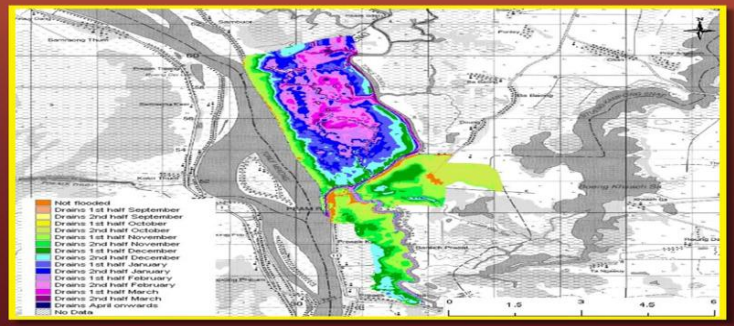
FLOOD MANAGEMENT AND MITIGATION PROGRAMME
LAND MANAGEMENT COMPONENT (FMMP C5)

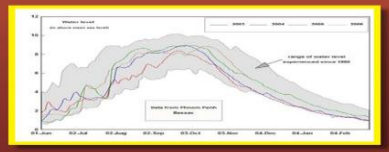
LESSONS LEARNED FROM FMMP-C5 PHASE II IN CAMBODIA

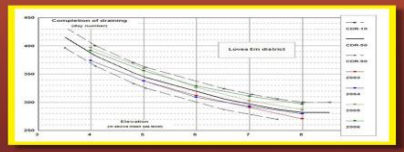
The FMMP Land Management Component provides detailed flood probability information for the flood plains of the Lower Mekong Basin.

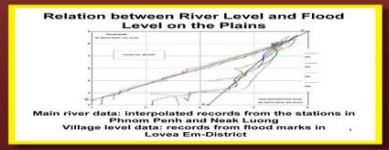
FMMP C 5 has commenced its Phase 2 by August 1, 2008 and will run until December 31, 2010.

Phase 1(2004-2008) focused on the development of an approach to generate flood probability information for flood plains of the LMB, particularly flood probability maps in three pilot districts in Cambodia. Phase 2 focuses on the adaptation of the developed technical tools (Software) by the respective line agencies of all four riparian countries (Cambodia, Laos, Thailand, Vietnam) for an improved "Flood Information Based Land Management (FIBLM)".









The Land Management Component can use existing data or that collected by national line agencies. This data is processed and fed into a specially designed software programme, which calculates flood probability statistics and generates images. These can be displayed as flood probability maps in any GIS platform.

FMMP C 5 produces flood probability maps in a scale of 1: 10 000 or larger. Therefore the project helps to supply the decision making authorities (particularly provincial and district offices of line agencies) in the four participating countries with an urgently required planning tool of the right scale, which will help to avoid or at least minimize flood risks and damages along the Mekong River.

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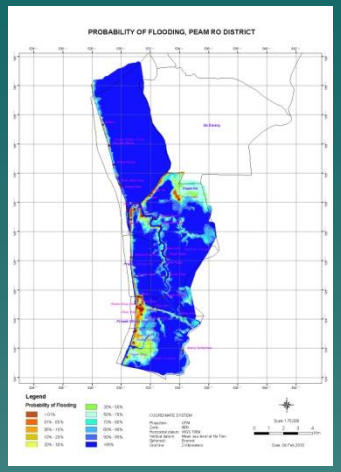
1. Product of FMMP-C5

FMMP-C5 has produced 5 different flood probability maps like:

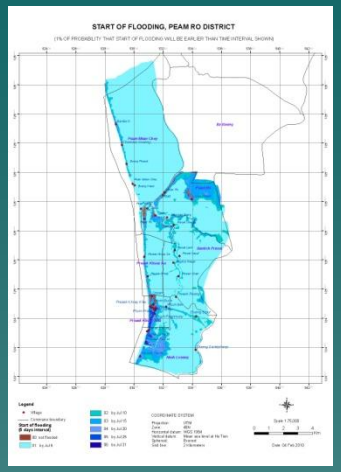
- Probability of flooding map
- Start of flooding map
- Maximum depth of flooding map
- Duration of flooding map
- Completion of draining map

Based on the FMMP-C5 products, we have generated another map called flood extent map

