


Good Practices

This Chapter presents the Good practices selected by the Project Management Board based on the agreed selection criteria of a good practice, as follows:

- Integrates the impact of climate change into addressing and managing disaster risks and utilizes science-based information and/or culturally appropriate technology and indigenous adaptation and disaster management knowledge that promotes communal access and benefits
- Demonstrates bottom-up approach, multi-stakeholder participation and entry strategy, and community ownership (participatory, people-driven with community buy-in and social acceptability)
- Incorporates sustainability strategies (with identified resources) and clear exit strategy with potential for replication (cost effective and doable using indigenous adaptation knowledge and materials if possible)
- Adopts clear monitoring and evaluation strategies with baseline information as basis for measuring impact; and identifies tangible and measurable results with evidence-based outcomes
- Demonstrates transparency and accountability in procedures and processes
- Includes capacity building and/or education, especially for the most vulnerable groups.
- Is gender sensitive, addressing both the issues and needs of men and women, boys and girls, highlighting the transformative leadership role of women in DRR-CCA



**Strengthening flood disaster
awareness and resiliency of
schools and communities
through the School
Hydrological Information
Network (SHINe)**

Province of Bulacan

Summary

Floods are the natural disaster that most affect the province of Bulacan. A wide area of the province is inundated annually. The provincial government of Bulacan, particularly its Provincial Disaster Risk Reduction and Management Office (PDRRMO), under the guidance of the Pampanga River Flood Forecasting and Warning Center (PRFFWC) of the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAG-ASA), maintains and operates a network of rainfall, river and flood stage observation stations within the province as part of its flood disaster mitigation and management program.

In response to the increase in the frequency and severity of disasters in Bulacan during the last five years, particularly those relating to hydrometeorological origin, the PDRRMO and the Department of Education (DepEd) in Bulacan initiated the School Hydrological Information Network or SHINe in the last quarter of 2008. SHINe was adapted from the idea of PRFFWC, which lends active support to the initiative.

In responding to the need for more awareness on hydrometeorological related disasters, mainly floods, SHINe seeks to address the adverse effects of climate change in Bulacan's most vulnerable areas. The project is in support of DepEd's program of a "climate change-enhanced curriculum" and is consistent with the underlying principle that disaster awareness should begin in schools.

The focus of SHINe is the secondary schools, initially those in the upstream areas, and eventually, the rest of the schools in the province.

The schools are provided with digital rain gauges and/or river stage monitors, and a tropical cyclone tracking map, and selected student groups are oriented, trained and supervised to complement the program. The students also receive further inputs on climate change and related disaster risk reduction. The program aims that the increased awareness of climate change instilled in the students will be echoed or transferred to their peers, families and eventually, communities.

The program aims to create an information/data network vital to disaster risk reduction. The data and information collected can be used in a variety of ways including infrastructure development, farm planning and agriculture development.

The schools in the remote upland areas were the first eyed for implementation of the project as these are the areas likely to experience the immediate effects

of impending floods and landslides. To date, a total of nine secondary level schools and about 350 students are involved in the program annually. The SHINE group activities of Bulacan province can be access through its website at www.bulacanshine.webs.com.

Project Description

Bulacan is found in the southeastern section of the central plains of Luzon (Region III), along the Pampanga Delta. Given its geographic location, it is often visited by catastrophe, both natural and man-made (Annex B). The province experiences two tropical cyclones every year. It is also within a region where flooding is common, with massive floods taking place at least once or twice annually.

From the period 2003 to 2007, the province experienced eight strong tropical cyclones. Damage to property, both agriculture and infrastructure, amounted to more than PHP 265 Million.

The province's proneness to flood is continually being addressed by the provincial government through structural and non-structural means, and on both annual and long-term basis. SHINE, which is managed by the PDRRMO, is one of the non-structural approaches that proved effective in terms of flood disaster awareness, mitigation and prevention, particularly at the high school level.



Project Goals and Objectives

The essence of SHINe is disaster awareness through the school's hydrological monitoring activities. It empowers the school and community to protect, prepare and make them resilient against the disastrous effects of floods.

SHINe's general objectives are to:

1. Enhance disaster awareness of the school populace through regular hydrological monitoring, and maintain a high level of school preparedness at all times, thereby preventing loss of life and damage to property.
2. Coordinate and provide timely hydrological information to the PDRRMO, and municipal and barangay Disaster Risk Reduction and Management Councils (DRRMCs) for efficient operations of the flood warning system in the province.
3. Develop long-term strategies on the provincial and national levels based on the data and information collected from the network of SHINe schools.

Project History

SHINe is an offshoot of the Community-Based Flood Mitigation and Management Program (CBFMMP) of Bulacan province begun in 2005 by the PDRRMO. However, because the CBFMMP's flood mitigation and preparedness activities were mostly limited at the provincial level, SHINe was re-conceptualized for Bulacan province in 2008 in light of local limitations including the need for barangay-level training in hydrological observations and disaster (hydromet-related) preparedness. The program was primarily meant to enhance and augment the data of the local disaster councils gathered from the local flood warning system managed by the PDRRMO.

Guided by the PRFFWC, the provincial government, specifically the PDRRMO, began SHINe in the last quarter of 2008 as part of its enhanced disaster mitigation and preparedness program. The PDRRMO remained steadfast and committed to its goal of maintaining a flood-resilient Bulacan, providing for the funding, logistics, personnel and monitoring of the program.

SHINe started out in three secondary schools found in the far-flung mountainous, partly isolated, areas of the province. It was roundly accepted by the school community and within two years, SHINe expanded to a total of nine high schools located in various parts of the province that are all active with their monitoring activities.

The SHINe Program Partnership

The provincial government of Bulacan is the lead agency managing and supporting the program. The PRFFWC, the main proponent of the SHINe concept, provides the technical plans for program implementation and all related activities. The provincial DepEd supports the program by coordinating and informing the target schools of the SHINe activities. It also participates in the evaluation of the students' presentations for various seminars and conferences. The respective municipal and barangay-level local government units (LGUs) where SHINe is being implemented work hand-in-hand with PDRRMO during the installation of gauges, planning for peace and security around the stations and other such activities. The primary beneficiary, the targeted SHINe school, conducts continuous monitoring whenever possible and transmits the data to the PDRRMO, especially during inclement weather, which can then use this data for the enhancement of flood disaster warning, awareness and mitigation in the province.

Results

Last year (2009), during the passage of tropical cyclones Ketsana ("Ondoy") and Parma ("Pepeng"), more than 30 people in Bulacan died and up to Php 500 million worth of property, in terms of agriculture and infrastructure, was damaged. The loss could have been worse, if not for the continued exchange of information and data between the PDRRMO, the local disaster councils and the SHINe groups.

SHINe's gains and accomplishments for the school and the community in the province include:

- The hydrological monitoring equipment (rain gauge and/or river stage, tropical cyclone tracking board) set up in the schools form part of the school's science development program and activities.
- Hydrological data that can be used for the province's development plans including infrastructure and agricultural upgrading is continuously available, and many more such applications.
- The resulting increase in the school's and the community's awareness of the hazards of hydrometeorological disasters such as floods and landslides helps prevent loss of life and reduces damage to property.
- The program empowers the school and the community to act together before, during and after disastrous flood events.
- SHINe sharpens the students' inclination to the sciences and provides an avenue for inter-school dynamics and social activities.

Role and Participation of Women

While SHINE is mainly a school-based program, women play an important role in its implementation. Majority of the parents who attend the schools' Parents-Teachers Association (PTA) are the mothers. Likewise, there are more women teachers than men in both elementary and secondary schools in Bulacan.

One SHINE activity is a presentation during a meeting of a PTA designed to impress to the audience the need for disaster awareness and mitigation not only within the school but also in the community. The mothers and teachers working together can be a conduit to help further motivate the students to be more concerned with the natural environment, to familiarize themselves with the issues behind disaster mitigation in their community, and initiate other activities that will reduce one's share in global warming. Women have also been instrumental in conveying and communicating the SHINE programs within the community.

Key Implementation Steps

Key steps that led to the implementation of SHINE in the province of Bulacan:

- 1. Creation and organization of SHINE Technical Working Group (TWG)**

The SHINE TWG is chaired by PDRRMO of the provincial government, which initiated the program. The TWG is composed of other provincial, regional and national agencies such as the provincial DepEd and the provincial Planning and Development Office (PPDO), the Office of Civil Defense- Region III, the PRFFWC of PAGASA, the municipal and barangay DRMMCs and the officials of the SHINE schools.

The TWG oversees the establishment of SHINE in schools and the conduct of activities. It helps in the provision of timely hydrometeorological data to the school's populace, the PDRRMO and local DRMMCs.

- 2. Selection of SHINE school/s and adoption of a Memorandum of Agreement (MOA) between the PDRRMO, DepEd and selected school/s for data and information exchange**

The TWG selected the schools where SHINE would be established. The schools first eyed were those in the upstream of river watersheds in the province's mountainous areas, specifically San Miguel, Maasim, and Angat Rivers, all lying on the eastern side.

The rationale behind the choice of schools in the upstream of watersheds was to be able to augment rainfall observations at upstream sections and buy lead time for the low-lying areas in times of typhoons and other adverse weather conditions.

3. Acquisition of the digital rain gauges, materials for the staff gauges and information boards such as maps for Tropical Cyclone (TC) tracking, and presentation supplies for SHINE group orientation workshops

The PDRRMO exercises sole responsibility in acquiring the rain gauges and other equipment needed as it is the one familiar with the required technical specifications. The equipment procured were as recommended by the PRFFWC. Digital rain gauges cost about PHP10,000 each, while the materials needed to make and assemble the staff gauges cost about PHP1,000 per five meters.

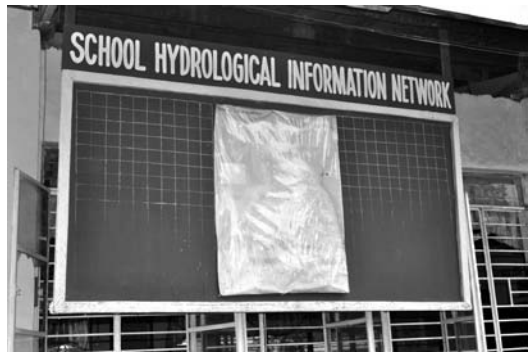
4. Installation of digital rain gauges and/or river gauges and information boards in the SHINE schools

The PDRRMO installed the rain gauges in strategic locations within the school grounds per the recommendation of the PRFFWC. Likewise, staff gauges were also installed in schools that are adjacent or near rivers for river monitoring.

The schools provided an information board as their counterpart in the program. The information board was used for posting the TC tracking map and announcing SHINE-related activities in the school. The board was also the medium used for warnings and other disaster-related information that needed to be relayed to the school populace.

5. Formation of the SHINE groups that would undertake orientation and training in rainfall and river stage observation, TC tracking and data exchange

The information board had to be in strategic locations. At the Akle High School, this was in front of the main building where all students could refer during adverse weather conditions.



The initial group was composed of about 30 students, ten each from first to third year levels. Members were oriented on climate change and flood disaster awareness and mitigation, and trained by the PRFFWC in the observation of rainfall and river stage measurements. They also had to undergo a workshop organized by the PDRRMO on TC tracking and plotting the TC's path onto the information board.

The idea behind 30 students is that one student per day shall be responsible for recording rainfall and/or water level observations at designated times. The group elects a president and fills in other positions for better organization and management of SHINE activities.

6. Regular monitoring and recording of hydrological data (rainfall and river stages), and monitoring and tracking of TC as it moves over the Philippine Area of Responsibility by each SHINE group

This is the main activity of SHINE program. SHINE group members observe rainfall and/or river stage levels regularly, according to a pre-arranged schedule. During normal weather conditions, the data is transmitted to the PDRRMO on a monthly basis. However, during inclement weather, the transmission of data is hourly, if possible, or at any time possible during a disaster. The information is relayed to the PDRRMO and local DRMMCs by phone or SMS. At any moment during a typhoon, the PDRRMO ensures that the phones of SHINE group members carry the minimum phone loads to sustain SHINE data transmission.

7. Comeback visitation by PDDRMC to SHINe schools

The comeback visitations serve as the mechanism for feedback from the SHINe group regarding SHINe activities and issues, as well as the concerns and problems encountered during monitoring. It also serves as the venue for the members' development of their public speaking abilities. For the PDRRMO, on the other hand, the comeback visits are necessary to ensure the program's sustainability and continuity even if there has been no occurrence of a flood in the province for a period of time.

8. Creation of SHINe group websites and newsletters; regular meetings and presentations

The SHINe groups are encouraged to create their own websites not only as a venue for timely information during adverse weather conditions in their area of concern, but also for updates on their activities. In addition, the SHINe groups are also encouraged to release newsletters within the school or network as a presentation of their activities.

The SHINe group is expected to present the activities lined up in relation to disaster awareness and mitigation in one PTA meeting a way of disseminating information on flood disaster awareness and mitigation throughout the community.

9. Training of selected incoming freshman for the SHINe school groups

After a year of activities has passed, ten incoming freshmen are selected to fill in for the next batch of observers. The senior members act as the facilitators and conduct the orientation and training to the new members. The senior members guide and manage the group's activities and sees to the growth and development of the group in relation to the school and the community.

10. Regular maintenance of equipment and analysis of rainfall and/or water level data

The PDRRMO is responsible for the maintenance of all equipment -- the rain gauges and river gauges – installed in the different schools and along different points of the river channels. Likewise, it is the PDRRMO, under the guidance of the PRFFWC, responsible for checking, reviewing and analyzing the database of rainfall and water levels. The information processed is vital not only as research material but as basis of updates of early-warning alerts regarding floods and possibly landslides within Bulacan.

11. Conduct of SHINe school conference

The PDRRMO shall organize an annual conference that will focus on SHINe school group dynamics to possibly harmonize the different school groups into one cohesive unit that will continually support the flood disaster awareness and mitigation activities of the province. The conference also serves as opportunity for the groups to socialize with one another. Various activities that encourage the groups' socialization and integration are being planned, including competitions in essay-writing, poster making, etc.

The event will highlight each school's achievements and accomplishments, and will most likely fall within the celebration of the "National Disaster Consciousness Month" in the country which is July.

The conference will also be a means of sustaining the SHINe school group as this will be a learning activity that the respective school groups shall prepare for annually.



Presentations by students of their observations at J. Russell High School (top) and essay writing contests (bottom) are part of the annual conference for the SHINE school group.

Matrix of Key Implementation Steps

| Implementation Steps | Expected Output | Timeframe | Responsible Persons / Units | Resources Budget Required |
|---|--|--|--|---|
| 1. Creation and organization of SHINE TWG | TWG composed of PDMO, DepEd, PPDO, Office of Civil Defense- Region III, officials of target schools and PRFFWC; Formulation of strategies and activities | 2 days | PDMO, Office of the Provincial Administrator | Commitment of personnel; related materials – P2,000 |
| 2. Selection of SHINE schools and MOA between PDMO, DepEd and schools | MOA between PDMO, DepEd and school officials | 1 day | PDMO, DepEd and school officials | Related materials – P1,000 |
| 3. Acquisition of rain gauges and materials for staff gauges and information board | Equipment and related materials for installation | 1 week | PDMO | Rain gauge – P10,000 each; Staff gauge – P1,000 per 5 meters (depends on the number of schools) |
| 4. Installation of gauges and information boards in the SHINE schools | Gauges and information boards in the respective schools | 1 day / school | PDMO, PRFFWC | Fuel and related materials – P2,000 per school (depends on the number of schools) |
| 5. Formation of the SHINE group; orientation and training | SHINE school group trained in monitoring, observation and related tasks | 1 day presentation and training / school | PDMO, PRFFWC and SHINE group | Participants' commitment, meals and related materials – P10,000 per school |
| 6. Regular monitoring and recording of data (rainfall and river stages); regular monitoring and TC tracking | Daily hydrological data; rainfall and water level database | Continuing activity | SHINE school group, PDMO | Transmission load: P1,000 per event (during inclement weather condition) |
| 7. Comeback visitation to SHINE schools | SHINE school group presentations; activity and issue discussions | 1 day / school (annual or bi-annual) | SHINE group, PDMO, PRFFWC | Related materials – P5,000 per school |
| 8. Creation of websites and newsletters; conduct of regular meetings | SHINE websites, newsletters and sustaining activities | Continuing activity | SHINE group, PDMO, PRFFWC | Related materials during meetings – P3,000 per school |

| Implementation Steps | Expected Output | Timeframe | Responsible Persons / Units | Resources Budget required |
|--|---|---|------------------------------------|---|
| 9. Training of incoming freshman for the SHINe school groups | Trained new SHINe members | Annually after start of classes (June-July) | SHINe school group | SHINe school member's commitment |
| 10. Regular equipment maintenance and data analysis | Operational rainfall and river stage monitoring equipment | Continuing activity (once every 6 months) | PDMO, PRFFWC (if necessary) | Related materials – P2,500 per trip |
| 11. Conduct of SHINe school conference | Sustainable and cohesive SHINe school groups | Annual activity | SHINe TWG and SHINe school groups | Related materials for the activities - P100,000 per event |

Analysis and Lessons Learned

The various components and activities of a SHINe program can be easily replicated by any LGU, school, or community most especially those situated in areas that are prone to flooding or flashfloods or at high risk to rainfall-induced landslides.

The SHINe program can also be used by other LGUs or schools that wish to become pro-active in addressing the issues arising from climate change. The highlight of SHINe is the information and data observed and recorded regularly. This can be used by the community for various researches and applications such as in formulating agriculture and infrastructure development plans, and in articulating long-term growth strategies of a community.

Several lessons can be learned from the SHINe project of the province of Bulacan to mitigate the disaster and displacement brought about by floods and become continually resilient to natural disaster:

A receptive and a strong-willed PDDRMO. An important aspect is the PDDRMO's openness to new ideas and strategies to mitigate and prevent natural disasters. For Bulacan, the challenge is the continual flooding in some parts of the province that has wielded tremendous effect on life and property. In consultation with the PRFFWC, the provincial government has tried both structural and non-structural approaches to the problem, which has yielded many new innovative practices in disaster risk management.

Capacity and preparedness of the PDMO staff. The Bulacan PDMO has been proactive and unwavering in its desire to provide the best services in terms of disaster mitigation and prevention. The staff has as its disposal a new set of water rescue and other accident-related equipment and underwent training on the use of these. As a whole, the program hews to a high standard of service through continued training and refresher courses in order to be ready at all times. The creation of Bulacan 566, which is similar to Rescue 911 in the US, demonstrates the provincial government's seriousness to achieve this goal.

Students show more inclination for monitoring and observation than barangay personnel. SHINe was basically an off-shoot from the province-wide community-based flood mitigation and management program mainly participated in by barangay-level personnel. This task has become an issue among some barangay tanods, however, as they do not believe this is part of their responsibilities. In the course of the program, the students have demonstrated a better grasp of the issue and a deeper appreciation of the concept of responsibility to the community. In addition, the students are still eager to learn and acquire new knowledge, especially those scientifically inclined.

Strong relationship between PRFFWC and provincial government. One clear indication of the success of SHINe in Bulacan is the strong ties developed between PRFFWC and the PDMO. The sharing of talent, data and information between the two entities, especially during inclement weather conditions, is continuous, to the benefit of both. The PRFFWC has rendered invaluable support for every capability-development activity the PDMO has organized, including the provision of training and sharing of knowledge and skills. On the other hand, PDMO has made its resources available to the PRFFWC whenever possible, particularly for the latter's post-flood surveys and field works within, and at times outside the province of Bulacan as well. The partnership has been solid, as it should be between government agencies at all levels.

Annexes

Annex A: List of Participating Schools

| School | Location in Bulacan | Contact Person | Position |
|---|------------------------|------------------------|-----------------------|
| Akle High School | San Ildefonso | Mr. Roman Carreon | Principal |
| Doña Remedios Trinidad High School | Doña Remedios Trinidad | Mrs. Lourdes Valondo | Principal |
| John J. Russell High School | San Miguel | Ms. Leonora Manalastas | Principal |
| Tabok National High School | Angat | Ms. Evelyn Sta. Maria | Officer-in-Charge |
| Norzagaray High School | Norzagaray | Mr. Reynaldo Paed | Adviser / Coordinator |
| Vedasto R. Santiago High School | San Miguel | Ms. Cecilia Buencamino | Principal |
| San Jose del Monte National High School | San Jose del Monte | Ms. Wilma Aquino | Principal |
| Binagbag High School | Angat | Mr. Juan C. Torres | Principal |
| F. Halili High School | Sta. Maria | Mr. Emmanuel Valdez | Principal |

Annex B. Media Coverage of SHINE

Bulacan taps students in flashflood prevention

(The Philippine Star) Updated December 02, 2008 12:00 AM

MALOLOS CITY – Students from different public high schools in eastern Bulacan are being tapped by the provincial government to mitigate flood disasters through the School Hydrological Information Network Project (Project Shine).

Felicisima Mungcal, head of the Provincial Disaster Risk Reduction Management Office (PDRRMO), said Project Shine aims to provide severe weather and flood bulletins and other related information whenever the situation warrants.

She said that real time information will allow the PDRRMO time to analyze data that will lead to fast issuance of flood advisories to the local government unit on flood prone areas in the province.

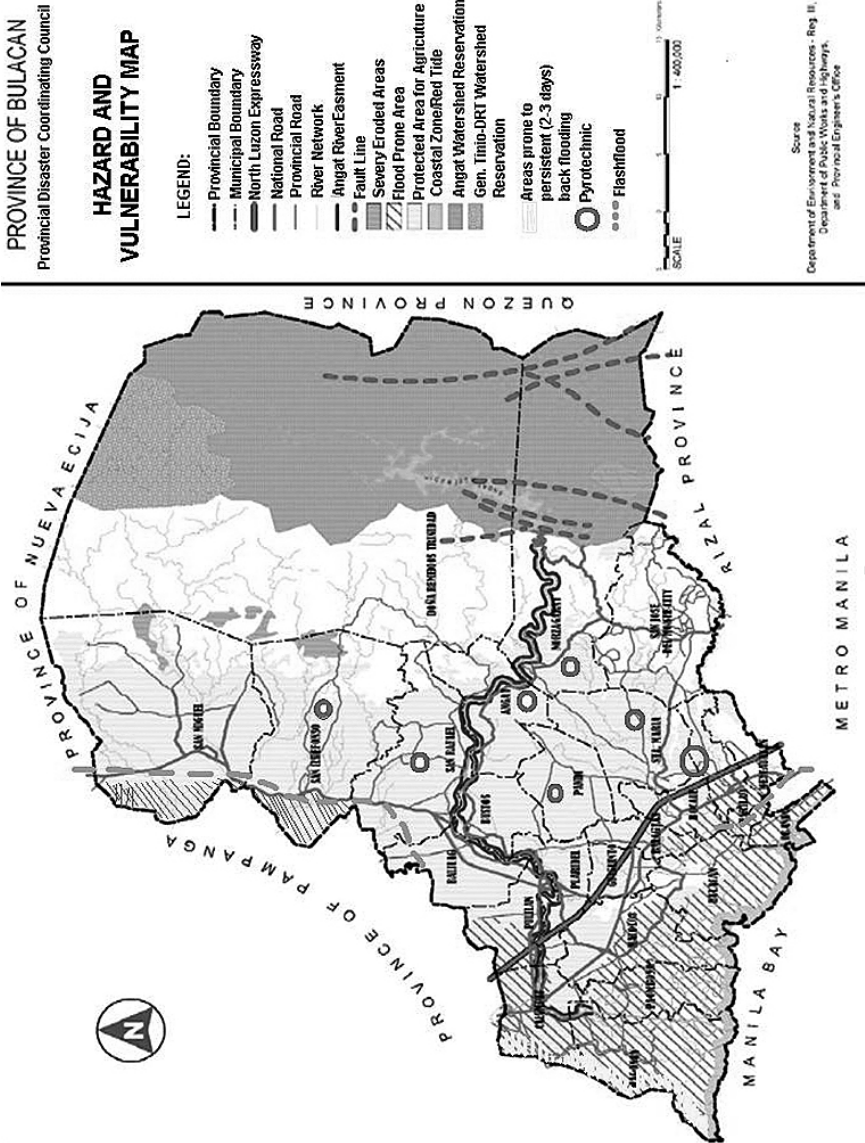
The advisories, the PDRRMO said, are crucial in saving properties and lives of people in low lying areas, including fish stocks of fishpond operators in the coastal areas of Bulacan.

