SMS from the observers, the Hydmet software installed in the desktop computer of national line agencies will decode the message and write the data into the database table in the Hydmet.

b) **Step two** - data transfer from national line agencies to the FTP at RFMMC:

Key NLA staff transfer the hydro-meteorological data using internet by connecting their desktop Hydmet computer to the server (FTP) of the RFMMC in Phnom Penh preferably before 8.00am or not later than 9.00am after all data are received from the observers of hydro-meteorological stations around 8.00am the latest. This would enable other NLAs to download this data from FTP at the same time.

1.2.2 Method used for analyzing the availability of data delivery to the RFMMC

The evaluation of the data transfer from NLAs to the RFMMC is conducted in two separate steps in according to the step of data collection and transfer by Hydmet software as mentioned in the above paragraph. The two steps for evaluation of the data delivery are:

1. To analyze the problem of data collection and transfer from the observation stations to the database located in the national line agencies. In this first step, the quantity and quality of data collected from the stations by observers of each NLA is evaluated, as well as the quality of data sending from the stations to the Hydmet data terminal at each NLA by SMS and its associated problem we may reported and which may have occurred during the data transfer.
2. To analyze the problem of data flow from the Hydmet database at national line agencies to the RFMMC. In this step the time for sending data from Hydmet data terminal at national line agency and the availability of data sent

to RFMMC in the period of one month and during the flood season were evaluated. Figure 1-2 shows the structure of data collection and transfer from the observed stations to the RFMMC and other concerning line agencies, and the steps to evaluate data collection and transfer.

1.2.3 Method used for evaluating the performance of data collection and data transfer

The evaluation method was selected and based on availability of data on the Hydmet software updated by each NLA and the RFMMC's data management log sheet and other progress reports provided by each NLA to RFMMC. The performance evaluation of data collection and transfer was looked at least three indicators:

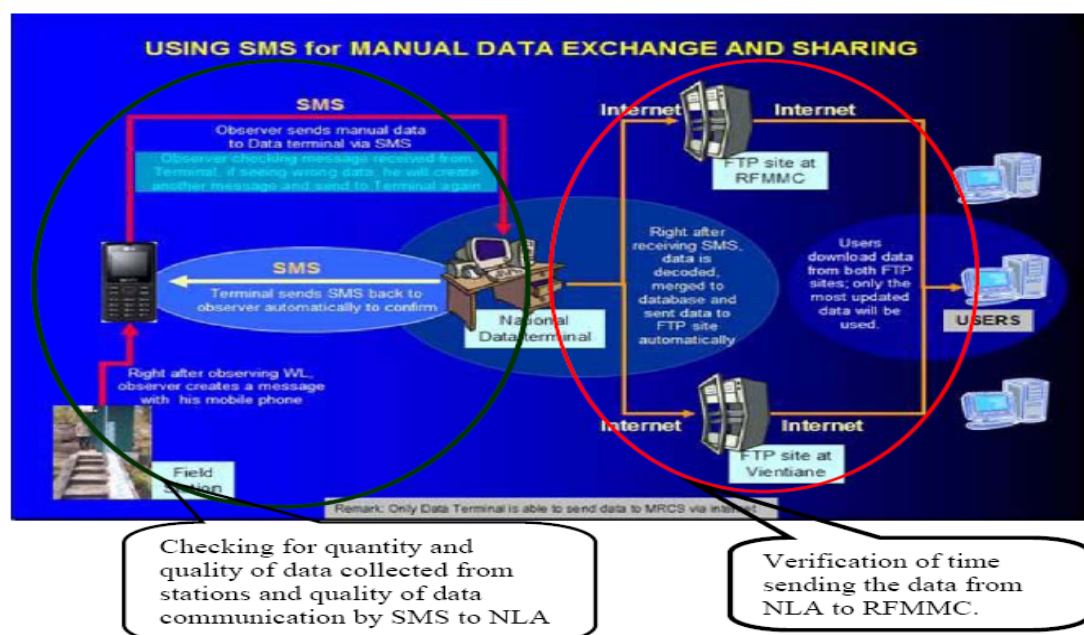


Figure 1-2 Step for analyzing and evaluating of availability of data provided to the RFMMC

- a. Availability of data at the NLA data terminals during the flood season 2013 in comparison to the 2012 flood season. The performance evaluation was based on availability of data on the Hydmet during the 2013 flood season careless whenever they were updated.
- b. Availability of data at the FTP of RFMMC during the flood season 2013 in comparison to the 2012 flood season. The performance evaluation was based on the availability of data at the RFMMC during the flood forecast. So why, it was normally seen that the availability of data in the Hydmet was often higher in number than the data availability counting by RFMMC staff. Some of data were updated later than the flood forecasting time.

- c. Time sending data from NLA data terminals to the RFMMC during the flood season 2013 in comparison to the 2012 flood season. The performance evaluation of time sending data from NLAs to RFMMC in the 2013 flood season was based on information given in the log sheet. The log sheet was given various times of data transferred by e-mail/updated on the Hydmet. However, it was argued that this type of record was a part of data monitoring and further work would be required such as update/improve the current Hydmet software database of which it can provide every data entry record of time. This activity was already approved and under implementation by the Hydmet expert. It is expected to finish the service by mid-June 2014.

2. Data transfer from stations to the data terminal at national line agencies

2.1 Data transfer from stations to the DHRW data terminal

There are 15 hydrological stations of the DHRW stations networks provided data to the DHRW data terminal during the 2013 flood season as same as in the 2012 flood season. 10 stations of them are located in the mainstream of the Mekong, Bassac and Tonle Sap Rivers and 5 stations in the tributaries of the Mekong River and the Tonle Sap Great Lake. This number was unchanged from the 2012 flood season.

Of these 14 stations have provided data to the level of 100% which means that the data from those stations were collected from 153 days out of 153 days required for the flood forecasting period, except Kampong Chen station where data was collected from only 144 days when in 2012 it was at Veun Sai station. Compared with the result of the data collection during the 2012 flood season, the data collection by DHRW during the 2013 flood season was at the same high level for all stations. The missing data was caused by the absence of the observer. Figure 2-1 shows the availability of data on the Hydmet of the DHRW data terminal during the flood season 2013.

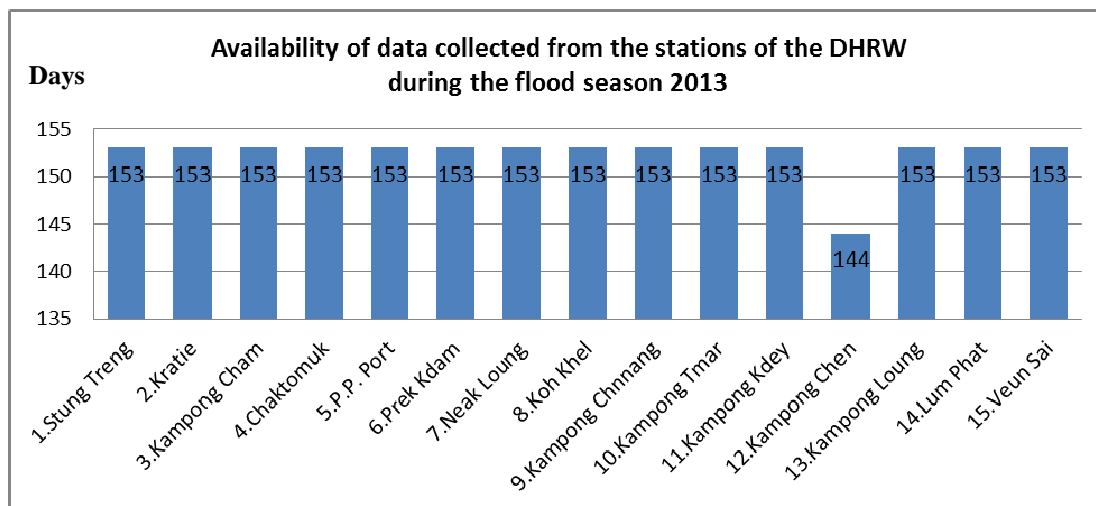


Figure 2-1 Chart representing the availability of data collected on the Hydmet at DHRW data terminal during flood season 2013.

The Figure 2-2 also proved the percentage of data collected on the Hydmet during the flood season 2012 and 2013. It was indicated that 100% data were collected from 14 stations and 90-98% was at Kompong Chen station only. To compare the result during the 2012 flood season, data collection performance at the DHRW during the 2013 flood season was maintained.

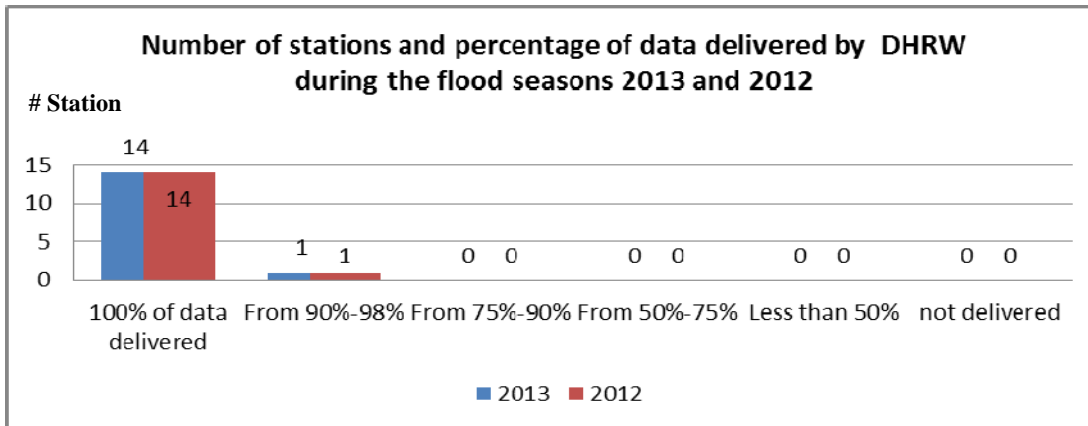


Figure 2-2 Chart representing number of stations categorized by percentage of data collected at DHRW data terminal during flood seasons 2013 and 2012

2.2 Data transfer from stations to DOM data terminal

During the flood season 2013, DOM data terminal collected data from 34 rainfall stations as same number stations as in the 2012 flood season. The performance was also maintained at the outstanding level although RFMMC sometimes received data quite late. It means that data were collected from 153 days per 153 days (i.e. 100%). In general, data transfer from the observation stations to DOM data terminal did not have problems, but at the DOM data terminal when internet connection sometimes had the problem. Figure 2-3 shows the availability of data collected at DOM data terminal during the flood season 2013.

