Department of Public Works and Highways
Japan International Cooperation Agency
Flood Control and Sabo Engineering Center

FCSEC Newsletter

Volume 2, December 2007

Revetment

Evacuation Center

Slit Dam

Hydraulic Laboratory

DPWH towards integrated flood mitigation

Flood control structures and sabo engineering works have been providing relief and safety for vulnerable communities, albeit at a certain level only, depending on the magnitude as designed return period, I.e., 5-10 yr, 30-yr. flood etc. Increasing the safety level would require enormous investment. Piecemeal project implementation will need to be replaced by a comprehensive and integrated flood mitigation approach on a basin wide basis. The development of river basin flood control master plans becomes imperative. FCSEC and Planning Service, in coordination with the regional and district engineering offices are now collating data and information to establish a database system that will support the development of flood control master plans.

In this issue

Editorial

Thank you for your interest in reading the 1st issue of our newsletter, and of course; on hearing some feedback comments and appreciation.

In this 2nd issue, and in order to keep you abreast of our activities, we continue featuring some significant highlights, such as the on-going two (2) flood control projects for the Laoag and Kinanliman Rivers, the former being a loan project while the latter is under the JICA-assisted technical cooperation project being implemented by this office.

As usual, conference/seminar reports of DPWH-FCSEC staff form part of this issue to share their experiences gained. Also, personalities in the flood control sector, and other informative events and trends in flood mitigation are presented.

We do hope that you get interested in reading this 2nd issue and we will appreciate some of your feedbacks to make this newsletter more informative and relevant to the call of the times in addressing water-related disasters.

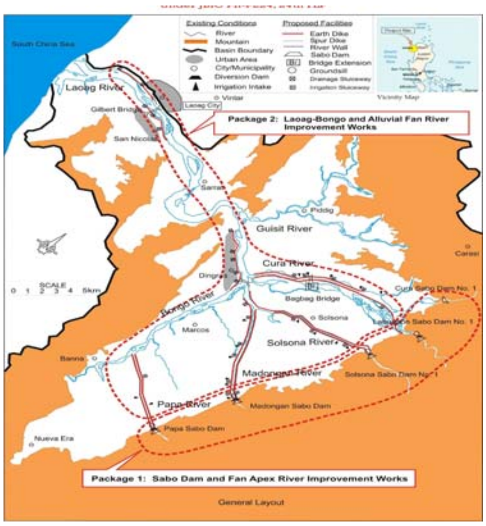
Featuring…

Laoag River Basin Flood Control and Sabo Project

By: Dolores M. Hipolito, PM II (FCSEC), Alejandro A. Sosa, PM II (MFCP II),
and Glenn V. Reyes. Engr. III (1st Ilocos Norte DEO)

Laoag City's potential as a trading center for foreign trade from the North, being strategically located close to Taiwan, Japan and China, may soon be realized with the completion of the ongoing Laoag River Basin Flood Control and Sabo Project. Economic development and the rise of the Ilocos region as an industrial base will be accelerated with the mitigation of flood and sediment deposition damages periodically experienced.

The project was realized in 2000 with the signing of the Minutes of discussion between the Government of the Philippines and Japan. The priority projects were identified from the Study on Sabo and Flood Control in the Laoag River Basin conducted with the assistance of the Japan International Cooperation Agency in 1996-1997.



Laoag River Basin is located in the province of Ilocos Norte in Region I and has a drainage area of 1,332 sq. km. covering wholly or partially the city of Laoag and the municiaplities of Banao, Carasi, Dingras, Marcos, Nueva Era, Piddig, San Nicolas, Sarrat, Solsona and Vintar.

The flooding problem in the basin area is aggravated by excessive sediment deposition over the river flood plain and alluvial fans such that the project includes not only the provision of earth dikes, flood walls, spur dikes, sliceways, groundsill, but also sabo dams.

To date, the five (5) sabo dams prioritized under the Project have been completed (Cura, Madongan, Papa, Labugaon and Solsona Sabo Dams). Other structures proposed to mitigate a 25-year return period flood that have been completed are the 83.2 km. earth dikes, 1043 units of spur dikes and 4 units of groundsills. The remaining works are envisioned to be completed in 2009, under the supervision of the PMO-Major Flood Control and Drainage Project II Office. It is the first time that sabo dams with sediment storage capacity of 4.7 million m^3 are constructed in the country. It will be quite interesting to see in the coming years how these dams and other infrastructures under the project cope with the challenges in flood mitigation in the region.

Featuring...

Flood Control Pilot Project for Kinanliman River Basin

By: Gil I. Iturralde, Engineer V, (FCSEC)

Introduction

One of the main activities under the Project for *Strengthening the Flood Management Function (SFMF) of DPWH* is the implementation of Pilot Project. The pilot project is being implemented to test the applicability of the technical standards, guidelines and manuals FCSEC has developed. Based on the following criteria and viewpoints: (a) Accessibility, (b) Technical, (c) Catchment area (d) Social, and (e) Peace and order, as concerns of JICA experts. the Kinanliman River was selected as a pilot project site for flood control.

Pilot Project Background

The Kinanliman River with a catchment area of about 10.0 km^2 is located in Real, Quezon Province in Region IV-A. The river originates from Mount Binangonan with elevation of about 1,034 meters and flows down the mountainous area toward east. After flowing through the mountainous area, it immediately enters the Lamon Bay of the Philippines Sea at the southern part of Real town.

