MEKONG RIVER COMMISION SECRETARIAT

PRELIMINARY REPORT ON LOW WATER LEVEL CONDITIONS IN THE MEKONG MAINSTREAM
5 March 2010

1. Introduction

This preliminary report has been prepared to provide information with regard to the current situation of extremely low water levels on the Mekong upstream at Stung Treng and particularly in northern Lao PDR and Thailand. The analysis is based upon the data currently available which are compared to historical hydrological and meteorological conditions.

Weekly reports of water levels at mainstream water level monitoring stations are updated every Monday at http://ffw.mrcmekong.org/

2. Rainfall conditions

Rainfall in the Upper Mekong River (Lancang)

Figure 1 shows the rainfall data obtained from NOAA at Jinhong, Lincang, Simao and Lancang stations in the Upper Mekong.

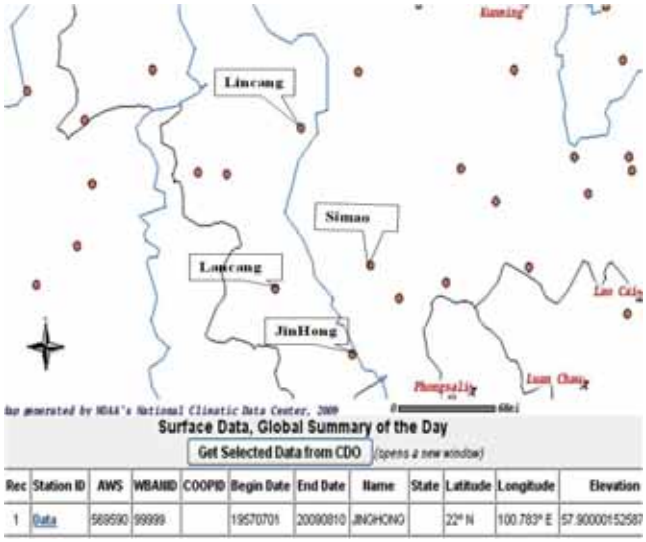


Fig. 1 Selected rainfall stations in the Upper Mekong Basin in Southern Yunnan.(http://www7.ncdc.noaa.gov/CDO/cdosubqueryrouter.cmd)

Figure 2 shows the comparison between the observed monthly rainfall from January to December, 2009 and the long-term monthly average (2000-2009) at each site. There is a consistent pattern of below average rainfall in each month between August and December. The January 2010 rainfall was also below average.