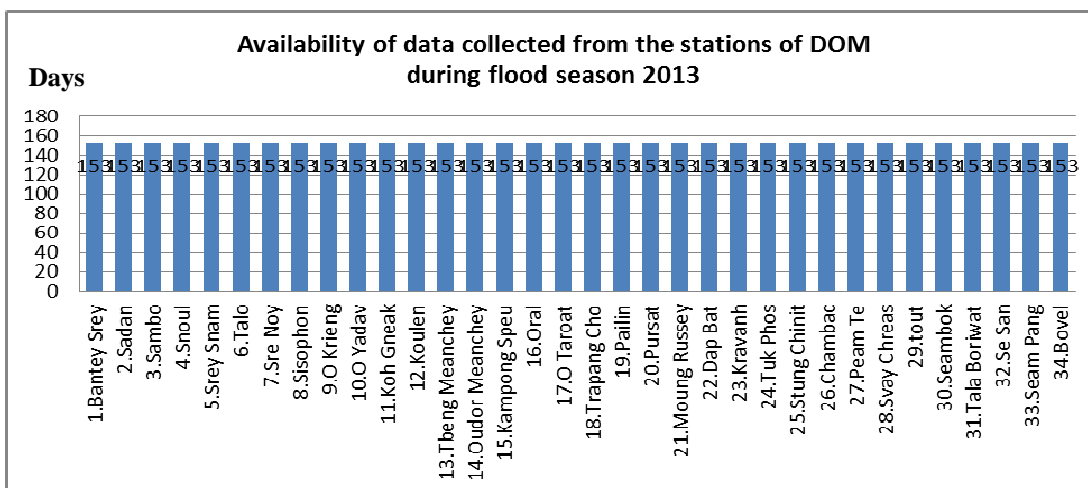


Figure 2-3 Chart representing a chart of availability of data collected on Hydmet at DOM data terminal during flood seasons 2013.

Compared to the result of data collection in the 2012 flood season, the data collection of the DOM during the 2013 flood season was improved. Figure 2-4 indicated that data were collected at level of 100% from all 34 stations during the 2013 flood

season, but during the 2012 flood season data collected were from 33 stations and 1 station data collected between 90% and 98%.

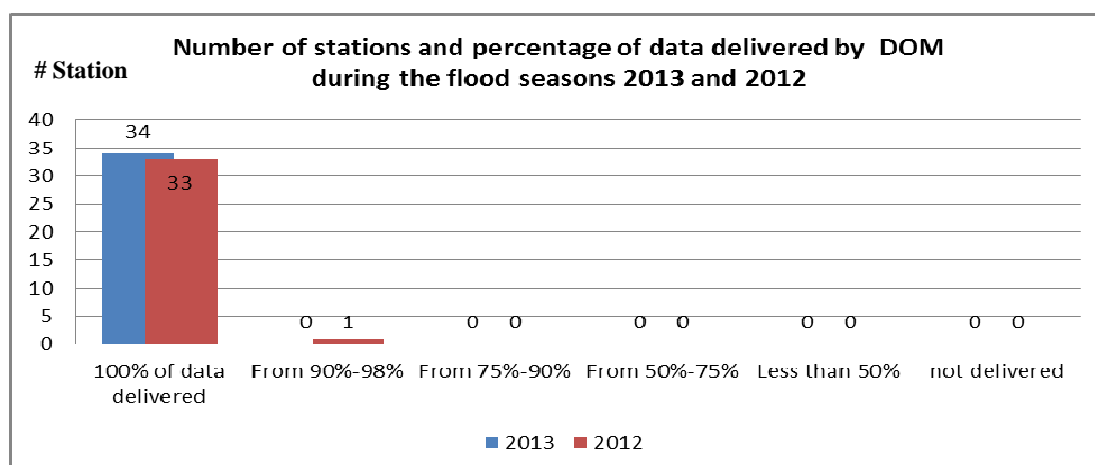


Figure 2-4 Chart representing a number of stations categorized by percentage of data collected at DOM data terminal during flood seasons 2013 and 2012.

2.3 Data transfer from stations to the DMH data terminal

Based on the MOU, DMH should collect the water level and/or rainfall data from 43 stations of which 9 of them were located in the mainstream of the Mekong and 34 stations located in the tributaries of the Mekong River and other main water bodies. However, during the flood season 2013, there were some problems in data collection from either the observations to DMH data terminal and then to the RFMMC terminal.

However, Figure 2-5 showed that the stations located along the mainstream the data was collected properly whereas 9 tributaries stations did not collected data. Almost the same problems were found in compare with the flood season 2012 such as a) internet connection at DMH; b) limited mobile phone communication between the observers and DMH staff including the reliability of coverage of mobile phone; c) the field observers were insufficiently familiar with the use of mobile phone in order to create the SMS message for sending the data and in addition d) mainly these 9 rainfall stations had technical problem due to broken glass and other matters. These stations were: 1) Xieng Ngeun, 2) Ban Signo 3) Ban Chan Noi; 4) Kuanpho; 5) Phalan; 6) MOUNG Phil; 7) Laongum; 8) MOUNG Nong and 9) Nikum. 03 stations: Oudomxay, Phonsaly and MOUNG Namtha where data were collected between 75% and 90%. Xieng Khoung and Ban Donhuen stations data were collected at 62% and 38% respectively. Figure 2-5 shows a chart represents the availability of data collected from rainfall stations of the DMH data terminal during flood season 2013.

Compared with the result of data collection during the 2012 flood season, the data collection of the DMH during the 2013 flood season has shown at almost the same level of performance. It showed that almost the same number of stations had not been

sent data nor had little data. This may be clear that the need should be clearly defined by data collectors and/or DMH.

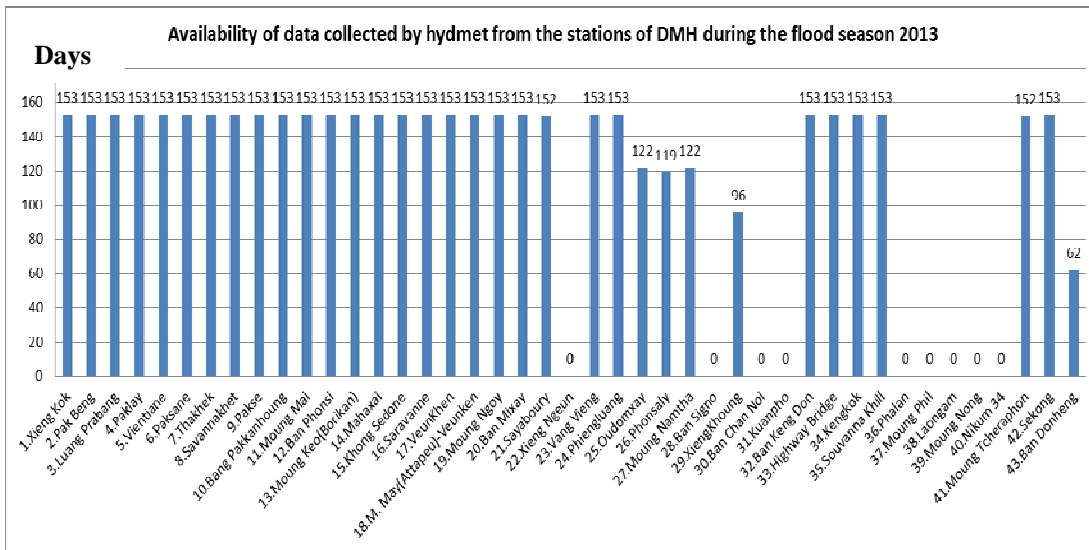


Figure 2-5 Chart represents the availability of data collected at DMH data terminal during the flood season 2013.

Figure 2-6 shows 100% data were collected at DMH data terminal from 29 stations whereas in the 2012 flood season were only 23 stations. It means that 6 stations were increased. 11 stations provided no data in 2012, but in 2013 were only 9. This means that the 2 malfunctioned stations had been improved. However, data delivered to RFMMC was not improved in compare to the 2012 flood season due to the above problems.

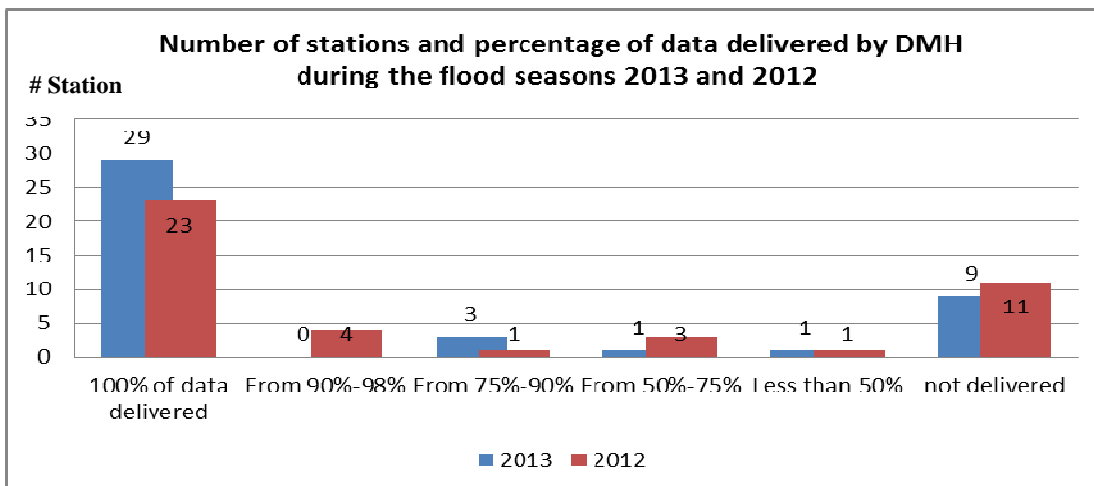


Figure 2-6 Chart representing number of stations categorized by percentage of data collected from stations of the DMH data terminal during flood season 2013 and 2012.

