

# **CONCLUDING REPORT**

## **“Roadmap Toward Effective Flood Hazard Mapping in the Philippines”**

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## **The Curriculum**

All parts of the curriculum were impressive, insightful and relevant especially the Flood Fighting Law in Japan and the preparation of the Flood Hazard Map. They improved my knowledge on hydrology, post flood investigation procedures and river engineering. My technical know-how on the methods to disseminate public awareness on flood damage mitigation was also enhanced. I consider topics on Flood runoff and inundation analysis; Effectiveness and Challenges of Flood Hazard Map. Although most of the topics in these subjects were quite familiar, still the Course had served as refresher trainees. Lectures on Effectiveness of Flood Hazard Maps and its Challenges (with the Tsunami Simulator Presentation) were very impressive and insightful. This is the area where the Philippines need to be enhanced and from these, collaborative efforts with other concerned agencies can be initiated to improve the disaster mitigating capabilities of our country.

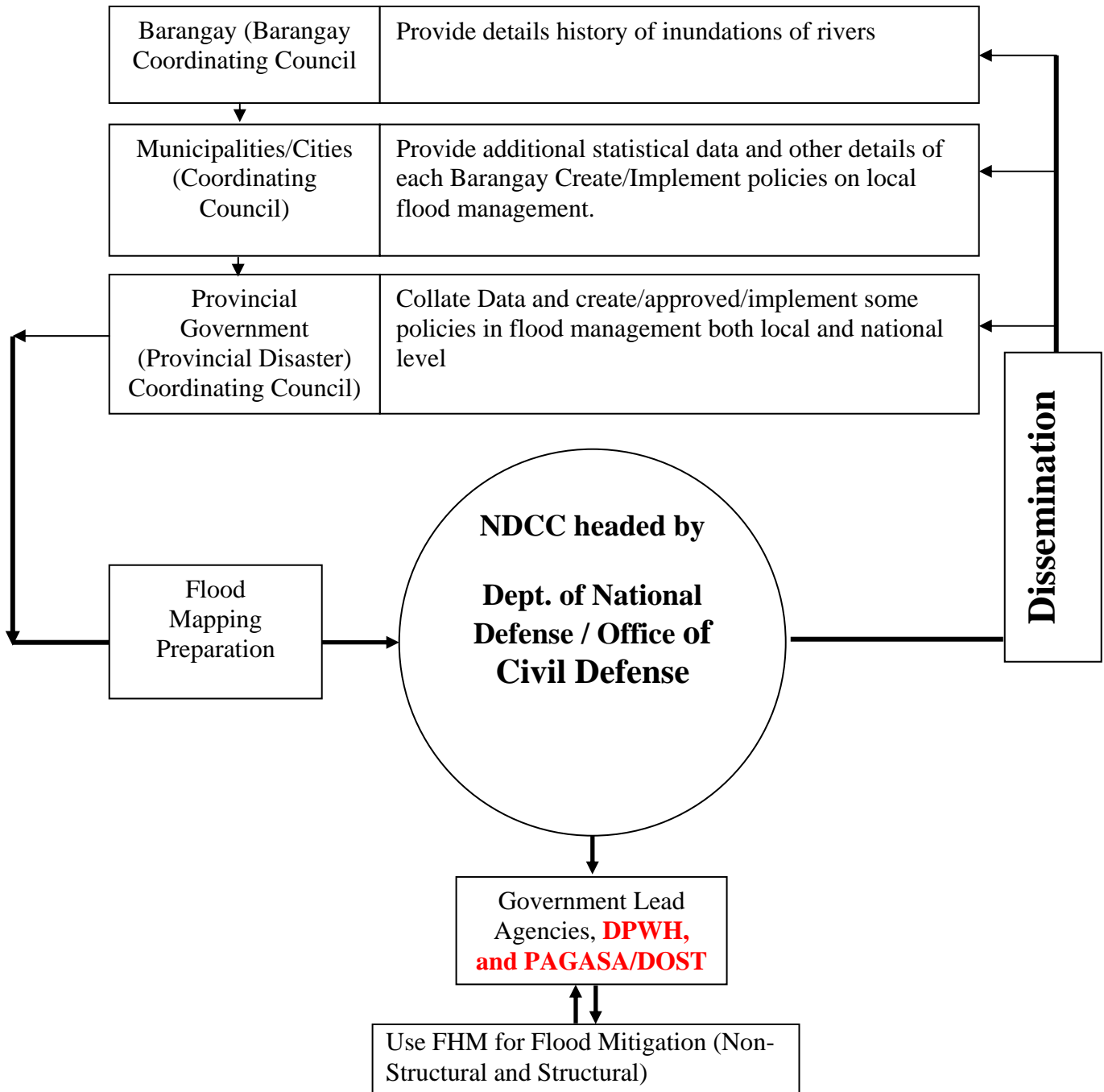
## **The Role of Flood Hazard Maps to Mitigate Flood Damages in the Philippines**

Philippines lies within the typhoon belt and because of this, the country often suffers from occurrence of natural disasters, floods and typhoons in particular, which has become an important factor adversely affect our economic development and social stability. Although many of these emergency situations could not be prevented, but its disastrous effects can certainly be mitigated if appropriate measures are adopted. This can be achieved by proper understanding of the hazards. But the extraordinary nature of these disasters can be mitigated if not prevented through “**effective contingency planning**”. Effective contingency planning involves a predictive response element to an impending emergency by ensuring the availability of financial, human and material resources. The very essence of this plan is to set-up a network of volunteers, who will be on-call during the occurrence of a disaster to coordinate individuals, agencies and organizations to affect a rapid and effective response. This is where Flood Hazard Map plays an important role. The Flood Hazard Map would guide the residents and flood managers to act decisively and accordingly.

