Philippine Atmospheric, Geophysical & Astronomical Services Administration
(P A G A S A)

# *Standing up to challenges and risks from climate change through S & T*

*"tracking the sky...
helping the country"*

# 2013 ANNUAL REPORT

## Mandate

"To provide protection against natural calamities and utilize scientific knowledge as an effective instrument to insure the safety, well-being and economic security of all the people, and for the promotion of national progress."

## Vision

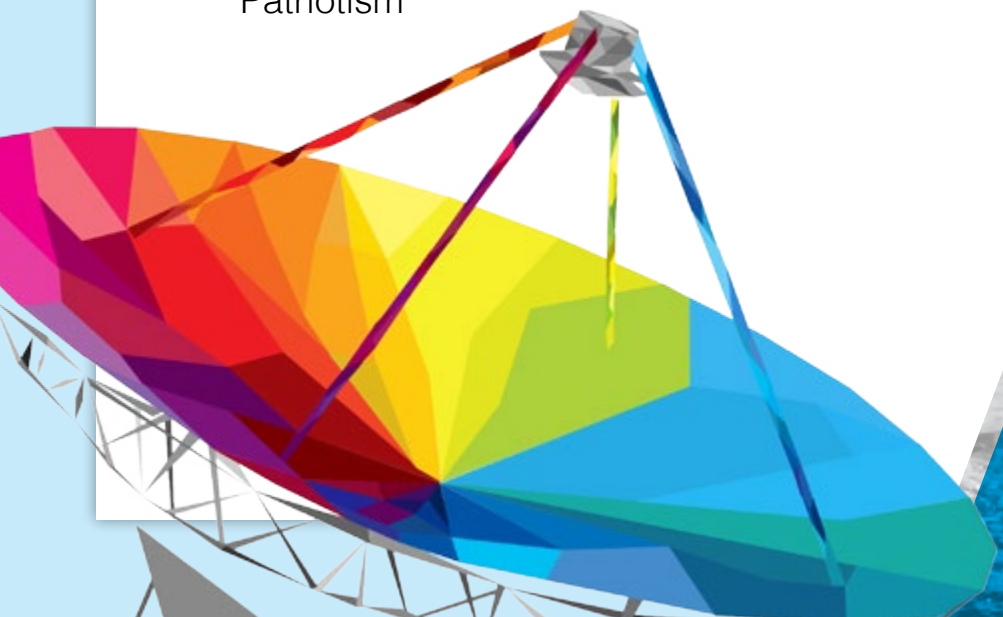
Center of excellence for weather related information and services

## Mission

Protecting lives, livelihoods and properties through timely, accurate and reliable weather-related information and services

## Core Values

Integrity
Commitments
Patriotism



# Contents

**Mario G. Montejo**
DOST Secretary

I congratulate the hardworking men and women of the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) for another year of service to the Filipino people. This quiet diligence is a reaffirmation of an intrepid brand of public service in the face of a natural force that is fickle and extreme.

Super typhoon Yolanda sent a strong signal that the hydrometeorological hazards in the country are getting increasingly ferocious and unstoppable.

But PAGASA remains undaunted as it grapples with this reality. While it is given that its best and collective efforts will always be tested by these phenomena, it has to remain armed with the best of weather-monitoring technologies to be able to see the challenges through.

With more Doppler Radars and Automatic Weather Stations (AWS) installed around the country, PAGASA's weather monitoring capability has been enhanced, and its forecasts and warnings have become more accurate and frequent.

This year, the people could expect more significant improvement as the DOST will acquire more state-of-the-art equipment for PAGASA, on top of its intensive human resource development.

The work for PAGASA modernization is now in full swing. I assure everyone of the
DOST's unending support for this. Thank you and mabuhay!

## Vicente B. Malano
## Acting Administrator



The year 2013 marked another fruitful year for PAGASA. The enhancement of weather forecasting capabilities achieved during the year has translated into a more accurate and timely provision of forecasts and warnings. Through the acquisition and installation of state-of –the-art equipment and facilities, the service capability of PAGASA as a warning agency stepped up to a higher level.

The operation of the Aparri Doppler Radar station beefed up the nine (9) existing radars ensuring a more comprehensive tracking and monitoring of tropical cyclones.

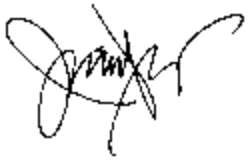
In addition, the installation of 158 Automated Weather Stations (AWSs) and 187 Automatic Rain Gauges (ARGs) was completed in strategic areas throughout the country to solidify the collection of vital weather data used in the formulation of forecasts.

The agency, in its effort to reduce the effects of hydro meteorological hazards, continued to strengthen its flood monitoring and forecasting system with the establishment of new centers in major river basins in Mindanao. These facilities are part of PAGASA's participation in the implementation of the highly successful National Operational Assessment of Hazard (NOAH) project.

Meanwhile, the agency's Research & Development programs provided support to Climate Change Adaptation (CCA) and Disaster Risk Reduction (DRR) measures with the publication of training manual and production of videos. Its disaster risk reduction awareness program significantly enhanced preparedness in time of impending calamities in communities at risk.

All these were accomplished through the effort of the men and women of PAGASA in the name of public service, proving once again their total dedication to the agency's noble mission.

For the coming year, I assured my countrymen that they can always depend on us for protection from the risks posed by hydrometeorological hazards.



# Profile of a Leader

## Dr. Vicente B. Malano

Dr. Vicente B. Malano was finally appointed as the Acting Administrator of PAGASA after serving as Officer-in-Charge for ten months. Dr. Malano was appointed by President Benigno Aquino III on December 16, 2013 and was formally sworn into office by DOST Secretary Mario G. Montejo on December 27, 2013 at the PAGASA Amihan Conference room.

Dr. Malano was designated PAGASA Officer-in-Charge in March 2013 following the retirement of Administrator Nathaniel Servando, his predessor. Dr. Malano, who was born in Alburquerque, Bohol became the sixth Visayan native to lead PAGASA since 1958. The late Director Roman L. Kintanar was from Argao, Cebu, while Dr. Leoncio A. Amadore who succeeded him in 1994 hails from Bassey, Samar. Former Directors Prisco D. Nilo and Engr. Martin F. Rellin Jr are from Leyte and Cebu, respectively, while Dr. Nathaniel T. Servando is from Iloilo.

He acquired his Ph. D. in Meteorology from the University of the Philippines (UP, Diliman) in 2003. He holds a Master's Degree in National Security Administration (MNSA) conferred by the National Defense College of the Philippines (NDCP) in 2010.

Dr. Malano is a graduate of two B.S Engineering Courses. He graduated with Bachelor of Science in Civil Engineering at the Central Colleges of the Philippines in 1987. Prior to this, he finished a degree in B.S Agricultural Engineering at the University of Southern Mindanao in 1980.

As all his predecessors, Dr. Malano rose from the ranks. He was hired as a Meteorologist in 1982 gradually rising to become the Acting Administrator for Operations and Services before his designation as PAGASA OIC. He also headed the Weather Division of PAGASA and published several research papers, most notable of which, is the Storm Surge Model for Leyte Gulf published in 1999.

For the next five years, he is determined to make PAGASA the best in Southeast Asia in terms of Early Warning System (EWS). In order to achieve this, he is focused in efforts to strengthen the data monitoring system, database management system, forecast and warning system and the equally important information dissemination system.

Known as unassuming and low-keyed person, he works silently to achieve immediate results even without expecting any praise or recognition in return. This positive effort makes him fit to lead PAGASA in serving its noble mission for the country.

He is married to Artemilita who is the Directress of her own school in Bulacan and they are blessed with three children.