2.4 Data transfer from stations to the DWR data terminal

For the 2013 flood season, the water level and rainfall data was collected at DWR data terminal from 10 stations of which 7 of them were located along the Mekong mainstream and 3 located in tributaries. However, the DWR provided data from 13 stations.

During this period, data was properly collected and transferred to the DWR data terminal and then to RFMMC through Hydmet and e-mail in regularly basis (daily in the flood season and weekly in dry season). Figure 2-7 presents the availability of data collected from stations to the DWR data terminal.

Comparing with the result of data collection in the 2012 flood season, the data collection of the DWR during the 2013 flood season was improved, except in mainstream station at Chiang Khan where data are missing about 3 days when a key staff in charge of data collection has a mission to the provinces. It means that data were available for 150 days of 153 days when in the 2012 flood season data were missing of 31 days in tributary of Chaing Rai. **Figure 2-8** shows the number of stations and percentage of data collected from the hydrological stations and transferred to the DWR data terminal during the flood season 2013 and 2012. The chart was clearly indicated that 100% data were collected at DWR data terminal from 13 stations during the 2013 flood season when in the 2012 flood season was only 9 stations. It means that data collected at DWR data terminal during the 2013 flood season was improved in comparison to the 2012 flood season when 4 stations could not provide data up to 100%.

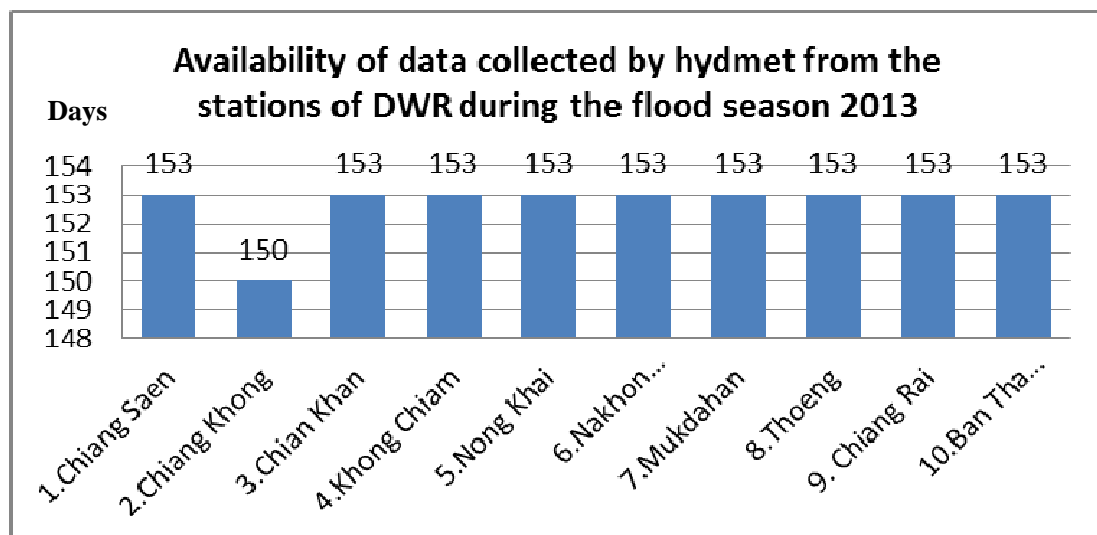


Figure 2-7 Chart represents the availability of data collected from stations to the DWR data terminal during the 2013 flood season.

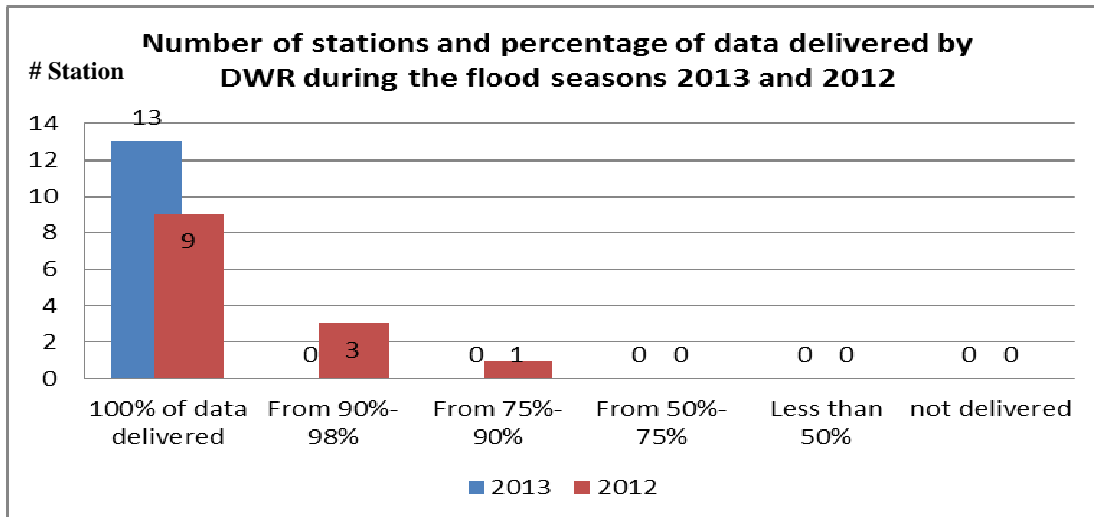


Figure 2-8 Chart representing number of stations categorized by percentage of data collected from stations of the DWR during flood seasons 2013 and 2012.

2.5 Data transfer from stations to the HMS data terminal

For the 2013 flood season the Hydro-Meteorological Service (HMS) in Viet Nam through the northern and southern parts including the central highland collected and transferred water level and/or rainfall data from 44 stations (100%) to the HMS data terminal. 4 stations were located in the mainstream, 39 located in tributaries and 1 in Vam Nao River.

Figure 2-9 shows that data were almost properly collected and transferred to the HMS data terminal from the 4 mainstream stations; except in Tan Chau station where the data was collected at 90%. Other stations, data were collected between 50% and 90%.

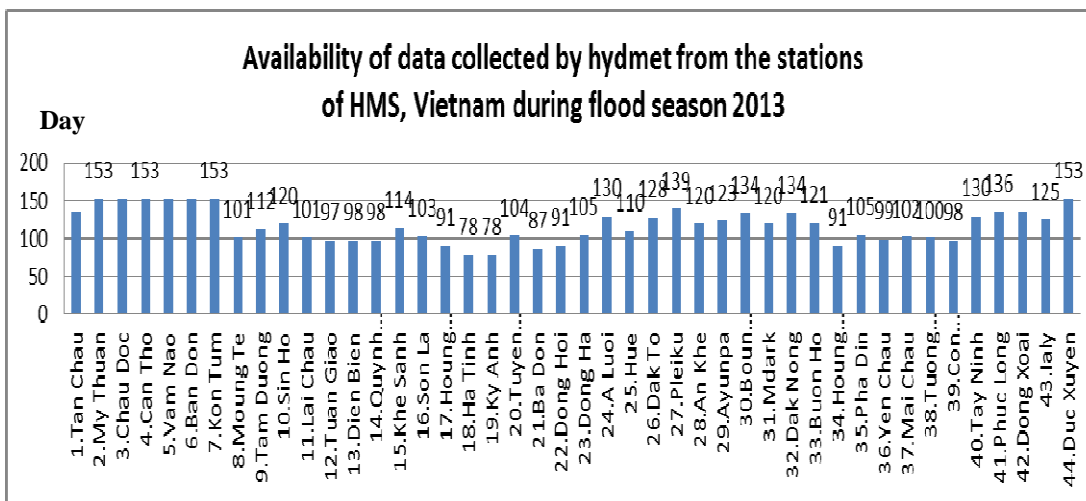


Figure 2-9 Chart representing the availability of data delivered from stations to HMS data terminal during flood season 2013.

Compared with the result of data collection during the 2012 flood season, the data collection by the HMS, Viet Nam during the 2013 flood season was improved. Figure 2-10 indicated that all categories of percentage of data collected were improved. It means that numbers of stations were increased by all categories of percentage of data delivery. For instance: for 100%, 1 station increased; from 90% and 98% with 2 stations increased; 75%-90% and 50%-75%, 5 and 2 increased respectively in compared with the 2012 flood season. Moreover, no stations where data delivered less than 50% in the 2013 flood season, but in the 2012 flood season were 8 stations. A Figure 2-10 shows the number of stations categorized by percentage of data collected from the stations of the HMS, Viet Nam during the flood seasons 2013 and 2012.