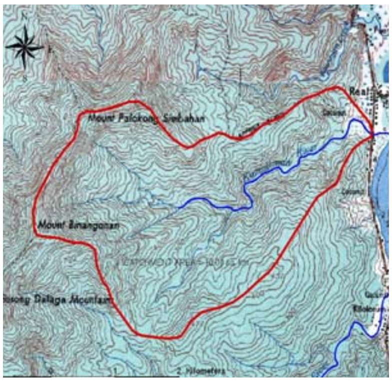
Almost all of the river basin is covered by the forest area, and the habitable area in the basin is limited to the area around the river mouth. The habitable area of the basin suffers from flood and sediment related damages caused by typhoon every year. Among those typhoons, the typhoon Winnie/ Yoyong in November 27, 2004 gave the largest damage over the habitable area. During the typhoon, flash flood associated with debris flow devastated the houses along the river, and the bridge along the national road was clogged with drift woods/cut-off logs that triggered its collapse. Reported damages by the LGU include 58 and 21 persons dead and injured, respectively; and 443 damaged houses. Moreover, riverbed aggradation of about 2 meters was observed.

After the flood, urgent recovery works were done through the joint effort of the 1st Quezon DEO, DPWH and the Local Government. However, the river course has drastically changed towards the town proper and more than 500 families are now in danger of flood. In order to mitigate the above flood damage, flood control works are urgently necessary. In this context, Kinanliman River was selected as site of one pilot project under the Project SFMF of DPWH.

Master Plan (Conceptual Plan Level) of Project Works:

After review of structural countermeasures, with due consideration of the social and economic conditions, diking system with revetment are proposed in the master plan. Such conceptual plan requires the implementation of non-structural measures. e.g., control of land use, resettlement, etc.

Location Map



Catchment Area

Project Implementation Structure and Schedule

The pilot project will be implemented in coordination with the RO/DEO (where the project site is located) starting from the planning/ design, construction, and maintenance stages, in order to complete the cycle of enhancement.

Implementation of works commenced in 2006 and construction is expected to be completed by mid 2008.

Debris Flow Area

Downstream Area

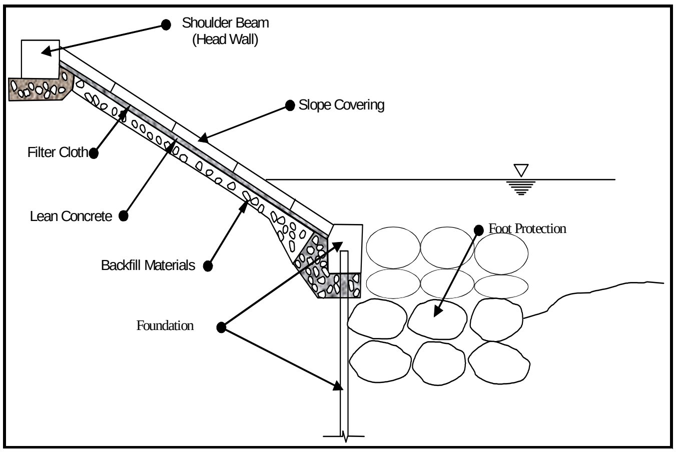
Featuring...

REVETMENT

By: Michael T. Alpasan, Engineer IV, FCSEC

Collapses of riverbanks are commonly seen in various parts of the country due to its prevailing topographic, geologic and meteorological condition. Let us take the Cagayan River (the longest river in the country) as an example, its meandering characteristic results to scouring of riverbanks in numerous sections of the river especially during flood events wherein such sections are subjected to direct attack of the flood flow. Other factors that contribute to scouring in rivers are a) channel excavation or dredging, b) river structures and c) sand bars in the riverbed.

In response to the above problem, the DPWH and local government units respond through the implementation of mitigation measures for the protection of riverbanks wherein lives and properties are located. Revetment projects are mostly implemented to directly protect the affected areas. Usually seen in urban communities are the concrete, reinforced concrete, grouted rip-rap and stone masonry types. A typical revetment structure is illustrated in the figure.



Typical Revetment Section

Field investigations and analyses undertaken by the Flood Control and Sabo Engineering Center (FCSEC) revealed that majority of revetment damages are caused by scouring of the toe/foot portion resulting to its collapse. Other observed causes of damages are the vulnerability of the slope covering work and the structure's end portions. Thus, emphasis is given in this article in providing essential information to be used by planning and design engineers in addressing the above problems.

Preventing damages due to scouring of the toe portion may be addressed by the adequate provision of **foundation work and foot protection work.** In principle, the top of foundation work shall be placed deeper than one (1) meter from the deepest riverbed. Although the foundation work may be sufficient by design, it will be better to provide foot protection work to prevent the lowering of the riverbed immediately in front of the revetment. The most economical type of foot protection is the riprap-type (loose boulder). With regards the planning and design of slope covering **slope covering works** which directly protects the riverbank, due consideration should be given to the velocity of flood flow. Riverbanks which are exposed to flood flows with less than two (2) m/s velocity may not require a revetment but only simple sodding works.In addition, the slope shall be gentle as much as possible (2:1 : horizontal : vertical) and a berm with a minimum width of one (1) meter shall be provided for heights greater than 5 meters. Weep holes should be provided in the revetment using 50-70 mm diameter PVC drainpipes, staggerdly placed in the horizontal direction and spaced 2 meters center to center


Concrete–type revetment in Ormoc City

Recognizing the limited budget for flood control leading to piecemeal projects, it is important that completed portions of revetment projects be protected from damage, especially the end portions. Thus, **end protection works** as simple as placing boulders must be implemented while awaiting for funds for the implementation of the succeeding section. For a more detailed planning and design of revetment, refer to Chapter 5, Manual on Design of Flood Control Structures prepared under the Project for the Enhancement of Capabilities in Flood Control and Sabo Engineering of the DPWH.

