

## **RFMMC ANNUAL FLOOD REPORT 2005**

*Mekong River Commission  
Regional Flood Management and Mitigation Centre*

*The opinions and interpretations expressed within are those of the authors and do not necessarily reflect the views of the Mekong River Commission.*

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## I. INTRODUCTION

This MRC Annual Flood Report 2005, the first flood report to be published at LMB level, was prepared as part of the MRC's Flood Management and Mitigation Programme (FMMP) at the RFMMC. This report is intended to be an account of the floods which occurred during that period. It will serve as source of information and as a reference document for the Joint Committee and Council members and also for a wider audience, like the agencies responsible for the disaster management and mitigation in the members states, institutes involved in water resources planning, donor organizations, NGO's etc. As part of its programme activities the FMMP is scheduled to develop annually an Annual Flood Report.

The preparation of this MRC Annual Flood Report 2005 is the result of a joint exercise which integrates the views of a wide range of stakeholders involved or affected by flood in the Mekong river Basin. The key objective of this exercise is to attempt to make this report as coherent and as "standardised" as possible in order for the reader to get the most comprehensive picture of the flood issues, benefits and stakes. As many concepts for covering the flood events were developed during the preparation period of this report together with those same stakeholders, there is room for significant improvement in the later editions. It is also essential to admit that the preparation of this report started more than three months after the flooding season; so much information was lost or was impossible to reconcile in the meantime, making the assessment of the data sometimes quite hazardous.

In the future, a comprehensive report should be prepared by monitoring the flood events according to standardized procedures during the flooding period. It will be important to organise data flow in such a way that the writing of the annual flood report could be eventually an easy exercise of consolidating the various information collected. It may take time to establish those common monitoring procedures in the four countries, but building this road step by step and gradually obtaining a better knowledge of the actual flood issues and stakes in the Mekong River is definitely an essential tool when designing flood management and mitigation strategies and investments.

## II. THE 2005 FLOOD

### II. 1. Overview of the Recent Past Flooding Periods

For getting a reasonable idea of a flooding period, it must be compared with past events. The figures below show years where maximum flow of the Mekong River has been recorded.

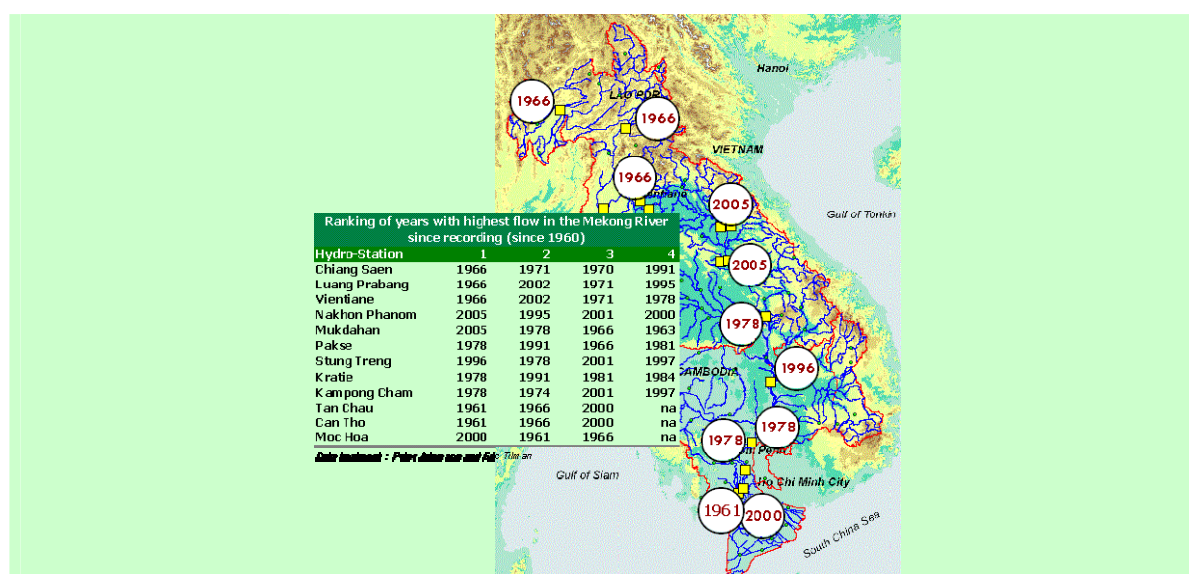


Fig 1. Years with maximum flood discharge

## II. 2. Hydrological Analysis of the 2005 Flood

In the upper section of the Mekong, from the border with Myanmar (Chiang Saen) to Luang Prabang and Vientiane, the level of the Mekong throughout the season remained quite low, and no flood generated by the Mekong River itself was recorded.