# Strengthening and Sharpening Focus on Continuing Program

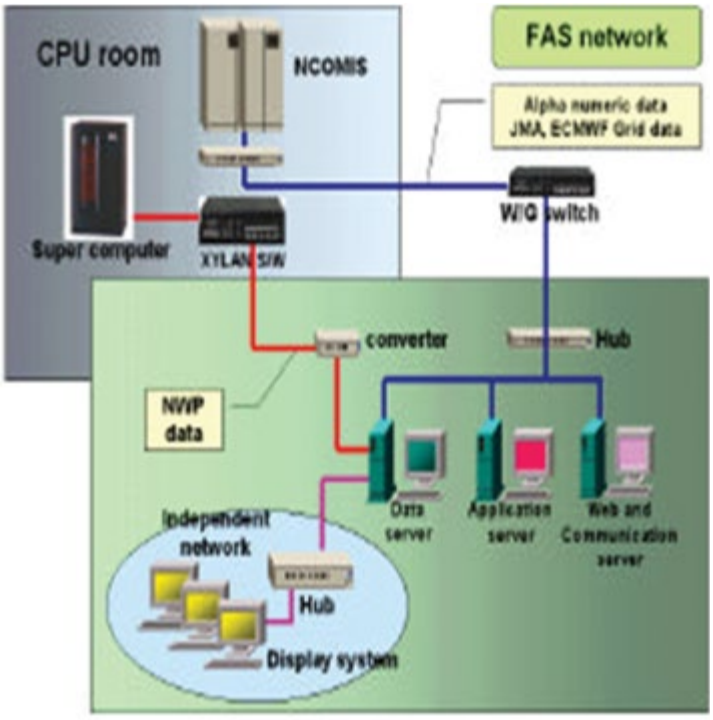
## Disaster Preparedness and Hazard Mitigation

### New Technologies to Enhance Weather Forecasting Capabilities and Services of PAGASA.

**COSMO Model**

The COSMO Model was an integral part of the acquisition of Forecasters' Workstation which was installed on March 2013. The nonhydrostatic fully compressible COSMO-Model has been developed to meet high-resolution regional forecast requirements of weather services and to provide a flexible tool for various scientific applications on a broad range of spatial scales. Many NWP-models operate on hydrostatic scales of motion with grid spacing down to about 10 km and thus lack the spatial resolution required to explicitly capture small-scale severe weather events.

The COSMO-Model has been designed for meso-β and meso-γ scales where non hydrostatic effects begin to play an essential role in the evolution of atmospheric flows. By employing 1 to 3 km grid spacing for operational forecasts over a large domain, it is expected that deep moist convection and the associated feedback mechanisms to the larger scales of motion can be explicitly resolved. Meso-γ scale NWP-models thus have the principle potential to overcome the shortcomings resulting from the application of parameterized convection in current coarse-grid hydrostatic models. In addition, the impact of topography on the organization of penetrative convection by, channeling effects is represented much more realistically in high resolution non hydrostatic forecast models. Record of discussion was conducted in August 2013 and signed by both parties in December of the same year.



**Forecasters' Workstation**

This workstation which was installed at different PAGASA Regional Services Divisions and other PAGASA Users is a visualization and processing system that integrates all the data and generates products. All database contents can be instantly accessed and brought to the screen. In summary the main functions are:

- overlaying of any kind of meteorological data and features
- display of all NWP products, unlimited number of models and parameters
- Mathematical Kernel for extensive model computation and evaluation
- combining different models in overlays or even computations between models
- display, generating and printing of surface charts, upper-air charts, weather charts, model outputs, remote-sensing imagery
- extensible satellite and radar support (including nowcasting) with composing, coloring, reprojecting and multi-channel combining of images
- producing own weather charts with interactive user-friendly editor
- preparing forecasts and forecast charts
- horizontal and vertical cross sections
- various thermo diagrams and hologram from observations and models
- nowcasting data integration
- NWP field modification
- report correction
- objective analysis with model-initialization and numerical quality-control
- Presentation Templates allowing on-map visualization of custom bulletins
- unification of BUFR/CREX and alphanumeric reports
- extended customizable shape file orography with unlimited precision and content
- direct access to received reports and messages
- extensive chart and table output including weather monitoring for both observations and models

**Mobile Weather Satellite Receiving System**

In line with the automation forecasting program of PAGASA, a Fixed Geostationary Satellite Receiving System was acquired during the year, and was installed in Tuguegarao on June 8, 2013 and El Salvador in Mindanao on June 18, 2013. One Geostationary Satellite Receiving System is to be used by the STRIDE Team or Storm Chaser as a new and cost effective satellite ground station that is portable and easy to transport. Internet data is not dependable during times of crisis when PAGASA needs it most. Likewise the Storm Chasers could see the weather system wherever they are. This direct reception ground station can provide continuous data coverage in the absence of internet connectivity and grid power. The system was acquired in June 2013.

**New capabilities for cloud and surface mapping**

PAGASA upgraded the X Band Satellite Ground Station to receive Suomi NPP Satellite apart from the Terra and Aqua Satellites. The upgraded and new system was installed in April 2013. In 2012, the direct broadcast transmission of SNPP Satellite was turned on. The Visible Imaging Infrared Radiometer Suite (VIIRS) on board this satellite was developed to extend the measurement series of the MODIS sensor currently flying aboard Terra and Aqua satellites. The VIIRS sensor is part of the National Polar-orbiting Operational Environmental Satellite System (NPOESS) Preparatory Project (NPP) - a joint NASA/IPO instrument risk reduction project. The success of MODIS, and of the Terra and Aqua platforms in providing earth observations, has set the bar for the next generation of instruments and spacecraft for the continuity of Earth observation. This new satellite launched will likewise takeover from the NOAA Series Satellites. Terra Scan visualization workstations were also installed to different users in PAGASA including the five PRSDs.

# MFO1: Weather, Climate and Flood Forecasting/Warning and Other Related Services

## Weather, Climate and Flood Forecasting

### Weather Forecasting and Typhoon Warning Services

This program is centered in the operation of the weather forecasting and warning system of the country. As part of the program the Agency issued public weather forecasts, including a five-day weather outlook, shipping and aviation forecasts. This also includes information on the probable daily weather condition especially during the occurrence of severe weather disturbances, such as tropical cyclones that entered the Philippine Area of Responsibility (PAR). During the year under review, twenty five (25) tropical cyclones entered the Philippine Area of Responsibility (PAR) namely: Tropical Depressions Bising (Jan 11-13) and Crising (Feb. 18-21) and Tropical Storms Auring (Jan. 03-04), Dante (June 07-10), Emong (June 16-19), Fabian (June 20-20 ), Gorio (June 27-30), Huaning (July 10-13), Isang (July 15-17), Kiko (Ayg 05-06), Labuyo (Aug 08-12), Maring (Aug 16-21), Nando (Aug 25-29), Ramil (Oct 06-07), Santi (Oct 08-12), Urduja, (Oct 21-23), Vinta (Oct 28-Nov 01), Yolanda (Nov 06-09), Wilma (Nov 03-04), Zoraida (Nov 10-12). Figure 1. Shows the tropical cyclones that entered the PAR. The information issued serves as inputs to day-to-day activities and extended periods for developmental and planning activities, more importantly, for disaster preparedness and response to disaster-causing severe weather phenomena. Beneficiaries of these services include various sectors such as the air, sea and land transportation, education, agriculture, tourism, trade & commerce and other industries. PAGASA has also provided specially packaged weather information for Mt. Mayon, Mt. Bulusan and other selected areas.

The program also entails observation, collection and compilation of weather data and information acquired from local and global networks. These data are then plotted and analyzed on weather maps for the formulation and issuance of weather forecasts, advisories and warnings, when warranted. The transmission of data and information utilizes a nationwide telecommunication network and communication link with global meteorological telecommunication institutions.