In previous years, flood advisories issued by the PDRRMO helped save hundreds of millions in aquaculture products in the towns of Hagonoy, Calumpit and Paombong, all in western Bulacan, or the coastal area of the province. –Dino Balabo

The Bulacan SHINE was featured in two major dailies in December 2008, shortly after the program was launched.

Annex C. Hazard and Vulnerability Map

Bulacan's Hazard and Vulnerability shows a big part of the province to be flood prone, particularly in the western and southern portions.





**The Critical Role of
Climate Information:
From Disaster Risk
Reduction to Agricultural
Development**

Climate Field School

Dumangas, Iloilo

Summary

The Climate Field School (CFS) is a flagship project under the Climate Forecast Application for Disaster Risk Reduction and Climate Change Adaptation Program. The CFS was designed to enhance the capacity of extension workers, rural women and farmers to understand and apply climate information in order to reduce disaster risk and adapt climate change to farm production and overall agricultural development.

The Climate Forecast Application Program aims to establish sustainable end-to-end systems that will generate locally tailored climate information tools and build the communities' capacity to apply these information and tools to mitigate the impacts of disaster, whether natural or manmade.

The municipality of Dumangas is one of the coastal municipalities in Iloilo province. (Dumangas was reclassified from a third-class to a first-class municipality in 2010.) In 2002, the Dumangas Agro-Meteorological station was established. The station played a major role in the use of climate information such as climate forecasts and weather advisories for disaster risk reduction and climate change adaptation.

Through collaboration with Asian Disaster Preparedness Center (ADPC) financial assistance in the amount of PHP180,910 was raised for the first batch of participants in the CFS training held from July to September 2007 in three target barangays. Here, 88 farmer participants graduated from the course.

The positive impact of the training on the farmers prompted the local government to request for another funding for a second batch of CFS scholars. The course lasted from July to September 2008, and was attended by farmers from another three barangays. Some 93 farmers-participants graduated.

In the implementation of the CFS, the Local Government Unit (LGU) of Iloilo collaborated with various stakeholders such as provincial government, ADPC, US Agency for International Development (USAID), Philippine Atmospheric Geophysical and Astronomical Services Administration (PAGASA), farmers, rural women and fisherfolk.

The importance of such a tool as climate information to development, disaster management and agricultural planning was considered. To that extent, the CFS guided the livelihood endeavors and decisions of the different sectors directly affected by the issue of climate change -- farmers, rural women, and fisherfolk -- to increase production.

The CFS project demonstrated the importance of climate information and weather forecasting in agricultural and fishing practices. CFS allowed the farmers to shift from traditional to scientific, and resulted in better farming and fishing practices.

The project will be sustained by the LGU's allocation of a budget to come from the province's annual appropriations.

Project Description

The municipality of Dumangas is situated at the tail end of Jalaur River, the largest river system in the island of Panay. The municipality experiences two extreme weather conditions with regularity, severe flooding during the rainy season and drought during the dry season.

Floods are a frequent problem of the town. During rainy season, water from the upland municipalities flows to the Jalaur river at high tide, causing severe damage to property, infrastructure and livelihood -- crops, livestock and fishery resources.

Meanwhile, Dumangas is also situated at the tail end of the national irrigation system that can not supply enough water to some areas of the municipality for the second cropping or during the dry season. As a result, drought also damages the crops.

In response, the municipal government implemented the CFS as a strategy for disaster risk reduction and climate change adaptation. The CFS is a product of coordination and collaboration between the ADPC, PAGASA and the Iloilo Provincial Agriculture Office, with support from the Office of the Foreign Disaster Assistance of USAID and the local government of Dumangas.

The CFS aims to enhance the capacity of extension workers, rural women and farmers to understand and apply climate information to reduce disaster risk and be able to adapt to climate change in the bid for sustain agricultural development. The program focused on improving farming practices, introducing new farming technologies and integrating climate forecasting information into the formulation of farm development plans.

The direct beneficiary of the project is the community of Sulangan where production levels are generally low, even though the area is classified as irrigated. To address this challenge, the local government introduced an innovation to the implementation of the CFS. The project focused on enhancing the knowledge and capabilities of farmers in gathering and interpreting weather forecasts/advisories, applying these in decision making on farming operations to enhance yield and profit.

It also focused on institutionalizing end-to-end climate information generation to enhance disaster preparedness and climate change adaptation.

Project Goals and Objectives

The CFS for farmers aims to:

- Enable the participants to understand different climate-related risks in agriculture and the cropping system in the municipality of Dumangas;
- Impress the importance of climate in plant growth and development as well as its relationship to plant pests and diseases;
- Familiarize participants with the weather parameter, and the weather instruments that influence plant growth, including temperature, air humidity and soil water content;
- Integrate weather and climate information into the formulation of development, disaster management and agricultural development plans.

Project History

Found at the tail end of the Jalaur River, the town of Dumangas is highly vulnerable to weather disturbances and its development is often hampered by perennial flooding, putting to waste millions of pesos' worth of property, road and bridges and other infrastructure, as well as crops, fishery products, poultry and livestock and merchandise. In addition, the town periodically suffers from drought (El Niño) during the dry season, which depresses production and reduces income.

Believing that the best way to cope with disaster and climate change is to have thorough knowledge of disaster risks and climate change phenomena, in November 2002, the local government of Sulangan initiated the establishment of an agro-meteorological station, or Agromet station, in partnership with PAGASA, the ADPC and USAID.

With the establishment of the Agromet station, a Community-Based Flood and Drought Forecasting and Warning System (CBFDFWS) would later be formalized. The initial investment of the project of PHP 2 million was funded by PAGASA. The LGU, on the other hand, contributed the lot and the building staff, and provided personnel that were trained by PAGASA. The provincial government also assigned to augment the workers assigned to the Agromet station.

In December 2004, a representative from the ADPC and a weather specialist of PAGASA conducted a one-day Focus Group Discussion among stakeholders in Barangay Maquina on disaster risk reduction in agriculture. From that activity, the idea of the CFS prospered.

Two years after, in August 2006, a Memorandum of Understanding (MOU) on the implementation of the CFS was signed between ADPC, the provincial government of Iloilo and the LGU of Dumangas. The CFS program aimed to establish sustainable end-to-end institutional systems for the generation and application of locally tailored climate information and tools. It also sought to build the communities' capacity to apply the climate information they have gathered in real time to mitigate the impacts of drought, floods and typhoons.

Results

The CFS is a learning process and proved to be an effective tool to improve farmer's capacity in understanding climate information, and applying this knowledge to agricultural planning and coping strategies that will minimize the risks caused by extreme climate events and hazards.

The CFS project basically started with internal capacity building, that is, a two-day seminar-workshop entitled "Climate Forecast Application for Managing Climate Risk in Agriculture at Dumangas, Iloilo." Held in December 2006, this was attended by municipal planning coordinators, municipal agriculturist, representatives of the irrigators' association, and farmers from different municipalities. ADPC representatives, officials from Indramayu, Indonesia and some PAGASA personnel served as facilitators and resource persons.

The following year, in June, a training to develop CFS facilitators was attended by 15 provincial- and municipal-level agricultural technologists. Attendance of this one-week trainers' training was a requirement for those looking to become resource persons or facilitators for the CFS. The participants developed training modules and drew up plans for the activities of the CFS.

After local capabilities were honed for the pursuit of the CFS, between July and September 2007, the first batch of CFS participants was trained for a total of 12 weeks (one class per week) in three selected barangays: Sulangan, Bacong-P.D. Monfort South and Nanding Lopez. In all, 88 farmers completed the training.

The following year, the mayor of Dumangas and other LGU officials held talks with ADPC on the implementation of the second batch of CFS participants that were to come from three other barangays, namely, Paloc Bigque, Pulao and Bantud

Fabrica. Ninety-three farmers graduated from this round of training. For this second phase, the curriculum was refined to focus on Rice Production Technology with Integrated Pest Management.

All told, there were 181 CFS graduates that completed the course in 12 weeks. There were 88 graduates in the first batch, and 93 for the second.

The farmers participation in the CFS has significantly improved their capacity in the application of climate forecast to planting strategy, management of plant growth, pest and diseases control and cropping patterns.

The CFS was a product of collaboration between the Provincial Agriculturist Office (PAO) which helped in the formulation of CFS curriculum in the initial implementation; the Department of Agriculture (DA) which provided technical support in the form of information and education materials, and resource persons; The LGU which was responsible for the actual implementation of the CFS and counter-parting; The USAID/ADPC which provided funds for the program; and PAGASA which lent technical support and its facilities.

The *punong barangay* and *kagawad* (village head and officers) were responsible for the mobilization and selection of farmer participants and ensured the venue for the CFS in their barangays. The farmer beneficiaries were the participants in the project.

The CFS is considered an important input in rice production in Dumangas. Farmers applying knowledge gained in CFS, particularly in agricultural planning and decision making, edged other farmers in terms of higher yield/production and lower production costs.

Top Rice Producing Municipalities, Iloilo Province 2008 Overall Production (Irrigated and Rain-fed)

| | in metric tons |
|-------------------|----------------|
| 1. Dumangas | 43.496 |
| 2. Pototan | 43.146 |
| 3. Cabatuan | 38.959 |
| 4. Barotac Nuevo | 37.924 |
| 5. Sara | 35.534 |
| 6. Barotac Veijo | 33.930 |
| 7. Dingle | 32.419 |
| 8. Passi City | 31.474 |
| 9. Lambuanao | 29.540 |
| 10. Santa Barbara | 28.327 |

Most of CFS farmer-participants shared their experiences, knowledge and skills with neighboring farmers, thereby improving farming practices in the municipality as whole. In turn, this contributed to increased production that made the province of Iloilo number one in the whole Western Visayas Region in rice production (942,286 metric tons) and made Dumangas one of the top rice-producing municipalities in the province in 2008 (43,4906 MT).

The CFS beneficiaries learned to manage their farm activities by using climate forecasting and information as guide. With greater awareness of climate forecasting information, new technologies and innovations in rice farming were applied, and production losses caused by climate hazards were minimized. The participants learned to assume a more scientific approach to climate forecasting, which at times prompted them to shift to other crops such as vegetables, corn, mung bean and watermelon.

In short, the CFS introduced more efficient farming practices and improved productivity.

Key Implementation Steps

The implementation of the CFS in Dumangas, Iloilo involves the following key implementation steps:

1. Coordination with the Local Chief Executive, *Sangguniang Bayan*, (Provincial Board) and *Barangay Officials*
 - CFS Project Proposal
2. Coordination and collaboration between LGU and funding agency (ADPC)
 - Fund sourcing
 - MOU between LGU and ADPC
3. Formulation of training design
 - Executive Order or Resolution designating the CFS facilitators
 - Trainers' Training – Agricultural Technologists
4. Coordination with *punong barangay* and *barangay* officials for:
 - Target participants
 - Training venue
 - Demonstration farm for field workshop

5. Orientation of *Barangay* Official and farmers/participants
 - CFS
6. Implementation of Climate Field School
 - 12 weeks (1 session per week/ class)
 - Documentation
7. Monitoring and Evaluation
 - Training report
 - Financial report
 - Impact assessment

Analysis and Lessons Learned

Agricultural production has remained dependent on weather and climate despite the use of modern technologies. From the time seeds are sown until plants are harvested and stored, farmers are at the mercy of climate and weather, especially during the critical periods in the growth and development of their crops. Delays in the onset of rain, untimely or excessive rains, droughts and the like have serious impact on the development and yield of crops.

Aside from climate and weather, crop mix and cultural practices contributed to the variability of crop yields as other factors as well.

It was imperative that farmers be armed with information on the weather and climatic conditions prevailing in their area, and the role that weather elements such as rainfall and temperature play on their production.

In Dumangas, weather forecast was developed and tailored to guide the scheduling of different farming operations. This forecast helped farmers in planning and deciding on farming operations. The CFS became an effective strategy to deal with climate and cope with climate-related hazards such as flood and droughts.

Not only can the adverse impact of climate be mitigated by a mechanism like the CFS. Production can also be made more cost-effective through the adaptation of strategies that are based on the study and understanding of the climate conditions in a specific area. Proof of this is the documented experience of Dumangas during the El Niño in 2009 when timely forecasts helped turned potential disaster into production surpluses.

Obtaining the correct climate information and understanding this can spell the difference in maintaining a competitive edge for producing and earning more. The CFS of Dumangas needs to be developed further to build the farmers' own capacity to deal with natural hazards.

An important lesson learned from the CFS program is the importance of political will in implementing CFS curriculum and ensuring the sustainability of CFS. A plan of the LGU to ensure the project's sustainability is an actual budget allocation from the annual budget of the municipality and/ or the 20% IRA Development Fund.

Annexes

Annex A – MOU/Resolution



Asian Disaster Preparedness Center

P.O. Box 4 Klong Luang, Pathumthani 12120, Thailand
Tel: (66-2) 524-5354 Fax: (66-2) 516-5900 Email: adpc@adpc.net
www.adpc.net

Human Resources Unit
Tel direct: (66-2) 524-5358
Fax direct: (66-2) 524-5360
E-mail: cmtuja@adpc.net

FORM NO.: TSD/CON-5

(Ref. No. ADPC/HRCRM-CFA/CT-40-2007)

AGREEMENT

between

the Asian Disaster Preparedness Center, P.O. Box 4, Klong Luang, Pathumthani 12120, Thailand, represented by **Dr. Luis Jorge Perez-Calderon**, Deputy Executive Director of the ADPC, hereinafter called the ADPC.

and

the Municipal Agriculture Office of Dumangas, Iloilo, Philippines, represented by **Mr. Pablo Demalsip**, Municipal Agriculture Officer, hereinafter called MAO.

Both the parties to the agreement have agreed to the following terms and conditions that constitute the framework of the present agreement.

1. Objective

Under the overarching Memorandum of Understanding (MoU) between ADPC and the Municipality of Dumangas on Climate Forecast Applications for Disaster Mitigation and Implementation of Dumangas Climate Field School (refer to Annex 2), this Agreement details the implementation arrangement for item (1) of Article 2 of the afore-mentioned MoU, as well as the financial assistance required to cover the costs of implementation, documentation, administration, and coordination of activities.

2. Scope of Work

MAO shall implement activities in the following areas as detailed in the attached Scope of Work (refer to Annex 1):

- 1) Screen, recommend and mobilize farmers from at least 6 barangays to participate in the Climate Field School
- 2) Provide 2 technical facilitators per class for the delivery and refinement of the CFS curriculum.
- 3) Coordinate training with the Provincial Agriculture Office who will monitor, provide technical supervision, document the training, and guide the refinement of the CFS curriculum
- 4) Provide logistics support to ensure smooth delivery of the CFS curriculum

3. Key Personnel

A.R. Subblah, Director, Climate Risk Management, is the key ADPC personnel for this agreement.

Subblah

Mr. Pablo Demaisip is the key MAO personnel for this agreement.

4. Period of Agreement

This agreement commences on 1 July 2007 and will continue until 30 March 2008.

5. Amount of Agreement, Terms of Payment, and Financial Reporting

5.1 The maximum total amount of this Agreement is **US\$ 7,450** for funding activities according to the budget detailed in Annex 1 attachment.

5.2 The fund will be provided in three installments: 50% at the signing of this agreement; 40% upon receipt of the training report on 30 November 2007; and the final 10% shall be provided upon receipt of the final training report, refined CFS curriculum and financial report on 30 March 2008. Any unspent amount shall be returned to ADPC.

5.3 Payment shall be made by bank transfer to:

| | |
|-----------------|---|
| Account Number: | 003439-0098-79 |
| Account Name: | Pablo Demaisip |
| Bank Name: | Bank of the Philippine Islands |
| Bank Address: | Tabac Suba, Jaro Branch Iloilo Province, Philippines |
| Swift Code: | BOPIPHMM |

5.4 An interim financial report covering the period 1 July – 15 November 2007 shall be submitted on 30 November 2007, and a final financial report covering the period 1 July 2007 – 30 March 2008 shall be submitted at the end of this Agreement, duly supported by receipts.

6. Obligations

Unless otherwise stated by ADPC, MAO shall neither seek nor accept instruction regarding the services to be performed from any authority external to the contract. MAO is required to exercise the utmost discretion in all matters of official business of the contract. MAO may not communicate on contract matters to any person or organization external to the contract any information known to them by reason of their association with the contract which has not been made public, except in the course of their duties or as authorized by ADPC, nor shall MAO at any time use such information to private advantage. These obligations do not lapse upon cessation of the services under the contract.

7. Title Rights

ADPC shall be entitled to all property rights, including but not limited to patents, copyrights and other similar rights with regard to material which bears a direct relation to, or is made in consequence of the services provided by consultants.

8. Health/Accident Insurance

MAO shall be responsible for taking out, at personal expense, such medical and accident insurance covering the period of this contract as MAO may consider advisable.

Pablo Demaisip

9. Status of MAO

MAO is not an official or staff member of the Asian Disaster Preparedness (ADPC) and is not entitled to any right, benefit, payment or compensation except as expressly provided in this contract.

10. Contact Details

MAO is required to provide ADPC with comprehensive and up-to-date contact details. This should include street address, postal address, email address, telephone number and fax number.

MAO should designate a person who could be contacted in an emergency, if necessary.

11. Modification and Repudiation of Contract

For modification and change to any clause of the present contract and also for the extension of it, both parties must have concurrence to the effect of modification, change and extension of the contract.

12. Termination of Contract

This contract may be terminated by either party before the due expiry date of the contract by giving fourteen days notice in writing to the other party.

In the event of the contract being terminated prior to the due expiry date in this way a consultant shall be compensated on a *pro rata* basis for no more than the actual amount of work performed to the satisfaction of ADPC. Additional costs incurred by ADPC resulting from the termination of the agreement by MAO may be withheld from any amount otherwise due to MAO from ADPC.

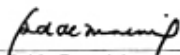
13. Settlement of Dispute

If any dispute arises in the future during the execution of the present contract for reasons whatsoever, that dispute will be settled by mutual discussion between both the parties without involving any other person(s) alien to the present contract.

For MAO:

(I acknowledge that I have read and accepted the conditions on this agreement)

For ADPC:



Mr. Pablo Demaisip
Municipal Agriculture Office
Municipality of Dumangas

Dr. Luis Jorge Perez-Calderon
Deputy Executive Director
Asian Disaster Preparedness Center

Date: 7-13-07

Date: _____

Annex B – CFS Curriculum Guide

1. Climate, Pest and Diseases, Crop Growth and Development
2. Cropping System/Pattern and Climate-Related Risks
3. Understanding Weather and Climate and Climate Parameters
4. Weather and Climate Information Products and Forecasts Generation
5. Forecast Interpretation, Translation and Communication and Incorporating Climate Forecasts in Decision Making
6. Learning and Implementing the Rice Integrated Crop Management System “Palay Check”
7. Summary of Key Checks and Assessment, Monitoring, Analysis and Improvement



**Reduced vulnerability
through community-Based
early warning systems**

**Handang komunidad,
ligtas sa kalamidad**

Saint Bernard, Southern Leyte

Summary

Saint Bernard is one of the six towns dubbed as “Pacific towns” of the northern part of Southern Leyte. The municipality was created through Executive Order No. 84 of the late President Ramon Magsaysay in 1954. St. Bernard is a 4th class municipality with a total land area of 10,020 hectares comprising 30 barangays. The community’s main economic activities are farming and fishing.

Geographically, Saint Bernard is vulnerable to almost all disasters. Seventy percent of its total land area is prone to all hazards except volcanic eruptions, as shown by the multi-hazard maps of the Hazards Mapping and Assessment for Effective Community-Based Disaster Risk Management (READY). The READY project, supported by AusAid aims to empower the most vulnerable municipalities and cities in the country and enable them to prepare disaster risk management plans.

The multi-hazard maps for Saint Bernard include Earthquake Induced Landslide Hazard Map, Flood Hazard Map, Ground Rapture Hazard map, Ground Shaking Hazard Map, Liquefaction Hazard Map, Rain-Induced Landslide Hazard Map, Storm Surge Hazard Map and Tsunami Hazard Map.

Seventeen of the 30 *barangays* (villages) are at risk to at least five natural hazards and 76.6% of the area is flood prone. Its proximity to a pathway of tropical storm and monsoons was cited as the cause of landslide and frequent flooding. The exposure of largely poor households to multiple hazards made Saint Bernard a high-risk municipality.

The tragic Guinsaugon landslide in 2006 claimed the lives of at least 1,000 people, mostly women and children. The devastation was so sudden and complete that the whole barangay was buried in minutes. This gave full alarm to the entire constituents and the local government to be more vigilant in observing precursors.

Prior to the Guinsaugon landslide, the appreciation of the threat posed by local hazards was low due to the absence of hazard assessment. The disaster coordinating council at the municipal and barangay levels had no clear-cut systems and procedures to carry effectively and efficiently their disaster management mandates. No contingency plans and early warning systems were in place.

Through the strong political will of the local government, a disaster risk management program was initiated. One of the program’s deliberate measures was the institutionalization of a flood early warning system. This project aimed to reduce the impact of disasters by automatically transmitting data of rainfall volume

and flood level height – information necessary to warn the affected barangays to evacuate. Stakeholders and NGOs’ support made the project possible. Success stories of these initiatives gained for the program the Presidential award Gawad Kalasag in 2008 and 2009.

Project Description

People living in the most flood prone areas of Saint Bernard evacuate at least 10 times a year to protect themselves. Knee-high flood waters are retained in low-lying areas for three to four days. In addition to its geographical characteristics that render Saint Bernard prone to almost all hazards, especially landslides and frequent flooding, another major concern in the province is overcoming political division, especially as the mayor, newly installed, was with the minority party. But the participation and support of NGOs and stakeholders at the community level, particularly financial and human support, filled the gaps of the ill-prepared and ill-equipped disaster risk community.

The Local Government Unit (LGU) and stakeholders established a capable and organized system of preparedness. Part of the disaster preparedness plan was the need to implement hydro-meteorological monitoring and early warning system.

Project Goals and Objectives

The flood early warning system project of Saint Bernard aims to:

1. Institutionalize an early warning system for hazard preparedness;
2. Reduce the impact of disasters;
3. Provide information on river system or watershed characteristics;
4. Establish a Municipal Disaster Management Office; and
5. Mobilize the community for hazard preparedness.

Project History

In 2006, one of the world’s worst landslides hit Southern Leyte, wiping out almost all 480 hectares of Barangay Guinsaugon, one of the 30 villages comprising the town of Saint Bernard. The disaster buried alive at least 1,000 people. Although the town had experienced other disasters in previous years, it was unprepared for the magnitude of the Guinsaugon disaster.

After the tragedy, hazard assessments were conducted by the Philippine Institute of Volcanology and Seismology (PHILVOCS), Philippine Atmospheric Geophysical and Astronomical Services Administration (PAGASA), and Mines and Geosciences Bureau (MGB), and NGOs such as CARE Philippines. The results revealed that 70% of the total land area of Saint Bernard is highly vulnerable to multiple hazards. Because of this, Saint Bernard strengthened its existing

Municipal Disaster Risk Reduction and Management Council (MDRRMC) in the search for a degree of resilience. Two years after the tragedy, Saint Bernard received the prestigious Gawad Kalasag Award, an annual Presidential Award given to a municipality, province or city with the most exemplary Disaster Coordinating Council or the best contingency plan or disaster preparedness/ disaster risk reduction management program in the country.

Despite limited funds, Saint Bernard, a fourth-class municipality, held a proactive stance. The mayor, together with the MDCC, undertook capacity building projects and regular flood-tsunami-landslide-earthquake drills, incorporated disaster preparedness in the executive-legislative agenda, and initiated small-scale and nonstructural mitigation projects, early warning systems, and many others. These were accomplished with the cooperation and support of the community and various NGOs under a project participated in by CARE Netherlands, Corporate Network for Disaster Response, European Community Humanitarian Aid, ACCORD Inc., Agri-Aqua Development Coalition Mindanao, German Agency for Technical Cooperation (GTZ), the Philippine National Red Cross, and Plan Philippines, among others.