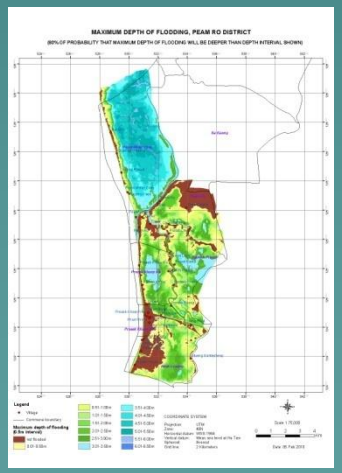
Probability of Flooding Map



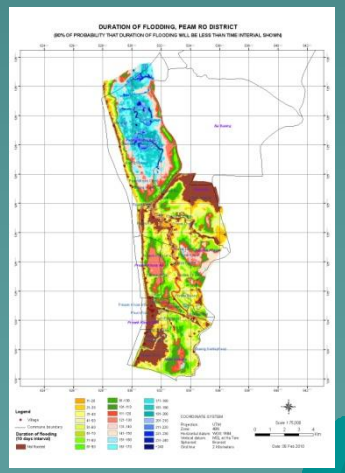
Start of Flooding Map



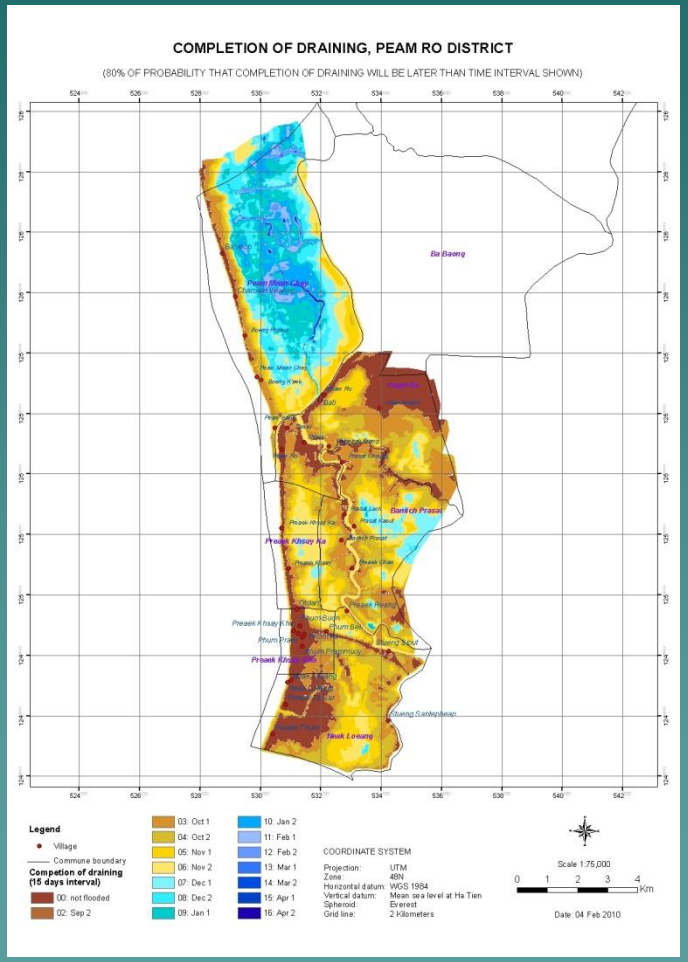
Maximum Depth of Flooding Map



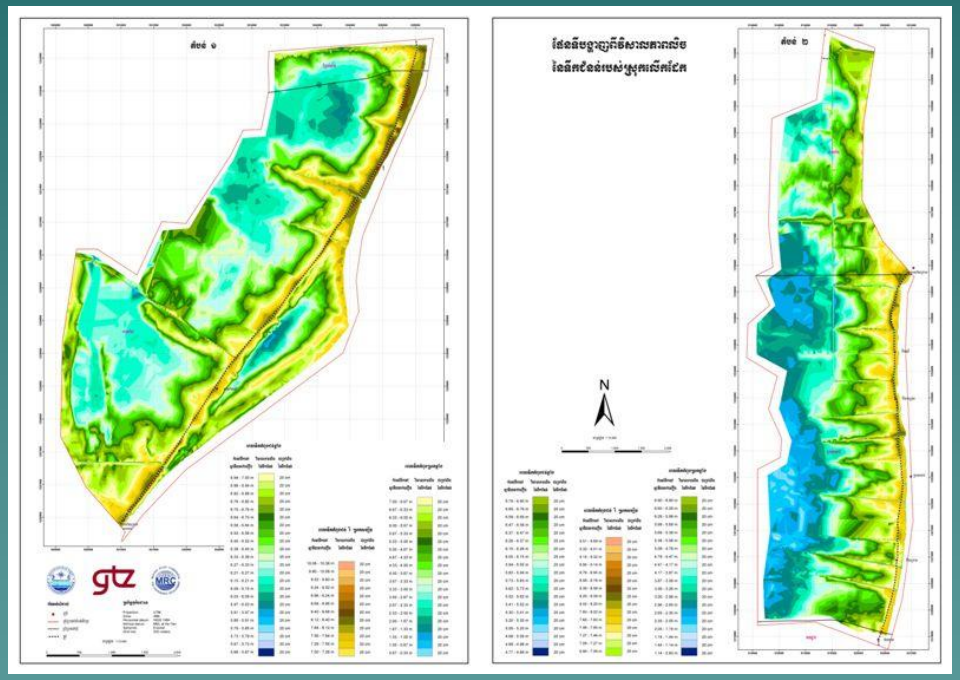
Duration of Flooding Map



Completion of draining Map



flood extent Map



2. NSTE's Role

- Follow up the flood plain water level collection and flood forecasting
- Build capacity of all relevant line agencies at National and Local levels through learning by doing method. The topics to be trained are also different according to their responsibilities like:

-DHRW – train on how to produce, update, analyze and use of FPMs.

-National line agencies: CNMC, CRC, MOE, MIME, MOWRM, MAFF, MLMUPC, MRD, MPWT and NCDM – train on how to analyze and use of FPMs in all relevant fields

-Province, district, commune and village at pilot areas – train on how to read FPMs and use of FPMs in all relevant fields.

- Develop training manuals
- Provide guidance to internship students' studies
- Promote the use of FPMs in all relevant sectors
- Prepare database for FPMs production
- Assist the preparation of regional study tour and regional workshop

3.Capacity Building

Capacity buildings were conducted for 3 different levels by NSTE. The topics to be trained are also different according to their responsibilities like:

- DHRW
- Province, district, commune and village at pilot areas