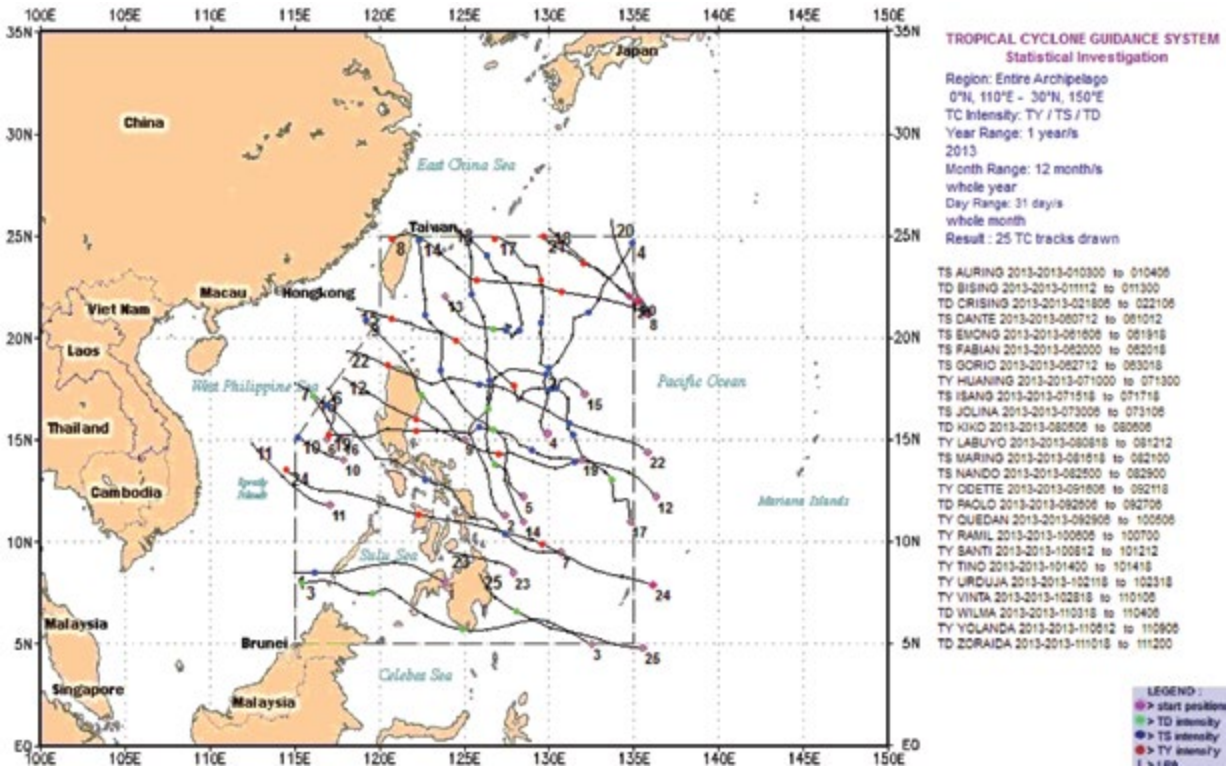



*Figure 1 shows the tropical cyclones that entered the PAR.*

*Handover of the JICA Doppler radar project*

One of the major accomplishments of PAGASA for the year is the completion of the Japan International Cooperation Agency (JICA) funded Doppler radar project. The project was completed with the installation of the Doppler radar at Guiuan radar station which was hit by typhoon "Yolanda" in November 2013. The rehabilitation will be done by JICA. Also completed was the project "Establishment of Early Warning and Response System for Disaster Mitigation in Metro Manila" (Pasig-Marikina-Laguna Lake river basin) under the Korean International Cooperation Agency (KOICA).

## Flood Forecasting and Hydro meteorological Services

On-going implementation of the projects for the improvement of flood forecasting and warning system of the agency include the Improvement of Flood Forecasting and Warning System for Magat Dam and Downstream Communities (Norwegian Agency for Development Cooperation- Norad) 2010-2014, and Strengthening Flood Forecasting and Warning system for Bicol River Basin. Likewise, there is an on-going installation of water level gauges, water level sensor and automatic rain gauge in 13 major river basins nationwide. The innovation is in collaboration with DOST-ASTI.

Information served for flood disaster preparedness, prevention and mitigation consisted of 99 flood bulletins Pampanga, Agno, Bicol and Cagayan (PABC) River Basins and 2598 general flood advisories. PAGASA has vigorously issued a total of 1351 hydrological forecasts for the PABC River Basins through its telemetry and multiplex telecommunications network. The flood bulletins and general advisories for flood were intended to be utilized for effective disaster risk management in the areas of concern. Enhancement of this flood related warning information through provision of inundation maps is also being undertaken to unable disaster managers to effectively plan their preparedness and mitigation.

Flood and storm surge hazard mapping and vulnerability analysis is another important activity being undertaken by the Agency aimed at enhancing the effectiveness of efforts to reduce the loss of life and damages caused by natural hazards.

**World Food Programme (WFP): Disaster Preparedness and Response (DPR) Program**

As one of the agencies under the United Nations, WFP serves as its food aid arm and promotes food security and the eventual eradication of hunger and poverty. Making food not only accessible to those who needed them most but also ensuring the continuity of food supply, which is often marred by the occurrence of natural disasters. Recognizing that disasters could result to economic damage, with long-term impacts on livelihood, the WFP is providing full support in disaster prevention, preparedness and mitigation as well as other post-disaster activities to ensure the return to normalcy in the lives of the people who are greatly affected. Programmes promoting self-reliance are being undertaken as this will lessen the community's dependency to the national government during emergency crisis.

Due to the high vulnerability of the Philippines to natural hazards, one of the programme initiated by WFP in the Philippines was the **Disaster Preparedness and Response (DPR)** Project, which aims to strengthen the capacity of the communities by implementing activities that are geared towards achieving this goal. DPR is carried out through three main activities in four highly disaster-prone provinces in Luzon (Laguna, Sorsogon, Benguet and Cagayan): 1) implementing high-impact WFP-supported community projects to mitigate specific hazards; 2) capacity building through training and provision of equipment; and 3) strengthening the government's logistics capacity. These activities are implemented with financial support from USAID/OFDA, AusAID and in close partnership with the Department of Social Welfare and Development (DSWD), the Department of the Interior and Local Government (DILG) and the Office of Civil Defense (OCD).

In the Province of Laguna, the DPR project is expected to complement the initiatives at the local level. Recognizing the need to adapt a flood mitigation measure which will cater to the unique needs of each municipality, the WFP Project has conducted consultation meetings with the LGU of the project sites (4 municipalities) to assess their needs in order to better address the flooding problems in their areas. Each municipality has formulated its own project proposal based on their needs, thus ensuring long-term sustainability and instilling a sense of ownership from the LGUs concerned.

Installation of weather monitoring facilities was one of the project components of DPR. Entitled **"Adapting a Communication Protocol to Monitor Rainfall Using Automatic Weather Stations (AWS) in Four Towns in Laguna Province namely Famy, Mabitac, Pila and Rizal"**, WFP established partnership with UPLB for the installation of AWS in the aforementioned municipalities. Research Team from UPLB also

developed and made enhancement on some of the important features of the AWS such as database management, wireless communications, internet connectivity as well as a program for triggering the siren and warning light module of the AWS.


In recognition of PAGASA's role as the country's national met-hydro service provider, the WFP has initiated the involvement of PAGASA in activities related to mitigating the impacts of flooding thru early warning system. WFP stressed the importance of working with PAGASA to ensure that the UPLB's activities, including the installation and data format generated by the AWS should be following the standards set by PAGASA. Though there was no provision for the installation of water level gauges to determine the response of the waterways to particular rainfall intensity, this will form part of the continuing activity for the project.