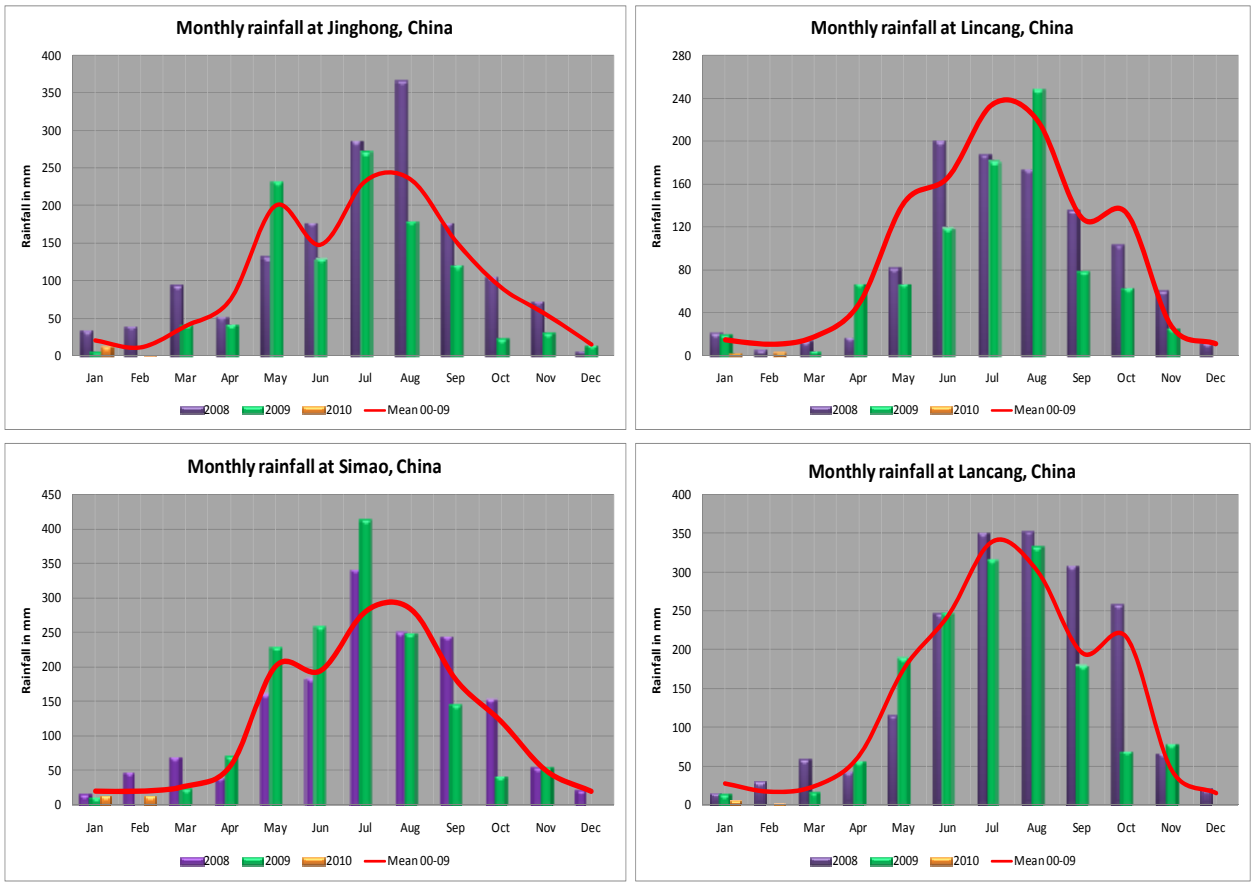


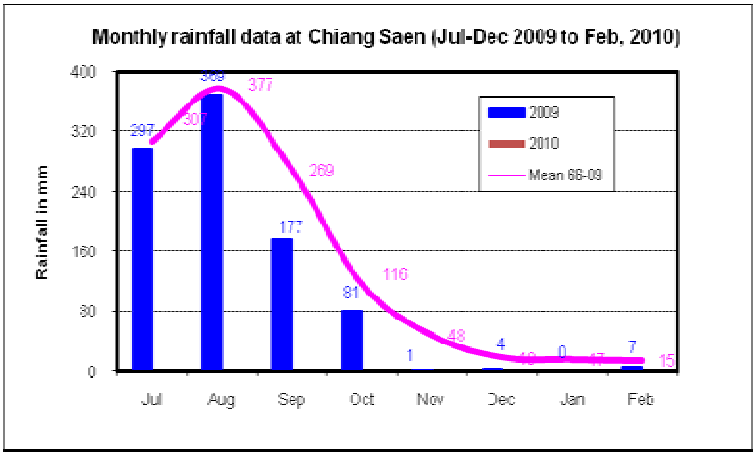
Fig. 2 Monthly average rainfall pattern from January to December, 2009 at Jinhong, Lincang, Simao and Lancang, compared with the long-term monthly average rainfall (2000-2009)

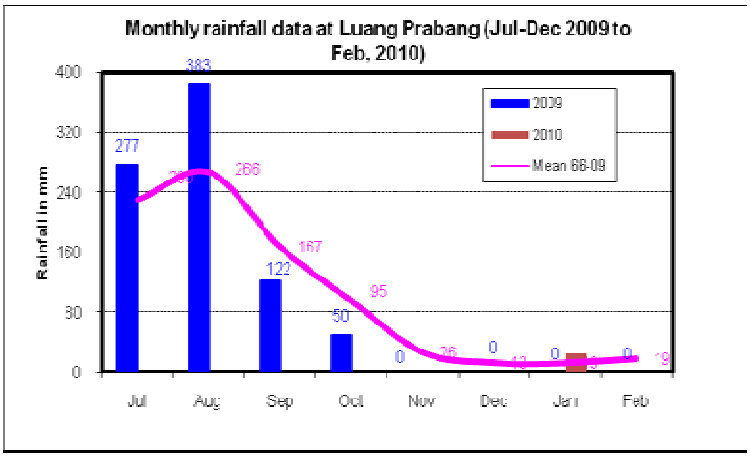
Rainfall pattern of the Northern part of Lao PDR and Thailand