In my area of responsibility especially the Agno River Basin, **FHM** can mitigate and reduce damages in terms of lives and properties thru a good and very informative but easy to understand by the residents. Like in our case if there is a weather disturbance and expected to hit our basin we issued flood forecast and warning and disseminate the information ahead of time to the

residents using the present assessment level and flood forecasting model in our telemetered water level station or what we called it real time data. So if we have the FHM we can easily identify thus areas to be inundated (depth and flood extent) and thus people expected to affect flooding can prepare much longer time before the flood occurs. Therefore, in addition of **FHM** in our flood warning, more accurate than the existing one.

### The Allocation of Roles in Making Flood Hazard Maps in my Country



## **ACTUAL FLOOD DAMAGES**

*July 12, 2002* Forty-one (41) people have died in the aftermath of four days of heavy rains and strong winds brought about by the southwest monsoon, according to the Office of Civil Defense. Among the fatalities are a five-year-old boy in Pangasinan and a two-year-old girl in Bulacan. Apart from Jake Sison, 5, of Barangay Angarian in Bugallon town, three others drowned in Pangasinan: Gerald Sison, 14, of Barangay Telbang in Alaminos City; Leopoldo Fernando, 16, of Barangay Umando in Malasigui town, and Nena Lopez, 54, of Barangay Turac, San Carlos City. A fifth fatality, Carlito Navarro, 56, of Rizal Street, Dagupan City, was electrocuted. Floods have affected 16,672 families in 22 towns and three cities in Pangasinan and damaged crops in 3,871 farmlands. Damage to crops and fishery resources has been estimated at P18.7 million. Pangasinan Gov. Victor Agbayani has ordered the provincial disaster coordinating council to deploy an engineering crew at the Gualsic-Caranglaan dike to protect the towns of Malasiqui and Alcala from rampaging floodwaters. The most affected areas in Pangasinan are Urdaneta City and the towns of Calasiao, Bautista, Bugallon, Mangatarem, Urbiztondo, Malasiqui, San Fabian, Sta. Barbara, Bayambang, San Jacinto, San Manuel, Sta. Maria, Sison, Agulla, and Labrador. In Dagupan City, the city disaster coordinating center has started relief operations in barangays which floodwaters had heavily damaged. The Philippine National Red Cross chapter in Pangasinan has also started distributing relief goods to some 300 families in Barangays Warding and Managos in Bayambang town. At least 583 barangays in 57 municipalities and three cities in Central Luzon have remained underwater following four days of heavy rains.

### **2004 Typhoon “Chedeng”, Damages - P49M**

The Pangasinan Provincial Disaster Coordinating Council reported that damages brought by typhoon Chedeng to crops, fisheries, livestock and infrastructures amounted to P49,197,060. Topping the list was the damage to fisheries, which amounted to P31.11 million, followed by infrastructure with P17.54 million. Partial damage to crops amounted to P36,220 while livestock damage was estimated at P511,440. The total number of cities and towns affected by the typhoon were 39 with 394 villages that suffered from the strong winds of Chedeng and the floodwaters it brought. There were 35,293 families affected, numbering 160,250 persons.

Reporting in behalf of Governor, infrastructure damages concern mostly on roads, eroded shoulders, road potholes, washed out or damaged surface materials and scoured bridge approaches as reported by the three

engineering districts of the Department of Public Works and Highways (DPWH) and the provincial engineering office. Damaged road lines in the first district were reported to cost P2.1 million; second district, P1.3 million; third district, P10 million; fourth district, P570,000; fifth district, P720,000; and sixth district, P2.75 million.

Damage to the Cawacalan Bridge along Sta. Maria-Balungao road in Balungao, whose approaches were scoured by the flood, was estimated at P100,000.

Livestock damage in Alaminos City and the towns of Bolinao, Malasiqui and Sta. Barbara was estimated to be P511,440. Some 150 fruit-bearing and non-fruit bearing mango trees in Barangays Laguit Padilla, Cayanga, Portic and Hacienda in Bugallon town were uprooted by typhoon Chedeng.

### **Counter Measures for Mitigating Flood Damages**

- Non-structural – this measures are being carried out by PAGASA and various government agencies (local and national)
  - Creation of Flood Hazard Maps
  - Establish additional permanent resettlement sites and evacuation centers.
  - Programs on Flood Precautionary measures and Flood Management Policies such as;
    - Land Zoning
    - Watershed Management
    - Reforestation
    - Flood Forecasting and Warning
  
- Structural – these measures are being carried out by the Department of Public Works and Highways.
  - Continuous seminars and trainings on the effective design, construction and maintenance and monitoring of present status of flood control structures includes levees, dikes, retaining wall cut-off channels/diversion canals and SABO works.