Hydraulic Experiment

September 11-December 08, 2007
Tsukuba, Japan
By: Harold N. Uyap, Engineer III, FCSEC

The Government of Japan thru Japan International Cooperation Agency (JICA), gave the author the opportunity to attend individual short-term training course for hydraulic experiment in Japan under the counterpart training program. The hydraulic experiment training was undertaken in Pacific Consultant Company Ltd. Hydraulic Laboratory in Tsukuba, Japan. Under the supervision of the laboratory's Director and engineers, several experiments were conducted, such as the basic hydraulic experiment using the miniature hydraulic flume. This is to simulate the flow condition in an open channel and study several hydraulic phenomena that are difficult to observe in the actual rivers. Prior to this activity proper calibration and setting of measuring instruments were performed to attain good and reliable results.

Hydraulic River Modeling for Shonai, Kariyata and Watarase rivers were also conducted. These rivers were scaled down from their original condition, considering the important dimensionless parameters and similarity of flow condition and the limitation of experiment facilities. Using this physical hydraulic modeling is one of the several methods in solving complicated hydraulic phenomena. It can directly review countermeasure work and the results can be easily obtained.

Aside from hydraulic laboratory experiments, several fascinating flood control structures and facilities were visited during the study tour. The author observed Sabo dam works and flood control construction and appreciated the importance of the structures in protecting the communities.

The acquired knowledge and skills during the course training are now being applied in the research and development activities of the Flood Control and Sabo Engineering Center (FCSEC), particularly in the conduct of hydraulic laboratory experiments, as well as in the training courses for DPWH field engineers.

Mt. Sakurajima, One of the Sites Visited During Study Tour

The Hydraulic River Model Experiment

From page 14… Bits of Knowledge in Sabo

These phenomena are continuing. There may be slope failure that looks like landslide. And also there may be landslide that looks like debris flow. And sometimes it is very difficult to decide which category those disasters have to be categorized. But I have an impression that in the Philippines, people are used to using the word 'flash flood' even if it might be 'debris flow' or 'inundation''. One of the typical causes for 'flash flood' is collapse of natural dams. But when debris flow goes down the slopes, it has front part and river discharge will increase very sharply. So if discharge volume increase sharply, we can not say it is 'flash flood' only from it. We should distinguish between 'flash flood' and 'debris flow'. Needless to say sometimes countermeasures for 'inundation' , 'flash flood' , and 'debris flow' will be different. So we have to use the word correctly.

The JICA study team on risk management for sediment-related disaster on selected national highways in t the Philippines classified the disasters as follows: Soil Slope Collapse; Rock Slope Collapse; Landslide; Road Slip; Debris Flow; River Erosion. I think there is a classification of the Philippines which is suitable to the climatic and geological characteristics.

Conference/Seminar Report...

9th River Symposium

September 4-7, 2006, Brisbane, Australia
By: Jesse C. Felizardo, Engineer IV, FCSEC

Attending the 9th River Symposium on 4-7 September 2006 in Brisbane, Australia was a big privilege for me. It gave me exposure to different trends in river technology and innovations in response to climate change and changing environment.

The conference, with the theme "Managing Rivers with Climate Change and Expanding Populations'', was attended by more than 500 delegates from different countries. In a topic session, I presented a paper on Reducing Disaster in the Densely Populated Waterway and Shoreline in Metro Manila. The subject dealt with the necessity for a warning and evacuation system in times of storm surge due to wind storm especially in the Mangahan Floodway and the shorelines of Laguna Lake, where there are countless residents.

The main feature of the conference was the keynote address of Mr. David Grey, Senior Water Advisor for the World Bank. He discussed the links between the sophistication of a country's water management and its economic health. He also stressed responsible growth requires valuing change with water security and that entails both environmental sustainability and social development.

Different case studies in Europe, Asia, Africa, Australia, North and South America were presented in the plenary sessions. A wide variety of topics were discussed such as indigenous river management, restoring rivers after disasters, community involvement, agricultural practices, environmental flows for rivers, water reforms, river modelling, rivers and human health, planning for climate change in river and catchment management, and more.

Each year, the symposium highlights the prestigious Thiess International River*prize* equivalent to Aus$225,000. The prize is regarded as the "Nobel Prize" for saving rivers, recognizing outstanding achievements in river conservation and management. The Sha River of China won the 9th RiverSymposium Theiss International Riverprize. In 1999, it was declared virtually dead and a public hazard due to rapid population growth and industrial development resulting to the combined impacts of city waste, raw sewage, deforestation, coal silt and rural garbage. The restoration project has improved water quality, controlled flooding, cleaned up pollution, landscaped parks, constructed drainage systems, and enhanced public use and understanding of the catchment.

Concerted efforts from different sectors of society involving community participations, government agencies, civic organizations, contributed to the success in river revival.

The conference served as venue to get acquainted with the different trends, technologies and practices in river management

Conference/Seminar Report...

3rd Asia Pacific Hydrology Water Resources Conference

October 16-18, 2006, Bangkok, Thailand
By : Jerry A. Fano, Engineer III, FCSEC

The National Research Council of Thailand (NRCT) and the Association of Researchers in collaboration with the Asia Pacific Association of Hydrology and Water Resources (APHW) jointly organized the 3rd APHW Conference at the Grand Hotel in Bangkok, Thailand from October 16-18, 2006. The APHW conference is held bi-annually to raise water problems to cases within the framework relevant to the geography and climate of the Asia Pacific Region and offer possible solutions or approaches.