Project Results

The Flood Early Warning System (FEWS) makes use of the following devices:

- 15 manual rain gauges
- one telemetered rain gauge
- three manual water level gauges
- one telemetered water-level gauge
- one tide gauge
- two-way radio system with two base transceivers and one repeater
- automatic weather station
- one computer set
- one generator set

More than two years after FEWS was set up, the project reported the following gains and accomplishments:

1. Flood-prone barangays underwent capacity building measures for complete knowledge of disaster preparedness and response to emergency cases.
2. MDCC and BDCCs were enabled to respond during emergencies.
3. The municipality's communication system was upgraded and its database was updated.
4. Community volunteerism for emergency cases strengthened.
5. The project was conferred the Gawad Kalasag Award for 2008 and 2009.

Key Implementation Steps

The successful implementation of Saint Bernard's flood early warning system involved the following key implementation steps:

1. Reactivation of the MDRRMC

Through an executive order, and with the assistance of PAGASA, the MDRRMC was reactivated by the Municipal Local Government Officer with a view to identifying and assessing the risks in setting up the FEWS devices. CARE Philippines provided capacity-building training and some equipment funding.

2. Identification of flood-prone areas

The hazard map of the READY project identified 23 of the 30 barangays of Saint Bernard, representing 76.67 % of the municipality, to be prone to flooding. Flood markers were installed for monitoring purposes. Funding support came from ACCORD under CARE Philippines as well as GTZ.

3. Strategic planning

The MDRRMC conducted a strategic planning workshop as well as regular meetings with concerned stakeholders including the barangay chairs.

4. Development of a disaster management program and identification of funding requirements

The MDRRMC's regular meetings led to the formulation of the municipal disaster management programs, contingency plan, and flood contingency plan. Thereafter, project proposals were formulated to address the plan's institutional and budgetary requirements.

5. Partnership-building with national government agencies, NGOs and people's organizations

6. Integration of a disaster risk management program into the LGU's executive-legislative agenda

This phase included the determination of annual budget appropriations.

7. Community trainings on disaster risk management; drills and contingency planning to evaluate the gaps and issues encountered in the operation

8. Installation of manual rain gauges, staff gauges and tide gauges with the assistance of PAG-ASA

This step included the designing of the early warning communication flow and identified persons in charge, from data gathering up to final dissemination.

These devices were monitored by duly trained volunteer observers in designated barangays. The data gathered was transmitted by radio to the operation center.

9. Installation of a telemetered device as back-up monitoring of the manual rain gauges

GTZ conducted a survey to ensure efficient and accurate data gathering of rainfall levels to determine the extent of flood and volume of water that would warrant the signal for an evacuation. The data gathered by the telemeter in the mountainous areas, specifically Barangay Bantawon, which is electronically transmitted to the operation center, determines the volume of water and the lead time before the flood reaches the lowlands. A Memorandum of Agreement (MOA) was signed by the LGU, CARE Philippines and GTZ defining the task and responsibilities of each in ensuring effective operations of the early warning system.

10. Creation of a disaster risk management office also as operation center

It was determined that a municipal disaster risk management officer and early warning system officer would be tapped from existing LGU employees. Meanwhile, two radio operators were hired by shifts for the 24-hour monitoring function. Emergency calls are easily and promptly acted upon by this mechanism. A *Sangguniang Bayan* (municipal board) resolution approved the creation of this disaster risk management office.

11. Distribution of hand-held radios to barangays for immediate dissemination

An MDRRMC resolution was made to authorize the distribution and installation of a base radio and repeater. Meantime, an MOA was signed by the barangays and the LGU prescribing the rules and responsibilities on the use of the radio communication setup.

12. Installation of automatic weather station for localized weather forecast at the operation center

A generator was acquired to ensure continuous monitoring of humidity, temperature, wind direction and wind velocity even when power supply is not available.

13. Installation of a specific computer program (Weatherlink 6510USB Data Logger and Software kit for VantagePro2) that automatically logs in the data gathered by the weather station

As well, the program installed recorded flood monitoring data and weather updates from PAG-ASA through internet access.

14. Community trainings and drills to assess gaps and problems in the operation

A series of training was conducted to develop the capacity of individuals gathered from the MDRRMCs and concerned BDCCs in the different aspects of the operation.

15. Contingency planning

Contingency plans were drawn up to assess the worst-case scenarios and gap, and develop measures to address issues.

16. Securing legislative and institutional support for the flood early warning system

A resolution by the MDRRMC provided for the institutionalization of the early warning system by the *Sangguniang Bayan*. The project would be financed according to the following cost-sharing:

| | |
|-----|--|
| 10% | LGU technical person and labor cost (LGU) |
| 90% | NGO |

The budget allocation for this project was clinched by the LGU's executive-legislative agenda, annual investment plan and Millennium Development Goal (MDG) where disaster risk reduction was incorporated for funding from the revenue allocation and local revenue generation. The total cost the project reached PHP 987,500.

Analysis and Lessons Learned

Several lessons can be learned from the experience of Saint Bernard in successfully establishing a flood early warning system:

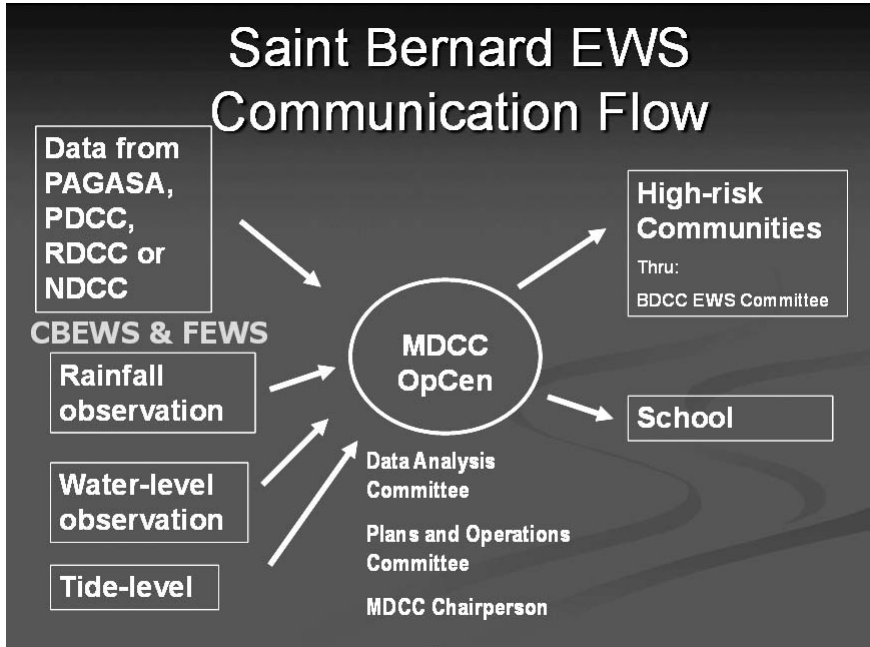
1. Strong political will is necessary to the success of the project, especially during a political transition phase. It was also difficult to combat the culture of complacency of the people though at some point, the tremendous setback from a tragedy like the Guinsaugon landslide persuaded the people to be more cooperative.
2. The project demands of LGU employees a correct perspective of government service, that is, the willingness to go the extra mile to finish their tasks. Multi-sectoral participation is also required. During the formulation of the Barangay Development Plans, active participation from all sectors in the community was solicited on

the argument that it is the people in the community who know better what their needs and problems are. Farmers, business, women's group, senior citizens and others were obliged to attend the assemblies. Consequently, all sectors were well represented.

3. Women in the barangays actively participated in the risk assessment and contingency planning, assisted in the conduct of drills, and engaged in advocacy, especially as community trainers.
4. "Those who have less in life must have more in law." This tenet of listening to the most vulnerable basically guided the conduct of the project. Concretely, this meant the adoption of a rights-based approach to disaster risk reduction where the less fortunate and people at risk (older people, children, persons with disabilities, women and people living in hazard-prone areas) were assigned the first priority to be served.
5. Transparency and accountability to beneficiaries are imperative and foremost. Accountability and transparency to donors follow.
6. The inclusion of disaster risk reduction and climate change adaptation into the local development planning was achieved through the mechanism of the executive-legislative agenda, which ensures a harmonious relationship between the executive and legislative departments in the municipality.

Annexes

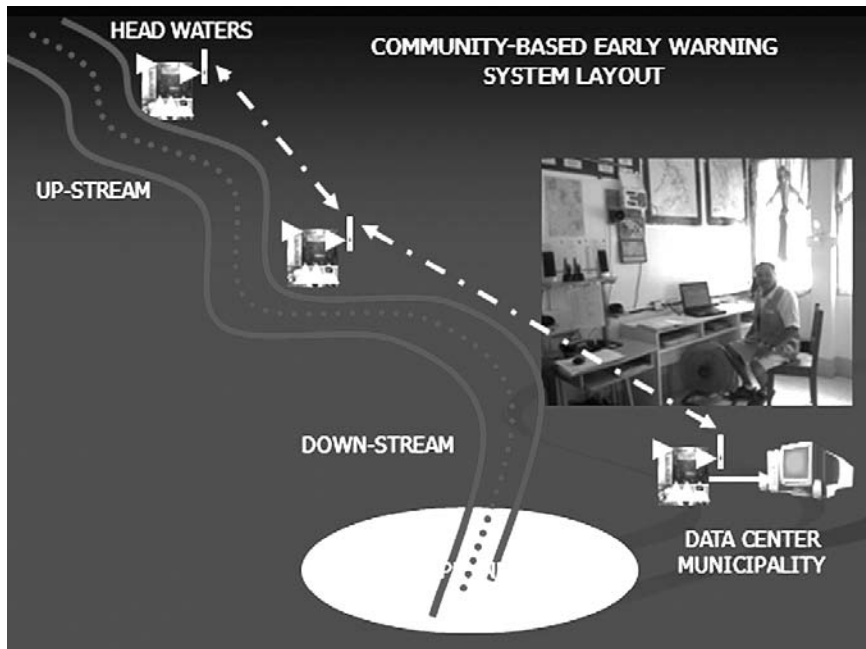
Annex A: Communication Flow Saint Bernard Early Warning System



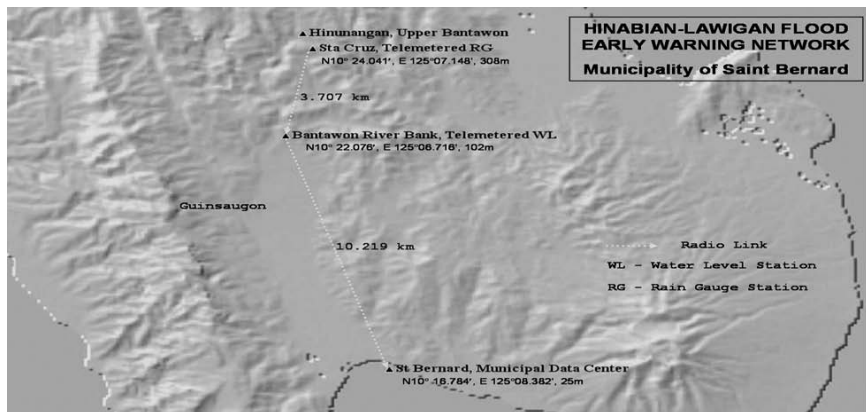
Annex B: Hinabian-Lawigan Flood Early Warning System



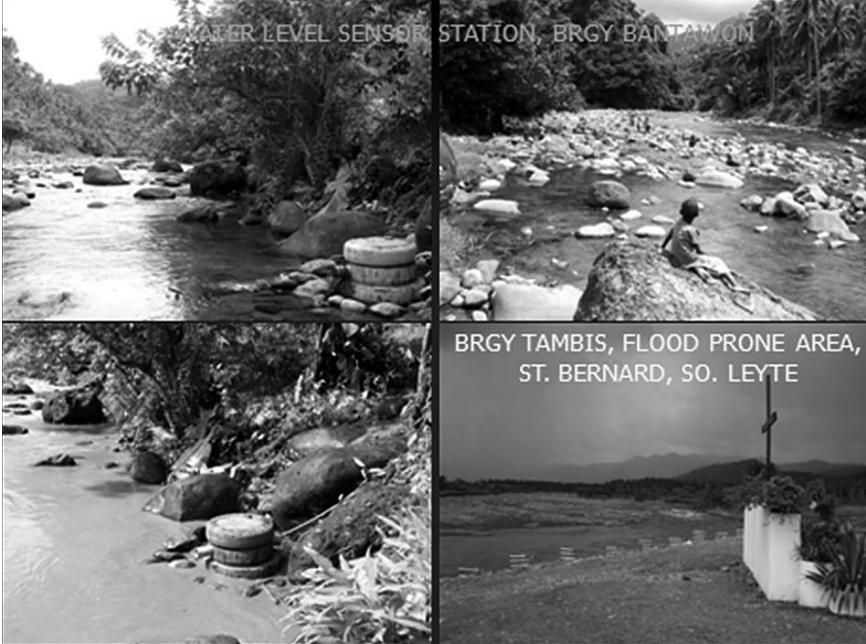
Annex C: Community-Based Early Warning System Layout



Annex D: Hinabian-Lawigan Flood Early Warning Network



Annex D: Hinabian-Lawigan Flood Early Warning Network





**The demarcation of
sanctuary areas as
strategy in climate
change adaptation**

**Fish sanctuary and
marine reserve area**

Ambao, Hinundayan, Southern Leyte

Summary

Barangay Ambao is one of seven coastal barangays of the municipality of Hinundayan, province of Southern Leyte, which is composed of a total of 17 barangays. Ambao is along the national highway, around two kilometers from the town proper. It is accessible by all types of land transportation.

At 32.5 hectares, the Ambao Fish Sanctuary and Marine Reserve Area spans practically the entire coastal area of the barangay, which is an estimated two-kilometer coastline. The core zone is the entire inside area of the sanctuary while the buffer zone is five meters away from the boundaries on all sides.

The idea of effective management, production and conservation of marine resources in the municipality, particularly the establishment of a marine protected area (MPA), was prompted by the declining catch of the fisherfolks in the locality as observed over the years. In September 1999, the Bureau of Fisheries and Aquatic Resources (BFAR) conducted an underwater assessment in consultation with residents of Barangay Ambao. After a public hearing, the MPA was officially established in April 2000. Led by the barangay council and representatives of the Local Government Unit (LGU), the community organized activities advocating the importance of marine protection, conservation and management.

Community support was evident such that even children were aware of the importance of the MPAs and participated in their surveillance. They were taught to report to the management council any intrusion into the MPAs that they observed.

By 2008, it became a learning/education destination such that students from different parts of the region visited it for coastal resource education. Later, communities and coastal resource management practitioners from other provinces also visited the site. This led to community-based tourism-related livelihood opportunities, such as food catering, that, in turn, redounded to supplementary income for women

Project Description

An underwater assessment conducted by the regional office of BFAR in September 1999 to address the depletion of marine resources and fish catch of marginal fisherfolk of Barangay Ambao, found that the locality qualified to be declared a marine protected area (MPA). The area was declared an MPA the following

year through Barangay Ordinance No.1, later amended by the Comprehensive Municipal Fisheries Ordinance No. 2007-65.

Project Goals and Objectives

1. To conserve coastal resources in response to the adverse impact of climate change;
2. To increase fish stocks towards food security; and
3. To allocate areas as breeding and spawning ground of marine resources.

A Profile: Hinundayan, Southern Leyte

| | |
|----------------------|------------------------|
| Land Area: | 6,108 hectares |
| Population: | 12,885 (2008 Census) |
| No. of Households: | 2,866 (2008 Census) |
| Ave. Household Size: | 4.5 |
| Income Class: | 5th class municipality |
| IRA: | 27,761,037 (2009) |
| Economic Activities: | farming and fishing |

Project History

In mid-1999, the Office of the Provincial Agriculturist of Southern Leyte advised its municipal-level counterpart in Hinundayan of an ongoing project of the regional BFAR to establish Marine Protected Areas (MPAs) region-wide, and of the identification within Hinundayan of two such possible fish sanctuaries. The idea was presented to the Local Chief Executive and some *Sangguniang Barangay* (village council) members, particularly those belonging to the Committee on Agriculture and Fisheries. After deliberations, the LGU agreed to the declaration of MPAs as this promised to be a significant contribution to the rehabilitation of local fishery resources. Local officials noted the dwindling catch of fisherfolk due to damaged marine ecosystems resulting from the use of destructive and illegal fishing methods. The proposal suggested the possibility of rehabilitation of both the environment and the locals' livelihood.

A team of experts from BFAR then surveyed the area and identified Barangay Ambao as one of the two potential sites in the municipality. Consultations at different levels – provincial, municipal and barangay – ensued. The Barangay Council drafted an ordinance for a Fish Sanctuary and Reserve Area. Public hearings and consultations were conducted through barangay assemblies. A barangay ordinance was finalized and approved in April 2000 establishing the

Ambao fish sanctuary, which has a total area of 32.5 hectares. The intent was to rehabilitate the fishery habitats and increase fisheries production to alleviate poverty.

Project Results

Within two years of its official declaration as a marine protected area, the Ambao Fish Sanctuary and Marine Reserve Area was assessed by personnel from Visayas State University (VSU). The following were the observable changes in the area:

- Local capacity in environmental protection increased, even among the children. Majority of constituents learned the value of coastal fisheries resource management programs and welcomed the project. Proof of this was their direct support to the program.

The perception survey conducted in 2008 revealed that a high level of awareness in the community which translated to a similarly high level of community support. Even children were enrolled in project monitoring. Some children even tagged along with their parents during meetings on the MPA.

- The biodiversity of marine resources expanded. The coverage of live coral, for example, increased. The excellent condition of the reefs is evident in the area's coral cover of 55% (Bernardita Germano, Local Resource Ecological Assessment, 2006). The corals in the sanctuary are in big colonies. The sanctuary hosts most types of soft corals, five of the six found in the province of Southern Leyte. The reef is dominated by branching Porites and Montipora.

Mounds of corals heads are also common (Cesar, et al., Local Resource Assessment, Leyte State University, 2004). Marine invertebrates such as sponges, ascidians, and anemone abound; some Bryozoans, Tridacna, Conus and Lambis can also be seen.

Dominant species of seaweeds found were the phaeophytes, chlorophytes, rhodophytes and five species of seagrass. These provided 34.2% cover.

- The fish catch (catch per unit effort) increased to two to three kilos in an hour, a radical change from the community's experience in the past -- in the time of rampant illegal fishing methods -- when there was barely any catch, despite a full day of fishing.

As many as 60 species of reef fishes and 43 seagrass fishes were recorded by Leyte State University survey of the Ambao MPA. The total number of species ranges from 47 to 60. The target species sighted (14-16) were of a good size, i.e., more than 20 cm. in length. The area has also been found ideal habitat now for lobsters.

Majority of the fisherfolk have affirmed this increase, stressing that fishing now has become a more viable livelihood because not only does it take less time but also allowed them to earn more cash to be able to buy other basic needs.

- The area's enhanced marine biodiversity was beneficial not only as habitat for the fish but for also because of the protection this offered from tornados, typhoons and other natural calamities. The 80% improvement of coral cover was perceived to add to the resiliency of marine resources as well as of the community that depends on these for their subsistence.
- The project introduced the benefits of eco-tourism in the area. Especially when the area began receiving citations and awards, it also began attracting more and more visitors wanting to learn from the process the project underwent in order to replicate it. In addition, the local women's group gained additional income through catering services rendered to visitors.

Among the citations the project has received are the top recognition during the 2009 Search for Champions of the Seas in Southern Leyte, the Bantay Dagat Watch tower from the GTZ, and 3rd placer in the 2009 National Search for Most Outstanding Marine Protected Area.

- The area drew increased support from the provincial government, line agencies, and development organizations. The Ambao fish sanctuary served as pilot area for assessment studies in marine protected area management conducted by the Visayan State University in collaboration with the National Oceanic and Atmospheric Administration of the University of Rhode Island Coastal Resources, and the provincial government of Southern Leyte.
- In addition, the catcher's fee offered an incentive to encourage reports of violations of restrictions within the MPA, also becoming means for the barangay to generate income from the fines.

Key Implementation Steps

The success of the implementation of the project involves the following key implementation steps:

1. Organization of the Technical Working Group
2. Site identification for the establishment of MPA
3. Bio-physical site assessment
4. Community/Barangay consultation and MPA information and education campaign
5. Formulation of the MPA ordinance
6. Implementation of the MPA ordinance
7. Organization of Fish Sanctuary Management Council
8. Formulation and implementation of the MPA Management Plan
9. Integration of the MPA Management Plan into the Barangay Development Plan
10. Monitoring and evaluation

1. Organization of the Technical Working Group

A technical working group (TWG) was created to oversee the legal technical aspects and administrative requirements of establishing a marine protected area. The TWG was tasked to draft a municipal ordinance in consultation with the municipal fisheries and aquatic resources office that would facilitate the creation of MPA.

The TWG was composed of the following persons and organizations:

- Municipal Mayor
- Municipal Agriculturist
- Sangguniang Bayan Committee on Agriculture and Fisheries
- Agricultural Technician-Fisheries
- Municipal Fisheries and Aquatic Resources Management Council (MFARMC)
- Barangay Development Council

2. Site identification for the establishment of MPA

The site identification was conducted by the barangay council together with constituents interested in rehabilitating and conserving their coastal resources.

3. Bio-physical site assessment

The bio-physical site assessment was completed by a team of experts from BFAR who surveyed the area and identified Barangay Ambao as one of two potential sites in the municipality.

4. Community/Barangay consultation and MPA information and education campaign

The LGU initiated consultations with the FARMCs at both municipal and barangay levels. The Barangay Council drafted an ordinance for the establishment of a fish sanctuary and reserve area. Public hearings and consultations were conducted through barangay assemblies and purok meetings. Other information, education and communication (IEC) activities were conducted in schools, students' forums, and sectoral gatherings of the fisherfolk and farmers.

The assessment results were fed back to the communities constantly to provide awareness and increase appreciation of the project among stakeholders. Later, both the barangay and management council of the sanctuary would receive significant IEC support in the form of information materials and paraphernalia, such as MPA boundary markings and tarpaulin posters, to further promote the project.

5. Formulation of the MPA Ordinance

The draft of an ordinance for a fish sanctuary and reserve area was discussed in public hearings and consultations. The ordinance was finalized and ultimately approved in April 2000. This was later amended by the Comprehensive Municipal Fisheries Ordinance No. 2007-65 which integrates the original ordinance establishing the MPA with other provisions relating to the management of the municipal waters of Hinundayan.

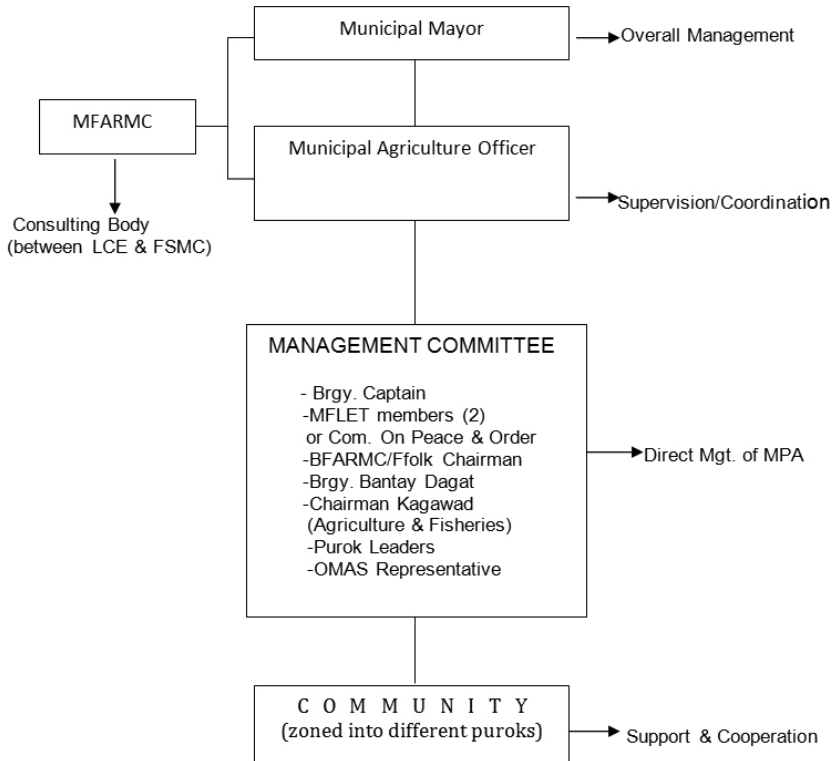
6. Implementation of the MPA Ordinance

With proper management and consistent implementation of the program, the area's marine biodiversity increased, as did the fish catch. This in turn strengthened local awareness and capacities in environment protection. The project won citations in the 2009 Champions of the Seas in Southern Leyte and the 2009 search for Best Marine Protected Area. Lastly, the area became an eco-tourism destination for those wanting to learn more about best practices in coastal and marine resource management.