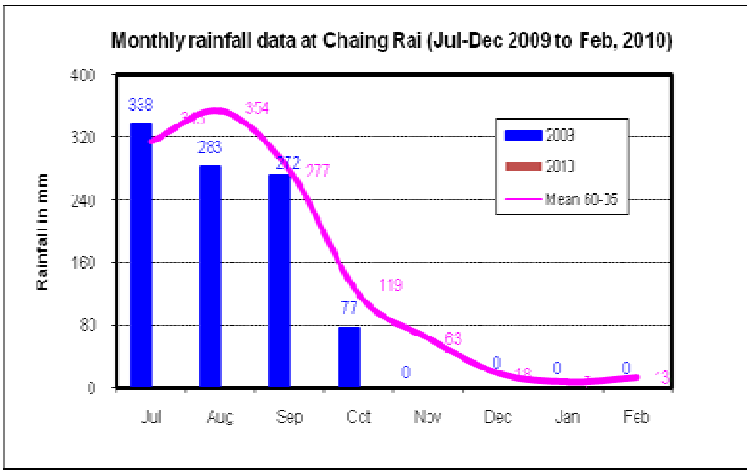
Figure 3 shows the mainstream hydro-meteorological stations in northern Lao PDR and Thailand. Data at the four rainfall stations at Chiang Saen, Luang Prabang, Chiang Rai and Vientiane were selected for analysis.

Fig. 3 Mainstream hydro-meteorological stations in northern Lao PDR and Thailand

The graphs in Figure 4 show a comparison of the monthly rainfalls observed between July and December, 2009 with the long-term monthly average over the last 50 years (1960-2009). In the upper LMB, the rainfall from July 2009 to February 2010 is comparable to the long-term average. However, from September onwards rainfall in this northern region of the Basin was considerably less than normal. Rainfall to date in 2010 has been minimal as it expected at this time of the year.







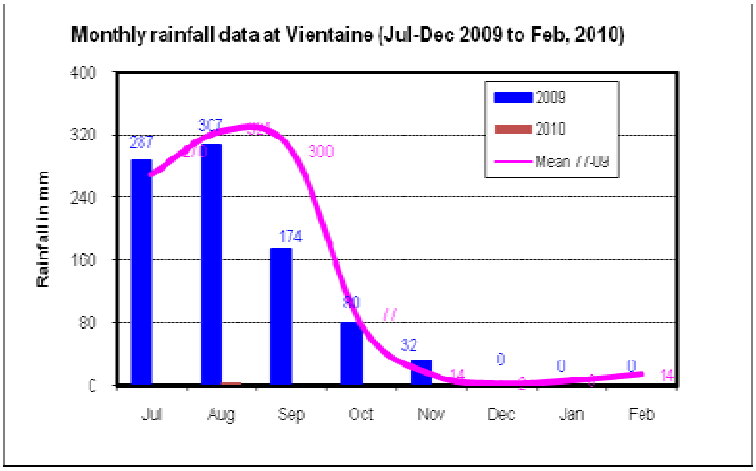
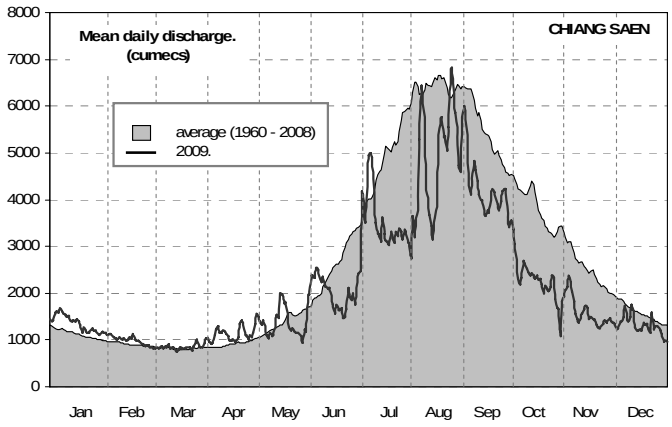