From the end of July to September 2005, the monsoon winds from southwest and cyclones namely: Washi, Matsa, Vicenty and Damray produced heavy rains. These rains increased dramatically the water level in the Mekong River downstream of Borikhamxai, and especially in the section Thakek to Savannakhet. This situation affected nearly all the Southern Provinces of Laos and the Provinces located downstream of Nong Khai Province in Thailand, especially the Provinces of Nakhon Phanom and Mukdahan. An aggravating factor has been the heavy flows in the tributaries of the Mekong located in this critical section which occurred in the same period, end of June up to the beginning of September. The drainage of the tributaries to the Mekong was slowed down or even stopped with the consequence that several villages got an exceptionally long period of flooding of over 6 weeks, the worst situation since nearly 30 years.

Going to the South, the situation was still critical in the provinces of Champasac (Laos), Ubon Ratchatani (Thailand) although much less than upstream. In Stung Treng, Kratie and Kampong Cham in Cambodia the situation was less exceptional and the damages were less important than in the upper sections. After the confluence with the Tonle Sap, a normal flooding situation was recorded throughout the Mekong Delta.



Fig 2. Hydrographs of the flood period in major hydro-stations along the Mekong

## III. THE IMPACTS OF THE 2005 FLOOD

It is definitely impossible to produce a detailed and comprehensive assessment of the impacts of the 2005 flood at LMB level. The process of monitoring the flood and the data collected vary from a country to another. Discrepancies are also often observed between data gathered at national level and data collected at provincial or district levels. Some indicators are not understood similarly

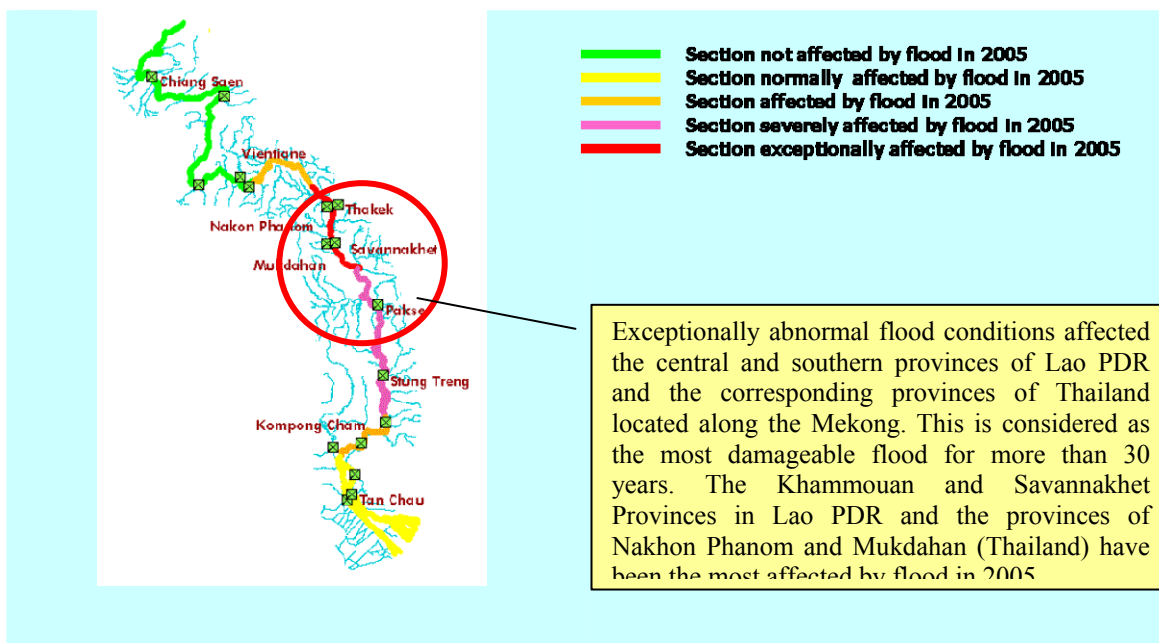
throughout the region. All flood events are not necessarily recorded, and a “no data” is not necessarily clearly distinguished from a “zero value”.