7. Organization of Fish Sanctuary Management Council (FSMC)

An FSMC was created as a mechanism that would concentrate solely on the implementation and management of the Ambao Fish Sanctuary and Marine Reserve Area.

Management Structure



Legend:

- MFARMC - Municipal Fisheries and Aquatic Resources Management Council
- BFARMC - Barangay Fisheries and Aquatic Resources Management Council
- LCE - Local Chief Executive or the Municipal Mayor
- FSMC - Fish Sanctuary Management Committee
- MFLET - Municipal Fishery Laws Enforcement Team
- OMAS - Office of the Municipal Agriculture Services

The Ambao FSMC leads the management of the MPA, with support from the barangay council, the Office of the Municipal Agriculture Services, and the local police.

The FSMC often conducted advocacy and awareness activities through purok meetings and barangay assemblies. The LGU supervised the project and shouldered the costs of markers, fuel and maintenance of patrol boats, and capability-building activities.

The responsibility of daily patrols is shared in by FSMC members, the barangay council and community volunteers. Two members of the FSMC that trained in fishery laws enforcement cooperate with the municipal fish wardens in periodic seaborne patrols.

8. Formulation and implementation of the MPA Management Plan

This plan was formulated and implemented last year through the initiative of the Provincial Environment and Natural Resources Management Office-Coastal Fisheries Resources Management Unit (PENRMO-CFRMU). Because the plan focused only on the fish sanctuary itself, it allows for all the necessary elements of a marine protected area. Strict implementation of the plan by the municipal and barangay LGUs and FSMC has resulted in the accumulation of fines collected from violators of MPA provisions.

9. Integration of the MPA Management Plan into the Barangay Development Plan

This step is crucial as it includes the financial aspect of an MPA. A budget allocation is key to a successful MPA.

10. Monitoring and evaluation

The Ambao MPA was assessed yearly from 2002 to 2004 by personnel from Visayas State University. This was followed by a survey conducted jointly by the Visayan State University and National Oceanic and Atmospheric Administration of the United States entitled “Enhancing Management Effectiveness of MPAs: Regional Capacity Building in Indonesia and Philippines.”

The sanctuary had been also a subject of researches by some students for their theses and similar requirements.

Meantime, the area has also been visited by those wishing to learn more on the management of fish sanctuaries and marine protected areas.

Analysis and Lessons Learned

Several lessons can be learned from the establishment and management of the Ambao Fish Sanctuary and Marine Reserve Area.

Through effective management and implementation of the program, biodiversity in the area has increased, as has the fish catch. No doubt the project has redounded to stronger local awareness and capability in environment protection, earning for the community several citations and awards in the management of protected areas. The community has also become an eco-tourism and study-tour destination.

The project can easily be replicated by other coastal barangays and municipalities that have areas that can be declared MPAs as well as communities seeking to rehabilitate or conserve their coastal resources.

Some recommendations and reminders for the replication of the project:

- Supplemental livelihood is necessary, especially in places where projects in conservation and the protection of natural resources are being implemented, as this inevitably affect the people's access to sources for everyday living;
- Advocacy programs and strict implementation of policies and regulations must be sustained to achieve the ultimate goals of the project;
- Documentation of MPA records and activities is likewise important for evaluation purposes.

Good Initiatives

This Chapter presents the Good Initiatives case studies selected by the Project Management Board wherein case studies have some of the criterion identified in the Good practice but not yet at the level of a Good practice.

Good Initiatives case studies needs further enhancement to be able to comply the seven (7) criterion of a Good practice.



**Securing local government
commitment in the
development process**

**Participatory, community-
based, multi-stakeholder
approach to disaster risk
reduction and climate
change adaptation**

San Miguel Island, Tabaco City, Albay

Summary

The Philippine Rural Reconstruction Movement (PRRM), in partnership with the Local Government of Tabaco initiated and implemented an action research project to help resolve the lack of enabling policy and institutional framework that integrates disaster risk reduction and climate change into local development planning.

This project adopted a participatory, community-based, multi-stakeholder approach to Disaster Risk Reduction (DRR) and Climate Change Adaptation (CCA). The major activities conducted were:

- team formation and training
- courtesy calls on LGU officials
- module development and conduct of participatory, community risk and vulnerability assessment
- community DRR and CCA planning workshop
- validation of the community assessments and plans with LGU officials and other local stakeholders for adoption
- dissemination of the action research output for possible LGU adoption and replication

These activities were undertaken with the LGU, relevant government agencies and people's organizations, and the target coastal communities in San Miguel Island. The whole project from action research to dissemination lasted a year.

A participatory, community-based risk and vulnerability assessment and planning exercise using five villages in San Miguel Island as the case study area served as an important input in the LDP process. A multi-stakeholder workshop was held to validate the community resource assessment and planning and develop strategies towards increasing the resilience of these coastal communities to climate-related disasters.

Major accomplishments and impacts:

1. Water system
2. Livelihood skills training
3. Sanitary toilet facilities
4. Eco-waste management
5. Agri-fishery technology
6. Mangrove reforestation
7. Upgrading of San Miguel Island main health center

Project Description

The Philippines now ranks as the world's fourth most disaster-prone country due to the increasing trend of natural disasters affecting the country in recent years. Albay is one of the provinces gravely affected by natural calamities every year. In 2006, the province was hit by two typhoons, Milenyo and Reming, as well as a volcanic eruption that left thousands of families homeless and damaged billions of pesos' worth of infrastructure, forest cover and livelihood.

The affected households and communities including San Miguel in Tabaco City became even poorer, which rendered them more vulnerable to future disasters. There was an urgent need to restore lost livelihood and assets, as well as rebuild the island's ravaged natural habitat and transform this into disaster-resilient and self-sustaining communities. Reducing the vulnerability of these affected communities to natural disaster is the most appropriate strategy in enabling them to cope with global climate change. Down the road, government efforts to reduce poverty and improve health and education in consonance with the Millennium Development Goals of the United Nations will be effective only if there are parallel efforts to address disaster risks associated with destructive natural disasters and extreme climatic events.

In partnership with LGU-Tabaco, PRRM developed a program intended to integrate disaster risk reduction and climate change into the local development plan. This effort allowed the transformation of these communities from vulnerability to disaster/climate resilience for the long term.

Project Objectives

1. Enhance the awareness of key stakeholders – the LGU, people's organizations and local communities – in DRR and CCA to foster a culture of safety and resilience;
2. Build the capacity of key stakeholders as well as individual, community and institutions in participatory risk and vulnerability assessment and DRR and CCA planning for integration into the local development plan; and
3. Disseminate results of the action research for adoption and replication by other LGUs and disaster coordinating councils and organizations.

Project History

PRRM and LGU-Tabaco adopted a participatory, community-based, multi-stakeholder approach in DRR and CCA assessment and planning. These activities were conducted with people's organizations, target coastal communities and the

barangay councils in the five villages of San Miguel Island from January 2008 to January 2009.

Research Duration

The whole project covered total of 12 months, broken down into nine months of action research and three months of dissemination and documentation. The process can be classified divided into five phases:

- Phase 1: Preliminary Activities (1 month)
- Phase 2: Literature Review and Data Gathering (1.5 months)
- Phase 3: Module Development and Implementation (4 months)
- Phase 4: Advocacy for Integration of DRR/CCA into Local Development Planning Processes (2.5 months)
- Phase 5: Report Preparation and Dissemination of Research Results (3 months)

Project Results

During the validation workshop, a Memorandum of Understanding (MOU) that laid down the following priority projects for the year 2009 was signed by the city government of Tabaco, representatives of five barangays of San Miguel Island, the Albay provincial government, PRRM and donor partners:

1. Water System

- Comprehensive water system plan for San Miguel Island
- Need for external fund sourcing

2. Livelihood Skills Training

- Alternative livelihood training in partnership with Technical Education Skills and Development Authority (TESDA)
- On-the-job (OJT) assistance after a series of trainings to acquire accreditation and potential livelihood from TESDA

3. Sanitary Toilet Facilities

- Installation of 690 sanitary toilets for households/families currently without these
- Rebuilding of 891 sanitary toilets for households with unsafe toilets

4. Eco-waste Management

- Promotion of indigenous materials instead of plastic.
- Recycling plastic materials by turning them into décor as part of a livelihood project in a community in San Miguel
- Production of biodegradables into organic fertilizers

5. Agri-Fishery Technology

- Rehabilitation of the fish sanctuary in Barangay Sagurong

6. Mangrove Reforestation

- Mangrove planting to be funded by Albay Provincial government for the CRABS climate-proofing project (Note: CRABS stands for Cagraray, Rapu-Rapu, Batan and San Miguel Island.)

7. Upgrading of San Miguel Island Main Health Center

- Construction and Rehabilitation of San Miguel Island main health center

Key Implementation Steps

A. Conduct of courtesy calls and area visit for key stakeholders

The courtesy calls and area visit took place during the last week of January 2008. The information gathered with the help of various agencies during this time contributed to the area analysis and secondary data gathering, and to the validation of an initial stakeholder analysis completed in mid-November 2007.



Courtesy call on the city mayor



Meeting with the head of Albay Provincial Disaster Coordinating Council



With the local communities of San Miguel Island

B. Data gathering and training module development

During the period of February and March, more research and data on international, national and local disaster management practices were gathered. This knowledge, combined with the experience of the project trainers and facilitators, formed the basis of a training designed for health workers, police, conflict resolution workers, nutrition staff, day care workers, and the youth council and officials -- the different sectors active in emergency management.

The project team developed a three-day four-in-one training module adapted from four existing types of training materials basically on Climate Change Adaptation, Disaster Risk Reduction, Participatory Coastal Resource Assessment, and Local Development Planning. This module, including various participatory tools and methodologies, were being utilized during the series of community training workshops in five communities of San Miguel Island.

C. Conduct of community training/workshops in five barangays/villages of San Miguel Island

A major activity of the project was the community workshops on “Integrating Disaster Risk Reduction and Climate Change Adaptation into Local Development Planning” held in five barangays/villages in San Miguel: Hacienda, Agñas, Sagurong, Visita and Rawis. The workshops sought to enhance the knowledge and skills of local communities in adapting to climate change and responding to disasters; and to build the awareness and capacity of these communities on climate change and disaster risk reduction.

After the training, the participants were able to (i) describe the basic concepts and elements of climate change; (ii) discern the relationship between hazard and vulnerability; identify the different aspects of DRR; (iii) discover the link between DRR, climate change adaptation and sustainable development; and (iv) establish mechanisms for integrating their recommendations into the local development plans.

The first day of the workshop focused on CCA and DRR, together with hazard mapping. The second day focused on the participatory assessment workshops including vulnerability and capacity assessment, timelining, stakeholder mapping and roles using venn diagrams, risk mapping, and indigenous mechanisms for early warning systems and coordination mechanisms. The third day started with a Riskland, a game developed by UNICEF and ISDR to consolidate and strengthen the learnings from the previous two days. This was followed by issue identification and prioritization, and solution identification. A session was held on local development planning, followed by action planning so the solutions identified are integrated into the local development plan.

The first of workshop was in Barangay Hacienda on 5-7 May 2008. This was attended by 25 community members who gave a positive evaluation of the activity and identified further training in adaptation and risk reduction solutions as a need. Each day of the workshop ended with a review and feedback session, on top of an overall assessment on the last day. These meetings were designed to review the workshop, adopt changes to the session flow and content based on discussion points raised during the day and plan for the next batch of workshops.

The second workshop was held in barangay Agñas on 21-23 May 2008, with 33 participants. Also in attendance were the purok (village zone) presidents.

The third workshop was held in Barangay Sagurong on 26-28 May 2008. It was attended by 30 participants, as well as Bantay Dagat (Sea Wardens) together with the Chairperson of the Marine Fishery Reserve found in the barangay.

The Agñas and Sagurong workshops similarly had daily recap and feedback sessions. During the portion on facilitation tips, as a form of on-the-job training, the mentors handed over facilitation of the session began with the mentors handing over the task of facilitation to the project leader and assistant project leader.

The fourth workshop took place on 2-4 July 2008 in the day care center of Barangay Visita. A total of 35 participants were in attendance.

The last workshop was in Barangay Rawis on 7-9 July 2008. Thirty-one residents attended.

Again the feedback from the participants was encouraging.

D. Presentation and validation of research results

As the culminating activity of the community assessment training/workshops and the action research project, a conference was organized to validate the key findings and recommendations to other stakeholders from Tabaco City and the Albay.

The objectives were:

- Validating the results/outcomes of the community training workshops conducted in the five barangays in San Miguel Island;
- Deepening the appreciation of the need to integrate climate/disaster risk reduction (CDRR) into the city development planning (CDP) process;
- Exploring ways of integrating these findings into the decision-making process and;
- Crafting a plan of action to integrate CDRR into the city development plan and budget.

A total of 49 participants attended the conference, coming from government line agencies (Albay province and Tabaco City), the barangay councils of San Miguel Island, people’s organizations, academe and non-government organizations based in the locality.

The conference was divided into five major sessions:

1. The presentation of consolidated results of the barangay/village workshops, followed by an open forum;
2. A workshop on integrating CDRR into the city development planning and budgeting process;
3. Action planning;
4. Identification, prioritization and development of project ideas/concepts; and
5. Signing of the MOU which contained commitments from the city and provincial governments to incorporate the CDRR solutions identified by the barangays into their development plans and budgets.

E. Dissemination of project results and report generation

Results of this action research project including lessons learned and analytical tools will be documented, disseminated and promoted in other program areas of PRRM in partnership with various LGU’s and other stakeholders. At present, PRRM covers 17 provinces in the country that are prone to natural disasters, including extreme climate events. Peer mentoring of the community and LGU officials and technical staff in the project areas will be used as a strategy to facilitate possible replication in other similar ecosystems. The process of dissemination will be done through publications, workshops, conferences and through the internet.

Indicative Project Costs

| Item (include description) | Unit Cost (US\$) | Unit Cost US\$1=P40 | PRRM Counterpart | LGU Counterpart |
|--|-------------------|---------------------|-------------------|-----------------|
| Consumable supplies | 200.00 | 8,000.00 | | |
| Equipment purchase or rental | 112.50 | 4,500.00 | | |
| Subsistence | 450.00 | 18,000.00 | | |
| Translation | | | | |
| Printing | 445.00 | 17,800.00 | | |
| Postage and Shipping | 45.00 | 1,800.00 | | |
| Telecommunications | 135.00 | 5,400.00 | | |
| Publications and software | | | | |
| Transportation and Travel | 582.50 | 23,300.00 | | 12,000.00 |
| Accommodation | | | | 43,200.00 |
| Honorarium (Staff & Resource Persons) | | | 42,000.00 | 30,000.00 |
| Bank fees | 10.75 | 430.00 | | |
| Other, specify: Institutional Fee (10%) | 500.00 | 20,000.00 | | |
| Other, specify: Actual Research & Training | 2,519.25 | 100,770.00 | 18,000.00 | 8,000.00 |
| TOTAL | \$5,000.00 | P200,000.00 | P60,000.00 | P93,200 |

Analysis and Lessons Learned

Based on the results of the barangay workshops, the team identified the following as inputs into the planning process:

- The impacts of climate/disaster risks, including low agricultural production and fish catch, rising sea levels and water shortage, the spread of diseases for children due to the spread of disease and food shortage crisis.
- The community's physical vulnerabilities including structural weaknesses, e.g., poor housing.
- Inadequate or lacking health and emergency facilities as well as early warning systems for health and peace personnel.
- The climate/disaster-related issues common to the five villages: low agricultural production and fish catch, environmental degradation, high price of basic commodities and lack of disaster-related training, livelihood opportunities, and health and medical facilities.
- Indigenous methods of weather forecasting and home-grown coping mechanisms such as "bayanihan".
- Absence of disaster plans and inactive Barangay Disaster Coordinating Councils (BDCCs).
- PRRM's long-term partnership with the LGU and island communities to facilitate project implementation and tap their participation, knowledge and information.

The significant findings of the stakeholders' validation workshop were:

1. Stockholders gained better understanding of the importance of integrating climate/disaster risk reduction (CDRR) into the city development plan and planning process.
2. The results/outcomes of the community training workshops conducted in the five barangays in San Miguel Island were validated.
3. The means of integrating these into the decision making processes were planned.
4. A plan of action on integrating CDRR into the city development planning and budgeting process was crafted.
5. A Memorandum of Understanding was signed by the city government of Tabaco; Albay Provincial Government; PRRM and other donor partners.

The next steps to pursue will be to:

1. Expand and strengthen linkages with Civil Society Organizations, (CSOs), government, academe, the corporate sector and potential donor partners and explore areas of collaboration with them towards the integration of climate and disaster risk reduction into their respective policies and programs (including formal and informal education programs).
2. Disseminate results to other PRRM areas and other LGUs for project replication.
3. Forge strong partnerships with supportive LGUs towards the development and implementation of demonstration projects on climate change adaptation and disaster risk reduction.
4. Build a strong working relationship with the local mass media (i.e., print, radio) to increase public awareness and catalyze local action with prepared media kits readily available for quick dissemination of information and other materials.
5. Develop information, education and communication (IEC) materials in the local language for dissemination to local communities and other stakeholders.
6. Ensure effectiveness and efficiency of the training and capacity building programs by addressing the weaknesses or constraining factors (e.g., time management, staff composition, etc.).
7. Establish and maintain a website that will serve as an information hub on climate and disaster risk reduction and facilitate information sharing among stakeholders.

Sustainability

This project opened up venues for increasing CSO's engagement with the government and other stakeholders. The Memorandum of Understanding signed at the stakeholders' validation workshop will ensure follow-through action to ensure the recommendations and proposed solutions are completed.

Another result of the project was the expression of interest by several LGUs to replicate the project in their communities through collaborations and cooperation agreements. PRRM is involved in two major national networks that are advocating a more pro-active and enabling policy environment in the areas of disaster risk reduction and climate change. Their passage will accelerate support for the integration of these issues at the local level and the development of appropriate climate and disaster resilience through reduced vulnerabilities.

Annex

Annex A – MOU/Resolution

MEMORANDUM OF UNDERSTANDING

KNOW ALL MEN BY THIS PRESENTS:

This Memorandum of Understanding is entered into and executed by and among:

The **TABACO CITY GOVERNMENT**, with office address at City Hall, Tabaco City, represented herein by its City Mayor Hon. Cielo Krisel Lagman-Luistro, hereinafter referred to as **TABACO CITY LGU**;

The **PROVINCIAL GOVERNMENT OF ALBAY-CENTER FOR INITIATIVES AND RESEARCH ON CLIMATE ADAPTATION**, with office address at the Provincial Capitol, Albay, represented herein by its Governor Joey Sarte Salceda and Executive Director Manuel C. Rangasa, herein referred to as **PGA-CIRCA**;

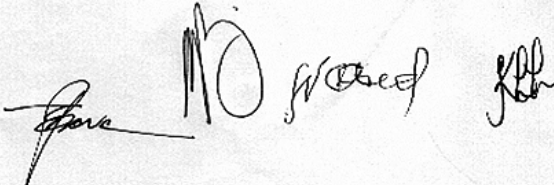
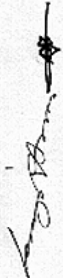
-and-

The **PHILIPPINE RURAL RECONSTRUCTION MOVEMENT**, with office address at #56 Mother Ignacia cor Lazcano St, Brgy Paligsahan, Quezon City, represented herein by its Acting President Isagani R. Serrano, hereinafter referred to as **PRRM**.

WITNESSETH that:

WHEREAS, the TABACO CITY LGU is a local government unit (LGU) in the province of Albay, Philippines which envisions a progressive, peaceful, self-sufficient, and God-centered community with empowered healthy people, supportive of a committed and responsible governance for a balanced development.

WHEREAS, the TABACO CITY LGU considers global climate change and natural disasters as among the most serious threats to our natural environment, the economy, and society, particularly the poor and vulnerable sectors, and recognizes the need to address their causes and impacts as these will hamper current efforts towards achieving poverty reduction and sustainable development.



WHEREAS, the PGA-CIRCA is a joint venture of the Bicol University, Environmental Management Bureau of the Department of Environment and Natural Resources (EMB-DENR) and the University of the Philippines at Los Baños (UPLB), a living research and training institution and is currently the implementing arm of the Albay in Action on Climate Change (A2C2) in order to demonstrate and increase the capacity of its constituents to cope with the harmful impacts of climate change that could exacerbate the effects of environmental degradation and other natural disasters that will hit the province;

WHEREAS, the PRRM is a non-government organization engaged in the design and implementation of community and habitat development programs across the archipelago. It envisions a society of empowered communities with full citizens entitlements, where women and men have control over their lives and share equally in the benefits of development taking place within the carrying capacity of the environment.

WHEREAS, the parties have been stakeholders in the one-year ProVention Consortium Project entitled "Integrating Disaster Risk Reduction (DRR) and Climate Change Adaptation (CCA) into Local Development Planning" with the aim of building awareness and capacity of local people in the pilot site covering five barangays in San Miguel Island, Tabaco City, LGU officials and technical staff and other local stakeholders and enable them to integrate DRR and CCA into the city development planning process;

WHEREAS, the parties have recognized the need to continue to work together and build on the modest gains achieved by project jointly implemented by TABACO CITY LGU and PRRM intended to build climate and disaster risk- resilient and sustainable communities in San Miguel Island, Tabaco City and eventually in the entire city and the province of Albay;

NOW THEREFORE, in consideration of the above premises, the parties hereby enter into this Memorandum of Understanding with the following stipulations:

COMMITMENTS OF THE PARTIES

A. TABACO CITY LGU

1. Mobilize resources of the local government unit and those of other government agencies at the local and national levels to ensure the continuity and sustainability of the existing collaborative project and its follow-through activities;
2. Provide the necessary policy and institutional support including the passage of appropriate local ordinances that will ensure the integration of the positive experiences gained from the project into the city development planning process; and

3. Disseminate relevant information and promote the lessons learned from the existing collaborative project to other constituent barangays of the city and other localities;

B. PGA-CIRCA

1. Help mobilize resources of the provincial government unit and those of other agencies and institutions within the province to ensure adequate support for the replication of the collaborative project of TABACO CITY LGU and PRRM in other parts of the province;
2. Provide the necessary policy and institutional support for sustaining the gains and successes of the current collaborative project by linking this to the A2C2 program of the provincial government; and
3. Facilitate wider dissemination and exchange of relevant information and lessons learned from this project through workshops, conferences and multi-media promotion.

C. PRRM

1. Deploy appropriate human resources for the development and implementation of follow-through projects and activities to the San Miguel Island collaborative project;
2. Explore opportunities for funding, both domestic and foreign, and forms of technical assistance from relevant national government agencies and other institutions for the follow-through projects and activities;
3. Disseminate relevant information as well as lessons learned and good practices gained from the existing collaborative project through its publications and conferences here and abroad; and
4. Monitor further developments of the collaborative project in the pilot area and provide technical assistance, whenever appropriate.

EFFECTIVITY

This Memorandum of Understanding shall take effect upon signing by all parties and shall continue in force and effect for a period of 3 years, reckoned from the signing of the MOU and shall be terminated upon satisfactory fulfillment of all terms and conditions embodied herein, or causes that will warrant discontinuance of the project.

