# Mekong River Commission

## Regional Flood Management and Mitigation Centre

# Weekly Flood Situation Report for the Mekong River Basin

**Prepared on: 10/09/2012, covering the week from the 03rd August to the 09th September 2012**

## Weather Patterns, General Behaviour of the Mekong River and Flood Situation

### General weather patterns

During the week of 03rd September to 09th September 2012, six weather bulletins were issued by the Department of Meteorology (DOM) of Cambodia. The weather charts of the 03rd September to the 09th September bulletins are presented in the figures below:

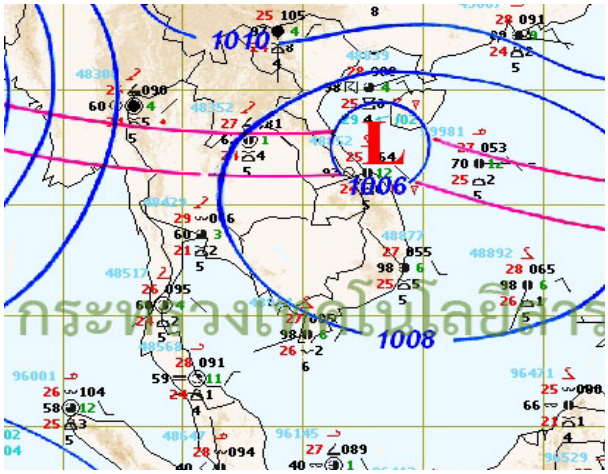



**Figure 1: Weather map for 03rd September 2012**

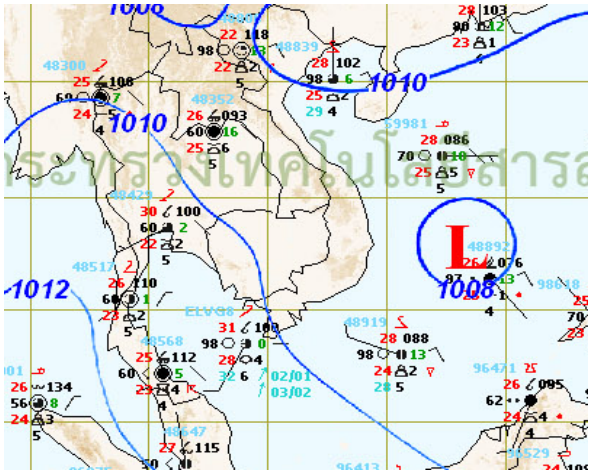



**Figure 2: Weather map for 09th September 2012**

South-West (SW) Monsoon

Moderate SW monsoon prevailed over Amanda Sea and the Gulf of Thailand for the whole last week (Figure 1and 2).

Inter Tropical Convergence Zone (ITCZ)

Inter Tropical Convergence Zone (ITCZ) was observed in the beginning and till almost the end of last week (Figure 1 and 2). It laid across Myanmar, Lao PDR, Cambodia and Viet Nam.

Tropical depressions (TD), tropical storms (TS) or typhoons (TY)

During last week, none of Tropical depressions (TD), tropical storms (TS) or typhoons (TY) has been observed.

Other weather phenomena that affect the discharge

No other weather phenomena affecting the discharge were observed.

Overall weather situation

A severe weather situation appeared from the first half of the week then resolved into normal weather situation for the rest. As a result of ITCZ and SW monsoon activity, heavy rain occurred in the North of Myanmar; in the North and Northeast of Thailand; in the South and the Central of Lao PDR, the Central and South of Vietnam; in the Northwest of Cambodia. Figure 3 illustrates rainfall amount distribution over the LMB, covering 03 September - 10 September 2012, in which heavy rain was

observed in the upper part of the LMB, from Chiang Sean to Chiang Khan, some tributaries in the middle part from Nakhon Phanom and Thakhek.

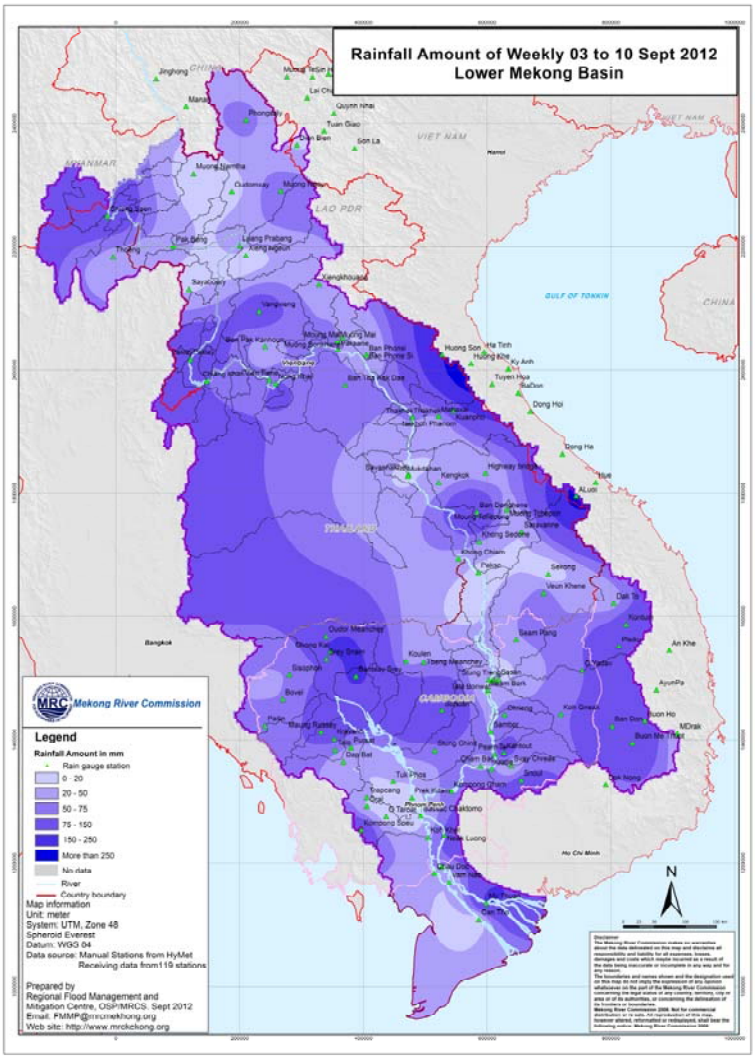



**Figure 3 : Rainfall distribution over the LMB, from the 03rd September to 10th September 2012**

## General behaviour of the Mekong River

Except at Kratie station, the water levels of all stations in LMB were fluctuated below the long-term average for this time of the year during the reporting period. Water levels at stations in the upper and middle reaches recessed in the first half of the week and raised till the end of the week, while water levels at lower reach were raised during the first half of the week and recessed till the end of the week below the long-term average for this time of the year except Kratie that was above the long-term average.

Regarding to 2 stations in downstream at Tan Chau and Chau Doc, water levels at those 2 stations showed a small rising trend at the beginning of last week and then were more-or-less stable during the rest of last week. These stations were recording levels that are far below the long-term average for this time of the year.

### *For stations from Chiang Saen to Paksane*

Except Chiang Saen that water level was more-or-less stable, the rest were recessing in the first half of the week and rising at the end of the week during the monitoring period. All water levels were below the long-term average for this time of the year.

***For stations from Nakon Phanom/ Thakhek to Pakse***

All water levels were recessing at the first half of the week then more or less stable or slightly rising at the end of the week as a result of influences of ITCZ appearances in the first half of the week.

These stations were recording levels that are somewhat below the long-term average for this time of the year at the end of last week.

***For stations from Stung Treng to Kompong Cham***

Water level at Strung Treng to Kompong Cham were rising at the beginning and recessing at the end of reporting period. These stations were recording levels that were below the long-term average for this time of the year at the end of last week except Kratie, where was above the long-term average.

***For stations from Phnom Penh to Koh Khel. Neak Luong***

Water levels at these stations were rising at the beginning and recessing at the end of reporting period. These stations were recording levels that were below the long-term average for this time of the year.

***Tan Chau and Chau Doc***

Water levels increased at the beginning of the week and then were more-or-less stable till the end of the week. Both stations were recording levels that were below the long-term average for this time of the year and significantly affected by tidal effects.

***Note:*** for areas between forecast stations, please refer to the nearest forecast station.

**Flood Situation**

- Flood stage or alarm stage:

No alarm stage (where the forecast is expected to reach flood level within three days) was reported anywhere on the mainstream of the Mekong River during the past week. Water levels are still significantly below flood levels (as defined by the national agency) at all forecast stations.

- Damage or victims:

No damage or loss of life due to river flooding was recorded anywhere along the Mekong River during the past week.

For more details see the following annex:

- tables and graphs for water level and rainfall for the last week in Annex A
- a graph for accuracy in Annex B
- a table of forecast achievement in Annex B
- tables and graphs for performance in Annex B
- the water level graphs showing the observed water level for the season in Annex C

# Annex A: Graphs and Tables

Table A1: observed water levels

unit in m

| 2012 | Jinghong | Chiang Saen | Luang Prabang | Chiang Khan | Vientiane | Nongkhai | Paksane | Nakhon Phanom | Thakhek | Mukdahan | Savannakhet | Khong Chiam | Pakse | Stung Treng | Kratie | Kompong Cham | Phnom Penh (Bassac) | Phnom Penh Port | Koh Khel | Neak Luong | Prek Kdam | Tan Chau | Chau Doc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 03/09 | 536.74 | 4.76 | 10.92 | 10.41 | 7.65 | 8.82 | 10.99 | 9.38 | 10.45 | 9.36 | 8.20 | 11.03 | 9.12 | 8.42 | 18.45 | 12.63 | 7.82 | 6.92 | 6.60 | 5.50 | 6.77 | 2.51 | 1.94 |
| 04/09 | 536.90 | 4.84 | 10.71 | 10.50 | 7.59 | 8.70 | 10.82 | 9.20 | 10.33 | 9.19 | 8.08 | 11.17 | 9.40 | 8.80 | 19.00 | 12.93 | 7.95 | 7.06 | 6.65 | 5.58 | 6.85 | 2.52 | 1.92 |
| 05/09 | 536.96 | 4.80 | 10.46 | 10.50 | 7.70 | 8.79 | 10.65 | 8.96 | 10.04 | 8.91 | 7.83 | 10.81 | 8.90 | 9.00 | 19.42 | 13.20 | 8.13 | 7.19 | 6.76 | 5.72 | 6.98 | 2.60 | 2.00 |
| 06/09 | 537.22 | 4.74 | 10.26 | 10.27 | 7.55 | 8.71 | 10.58 | 8.75 | 9.84 | 8.61 | 7.56 | 10.37 | 8.62 | 8.81 | 19.55 | 13.43 | 8.25 | 7.33 | 6.85 | 5.84 | 7.11 | 2.68 | 2.07 |
| 07/09 | 536.99 | 4.71 | 10.13 | 10.05 | 7.26 | 8.43 | 10.57 | 8.71 | 9.80 | 8.53 | 7.42 | 9.98 | 8.28 | 8.47 | 19.36 | 13.46 | 8.30 | 7.41 | 6.88 | 5.85 | 7.16 | 2.71 | 2.11 |
| 08/09 | 537.03 | 4.70 | 10.03 | 10.22 | 7.24 | 8.31 | 10.59 | 8.83 | 9.90 | 8.59 | 7.51 | 10.04 | 8.22 | 8.19 | 18.96 | 13.31 | 8.30 | 7.41 | 6.87 | 5.86 | 7.18 | 2.73 | 2.13 |
| 09/09 | 536.79 | 4.72 | 9.92 | 10.30 | 7.38 | 8.42 | 10.66 | 8.80 | 9.91 | 8.59 | 7.51 | 10.12 | 8.27 | 7.95 | 18.55 | 13.09 | 8.25 | 7.35 | 6.83 | 5.82 | 7.18 | 2.73 | 2.15 |
| 10/09 | 536.95 | 4.82 | 10.08 | 10.48 | 7.62 | 8.66 | 10.59 | 8.69 | 9.75 | 8.47 | 7.38 | 10.15 | 8.34 | 7.83 | 18.30 | 12.90 | 8.18 | 7.26 | 6.78 | 5.78 | 7.16 | 2.72 | 2.16 |
| | | | | | | | | | | | | | | | | | | | | | | | |
| Flood level | | 11.80 | 18.00 | 17.40 | 12.50 | 12.20 | 14.50 | 12.70 | 14.00 | 12.60 | 13.00 | 16.20 | 12.00 | 12.00 | 23.00 | 16.20 | 12.00 | 11.00 | 7.90 | 8.00 | 10.00 | 4.20 | 3.50 |