- National line agency: CNMC, CRC, MOE, MIME, MOWRAM, MAFF, MLMUPC, MRD, MPWT and NCDM

3.1 Local Level

- Two trainings were conducted for the pilot districts Peam Ro and Leuk Dek.
- Participants invited for the trainings are village chiefs, commune council, district staff, all relevant technical offices at those districts and representative from province.
- Topics of training for the pilot districts were designed to fit the local knowledge and available equipment at the local level:
- The first training focused on the introduction and the application of FPMs in a simple way
- The Second training focused on the FPMs application in early warning system, flood disaster management and agricultural zoning and planning.

3.2 National Levels

Capacity building at National Level was focused on flood relevant line agencies and divided into 2 categories according their role and responsibility, i.e. FPM generation - DHRW and FPM user - CNMC, CRC, MOE, MIME, MOWRAM, MAFF, MLMUPC, MRD, MPWT and NCDM . The topics for training are different from FPM producer and users.

- ***FPM producer***: train on how to produce, analyze and Update FPMs
- FPM users: train on how to use and analyze FPMs

4. Use of Products-FPMs

FPMs were promoted to use in:

-Flood confirm policy formulation for flood plain management

-Provincial flood disaster preparedness and early warning system

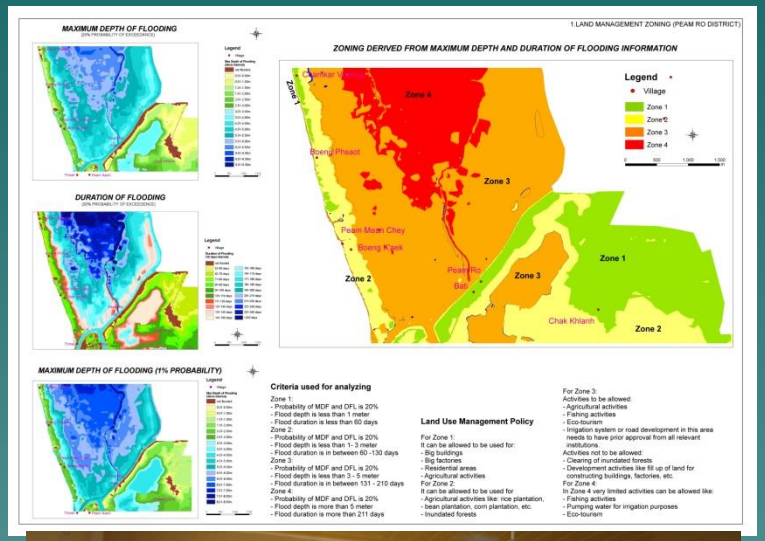
-Rural infrastructure planning and design