REVISION CLAUSE

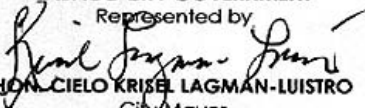
Any party may at any time elect to terminate this Understanding by giving at least fifteen (15) days notice thereof to the other parties whenever said party determines that termination is for its best interests. In such an instance, neither party shall be liable for damages unless the termination is done in good faith or is unduly prejudicial to the other parties.

No amendment, alteration or modification of any of the terms and conditions of this Agreement shall be valid unless evidenced by a written agreement of the herein contracting parties.

IN WITNESS WHEREOF, the parties have hereunto affixed their signatures this 19 day of September, 2008 at Tabaco City, Philippines.

TABACO CITY GOVERNMENT

Represented by


HON. CIELO KRISL LAGMAN-LUISTRO
City Mayor

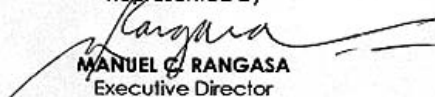
PROVINCIAL GOVERNMENT OF ALBAY

Represented by

JOEY SARTE SALCEDA
Governor

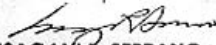
CENTRE FOR INITIATIVES AND RESEARCH ON CLIMATE ADAPTATION

Represented by


MANUEL C. RANGASA
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Recommendations for Improvement

1. Expand the timeframe of the community workshops from three days to four days to give more time to small group activities and presentations.
2. Allow more time at start up phase for training of facilitators and documenters.
3. Ensure effectiveness and efficiency of the training and capacity building by addressing the constraining factors (e.g., more balance sectoral representation, time management).

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**Integrated farming for
food security and reduced
disaster risk vulnerability**

**May Bigas Na, May
Ulam Pa Rice-Duck
Farming**

Zamboanga del Sur

Summary

Food security is a serious national problem that requires not only comprehensive policy-related solutions but also area-specific ones with concrete, measurable targets in terms of increased food production and household incomes. For the latter, the entrepreneurial drive of the local government is important. In Zamboanga del Sur, a way of ensuring the province's food security while providing farmers with alternative sources of income was a partnership between the LGU, under the leadership of Governor Aurora Cerilles, and PARFUND. Specifically, the collaboration sought to introduce and propagate a rice farming system that made use of ducks in order to:

- increase rice production;
- increase farmers' incomes; and
- reduce production costs.

Within a year of implementation, the project's objectives were met: production surpassed the national average, and farmers realized higher incomes both through access to other food and income sources in the form of duck eggs and duck meat, and lower farming costs.

Project Description

Composed of 26 municipalities and one city, the province of Zamboanga del Sur covers all of 4,477.36 square kilometers. It has a population of 925,981 and a total household population of 188,394. Farming is the primary economic activity in the province, the dominant output being rice (23,343 hectares; irrigated), corn, coconut (106,574 hectares), rubber (2,583 hectares), and banana.

The province of Zamboanga del Sur entered into the tie-up with PARFUND for a rice-duck farming system as a response to the people's health issues, specifically the lack of nutritional value of the food typically consumed, and to provide farmers with additional sources of income. The project was envisioned moreover to enhance food security at both the household and macro (provincial) level, and enable the province to supply rice to neighboring municipalities in Lanao del Sur, Lanao del Norte, Misamis Occidental and Cebu.

The rice-duck farming technology was developed in Japan by Dr. Takao Furuno. It was promoted by PARFUND among its partners after realizing its benefits to the farmers and the entire community.

In this system, five-day old ducklings are released to rice fields to graze and feed.

The paddling movement of the ducks in the rice fields increases the rice tillers, in effect raising annual yield by as much as 10% to 15%.

Besides their paddling, the ducks are organic to rice farming not only because they eat the insects and weeds in the rice field; their waste also serves as natural fertilizer. In liberating the farmers from their reliance on synthetic fertilizers and pesticides, the technology therefore reduces their production costs significantly.

The technology also helps reduce the emission of methane, a greenhouse gas. Wetlands are major producers of natural methane. When soils are saturated with water and oxygen concentrations are low or zero, microorganisms called methanogens produce large amounts of methane. Methanogens are anaerobic but because of the paddling of the ducks in the irrigated rice fields, the water is aerated, oxygen is supplied into the water of the rice fields, and the methanogens are arrested from producing methane.

The rice-duck farming system also enables farmers to earn from the duck eggs and duck meat.

Objectives of the Project

- Convert 100 hectares of conventional rice farms to rice-duck farming;
- Engage 100 farmers to adopt the rice-duck farming technology;
- Reduce the production costs of farmers through the removal of the use of synthetic fertilizers and pesticides;
- Increase production beyond the national average of 3.9 tons per hectare;
- Implement the integrated rice-duck farming province-wide.

Project History

In 2007, PARFUND Project Director Jose Apollo Pacamalan encouraged farmer Adolfo Ballesteros to try the integrated rice-duck farming system on one hectare of his farm. Within one cropping alone, Mang Adolfo was able to harvest 80 sacks (milled), compared with his average yield of 65 to 70 sacks without the ducks. Following his successful experiment, Mang Adolfo expanded his rice-duck farm to two hectares. Mang Adolfo's experience encouraged PARFUND to use it as a model in promoting the integrated rice-duck farming system to the whole province.

In March 2008, PARFUND presented the rice-duck project to Governor Cerilles who promptly endorsed it to the Provincial Agriculture Officer. In March 2009, the provincial LGU sealed partnership with PARFUND and launched the technology

in an activity attended by farmers, agriculture technicians and LGU officials. The partnership was further strengthened in May 2009 when PARFUND and the PLGU of Zamboanga del Sur conducted a planning session that identified the targets and commitments of both parties. By March 2010, the integrated rice-duck farming system had expanded to ten municipalities of Zamboanga del Sur.

Project Results

The results of one year's implementation of the project "May Bigas Na, May Ulam Pa" are:

- Increased the rice yield by 10.2%; the average yield is 4.3 tons per hectare or 83 bags, compared with the national average of 3.9 tons;
- Established a total of 68 hectares of rice-duck farms in the province, while duck release for 100 hectares more is ongoing;
- Expanded the technology to 10 municipalities;
- Persuaded 79 farmers to adopt the system.

Significantly, the project observed a faster rate of adoption of the integrated rice-duck farming system in LGUs that are headed by women chief executives.

Key Implementation Steps

- Presentation of the Project by PARFUND to the LGU. If the LGU is interested, PARFUND submits a proposal to the LGU for approval.
- Site visit to potential demo farm of LGU.
- Final Memorandum of Agreement between PARFUND and the LGU.
- Identification of areas for the implementation by the LGU.
- Validation of sites/areas selected.
- Orientation of the farmers and municipal technicians to the program.
- Season-long training in selected areas. Here, PARFUND coaches farmers and the technicians about problems that may arise during the cropping season.
- Site validation (accessibility, fitness for rice-ducks, ocular inspection)
- Duck release (farmers are coached on how to acclimatize the ducks and manage them).
- Tillering stage (dynamics of the ducks and the pests, water management, soil management).
- Flowering stage (basic management of ducks in flowering stage of rice, actual field observations, do's and don'ts)
- Before harvest: planning for a rice-duck farm as enterprise (development of an agri-governance framework, and formulation

of financing schemes, marketing strategies, organic standards and market linkages).

- Capacity development of technicians and local agriculture officers to generate a comprehensive agricultural plan.
- Implementation of expansion plan by the LGU with PARFUND coaching.

Analysis and Lessons Learned

Opportunities

- Creation of a market for ducks and by-products
- Establishment of duck centers

Limitations

- Limited supply of ducklings and nets
- Resistance of some technicians and farmers to the technology

Problems Encountered and Solutions

| Problems | Solutions |
|-----------------------------|---|
| Limited supply of ducklings | Establishment of duck hatcheries by individual farmers to supply the others |
| Wait-and see-attitude | Establishment of techno-demo farms |

Sustainability

- PARFUND has been training farmers, technicians and the LGUs to develop their own agriculture plan that will make the project sustainable and long-term.
- The project has a “buy-back scheme” where the LGUs provide the farmers with ducklings at the start of the season and buy back the ducks at the end of the cropping to replace them with new ducklings. The mature ducks are then transferred to the duck center for egg laying.

Replicability

- The project can be replicated in other LGU or provinces as long as the LGU, technicians and farmers complete the process.
- Individual champions should be identified to promote and replicate the system in other LGUs.

Successful replication experiences of the project include in Dumingag where the LGU expanded the rice-duck farms from 10 hectares to 100 hectares, in Gingoog City where the Sanguniang Panglunsod earmarked countryside development funds not only for a rice-duck farming project but its expansion as well.



Ducklings slide from the duck house to the rice field



Ducklings feed on insects and weeds

Comparison of rice tillers under different farming systems



A maturing rice-duck farm





The search for new farming technologies suitable to flood-prone communities

Diversified farming systems combining rice with other high-value crops

Siy, Zamboanga Sibugay

Summary

Marginalized communities in the Philippines depend on rice farming as the primary source of income. Farm productivity, however, depends on certain conditions such as climate, environment, water supply, the prevention of plant diseases, the absence of pests, etc. Of all the factors, climate and environment are the hardest to control. Because of this, the farm yield in areas frequented by typhoons and floods is always at risk of damage.

As a way of addressing the adverse effect of climate change, the Philippine Rice Research Institute (PhilRice), together with the International Rice Research Institute (IRRI), developed new rice varieties that can survive even when submerged. Together, the two groups studied rice varieties that can grow and produce even after 10 days of being under water at vegetative stage. An innovative rice-based farming system called “Palayamanan Model” was also introduced by PhilRice to help farmers earn supplementary income while waiting for the harvest season. Though these technologies have been tested in some areas, some farmers still stick to the traditional modalities.

The Social and Agro-Industrial Ventures Unit of PhilRice (PhilRice-SAIV) was established to help provide sustainability among marginalized farmers in disaster-prone, war-torn and post-disaster areas in the Philippines. PhilRice-SAIV was to introduce and test new technologies in a socially acceptable, culture-friendly way.

From September 2008 to February 2009, PhilRice-SAIV piloted a project in Barangay Salinding, Siay in Zamboanga Sibugay, in collaboration with the Social Action Ministry of Ipil (SAM-Ipil). The flood-tolerant varieties developed were tested in Barangay Salinding in comparison with the farmer’s traditional rice varieties. The Palayamanan model as well as mobile agriculture introduced to the community proved beneficial because the beneficiaries experienced food security even in times of flood.

Project Description

Flood-prone rice areas in the Philippines are estimated at around 300,000 hectares. In addition to the damage brought by typhoons and floods in lowland farms, rice farming productivity is very low because these are one-cropping areas only, i.e. they are able to cultivate rice only once yearly. The communities in these areas, therefore, are highly vulnerable to food and income inadequacy.

As the agency mandated to serve as a vital force in attaining and sustaining the

country's goal of self-sufficiency in rice and in promoting greater access of farmers to agricultural technologies, PhilRice, which is attached to the Department of Agriculture, led several research and studies to mitigate the effect of a changing and unfavorable environment on farm yields in the Philippines. It developed the NSIC Rc194 (known as Submarino 1), a rice variety that can survive, grow and develop even after 10 days of complete submergence in water at vegetative stage. The agency also introduced Palayamanan Model, an integrated farming system that can provide additional income to farmers during off-seasons.

These technologies were packaged and introduced to the communities of Barangay Saliniding, Siay, Zamboanga Sibugay through a collaborative project between PhilRice-SAIV and SAM-Ipil.

The pilot project aimed to:

- Establish a demonstration farm where Submarino 1 rice variety will be tested in terms of adaptability and productivity;
- Provide training programs in rice-based farming systems;
- Establish a Palayamanan model at the backyard of each beneficiary;
- Promote mobile agriculture and optimize land productivity; and
- Introduce other livelihood opportunities depending on the resources available in the locality.

Project History

Palayamanan is a diversified rice-based farming system coined from the words “palay” – a Filipino term for rice at any stage prior to husking, and “yaman,” which translates to “wealth.” Palayamanan combines rice with other high-value crops, as well as trees, fish, poultry, livestock, and farm waste recycling. This strategy was conceptualized in PhilRice to provide farmers with additional income sources while waiting for the rice harvest. Farmers who ventured into this farming system found it beneficial because of increased availability of food for the household, more income sources and reduced production risks.

Submergence-tolerant rice varieties have been developed by PhilRice in partnership with IRRI so farmers can produce and harvest rice under normal or submerged conditions. These new rice lines are high-yielding varieties infused with submergence tolerance gene (sub1) discovered from the Indian rice variety FR13A. The innovation was actually a result of the collaborative project of DA-PhilRice and IRRI entitled “Implementation plans to disseminate submergence tolerant rice varieties and associated new production practices to Southeast Asia” funded by Japan's Ministry of Foreign Affairs.

The PhilRice-SAIV (formerly known as PhilRice Agribusiness Incubation Services for Enterprises), the program that aims to help rice-based marginalized communities, saw the need to test new technologies such as submergence rice lines and Palayamanan model as long as the any possible shifts resulting from successful experimentation would not force the community to alter traditional ways of farming.

In August 2008, PhilRice-SAIV collaborated with the Social Action Ministry of Ipil (SAM-Ipil) to test the adaptability and productivity of submergence-tolerant rice varieties and to establish Palayamanan model farms where the components are made appropriate to the flood-prone area of Barangay Salinding.

Results

After six months of project implementation, the project delivered the following accomplishments:

- Established a demonstration farm where Submarino 1 (a flood-tolerant rice variety) was compared with traditional varieties.
 - » Although the new variety survived despite being submerged in floods from four to six weeks, the traditional rice variety used by the community still offered the highest average yield. The community learned in the course that the commonly used variety can produce better than Submarino 1.

| Harvest Date | Variety | Harvest | No. of Plots | Average (kgs) |
|--------------|----------|-----------|--------------|---------------|
| 22-Dec-08 | Sub3 | 10.25 Kgs | 1 | 10.25 |
| | Sub7 | 10.5 Kgs | 1 | 10.5 |
| | Sub4 | 7.25 Kgs | 1 | 7.25 |
| | Sub11 | 11 Kgs | 1 | 11 |
| | Sub18 | 11.5 Kgs | 1 | 11.5 |
| 23-Dec-08 | Sub14 | 2.25 Kgs | 1 | 2.25 |
| | Raeline9 | 50 Kgs | 5 | 10 |
| | B-26 | 45 Kgs | 2 | 22.5 |
| 24-Dec-08 | Sub5 | 7.75 Kgs | 1 | 7.75 |
| 26-Dec-08 | Sub10 | 7.75 Kgs | 1 | 7.75 |
| | Sub19 | 7 Kgs | 1 | 7 |
| | Sub23 | 8.5 Kgs | 1 | 8.8 |
| | Sub13 | 4.5 Kgs | 1 | 4.5 |
| | Sub17 | 4.75 Kgs | 1 | 4.75 |
| | Sub1 | 10.25 Kgs | 1 | 10.25 |

- Established a Palayamanan model farm in 14 households
 - » More diverse and nutritious food for the households became available.
 - » From zero extra income, the communities earned additional income from the Palayamanan harvest surplus. Children of the beneficiaries said they sell the surplus to neighbors for recess money for school.
 - » Neighbors are setting up their own Palayamanan after seeing the benefits of a vegetable and herb garden.
 - » There was a high 71% estimated adoption rate.



The Palayamanan Model set up by a beneficiary in his backyard.

- Optimized land productivity through the provision of planting materials for the cultivation of idle backyards/gardens and the promotion of mobile agriculture for a more secure food source in the event of flooding.
 - » Because of the new production methods introduced, the beneficiaries did not worry much where to get food in times of flooding.



Mobile agriculture: The beneficiaries planted vegetables in sacks so they could easily move their gardens to safer places in times of flooding.

- Enabled both farmers and community development workers through the training programs in rice-based farming systems
 - » Eleven representatives from Social Action Ministry of Ipil attended the Trainers Training Program on the Establishment of Farmers' Field Schools to gain knowledge in rice and diversified farming systems.
 - » SAM-Ipil re-echoed was learned to the community of Barangay Salinding to help farmers improve their know-how in rice farming and suggest ways to increase farm income.
- Introduced other livelihood opportunities such as kalamansi juice and kalamansi soap production, thereby encouraging household members, especially women, to become entrepreneurs.
 - » Ten household members were given a kalamansi soap and kalamansi juice production training workshop because kalamansi is always available in their backyards.

- » After the training program, the beneficiaries themselves took the time to research on soap-making for product diversification and development.
- » After the training, the beneficiaries became more confident to use their own creativity for additional income.



Training in kalamansi soap production

Key Implementation Steps

The following strategies account for the effective implementation of this collaborative project:

a. Pre-Implementation Procedures

- **Identification of project partners**

Barangay Salinding is a low-lying coastal community near the biggest river of the province, Sibuguey River, making it vulnerable to floods during heavy rains. The Disaster Management Program of SAM-Ipil aims to enhance Barangay Salinding's capacity in disaster resilience. SAM-Ipil partnered with the local government as well as institutions to mitigate the recurring flood problem. The Social Action Ministry

saw the need to introduce flood-resistant farming technologies in the community with the help of PhilRice. St. Joseph Parish was tapped as a project partner because it is where SAM-Ipil is based, and can train staff who can eventually lead project implementation sustainably. Marian College was also tapped because of the students' continuous study and initiative to make Salinding a community completely prepared against flooding. The local government of Salinding was also identified as a partner because it could lead in designing and implementing policies to make the barangay and similar communities become disaster-resilient.

- **Preliminary visit to the area**

An initial visit was conducted in August 2008 to work with the Social Action Ministry of Ipil in assessing the area and its resources, the beneficiaries and the possible networks that can be tapped for the implementation of the project to ensure project sustainability. Field demonstration site for the testing of submergence tolerant rice varieties was identified. Market scanning initiative was also done to determine the channel of farm produce coming from Brgy. Salinding. Preliminary discussion with the identified project partners (St. Joseph Parish, Marian College and Local Government of Salinding) led to the design of the 6-month project implementation plan.

b. Actual Implementation Procedures

- **Conduct of Focused Group Discussion with the beneficiaries**

A Focused Group Discussion with the target beneficiaries was conducted to gather data on the household's income, food source, farming practices and rice production in the area. Baseline data are important because this serves as the basis in assessing the project's impact.

The beneficiaries were also oriented about the project not only as part of building a harmonious working relationship but in respect of their right to know the proponents' plans for the area and to make them aware of what they can contribute for the project's success.

- **DRR Orientation/Seminar**

Because Barangay Salinding is frequented by typhoon and floods, the community was provided with a brief orientation on disaster risk reduction (DRR). This is for the people to become aware of DRR and

develop a plan of activities that might influence barangay officials in reforming policies to reduce the vulnerability of the community.

- **Rice-Based Farming System Seminar**

Development workers from SAM-Ipil attended the rice-based farming system seminar with modules focusing on organic fertilizer production, piggery and poultry production, rice-fish production and vegetable production. SAM-Ipil then re-echoed what was learned to the communities. Farmer consultants in the area were assigned to serve as advisers/extension workers of the farmer community.

- **Putting-Up of Demo Farm**

The community prepared the land on 9-11 September 2008 with the traditional way of tilling (use of animal labor instead of machine). Twenty plots were prepared to test the adaptability and productivity of different submergence-tolerant varieties in the area. Farmer's traditional seeds were also planted in plots were submergence-tolerant varieties failed to germinate. Actual observation was done to compare the traditional with the new varieties.

PhilRice experts visited the site monthly as part of monitoring and documentation. The responsibility of taking care of the demo farm was handed over to the community. Weekly monitoring was performed by SAM-Ipil.

- **Setting-up of Palayamanan Model and promotion of mobile agriculture**

The aim of this activity was to optimize the beneficiaries' garden as source of food and extra income. It was assumed that this activity would allow the communities to innovate and learn better ways of vegetable production through the experience they will gain in their own backyard.

Mobile agriculture was promoted in the area as a response to the community's common problem of flooding.

The question of what to cultivate was posed before the beneficiaries. The community identified all the vegetables they wanted to grow in their gardens. PhilRice-SAIV then provided the seeds with the following controls:

1. The beneficiaries should have attended the training programs;
 2. The amount of seeds requested should match the size of the garden area;
 3. As long as there were no plots and no prepared soil in sacks/ coconut shells, no seeds would be distributed; and
 4. Seeds should not be given to relatives or friends.
- **Conduct of alternative livelihood seminar and skills training**
Alternative livelihood activities such as kalamansi soap and kalamansi juice production were introduced as possible sources of extra income and to allow the community members to explore their creative potential. This endeavor also benchmarked existing products and optimized the use of available resources within their vicinity.
 - **Impact assessment**
To evaluate the project and to know its impact on the community, an impact assessment was done through interviews with the beneficiaries one month after project implementation. The learnings from the activities were recorded. Data such as adoption rates, increased food security and additional income were taken into account to verify if the project changed the lives of the community for the better significantly.

Analysis and Lessons Learned

The following were the lessons learned while carrying out the project:

- Climate change is uncontrollable. Submergence-tolerant rice varieties planted in the demonstration site for testing experienced drought during its first month. September, however, was a rainy month for the past years.
- Not all varieties brought by PhilRice in the area germinated. Traditional varieties such as Raeline and B-26 were planted in the vacant plots instead. This circumstance led to the comparison of new and traditional varieties.
- Project partners as well as beneficiaries should be cooperative and responsible for proper implementation of the project. If problem surface in the demonstration farm, the field staff assigned must have the initiative to solve it.
- Mistakes are learning avenues. The project did not force the community to alter traditional farming systems. In fact, it let the

community do things their way, so as to respect the existing culture in the area. In some activities, the beneficiaries committed mistakes but these did not stop them from taking the additional step to learn and finally achieve the ideal result.

- Technologies must be location-specific. The project results showed a bigger yield in the traditional rice variety compared with the submergence-tolerant rice variety planted in the demonstration site in Barangay Salinding, Siay in Zamboanga Sibugay. Series of tests must be done before new technologies can be promoted and recommended in the area.



Local action for global concerns

Appropriate solid waste management technologies to reduce greenhouse gas emissions waste management and recycling center

Bais City, Negros Oriental

Summary

With the release of the Republic Act 9003, also known as Ecological Solid Waste Management Act of the Philippines, various enhancements of municipal solid waste management (MSWM) systems were envisioned by local government units (LGUs). This law and its executing administrative orders and guidelines define specific minimum standards to enhance MSWM and especially, the safe closure of dumpsites and establishment of engineered landfills.

In Bais City in Negros Occidental, located 45 km north of Dumaguete City along the Tañon Strait, the bane of urbanization -- specifically environmental degradation and water contamination -- threatens the quality of life of its citizens. The city is composed of 35 barangays and has a total population of roughly 74,000 (2007 census) Twelve of the 35 barangays are coastal; another 12 are located in the lowlands, within elevations of 5 to 20 meters above sea level. The remaining 11 are hilly upland barangays with slopes of 16 to 30%.

The upland barangays comprise almost 80% of the city's total jurisdiction. The urban area comprises around 398 hectares, and covers Poblacion Barangays I and II, and Barangays Hangyad and Talungon, respectively. Fourteen of the 35 barangays are sugarcane haciendas owned and managed by people of Spanish ancestry. A major source of employment is sugar since Bais City has two sugar centrals, the Central Azucarera de Bais (CAB) of the Chan Family and the Universal Robina Sugar Milling Corporation (URSUMCO) of the Gokongwei family.

The deterioration of water quality in the South and North Bays of Bais City is partly attributable to uncontrolled open burning and disposal of solid waste, as well as the discharge of various liquid waste matter. Consequently, the local government proposed to enhance the municipal waste management system and to promote waste avoidance strategies without creating environmental hazards. A suitable site for the establishment of a central Waste Management and Recycling Center (WMRC) was identified in 1999.

The LGU tapped official German development support and implemented the said project in April 2003. The central WMRC integrates a composting plant, a material recovery facility, a waste water treatment facility and a low-cost landfill with a Bentonite enhanced clay-liner, the first of its kind constructed in the Philippines. A base clay-liner was favored over a synthetic liner for lower investment costs. At the same time, the former dumpsite was closed and covered with soil.