Other activities that were undertaken by the municipalities concerned was the conduct of IEC and Flood Drills which served as avenue for the WFP as well as the LGUs to test the operation of the installed AWS and assess how it could be integrated into their existing disaster mitigation activities. Although the UPLB followed PAGASA's rainfall

warning system, it was pointed out that the assessment levels are site specific and will not be uniform for the whole Philippines.

The WFP initiatives on FEWS are expected to complement GMMA Ready project which is set to be implemented in the Province of Laguna.

**JICA Data Collection Survey on Situation of Nationwide Flood Forecasting and Warning System**

The Japan International Cooperation Agency (JICA) has been a staunch supporter of PAGASA in its endeavor to improve one of the Agency's operational activities: that of flood forecasting and warning service.

As the Philippines experienced an escalation of flood disasters in the last five (5) years, the establishment of a flood forecasting and warning system (FFWS) for other major river basins has even become more essential as it has been proven to be one of the most effective non-structural measures to mitigate the impacts of flooding. PAGASA has aimed to put up a functional hydrological monitoring equipment to make it possible for FFWS to be carried out in other major river basins in the Philippines.

JICA and PAGASA agreed on the scope of a joint undertaking on the needs assessment relative to the rapid expansion of FFWS thru the collection of relevant information. Foremost of these are the issues on equipment, organizational/institutional arrangements, capacity development of the PAGASA technical personnel to operate, manage and handle the challenges of the imminent latitude of development of the PAGASA FFW services. The study also aimed to clarify the current conditions and prospects for future development of FFWS in the other 13 major river basins.

Aside from the usual meeting and field surveys, a seminar was conducted at the Holiday Plaza Hotel in Tuguegarao City and attended by a total of 65 participants representing different LGUs from the Cagayan Province and regional government agencies. The one-day seminar was aimed at identifying crucial issues on present status of FFWS in the Cagayan River Basin (and other river basins), its appropriate direction for improvement and enhancement from the point of view of PAGASA-HMD, DOST, DPWH, NIA-MARIIS and LGUs. Participatory methodology was applied, wherein participants were divided into three (3) groups and each group carried-out some brainstorming through SWOT (Strength, Weakness, Opportunities and Threats) analysis method. Outputs of each group were utilized to formulate the development strategies and the direction of FFWS expansion in other major river basins in the Philippines.

**Developing a Flood Early Warning System for Communities Along the Tullahan River**

The PARTNERS for RESILIENCE (PfR) is a joint undertaking of the different humanitarian, development and environmental organizations, with the primary goal of reducing the impacts of natural hazards to vulnerable communities. It is being implemented in nine countries, including the Philippines, where the projects sites are the Cordillera Administrative Region (CAR), Metro Manila and CARAGA. Considering the scale and magnitude of flooding disaster in the cities of Malabon and Valenzuela, these two (2) cities were chosen as projects sites of PfR. Main implementing agency of PfR is ACCORD, Inc. (Assistance and Cooperation for Community Resilience and Development, Inc.).

Taking a river basin approach to address the flooding concerns facing the target barangay for the City of Malabon, the PfR will look at the whole landscape of Tullahan River, identifying the natural as well as the anthropogenic drivers of flooding. To better make these factors understandable to the LGUs of Malabon and Valenzuela, a stakeholders' meeting was held. In this forum, representatives from the dam offices (La Mesa, Bustos, Ipo and Angat dams) which were thought to exacerbate the flooding along the Tullahan River were invited to present their operational activities, especially during gate/spilling operation. Representatives from Quezon City DRRMO was also invited as the forum will serve as an avenue to discuss coordination for data/information exchange during inclement weather condition that is expected to affect the whole of Tullahan River. PAGASA provided the initiatives in so far as flood early warning activities is concerned, like the Rainfall Warning System and the UNDP rainfall monitoring facilities installed in some strategic areas along the Tullahan River.

The installation of flood monitoring facilities is a crucial component of the PfR project. PAGASA will provide the technical assistance in the continuing activities of the project: as a resource speaker in the conduct of training for the partner agencies of PfR and in the conduct of survey for the rainfall and water level gauge. This will by capped by a basin-wide flood drill that will see the participation of all the cities that encompasses the Tullahan River.

## Climatological and Agrometeorological Services

The Climatology and Agrometeology Division (CAD) of PAGASA has consistently carried out services for the agricultural sector, with vital agro-meteorological information disseminated for farming activities and proper farm management and necessary planning. Farmers make use of this information to increase their income by avoiding inclement weather that induced losses

and prevent unnecessary waste of time and material input. For the semester, 365 Daily Farm Weather Forecasts and Advisories (FWFA) were issued to 42,588 recipients. Likewise, 10-day Regional-Agro weather forecasts and advisories for agriculture were provided, 36 were issued and 3240 copies disseminated while 36 Philippine Agro climatic Review & Outlook and one Seasonal Climate Outlook were also issued and 3240 copies disseminated. Other beneficial climatological information were also published.

Increasing demand for climate forecasts as important inputs in agricultural planning for climate sensitive crops, such as rice and corn during the occurrence of extreme climate events, has been observed. Since the Philippines relies chiefly on rice and corn as staple food, the application of climate forecasts for agriculture will be replicated in all the agricultural areas across the country. In addition, agro-meteorological research stations will be established in state colleges and universities to obtain the database as well as the information for studies on cropping calendar, plant pest and disease control. Increase collaboration on improving crop yield must be strengthened with state universities and colleges.

**Communicating Climate Information for User-Groups**

The National Climate Outlook Forum is being conducted by the Climatology and Agrometeorology Division (CAD) under the Climate Impact and Prediction Section (CLIMPS) to give an update on the Weather and Climate Outlook for the coming months of the year. The regular presentations included were: (1) Latest Weather Update and Weather Outlook for the next 3 to 5 days; (2) Status of Monitored Major Dams; (3) Review of the Climate Conditions; (4) Climate Outlook for the next 6 months; and an (5) Open Forum, where the participants can give suggestions, comments, and recommendations for the continuous improvement of the PAGASA climate products and services. The forum serves as an avenue for the clienteles of PAGASA as well to exchange ideas, information, and to render/deliver also their respective products, services, works and functions with excellence. This initiative is incorporated in the yearly activity of PAGASA in order that the public would be more aware of the weather and climate scenarios and as one of the responses to the Climate Change thrusts of the country.

During the year, five national Climate Outlook Forums were conducted by PAGASA with 368 participants from different private and government sectors, industrial and plant companies, individual and group investors on farm and crop plantation, electric, water and other business corporate, academe as well as weather and climate enthusiasts, in attendance. Likewise, the forums were represented by the different divisions and sections of PAGASA.

The symposium also provided a venue for participating agencies to present special lecture relating the importance of the products and services of PAGASA to the main functions of their company/institutions.

Moreover, it is during the year that the 1st Regional Climate Forum was realized. It was held at Region V, Legazpi City on April 17, 2013 where 91 participants came from different organizations of the region, particularly, from local government and private sectors. It was spearheaded by the Southern Luzon PAGASA Regional Services Division (SLPRSD) in cooperation with the Department of Agriculture Region V (DA-RFU V), Food and Agriculture Organization – European Union (FAO-EU).

Local Climate Forum was also conducted in Irosin, Sorsogon in cooperation with the Climate Resiliency Field School (CrFS) and sponsored by Rice Watch Action Network (RWAN). Majority of the 107 participants were farmers from different barangays in the province.

Through the Philippine Climate Change Adaptation Project (PhilCCAP), a regional climate forum was held in Iloilo City on August 27, 2013 with 43 participants from the LGUs.