The 3rd APHW Conference Theme entitled: "Wise Water Resources Management Towards Sustainable Growth and Poverty Reduction" features the regional characteristics and water problems, lessons from the past, sound utilization of water resources, climate change, variation and disasters, and wise water resources management.

UNESCO-IHP Session The author presented the topic 'Strategy for Flood Disaster Mitigation in the Philippines' in the 3rd APHW Conference Bangkok, Thailand.

Over 40 thematic sessions were held, and almost 250 participants attended, representing governments, academe, hydraulic research agencies, intergovernmental organizations, non-governmental organizations (NGOs), and business and industry.

The author, an Engineer III of the DPWH PMO-Flood Control and Sabo Engineering Center was invited to the Conference under the sponsorship of the NRCT and the APHW and presented the following topics:

a) "Strategy for Flood Disaster Mitigation in the Philippines" (Oral Presentation)
Sub-Theme 4 : Disaster Risk Management

b) "The Quezon, Philippines 2004 Debris Flows" (Poster Presentation)
Sub-Theme 5 : Effects of Floods, Droughts, Debris Flows and Landslides

c) "Technical Cooperation Project: Enhancement of Capabilities of Philippine Engineers Towards Effective Flood Management" (Oral Presentation)
Sub-Theme 6 : Other Topics

Engr. Fano's experience in attending the conference has exposed him to the new trends and strategies in risk management, including application of non structural measures that involve communities' preparedness to live and deal with risks, societies' risk perception issues and consideration of emerging threats.

> *Flood for thought...*
>
> *United Nations International Strategy for Disaster Reduction defines:*
> ***Hazard** as a potential damaging physical event, phenomenon as human activity that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation.*
>
> ***Vulnerability** as the conditions determined by physical, social, economic, and environmental factors of processes, which increase the susceptibility of a community to the impact of hazards.*

Conference/Seminar Report...

EAST AND SOUTHEAST ASIA REGIONAL SEMINAR ON FLOOD HAZARD MAPPING (FHM)

February 07 to 09, 2007, Kuala Lumpur, Malaysia

By: Grecile Christopher R. Damo, Engineer III, FCSEC

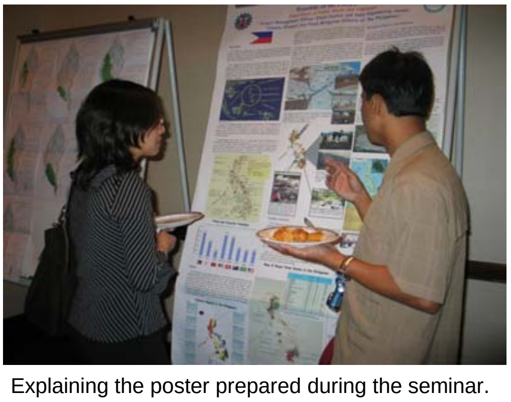
The International Center for Water Hazard and Risk Management (ICHARM) under the auspices of United Nations Educational, Scientific and Cultural Organization (UNESCO) together with the Public Works Research Institute (PWRI) and Japan International Cooperation Agency (JICA) in collaboration with the Department of Irrigation and Drainage (DID) of Malaysia organized the 1st East & Southeast Asia Regional Seminar on Flood Hazard Mapping at the Renaissance Hotel, Kuala Lumpur, Malaysia from 7th to 9th of February 2007. The seminar will be held annually to strengthen the capability of the Asian nations in the non-structural measures in dealing with the flood problems and to build-up the network with other Asian countries.

In 2005, the 1st training on Flood Hazard Mapping was conducted and it was preceded by several batches and in order to monitor the activities and the current development of each participating Asian countries in solving the flood problems of Asian nations using the non-structural measures (flood hazard map, early warning and evacuation), the 1st Regional Seminar was organized. The main objective of the seminar was to provide a platform and sharing of knowledge and experience through interactive participation.

The seminar concentrated on the issues of flood hazard mapping and its field application as a tool for disaster preparedness and mitigation. Aside from the 15 participants (ex-trainees) coming from the Philippines, Cambodia, Lao, Thailand, China, Vietnam, Indonesia and Malaysia local and international agencies, institutions and organizations, coming from both government and private sector also attended the seminar. Engineer Grecile Christopher R. Damo, DPWH-PMO-FCSEC along with 2 participants from Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) represented the Philippines having attended the training.

During the course of the seminar, each participant shared their experiences, projects and proposals to the partakers, sharing theoretical and practical knowledge and achieving hands-on experience back in their own countries. The presentations covered a variety aspects such as case study, work progress, current issues, future challenges etc. In addition, invited lecturers from selected international organizations gave insights on latest technology and methodology for the development of flood hazard map. Engineer Damo presented the "Community Based-Flood Hazard Map of Camiguin Island" together with a poster of the structural and non-structural measure activities of the Philippines, while the representative from PAGASA presented the Eastern Board Multi Hazard Mapping and the community based warning and evacuation project of PAGASA.

One of the activities during the course was a field visit and town watching in one of the flood affected areas in Kuala Lumpur, Malaysia, the Taman Tun Dr. Ismail Jaya, to be observe the effectiveness of application of both non-structural (flood hazard map, warning and evacuation) and structural measures in a flood plain area.



Explaining the poster prepared during the seminar.

Town watching at Taman Tun Dr. Ismail Jaya, the participants took pictures of the facilities and visited the affected areas. Which were severely affected by the recent flooding. The group was welcomed and led by the town officials and administrators during the town

Introducing...