Table A2: observed rainfall

Unit in mm

| 2011 | Jinghong | Chiang Saen | Luang Prabang | Chiang Khan | Vientiane | Nongkhai | Paksane | Nakhon Phanom | Thakhek | Mukdahan | Savannakhet | Khong Chiam | Pakse | Stung Treng | Kratie | Kompong Cham | Phnom Penh (Bassac) | Phnom Penh Port | Koh Khel | Neak Luong | Prek Kdam | Tan Chau | Chau Doc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 03/09 | 20.8 | 4.0 | nr | 27.1 | 21.2 | 5.8 | 1.4 | 0.1 | 2.3 | 10.6 | nr | 58.0 | 43.0 | 47.0 | 24.1 | 0.6 | 18.1 | - | nr | nr | nr | 0.2 | - |
| 04/09 | 1.0 | 23.5 | nr | 0.0 | nr | 0.0 | 0.4 | 10.4 | 26.9 | 0.0 | nr | 3.1 | nr | 24.0 | 10.6 | 10.7 | 10.7 | - | nr | 2.8 | 7.4 | 6.5 | - |
| 05/09 | 0.0 | 1.7 | nr | 16.0 | 16.6 | 0.0 | 2.7 | 27.4 | 27.4 | 2.5 | 2.2 | 6.5 | nr | 7.0 | 15.6 | 9.8 | 0.5 | - | 5.5 | 2.4 | nr | 34.9 | 25.0 |
| 06/09 | 9.0 | 5.0 | 8.4 | 0.0 | 1.5 | 1.8 | 10.6 | 1.4 | 1.9 | 0.0 | nr | 1.0 | 9.4 | 22.7 | 16.0 | 16.3 | nr | - | 32.5 | 49.2 | nr | 8.7 | - |
| 07/09 | 13.0 | 0.0 | nr | 26.8 | 4.3 | 11.5 | 4.2 | 0.8 | 2.0 | 5.0 | 10.6 | 1.0 | 2.5 | 5.0 | 7.1 | 11.5 | nr | - | nr | 24.4 | nr | 4.2 | 2.7 |
| 08/09 | 21.0 | 0.9 | 4.6 | 16.9 | 28.6 | 34.7 | 15.0 | 0.4 | 0.7 | 6.6 | 5.2 | 11.6 | nr | nr | nr | 12.1 | nr | - | 0.3 | 0.0 | nr | 0.9 | 12.0 |
| 09/09 | 0.0 | 70.8 | 7.0 | 11.7 | 4.4 | 15.4 | 0.3 | 0.0 | nr | 0.0 | nr | 1.0 | nr | 1.5 | 2.2 | nr | nr | - | nr | 6.2 | nr | 2.3 | 0.5 |
| 10/09 | 0.0 | 12.0 | 20.0 | 6.5 | 9.2 | 12.6 | 17.1 | 0.0 | 2.8 | 1.3 | nr | 14.9 | - | nr | nr | 6.4 | nr | - | nr | 0.0 | nr | 0.0 | - |

Figure A1: Water level and rainfall for Jinghong, Chiang Saen, and Luang Prabang

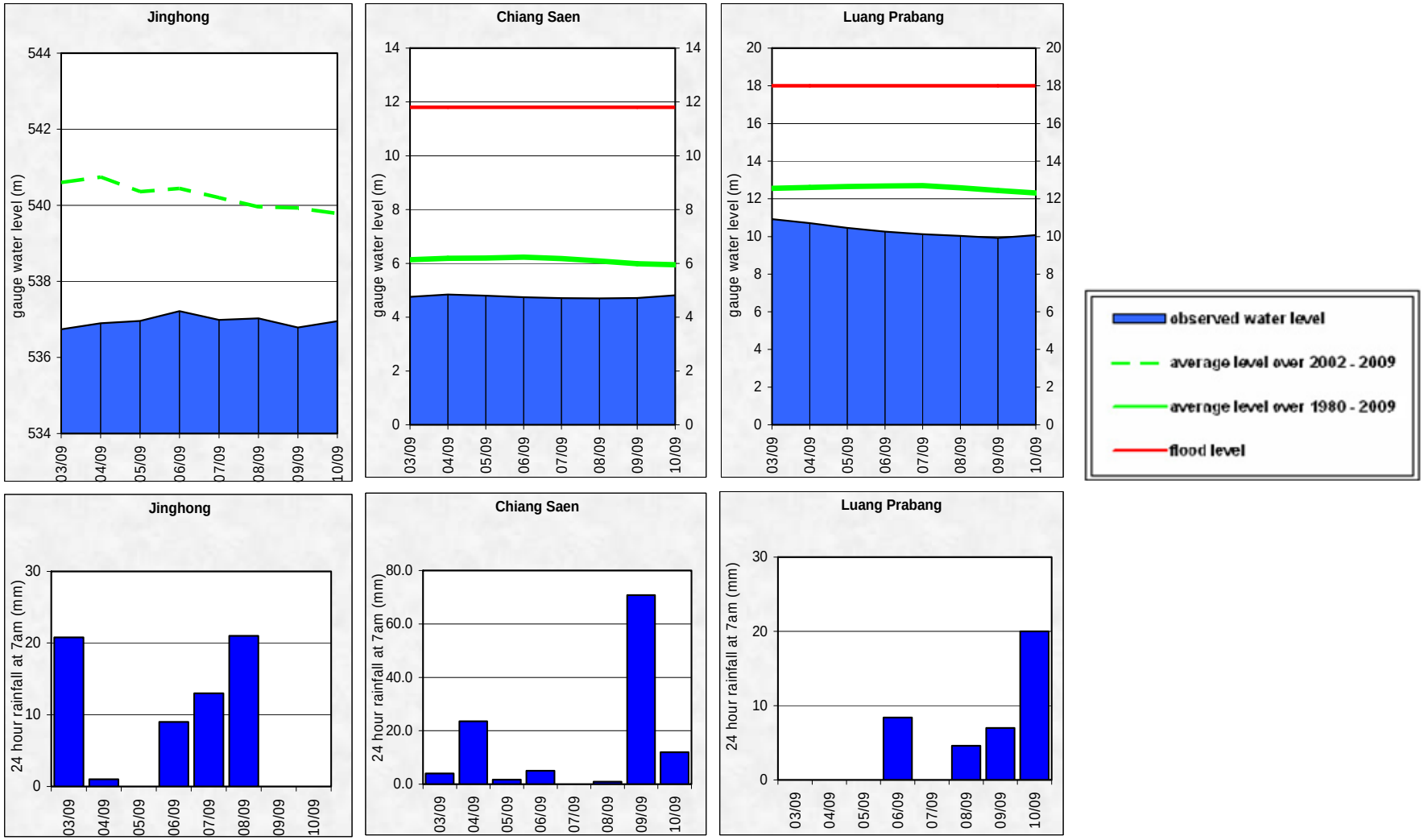


Figure A2: Water level and rainfall for Chiang Khan, Vientiane, Nongkhai, and Paksane

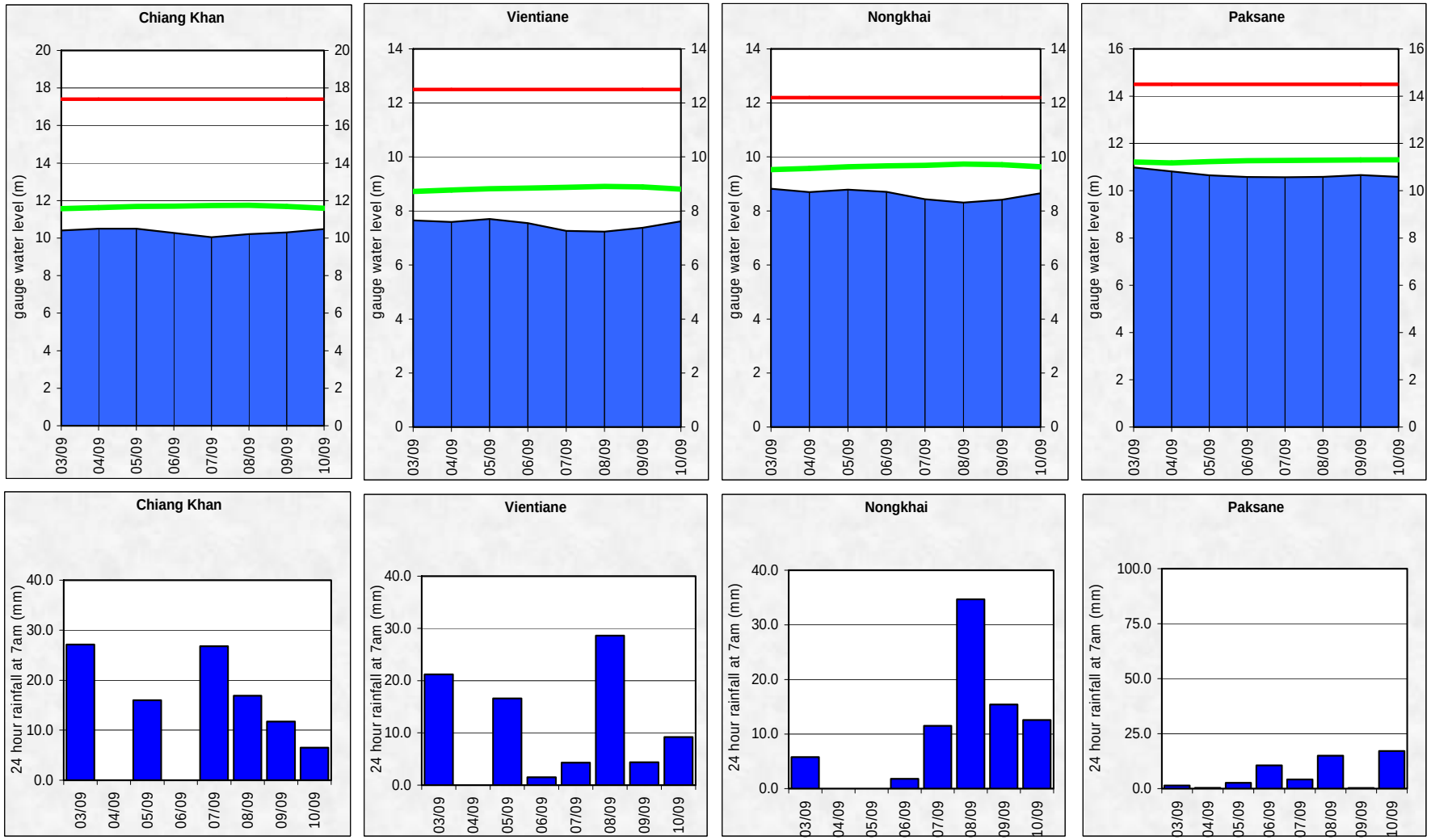


Figure A3: Water level and rainfall for Nakhon Phanom, Thakhek, Mukdahan and Savannakhet