One major component of the damages is nevertheless recorded in each country in a rather comprehensive way: the loss of paddy fields. To a certain extent, the indicator “loss of paddy” fields give a good idea not only regarding the intensity of the flood but also its duration. Damage to infrastructures (irrigation, roads, bridges, school, temples, health centres) is patchy reported and generally estimated only when external funds are requested for reconstruction. Damages to houses and resettlement accounting are also not systematically recorded except when authorities have strong plans for tackle the issue, like in the Mekong Delta in Vietnam.

Severe flash floods occurred on several Mekong tributaries in Lao PDR and in the Province of Chang Rai in Thailand, damaging roads and bridges, irrigation schemes and other villages’ infrastructures such as schools, water supplies and health centres.

Exceptionally abnormal flood conditions affected the central and southern provinces of Lao PDR and the corresponding provinces of Thailand located along the Mekong. It is due to severe flood in the tributaries coinciding with very high water level in the Mekong which generated extended and long duration backwater effect. This is considered as the most damageable flood for more than 30 years. The most affected districts are located in Khammouan Province in Lao PDR and in Nakhon Phanom Province in Thailand. Savannakhet (Lao PDR) and Mukdahan (Thailand) have been severely affected as well. These flood conditions also occurred in the southern provinces of Laos, the corresponding provinces of Thailand, as well as in the northern provinces of Cambodia, namely Stung Treng and Kratie, but with less damageable effects.

The province of Kampong Cham in Cambodia, located at the entrance of the Cambodian flood plain, has been well flooded due to the high level of the Mekong but nothing exceptional. After its confluence with the Tonle Sap, the water level of the Mekong decreased in intensity which makes that the flooding situation in Kandal and Prey Veng provinces in Cambodia were recorded as “normal”. In Vietnam, the flood conditions and impacts were also reported as “normal”. Even if substantial damages were recorded in the Vietnamese delta, 2005 has been the less damageable year since 2000. The production of paddy reached 17.2 million tons which makes 2005 a successful year for crop.