Philip F. Meñez

Project Director, PMO-Major Flood Control Project Cluster II

By: Michael T. Alpasan, Engineer IV, FCSEC

At the forefront of flood control project implementation is Mr. **PHILIP F. MEÑEZ**, CESO III, Project Director of the PMO-Major Flood Control and Drainage Projects, Cluster II. He is one of the energetic project directors in DPWH Flood Control Project outside Metro Manila.

He started his government career in 1973 as a Civil Engineering Aide in the Flood Control and Drainage Division of the then Bureau of Public Works. It was in 1982 when he started his work at the PMO-Major Flood Control Project. It was during his tour of duty in Pampanga that then DPWH Secretary Gregorio R. Vigilar saw the high proficiency and reliability of Engr. Menez in handling infrastructure projects. He was designated by Secretary Vigilar as a member of the Mt. Pinatubo Task Force after the eruption of Mt. Pinatubo in 1991.

Recently, he was given a plaque of recognition by no less than the Governor of Ilocos Norte for the timely completion of the Laoag River Sabo and Flood Control Project, as well as the Rehabilitation/Enhancement of Ormoc Flood Mitigation Structures during the unveiling and turnover ceremony, October 20, 2007 . in the project implementation, he recognizes two (2) main issues that need to be addressed, i.e.: a) timely acquisition of right-of-way (ROW) and b) the speculative attitude of inhabitants towards infrastructure projects. He feels that the first priority should be given to all major river basins and then the principal rivers. With the 2nd and 3rd largest rivers in the country, projects for Mindanao should be pipelined in the near future.

Due to the increasing demand to cope with floods and other water-induced disasters, he recommends the refocusing of training activities in DPWH to give more focus in flood control and sabo (erosion and sediment movement control) and the establishment of an internal mechanism to secure the specialization in the above fields, e.g., accreditation of river/sabo engineers comparable with that for the project engineers/inspectors and material engineers. He also recommends that the required budget to ensure effective countermeasures must be provided by the national government and concerned local government units.

The flood control sector is in good hands with a dynamic team, under Dir. Menez who ably provides their expertise and clear direction in support of the Department's goal in mitigating floods and othe-water induced disasters through the conduct of studies and implementation of appropriate infrastructures

Flood for thought...

"The kinds of things you see coming, you know they're going to happen, and yet we at times seem unwilling or unable to act"

Dean David T. Ellwood
Kennedy School of Government, Harvard University

Introducing...

MITSUNAGA, Takeo

JICA Sabo Expert, Project SFMF

By: Michael T. Alpasan, Engineer IV, FCSEC

He graduated from Kyoto Univ. on March 1991 with a degree in Agriculture and entered the Ministry of Construction (now the Ministry of Land, Infrastructure and Transportation (MLIT). He has worked as a national public officer for about 17 years. During those years, he worked for 4 construction offices under MLIT and also worked for the Niigata Prefecture (Local Government Unit) for 2 years, Development Construction Department, Okinawa General Bureau, Cabinet Office for 1 and half years and Grant Aid Division, Economic Cooperation Bureau, Ministry of Foreign Affairs for 2 and half years. After working at the Land Conservation Division, Sabo Department, River Bureau, MLIT as Deputy Director, he was dispatched to the Project Management Office Flood Control and Sabo Engineering Center, Department of Public Works Philippines (PMO-FCSEC) as a JICA Sabo Expert on March 2006.

After less than 2 years of his assignment in the Philippines, he has the following viewpoints/ impressions on flood control in the country.

1. DPWH and other agencies should increase prioritization in flood control, not only the implementation of structural measures but also non-structural measures such as reforestation and land use regulation so that they can make a comprehensive flood control plan. DPWH should have closer relationship and information sharing with DENR, PAGASA, LGUs and other related agencies.
2. When DPWH carryout their flood control project, they should think about a comprehensive plan for the watershed not only focusing on a particular problem site. For example, if they carryout the rehabilitation project they should not only rehabilitate the damage portion but also survey the site and make sure of the cause of the damage. If sand bar formation is present at the site and it makes the river shift towards the riverbank, the project for removal of the sand bar or reduction of sediment run off could be considered as the project itself.
3. The number of Sabo projects are very few in the Philippines. But the sediment run off is very big in many rivers in the Philippines. So Sabo works is one of the useful countermeasures in this country.

He hopes DPWH has Sabo Training under the FCSEC Training program and many DPWH and LGU staff would be able to formulate a flood control plan considering the upstream (sabo) and downstream (flood control).

Flood for thought...

Section 32 of the Water Code (PD 1067) and its Amended IRR provides that a permit/authority shall be secured from the DPWH in the following instances;

a. Construction of dams, bridges and other structures in navigable or floatable waterways
b. Cultivation of river beds, sand bars and tidal flats upon clearance from DENR
c. Construction of private levees, revetments and other flood control and river training works, and
d. Restoration of river courses to farmer feds

Community-Based Disaster Mitigation: Camiguin

By: Dolores M. Hipolito
PM II, FCSEC

The volcanic island of Camiguin, despite its idyllic island setting is home to a variety of natural hazards like volcanic eruptions, earthquakes and typhoons that trigger debris flows and flash floods. Small localized rainstorm, referred to as “buhawi”, also induces small-scale landslides and debris flows which mostly flow within the confines of river channels. After experiencing a devastating typhoon in November 2001, structural and non-structural countermeasures were formulated for the island under a development study grant from the Japan International Cooperation Agency (JICA). In 2004, another JICA-study was conducted to strengthen the disaster prevention abilities of the Camiguin disaster units and raise the community people’s awareness on disaster prevention. The construction of the structural measures (sabo dams and river training works), and the reconstruction of the Hubangon bridge has been applied for JICA grant, but has not been granted yet.