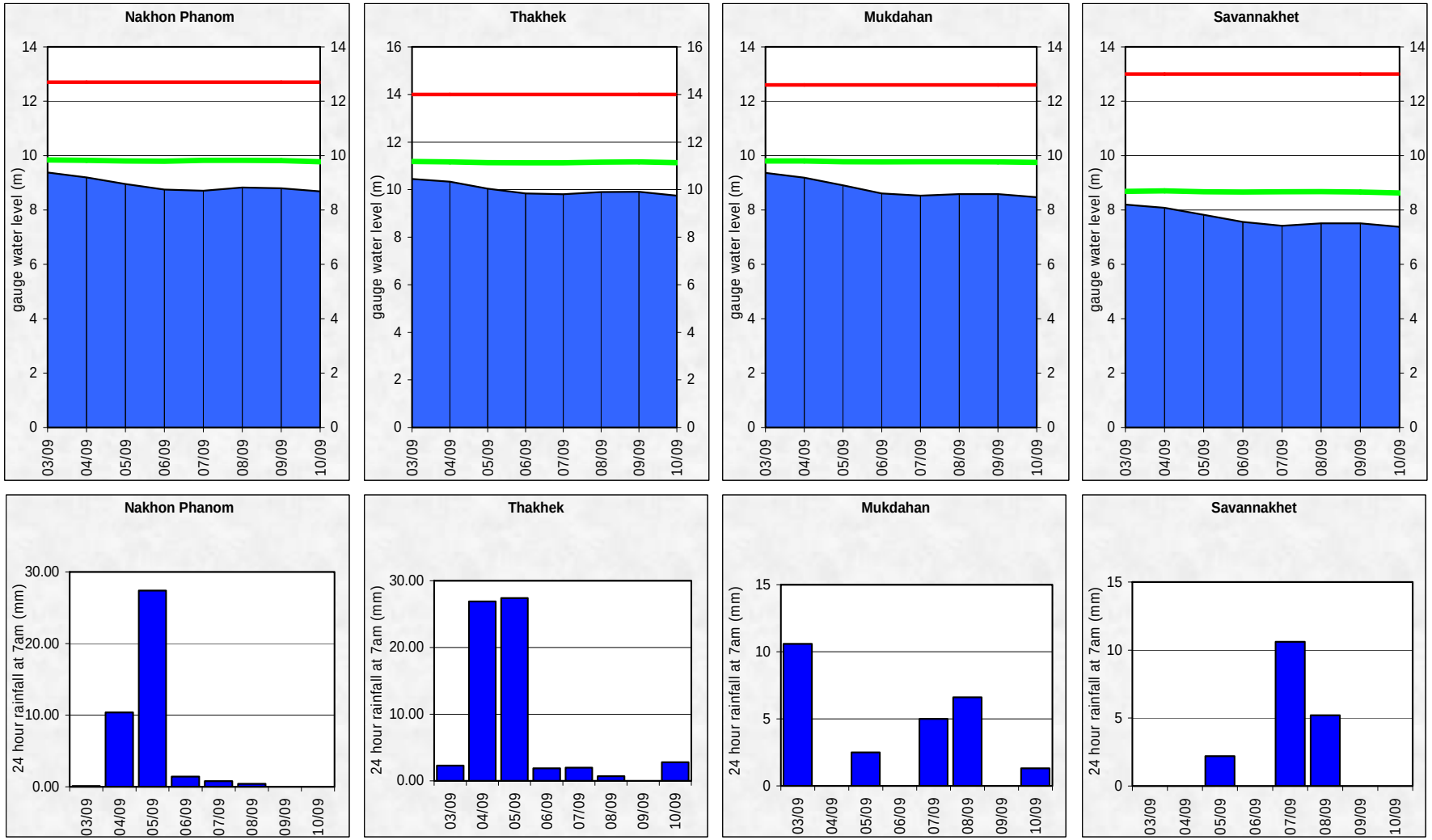


Figure A4: Water level and rainfall for Khong Chiam, Pakse, Stung Treng, and Kratie

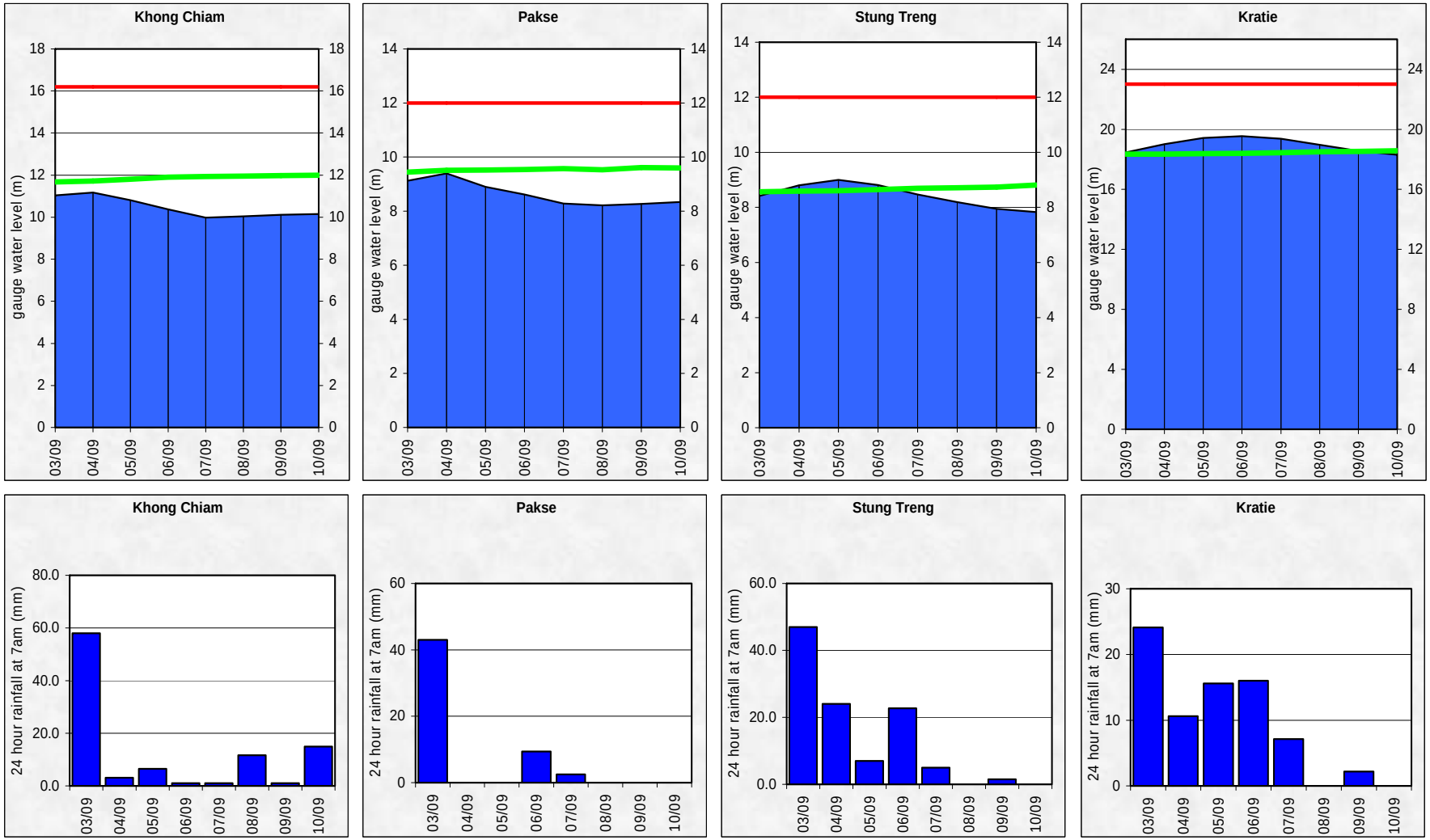


Figure A5: Water level and rainfall for Kampong Cham, Phnom Penh (Bassac and Port), and Koh Khel