Since then, Bais City has been operating the WMRC successfully, increasing

waste collection and segregation gradually. The city now collects around 4,000 tons MSW/year, which are forwarded to the WMRC. Meantime, the recovery of organic waste, which is processed at the municipal composting facility, could increase to more than 30% of collected waste side by side the reduction of leachate and Green House Gases (GHG) emissions.

Although the effects of the new waste management project on disaster management and climate adaptation were not considered initially, the new WMRC is credited for providing local expertise, an organizational system, a central waste management facility using appropriate technologies and infrastructure, including an environmental monitoring and early warning system. The set up of a new environmental office has contributed to the strengthening environmental management practices within the LGU and the community.

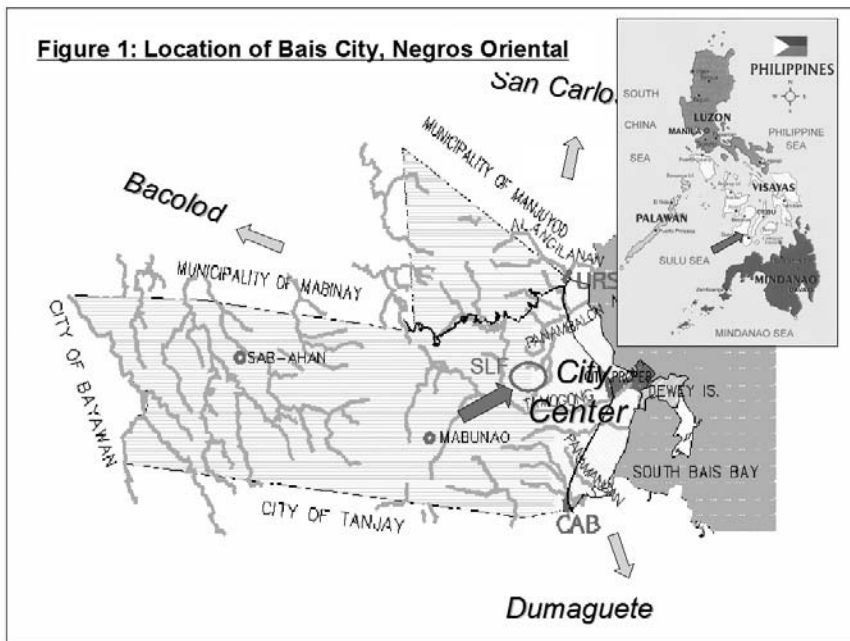
Another milestone was the city's formulation of a new local waste management ordinance in 2008 which provides guidelines and standards for good governance and fair treatment of waste generators based on adequate waste users fees. In turn, the municipal compost production, which supplies a soil enhancer called "Bais Friendly Soil," supports the LGU's reforestation program designed mainly for upland farmers. As a result, local farmers are reducing chemical fertilizer application.

Although the Clean Development Mechanism (CDM) is available to LGUs, the smaller local governments such as Bais City's may not be able to participate for a host of reasons, but principally, for the lack of economies of scale. Nevertheless, appropriate but lower-cost solutions are available. Among these is landfill rehabilitation with the use of an eco-efficient soil cover. Biofiltration as a natural and in-situ process is cheap and easy, yet efficient in reducing landfill gas emissions. Other GHGs such as methane, hydrogen sulfide and ammonia can be oxidized by specialized microorganisms.

Objectives

Bais City set the following objectives to enhance the local solid waste management situation:

- Raise awareness among residents and waste generators;
- Improve the delivery of basic services at the community level;
- Increase material recovery and especially the recovery of organic wastes;
- Mobilize the community to inspire residents and other stakeholders take active part in waste avoidance and waste segregation at source;



- Develop an appropriate and low cost technology for landfill operation;
- Safeguard environmental sound landfill operation including climate concerns;
- Enhance cost recovery for provided municipal waste management services as base for sustainable operation.

Project Description

a. Project history

The Local Government of Bais City set up the Waste Management and Recycling Center (WMRC), which includes the first clay-lined landfill constructed in the Philippines, in 2002. It began operations in July 2003, in the meantime that the old dumpsite in Barangay Talungon was closed. With the application of Bentonite to establish a clay liner for the landfill, instead of a more costly synthetic liner, the local government was able to reduce investment cost. The clay liner was acquired from a nearby clay deposit in nearby Ayungon, located 45km north of Bais City. As a result, the local government avoided costly imports.

The project planning, construction and landfill operation was supported by the German Development Service, whereas actual development and construction of the Bentonite-enhanced clay-liner was assisted by the Department of Science and Technology (DOST) through the Industrial Technology Development Institute (ITDI).

b. Local waste generation

Earlier waste characterization studies estimate Bais City's average waste generation at 0.48 kg/cap/day for urban households and 0.35 kg/cap/day for rural areas. In total, the city produces around 13,000 tons/year of domestic-type waste. From that, 61% is classified organic waste; 6%, used paper and cardboard packages; 3.3%, glass; 2.1%, metals; and 7.5%, plastic waste (hard plastics, bags, foil). The remainder was a mixed fraction of fine-grained material less than 2cm in grain size such as sweepings, ashes, fine organic materials, soil-like materials and small, broken waste components.

At present, the WMRC serves only eight of the 35 barangays that form the lowland part of the city. This represents 35% of total households. All other barangays are hardly reached by waste collection due to lacking road development.

c. Design and functions of the WMRC

The WMRC lies 4km northwest of the city center. The site covers an area of five hectares, with three hectares for landfill establishment and two hectares for the operation of a composting facility; a waste water treatment plant with a total storage capacity of 820 cubic meters; a material recovery facility; and an office building with sanitation facilities. Other infrastructure are a water supply system with deep-well pump and a 7,000-liter storage tank, three rainwater tanks with a total storage capacity of 25,000 liters, a perimeter fence with tree plantations, energy supply, operation roads, entrance gate and storage.

So far, the WMRC serves only public waste collection. Incoming trucks are inspected and waste volumes assessed by ocular inspection and recorded.

The development of a Bentonite-enhanced clay liner was supported by the DOST. The clay liner itself has a permeability of 1.54×10^{-6} cm/s in a mixture of 90% host soil from the landfill area and 10% Bentonite.

The liner construction took place in the dry season (February and March 2003). A critical aspect of clay liner construction is the reaching optimum water content in order to achieve best compaction and barrier properties. The finished clay-liner was sampled and analyzed by the DOST, which proved to comply with the legally prescribed permeability factor.

After final clay liner compaction, a 0.15 meter sand protection layer was applied to cover the clay liner and protect it against drying. Finally, a gravel drainage layer of 0.3 m thickness was placed on top of the sand protection layer. However, the locally available gravel for the drainage layer had a relatively poor sorting with too many fines. Hence, the envisioned performance to drain out leachate of the landfill may be suboptimal in the longer run.

d. Waste processing

In the beginning of operation, around 10,000 to 12,000 cubic meters of solid waste were collected and delivered annually to the WMRC. By 2004, the volume of waste collected and delivered to the WMRC was around 13,436 cubic meters, of which only 12% of organic waste was recovered and processed into organic fertilizer at the composting area.

The waste diversion increased some more over time such that by 2008, the facility was processing 1,000 tons or a remarkable 31% waste recovery by segregation at source and recovery of organic materials at the composting facility.

Although the material recovery continues to increase over time, a significant portion of mainly fine organic waste is still disposed together with residual waste at the landfill.

The compost products are sold to various farm operators and upland farmers at minimal cost. The pricing is supported a subsidy scheme especially intended for marginal farmers and supported through the city's various agricultural production programs.

The increased organic waste segregation and recovery is supported by several waste management enforcers, who assist in information dissemination and various IEC activities, coupled with the installation of waste segregation receptacles at various strategic points in the city. In addition, billboards illustrating proper segregation were set up in strategic places such as the public market.

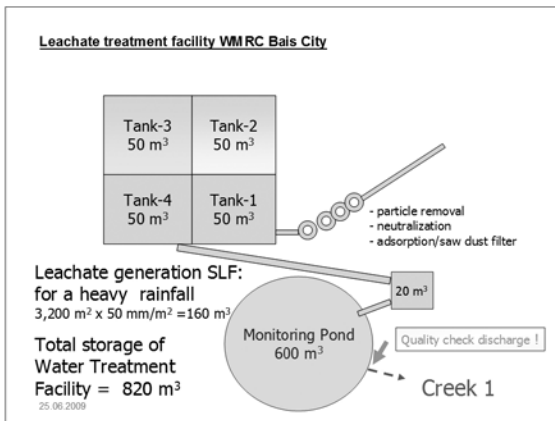
e. Landfill operations

Financial constraints limit landfill operations to the use of a backhoe, instead of a more costly bulldozer. The backhoe, moreover, not only compacts and covers incoming waste but also gathers cover soil from the next landfill cell, besides performing other excavation work.



The city has already acquired an adjacent seven hectares, which could be used in case waste disposal is still needed in the long-term.

Generated leachate from waste disposal is collected via the gravel drainage layer at the landfill base, forwarded to a central collection pipe and released to a pre-filtering unit which connects to a 200-meter tank. The tank, in turn, is divided into four compartments for a treatment process that includes both physical (sedimentation) and biological (oxygenation) treatment, including recirculation and back-spraying of the leachate with the use of a small pump station.



The sketch shows the outline and main components of the leachate collection/ treatment facility at the WMRC Bais City.

Treated leachate is forwarded to a sealed buffer pond that allows for inter-storage and natural treatment of effluent. Within this pond, nutrients are utilized by a small wetland where a larger portion of the stored water is evaporated. To avoid clogging, small catchment basins along the main leachate drainage pipe were established. These are regularly checked and if needed, desludged, similar to the first tank of the treatment facility, which serves as sedimentation tank. The gathered sludge is disposed at the landfill.

Although some waste pickers started to visit the landfill illegally in the beginning of the landfill operation, the local government managed to integrate a group of around 10 waste reclaimers (volunteers) by allowing them to enter the site under certain conditions, such as following simple work safety precautions and working in teams or at least tandems.

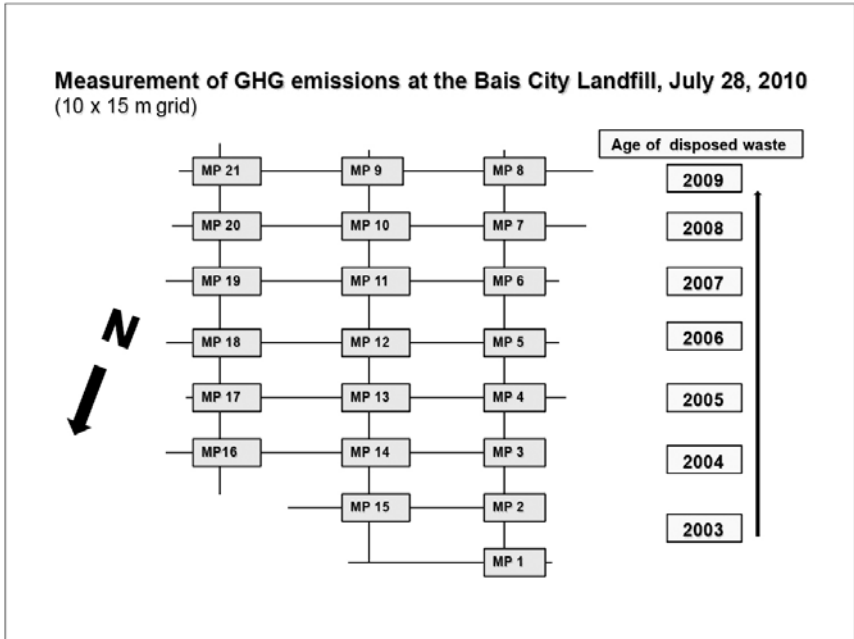
Results

a. Monitoring and mitigation of gas emissions

Climate change is now an urgent global concern, following the signing of the Kyoto Protocol in 1997. At present, it is estimated that around 4% of all anthropogenic greenhouse gas emissions are generated by the waste management sector. Since around 90% of all GHG contributions are generated by waste disposal, strategies to avoid or recycle organic wastes, or to capture, utilize and treat GHG emissions from waste disposal are being explored and applied far and wide in industrialized countries, but only to a significantly less extent in developing countries. Uncontrolled waste dumping is still practiced in many developing countries, resulting in higher GHG emissions.

As one solution, the Kyoto Protocol proposed the Clean Development Mechanism (CDM), which allows developing countries to initiate mitigation measures by benefiting from carbon credits and technology transfer from industrialized countries. Unfortunately, CDM as an option is hardly applied in the Philippines and other developing countries so far. It is feared that especially small and medium-sized municipalities with less than 100,000 residents will not be able to participate in CDM because of lack of economies of scale.

An alternative solution to reduce landfill gas emissions is microbial methane oxidation. Biofiltration as a natural and in-situ process is cheap, easy and efficient.



The following graph shows the first landfill unit of around 0.5 hectare that was filled from 2003 to 2009.

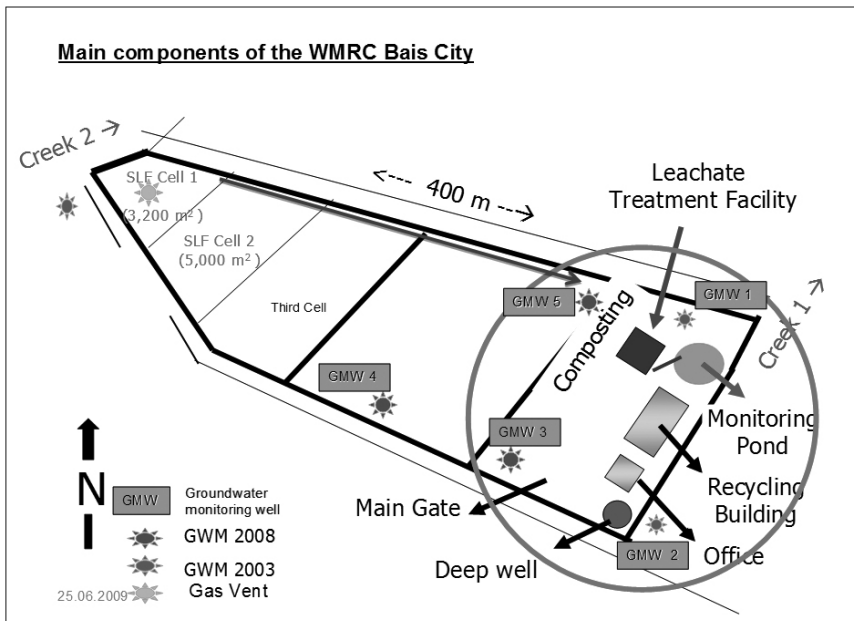
Although the International Panel on Climate Change (IPCC) so far only recognizes a maximum of up to 10% methane reduction, studies have shown that methane reduction can reach an efficiency of up to 90%, provided that specifically designed biofilters are put in place as enhanced cover for waste disposal sites.

In order to assess the methane generation potential for the Bais City landfill, various assumptions were made based on extrapolations from the available waste characterization statistics. Actual field measurements were performed in July 2010 with the use of a gas probe that measures oxygen (O₂), methane (CH₄), carbon dioxide (CO₂), among others.



At every monitoring point, the gas detector was used to measure O₂, CO₂ and CH₄ concentrations at the surface and at a depth of 0.5–0.6 meter below surface.

A total of 21 points was measured covering an area of around 0.2 hectare.



The following sketch shows the measurement grid but also indicates the areas and time of waste disposal at the various monitoring points and filled landfill units.

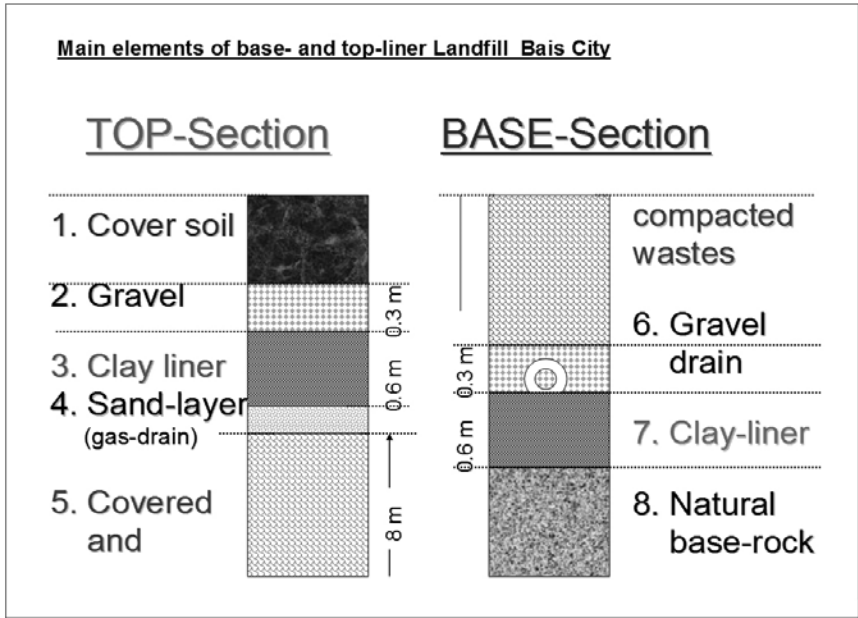
The results of the GHG monitoring indicate that the landfill units filled prior to 2008 generated and emitted GHG, with very high methane concentrations of up to 68% detected at measurement point 15 within the landfill areas operated from 2006–2007.

The comparatively high GHG values detected are no surprise, from a scientific point of view, since landfills usually turn anaerobic two to three years after disposal. This means that due to compaction and degradation of organic waste components through the absence of oxygen, methane generation developed gradually and may remain over the medium to long-term, depending on the quality, quantity and biodegradability of disposed organic waste.

b. Proposed establishment of an eco-efficient landfill cover

In order to address the issue, the LGU discussed mitigation measures and available solutions. The option to establish an eco-efficient soil cover for filled landfill units was considered. Previous research has established that soil strata with natural compaction and sufficient organic content are able to reduce methane emissions

from waste. A test run was proposed to ascertain the technology’s applicability and performance.



To apply the concept at the Bais City landfill, several changes were proposed for the top cover arrangement, as seen in the diagram.

The proposed changes for the top landfill meant additional technical measures and construction materials. While the supply of clayey cover soil is in general easy to organize, the identification of a locally available, eco-efficient soil cover proved to be the main challenge. Bais City proposed to utilize the following substrates to test them for eco-efficient landfill cover: (a) alluvial soil mined out from local river beds without additives, (b) alluvial soil with 10% compost addition and (c) alluvial soil with 10% addition of mudpress, a locally available, organic-rich byproduct from the sugar milling process. The latter is often used for soil amendment, but certain amounts are on stock at the local sugar mills, mostly for free.

c. Monitoring of leachate emissions and local water situation

The landfill unit in operation, the leachate collection and treatment facilities, perimeter fence and access road are regularly maintained. An environmental monitoring program which observes selected parameters of leachate composition as well as ground and surface water quality was also proposed. This program acts as an “early warning monitoring system” and alerts decision makers in case threshold levels of water quality are surpassed.

The main targets of water system monitoring are the leachate effluent from the landfill, the monitoring pond, two small creeks located upstream and downstream of the WMRC, the shallow groundwater monitoring wells, and the deep well for water supply. The monitoring includes observation of water levels, pH levels, temperatures, conductivity and oxygen concentrations.

So far, the data gathered does not indicate any water contamination. Temperature values of leachate varied from 28 to 33 degrees Celsius during the monitoring period. In addition, the established barrier systems at the sanitary landfill as well as the leachate treatment system functioned properly. No abnormal water chemistry was detected from the points of surface water and shallow and deep groundwater monitoring wells.

d. Financing the program

The city government used its local annual development fund to develop the WMRC, and only the land acquisition was financed by a bank loan. Since start of the project in 2001, the highest annual budget incurred was in 2006 when operational costs rose with the institutionalization of the environment office that handles the management and operation of the WMRC. It was during this time moreover that full operation of the landfill commenced and that activities to increase waste diversion intensified. Furthermore, an additional composting building was also constructed at this time.

e. Community involvement and additional employment

Since start of construction and over the years of operating the WMRC, the project has benefited many residents from the surrounding communities including Cambanjao, the host barangay. Since 2003, a total of 444 laborers were employed from the adjacent barangay of Valencia, 182 of them male, and 262, female. They are assigned manual labor at the WMRC like production of compost, housekeeping, maintenance and vegetation maintenance.

In addition, 97 laborers from the host barangay Cambanjao benefited through employment with the development of the WMRC. Of this number, 60 were men, and 37, women.

In sum, a total of 541 persons were employed at the WMRC within 2003 to 2009, of whom around 48% were men and 52%, women.

Aside from the workers, 17 registered waste reclaimers depended on the landfill for their livelihood. The material recovery facility located at the WMRC serves as the drop-off point of the reclaimed recyclable materials prior to pick-up by scrap buyers.

In order to ensure occupational health and work safety of the reclaimers, the city government, through the City Health Office in coordination with the City Environment and Natural Resources Office provided them cost-free, anti-tetanus toxoid vaccination.

Project Benefits

The WMRC project and enhanced solid waste management program provided various benefits:

a. For the MSWM system

- Enhanced waste segregation at source
- Reduced waste disposal
- Recovery of organic waste with compost production
- Enhancement of work safety and occupational health for involved workers
- Formulation of a new local solid waste management ordinance
- Compliance with Republic Act 9003

b. Socio-economical benefits

- Increased investment attractiveness of the LGU
- Increased public awareness and participation
- Skills development of involved workers
- Integration of local waste pickers
- Increased material recovery to substitute primary resources

c. Environmental benefits

- Leachate and gas emission control
- Control of vectors and land pollution
- Elimination of GHG, especially methane, from waste disposal
- Reduction of chemical fertilizer application through compost production
- Soil enhancement, especially increased organic content (carbon sink) in local farmlands through compost application

Analysis and Lessons Learned

Bais City is one of the few LGUs that implemented the new waste management legislation. The approach to establish a Bentonite enhanced clay-lined landfill by utilizing appropriate technologies proved successful. Local labor and equipment could be adjusted to the concept and used in implementation. As a result, dependence on expensive equipment and imported materials as well as foreign technologies was reduced. These cited benefits are validated by the

successful operation of the landfill for over a period of seven years. The preferred developmental approach to the project's financing requirements proved successful too.

The environmental benefits of the WMRC are multifold. Generated leachate is collected and treated in a comparably simple manner. Effluent that is occasionally discharged usually correlates with heavy typhoon rains. During the five years of operation, no indication of surface or groundwater pollution was observed. However, the availability of field equipment and expertise to conduct and evaluate environmental monitoring remains a bottleneck. Likewise, the lack of standard procedures and qualified laboratories, as well as service providers for consultancy and environmental monitoring, hinders efficient monitoring.

In the meantime, the LGU addressed issues related to GHG generation from waste disposal and proposed to pioneer a low-cost, appropriate technology by testing the effectiveness of an eco-efficient soil.

Replication Potential

Bais City demonstrated that the enhancement of the MSWM system, especially residual waste management, is feasible and can be maintained, even with restricted budgets and in the context of a developing country.

As one of the main threats to sustain the started WMRC project, the low cost recovery from waste generators and service users needs to be emphasized. Most municipalities in the Philippines tend to provide waste management services out of their annual budget and fail to collect user fees. Although the refinancing of a low-cost landfill seems feasible, the Bais City experience suggests some cost recovery difficulties. As of now, seven other LGUs in the Visayas region have adapted or are poised to employ a similar approach and established similar low-cost landfills.

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Indigenous Peoples' Practices

This special feature of Indigenous Peoples' case study give emphasis on the importance of IP practices in disaster risk reduction and climate change adaptation.

9

**The codification
and integration of
indigenous practices
into disaster risk
reduction and climate
change adaptation plans**

Province of Benguet

Framework for Discussion

The resiliency of indigenous communities in relation to disaster risk reduction and climate change adaptation is manifested in their “traditional safety nets” such as the food and medicines gathered from the forests, the networks of mutual aid within the community, and belief systems that have contributed to mental health and conflict resolution.¹ One of the best examples of such a safety net is the indigenous peoples’ strong spiritual link to their domain, as seen in their centuries-old knowledge systems in forest and resource management, resulting in the rich bio-diversity of their territories.