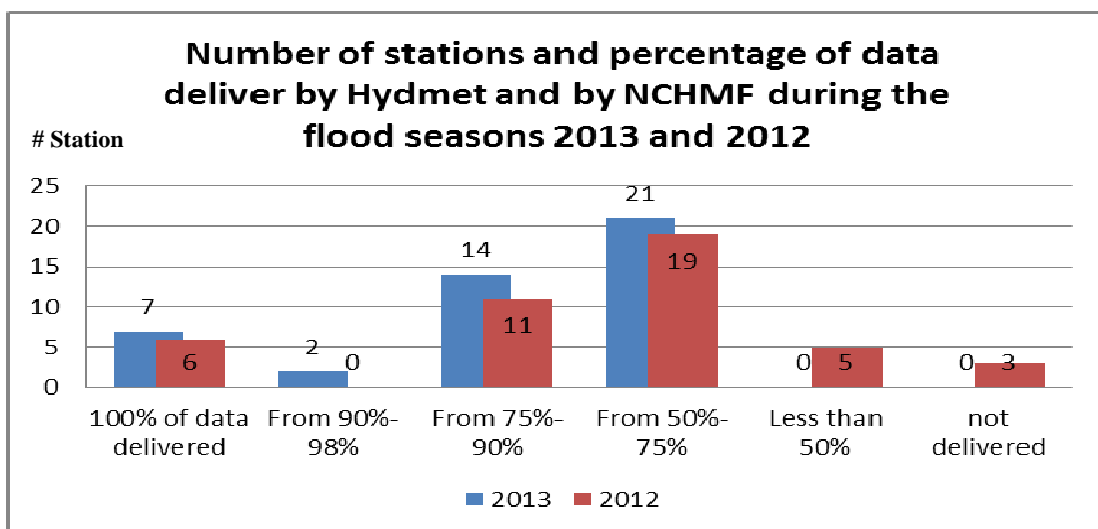


Figure 2-10 Chart representing the number of stations categorized by percentage of data collected from stations of the HMS Viet Nam during flood seasons 2013 and 2012.

3. Data delivery from data terminal at national line agencies to the FTP of RFMMC

3.1 Data transfer from the DHRW to the RFMMC data terminal

The hydro-meteorological data were provided every month and some 96% of the data was sent during the 2013 flood season through the DHRW data terminal to FTP of the RFMMC when in the 2012 flood season it was 95%. Thus, data collection at RFMMC this year was better than last year about 1%. The data sent trend line for the 2013 was rose up from the start to the end of the flood season. However, the data sent during June 2013 was less than the average (i.e. 88% data sent of the month) when in the 2012 flood season was 85%. The major problem was associated with the Hydmet issue as reported by the DHRW. Therefore, the number of data transfer to RFMMC was improved in compare to the 2012 flood season. Figure 3-1 represents the chart of the data sent by month from stations of the DHRW to the RFMMC data terminal during the flood seasons 2013 and 2012 including the trend line of data transfer during the 2013 flood season.

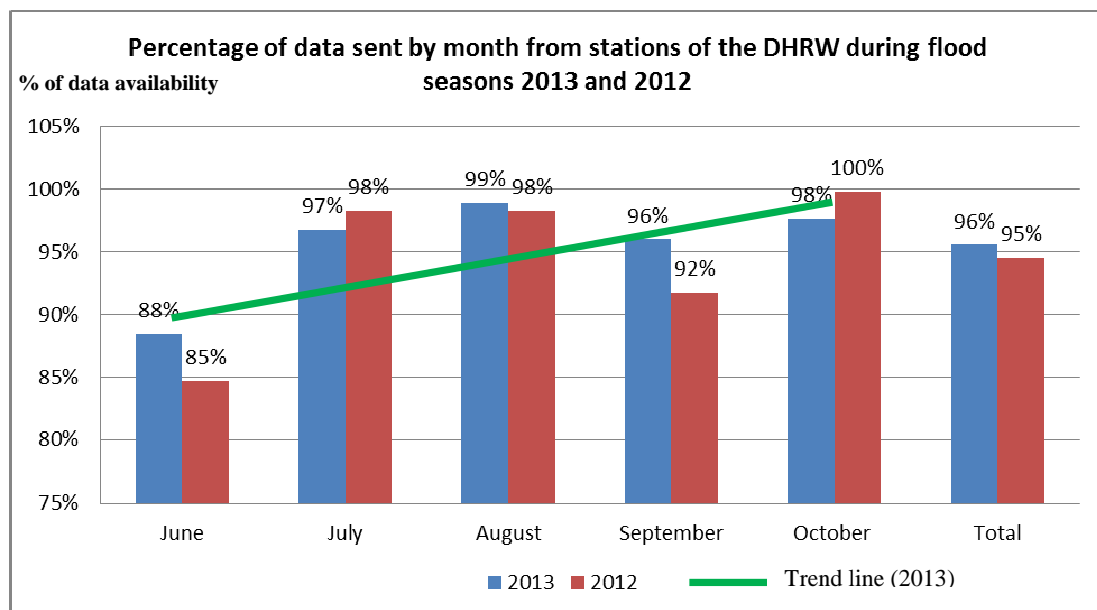


Figure 3-1 Chart representing the comparison data sent by month from stations of the DHRW to RFMMC data terminal during the flood seasons 2013 and 2012.

For the flood forecast of the RFMMC, the performance of data collection was evaluated based on both data availability and time of sending data. The Figure 3-2 shows that 99% of data sent to the RFMMC was received before 9.00am of which 86% of data received between 7.00am and 8.00am. To compare with the 2012 flood season, time of sending data to RFMMC was almost at the same time. This means that RFMMC did not face an issue/difficulty for its flood forecast. DHRW provided

not only availability of data, but also timely sent their data to the RFMMC. As a result, time sending data from DHRW to RFMMC was maintained at very satisfactory level. A detail was shown in the Figure 3-2.

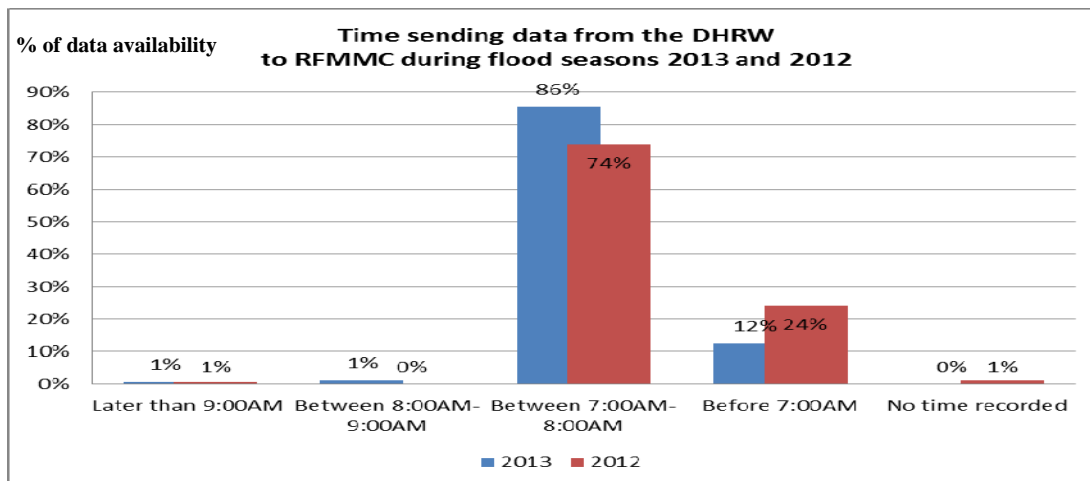


Figure 3-2 Chart representing the percentage of data availability categorized by times sending from the DHRW to the RFMMC during flood season 2013 and 2012.

To conclude the evaluation of the data collection and transfer performance from the DHRW, Cambodia to RFMMC during the flood season 2013 is very satisfactory. This was clear that the DHRW has a good coordination and communication with their field observers and in addition the hardware and equipment including all related facilities were at good conditions and well managed. It was very much appreciated that the DHRW was always used both Hydmet and e-mail in sending the data to RFMMC in regular basis. In addition, communication between RFMMC staff and DHRW personnel were in positive and cooperative.

However, as suggested by the DHRW, 4 hydro-meteorological networks stations should be improved for this dry 2013/14 season in order maintain this good performance. These stations are: Kampong Thmar, Kampong Chnnang, Kampong Chen, and Kampong Kdey. The work plan for the improvements of these stations networks were already submitted to RFMMC in March 2014 and the implementation would be accomplished by April 2014.

3.2 Data transfer from the DOM to the RFMMC data terminal

3.2.1 Rainfall data

The rainfall data were provided every month from DOM data terminal to RFMMC FTP data terminal during the flood season 2013 and some 65% of the data was sent to RFMMC when in comparison with a result in the 2012 flood season was 77%. This means that 12% of data available at RFMMC in the 2013 flood season was declined at 12% in compare with the 2012 flood season. This was also shown that the

trend line of data sent in the 2013 flood season was shown a decline from the beginning to the end of the season. Therefore, the performance of data sent from DOM data terminal to RFMMC for this year was highly considered and addressed. Figure 3-3 shows the chart representing the data sent by month from stations of the DOM data terminal to RFMMC data terminal during the flood seasons 2013 and 2012.

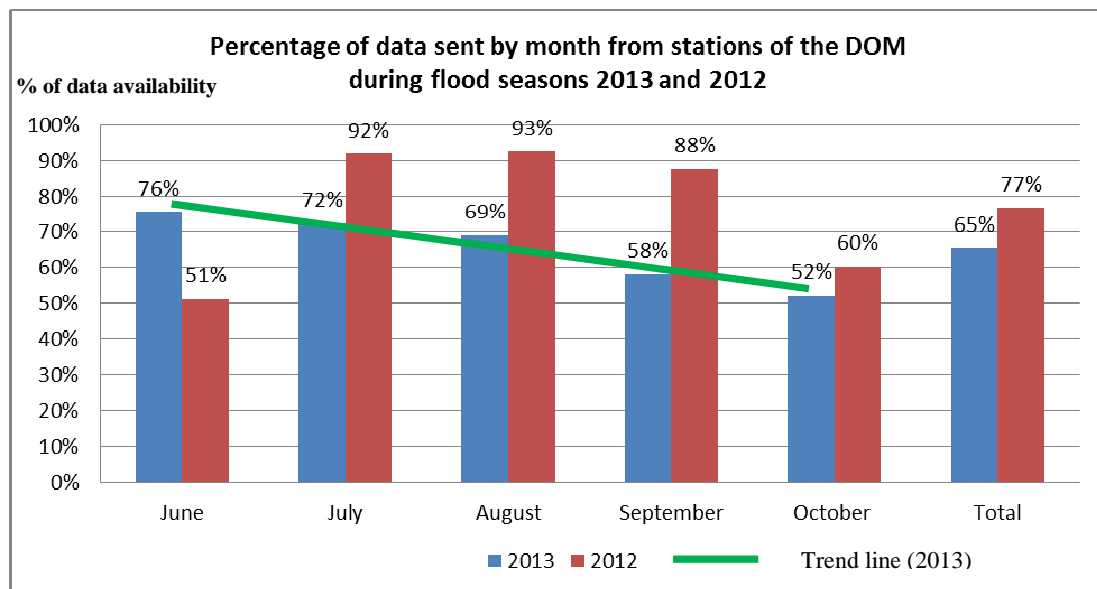


Figure 3-3 Chart representing the percentage of data availability by months sending from stations of the DOM to RFMMC data terminal during the flood season 2013 and 2012.