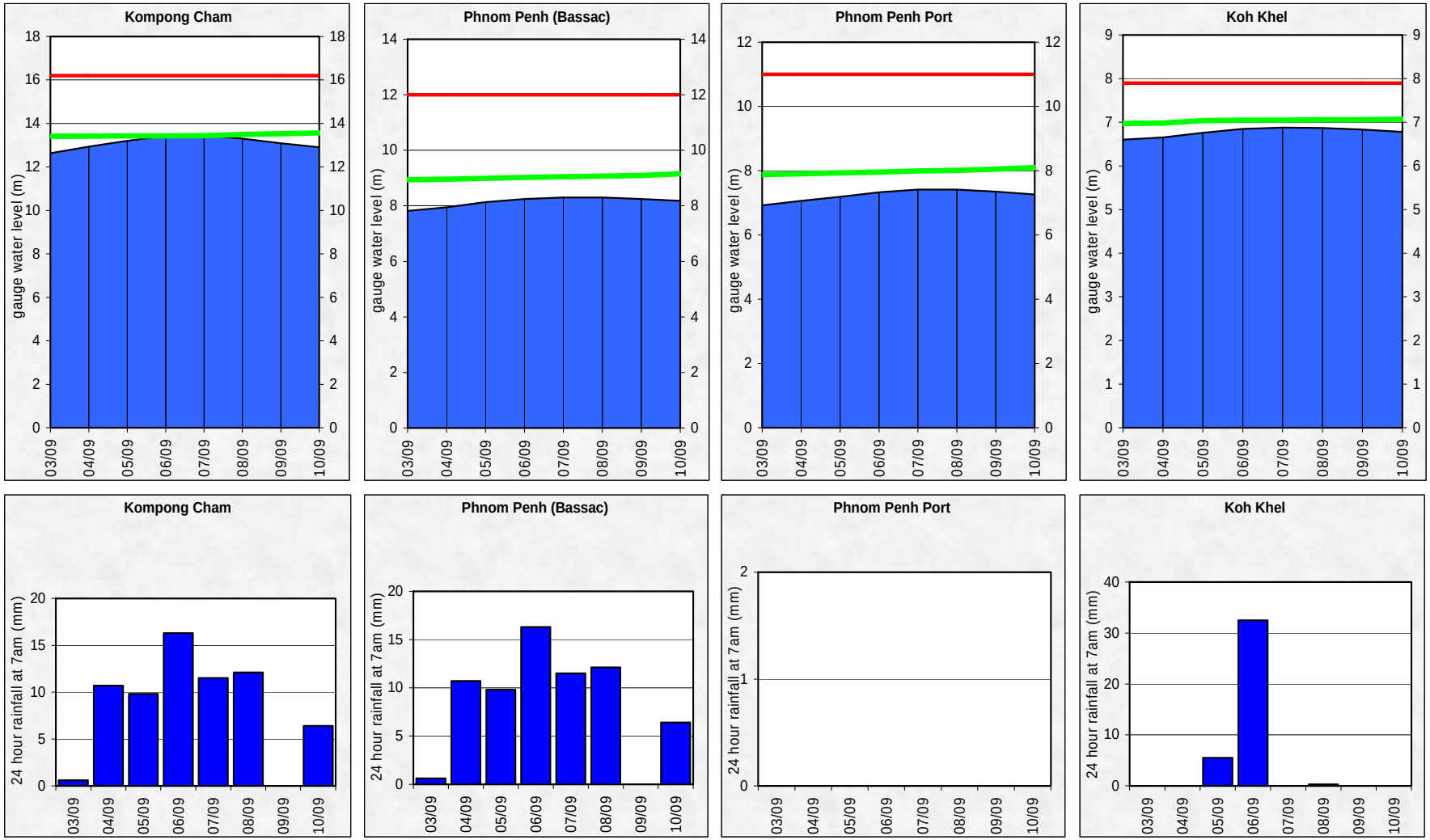
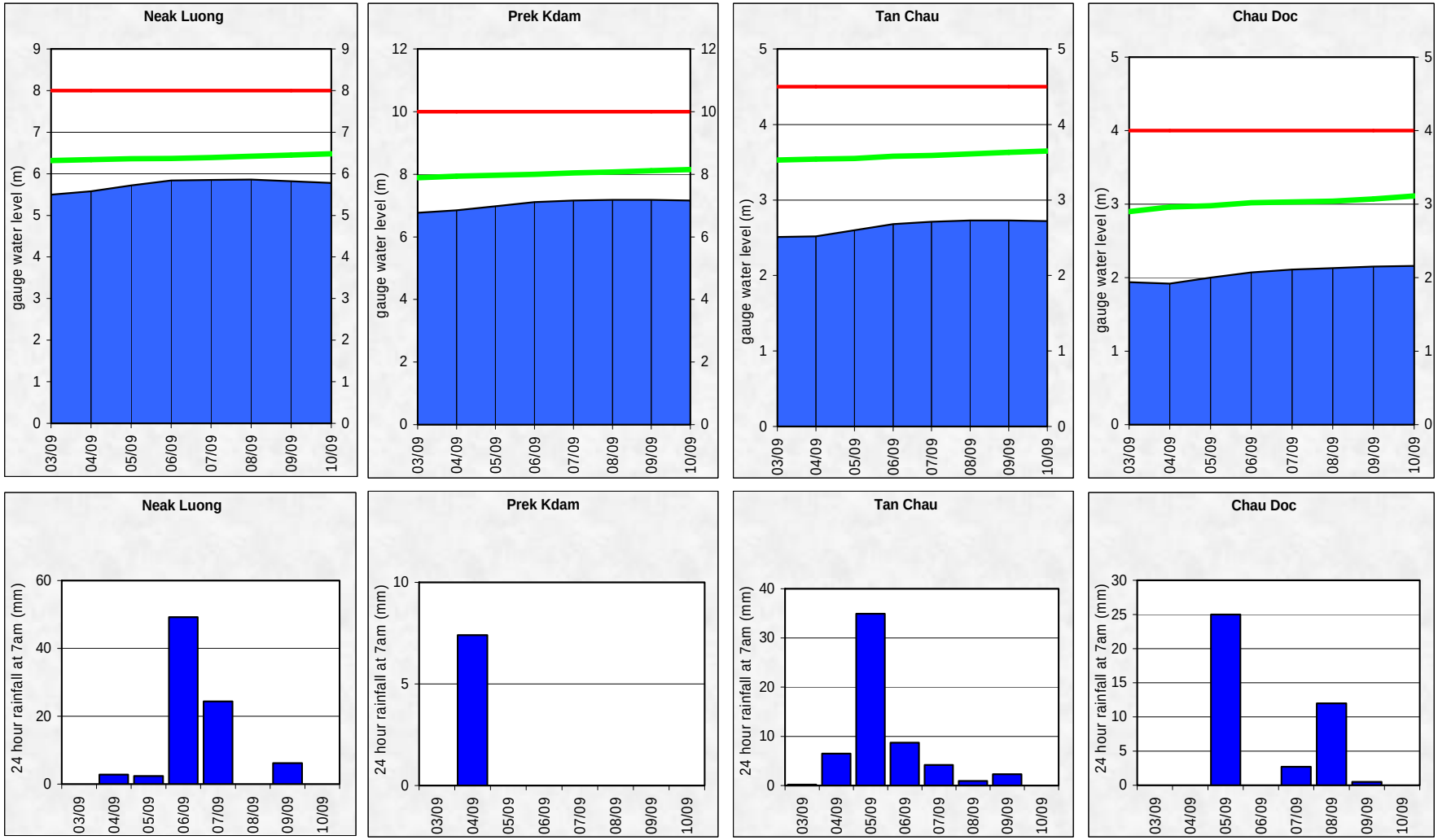


Figure A6: Water level and rainfall for Neak Luong, Prek Kdam, Tan Chau and Chau Doc



# Annex B: Accuracy and performance

## Accuracy

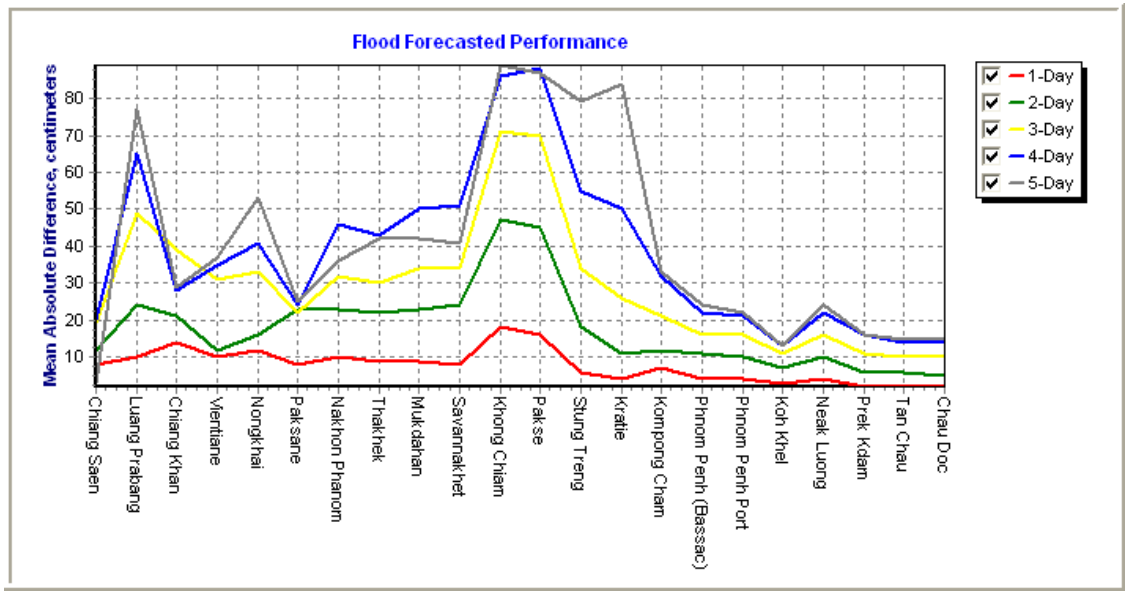
"Accuracy" describes the accuracy of the adjusted and published forecast, based on the results of the MRC Mekong Flood Forecasting System, which are then adjusted by the Flood Forecaster in Charge taking into consideration known biases in input data and his/her knowledge of the response of the model system and the hydrology of the Mekong River Basin. The information is presented as a graph below, showing the average flood forecasting accuracy along the Mekong mainstream.

The graph of average difference between forecast and actual water levels for the past week shows abnormal pattern in which the accuracy is worse in the middle reach of LMB if the forecast lead time is greater.

In general, accuracies at most stations along mainstream of Mekong River in the LMB for 1-day to 2-day forecast lead time are quite good. However, accuracies at Khong Chiam and Pakse for 2-day to 5-day forecast and at Kratie for 3-day to 5-day forecast lead time were less than expected.

The above differences due to 2 main factors: (1) high variability of the forecast rainfall NWP when critical weather appearances as ITCZ; (2) internal model functionality in forecasting especially at those stations; for which the parameter adjustment in the model is not possible.

Figure B1: Average flood forecast accuracy along the Mekong mainstream



## Forecast Achievement

The forecast achievement indicates the % of days that the forecast at a particular station for a lead-time is successful against a respective benchmark (Table B2).

Table B1: Achievement of daily forecast against benchmarks unit in %

| | Chiang Saen | Luang Prabang | Chiang Khan | Vientiane | Nongkhai | Paksane | Nakhon Phanom | Thakhek | Mukdahan | Savannakhet | Khong Chiam | Pakse | Stung Treng | Kratie | Kompong Cham | Phnom Penh (Bassac) | Phnom Penh Port | Koh Khel | Neak Luong | Prek Kdam | Tan Chau | Chau Doc | *Average* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1-day | 100.0 | 85.7 | 71.4 | 42.9 | 42.9 | 57.1 | 42.9 | 71.4 | 57.1 | 57.1 | 42.9 | 42.9 | 85.7 | 100.0 | 85.7 | 85.7 | 85.7 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | ***75.3*** |
| 2-day | 100.0 | 83.3 | 83.3 | 83.3 | 83.3 | 66.7 | 50.0 | 66.7 | 66.7 | 66.7 | 16.7 | 33.3 | 66.7 | 100.0 | 83.3 | 66.7 | 50.0 | 83.3 | 50.0 | 83.3 | 100.0 | 100.0 | ***72.0*** |
| 3-day | 80.0 | 60.0 | 80.0 | 20.0 | 20.0 | 80.0 | 40.0 | 40.0 | 40.0 | 40.0 | 20.0 | 20.0 | 60.0 | 40.0 | 60.0 | 20.0 | 40.0 | 60.0 | 40.0 | 40.0 | 40.0 | 60.0 | ***45.5*** |
| 4-day | 100.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 50.0 | 75.0 | 50.0 | 50.0 | 50.0 | 25.0 | 25.0 | 50.0 | 100.0 | 25.0 | 50.0 | 25.0 | 50.0 | 100.0 | 25.0 | 25.0 | ***56.8*** |
| 5-day | 100.0 | 66.7 | 100.0 | 66.7 | 66.7 | 100.0 | 66.7 | 66.7 | 100.0 | 100.0 | 66.7 | 66.7 | 0.0 | 0.0 | 66.7 | 66.7 | 66.7 | 100.0 | 66.7 | 100.0 | 100.0 | 100.0 | ***74.2*** |

Table B2: Benchmarks of success (Indicator of accuracy in mean absolute error) Unit in cm

| | Chiang Saen | Luang Prabang | Chiang Khan | Vientiane | Nongkhai | Paksane | Nakhon Phanom | Thakhek | Mukdahan | Savannakhet | Khong Chiam | Pakse | Stung Treng | Kratie | Kompong Cham | Phnom Penh (Bassac) | Phnom Penh Port | Koh Khel | Neak Luong | Prek Kdam | Tan Chau | Chau Doc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1-day | 25 | 25 | 25 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| 2-day | 50 | 50 | 50 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| 3-day | 50 | 50 | 50 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| 4-day | 75 | 75 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 10 | 25 | 10 | 25 | 25 | 10 | 10 |
| 5-day | 75 | 75 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |