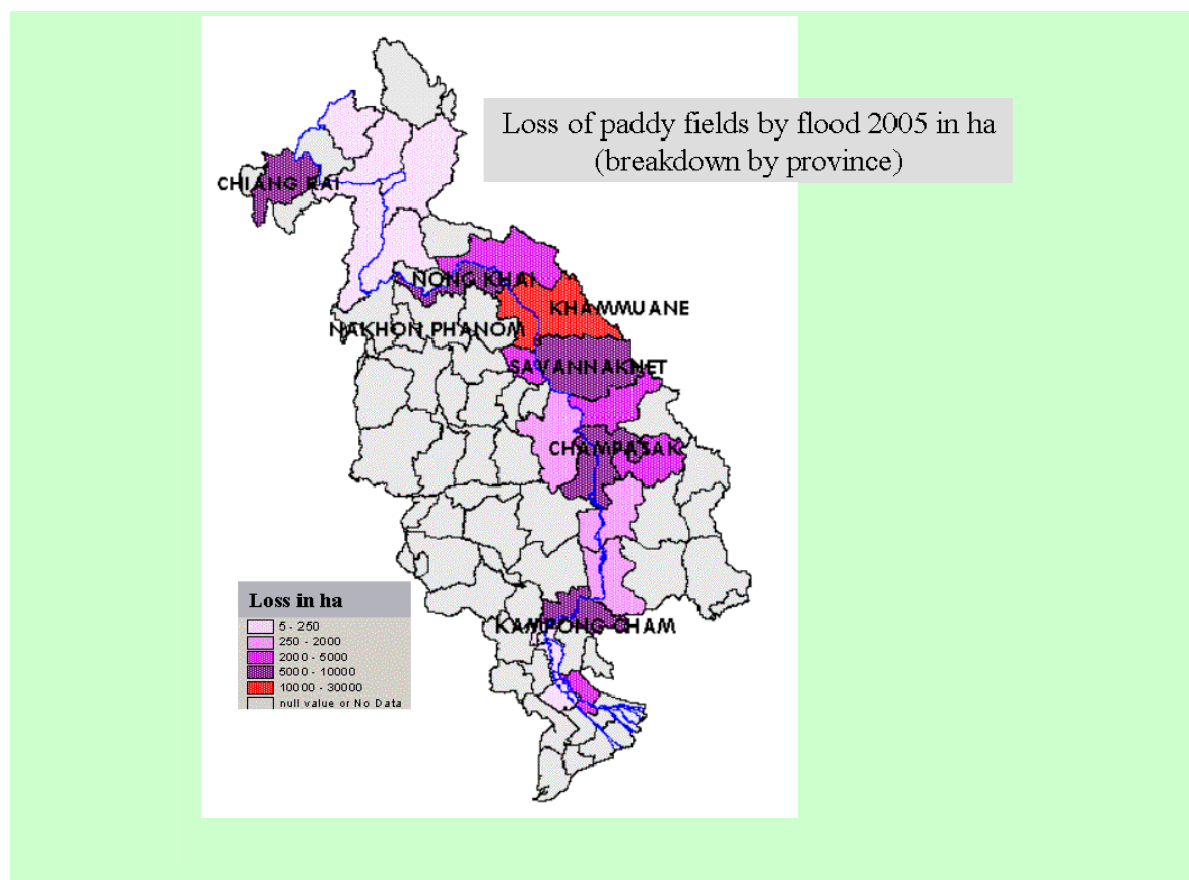


Map 1. Map of the sections of the Lower Mekong affected by the flood in 2005

The table below is an attempted estimate of damages from 2005 flood in the LMB. Unfortunately, several data could not be reconciled or are missing. For that reason, the full consolidated listing of the impacts of the flood in the LMB for the year 2005 can not be presented.

Estimation of damages of the flood 2005 at Mekong River Basin level (consolidation of data considered as sufficiently coherent for comparison)					
Provinces	Laos	Cambodia	Thailand	Vietnam	Total
<b>People affected</b>					
Nr of provinces affected	16	4	5	8	33
Nr of districts affected	84	35	23	2	144
Nr of Communes affected	NA	195	234	NA	NA
Nr of villages affected	2.510	NA	NA	NA	NA
Nr of Families affected	85.553	29.549	78.121	NA	NA
Nr of people affected	480.913	14.408	NA	NA	NA
Houses severely damaged/collapsed	NA	NA	1.275	4.303	NA
People died from flood (2)	4	19	0	77	100
People evacuated to safe places	356	4.805	NA	NA	NA
<b>Agricultural production</b>					
Rice planted (ha)	687.555	NA	NA	NA	NA
Paddy field loss(ha)	55.955	9.906	39.538	3.876	109.275
Loss of livestock (Unit)(1)	2.124	28	0	0	2.152
Loss of fishponds (ha)	296	NA	759	NA	NA
<b>Damages to infrastructure</b>					
(only scattered information is available - consolidation for MRB may not be done)					
Total estimate of damages in MUS\$	28,56	NA	NA	15,27	NA
source and comments related to data : see country reports					
(1) includes buffalows, cows, pigs, goats					
(2) data regarding flash floods not available					

The map below shows the loss of rice fields by provinces. The map confirms clearly that the most affected areas by 2005 flood were the Province of Khammouan in Laos and the Province of Nakhon Phanom in Thailand.



Map 2. Map of provinces affected by loss of paddy fields in LMB

#### IV. RESPONSES TO THE FLOOD EVENTS

At LMB, The Flood Management and Mitigation Programme (FMMP) has been designed for supporting the MRC's member countries for bringing adequate responses to flood events. The overall development objective of the Strategy is stated as: "people's suffering and economic losses due to floods are prevented, minimized, or mitigated, while preserving the environmental benefits of floods". The FMMP components are: (i) Establishment of a Regional Flood Centre (RFMMC); (ii) Structural Measures and Flood Proofing; (iii) Mediation of Transboundary Flood Issues; (iv) Flood Emergency Management Strengthening; (v) Land Management.

The Flood Forecasting and River Monitoring System in the Mekong River Commission (MRC) has over the years been improved to provide timely and accurate river forecast to its member countries in order to reduce the vulnerability of floods and droughts in the Lower Mekong Basin. During the dry season (November-May), seven-day river monitoring and low flow forecasts are conducted and updated weekly at <http://www.mrcmekong.org> while five-day flood forecasts at 21 key stations along the Mekong mainstream during flood season (June-October) are updated on a daily basis. The MRC Forecasting System consists of three main components; data collection and transmission, forecast operation, and forecast dissemination.