The design and development of the non-structural measures were based on the findings from a social survey. The communities and the local government units actually participated in most activities for the development of the warning and evacuation system, public awareness materials, flash flood and debris flow disaster prevention manual and evacuation plans.

The constant involvement of the community in assemblies, meetings, training, surveys, workshops, evacuation drills resulted to enhanced communities in disaster prevention and the development of non-structural measures that is suited with the community’s needs capabilities and resources. The multi-stakeholders participation has ensured people’s awareness, acceptance and mobilization. Roles and responsibilities were identified, delineated and monitored.

After a monitoring and evaluation visit to Camiguin in March 2007, it can be declared that indeed, the communities are better prepared and equipped now to cope with disasters. This can be gleaned from the following, among others:

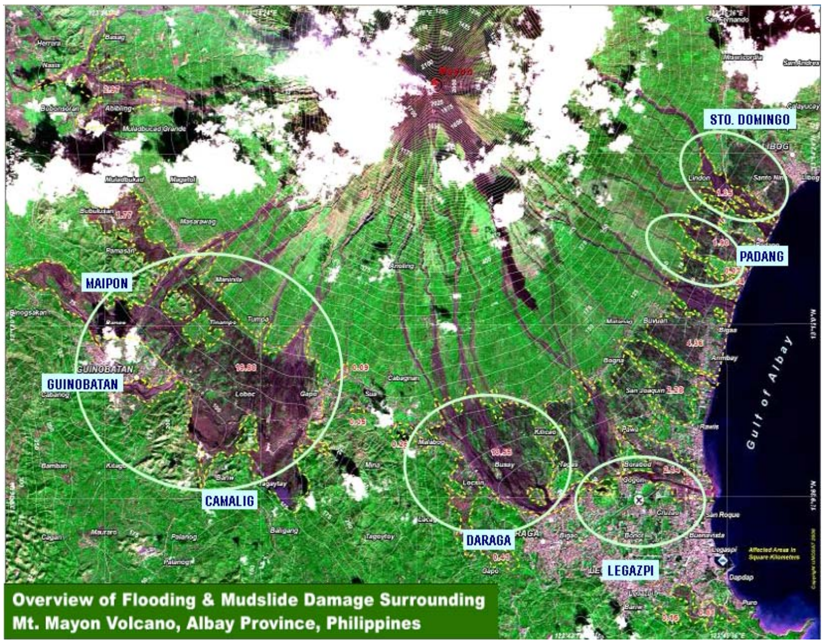
a. Constant communication among river observers and the disaster coordinating councils
b. Conduct of programs for disaster management, such as seminars, trainings and procurement of equipment.
c. Continued community dialogues for people in hazard areas
d. Communication networking among the members of DCCs, particularly in rainfall monitoring
e. Awareness of the community on the hazard maps and evacuation plans.

In 2006, the National Disaster Coordinating Council conferred the Gawad Kalasag Award to the province of Camiguin as the best provincial Disaster Coordinating Council. This award recognizes the capability of the Camiguin PDCC in disaster mitigation.

MAYON 2006 DEBRIS FLOW: The Destructive Path of Typhoon Reming

By : Jerry A. Fano, Engineer III, FCSEC

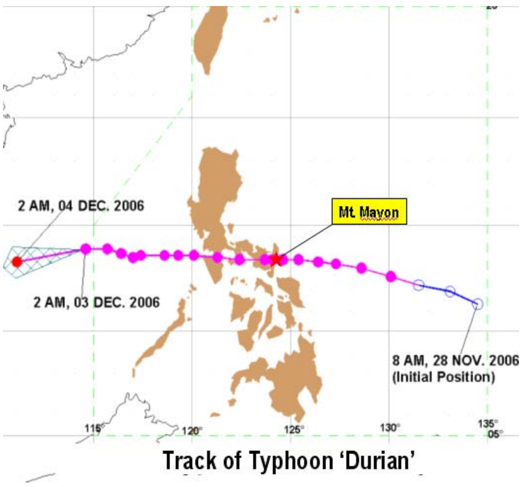
On November 30, 2006, Super typhoon “Reming” crippled the Bicol Region, especially the province of Albay, after pummeling it with strong winds and heavy rains that resulted in debris flows. One thousand bodies are believed to have been buried in the debris and mud that swept over the towns of Santo Domingo, Daraga and Guinobatan and Legazpi City. The Philippine Atmospheric, Geophysical, Astronomical Services and Administration (PAGASA) recorded sustained winds of 190 kilometers per hour (118 mph) with gusts to 225 kph (140 mph) when the storm made landfall.



Post Disaster Satellite Image Areas affected by flooding and debris flows in the municipalities surrounding Mayon.