Fig.4 Monthly average rainfall pattern from January to December, 2009 at Chiang Saen, Luang Prabang, Chiang Rai and Vientiane, compared with its long-term monthly average rainfall (1960-2009)

From these preliminary rainfall data, the indications are that the 2009 SW monsoon ended early. The average date for monsoon withdrawal at Chiang Saen is the first week of November and at Vientiane the first week of October. The early withdrawal of the monsoon in 2009 meant that the discharges on the Mekong and its northern tributaries started to recede early in the season, drawing on what natural catchment and groundwater resources there were. Natural and groundwater storage in the northern parts of the basin are not large so a deficit situation would have arisen relatively quickly, particularly on the large tributaries in northern Lao PDR, leading to considerably reduced flow contributions to the mainstream.

3. The 2009 flood season

The general weakness of the 2009 SW monsoon meant that flows during the flood season were well below normal, particularly in these northern parts of the Mekong Basin (Figure 5). The peak and the total volume of the 2009 flood at Vientiane, for example, were the 5th lowest over the last 98 years. Thus the natural catchment storage in northern Lao PDR, in particular, would be expected to be significantly below normal at the end of the wet season with the follow-on effect that the subsequent dry season flows would also be below the seasonal average.



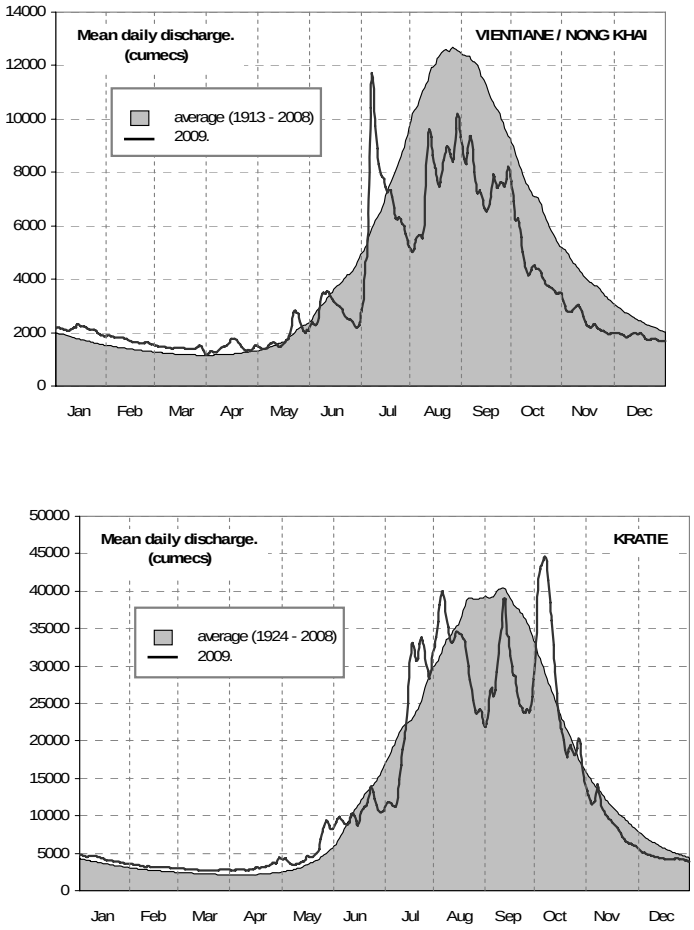


Fig. 5 Chiang Saen, Vientiane and Kratie: The 2009 daily discharge hydrograph on the Mekong mainstream compared to the long term average.