The year 2013 marked the hallway of CAD staff with series of activities in keeping/maintaining the education and information campaigns going through the Climate Outlook Forums. The staff were not only able to carry out one of PAGASA's mandate to deliver quality climate information and services through this activity, but appropriate and relevant refinements and improvements were also done from suggestions and creative ideas brought up during the discussions.

## Astronomical Services

The DOST-PAGASA is the country's official time keeper and has the responsibility to maintain and disseminate the Philippine Standard Time (PST). It operates a precise standard clock from which the setting of time pieces may be referred. Under normal conditions, the PAGASA Observatory broadcasts time signals every hour-on the hour. For the year, 7,978 time check requests through telephone, mostly in Metro Manila, were accommodated and included the synchronization of time in all TV stations in Metro Manila.

To promote astronomy in the countryside, PAGASA conducted Mobile planetarium, stargazing, and telescoping sessions in different schools in Luzon that accommodated a total of 1,219 students and science teachers in lectures and stargazing, and 14,908 for planetarium shows, which generated an income of P 324,200.00. Likewise, the agency disseminated 1,464 astronomical information packages to students and science teachers nationwide.

## Natural Disaster Preparedness and Mitigation Services

PAGASA remains at the forefront, with other concerned agencies, in formulating strategies to combat the effects of natural calamities. One proven strategy is the vigorous conduct of information and education campaign being pushed by the agency to promote awareness on hydro meteorological hazards. PAGASA regularly conducts lectures on the different hydro meteorological hazards, its effects and characteristics. The STRIDE (Special Tropical Weather Disturbance Reconnaissance, Information Dissemination and Damage Evaluation) Team, a quick response group of the Agency that performs activities explicitly expressed by the group's name, conducted field investigation and extended assistance in the mitigation of meteorological hazards and disaster reduction in areas affected by land falling tropical cyclone, tornadoes, store surge, etc. For the year, the STRIDE team was deployed to investigate the passage of tropical cyclone LABUYO, SANTI and YOLANDA which caused the country tremendous damages and visited the areas affected.

*PAGASA Tacloban synoptic station after Typhoon Yolanda*

*Guiuan PAGASA Doppler Radar damaged by typhoon Yolanda*

The occurrence of tropical cyclone "YOLANDA" categorized as number 5 was the strongest typhoon that made landfall in the country, and on record, which resulted in unimaginable destruction, particularly in Eastern and Southern Visayas provinces of Guiuan Eastern Samar and Tacloban City. More than six thousand perished and significant agricultural and economic losses were recorded. The strong winds, excessive rainfall and storm surge associated with the monster typhoon destroyed power and communication lines as well as agricultural land area.

PAGASA closely monitored the occurrence of typhoon YOLANDA, and equipment acquired as part of its modernization plan were fully utilized for timely and accurate forecasting and warning. Unfortunately, the newly completed Guiuan Doppler radar which was scheduled to be inaugurated in November 2013 was damaged by typhoon YOLANDA. Efforts are underway for its rehabilitation in 2014.

# Research and Development

On research and development activities, PAGASA stepped up efforts to develop systems and techniques to enhance its operational forecasting and warning capabilities. These activities are supportive of the R&D priorities of the Department of Science and Technology (DOST), which aim primarily to enhance agricultural and industrial productivity, water resources and energy production. For the year, five (5) research studies were completed

## Completed projects

- Improvement of Meteorological Radar Network in the Philippines (Doppler Radar) – (JICA)
- Establishment of Early Warning and Response System for Disaster Mitigation in Metro Manila (Pasig-Marikina-Laguna Lake river basin) –(KOICA 2)
- MDGF 1656: Strengthening the Philippines Institutional Capacity to Adapt to Climate Change – Spanish grant & UNDP
- Climate Change Adaptation Project - World Bank funded
- Philippine Climate Change Adaptation Project (PhilCCAP) - WB

## On-going projects/researches

### Foreign-Funded Projects

- Improvement of Flood Forecasting and Warning System for Magat Dam and Downstream Communities - Norwegian funding
- Strengthening of Flood Forecasting and Warning System (FFWS) in the Bicol River Basin - (EOJ)
- Applying Remote Sensing Technology in River Basin Management - JAXA-ADB
- Enhancing Greater Metro Manila's (GMMA) Institutional Capacities for Effective Disaster/ Climate Risk Management Towards Sustainable Development (CSCAND for GMMA Project) and Enhancing Risk Analysis Capacities for Flood, Tropical Cyclone, Severe Wind and Earthquake for GMMA (Risk Analysis Project)/
- FAO - AMICAF Project on "Assessment of Climate Change Impacts and Mapping of Vulnerability to Food Insecurity under Climate Change to Strengthen Household Food Security with Livelihoods Adaptation Approaches"
- Enhancing the Forecasting and Warning Capabilities of PAGASA through Effective Utilization of Weather Data – JICA -TCP.

## Locally-Funded Projects

- Philippine Climate Change Adaptation (PhilCCAP) project
- Assessment of Climate Change Impacts and Mapping of Vulnerability to Food Insecurity under Climate Change to Strengthen Household Food Security with Livelihoods Adaptation Approaches
- Wind Resource Assessment for Wind Power Systems
- Climate Impact modeling on Various Sectors (e.g. water, agriculture, health)
- Severe Wind Impact Analysis and the Exposure Database for Greater Metro Manila Area (GMMA)
- The Impact of Climate Variability on Entomological Activity in Central Luzon
- Human Response to Tropical Cyclone Warning in Less Frequented Areas
- Severe Wind Impact Analysis and the Exposure Database for Greater Metro Manila Area (GMMA)
- Development of Hybrid Weather Monitoring System and Production of Weather and Rain Automated Stations – PAGASA- DOST-ASTI
- Establishment of Doppler Weather Radar Network for Disaster Prevention and Preparedness
- Climate Impact modeling on various sectors (e.g. water, agriculture, health)
- CCAM-Simulation of HadCM3 model of A1b emission scenario - Summarized by municipalities– Projected change in monthly average rainfall and temperature under medium-range Emission scenario (A1b)
- Development of an ensemble of climate change scenario in the Philippines
- Summarized and analyzed Drought events by provinces using SPI for the period 1951-2010. Severe Wind Impact Analysis and the Exposure Database for Greater Metro Manila Area (GMMA)
- Analysis and presentation of results on the Risk Analysis Project (RAP) Flood, Severe, Wind and Earthquake Impacts
- Development of Drought Monitoring index for the Philippines using Standard Precipitation Index (SPI) as a Drought Monitoring Tool
- Enhancement of Rainfall Warning System for Metro Manila.
- Isohyetal Analysis of Tropical Cyclone Rainfall during its Occurrence within the Philippine Area of Responsibility (PAR).
- A study of Thunderstorm Forecasting at Selected Areas in the Philippines
- Validation of Radar Rainfall Estimates of Subic Radar in the Pampanga- Agno River Basin
- Intercomparison and validation of Radar Rainfall Estimates Using Rain gauge data for Hinatuan and Cebu Radar (2012-2013)
- Enhancing PAGASA's Impact and Risk Assessment Capability for Severe Wind Associated with Tropical Cyclone, (Legaspi, Albay)