## Actions To Be Undertaken

### • Within one (1) year



- Make Flood Hazard Map for the target areas in Sinocalan River Sub-basin.

Sinocalan River sub-basin is a part of the Agno River Basin. This area is chosen considering the following:

- (1) It was severely hit by a flood event yearly especially in the month of July up October.
- (2) Its proximity to the main Flood Forecasting Office as compared to other river basins. Ground-truthing, data gathering and other activities would be easily carried out with minimal expense considering the limited budget of the office.
- (3) Our Flood Forecasting Office has initially established some tie-ups with local administration for the implementation of certain activities (i.e., public information drives, establishment of flood markers, among others.)

- (4) Availability of some data
- (5) The area has been the subject of some project studies and thesis. These initial studies will be important inputs to this undertaking.

### • Short Term Project

- Conduct study on the feasibility of producing a Flood Hazard Map for cities/municipalities within existing telemetered river basins, in coordination with colleague/co-trainee.
- Conduct training for Flood Hazard Mapping and introduce the advantages of Flood Hazard Maps to my office and other agencies as well in the local government units.

Considering the task, as well as great financial requirement of producing flood hazard maps, this proposal can be collaborated with the Local Government Units. To further explain to them the importance of having the FHM, this can be done during the conduct of the Public Information Drive. In this manner, the localities can be educated on the importance of the FHM and thus could assist in the out-sourcing of budgeting requirements for this endeavor.

- **Mid/Long-term Project**

- Improvement of the present format of the Flood Bulletins/Information which our office is issuing by incorporating some basic points from Flood Hazard Map.

One of the main operational services of our Agency, thru its Flood Forecasting Branch (FFB), is the issuance of flood forecasts, warnings and other relevant information whenever there is an impending flood. The format is basically text message which tells something about the present hydrometeorological condition of the river basin, quantitative information on rainfall and water level and the hydrological forecast on what would be the effect of such condition within the next 6-12 hours. By incorporating some “basic” aspects drawn from Flood Hazard Maps (such as inundation patterns, available evacuation shelters and routes, important telephone numbers, and some information that would easily understand by the people.), the localities will have a clearer picture on the effect of the RR data within their area thus, can act accordingly. Furthermore, the people involved in rescue and relief operations can systematically re-align their actions to give emphasis on some areas that need to be prioritized. Although some might not be feasible at the moment, but steps will definitely be undertaken and that collaboration with the proper channels will be done so that a core group could be created to execute the proposal. In this manner, the disaster management program of the country could also be improved and enhanced.

- **Before the next batch of trainees**

In the event that projects/initiatives described above are put into operation, the candidates for the next training must be involved in all the activities of such undertakings. This is not only to prepare training but also for Training Proponent in all endeavors of the Agency in relation to this training. Furthermore, since the training could serve as an avenue of discussion and exchange of ideas, the next trainee can very well contribute something, which the trainees from other countries could adapt in their area of operation.

### **Advice / Suggestions for Effective Flood Management in Japan**

Japan at present has already developed a well-coordinated and multi-disciplinary method of flood management. However, this should mean that the Government of Japan would stop at this point. Further review of its existing flood hazard maps, programs and other legislations is needed to come up with more finite programs that would cater to the specific needs of the end-user. Furthermore, during the conduct of information education campaign, dialogues with the localities could be done to access the

effectivity of each counter-measure that is being adapted. Although this is already being done on the part of the disaster centers, let us not discount the possibility of further improving the existing system. The FHM might have been too complicated for a common person to comprehend or understand.

Many things had also been identified during the discussion on Town-watching activity. I would say those are very relevant to my area of operation. Provision of signages for flood evacuation routes and location of evacuation centers are quite simple proposals but have proven to be effective. However, such signages should be bilingual so that foreign participants can also comprehend the said information.

Finally, the increasing trend of the number of elderlies as well as the children should be given consideration in the planning stage of flood management programs.

### **Advice / Suggestions for More Meaningful Training Course**

All the knowledge gained should be passed on to the next participants for them to realize that this is a “Focused Training Course”. It is not enough to just listen to lectures; that exchange of information on the applicability of the lectures in one’s area of operation is very necessary. It is also important to present something from their own sides: specifically their country’s condition on flooding and all efforts initiated by their government in abating the ill-effects of this disaster. In this manner, every participant can benefit from the actions undertaken by the others, which is part of the learning process being aimed by the Training Course. It is also very important to interact and ask what is vague that needs further explanation.

Finally, some important topics and activities should be provided with a longer time like for example the flood modeling must be given more time to familiarize the participants in using the latest software. It will be the basic tool to determine the depth and inundation areas (extent of flooding). If the course duration is impossible to extend to consider some important topics, or if not shortened some topics that are not really close to the proper course.