***Note:*** *An indication of the accuracy given in the Table B2 is based on the performance of the forecast made in 2008 from the new flood forecasting system and the configuration for the 2009 flood season and is published on the website of MRC (http://ffw.mrcmekong.org/accuracy.htm).*

*A new set of performance indicators that is established by combining international standards and the specific circumstances in the Mekong River Basin, is applied officially for the flood season of 2011 onward.*

## Performance

Performance is assessed by evaluating a number of performance indicators, see table and graphs below:

Table B3: Overview of performance indicators for the past 5 days including the current report date

| | Flood Forecast: time sent | | | | Arrival time of input data (average) | | | | | | | Missing data (number) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **2012** | FF completed and sent (time) | stations without forecast | FF2 completed and sent (time) | Weather informaition available (number) | NOAA data | China | Cambodia - DHRW | Cambodia - DOM | Lao PDR - DMH | Thailand - DWR | Viet Nam - NCHMF | NOAA data | China | Cambodia - DHRW | Cambodia - DOM | Lao PDR - DMH | Thailand - DWR | Viet Nam - NCHMF |
| *week* | *10:16* | *0* | *-* | *7* | *08:12* | *08:11* | *07:19* | *06:09* | *08:41* | *07:22* | *07:08* | *0* | *0* | *8* | *51* | *132* | *2* | *69* |
| *month* | *10:23* | *0* | *-* | *19* | *08:12* | *08:11* | *07:15* | *06:13* | *08:45* | *07:22* | *07:15* | *1* | *1* | *15* | *90* | *477* | *5* | *400* |
| *season* | *10:33* | *1* | *-* | *61* | *07:43* | *-* | *07:20* | *06:10* | *08:48* | *07:23* | *07:20* | *10* | *1* | *93* | *709* | *1757* | *18* | *1348* |

*Week* is the week for which this report is made; *Month* is actually the last 30 days (or less if the flood season has just begun); *Season* is the current flood season up to the date of this report.

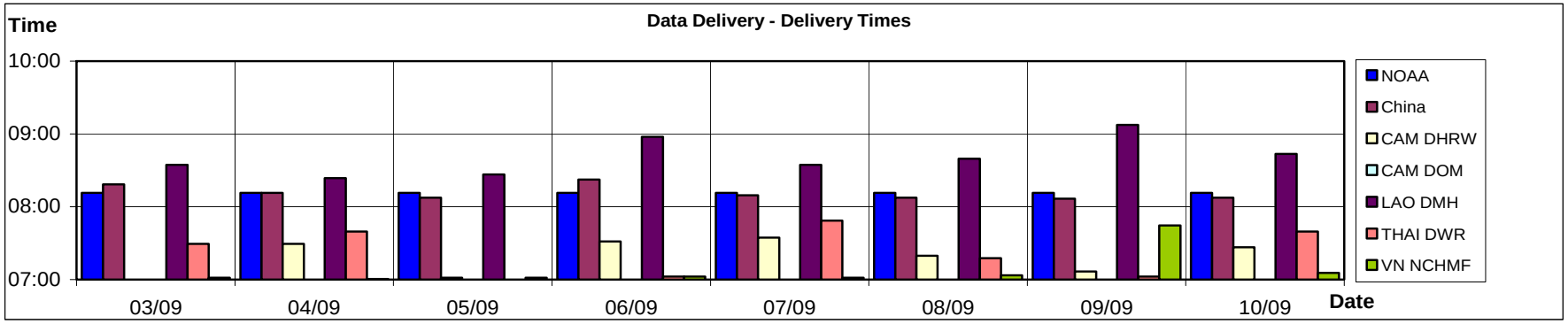



Figure B2: Data delivery times for the past 8 days including the current report date

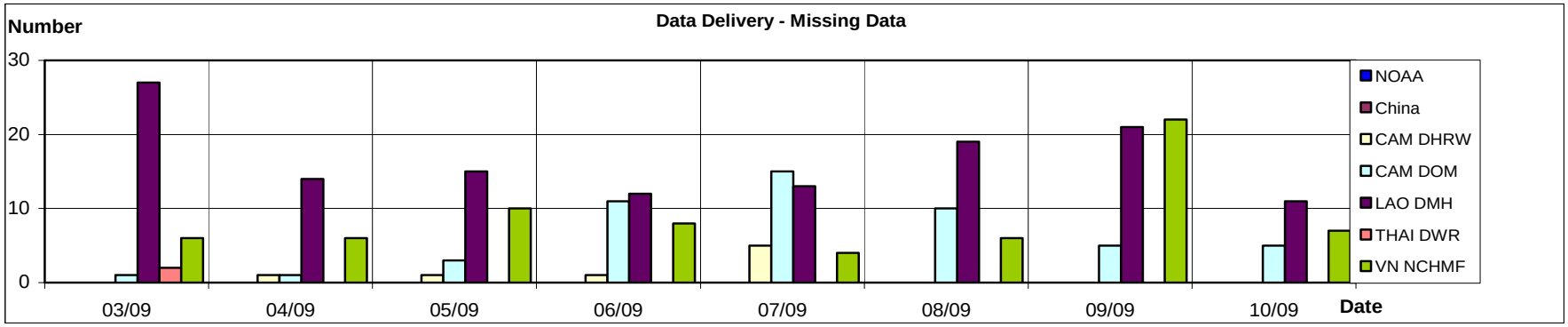



Figure B3: Missing data for the past 8 days including the current report date

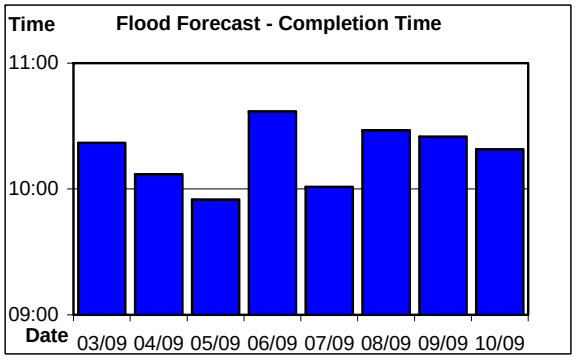



Figure B4: Flood forecast completion time

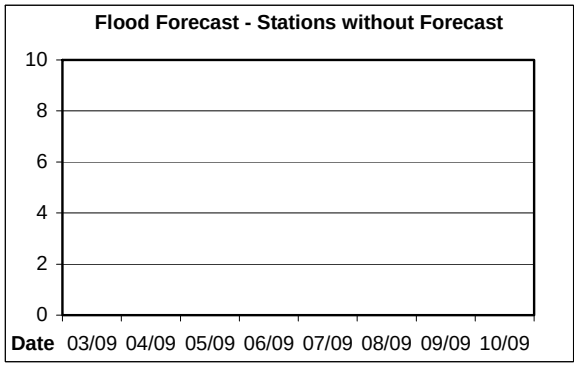



Figure B5: Flood forecast stations without forecast

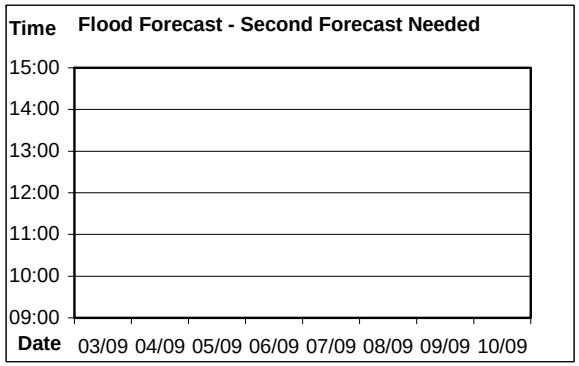


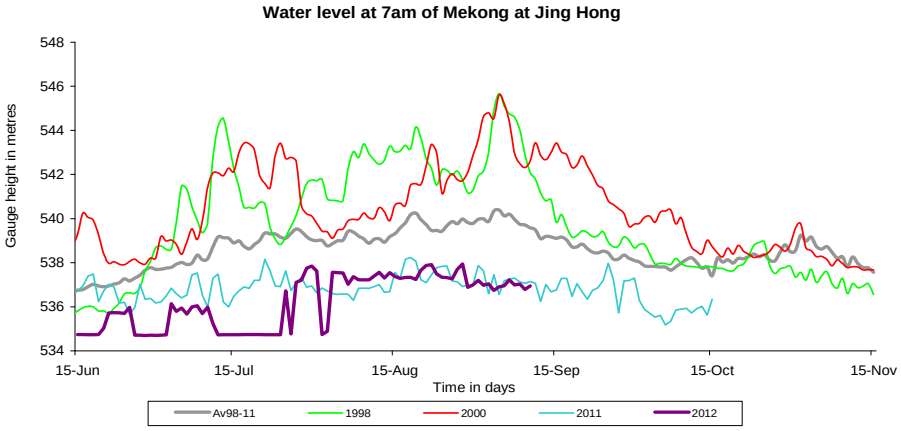

Figure B6: Second forecast needed

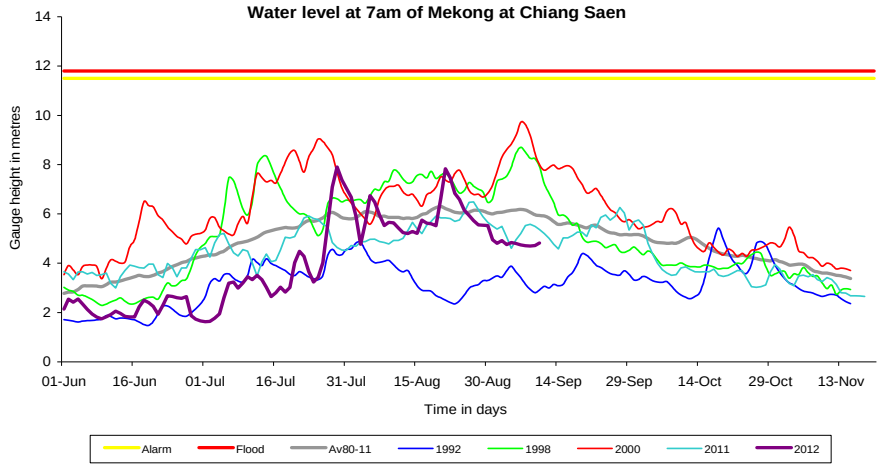
# Annex C: Season Water Level Graphs

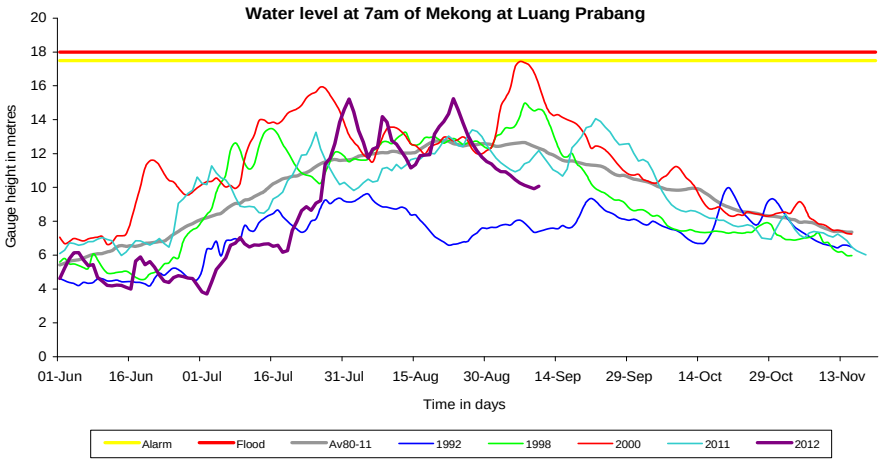
This Annex has the water level graphs of the report date. These graphs are distributed daily by email together with the Flood Bulletins.