However, the Figure 3-4 shows the time sending data from DOM data terminal to the RFMMC data terminal during 2013 flood season was improved. It was clear that 90% of data were sent before 9.00am when in the 2012 flood season was 87%. Of these 87% of data received before 7.00am. Data sent without time record was in 2013 was 8%, but in the 2012 was 12%.

Based on the result of the investigation regarding data collection and data transfer from the observed rainfall stations 4 main associated problems were identified and should be addressed from the 2014 onwards:

1. Level of data collection at some observation stations due to the existing measuring equipment (at Sre Noy, Koulen, Tbeng Meanchay, Trapeng Cho, Kravanh, Kantout, Tala Boriwat and Seam Pang) were old and/or out of order (e.g. measuring glass). These were planned to repair/replace by Feb/Mar 2014.
2. Level of data transfer problems at the observation stations such as: 1) lack of mobile phones/they were getting out of order; 2) network reliability when some stations were located in the remote areas; 3) they may have a limitation of skills in using mobile phone for sending data via SMS or e-mail to DOM data terminal. These were already planned to address by Feb/Mar 2014.

3. Some issues related to the internet connection at DOM when the office was moved. However, based on the advice from RFMMC, this issue was taken and solved by DOM by Jan/Feb 2014.
4. Level of staff capacity in data generation and transfer including low capacity of the existing computer³ to manage large data and files. However, by December 2013, a new computer was delivered to DOM and on-job training on the use of the update Hydmet will be provided in early June 2014.

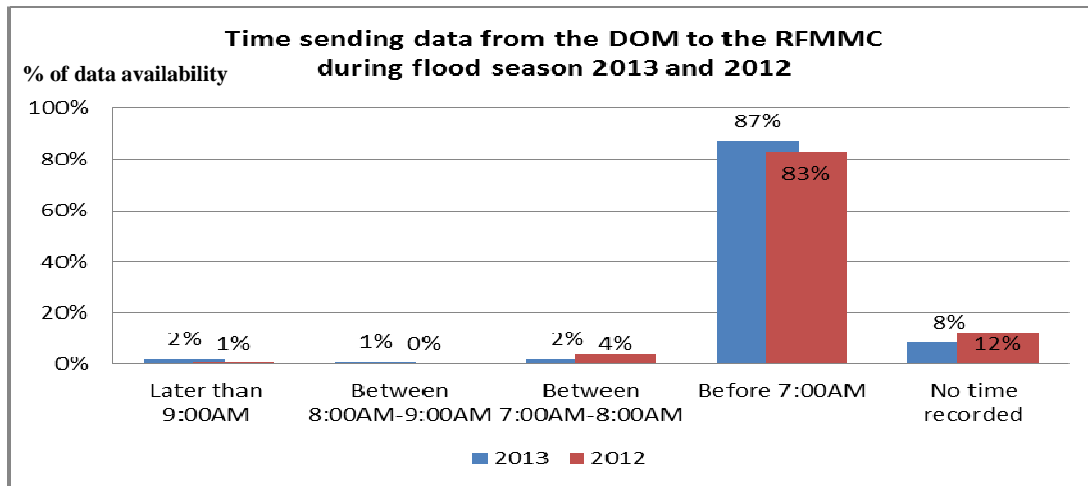


Figure 3-4 Chart representing the percentage of data availability categorized by times sending from the DOM to the RFMMC during flood season 2013 and 2012.

The evaluation of the data collection and transfer performance of DOM, Cambodia to RFMMC during the flood season 2013 was fairly satisfactory. However, there would be a need to provide additional technical support as described in the above problems in order to improve data collection and transfer in the next season.

3.2.2 Weather Situation Notices

Some 2-5 weather situation notices were provided every month from DOM to RFMMC during the 2013 flood season. During the critical weather conditions between September and October 2013, more notices (4-5) per week were provided and in opposite about 2-3 notices per week were received. In total, there were 96 (max 100) were received in this year as same number as the 2012 flood season. This number was adequately contributed to the flood forecast and preparation of the weekly flood reports. Figure 3-5 shows number of the notices sent each month from DOM, Cambodia to RFMMC during the flood seasons 2013 and 2012.

³ The old computer provided by MRCS since 2005.

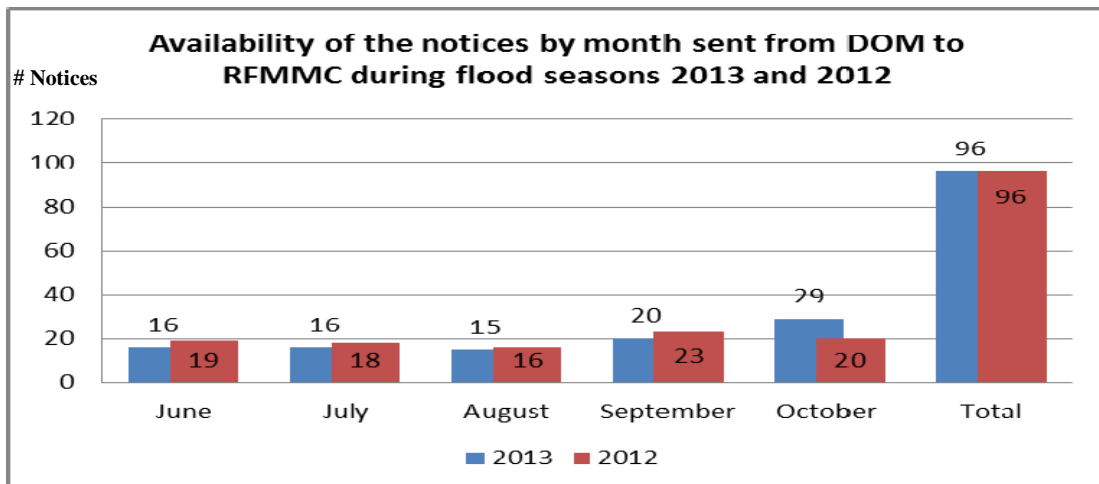


Figure 3-5 Chart representing the number of notices sending from DOM to the RFMMC during flood season 2013 and 2012.

Of these 96 notices, the RFMMC received before 9.00am when in the 2012 flood season, 4% of notices was sent later than 9.00am. In most cases, the notices were received before 7.00am and between 7.00am-8.00am. Therefore, the sending time of notices from DOM to RFMMC in the 2013 flood season was improved in comparison with the 2012 flood seasons. Figure 3-6 shows time sending weather situation notices from DOM, Cambodia to RFMMC during the flood seasons 2013 and 2012.

As a result, the performance evaluation of the weather situation notices from DOM, Cambodia to RFMMC during the flood season 2013 is very satisfactory and no doubt. The cooperation between DOM and RFMMC was very good. The Directors of DOM increased his understanding of our constraint and he tried his best (or advice his colleagues) to answer to our needs.

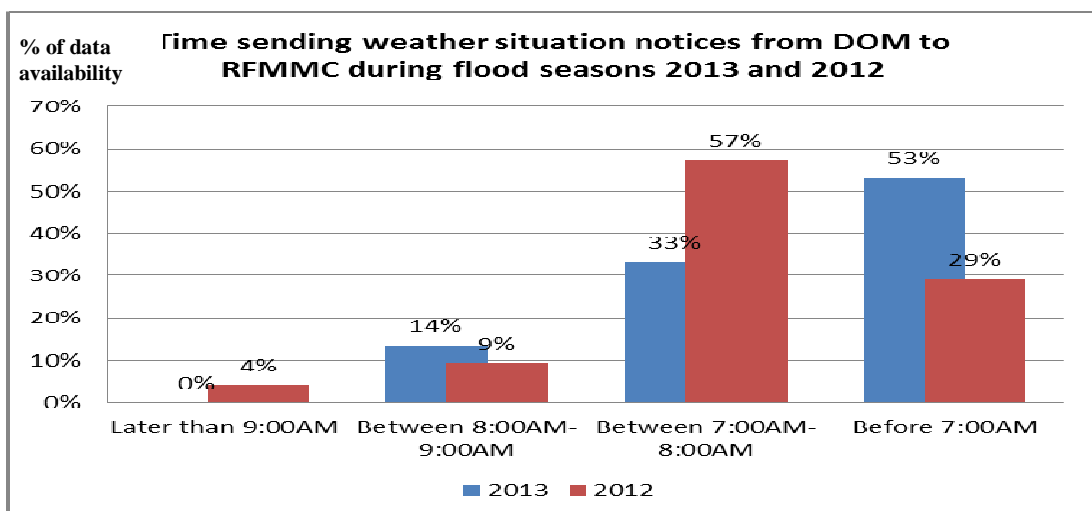


Figure 3-6 Chart representing the percentage of notices received and categorized by times sending from the DOM to the RFMMC during flood season 2013 and 2012.