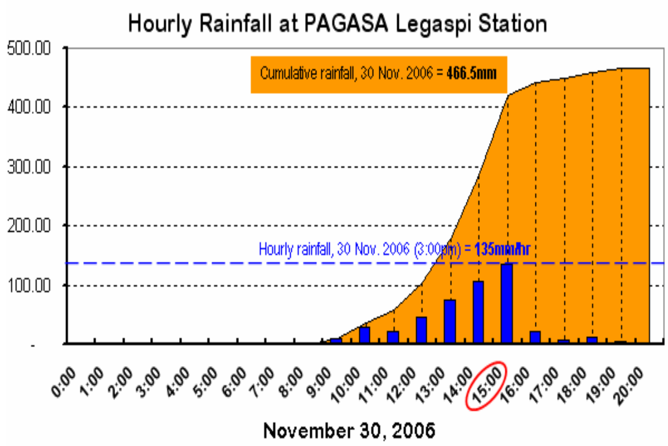
Source : UNOSAT / JICA-FCSEC-Japan Survey Team December 2006

Typhoon Reming generated 466 millimeters of rainfall for 12-hour record (daily rainfall) on 30 November 2006, the day widespread debris flow occurred. It was 40 years ago when similar amount of rainfall was last recorded in the Province of Bicol. Typhoon Reming moved slowly over Legazpi and overwhelmed the area with rainfall intensity of 135 mm/hr (3:00pm hourly rainfall data). Generally, debris flows in Mayon are triggered by intense and prolonged rainfall as a result of the passage of a tropical cyclone in the vicinity.



Typhoon Track Typhoon Reming showing high concentration of rainfall in Mt. Mayon, Province of Bicol.

Source : PAGASA



PAGASA Hourly Rainfall of Typhoon Reming on 30 November 2006 which recorded cumulative rainfall of 466mm (40 year high).

Source : PAGASA Legazpi, Albay – Station 444

Continuation... Page 15

Bits of Knowledge on Sabo

By: Takeo Mitsunaga, JICA Sabo Expert
Project SFMF

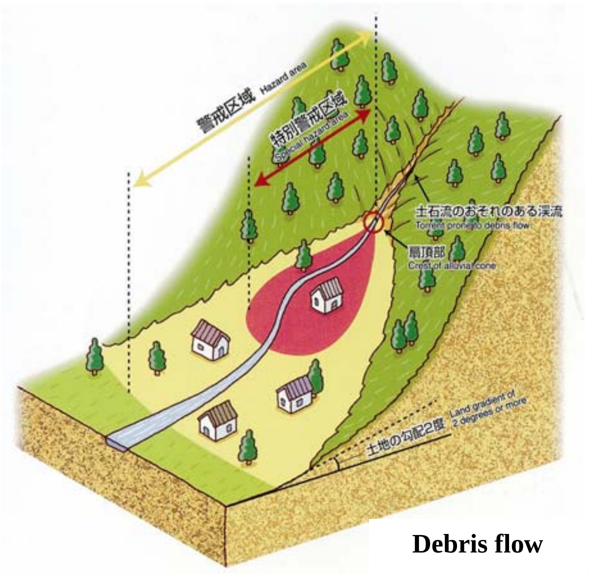
Types of Sediment-Related Disasters

How was the first article? I hope it aroused your interest to know more about sabo engineering. This time, I will write about the types of sediment-related disasters that are covered by sabo works.

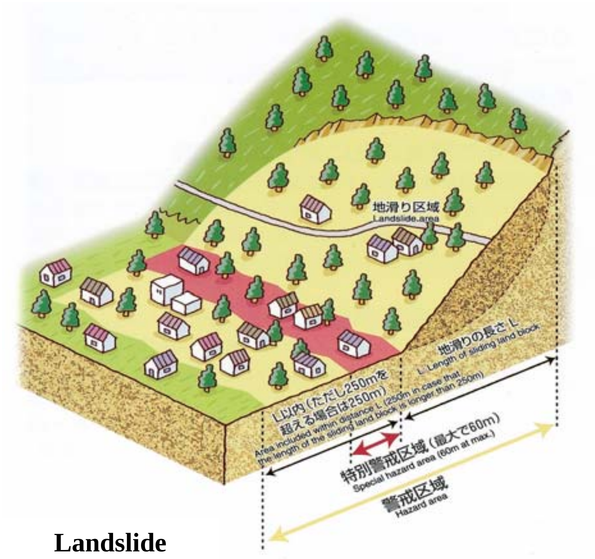
There are many ways to define the types of disasters.
But it is very important that every one has a common classification, or every one has the same image for each word. When we went to the damage site at Antipolo after typhoon Milenio in 2006, we had heard that 'There was a landslide.' But it was an erosion of the road along national highway. If we have the same images for the word of 'landslide', we will not have misunderstanding.

Debris Flow
Part of soil, stone and gravel making up a hillside and river bed is intermingled with water from long-continuing or localized torrential rainfall and becomes slushy like porridge and be carried downstream at a dash at speeds from 20 to 40 km/h

Landslide
A massive soil on a slope moves along the slip surface downward the slope under the influence of ground water and other causes. Most of the case, it moves at speeds from 0.01 to 10 mm/day but sometimes it is very fast. Sometimes it is very big and it can cause serious damages

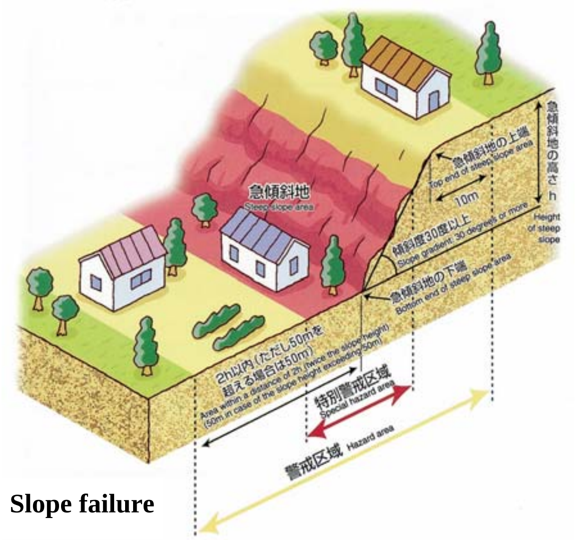


Debris flow



Landslide

Slope Failure
A slope collapses abruptly due to weakened self-retainability of the earth under the influence of rainfall or an earthquake. Because of sudden collapse of slope, many people fail to escape from it, if it occurs near a residence area, thus resulting in a higher rate of fatalities.