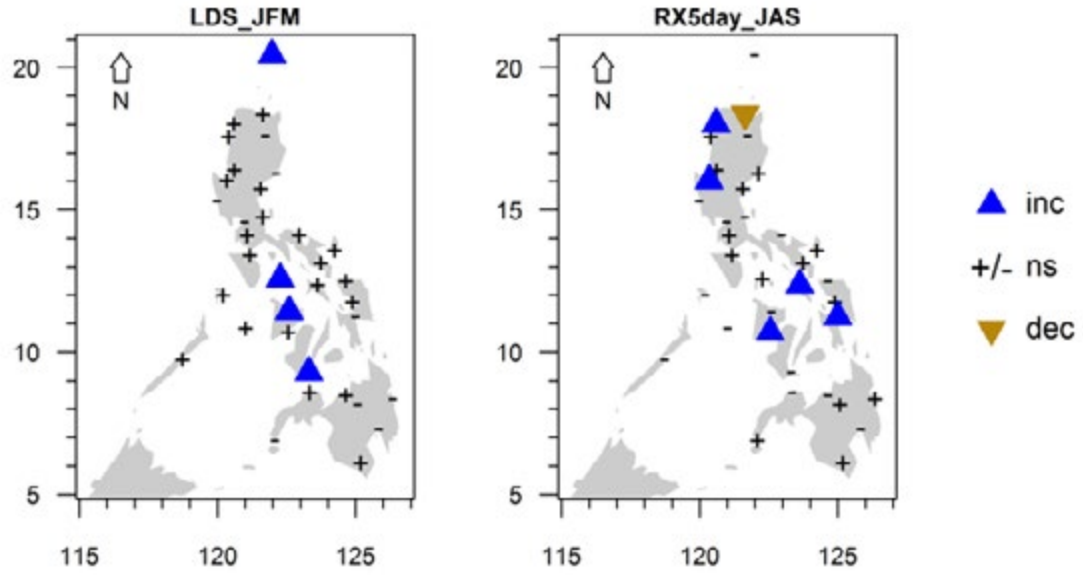
## Long-term trends and variability of rainfall extremes in the Philippines

Villafuerte II, M.Q., J. Matsumoto, I. Akasaka, H.G. Takahashi, H. Kubota and T.A. Cinco, 2014: Long-term trends and variability of rainfall extremes in the Philippines. *Atmospheric Research 137, 1–13.*

**Abstract**

Owing to the increasing concerns about climate change due to the recent extreme rainfall events in the Philippines, long-term trends and variability in rainfall extremes in the country are investigated using 60-year (1951–2010) daily rainfall data from 35 meteorological stations. Rainfall extremes are described using seven extreme precipitation indices (EPI) that characterize daily rainfall in terms of intensity, accumulation, and duration on a seasonal perspective. The nonparametric Mann–Kendall test is employed in combination with the moving blocks bootstrapping technique to detect significant trends in EPI. The results suggest a tendency toward a drying condition for the dry season, January–March (JFM), as indicated by statistically significant decreasing trends in seasonal wet days total rainfall (PCPTOT) associated with increasing trends in maximum length of dry spell (LDS). In contrast, statistically significant increasing trends in maximum 5-day rainfall (RX5day) and decreasing trends in LDS denote a wetting condition during the July–September (JAS) season, particularly at stations located in the northwest and central Philippines. The trends obtained are further assessed by examining the longer time series of EPI at four meteorological stations (Aparri, Dagupan, Iloilo, and Masbate) that have rainfall data from 1911 to 2010. The longer historical data revealed that the trends obtained in the shorter period (1951–2010) could either be consistent with the continuous long-term trends, as observed in RX5day during JAS at Aparri and Masbate, or represent interdecadal variability as was observed at Dagupan and Iloilo. The long-term (1911–2010) southwestward extension of the western North Pacific subtropical high associated with a weakening of the 850-hPa westerly wind over the South China Sea partly provides a possible cause of the trends in EPI during JAS, whereas the weakening of the East Asian winter monsoon contributed somewhat to the trends obtained during JFM. Furthermore, interannual variations in EPI are found to be influenced greatly by the El Niño–Southern Oscillation (ENSO). Composite analyses suggest that El Niño (La Niña) events are associated with statistically significant drier (wetter) conditions over the Philippines, especially during the seasons close to ENSO mature stage.

Trends in the maximum length of dry spell during January–March (left panel) and maximum 5-day rainfall in July–September (right panel); triangles indicate significance at the 5% level based on the combined Mann–Kendall and moving blocks bootstrapping technique.



## FAO - AMICAF Project on "Assessment of Climate Change Impacts and Mapping of Vulnerability to Food Insecurity under Climate Change to Strengthen Household Food Security with Livelihoods Adaptation Approaches"

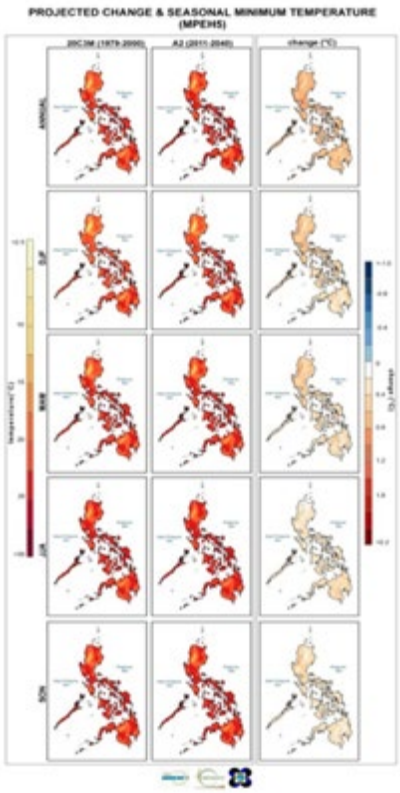
OUTPUT: Generated the validated and statistically downscaled climate scenarios using MOSAICC (Modeling System for Agricultural Impacts of Climate Change)

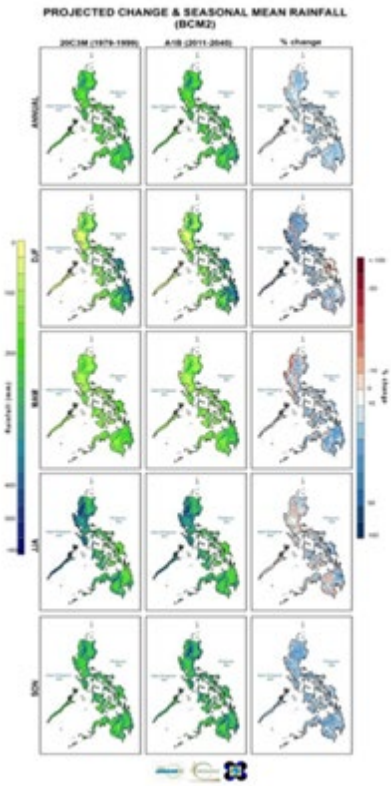
This is a 4-step approach project to be completed in 3 years (October 2011-September 2014), with the Philippines and Latin America as the participating countries. PAGASA is involved in the Step 1 Approach: Climate Change Impacts Assessment. The main objectives are:

- to assist the developing countries to address comprehensive climate change adaptation planning targeted at improving food security of vulnerable household groups through impact assessments, development of an information and mapping system for food security and climate change, and livelihoods' adaptation approaches; and
- Enhanced awareness and improved institutional mechanism.