-Irrigation planning and design

-Agricultural planning and programming

4.1 Flood confirm policy formulation for flood plain management

We use probability of flooding, maximum depth of flooding and duration of flooding maps for land management zoning. These maps provide us the capability in zoning according to criteria we set. For example, the beside map shows 4 zones of the flood plain and policy for each zone was defined.



4.2 Provincial flood disaster preparedness and early warning system

We use probability of flooding, maximum depth of flooding and duration flooding for flood disaster preparedness and early warning system. These maps provide the capability in flood management like:

-Identify vulnerable villages, safety areas and evacuation roads

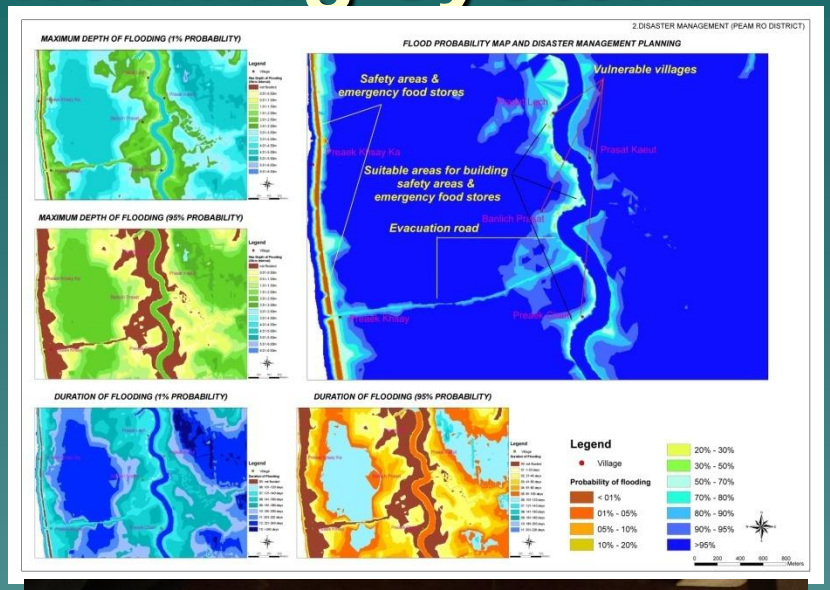
-Alert Vulnerable villages

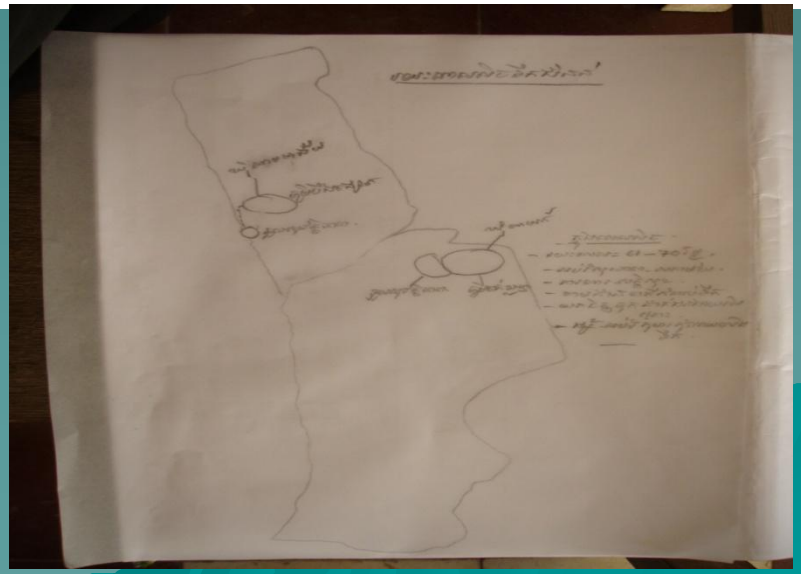
-Prepare equipments and material needed for evacuation during big flood.

-Identify how, where and through what means should be used for evacuating people.