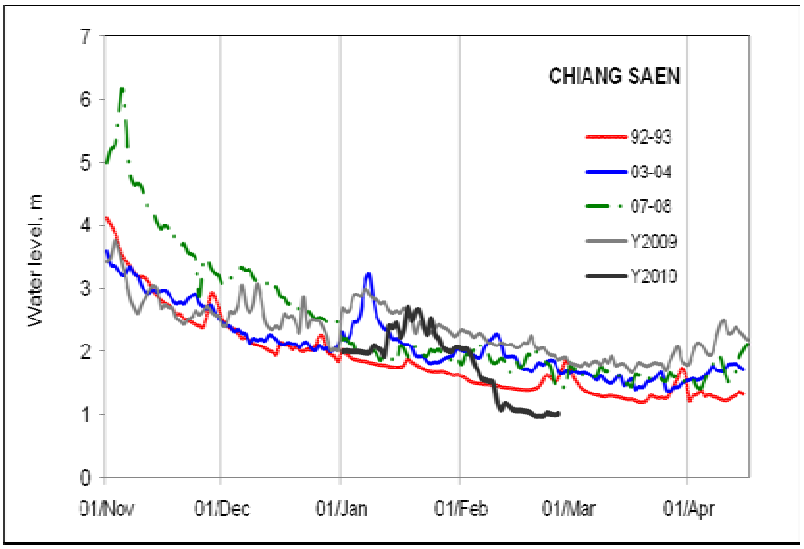
Not only were discharges low but the flood season at Chiang Saen ended almost two months early, reflecting the early monsoon withdrawal. This, as indicated above, led to very low levels of natural catchment storage to sustain flows during the dry season and the early onset of the flood recession leading in turn to very low tributary flows by January 2010.

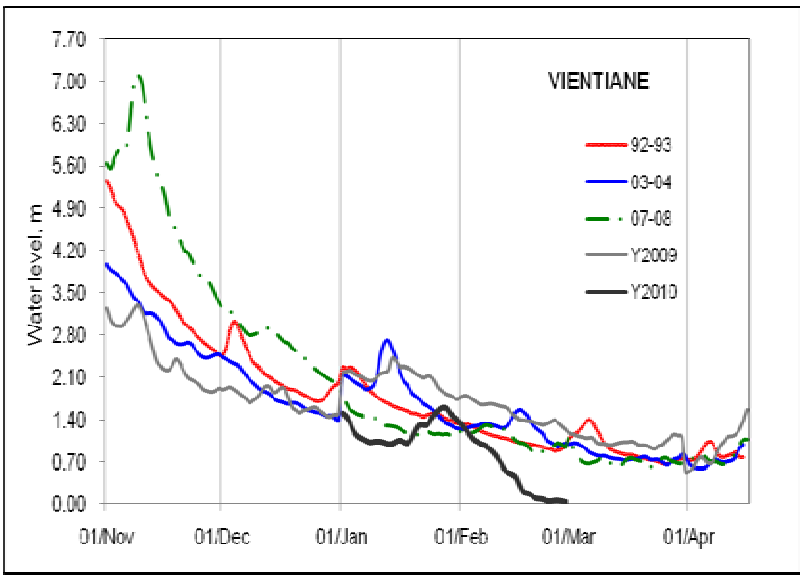
4. Water levels in late 2009 and early 2010.

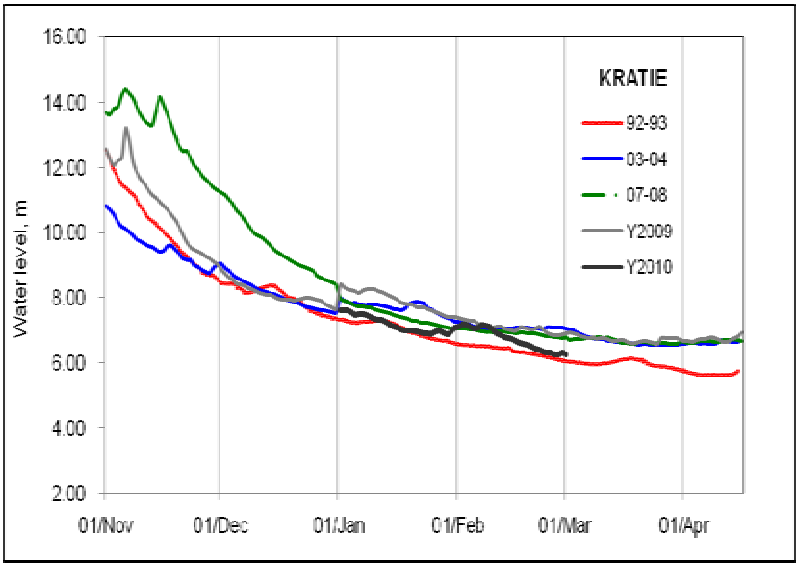
Figure 6 compares the 2010 water levels observed at four sites in the Mekong mainstream from 1 November 2009 to 28 February 2010 with those over the same period in 1992-93; 2003-04 and 2007-08. The 2010 levels in general were the lowest that have occurred in the last 90 years.