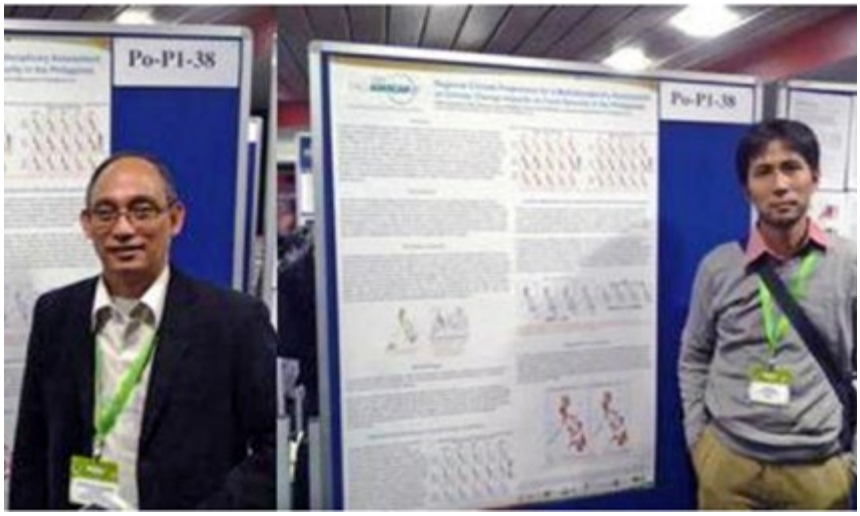
- The series of modeling trainings for AMICAF Step 1 - Assessment of Climate Change Impacts on Agriculture were completed successfully and the Climate Monitoring and Prediction Section (CLIMPS) of PAGASA has been running the climate downscaling experiments and completed the following activities:

- climate downscaling activities using computing facilities at the University of Cantabria, Spain on March 10-20, 2013;
- post processing of downscaled climate projection for 2011-2040 at station level;
- post processing in 10km grid format of downscaled rainfall and temperature projection aggregated to provincial level for 2011-2040; and
- map analysis of projected rainfall and temperaturel for 2011-2040 climate scenario.




Prepared and presented results of climate downscaling through Poster display in CORDEX conference held in Brussels, Belgium on 4-6 November 2013.



## Philippine Climate Change Adaptation Project (PhilCCAP) Component 3. Enhanced Provision of Scientific Information for Climate Risk Management (DOST/PAGASA)

Sub-Component 3.1. Strengthening the Provision of Climate Information to Guide the Design of Adaptation Actions
Sub-Component 3.2. Strengthen Institutional Capacity for Effective Climate Risk Management

The Philippines Climate Change Adaptation Program, Phase 1 (PhilCCAP1), the first phase of a long-term program of the Government of the Philippines to develop measures to better adapt to climate change impacts and respond to climate change-related risks and hazards. The program comprises the following four components: Component 1, Adaptation Policy Oversight and Implementation of CCA Framework; Component 2, Demonstrating Climate Change Adaptation Strategies in the Agriculture and Natural Resources Sectors; Component 3, Enhanced Provision of Scientific Information for Climate Risk Management; and Component 4, Project Management.

The primary objective of Component 3 is to improve the access of end users, especially in the agriculture and natural resources sectors, and to provide more reliable scientific information to enable more rapid and accurate decision-making to safeguard against climate change-related impacts that could affect productivity. The initial beneficiaries of the Component will be the primary service providers, NAMRIA and PAGASA, who are responsible for gathering, inputting, interpreting and disseminating basic climatic and weather-related data. The next level of beneficiaries will be those agencies that employ this information for direct decision-making (e.g., DENR, DA), and others (e.g., LGUs) which further disseminate climate data to final end-users. The ultimate beneficiaries will be farmers, fishers, and other resource users, who rely on the information being provided to them by LGU extension workers in making critical decisions that affect their basic livelihoods. It is expected that by strengthening the linkages for information gathering and dissemination, it will be possible to increase overall resiliency of end-users to the impacts of climate change through more rapid response and more reliable decision-making.

### AWS installed in 3 Project Sites
**(Siargao, Tuguegarao, Iloilo)**

## Wind Resource Assessment for Wind Power Systems (In support of Ecotown Project of Climate Change Commission)

The goal of this two-year project (2013-2014) is to determine the wind energy potentials of the project sites, the information that will be obtained will provide input in determining the best specification of Wind Energy Conversion System (WECS) to be installed and commissioned for purposes of supplying part of the energy needs of the Eco-community as part of the climate change adaptation long-term strategy.

1. Siargao, Surigao del Norte
2. Lanuza, Surigao del Sur
3. Gen. Santos City
4. San Vicente, Palawan
5. Can-avid, Eastern Samar

# Physical Resource Development

To ensure efficient public service delivery, the following infrastructure projects were undertaken:

- Establishment of Tacloban Synoptic Station
- Rehabilitation/repair of Dumaguete and Maasin Synoptic Station
- Rehabilitation/repair of La Granja, Aborlan and Visca Agromet Station
- Completion of Cuyo Perimeter Fence
- Establishment of Quezon, Palawan and Busuanga Radar Station
- Rehabilitation of Ambulong Station
- Establishment of Iloilo and Tagbilaran Synoptic Station

**Continuation from p. 16.**

## Information, Education and Communication (IEC) Campaign

A continuing activity of the agency is aimed at increasing public awareness on natural hazards for proper implementation of appropriate mitigation measures. The main component of the IEC program is the consistent participation of its personnel as resource persons in seminars, workshops, training, fora, and other public gathering organized by LGUs, NGOs and other disaster-oriented organizations on related topics such as hydro-meteorological hazards, climate change, El Niño, La Niña, the agency's role in S&T and disaster preparedness and mitigation. A total of 23,039 participants attended the different fora conducted in Metro Manila and in different provinces. These activities have brought PAGASA closer to the public and likewise enhanced the participants' level of awareness on disaster reduction. Likewise, a total of 6,255 information materials such as pamphlets, maps, posters and brochures were distributed to the public to help sustain the agency's IEC campaign. Strengthening of ties with the media continued in support for a wider dissemination of information.

# Human Resource Development (HRD)

The agency continues to upgrade its manpower resource to provide an adequate pool of highly qualified and well-trained scientists, technical and administrative personnel for effective and efficient delivery of S&T services.

## Scholarship

For the year, the agency supported 15 scholars leading to post-graduate studies under the PAGASA Scholarship Program. Of these, two (2) are pursuing Doctorate Program while thirteen (13) are pursuing Masters Degree, which includes three (3) foreign fellows who are all obtaining their Masters Program at the University of the Philippines. Under the DOST Scholarship Program, three (3) graduated in Master in Public Administration at the Polytechnic University of Philippines while two (2) colleagues are pursuing their Master's Degree in Public at the University of Santo Tomas, other one is pursuing Master of Arts in Public Administration while the other one is finishing Master of Science in Human Resource Management. The grant of fellowship to foreign nationals is a commitment of the Philippine Government to the WMO Voluntary Cooperation Program (VCP), being a member of the WMO. Also under the Philippine Australia Human Resource Organizational Development Facility (PAHRODF), four (4) completed their Masters Degree. Two of the four scholars finished Masters in Remote Sensing while the other two accomplished their Masters Program in Software Development and Strategic Human Resource Management.