-Prepare early warning systems

-Food supply and etc.



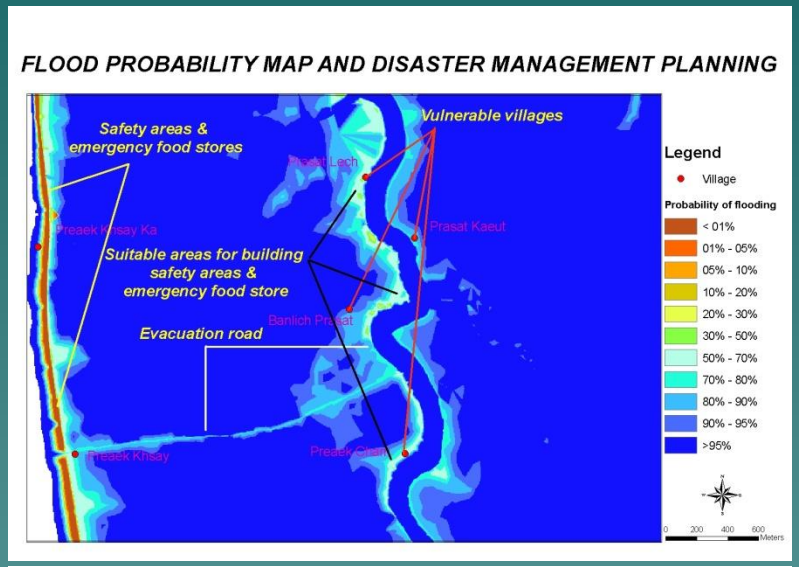


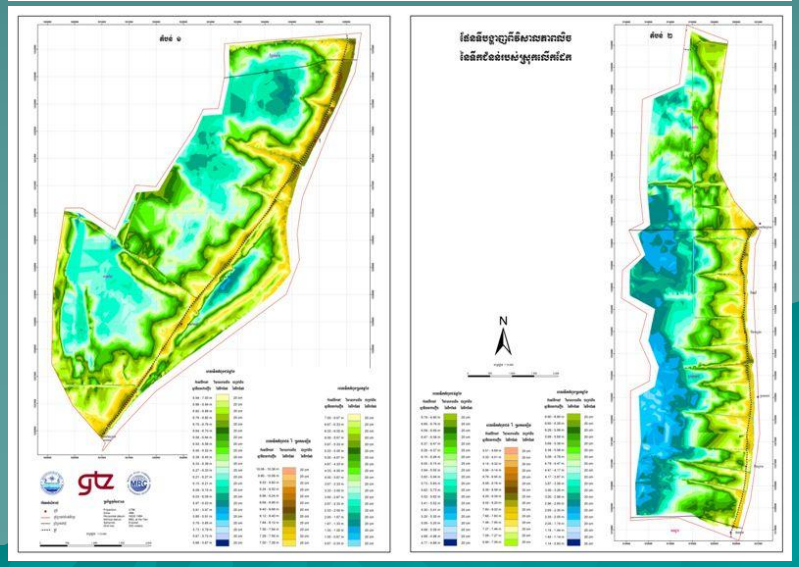
4.2 Provincial flood disaster preparedness and early warning system (con)

We use probability of flooding and flood extent maps for the early warning system.

-Probability of flooding shows vulnerable villages, safety areas and evacuation roads

-Flood extent map shows when and where will be flooding according to the forecast of mainstream water level.