At Chiang Saen water levels up to the end of January 2010 were above those of January 1993. These higher levels appear to be a result of releases from dam operations upstream. Between 24 January and 23 February 2010, the levels then fell by 1 metre, which is equivalent to a decrease in discharge in the order of 250 cubic metres per second. This reduction over a period of 3 to 4 weeks is steeper than in previous years and may be explained by drought conditions upstream, meaning that flow releases through the hydropower operations that had been evident earlier in

January could no longer be sustained. Very low levels of reservoir storage have also been reported by Chinese news agencies.







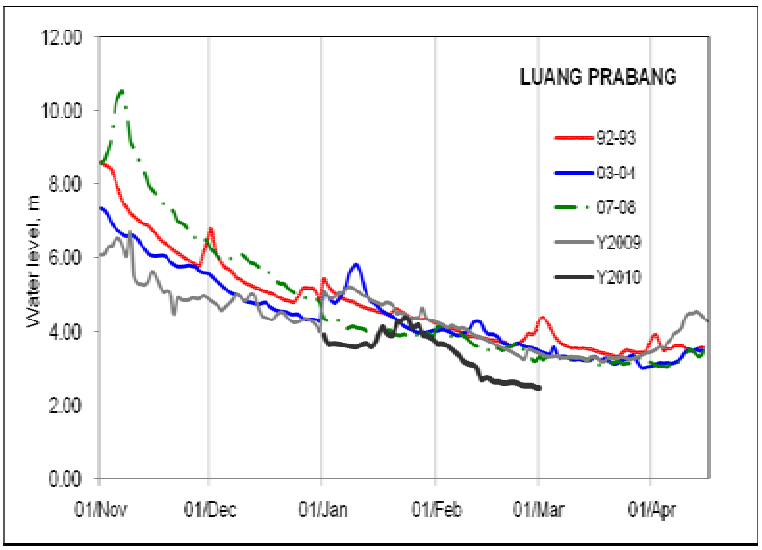


Fig. 6 Chiang Saen, Luang Prabang, Vientiane and Kratie: Water levels of 01 November 2009 – 28 February 2010 compared to those 1992-93, 2003-04 and 2007-08

This decrease in upstream water levels is reflected at Luang Prabang and Vientiane from late January onwards. Clearly the contributions from the large northern Lao tributaries such as the Nam Ou and Nam Khan were already low due to the drought conditions and observations confirm that these rivers are currently very low.

Further downstream at Kratie the decrease in water levels during February remains quite apparent with those of 2010 being half a metre higher than those of 1993 during late February.

Figure 7 compares the 2009-10 water levels on the Mekong mainstream with those of 1992-93. The key feature is that water levels at Chiang Saen from November 2009 onwards were higher than those in 1992-93. At Luang Prabang and Vientiane, the opposite is the case. This suggests that the water levels at Chiang Saen were kept artificially high by upstream reservoir releases until late January when they receded. The levels at Luang Prabang and Vientiane being lower than 1992-93 reflect the regional drought conditions from September 2009 onwards and the very low contributions to the mainstream by the large tributaries in northern Lao PDR. The situation represents serious regional hydrological drought conditions.