For these communities, the forest is essential to their survival, being a source of their food, livelihood, water and now, carbon credits. The use of forest resources is governed by the unwritten community rules, yet water and carbon credits are free of charge to the lowlands surrounding non-indigenous communities. However, in the past, and to some extent until now, as a result of development aggression, that is, the western paradigm of extraction of resources that government systems and processes adhere to, these safety nets have not been accorded the same valuation and respect accorded by the indigenous communities.

Instead, the domains of indigenous communities have been reduced to being mere instruments to enrich corporations and the elite, paving the way for the encroachment of large extractive industries such as mining, logging and/or forest and agricultural plantations, and subsequent militarization. The Indigenous Peoples’ Rights Act (IPRA) or Republic Act 8371 was legislated precisely because of existing discriminatory national legislation that violates the rights of indigenous communities to ownership over their domain and to decide the priorities of their development. With the passage of the IPRA in October 1997 and the mandated recognition of their rights, there is hope of further strengthening the resiliency of indigenous cultural communities or indigenous peoples (ICCs/IPs).

As the indigenous peoples of Bokod, a municipality in the province of Benguet in northern Philippines, declared of forest protection in their Ancestral Domain Sustainable Development and Protection Plan (ADSDPP):

Predisposed by an imprint of witnessing the “ecological rape” of the vast forest lands and ripped off powers to defend or protect it from destructive exploitation, the IP communities of Bokod have virtually been relegated to take a passive stance on forest protection as may be consistent with its indigenous knowledge systems and practices (IKSP) on natural resource management.... Subsequently with the long denied recognition of their ancestral rights to ownership of their ancestral

¹ Carol J. Colfer, *Human Health and Forests: A Global Overview of Issues, Practice and Policy* (United Kingdom: Earthscan), 2008, p. 355.

domain, the people of Bokod can hardly believe that at long last, they can now take hold of their title to their territory as the IPRA provides.²

IPRA provides for the recognition of the indigenous peoples' immemorial ownership and control over their domain. Under the law, the titling of domains/lands, the formulation of the ancestral domain sustainable development and protection plan (ADSDPP) and the Free Prior Informed Consent (FPIC) are processes of empowerment to strengthen the governance systems of indigenous cultural communities in resource management.

The implementing mechanism of IPRA is the National Commission on Indigenous Peoples (NCIP), which is tasked to protect and promote the interest and well-being of ICCs/IPs with due regard to their beliefs, customs, traditions and institutions.

The ICCs' peculiar definition of ownership, as stipulated in Section 3 of IPRA, emphasizes that domains and lands are the material basis of cultural integrity, and are therefore communal in nature. Because the territories belong to all generations, the care and conservation of land and natural resources for future generations are an inter-generational responsibility. The titling of the indigenous peoples' territories encompasses the physical as well as spiritual space.

This paper focuses on the resiliency of the IP communities of Benguet with completed domain titles and ancestral domain management protection plans as can be gleaned from their traditional safety nets. "The focus on resiliency means putting greater emphasis is on what communities can do for themselves and how to strengthen their capacities, rather than concentrating on their vulnerability to disaster or their needs in an emergency."³

Benguet Experience

In the Cordillera Administrative Region, 11 ADSDPPs have been formulated, packaged and reproduced, ten of which have been adopted and integrated into local government plans, except in Tublay.

Benguet is located in the Cordillera Administrative Region and shares a very unique characteristic common to tribes in this region. It is the only region with a homogenous population of indigenous peoples. Benguet province has 13 ancestral domains, each with a recognized Indigenous Peoples' Organization (AD-IPO) responsible for the management of the affairs of their respective domains. These

² Tublay Ancestral Domain Sustainable Development and Protection Plan (ADSDPP), 5 January 2008, p. 105.

³ John Twigg, "Characteristic of a Disaster-Resilient Community: A Guidance Note," August 2007, p. 6 (unpublished).

IPOs were fully involved in the preparation of their respective ADSDPPs, with the assistance of NCIP-CAR.⁴

Benguet is also the watershed cradle or headwaters for the lowland areas and has three dams that generate electricity for the Luzon grid. Benguet is also host to the country's mining industry. In 2006 alone, revenues from mining reached a stunning P4 billion. The figure comes from only two of the many mining firms operating in the province, Lepanto Consolidated Mining Corporation and Philex Mines.

Yet, the province's mining vigor has not translated to a better quality of life of the Benguet people, simply because the bulk of the mining firm's taxes are not paid directly to the province. Like many other mining operations around the country, Lepanto and Philex have principal offices in the City of Makati, a set-up that makes Makati the main mining tax beneficiary.⁵

Benguet is legendary for its gold which the Spaniards attempted to exploit by attempting to conquer the Igorots in the name of religion and the King. The Spaniards declared that all lands belonged to the King -- the infamous Regalian Doctrine. The Spaniards were fought off by the Igorots of the Cordilleras, which explains why they were able to retain their cultural distinctness. As a result, however, the Igorots became objects of discrimination, labeled by the Spaniards as pagans and later by the Americans as primitive and backward. Such biases would influence as well the Filipino lowlanders' attitude towards Igorots.

The Americans were able to gain foothold in the Cordilleras by exploiting the gold mines of Benguet, obtaining private titles over some of their claims under the Parity Rights agreement in the 1900s and again, under the 1935 Constitution. Under the Philippine administration, Igorot lands were then confiscated through laws such as Presidential Decree 705 that converted 80% of lands in the Cordilleras to state ownership following passage of a policy where territories "18 degrees in slope are classified as forest lands and therefore inalienable." Most of the land in Benguet falls under the Cordillera Forest Reservation. But, by virtue of law, the State owns all natural resources.

NCIP Intervention

The formulation of the Ancestral Domain Sustainable Development and Protection Plan (ADSDPP), as facilitated by the NCIP, is a process of indigenous-based research with the participation of the entire community, led by the elders.

⁴ National Commission on Indigenous Peoples-Cordillera Administrative Region, "Executive Summary," *Terminal Report on the NPC-FAB*, June 2009, p. 9.

⁵ Wikipedia: The Free Encyclopedia, Benguet , <http://en.wikipedia.org/wiki/Benguet#Economy>. Accessed 17 February 2011.

In this case, the community does not comprise mere objects but active subjects of the research. As facilitator, the NCIP convenes the elders of the domain. In turn, the elders designate a technical working group to perform the research for the ADSDPP. The focus of the research is on the indigenous knowledge systems and practices (IKSP) in general. At the end of the ADSDPP process, the document is presented to the local government unit for adoption through resolution.

The ADSDPP has the following basic information:⁶

- Manner by which the ICC/IPs will protect their domains;
- Kind and type of development programs adopted and decided by the ICC/IPs in relation to their livelihood, education, infrastructure, self-governance, environment, natural resources, culture and other practical developments;
- Basic community policies covering the implementation of all forms of development activities in the area and;
- Basic management systems, including the sharing of benefits and responsibilities among members of the concerned ICC/IP community.

In the various ADSDPPs, the indigenous peoples’ organizations identified community policies in relation to the titling and management of domain in general.

Domain Titling

In the course of completing the ADSDPP, particularly the SWOT analysis (Strength-Weakness-Opportunity-Threat), the indigenous communities identified as their strengths their rich natural resources, especially the communal and watershed areas. The main opportunity identified was the Indigenous Peoples’ Rights Act itself, while Regalian Doctrine that assigns to the State ownership of resources was the main weakness.

| | |
|--------|---|
| Tublay | Opportunities: IPRA and FPIC Weakness: the Regalian doctrine, which is prejudicial to the rights of IPs ¹ |
| Bokod | Opportunity: IPRA Threats: corporate mining and exploitation by capitalists ² |
| Sablan | <i>(lies adjacent to Baguio and is significantly affected by the latter’s urbanization)</i> Strengths: international and local policy and agreements on IP ancestral domains Threats: unregulated titling by real estate developers as evidenced by the rise of several subdivisions, resulting in the destruction of forest cover; environmental degradation and the proposed BLIST concept by Baguio City (Baguio, La Trinidad, Sablan, Tuba concept where there was no participation by the indigenous peoples of Sablan) ³ |

⁶Section 4, Part II, Rule VIII of the Indigenous Peoples Rights Act (Republic Act 8371).

| | |
|----------|--|
| Mankayan | <i>(the site of one of the largest mining companies in the country, Lepanto)</i> Weakness: the pollution of waters and land with mining waste from both large and small-scale mining; the depletion of mineral resources; patented mining claims and proclamations within watershed areas; and insecurity of land tenure are threats ⁴ |
| Atok | <i>(has registered its Certificate of Ancestral Domain Title-CADT)</i> Strength: the intact traditional practice of respect for elders is a strength Weaknesses: the people's very small farm holdings and the impact of the full implementation of the Agreement on Agriculture in the GATT-WTO, which is killing the vegetable farm industry ⁵ |
| Kabayan | <i>(where Mt. Pulag, a protected area, is found)</i> Strengths: the surrounding natural resources, intact cultural heritage, kinship and traditional institutions, strong peoples' organization, and Local Government Unit cooperation Threat: the conflicting policies on natural resources management and tenurial instruments viz the Regalian Doctrine as against the Native Title Doctrine ⁶ |
| Tuba | <i>(the only domain whose boundaries have not yet been settled)</i> Strengths: the presence of, and respect for, traditional elders; a supportive local government; and the community's awareness of forest conservation Weaknesses: the ability of outsiders to secure paper titles over their lands; a conflict with the lowland non-indigenous areas' claim over the communal watershed; the GATT-WTO's Agreement on Agriculture; mining applications; and lack of information on the IPRA ⁷ |
| Bugias | Strengths: issuance of the CADT and ancestral land titles; representation of the indigenous peoples in local governance, settlement of suits through customary laws, full support of LGU to the IP community, ordinances on water conservation, water pollution prevention, illegal logging and the prohibition in hunting migrating birds Weaknesses: absence of consultation regarding government proclamations over forest areas, which led to rampant illegal logging ⁸ |

Domain titling under the IPRA is in accordance with the native title doctrine, which refers to pre-conquest rights to lands and domain as far back as memory reaches. The ICCs/IPs assert that their territories have never been public lands. The domain comprises not only the physical, but also the spiritual, space of the indigenous communities, including sacred sites and burial grounds. The communal forests identified by tribes as their “muyong”; the traditional mining areas where gold was extracted by *usok* (lode mining), *abukay*, *sawil/dawil* or *sayo*; swidden farms usually called *uma* or *nem-a*; backyard gardens called *ba-ang*; hunting grounds; coastal and inland waters and other natural resources are evidence of the ICCs' ownership claim from the start. The basis for delineation is the traditional boundaries, also called by some tribes as the *beddeng*.

The native title doctrine has overturned the Regalian Doctrine under present Philippine jurisprudence.

Belief Systems Documented in the ADSDPP

Approval of the Spirits

The protection of domain resources is evident in two common views among the indigenous peoples in Benguet. The first is the absence of any distinction between a forest and a watershed as all forests function as watersheds.⁷ The second belief system is that the forests are inhabited and guarded by spirits:

- *Inayan* or fear of divine sanction for a wrong or sinful act which is associated with fear of wrath of the spirits, e.g., if trees are cut without their permission⁸
- *Paniyew* of a sacred prohibition as foremost guide. The ancestors were careful in cutting down a tree and engaging in earthwork such as digging a deep canal.⁹

They needed to secure the permission of the spirits through a ritual, indicating that wanton destruction was taboo for them. *Elam* or greed was greatly abhorred. Because of the “paniyew,” the IPs were never greedy, taking only what was needed from the forest and clearing only what was needed for cultivation.¹⁰

Land Management

The concept of land use was traditional knowledge among the indigenous communities. There were major classifications based on type of management: individually managed, clan managed and community managed.

An IP member got to own land by working, developing and improving it. The improvement features or proofs of ownership include the *payew* or ricefield, *uma* or swidden farm, visual trace of a stone wall or a single fence pitch (*palitek*), the trunk of a dead tree, pasturelands (*estancias*) and burial place (*dubok/luklok*).¹¹

In Bakun, the clan-owned *muyong* is understood to be for the benefit of the wider environment as it contributes to the total well-being of the community and ecology.¹² There are however traditional practices of maintaining the *muyong* such as a source of fuel, timber, nutrition, grazing area, and animal and bird sanctuary.

Land Use

Only the branches are harvested, specifically the lower and bigger branches. By doing so, the tree is encouraged to grow upwards, making the timber straighter. Deceased and deformed trees are weaned out and used as fuel. The *muyong* is

⁷ Bakun Ancestral Domain Sustainable Development Protection Plan (ADSDPP), March 2004, p. 31.

⁸ Kibungan Ancestral Domain Sustainable Development Protection Plan (ADSDPP), 17 May 2004, p. 22.

⁹ Buguias ADSDPP, October 2008, p. 31.

¹⁰ Ibid, p. 32.

¹¹ Atok ADSDPP, p. 34.

¹² Mankayan ADSDPP, p. 68.

maintained as tree farms so members of the community will not have to go to the pristine forests for timber. The *muyong* also provides rattan and bamboo for fencing, basket weaving, nutrition and medicine.

There are rituals and taboos associated with the selection of areas for swidden farms, and the cultivation and harvest of rice. The IPs basically maintain two types of vegetable farms: in Kibungan, there is the *nem-a* or swidden farm; and in Sablan, the *ba-ang* or *baeng* or backyard garden. Both types have one common feature, crop diversity.¹³

Swidden farms are maintained for an average of four years, and then left to fallow for about six years to allow the soil to regenerate. Most swidden farms are located away from residences and are planted with crops of high cultural value such as *camote* and *gabi*.

The Bokod domain is home to the famous indigenous technology of agroforestry, i.e., homelot agroforestry or home gardens (*baeng*). These are planted to fruit trees and vegetables of different layers of canopy with multiple and mixed cropping.¹⁴

In the Kanankanaey-Bago domain of Bakun, the *kabite* or *riprap* technology that involves the lining of stones, fitted together on top of the other without the support of clay or mortar, is practiced. The r ripraps forms terrace that produce leveled plots that retain fertile soil. Such terraces can hold water so that the area could be planted to rice. Terracing is also done in between slopes and gullies to prevent soil erosion and collect topsoil for crop production. The community refers to the terracing technology as a practice that tamed their tough mountainous territory.¹⁵

Common Property

In all the domains, the recognition of traditional responsibilities to the forest in terms of protection, conservation and development is an unwritten law. An additional explanation for this is the belief that forests are inhabited by spirit dwellers. Communal forests serve as watershed for the community and where nobody is allowed to introduce any improvement.

The Bakun people consider their lands as *saguday*¹⁶ or inheritance from their ancestors, which must be passed from one generation to the next.

In Atok, the *man-ili* or *umili* have exclusive rights over their water and watershed. The watershed is protected by the community. Kaingin burning or any form

¹³ Kibungan ADSDPP, p. 23.

¹⁴ Bokod ADSDPP, p. 41.

¹⁵ Bakun ADSDPP, p. 44.

¹⁶ Ibid., p. 42.

of cleaning or clearing is not allowed. Even the construction of houses in the watershed area is discouraged. Residents vowed that if necessary, they will fence off the area (*aladan*). The different barangays have identified and maintained their respective watershed areas. No individual is allowed to declare the area for exclusive use because this is reserved for community use.¹⁷

Common to all the domains is the belief that water is *biag* (life) and spirits live in and guard the bodies of water.¹⁸ Water is *kataguan* or *kabiagan di amin*, i.e., water is vital to the survival of everyone, be it for domestic or irrigation use. Water is a prime necessity.¹⁹ Springs and water sources are managed and protected by the community through free labor (*garates*).

In Sablan, some barangays with rugged terrain have installed water systems by constructing indigenized suspended pipe networks secured by steel wires. From the spring, water is attached to the main tank through a transmission pipe. Distribution tanks complete with where distribution pipes are constructed near clusters of households. Waterworks associations are formed to maintain and operate the water system. Maintenance tasks include cleaning the surroundings of the water source, the repair of tanks and pipelines, and tree replanting. Local ordinances have been passed to penalize individuals who vandalize, steal or destroy the flow of water.²⁰

Irrigation systems are also communal property. In Mankayan, the system is repaired and cleared of vegetation at least once a year or when needed. The maintenance usually takes days and affected farmers are expected to help. Those who do not help are sanctioned.

Mutual Help Systems in Resource Management

On the part of the indigenous communities, the cohesion of the community strengthens their resiliency, and this can be seen in various forms of traditional community cooperation or mutual help systems.

In all the domains of Benguet, whether Kanakanaey or Ibaloy, their terms for the community mutual help system are almost the same.

In Atok, communal labor or the mutual help system neighbours are expected to help and be helped is called the *aduyon*. During planting and harvesting seasons, a farmer asks a neighbor to help and the farmer is expected to return the favor.

¹⁷ Atok ADSDPP, pp. 38-40.

¹⁸ Mankayan ADSDPP, p. 74.

¹⁹ *Ibid.*, p. 40.

²⁰ Sablan ADSDPP, p. 38.

- The aduyon is not limited to planting and harvesting but to other activities such as the construction and upkeep of their irrigation dikes, the excavation and stonewalling of ricefields and the construction of houses.
- Kamal, sometimes referred to as the bayanihan spirit or collective free labor, is always readily extended to community activities. However, when the activity concerns an individual or a family such as home construction or the repair of stonewalls destroyed during calamities, free labor is still extended but the owner has to prepare food to feed the neighbours in the course of the day.²¹

The same mutual help system in Sablan also exists but there is no element of an outside compulsion – the members are self-motivated to be one with the rest of the community in helping another member with a major task.²²

In Bokod, the system of mutual help systems are called by various names, to wit:

- *Amoyo/ogbo* - A collective effort and responsibility to accomplish a task for an individual or family without remuneration
- *Karatis* - A community effort or free labor to establish an irrigation system for the community;
- *Poldias* - The appointment of a proxy to render one's service in cooperative undertakings in the absence of the individual
- *Binedeg* - Representation per household in a community effort;
- *Atang* - Servitude where compensation is in terms of harvested goods and is deferred until harvest time
- *Paw-it* - Goods or a donation called *ufo* contributed to a grieving family to lighten the burden of spending on gifts for the wake. These "gifts" are to be brought by the departed to ancestors in the spirit realm.
- *Chu-pang* - Leftover uncooked meat distributed to the neighbours²³

²¹ Atok ADSDPP, p. 72.

²² Sablan ADSDPP, p. 31.

²³ Bokod ADSDPP, p. 44.

In Buguias, members of the community perform construction through the *alububu* or *bayanihan* system where members are obliged to help in the construction and maintenance of the diversion dam (*saep*), the irrigation system (*colocol*) and canals. Through the *alububu*, they likewise assist in land preparation, sowing until harvest. Irrigation systems and wells belong to the entire community, and everybody can make use of the irrigation as long as the family helps in the construction and maintenance of the structures. The elders of a community rebuke anyone found to have deliberately destroyed the irrigation system.

Conclusion

Among the Ibaloy in Tuba, Benguet one leader said, “In our community, *awan ti mabisin* (nobody goes hungry). When the community learns about a family who is in dire need of food, it is always the case that the community provides them with their basic needs. In cases where a family is in need of land to till, with the permission of the landowner, and provided the land is idle, they can till this to provide themselves with food.”²⁴

The indigenous peoples’ worldview especially on the mutual help system is the best indicator of the resiliency of indigenous communities. Tangible evidences of these system are the existing natural resources among others the maintenance of the communal forests and the “rice terrace farming acknowledged to be sustainable worldwide.”²⁵

Climate change adaptation has already been practices by indigenous communities. More so mainly and simply because of their worldview that resources are for the next generation. Perhaps it is the attitude the outside world that needs changing and adaptation to the IP way of thinking.

The NCIP plays a pivotal role in ensuring empowerment through the meaningful participation of the indigenous cultural communities in all of the processes and providing political/sacred-cultural space²⁶ through the Indigenous Peoples Rights Act (IPRA) and translation of said processes into innovative tools, policies and legislations.

²⁴Excerpts from the interview of Rose Labutan (woman leader of Ibaloy tribe of Tuba), September 2010, Baguio City.

²⁵Kibungan ADSDPP, p. 23.

²⁶From an interview of Easterluna Canoy, an anthropologist working among the indigenous peoples of Bukidnon, August 2010, Quezon City.

Typhoon Ketsana (Ondoy) Experiences

Two (2) stories from two (2) organizations of their experience during the onset of Typhoon Ketsana (Ondoy) in 2009. The tragic experience to its building back better towards resilient community.

A large, stylized graphic of the number '10' in white, set against a grey background. The '1' is on the left and the '0' is on the right, both with a slight shadow effect.

**A radio communications
group leads in inspiring
and sustaining
community volunteerism
for multi-sectoral
partnerships in disaster
risk reduction**

Los Baños, Laguna

Background of the Community

Purok 3 in Barangay Bambang, Los Baños, Laguna is a flood-prone area. It is a Laguna Lake shoreline community with a large creek that runs through the populated section. A major exit point of the water run-off from Mt. Makiling, this creek -- because of heavy siltation -- overflows and floods major portions of the barangay during heavy rains and typhoons. But many informal settlers have set up their homes in the area, the lake being a source of many livelihood opportunities such as fishing and small-scale farming. In 2000, only about 38 families were registered as residents of the area, but this had increased to around 150 families -- around 750 persons -- by 2009. The labor force profile includes employees, bus, jeepney and tricycle drivers and operators, fishermen/farmers, and teachers' associations.

Bambang is a “vulnerable” site that experienced heavy flooding and damage during Typhoon Ketsana. Even the Bambang Elementary School, which could have served as an evacuation center, was submerged because of the area's low elevation. In fact, most of the shoreline residents were rescued by crossing over the topmost portion of the school fence as they were trapped by the waters that rampaged and flowed over the creek. The ground floor of some houses was completely submerged and boats had to be used to ferry residents to the evacuation center gym. The bridge connecting them to the main barangay center was also impassable.

The Kabalikat Civicom Los Baños Chapter

The Kabalikat Civicom (KB Los Baños) provided the needed assistance at the height of Typhoon Ketsana. KB Los Baños was organized in December 1990 “to enable radio enthusiasts to actively participate in public assistance... during calamities and emergencies, or whenever there is a need to ensure public comfort and convenience”. The group's objectives include:

- to foster cooperation among those involved in community radio communication,
- to develop dedication, discipline and professionalism in community service, and
- to promote the bayanihan spirit, mutual help and cooperation among various government agencies and civic-minded organizations by bringing its services closer to the community.

KB Los Baños' Plan of Action, called “Operation Kabalikat,” mandates the group to assist and coordinate with government agencies and other social welfare agencies of the government in times of national calamities and emergencies. The group should also encourage the participation of radio enthusiasts in times of emergencies/accidents where public assistance is required.

KB Los Baños is an organization that capitalizes on the volunteer spirit of its members. They are among the civic organizations pioneering on deployment of disaster and rescue volunteers even before the PDRRM Act of 2010 came out.

Membership is diverse. “We come from all walks of life...there are businessmen, employees from the government and private sector, nurses, politicians, Overseas Filipino Workers and even out-of-school youth. Our members’ age profile starts at 18 years and up. We, however, give due importance to education and everyone is urged to finish at least their high school,” said one officer.

The group works closely with the Department of Interior and Local Government (DILG) and the Municipal Government of Los Baños, Laguna. An agreement with DILG recognizes KB Los Baños’ commitment to render community services, particularly along the lines of Relief Disaster Operations, Medical and Dental Missions, and Rescue and Radio Communication Monitoring. A more specific agreement with the municipal government of Los Baños outlines KB Los Baños’ responsibilities in times of calamities, i.e., to assist in information dissemination and to provide training for rescue operations. The LGU counterpart includes the provision of vehicles during emergencies, food and other assistance to KB Los Baños.

In 2009, the LGU secured a small rescue mobile vehicle (a mini-cab) and turned it over to KB Los Baños for its exclusive use. KB Los Baños also has access to the municipality’s three ambulances in case of emergencies.