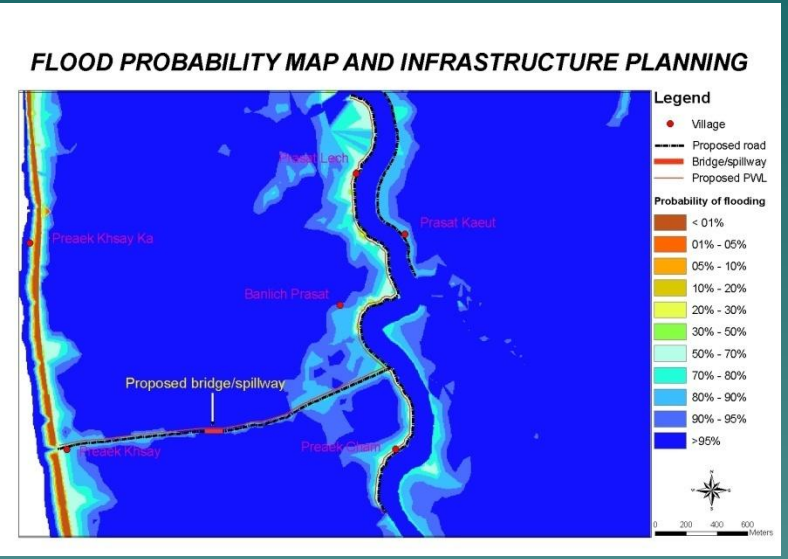


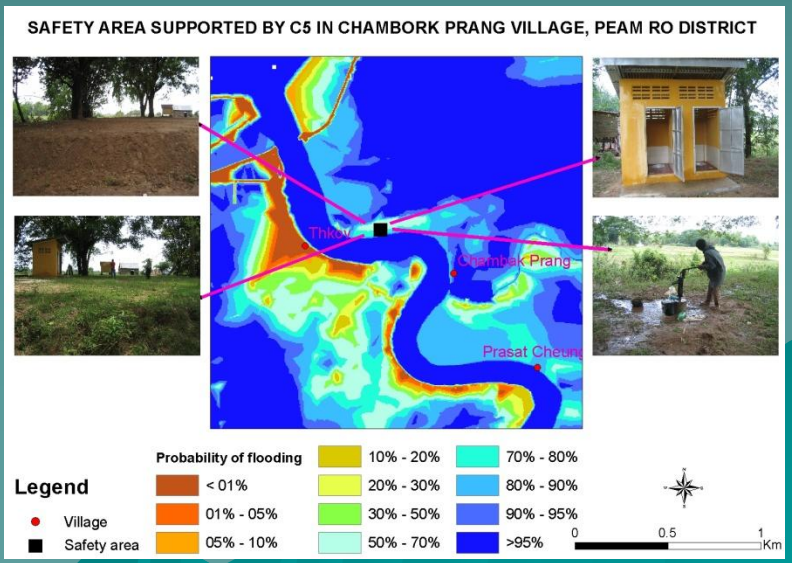
4.3 Rural infrastructure planning & design

Probability of flooding and maximum depth of flooding provide the capability in planning and design of rural infrastructure like:

-Building schools, health centers or safety areas

-Rural roads etc.