In Lao PDR, disaster management in general and flood management in particular is the responsibility of the National Disaster Management Organisation (NDMO), which coordinates the technical departments and institutions in charge of facing these issues. At provincial and district levels, similar structures (Committees) have been set up as well. The Committee's members coordinate to work in the affected areas in order to assess the damages and primary needs and proceed to emergency measures, each institution according to its field of responsibility. Infrastructures for controlling or mitigating the effects of the flood are very limited. Embankment protections along the Mekong or along the major tributaries were built only in some sections of the major cities. The rural roads are rarely built on embankment in the risky flood areas.

In Thailand, the institutional framework for disasters prevention and management is organised at National and Provincial levels and is aimed to coordinate all field operations. Specialised Units are generally constituted of Department of Water Resources, Agriculture and Irrigation, Transports, Natural Resources and Environment, Health as well as Police services. Loss in Agricultural Production by flood is compensated in cash on a lump sum basis per ha and after declaration of the farmers and assessment from the Agricultural Services. Except from these non structural measures, a longer term strategy aims to limit the effects of the flood by building or reinforcing the protection. So several regulation structures have been built in the North Eastern Region. Roads along the Mekong River are heightened on embankments which offer at the same time an efficient protection for lands and housings. More and more sections of the bank of the Mekong itself have been protected against erosion, and this especially in important villages, semi-urban and urban areas. In addition, the protection of urban areas from runoff water is underway.

In Cambodia, flood management, and coordination for mitigation and reporting the impacts of the flood are the responsibility of the National Committee for Disaster Management (NCDM). At Provincial level, a similar multi-disciplinary group has been set up as well. At District level, some of the technical departments are represented in addition to the Chiefs of Communes. The Communes Disaster Management Committees include the Chief and Responsibles of Villages as well as the "EWS" Volunteers in the villages where an Early Warning System (EWS) has been set up. The United States Office of Foreign Disaster Assistance (OFDA) and the Mekong River Commission (MRC) signed a Cooperative Agreement (CA) on 16th December 2002 entitled, "Provision of Flood Early Warning to Flood-Vulnerable Communities in the Lower Mekong River Basin, Phase 1: Cambodia and Lao PDR". The project is implemented under the overall umbrella of the Flood Management and Mitigation Programme (FMMP) at RFMMC. Limited infrastructures exist in Cambodia for controlling the flood, except some main roads sections built on embankment

on large section (e.g. RN 6). No regulators or “colmatage” gates are mentioned in the Northern section of the Mekong that could manage/limit the effect of backwater entering into the tributaries. Four control gates (width 9 m, length 13,5 m) have been built on the National Road 1 from Phnom Penh to Neak Loeng (funded by JICA), controlling the backwater from the Mekong to rice cultivated areas

In Vietnam, The need for having a coherent strategy, in a long term prospect, for managing and mitigating the flood cropped up as a consequence of the flood 2000. Some measures have already been implemented or are under implementation in view of facing emergencies. Some other structural measures are being examined as they require heavy investments and may sometimes be questionable in long term impacts. The issue of housing located in risky areas has been tackled for several years. Families in such a risky situation are encouraged and supported to move to safer places. For that purpose new settlement areas have been built and some are still in progress or planned. To secure the rice production, priority is given, in the lowest areas, for building embankment able to retain the early flood and secure the second crop. The pressure is also great, in those low lands, for building fully protected areas enabling the third annual crop during the flooding period. Similarly, the flood 2000 has been a starting point to reinforce the road network. The National Roads are heightened for facing similar water level referring to flood 2000. Rural roads can still be flooded, as the improvement of the weakest sections being step by step carried out and monitored. The road network constitutes at the same time an embankment network protecting the low lands against flood.

## V. CONCLUSIONS AND RECOMMENDATIONS

### V. 1. Preparation of the MRC Annual Flood Report 2005 - Lessons Learnt

Lessons have been learnt in preparing this annual flood report for 2005: At countries level, many data related to flood and damages from flood are available. There are nevertheless many limitations when gathering those data and this for various reasons that may not be the same from one country to another country.

- Location of data is multiple: administrative levels such as villages (communes), districts and province levels and technical levels such as department of agriculture, public works, health, etc.
- Most of the affected Provinces use to prepare lists presenting the consolidation of the damages from flood. But those lists are not standardized resulting in well detailed indicators in some provinces and same indicators not monitored in other provinces.
- The meaning of the terms used for describing the indicators may vary from one list to another; e.g. : “Number of affected people” which is often recorded in the lists may refer to people having been flooded a few days with very little damages or people having lost all their rice production.
- The financial estimate of the damages is rarely exhaustive. In some provinces, we were also told that there is a lack of expertise for making such an assessment.
- In the available list of damages, it is not always clearly understandable if some data are “not available” or “zero” or “little damages”. Very often, only “blanks” appear on the lists. If data are missing, additions are obviously biased.
- The data are rarely centralised at national level, and even in that case, they are doubtful on the reliability of such consolidation when examining the poor coherence of the data collected locally.