KB Los Baños’ track record includes accomplishments in disaster risk reduction-related activities such as recovery, rescue and clearing operations during typhoons; training in basic life support and standards for community lay rescuers; house building projects; and, medical assistance, first aid, rescue procedures and basic fire fighting training.

Typhoon Ketsana

As with most communities, the level of community awareness of DRR in Barangay Bambang during Typhoon Ketsana was low. Much of the population did not even know what DRR meant. There were no organized disaster teams. At the height of the typhoon, KB Los Baños hands were full, with its members were spread out across many barangays of Los Baños, attending to a host of rescue activities.

“During the flood rescue, we experienced working in waist-deep areas for hours despite the cold. We were evacuating people from landslide and flooded areas but we did not mind this. We were more concerned with getting the people to safety,” Ronald San Valentin, a member, recalled.

In Bambang, the group had to evacuate scores of residents with a rubber boat. Only one person at that time knew how to handle a rubber boat, and the rescue effort had only this member to rely on for the rescue operations to the point of his exhaustion. The rescue effort was almost cancelled for lack of an alternate operator.

The KB Los Baños teams also got busy clearing roadways of debris. In three barangays (Anos, Maahas and Tinungan), this meant removing huge logs brought down by the rushing waters of Typhoon Ketsana.

KB Los Baños also worked closely with Oxfam’s Emergency Response Team during Typhoon Ketsana, specifically deploying volunteers for public health promotions and emergency food security and livelihood (EFSL) programs.

With KB Los Baños as the most prominent search and rescue institution at that time, some private donors of relief goods and financial assistance went directly to KB Los Baños or its evacuation centers. Forty families were relocated to Barangay Lalakay, which was not too far from their homes. The relocatees, however, were not in favor of the site, as they could not find the livelihood opportunities here. KB Los Baños was also instrumental in coordinating with Gawad Kalinga, which has started to assess the housing assistance requirements of the new settlers.

For the group members, the ability to help was its own reward. “Every time our group is able to help someone, and that person says thank you or smiles at us, the feeling of fulfillment is priceless,” one member said.

Processes and Steps Taken

1. Training

KB Los Baños has a distinct advantage as far as DRR trainings are concerned because its members include staff and officials of the Red Cross and the Bureau of Fire Protection. For one, the trainings cost less because the training officials waived their honoraria. The DRR training conducted together with the Red Cross involved around 55 attendees, most of whom were barangay officials and tanods. Four of the participants were from Bambang.

The training graduates can easily help transfer their learning to others. At the same time, KB Los Baños noted a desire from the graduates for advanced courses in DRR and the preparation of Disaster Management plans.

A specialized training module on proper rubber boat handling and maintenance that was sponsored by the Red Cross was also conducted to avoid the problem experienced during Typhoon Ketsana. Arrangements were made with Trace

Computer College so that KB Los Baños could borrow and use the rubber boat when this type of rescue operation is required in the future.

Their group also worked closely with Oxfam's Post Ketsana Recovery Project team, availing of DRR training programs.

2. Early Warning Systems and Hazard Mapping

Nowadays tri-media weather report warnings are cascaded from the Provincial Disaster Risk Reduction and Management Council (PDRRMC) to the Municipal Disaster Risk Reduction and Management Council (MDRRMC). The information flow continues to the Barangay Captain who, in turn, mobilizes the barangay councilors and Barangay Safety Officers (BSOs) for disaster preparedness action. Megaphones are used to warn people, especially those staying near the creek.

Local folk provided indigenous/traditional inputs during the DRR discussions. Elders have observed that if the winds are observed to come from the side of Laguna Lake, the typhoon will be intense. But if the winds come from the mountainside, the typhoon will not be as dangerous. Residents near the creek-side have also more or less established certain creek water-flow speeds as useful early warning indicators. They also noted that if the water level reaches the floor of the bridge spanning the creek, certain areas in the barangay have to evacuate.

In the training sessions, the local residents expressed appreciation for their involvement in the revision of the old hazard maps. They contributed vital information such as new risk areas that were not reflected in the old map. This activity was coordinated by the barangay LGUs and supervised by experts from the Department of Environment and Natural Resources (DENR). The map identified and located the various types of risks such as landslides, mud flows, creek-side flooding starting from the mountain side down to the exit point near the lake. They also marked early warning systems to monitor rising water levels.

3. Organization and Communication

Closer links were established between the MDCC, the police, fire department, KB Los Baños and all the barangays. In all planning activities, KB Los Baños gained recognition as an effective DRR institution. Before Typhoon Ketsana, it was simply an informal organization; but now, the group is recognized and frequently invited as an expert as far as DRR is concerned. One KB Los Baños member said, "Iba na ang tingin sa amin ngayon" (They regard us differently now).

The Municipal Fire Marshall, Major Renato Samson, said, "KB Los Baños is a valuable force in our municipality. The Bureau of Fire Protection has worked hand

in hand with this group countless times. The members are always prepared and they make it a point to hone their skills further.”

The LGU Action Center always involves KB Los Baños in its operations, especially during typhoons, fires and accidents. The LGU now has six employees assigned to the Action Center round-the-clock. Operations now include regular pre- and post-disaster meetings to discuss lessons learned and adjustments to be made for better efficiency.

4. Resource Mobilization

KB Los Baños was one of the few institutions that had DRR-related resources during Typhoon Ketsana, specifically, rope and other rescue equipment. But it did not have enough, and lacked as well other vital equipment even as situations were surfacing one after another during the crisis that posed various demands on the rescue effort. The action centers did not have the necessary equipment either. KB Los Baños procured first aid kits and sought the help of the Municipal Health Officer for more supplies.

After the typhoon, KB Los Baños began manufacturing its own makeshift spine boards from plyboard. In the past, these spine boards had to be imported. The locally fabricated boards and splints were submitted to the Red Cross for certification and subsequently approved for use. The adaptation brought equipment costs down.

The LGU granted KB Los Baños increased access to operations by allowing its use of ambulances and fire trucks for DRR activities. The Philippine National Police also turned over to the group a rubber boat for its own use in the area.

Results and Outcomes

- 1. Identification of actual needs.** To some residents, being consulted about what their actual needs are, boosted their self-esteem and resulted in better DRR cooperation. This was evident during the hazard-mapping exercises that gave the community opportunities to contribute to the completion of the maps. Now that there is ownership of this articulation of needs, there is also a commitment to work harder to address them.
- 2. Desire for better organization.** The continued implementation of the agreement between KB Los Baños and the LGUs, and the addition of DRR-trained staff enhanced the capabilities of the lower levels of the organizational structure considerably. Each barangay now has DRR-trained staff that can plan and execute disaster management

procedures. These staff can also more easily share their learnings with their colleagues.

3. **Training costs and benefits.** The KB Los Baños-assisted trainings came out cheaper in the long run because the resource persons were KB Los Baños members themselves. This arrangement can be replicated in other areas needing DRR interventions. In addition, the graduates themselves are requesting more advanced courses -- evidence of their appreciation of the benefits of their earlier courses and their preparedness not only to increase their DRR-related knowledge and skills but also to pass these on to others.
4. **KBC involvement.** From its previous focus on fire and accident emergencies, KB Los Baños now found itself more involved in the expanded DRR movement. “The Kabalikat Los Baños is always there when you need them, especially during accidents, traffic problems and natural disasters. Our Sanggunian Bayan has counted on them many times and this is a group that never expects something in return,” said Los Baños Vice Mayor Baby Sumangil. Its reputation as an effective radio communications group helped to establish KB Los Baños as a major DRR institution. Realizing now that KB Los Baños is a reliable partner before, during and after typhoon disasters, the community will no doubt lend support to the group’s programs.

Lessons and Challenges

1. DRR interventions should not be limited to the vulnerable sectors of the community. The unaffected sectors should also be involved in awareness-raising efforts on the need to mainstream community preparedness for disasters. In addition, they should be tapped for whatever resources they already have so that the resource base is expanded.
2. The collaboration between the LGU, private networks and experts groups (such as the DENR hazard identification teams) is crucial in all DRR efforts. There is much room for improving coordination and partnerships among these groups. The KB Los Baños could serve as a bridge that will foster synergy among the stakeholders. The members’ radio-communication links can be expanded and put to good use during disasters.

3. The adoption and validation of some indigenous early warning techniques will help meet DRR objectives. This will also encourage higher levels of participation from the locals and allow them to determine if their knowledge complements scientific methods of weather forecasting.
4. Using the incident of a single rubber-boat operator as a case in point, there is a need to develop back-up staff that can relieve exhausted team members so that rescue or emergency efforts are not stalled or delayed. Such a contingency plan should form part of the DRR training design for adequate and sustainable staff deployment.
5. To lessen costs, it will be prudent to tap DRR experts that offer their training services for free. The idea of local manufacturing of rescue equipment, as long as the output is certified by appropriate institutions, enhances sustainability and replication.

Growth and Expansion Plans

1. KB Los Baños intends to work with the Philippine Atmospheric, Geophysical and Astronomical Services (PAGASA) that is dedicated to provide flood and typhoon warnings for the protection of life and property. It is believed PAGASA has a rain gauge instrument operating near Bambang. KB Los Baños wants to ascertain if there are advantages to collecting data from this remote sensor instrument as a quicker way of determining rainfall levels and possible weather scenarios.
2. Advance courses will be included in future training designs. Experts from various government and private institutions as well as graduates of previous training will be asked to help in the design so that both trainer and trainees will benefit from the inputs.
3. KB Los Baños intends to undertake more simulation drills that will involve all sectors as this is the only way existing early warning procedures, action plans, evacuation routes, pick-up points and other DRR elements can be tested.
4. KB Los Baños will involve all concerned in the possible dredging of the already shallow creek that overflows to the school grounds. At the moment, small boys are tapped to shovel the sand and gravel from the bottom of the creek. The aggregates are placed in bags and sold

to the community for their construction requirements. However, there is a plan to study how a large-scale sand and gravel operation can be done through the involvement of local construction firms that need the aggregates. The plan is viable as long as the LGUs can identify upcoming construction projects near the area and there is coordination with the contractors concerned.



**The elements of relief
and rehabilitation
for community-
based disaster risk
management**

San Mateo, Rizal

The Environmental Constraints Map of San Mateo, Rizal shows Libis in Doña Pepeng Subdivision as one of the 13 areas prone to flooding. Libis is more or less a seven-hectare patch of land located at the embankment of a major waterway, the San Mateo- Marikina River and its tributary, the Nangka River. This elongated, albeit, soft, strip of land is now an informal community of 2,100 dwellers or 350 households. The southwestern tip of Libis community abuts onto the juncture where the Nangka River feeds into the San Mateo-Marikina River on an almost 45 degree angle. During heavy and continuous rains, as in the case of Typhoon Ondoy (international name: Ketsana) that struck in September 2009, the waters of Nangka River slam against the turbulent flow of the San Mateo-Marikina River, pushing the water back upstream. Floodwaters then begin to inundate houses and arable land, and, in the last few years, to erode the river banks and undermine the foundation of houses, causing these to slide into the river.

For the past thirteen years, Buklod Tao's Community-Based Disaster Risk Reduction and Management (CBDRM) program had been undertaking grassroots, citizenry-based, community-managed disaster preparedness. To date, no casualty has been reported due to flooding or soil erosion. Therefore, relief and rehabilitation efforts were in place during and after Ondoy and the local government unit (LGU) had fewer concerns about its impact of the disaster in this part of the municipality.

Volunteerism is the key factor in these home-grown initiatives, coupled with dynamic partnerships and alliances with civil society groups.

Project Description

Thirteen years before typhoon Ondoy struck Luzon, particularly the National Capital Region, Region IV and parts of Region III, a community-managed disaster preparedness initiated by Buklod Tao was already in place in Libis. Buklod Tao is a peoples' organization that initiated the disaster mitigation and preparedness program in San Mateo, Rizal. The program involved localized advocacy, orientation, organizing and equipping. This can be chronicled as follows:

- 22 June 1997 - one-day seminar/workshop on disaster management in the community chapel
- 24 June 1997 - purchase of rope, megaphones, flashlights, and first aid kits
- 27 June 1997 - completion by the fiber glass fabrication team of the first fiber glass rescue boat
- 30 June 1997 - completion and delivery of the second fiberglass rescue boat

- 2 July 1997 - completion and delivery of the third fiber glass rescue boat
- 5 July 1997 - meeting of the rescue teams and formulation of the program's counter-disaster plan
- 12 July 1997 - rescue drill at the river and distribution of equipment to the three teams

Over the years, environmental damage aggravated the community's vulnerability to disaster, which was compounded by the effects of global warming and climate change. The community is found in Ampid at the foot of Montalban's hills and mountains. It is surrounded by creeks and rivulets, most of which have been clogged by the indiscriminate development of private housing subdivisions. Thus, in times of torrential rains, the community is at high risk of flooding.

Early work in disaster preparedness had enabled the community to identify appropriate evacuation centers, and evolve a system for relief delivery operations. Once the relief goods were inventoried and repacked by the mothers and the youth, relief distribution operations (RDO) included:

- naming/enlisting the recipients;
- numbering the RDO stubs and distribution of these stubs to the named recipients; and
- actual distribution of the relief items.

A community kitchen had also been established in the past.

Thus, it was with a relative sense of empowerment that the community proceeded to rise from disaster when Typhoon Ondoy struck. With the benefit of preparation and previous experience, the response to the community's call for help was quick. Relief distribution, shelter assistance, and restoration and clean up work proceeded promptly.

Project History

All organizations undergo their acid test. Buklod Tao's came with the monsoon rains that accompanied Typhoon Ibiang on 18 August 1997 – barely two months after the formation of the program's rescue services. The three newly formed all-male rescue teams and the all-female health and relief teams implemented a disaster preparedness plan hatched in time for the flooding season. The plan evolved from a one-day seminar-workshop on hazard mapping conducted in June 1997 at the community chapel.

The workshop concretized the concepts of hazard, vulnerability and risk assessment as these principles applied to the community. The afternoon session focused on the formation of three rescue teams: one each for South Libis, North Libis, and the sentro of South and North Libis. The new plan charged each team with the following tasks:

- setting up an early warning system utilizing megaphones;
- rescuing flood victims using boats, ropes, and flashlights;
- providing evacuation assistance to two identified centers; and
- formulating a simplified counter-disaster plan.

Hence, for the past 13 years, from June 1997 to June 2010, the Buklod Tao CBDRM program and plan remain operational. Only last week (June 2010), the fiberglass fabrication business group delivered the group's latest fabricated rescue boat.

Project Results

The post-Ondoy clean-up and restoration efforts, called “Bawas Peligro, Iwas Sakuna, Ngayon Na!”, hastened the relief and rehabilitation initiatives for affected families. Buklod Tao CBDRM sought to minimize the lingering risks after the big flood subsided by undertaking completed the following:

- restoration of 56 silt-covered canals;
- excavation and declogging of three subdivision drainages;
- dredging and clean-up of Nangka Creek;
- redirection of Nangka River's current flow to the middle portion, away from the high-risk families at the river banks;
- clean-up of Marikina River; and
- removal of the garbage dumped by Metro Manila that had settled on the embankment of Nangka River.

Moreover, the gazebo of Buklod Tao that was completely damaged by Ondoy was reconstructed. And to prevent further erosion at the river banks, the program embarked on ground leveling, back filling, cement grouting of a 1.5-meter footing, laying out of gabion boxes against the eroding wall, and filling up some 12 gabion boxes with rock boulders.

The entire process mobilized 15 teams (called pangkat), eight pangkat leaders and four area coordinators and involved them in decision making. In addition, 165 jobless members of the community were given cash-for-work opportunities.

The Program of Works for each of the 15 teams was monitored weekly by the area coordinators in consultation with the leaders. The groups that finished earlier shared a week or two of their time with those groups with longer work schedules. Students from De La Salle University pitched in with the provision of tarpaulin signages that were posted in critical areas.

Key Implementation Steps

a. Feedbacking

- When Ondoy's impact started to subside 12 hours after the height of the typhoon winds and rain, and once electric supply was restored, Buklod Tao, initiated to sound off local situationers via email messages to its DRR/M partners in civil society.
- As a result, within 32 hours of Ondoy's onslaught, partners from the academe, business and civil society, in quick response to the community leader's online appeal for help, trooped to the community to determine the extent of damage. Basic data was gathered by the partners -- casualties suffered, houses damaged, size of affected population and relief items needed. During the site visit, the location of relief operations was also identified.
- Rapid Assessment Teams from partner NGOs and the academe were likewise deployed to undertake Damage Needs and Capacity Assessment (DNCA) in Banaba.
- Buklod Tao, mobilizing its area coordinators in Baybay Ilog, North Libis, Baybay Sapa, Banaba Extension and Belong Compound also conducted DNCA using the format and questionnaire of Christian Aid.

b. Mobilization of Resources and People

- Two days after, donations of relief goods started to arrive. Buklod Tao proceeded to document the specific items received, volume and identity of donors.
- RDO mechanisms were set up, as follows:
 - » Repacking of relief items, head count of repacked bags
 - » Identification of recipients, enlisting, issuance of instructions on actual distribution
 - » Printing of stubs, filling of stubs with recipients' names, house-to-house distribution of stubs
 - » Queuing of recipients at the RDO center
 - » Encoding of names of recipients and subsequent report to donors and partners via the Internet

c. Shelter Assistance

- The RDO was followed by housing assistance. This entailed a validation survey of families whose houses were washed out, the determination of the extent of damage (total or partial), and the identification of materials needed for reconstruction.
- A call for bids for local construction materials was issued. The winning bidder was given the volume of various materials to be purchased. Recipients were categorization according to the kind of housing materials needed.
- The housing materials were distributed.

d. Community Rehabilitation and Repair

- A Post-Ondoy rehabilitation scheme of cash for work enrolled 165 Buklod Tao members.
- Fifteen groups were assembled to undertake rehabilitation and repair work -- creek and river clean-up, restoration of canals, dredging of subdivision drainage, retrieval of garbage dumped at the Nangka River embankment. A Program of Work for all the teams was completed, including revisions and adjustments.
- As sustainability and maintenance measures, the barangays and homeowners' associations of nearby subdivisions were sent letters, the signages contributed by DLSU students were distributed, and a re-clean-up was conducted with the participation of community members.

e. Livelihood Rehabilitation and Assistance

- Assistance to livelihood was formalized through the Social Enterprise Capital Augmentation Program (SECAP) which provided for:
 - » Skills training in business planning
 - » Rapid Livelihood Assessment for 1,523 household beneficiaries
 - » Categorization of beneficiaries into individual and group business
 - » Orientation for beneficiaries
- For individual businesses, the steps included:
 - » Review and revisions of individual business plan
 - » Availment of capital augmentation for individual business recipients
 - » Finalization of assistance including signing of promissory note that details repayment and subsequent deepening of responsibilities to SECAP, the community and the environment; a repayment schedule that includes the return of the principal amount, and mandatory personal savings

- For group businesses, viable ventures were identified:
 - » tetra pots production
 - » urban container gardening
 - » organic compost production
 - » fiberglass fabrication
 - » green charcoal trading

f. Partners

- The Barangay Development Council and the Local Disaster Risk Reduction and Management Office are crucial to the institutionalization of the DRR initiative.
- The National Service Training Program-Civic Welfare Training Service and Theology and Religious Education 2 of De La Salle University-Manila provide continuing support in the form of the students’ community service.
- The UP Center for Social Work and Community Development cultivates the interest of its students in CBDRM through integration initiatives and by suggesting thesis research on the subject.
- The ten-year collaboration between Buklod Tao and the Center for Disaster Preparedness has cemented the institutionalization of CBDRM in the latter’s training modules.
- Since Ondoy, Christian Aid has provided funding, training, technical and organizational support so that Buklod Tao can continue to build disaster resilient communities.
- The urban poor community members of Buklod Tao, in the true spirit of volunteerism, have kept the flame alive to achieve a “culture of safety.”
- The DRR Net-Philippines is engaged in a continuous campaign for government to implement all provisions of Republic Act 10210, specifically the provisions directly favorable to Buklod Tao’s CBDRM program.

g. Budget

| | | |
|--|-------------|-----------|
| Cash for Work/Food for Work to construct the 750 meter-gabion wall | P12 million | July 2010 |
| Medium-rise structure for the evacuation center at headquarters | P12 million | July 2010 |

| | |
|---------------------------|------------|
| SECAP Individual Business | P1 million |
| SECAP Group Business | P5 million |
| Capability Building | P2 million |

h. Other Resources

- Training equipment - LCD projector, sound system, video camera and fax machine
- Facilities - training hall, conference room, 470 square meters of land, evacuation center, composting area, storage
- Equipment - early warning devices (megaphones, early warning posts), two- way radios with spare batteries, radio antenna, single-band radio transceiver, head lamps, telephone, fiber glass rescue boats

Lessons Learned

- The implementation of CBDRM without a national framework already mainstreamed in all levels of government is a huge task for grassroots organizations like Buklod Tao.
- Survivors of disasters are impatient; they have no respect to rules or mechanisms of government. They want relief right away, and for a prolonged period of time.
- Prolonged dole-outs of relief only encourage parasitism, dependency and laziness.
- When a civil society organization (CSO) is dynamic in attaining a culture of safety for a community, the local LGU tends to be complacent because there is somebody doing its job. The CSO, on the other hand, is taken for granted and may even become a victim of gossip and idle talk.
- The people's organization involved should not be discouraged when no support comes from the LGU. Many CSOs are prepared to extend support.
- Developmental projects, not dole-outs, will ensure community support. The community has enormous capacity waiting to be tapped. However, only the CSOs that immerse with the people and

recognize their value will earn the community's support.

- Buklod Tao's CBDRM is directly related to poverty alleviation. The premise of Buklod Tao is that high-risk families ought to be given sustainable livelihoods so that they can accumulate sufficient savings for the eventual transfer to safer places.
- Buklod Tao's adoption of CBDRM thirteen years ago, and the activities and experiences conducted are building blocks for mainstreaming CBDRM at the national level for the advocacy for the DRR legislative agenda in government.
- The passage of a national DRRM bill into law will underscore the importance of community participation to building a culture of safety in the Philippines. The replication of grassroots disaster risk reduction and climate risk management by all LGUs is mandated by Republic Act 10201.

8. Sustainability

- Cultural: SECAP attunes itself to what is already in the community and to what has been achieved so far by each beneficiary, and starts from there -- to augment, restore and sustain.
- Social /economic: Cash-for-work programs and SECAP should make space for both women and men, as well as persons with disabilities.
- Environmental: Discarded tetra juice packs now fetch a value of 25 cents each for Buklod Tao. To date, Buklod Tao has bought some P12,000.00 worth of the juice packaging.
- Financial: SECAP poses a challenge to usurers, lending institutions and even conventional micro-financing setups. SECAP is capital augmentation at the easiest terms possible for Ondoy survivors.

Acknowledgement

Good Practices

The School as Mechanism for Awareness Raising on Disaster Risk Reduction, Bulacan

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The Critical Role of Climate Information: From Disaster Risk Reduction to Agricultural Development

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The Demarcation of Sanctuary Areas as Strategy in Climate Change Adaptation

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Good Initiatives

Securing Local Government Commitment in the Development Process
San Miguel Island, Tabaco City, Albay

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Integrated Farming for Food Security and Reduced Disaster Risk Vulnerability
May Bigas Na, May Ulam Pa Rice-Duck Farming
Zamboanga del Sur

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The Search for New Farming Technologies Suitable to Flood-Prone Communities
Diversified Farming Systems Combining Rice with Other High-Value Crops
Barangay Saliniding, Siay, Zamboanga Sibugay

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Local Action for Global Concerns: Appropriate Solid Waste Management
Technologies to Reduce Greenhouse Gas Emissions
Waste Management and Recycling Center
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Indigenous Peoples' Practices

The Codification and Integration of Indigenous Practices into Disaster Risk
Reduction and Climate Change Adaptation Plans

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Typhoon Ketsana Experience

A Radio Communications Group Leads in Inspiring and Sustaining Community
Volunteerism for Multi-sectoral Partnerships in Disaster Risk Reduction

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The Elements of Relief and Rehabilitation for Community-Based Disaster Risk Management

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