**HYDROGRAPHS OF THE MEKONG AT MAINSTREAM STATIONS**

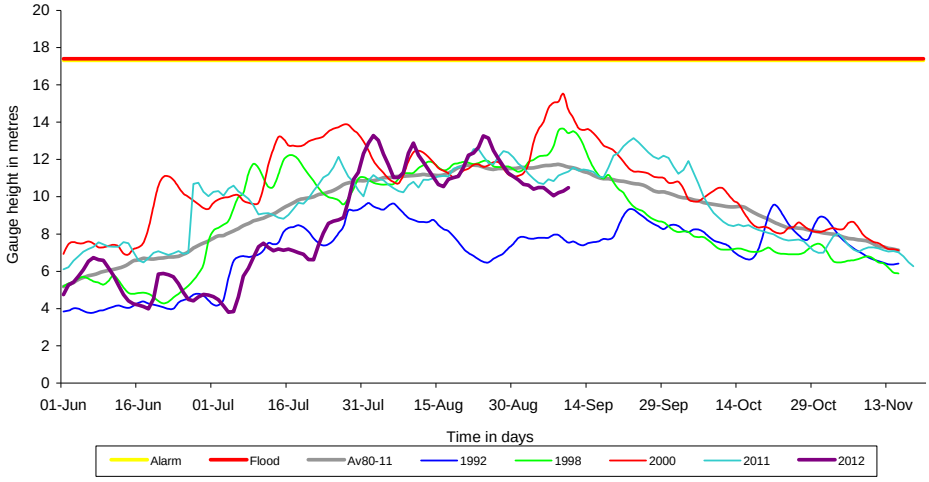
**IN FLOOD SEASON FROM 1 JUNE TO 31 OCTOBER**



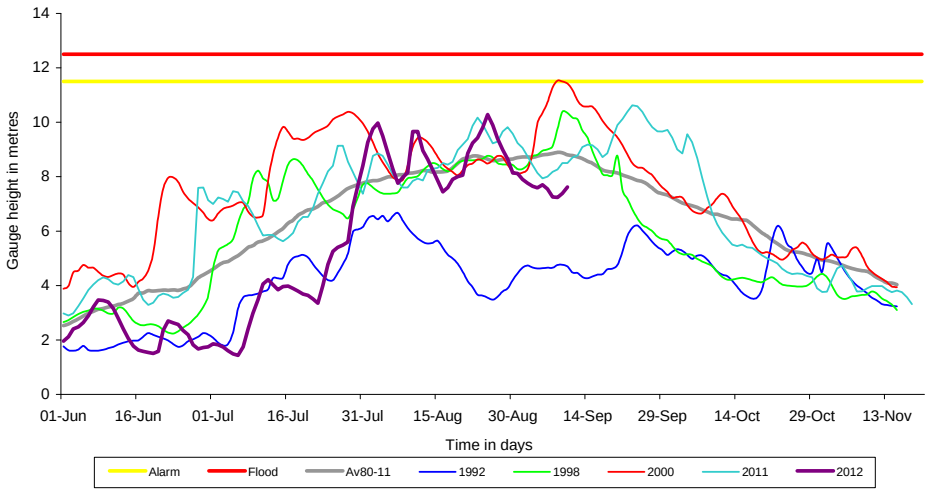



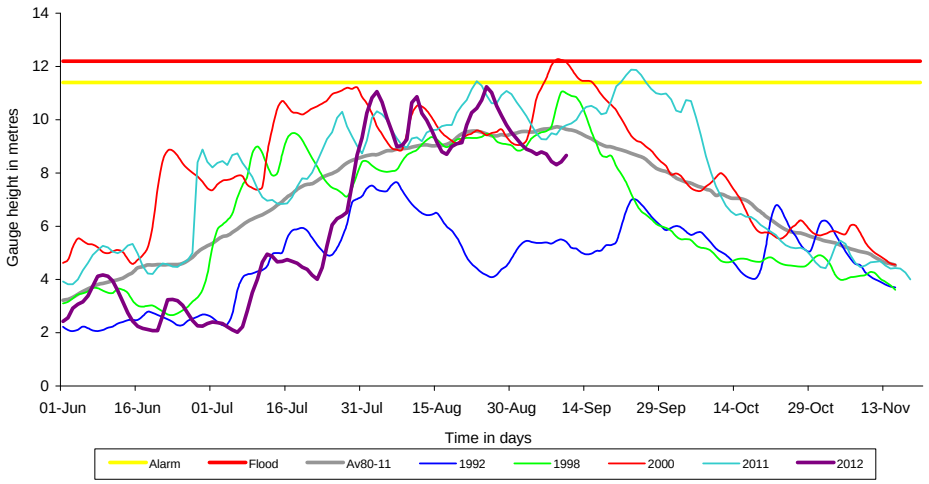
**Water level at 7am of Mekong at Chiang Khan**

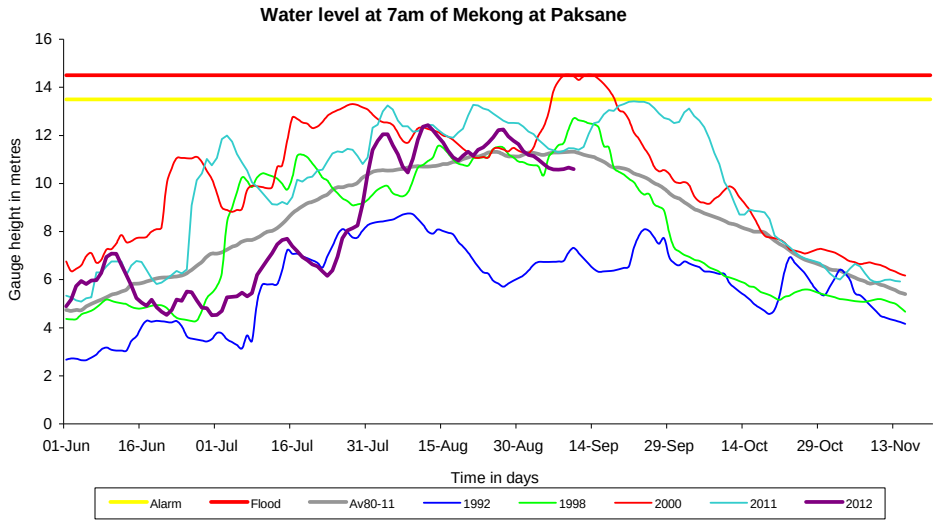


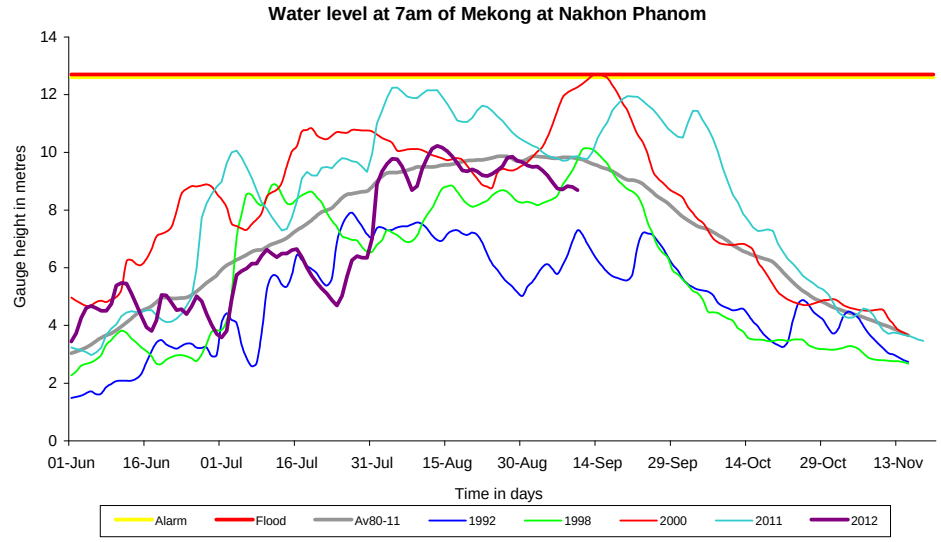

**Water level at 7am of Mekong at Vientiane**

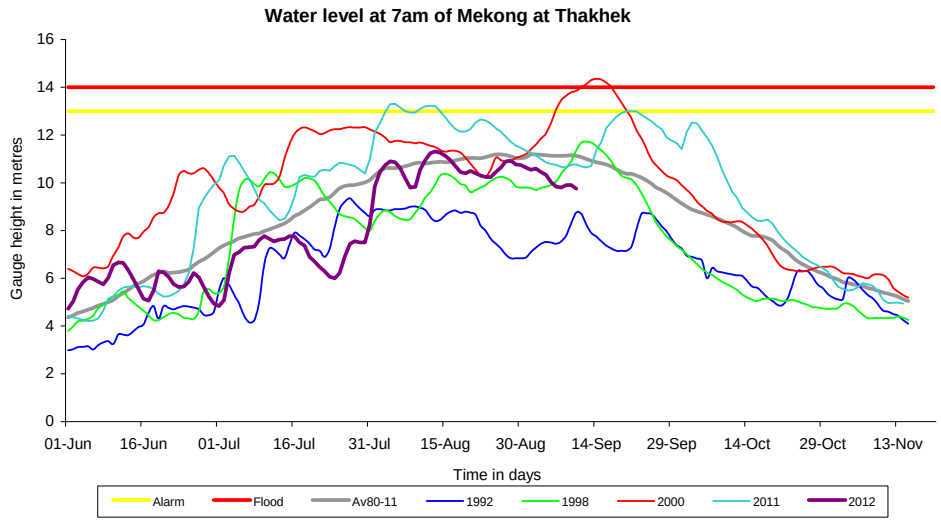



**Water level at 7am of Mekong at Nong Khai**

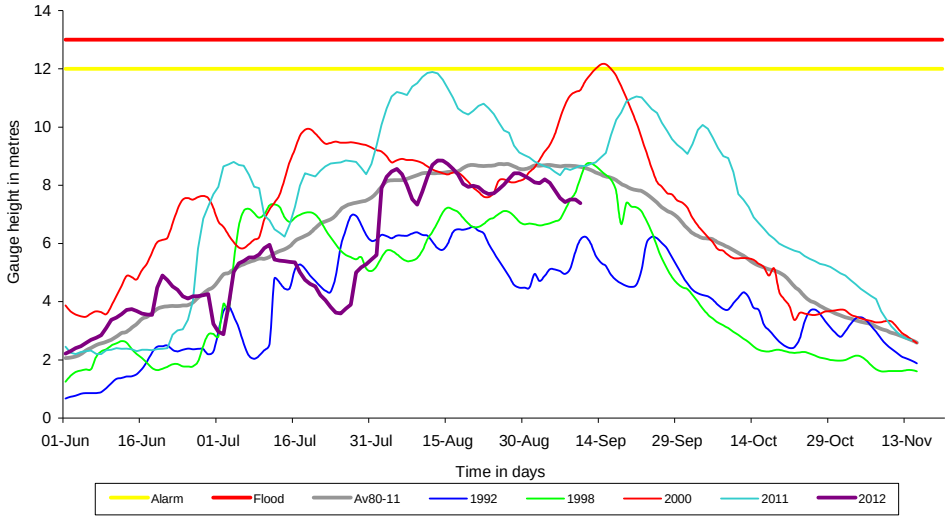



Water level at 7am of Mekong at Paksane
Gauge height in metres
0
2
4
6
8
10
12
14
16
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Time in days
Alarm
Flood
Av80-11
1992
1998
2000
2011
2012