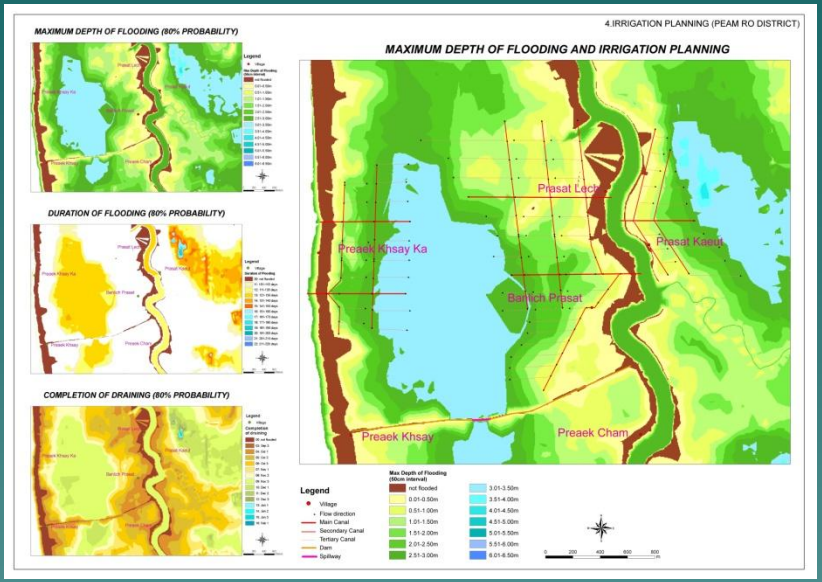




4.4 Irrigation planning and design

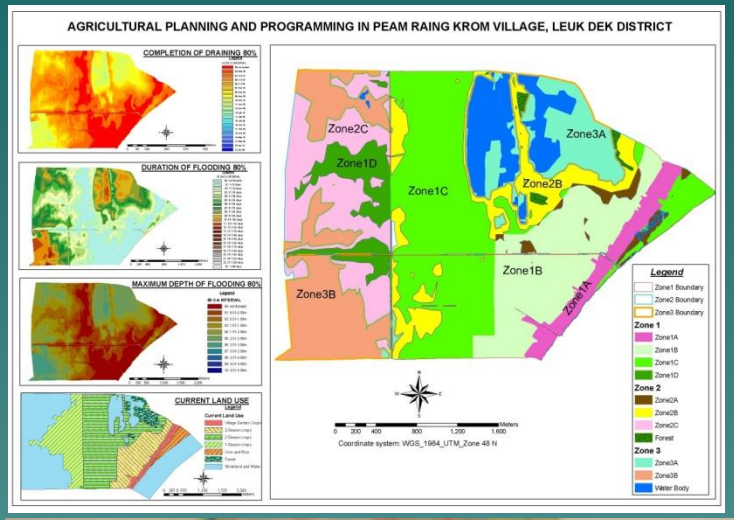
Probability of flooding, maximum depth of flooding, duration of flooding and completion of draining provide the capability in preparing irrigation systems master plan which compose of:

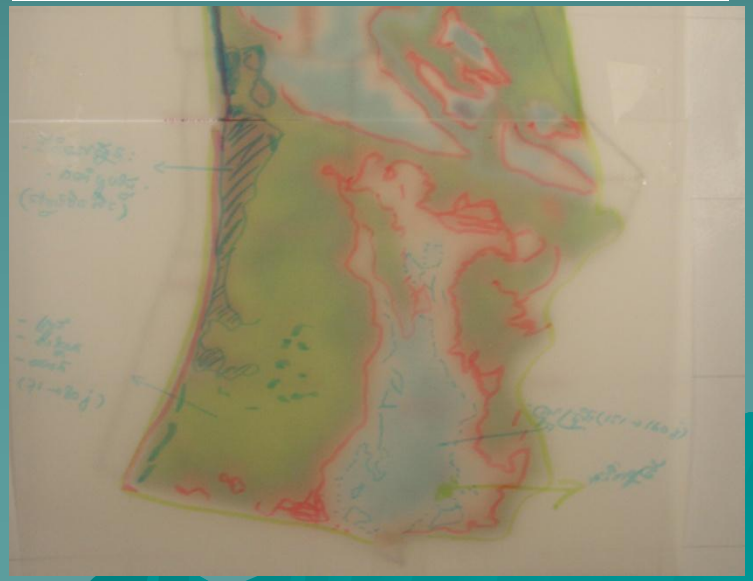
- Main canal
- Secondary canal
- Tertiary canal
- Dam (submerge dam, flood protection dam etc.)
- Spillway



4.5 Agricultural planning and programming

Probability of flooding, start of flooding, maximum depth of flooding, duration of flooding and completion of draining provide the capability in land use zoning, agricultural planning and preparing crop calendar.





5. The Advantages of Those Products

The flood probability data can be used to analyze and produce many useful products like:

-Analyze and define zones for other development sectors

-Prepare plans and arrange schedule for other development activities

-Flood extent map

-DTM (it can be used for design rural infrastructures such as road, irrigation etc.)

6. Future Plans for the Pilot Districts

DHRW will take responsible for the FPM in the 3 pilot districts in the future.

A-Activities to be continued in the future are:

-Collect hydrological data in the flood plain

-Maintain flood marks and billboards

-Conduct flood forecasting

-Update FPM which include hydrology and DTM

6. Future Plans for the Pilot Districts (Continue)

B-Proposed mechanism takes responsible in future activities in early warning system in 3 pilot districts:

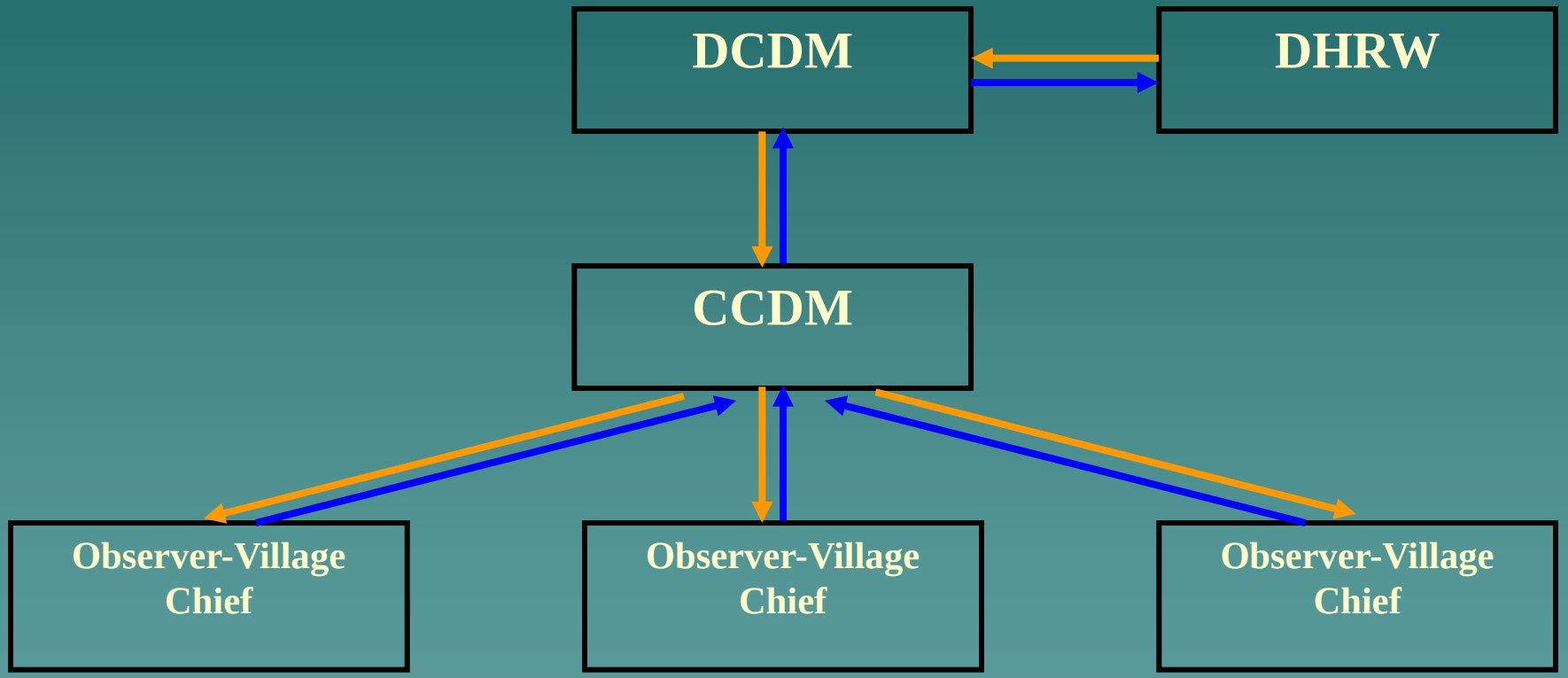
- Trained observers (village chiefs) will responsible in collecting and posting water level and flood forecast on the billboards in their villages. The data will be sent to DCDM through CCDM and DCDM send the data to DHRW by cell phone and they will keep a copy.

-DHRW collect water level data from DCDM assigned staff

-DHRW conduct long (6 months) and medium (3 months) forecasting – low accuracy, and short term (5 days) forecasting (acceptable accuracy) of water level in flood plain back to DCDM

-DCDM has to disseminate the flood forecast to observers (village chiefs) to post on the billboards.

Flow Chart of Water Level and Flood Forecast Transfer



7. Capability and Challenge of DHRW in Early Warning and FPMs Production

1. Capability

-DHRW has experienced cooperation observers in reading water level and posting water level and flood forecast on billboard at pilot villages.

-DHRW has capable staff for flood forecast and FPM update and generation

-Software for updating and generating FPM are available at the DHRW

2. Challenge

DHRW will face two challenges in the Future:

a. Flood plain hydrological data collection and flood forecasting mechanism is not concrete at the moment

b. Finance

-Collecting hydrological data from the pilot flood plain

-Maintaining flood marks and billboards

-Updating topography (DTM)

8. Suggestion and Recommendations

-Improve the Flood plain hydrological data collection and flood forecasting mechanism

-Continue to support DHRW in early warning system which includes water level collection, maintenance of flood marks, billboards and communication networks

-Build capacity for the extended pilot areas

-Extend the pilot areas to other flood plain

9. Cost Estimate for Future Early Warning System in 3 districts: PR, LD & LE

Description	Total Cost (USD)
Annual operating and maintenance cost for total 25 stations (3 pilot districts)	*12,426*
Rehabilitate the existing flood marks and billboards in 2 districts (3 in Peam Ro and 8 in Lvea Em)	*9,230*
Grand Total	*21,656*