All these factors make the consolidation of information at LMB’s level very problematic.

## V.2. How to Improve the Next Issues of This Annual Report?

The Annual Flood Report is keeping with the FMMP strategy and its components. It obviously stimulates the exchange of data throughout the 4 LMB's countries. In addition, it could be indirectly a complementary tool for a pragmatic monitoring of some FMMP activities and a tool for supporting the decision's maker when addressing the flood issues.

If such orientation is expected, it would be necessary for the NMCs and the LAs to refine the objectives of the annual flood report in regard to the FMMP objectives and components and adapt the methodology and approaches accordingly. It could be recommended for example to develop chapters addressing and/or monitoring specific themes such as procedures for exchange of data, effect of infrastructures on flood and damages from flood, trans-boundary topics, land management issues and flood warning activities.

Basically, the preparation of the annual flood report must start during the flood period rather than a few months later. Direct observations in the affected areas may be done together with the emergency teams and institutions in charge of managing the flood events. Advises may also be given when monitoring the flood impacts. In the future, the key content of the annual flood report should be based on coherent Data Base established at national level in which all the relevant indicators would be collected. These Data Bases must nevertheless be as simple as possible to be manageable at District level (or any other efficient institutional level according to the specificities of each of the countries). Then the consolidation of data would be an easy process and the "National Annual Flood Report" would just need some additional elements of analysis and validation of data; the cause of the floods together with hydrologic data, maps and interpreted satellite imagery where necessary.

The zooming of the data is also an important topic. Data can be available with breakdown by provinces, by districts, by communes or even by villages. All these considerations require some preparation works to be carried out in close collaboration with the four MRC's member countries. The following topics should be tackled:

- Refine the expected objectives and outputs of the annual flood reporting
- Set up the list of indicators, data and documents to be collected at country level during the flood period, considering both indicators related to damages but also when possible some indicators related to the benefits of the flood. For each indicator, define the zoom factor.
- In addition to the data available at MRCS level, get additional hydrologic data such as rainfall and water level in the main tributaries, as well as the most updated calibration curve to calculate the flow in the Mekong.
- Envisage access to data related to the operation of the main regulation infrastructures in order to improve the analysis of the flood graphs.
- Better define the content of the indicators and the units for quantity estimate
- Define the procedures for data flow and data validation at national level and procedures to improve the access to those data by MRCS team.
- Define the scheduling for data gathering and validation in order to get the annual flood report within a reasonable time limit.
- Precise the institutional framework for the whole process including collaboration and contracts to be set up for an easy implementation and identify the needs for training.

GIS is an appropriate tool to illustrate the flood. Nevertheless, some layers located at MRCS level have been proven to be out of dated or not standardised. It is therefore recommended for MRCS, together with NMCs and LAs to draw up a list of standard GIS layers with specific use for the flood monitoring, and keep them updated and standardised accordingly.

Year 2005 has been quite damageable in terms of flash floods on the tributaries of the Mekong river. Such flash floods occur almost every year somewhere throughout the LMB. The way of



monitoring, predicting, managing and mitigating the flash floods is however different from flood occurring on the main stream and in the flood plain of Cambodia or the Mekong delta in Vietnam. Decision should be taken for the next annual flood reports: must the flash floods on tributaries be considered? If yes, does it concern any place within the LMB? Or would it be better to focus on key watersheds and in that case what are the areas to be considered in term of yearly systematic monitoring?

An interesting way to observe the flood events is the satellite imagery. However, the agencies are used to making such observations are not always concentrated on the Mekong events. It results for example that interpreted images of the 2005 flood could not be found. Each Annual Flood Report should be illustrated with satellite images showing the extension of the flood areas. Proactive collaboration with institutions or companies able to provide satellite images of the flood events is recommended.

In Cambodia, several flood markers have been installed at village level with volunteers for daily observation during the flooding period. Such flood markers could be extended in other risky areas as they could provide very interesting information related to the extension of the flood and “ground truth” for interpretation of areal photographs or satellite imagery.