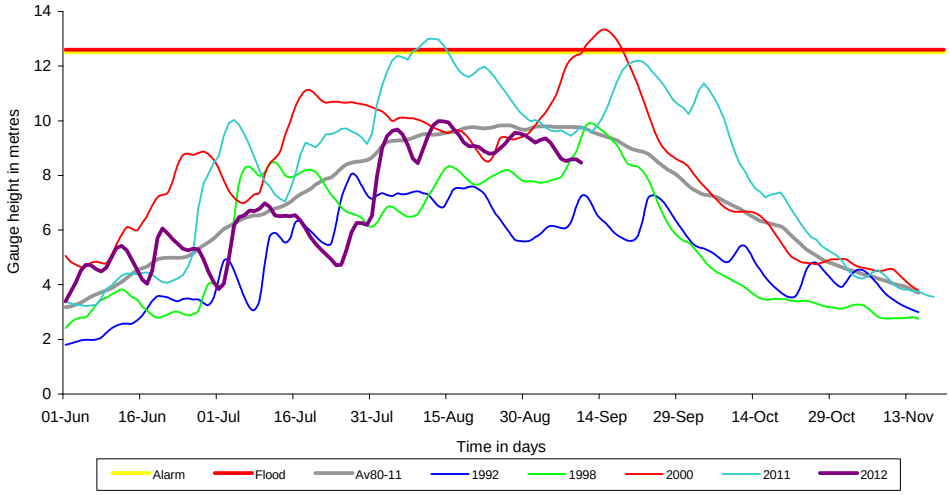

Water level at 7am of Mekong at Nakhon Phanom
Gauge height in metres
0
2
4
6
8
10
12
14
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Time in days
Alarm
Flood
Av80-11
1992
1998
2000
2011
2012


Water level at 7am of Mekong at Thakhek
Gauge height in metres
0
2
4
6
8
10
12
14
16
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Time in days
Alarm
Flood
Av80-11
1992
1998
2000
2011
2012

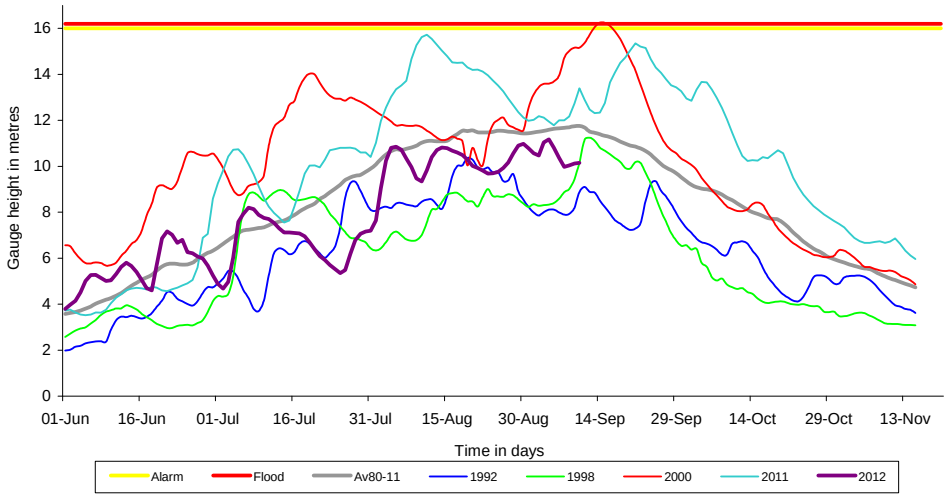
**Water level at 7am of Mekong at Savannakhet**

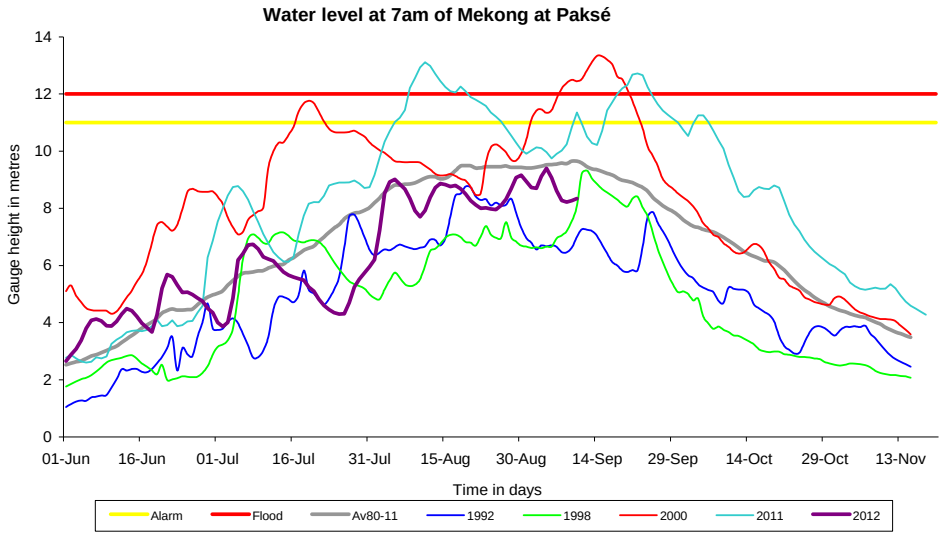


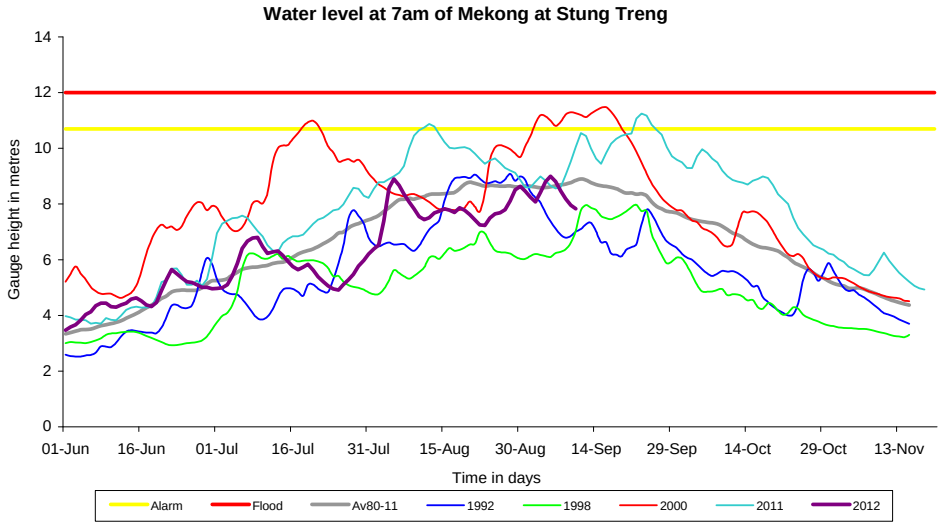

**Water level at 7am of Mekong at Mukdahan**

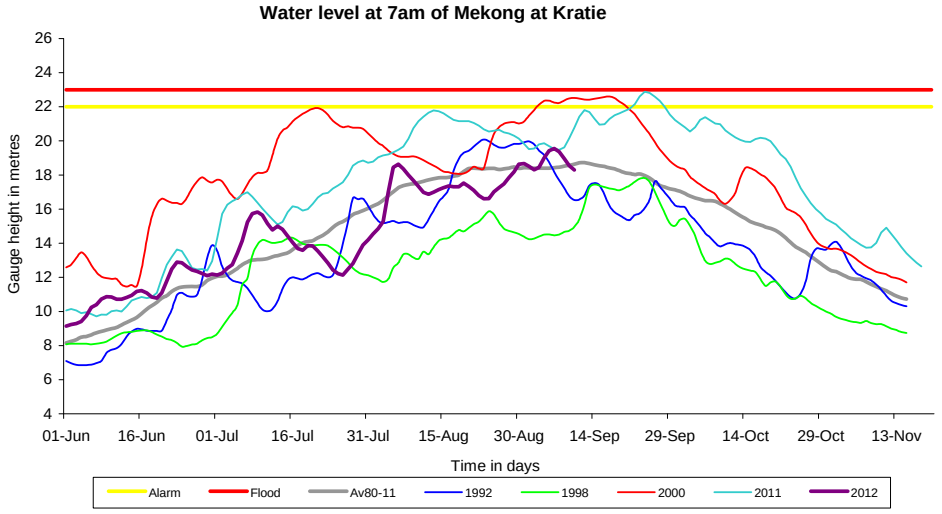



**Water level at 7am of Mekong at Khong Chiam**

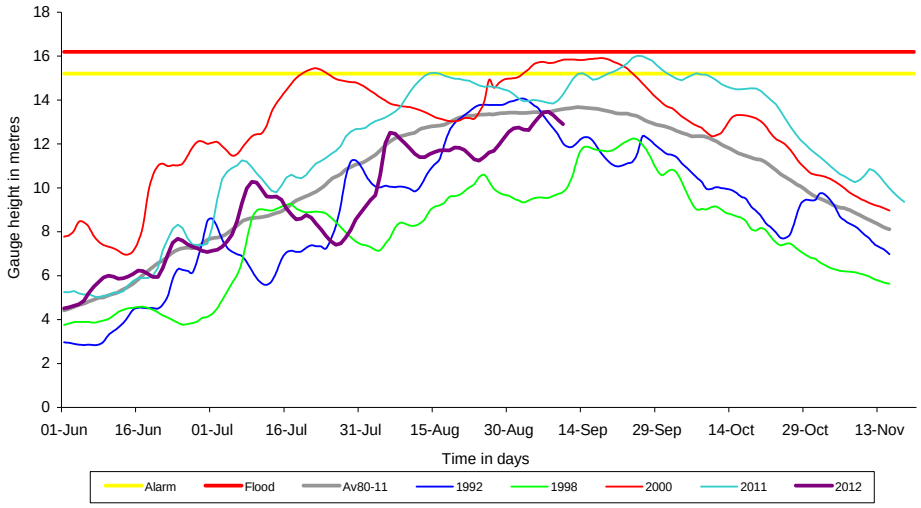



Water level at 7am of Mekong at Paksé
Gauge height in metres
0
2
4
6
8
10
12
14
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Time in days
Alarm
Flood
Av80-11
1992
1998
2000
2011
2012