3.3 Data transfer from the DMH to the RFMMC data terminal

The hydro-meteorological data were provided every month during the flood season 2013 and some 41% of the data was sent through the DMH, Lao PDR data terminal to FTP of the RFMMC. Compared a result in the 2012 flood season, 57% of data was sent to RFMMC and this was shown that data sent in the 2013 flood season was declined and not improved. In this regard, extra efforts should be provided prior the next flood season 2014 in responding to the need of the DMH. However, the data trend line in the 2013 flood season was shown that number of data sent was risen from the beginning to the end of the flood season and hopefully this would be continued to improve for the next flood season with affirmed supports from all key stakeholders involved such as RFMMC, IT expert of MRC OSV and DMH/LNMCS. It was encountered that missing data was generally occurred every 2-3 days during the flood season, especially in June and July. Figure 3-7 shows the chart representing percentage of data sent by month from stations of the DMH, Lao PDR to RFMMC data terminal during the flood seasons 2013 and 2012.

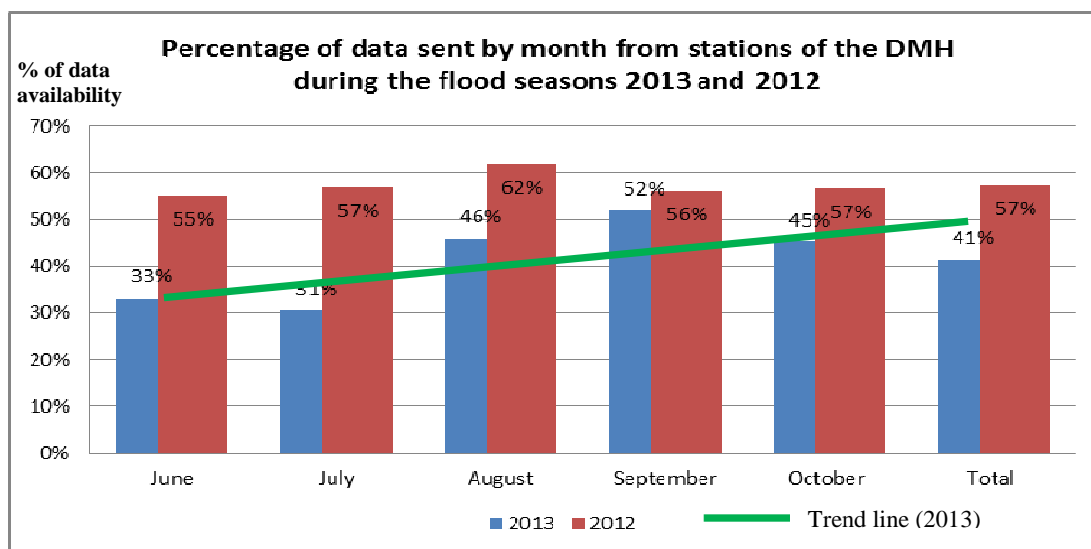


Figure 3-7 Chart representing the percentage of data availability by month sending from the DMH to the RFMMC during flood season 2013 and 2012.

According to the records of data sending time in the RFMMC data log sheet during 2013 flood season, only 64% of the data was sent by the DMH, Lao PDR to the RFMMC data terminal before 9.00am and 36% was after 9.00am. 54% was sent between 8.00am and 9.00am and only 11% was sent before the preferred time before 8.00am. 3% of data were shown no time recorded. Therefore, it was evaluated that data sending time during the 2013 flood season was a bit improved in compare with the 2012 flood season although data availability was declined.

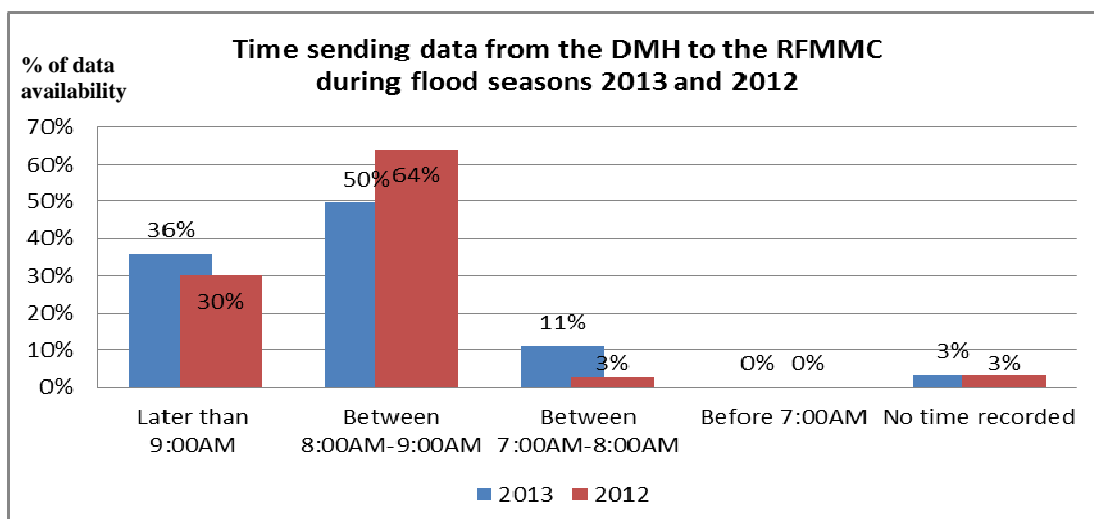


Figure 3-8 Chart representing the percentage of data availability categorized by times sending from the DMH to the RFMMC during flood season 2013 and 2012.

The following were some problems associated with the performance of data collection and data transfer during the 2013 flood season and these problems should be addressed from the 2014 onwards:

- 12 rainfall stations networks (e.g. Sayaboury; Xieng Ngeun; Oudomxay; Phonsaly; Moug Namtha; Ban Signo; Xieng Khoung; Ban Chan Noi; Moug Phil; Laongam; Moug Nong and Nikum) had suggested to repair/improve.
- Level of the internet connection at DMH for data transfer to RFMMC.
- Level of communication between DMH staff and the observers such as budget to purchase prepaid SIM cards, mobile phone, and the reliability of on-line reach from the isolated stations to the DMH and etc.
- Level of staff capacity in the use of the mobile phone to create the SMS message for sending the data to DMH data terminal
- Level of the understanding and the applications of the Hydmet software and general IT of the key DMH staff to those who use the Hdymet and mage data collection and tr4ansfer.
- The capacity of the old computer at DMH to store/download and transfer large data and files. However, a new computer was provided in December 2013 and required the assistant from either the IT staff at MRC OSV and/or Hydmet experts during his mission in June 2014.

To conclude, the evaluation of data collection and transfer performance from DMH of Lao PDR to RFMMC during the flood season 2013 was somehow maintained its performance. However, technical aspects of stations networks and communication including coordination should be further strengthened.

3.4 Data transfer from the DWR to the RFMMC data terminal

The DWR transferred the hydro-meteorological data to RFMMC in regular basis during the flood season 2013 and some 98% of the data was sent from the DWR data terminal to FTP of the RFMMC. Compared a result in the 2012 flood season, 1% was increased and this was shown that this year performance was better and/or remained high level of data transferred to RFMMC (i.e. between 97% and 98%). The lowest percentage (92%) was in August 2013 when the person in charge of data transfer to RFMMC was on field mission. However, the trend line for 2013 seemed stable. We recognized that DWR has very good coordination and communication. Figure 3-9 shows the chart representing percentage of data sent by month from stations of the DWR, Thailand to RFMMC data terminal during the flood seasons 2013 and 2012.

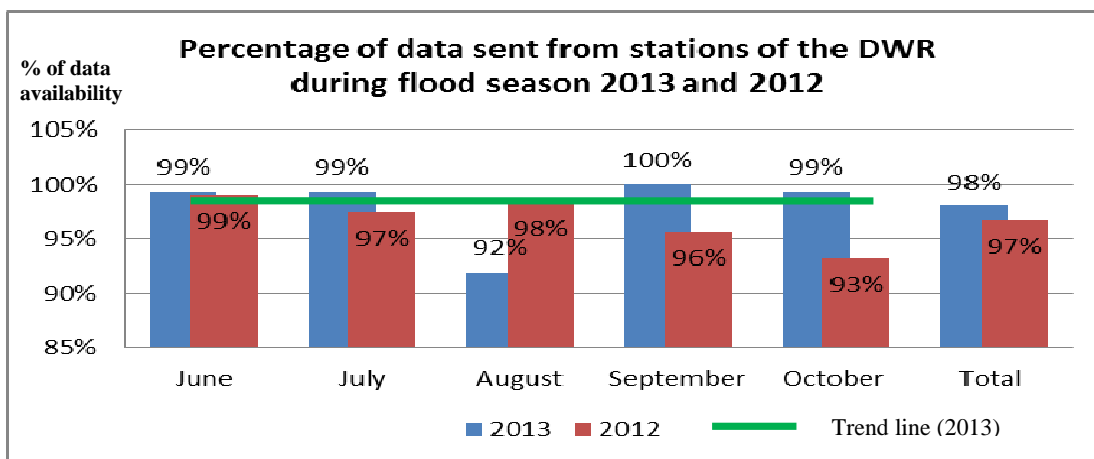


Figure 3-9 Chart representing the percentage of data availability by months sending from the DWR to the RFMMC during flood season 2013 and 2012.

97% of data sent to RFMMC was received before 9.00am of which majority (59%) received between 7.00am and 8.00am. However, 2% of data received later than 9.00am, but no effect to the flood forecast due to extended time sometimes to 10.30am. To compare the result in 2012, the 2013 time sending data to RFMMC was maintained almost the same times. Figure 3-10 shows the percentage of availability of data categorized by times sending from DWR to the RFMMC during flood seasons 2013 and 2012. The RFMMC also appreciated DWR often sent data through both Hydmet and e-mail to RFMMC.