Slope failure

Continuation... Page 6

River Administration in Japan

By: Yoshio Tokunaga, JICA Chief Advisor
Project SFMF

Ministry of Land, Infrastructure and Transportation (MLIT) plans and implements a variety of projects to protect people from disasters caused by rivers, sediment, storm surge, and other natural phenomena, and to ensure sufficient water resources to support affluent lifestyles and develop attractive waterside environments.

MLIT also drafts laws, manages river administration, issues licenses for water use, and maintains facilities for the proper management of rivers, sediment control, and coastal protection.

River Administration Classification

Two main objectives have motivated river administration in Japan since early times. One is to control river flooding and the other is to ensure availability of river water for daily and industrial use.

Recently, conservation and creation of river environments have become increasingly important aspects of river administration.

In accordance with the River Law, river administration is done by classifying rivers, breaking them into sections, and delegating responsibility for the administration of their various subdivisions. River systems deemed important for the national economy and people's lives are designated as "Class A river systems" and administrated by the Minister of Construction. The others are designated as "Class B river systems" and administrated by the prefecture governors.

Class A river systems are further sub-classified as "Trunk rivers" and "Others"; and the "Others" are administered, except for approval of certain specified water rights,
by the prefecture governors.

Continuation… Page 16

From Page 13…. ***MAYON 2006 DEBRIS FLOW***

Typhoon Reming after making landfall over Bicol in November 2006 has brought extreme amount of rainfall that supersaturated the thick volcanic soil and highly weathered and sheared bedrocks in on the steep slopes of Mayon. This resulted to the failure of the soil and rock materials that make up the hill slope of Mayon and consequently driven down by gravity.

Such phenomena caused the mass wasting or down slope movement of loosened of unconsolidated materials (e.g., weathered rock and thick volcanic soils). High concentration of runoff also added weight to the instability of loose masses of rocks and soil triggering them it to slide down steep slopes. This in turn, transformed from slope collapses to debris flows, considering the fluidized movement of volcanic debris (boulders, logs, etc) that flowed in relatively rapid velocity due to the lower cohesion of higher water content and coming from steep slopes (Elev. > 2,000m) of Mayon. The debris flow have slump blocks at the head, and the cascading debris mass breaks up into smaller and smaller parts as it advances towards the foot. The numerous debris flows that occurred around Mayon happened in rapid progressive failures, and the whole mass coming from steep slopes flowed in rapid velocity - after liquefying due to super saturation - finding its way to stream channels and gullies. These were observed in several stream channels like those in Brgys. Maipon and Busay. Unsuspecting streams suddenly bulked to debris consistency and buried communities.

Mechanism of Debris Flow Schematic diagram of mechanism of debris flow that triggered numerous debris flows in Mayon

Source : JICA-FCSEC-Japan Survey Team December 2006

Debris Flow Extent of debris flow on the municipalities of Daraga and Guinobatan.

From Page 15… River Administration in Japan

Some sections of small tributaries of both class A and class B rivers, where part of the River Law is applied are set. Administration of the others is done by the mayors of cities, towns, and villages.

Other smaller rivers not mentioned above, to which the River Law is not applied at all, are administered by mayors.

The River Law stipulates that any utilization of land and river water within the sections defined by the River Law must obtain approval from the designated river administrator.

The total length of class A rivers, which include 109 river systems, is approximately 87,150 km; the length of class B rivers, which include 2,691 river systems, totals approximately 35,720 km; and the total length of rivers to which the River Law is applied was approximately 132,870 km as of June, 1993.

Table 1: Number of Rivers (June, 1993)

	River systems	Rivers	Total length (Km)	Total Catchment's area (Sq.Km)
Class A Rivers	109	13,798	87,152.5	239,947
Class B Rivers	2,691	6,931	35,717	107,997

Profile of Related Laws

The objectives of river administration are upgrading of safety of the nation's land against flood disasters, stabilization of the water supply, and improvement of the living environment. River administration centers on the River Law and is also regulated by the Specified-Multipurpose Dam Law, the Sabo Law, and the Seacoast Law.

* Sabo means erosion and sediment control in Japan and several country

Organization

The Ministry of Construction was established, and the River Bureau was provided as its internal bureau for managing various matters related to rivers, by the enactment of the Ministry of Construction Establishment Law on July 1, 1948.

Today, the River Bureau department comprises ten divisions and five sections involved in river planning, river improvement, dam construction, disaster recovery, sand control measures, and coastal preservation. The Bureau also maintains eight Regional Construction Bureaus - Tohoku, Kanto, Hokuriku, Chubu, Kinki, Chugoku, Shikoku, and Kyushu.

Budget

The River Bureau budgets are for carrying out projects related to rivers, dams, sabo, seacoasts, slope preservation measures, and disaster rehabilitation. Figures for fiscal year 1995 (April, 1995 through March, 1996) total about ¥2,281 billion, including about ¥1,318 billion in prefecture expenditures.

River Bureau projects can be broadly classified as national projects and subsidized projects.

National projects are projects that the MOC itself carries out in sections of Class A rivers that are under the direct control of the Minister of Construction. The major portion of funds for national projects comes from the national budget, and the remainder comes from local budgets. Subsidized projects are projects that receive some funding from the national government but are carried out by prefecture governments in sections of Class A or Class B rivers that are under the jurisdiction of the prefecture governors.