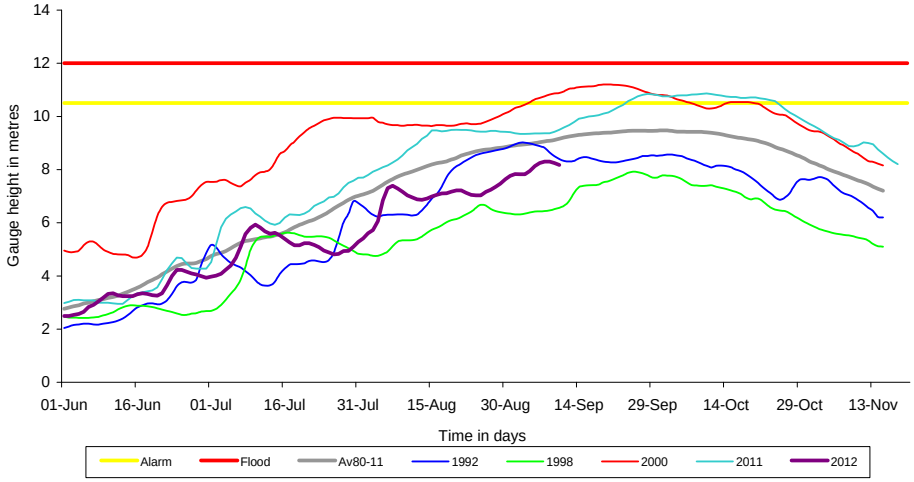

Water level at 7am of Mekong at Stung Treng
Gauge height in metres
0
2
4
6
8
10
12
14
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Time in days
Alarm
Flood
Av80-11
1992
1998
2000
2011
2012


Water level at 7am of Mekong at Kratie
Gauge height in metres
4
6
8
10
12
14
16
18
20
22
24
26
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Time in days
Alarm
Flood
Av80-11
1992
1998
2000
2011
2012

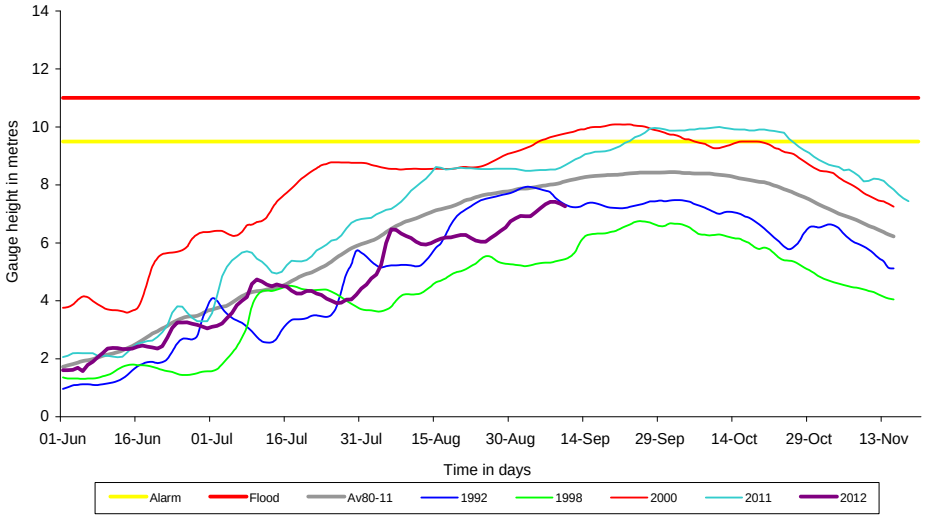
**Water level at 7am of Mekong at Kampong Cham**

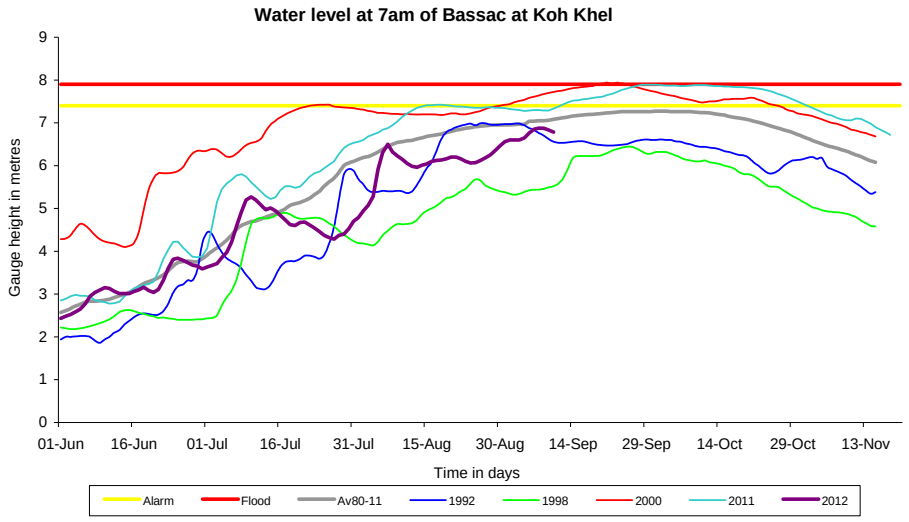


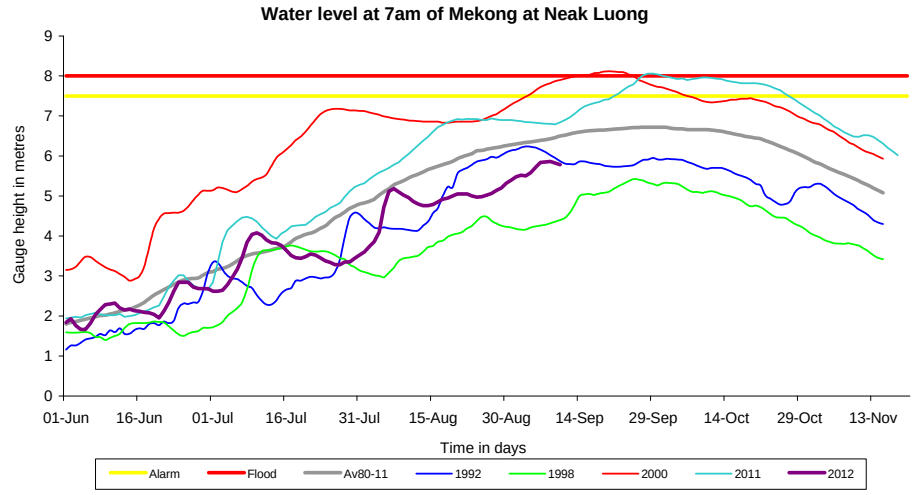

**Water level at 7am of Mekong at Phnom Penh Chaktomuk**

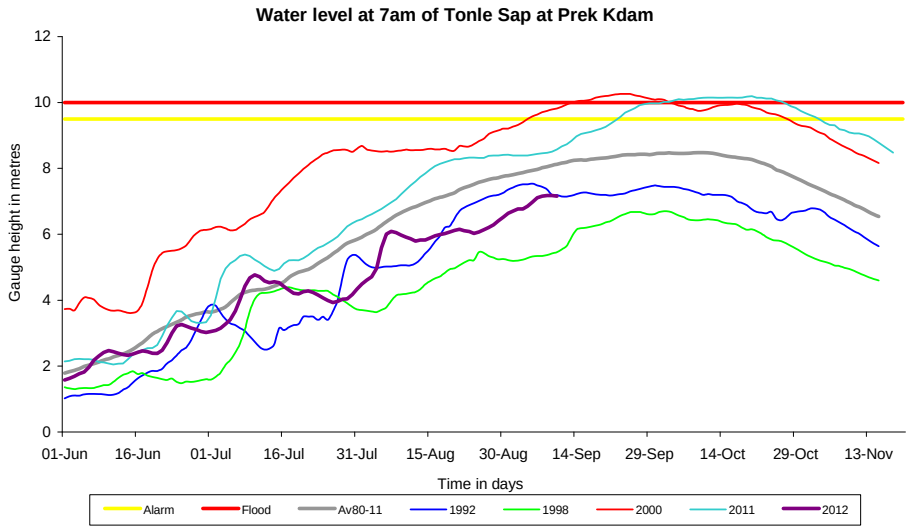


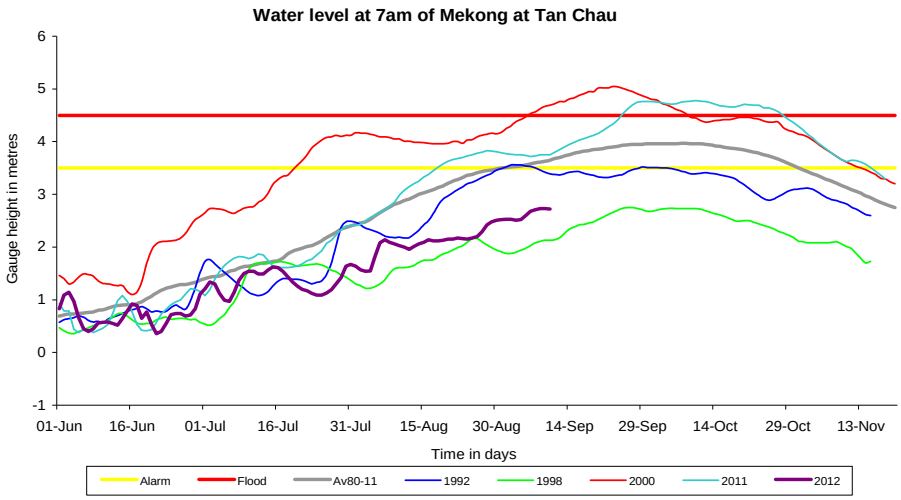

**Water level at 7am of Tonle Sap at Phnom Penh Port**

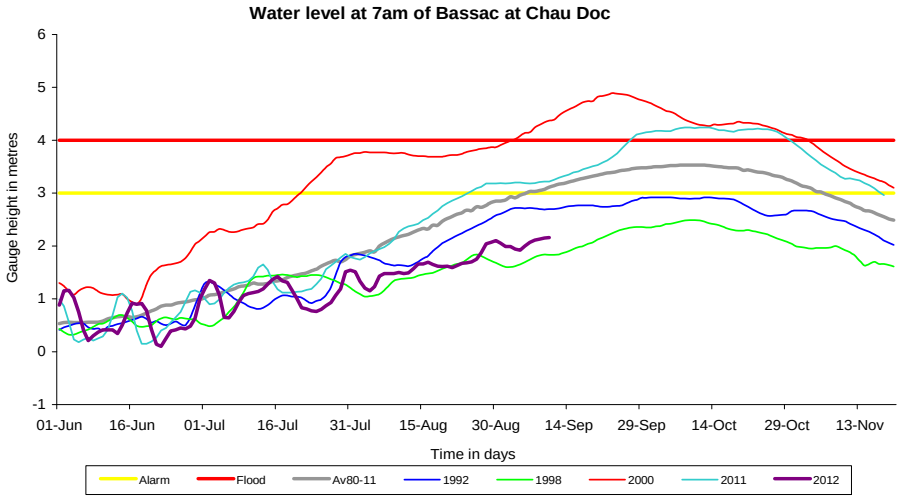



Water level at 7am of Bassac at Koh Khel
Gauge height in metres
0
1
2
3
4
5
6
7
8
9
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Time in days
Alarm
Flood
Av80-11
1992
1998
2000
2011
2012


Water level at 7am of Mekong at Neak Luong
Gauge height in metres
0
1
2
3
4
5
6
7
8
9
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Time in days
Alarm
Flood
Av80-11
1992
1998
2000
2011
2012


Water level at 7am of Tonle Sap at Prek Kdam
Gauge height in metres
0
2
4
6
8
10
12
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Time in days
Alarm
Flood
Av80-11
1992
1998
2000
2011
2012


Water level at 7am of Mekong at Tan Chau
Gauge height in metres
6
5
4
3
2
1
0
-1
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Time in days
Alarm
Flood
Av80-11
1992
1998
2000
2011
2012


Water level at 7am of Bassac at Chau Doc
Gauge height in metres
6
5
4
3
2
1
0
-1
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Time in days
Alarm
Flood
Av80-11
1992
1998
2000
2011
2012