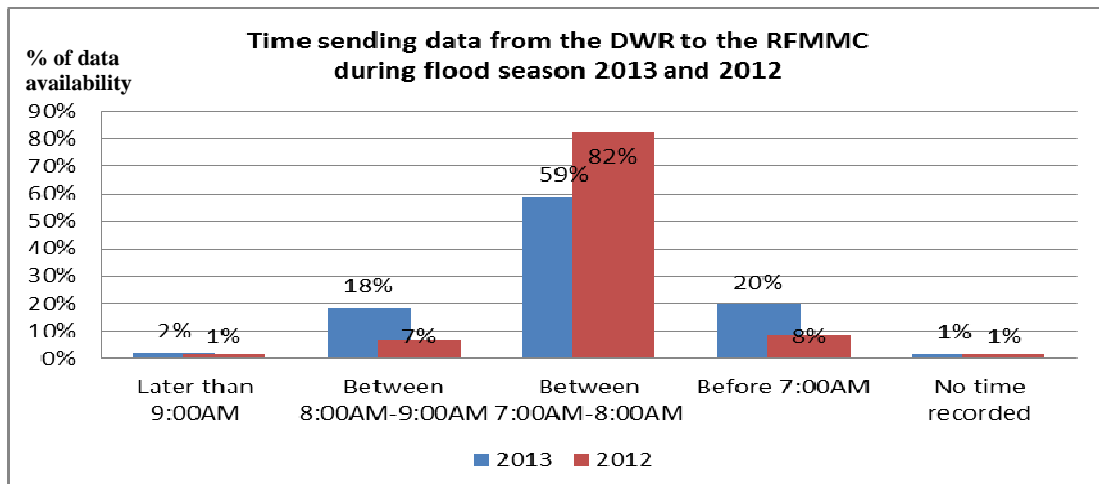


Figure 3-10 Chart representing the percentage of data availability categorized by times sending from the DWR to the RFMMC during flood season 2013 and 2012.

The performance of the data collection and transfer from DWR, Thailand to RFMMC during the flood season 2013 is very satisfactory. This was proved that the DWR, Thailand has familiar with the data transfer mechanisms and understanding the data transfer schedules between the field observers to DWR and then to RFMMC.

3.5 Data transfer from the HMS to the RFMMC data terminal

The hydro-meteorological data were provided in regular basis during the flood season 2013 to RFMMC and 89% of the data was sent daily through the SRHMC and NRHMC of HMS data terminal to FTP of the RFMMC. Compared a result in the 2012 flood season, data sent was only 66% and this was shown an increase of 23%. In addition, the data trend line for 2013 was slightly rose up between 87% and 91% during the period. It means that every month data sent was maintained at around 90%. This was indicated that the coordination and communication of the HMS with their field observers were better in compare to the last year. Figure 3-11 shows the chart representing percentage of data sent by month from stations of the HMS of Viet Nam to RFMMC data terminal during the flood seasons 2013 and 2012.

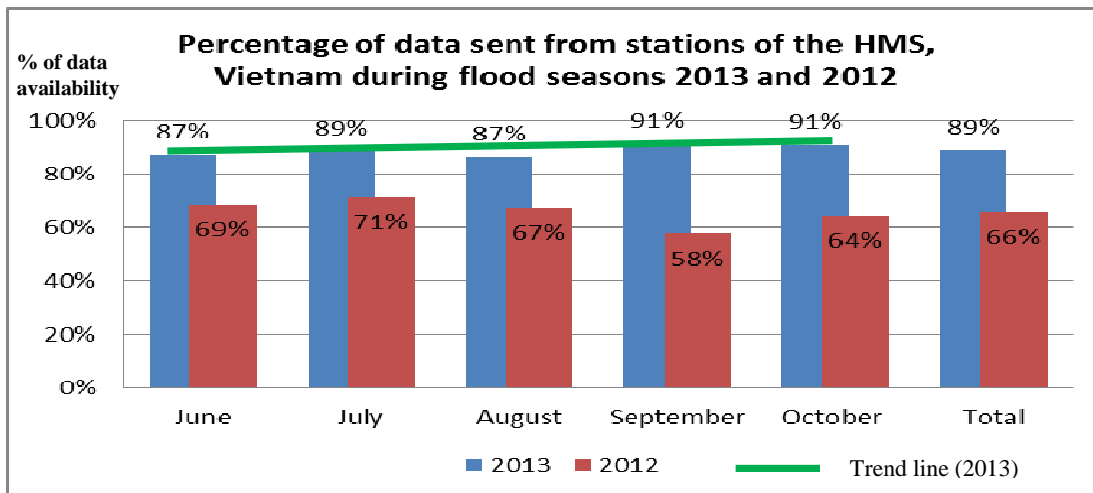


Figure 3-11 Chart representing the percentage of data availability by months sending from the HMS to the RFMMC during flood season 2013 and 2012.

98% of data was sent during the 2013 from the HMS, Viet Nam to the RFMMC data terminal before 9.00am (in 2012 was 96%) of which the majority (i.e. 84%) was 7.00am and 8.00am. This year only 1% each respectively data sent later than 9.00am and no time record, but in 2012 was 2% falls under these categories respectively. This was clear that time sending data to RFMMC were better and improved in comparison with the 2012. Figure 3-12 shows the sending time of data from the HMS, Viet Nam to the RFMMC during flood seasons 2013 and 2012.

The performance of the data collection and transfer from HMS of Viet Nam to RFMMC during the flood season 2013 is satisfactory and hopes that with continuous supports from RFMMC and HMS, the data collection and transfer would reach at very satisfactory level in the next season when issues are well defined and addressed, especially on technical aspects of the stations networks. The schedule of sending data was not an issue.

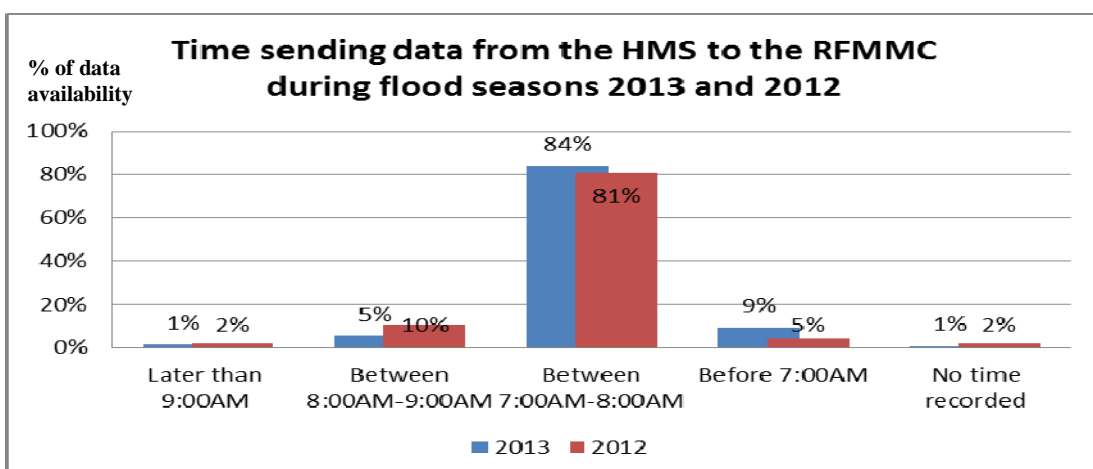


Figure 3-12 Chart representing the percentage of data availability categorized by times sending from the HMS to the RFMMC during flood season 2013 and 2012.

3.6 Review the planned activities related to data collection in 2012 flood season

In order to have a smooth implementation of data collection and data transfer through the Hydmet from observation stations to national lines agencies and then to the RFMMC, an action plan (it was mentioned in the previous report of performance of data collection and transfer for flood season 2012) had been carried out and accomplished, which was formulated in close consultation with the national line agencies. The result of the implementation of the action plan for improvement of data collection and transfer for flood season 2012 is presented in the Table 3-1 below.

Table 3-1 Implementation status of the RFMMC’s Action Plan for the improvement of data collection and transfer during the 2013 flood season.

Time line	Work Activities	Status of Implementation
May- June 2013	Preparation of new MOU and contract for data collection and transfer	<p>Complete</p> <ul style="list-style-type: none"> - 4 MOUs with DHRW, DOM, DMH and HMS were accepted and signed in August 2013 - TOR 2013-2014 for Thailand was accepted and signed in September 2013
June- October 2013	Proposed solutions to improve the performance of data collection and transfer during the 2013 flood season	<p>a. Improvement of internet communication and protection of the Hydmet database computer: On-going</p> <ul style="list-style-type: none"> - No problem for DHRW, DWR and HMS. - DOM has plugs issue and had been resolved including the internet line fee was paid. - DMH Lao PDR data transfer has been assessed and provided temporary solutions to DMH by IT expert of MRC OSV - New computer were provided to all line agencies and NMCs <p>b. SMS mobile phone connection: On-going</p> <ul style="list-style-type: none"> - No report about the problem rather than request on-job training on the use of SMS message by DMH. MRC RFMMC provided prepaid SIM cards to all stations. <p>c. Back-up system for data transfer: On-going</p> <ul style="list-style-type: none"> - Two National Line Agencies sent data daily by both Hydmet and e-mail (i.e. DHRW and DWR). - RFMMC prepared the template and advised other three line agencies to send data by e-mail also. <p>d. Improvement of Hydmet software: On-going</p> <ul style="list-style-type: none"> - Time frequency of data receiving from stations was twice daily - Improving automatic export data tool. The contracted was signed and activity was commenced in February 2014 and would accomplish in June 2014. <p>e. Distribution of new release version of Hydmet: Complete</p> <ul style="list-style-type: none"> - Guided and provided instruction of the new Hydmet software to all Hydmet users.