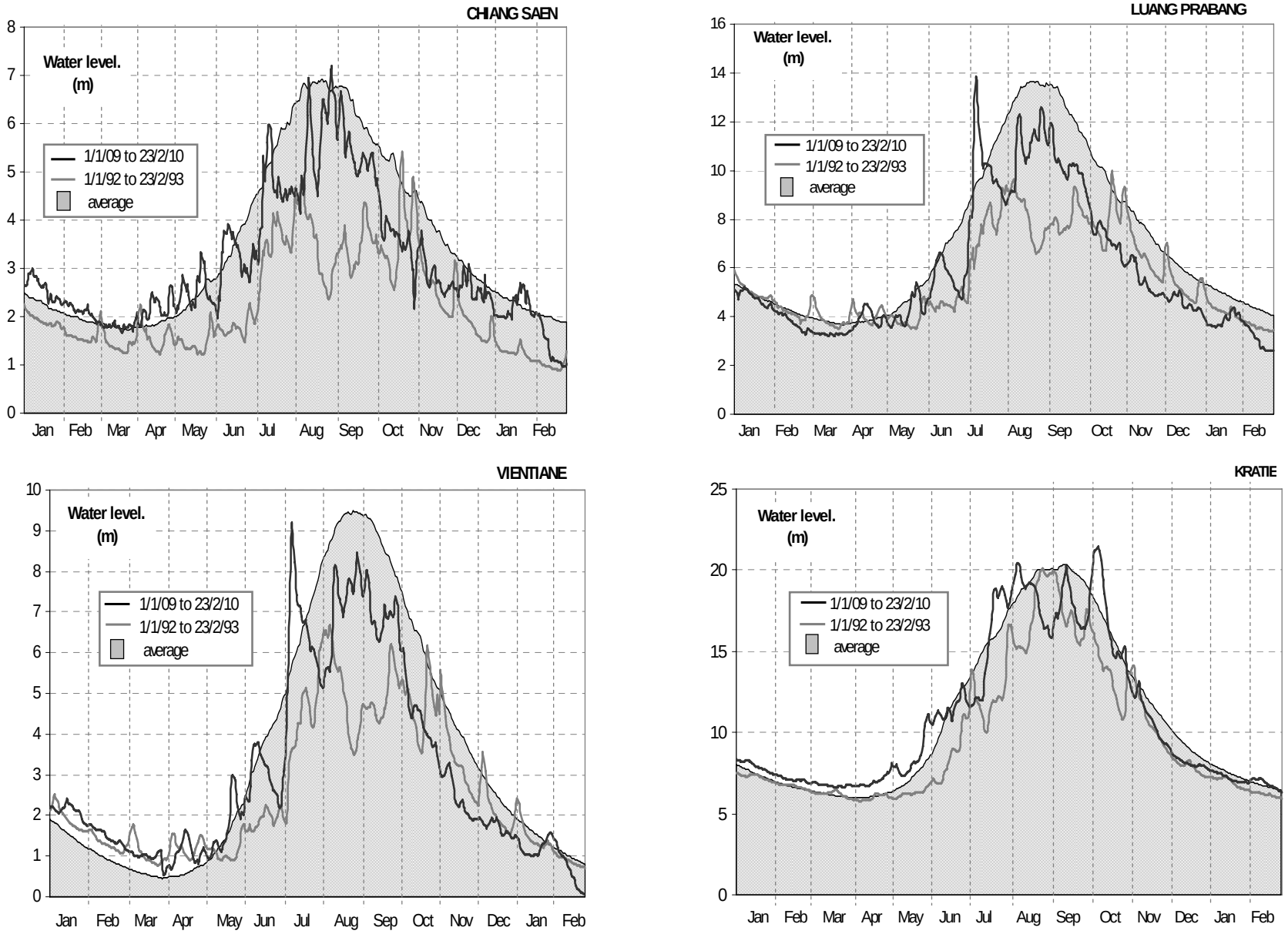


Fig.7 Comparison of water levels at selected sites on the Mekong mainstream for the periods 1/1/1992 to 23/2/1993 and 1/1/2009 to 23/2/2010

5. Tributary flows

Figure 8 confirms the severity of the regional drought conditions provided by an analysis of the flows so far in 2010 on two large Mekong tributaries the Nam Ou and Nam Khan in northern Lao PDR. Discharges on the Nam Ou are amongst the lowest recorded, while those on the Nam Khan are unprecedented, falling well below anything observed over the last 50 or so years.

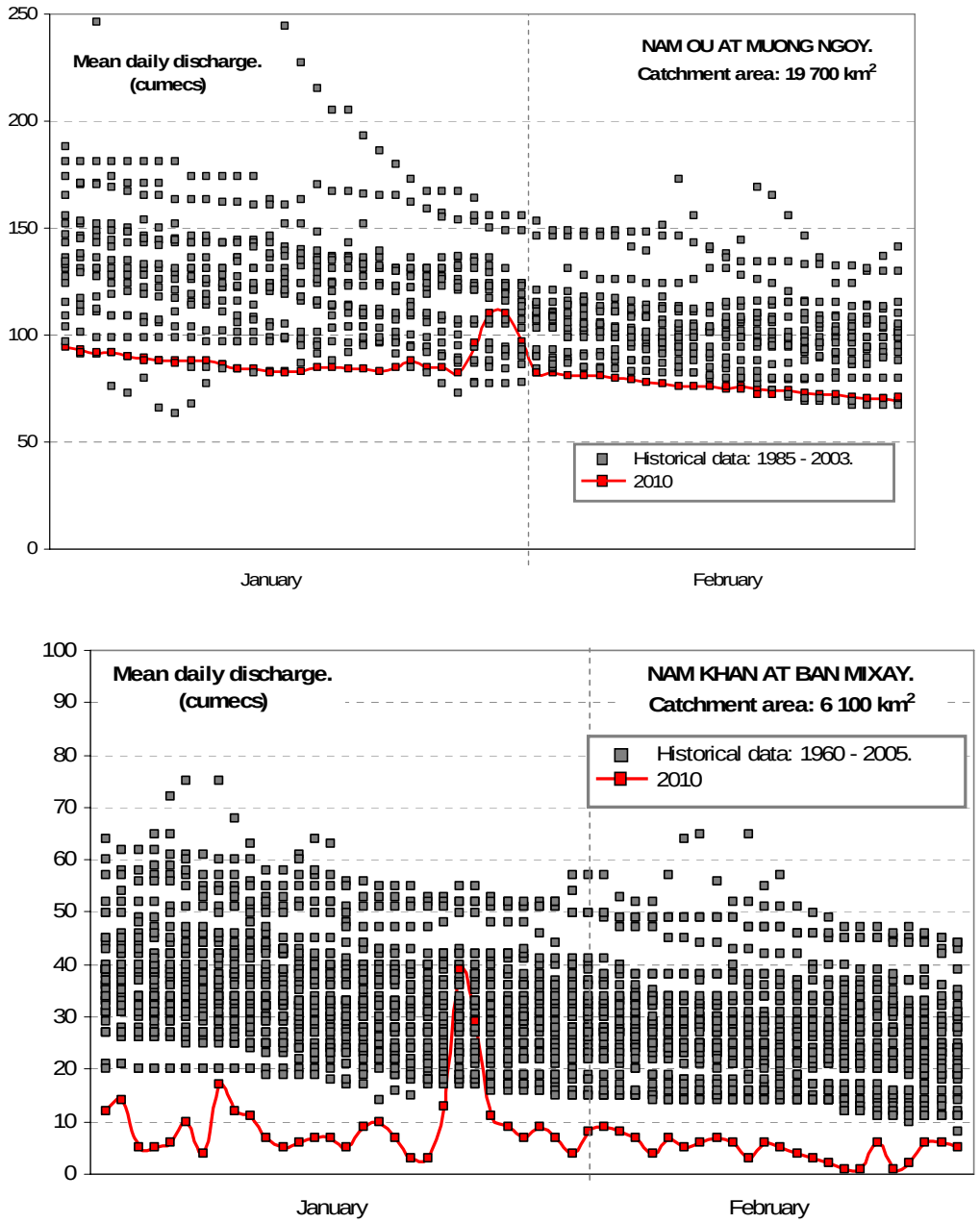


Fig. 8 Nam Ou and Nam Khan in Northern Lao PDR: Daily discharges for the period 01 Jan to 23 February, 2010 compared to their historical range

6. Preliminary Conclusions

The main causes of low water levels being experienced in the 2010 dry season in the Mekong mainstream are a combination of an early end to the 2009 wet season, low monsoon rainfall and very low rainfall in the dry season which together have led to regional drought conditions. Based on the available information it appears that flows from tributary rivers in Lao PDR and northern Thailand are at levels that are amongst the lowest recorded in recent decades. This situation represents a regional hydrological drought affecting all countries in the Basin. The levels are expected to drop further before rising slowly in mid to late April. The higher than natural levels in the Mekong River experienced at Chiang Saen in early to mid-January resulted from hydropower operations upstream. These levels then reduced to to levels closer to those of the usual conditions in late January as reservoir storage levels upstream fell in response to the drought. Further analyses and discussion with China are planned.