4. Issues and Problems for Data Transfer during the Flood Season 2013

Due to the above mentioned the following associated problems with data collection and transfer for operational flood forecasting during the 2013 flood season have been reported and identified:

- A delay of MOUs/TOR for about several months causing some delays of data transfer. However, the RFMMC takes proactive approach by providing cash advance in July 2013 in order to immediately address the issue.
- Level of data received from DHM to the RFMMC. It was not so clear what the actual problem were either at data terminal of DMH or at the observation stations. However, the IT expert of OSV visited the DMH and preliminary found out some issues such as the weakness of the internet at DMH, lack of mobile phone and data collector skills in using SMS to send the data to the DMH, poor/broken rain gauge and rainfall measuring glass (when they provided by RFMMC during 2008). These were gradually tackled at the 1st or 2nd quarter of 2014. The similar issue at DOM on internet, but it was solved in the last quarter 2013.
- Level of the communication between the national line agency of DMH and some observation stations where they located isolate due to network coverage and its reliability.
- The problem of data transfer at DOM and DMH occurred in the beginning of the flood season 2013. This was caused by internet communication problems, quality of connection line at DOM and capacity of DMH staff in the operation of Hydmet software, the reinstallation of the new released Hydmet software and etc.
- Absence of the key staff at the observations stations and NLA data terminal (internal issue of NLA).

More details of the prioritized issues/problems categorized by each national line agency and should be addressed are presented in the Table 4-1.

Table 4-1 List of prioritized issues of each national line agency (NLA) during 2013 flood season

Issues	DHRW	DOM	DMH	DWR	HMS	RFMMC
Accomplishment of the renewable MOU/TOR for 2013-2015/16	n/a	n/a	n/a	n/a	n/a	Require annual extension of TOR for Thailand
Working conditions of stations networks that is required to repair and/or replace	3	2	1	n/a	3	Carry out joint field missions with NLA staff to some stations of Cambodia and Lao PDR
Back-up system for data transfer	n/a	2	1	n/a	2	Require both means of data transfer (i.e. thru Hydmet and excel file by e-mail)
Reliability of internet connection at the NLAs and coverage of the mobile phone network at the stations	n/a	n/a	1	n/a	n/a	MRC IT may assess and provide advice if necessary
Hydmet system in exporting data and providing time stamp of every entry	2	2	2	2	2	Provide financial support for the Hydmet improvements
Technical capacity of field observers in the use of SMS for data transfer to the NLA's data terminal	n/a	3	1	n/a	3	Would be considered if request
Mobile phones and prepaid SIM card for sending data from the station to the NLA's data terminal	2	1	1	n/a	2	Provide financial support to NLAs

Note: n/a-not applicable; 1 high priority, 2 medium priority, 3 low priority

5. Summary, conclusions and proposed actions for flood season 2014

5.1 Summary and conclusion

During the flood season 2013, five national line agencies of four MRC Member Countries provided the hydro-meteorological data and weather situation notices to FTP of the RFMMC for flood forecasting and flash flood guidance system. In Cambodia, data were getting through two departments (DHRW and DOM); Lao PDR- DMH; Thailand-DWR and Viet Nam-HMS.

The data were collected and transferred from 146 stations of which 34 stations were located in the mainstream of Mekong Rivers including Bassac and Tonle Sap and 112 from tributaries and other main water bodies. However, some stations in Lao PDR data were not available due to number factors. 96 weather situation notices were provided by DOM, Cambodia.

The data collection and transfer performance evaluation were based on three ways: 1) data availability at the Hydmet careless time sending; 2) percentage of data availability at the RFMMC and 3) percentage of data availability by sending time.

In overall observation and analysis, it was found that the level of performance of all NLAs was maintained at same level in comparison with the 2012 flood season. It means that data were available almost 153 days from majority of stations, except only in Lao PDR, some stations no provided data at all.

Regarding with the percentage of data availability or data transferred to RFMMC data terminal during the flood season 2013 were improved for DHRW (Cambodia); DWR (Thailand) and HMS (Viet Nam). The percentage of data sent was increase 1% for DHRW (in 2012 was 95%); 1% for DWR (in 2012 was 97%) and 23% for HMS ((in 2012 was 66%) respectively. In opposite, there were a decline of data sent for DOM about 12% in 2013 (in 2012 was 77%) and for DMH about 16% ((in 2012 was 57%). 96 weather situation notices were received as same number as in 2012.

About percentage of data sent before 9.00am were found that DHRW has been improved (i.e. increase 3% when in 2012 was 96%; DOM was increased 3% (in 2012 was 83%); DMH declined 6% (in 2012 was 30% only); DWR was maintained at 97% and HMS was increased 2% (in 2012 was 96%). Time sending of the weather situation notices from DOM this year was 100% buffer 9.00am when in 2012 was 96%.

See details by NLA and countries in the Table 5-1 below.

To conclude for the 2013 flood season, the data collection and transfer performance was improved for DHRW, DWR, HMS, except DOM and DMH. Therefore, extra efforts should be provided and addressed in order to meeting the needs and answering the real issues either at NLS data terminal and/or at observation stations.

Table 5-1 summary of data collection and transfer performance of each NLA during the 2013 flood season in comparison to the 2012 flood season

Name of national line agencies	Country	Data availability at NLA data terminal (compared with the 2012)	Data availability at RFMMC data terminal (compared with the 2012)	Time sending data to RFMMC before 9.00 am (compared with the 2012)	Time sending data to RFMMC later than 9.00am (compared with the 2012)	General remarks for the 2013 flood season (compared with the 2012 flood season)
DHRW	Cambodia	15 (15)	96% (95%)	98% (98%)	1% (1%)	Maintained at very good level
DOM	Cambodia	34 (34)	65% (77%)	100% (96%)	2% (1%)	Maintained
DMH	Lao PDR	34 (32)	41% (57%)	61% (67%)	36% (30%)	Not improved
DWR	Thailand	13 (13)	98% (97%)	97% (97%)	2% (1%)	Maintained at very good level
HMS	Viet Nam	44 (44)	89% (66%)	98% (96%)	1% (2%)	Improved

Red color should be put more attention

5.2 Proposed activities for preparation of data collection and transfer during the 2014 flood season

a. 2014/15 TOR for data collection and transfer for Thailand

Recognizing the vital role of the hydro-meteorological data in process of flood forecast and river monitoring at the RFMMC and also considering the follow up of the effective implementation of renewable MOU for Cambodia, Lao PDR and Viet Nam and TOR for Thailand in June 2014, the following activities should be taken by RFMMC before the coming flood season 2014 as below:

- Plan and implement stations networks improvements for all four line agencies (action by DHRW, DOM, DMH and HMS in the 1st and 2nd quarter 2014)

- Conduct a national consultation meeting with DWR and TNMC to renew 2014-15 TOR and get it signed off (action by: RFMMC in cooperation with TNMC in the 2nd quarter 2014)
- Encourage the submission of the progress report for the financial transfer on time.

b. Improvement of internet communication, install and transfer data and Hydmet software to new computers include SMS mobile phone connection

- Review and select a reliable internet services provider if necessary (action by line agencies if necessary with the input from IT of MRCS before the flood season 2014)
- Ensure that antivirus software of Hydmet database computer was updated and well protected from the computer virus. (action by line agencies before the flood season 2014)
- Ensure that connection of Hydmet database computer and electricity system with the ground connection line was well established that will protect the computer and SMS modem from the lightning, (action by line agencies before the flood season 2014)
- Investigate the SMS problem with mobile phone providers (action by line agencies before the flood season 2014)
- Hydmet database operator check the validity (air time) of the SIM card of SMS modem, which is connected to Hydmet database computer, and/or SIM card used for the modem is to be subscribed for “postpaid” payment and verify the contact between SIM card and modem (action by line agencies in cooperation with the Hdymet expert during the mission to each national line agency in first and second week of June 2014)
- Ensure all software include new version are installed and updated in the new computers (action will be provided by Hydmet expert during on-the job training and mission to each NLA in the first and second week of June 2014)

c. Back-up system for data transfer

- National Line Agencies to send data by E-mail in case the Hydmet does not function, but to secure that data are made available in a timely manner (action by line agencies of DOM, DMH, HMS during the flood season 2014). DHRW and DWR already made data transfer by e-mail in the 2013 and will continue.
- Use facsimile and other means (phone calls) in case of internet connection breakdown (action by line agencies during the flood season 2014).

d. Improvement of Hydmet software

- Increase the time record of every data entry and distribute a new release version of Hydmet software to be done through the RFMMC. The RFMMC needs to check and verify the new release version before its distributions to National Line Agencies concerned (Action by Hydmet expert in the first-second week of June 2014)
- Develop and check a tool to automatically validate (air time) SIM card of SMS modem connected to Hydmet computer (action by Hydmet expert I the first-second week of June 2014)
- Improve automatic export data tool. The name of export file should be indicated the date and time (propose to develop name of export data file like “yyyy, mm, dd, hh, mn”). (action by Hydmet expert I the first-second week of June 2014)
- Create a tool (for Hydmet data terminal at line agencies) to automatically send the SMS data logger file to Hydmet FTP at RFMMC. For example at 1st July 2014. The Hydmet at data terminal of national line agencies automatically send the SMS data logger file for the previous month (June) C:\MRCdata\TEMP\SMS\sms-1006, to FTP Hydmet at RFMMC. The SMS data logger file contains the information about the time of sending the data from each observation station to the Hydmet data base at national line agencies, this information is usefully for RFMMC to analysis the time sending data from each station and find out the solution to improve the time sending data for specific station which was late to send data to Hydmet data terminal. (Action by Hydmet expert in the first-second week of June 2014).

e. Other, but not limit to

- Carry out others tasks deem necessary and findings from the field assessment and improvements of the station networks. This may include training and provide other support such as prepaid cards and data collection and O&M costs and etc.

References

MRCs, 2013: Signed MOU and TOR for the hydro-meteorological data collection and transfer from MRC MCs NLAs to RFMMC for 2013-2015/16

NLAs, MCs, 2013: Progress reports on data transfer and O&M during the flood season 2013

RFMMC, March 2013: Report on data collection, data transfer and performance of Hydmet for hydro-meteorological data transfer for the 2012 flood season, key issues and actions required prior to the 2013 flood season

RFMMC, Nov 2013: Hydmet profile for the flood season 2013 and 2012

RFMMC, Nov 2013: Log sheet excel files for the flood season 2013 and 2012