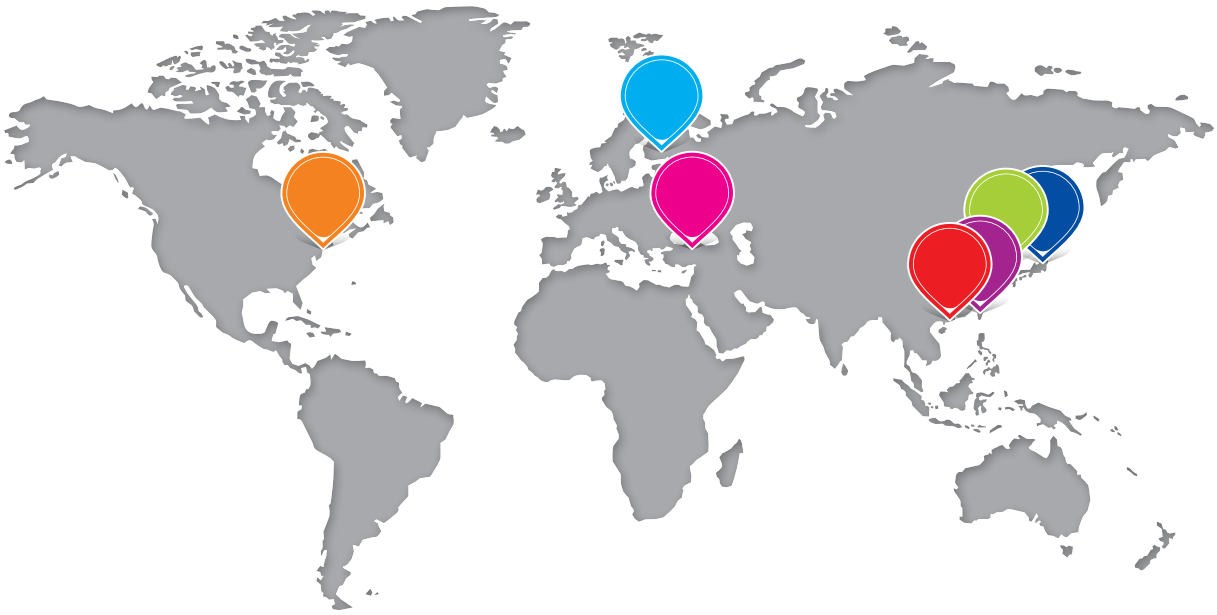
## Capacity Building

To further enhance the skills and improve the capabilities of its personnel, the agency conducted twenty (20) specialized in-house training courses benefiting 436 participants. The courses covered a range of topics from observation and monitoring weather, climate and other related phenomena, climate prediction tools to basic computer operations, communication, management and software development. In addition, a total of 56 personnel attended training courses, workshops and seminars held locally while 38 officials and employees participated in international expert's training and meetings. The list of in-house training conducted by PAGASA is shown below. Also, sixteen (16) participants participated in the long term in-house technical training under the AGHAM Party list.

| | Title | No. of participants |
|---|---|---|
| 1. | Orientation and briefing of Comparing AWSs Sensor with Newly Acquired Calibration Equipment, January 10-11 | 19 |
| 2. | Training/Workshop on Rainfall Warning System, January 17-18 | 35 |
| 3. | Seminar/Workshop on the Use of Automatic Weather Station (AWS) Data for Disaster Preparedness for the Philippines Science High School System (PSHS), January 25 | 20 |
| 4. | Orientation and Briefing of Comparing AWSs Sensors with Newly Acquired Calibration Equipment, February 13 | 21 |
| 5. | Orientation and briefing of Comparing AWSs Sensors with Newly Acquired Calibration Equipment, February 21 | 9 |
| 6. | Administrator Training, February 21 | 4 |

| Title | No. of participants |
|---|---|
| 7. Advanced On-Site Training, February 22 | 5 |
| 8. Training Seminar on Radar Observation and Data Interpretation, April 1-5 | 44 |
| 9. Refresher Course on Meteorological Observation, Practices and Procedures for Visayas-PRSD personnel, April 17-19 | 26 |
| 10. Training on Rainfall Warning System in Mindanao-PRSD, April 18-20 | 27 |
| 11. Refresher Course on Meteorogical Observation, Practices and Procedures for Mindanao-PRSD personnel, April 24-26 | 25 |
| 12. Training on Rainfall Warning System in Southern Luzon-PRSD, April 24-26 | 23 |
| 13. Refresher Course on Meteorogical Observation, Practices and procedures for NCR-PRSD personnel, May 2-4 | 23 |
| 15. Refresher Course on Meteorogical Observation, Practices and Procedures for Northern Luzon PRSD personnel, May 8-10 | 23 |
| 16. Refresher Course on Meteorogical Observation, Practices and Procedures for Southern Luzon PRSD personnel, May 23-25 | 21 |
| 17. Seminar/Workshop on Rainfall Warning for MMDA, PAGASA Central Office, May 29 | 18 |
| 18. Seminar/Workshop on Rainfall Warning for OCD and DILG, PAGASA Central Office, May 31 | 59 |
| 19. Training on the Operation and Maintenance of Calibration Chambers/Equipment, November | 14 |
| 20. Hydrologist Training Course, July 2013-2014 | 32 |
| 21. Seminar of government Radio Operator's Certification (GROC), December 3-5 | 20 |
| TOTAL | 436 |

## Foreign Training Seminars/Workshop, Symposium and Conferences



### Maryland

Dr Carina G. Lao (2nd from left) serves as paper presenter in Workshop to assist in Sustaining National Meteorological Services (NMS)-Strengthening WMO Regional and Global Centres for the Severe Weather Forecasting Demonstration Project (SWFDP), 18 to 20 June 2013 in Washington DC, USA



### Korea

**Course Title:**
Information and Communication Technologies For Meteorological Services

**Date:**
October 06 to November 26, 2013

**Venue:**
Korea Meteorological Administration (KMA) Seoul, South Korea

**Name of Participants:**
Alfredo F. Quiblat Jr.
Lilian N. Guillermo
Cynthia O. Iglesia
Anianita R. Fortich
Andre Jude M. Jose



**Dr. Cynthia P. Celebre** (2nd from L) during the Open Forum conducted after her presentation entitled "Rainfall Warning System (RWS) for Metro Manila: A Climate Change Adaptation Tool of the Philippines," in connection with her participation in the 2013 Seoul S & T Forum with the theme "Creative R & DB for Inclusive & Sustainable Development for the Global Community," held on Oct 30 – 02 November 2013 at Seoul, South Korea.

Group Photo Dr. Cynthia P. Celebre (2nd row, 5th from L)





On 26 to 29 November 2013, Dr. Carina G. Lao participated in the **16th International Council of Science (ICSU) Meeting and 5th ICSU Regional Consultation in Asia and the Pacific on Future Earth in Asia and the Pacific**, sponsored by ICSU and Sida, and hosted by Korea Polar Research Institute (KOPRI) and future earth (FE), Seoul, Republic of Korea. From left to right are: Dr. Nordin Hasan, Director of ICSU-Regional Office for Asia and the Pacific, Dr. Hong Kum Lee, Chair ICSU Regional Committee for Asia and the Pacific and Principal Research Scientist of KOPRI, and Dr. Lao of PAGASA, thru the effort of NRCP.

## Taiwan


A paper on "The Unusual Movement of Typhoon Pablo (BHOPA)" was presented by Dr. Carina G. Lao during the 2013 APEC Typhoon Symposium with a theme, Typhoon Behaviour and Its Impacts in a Warming Globe. With her are co-presenters, Mmes. Nanette C. Lomarda of the WMO on Researchers' Role in Helping Society Cope with Weather Extremes in a Changing Climate and Thelma A. Cinco on Severe Wind Risk Modelling in Greater Manila Area. Dr. Cynthia P. Celebre participated in the Symposium as Session Chair on Science Technology Dialogue: Member Economy Experience Sharing by APEC Members. It was held at NTU GIS Convention Centre, Taipei, Taiwan on 21-23 October 2013.

## Finland

## Macau, China


The ESCAP/WMO Typhoon Committee 8th International Workshop (IWS) and 2nd Training and Research Coordination Group (TRCG) Forum was held in Macau, China on 2-6 December 2013. The workshop and Forum was attended by Dr. Susan R. Espinueva for the Working Group on Hydrology (WGH), Mr. Renito Paciente for the Working Group on Meteorology (WGM), and Dr. Carina G. Lao for the Working Group on Disaster Risk Reduction (WGDRR). Dr. Lao also took part in the TRCG Forum. The three of them presented a paper for each committee participation and forum, especially on the recent passage of Typhoon Yolanda in the Central Visayas, Philippines.

**Japan**

**Turkey**

## Local Training, Seminar/Workshop, Meetings, Conferences and Symposium

AWS Training conducted by ASTI & PAGASA at VPRSD, Mactan, Cebu City on February 21, 2013.


Training on One-Month Probabilistic Forecast System at CAD Conference Room on October 21-25, 2013.

61st Philippine Society of Mechanical Engineering (PSME) National attended by Dean Ragadio.

# Improvement of S & T Governance, Management and Linkages

The Annual PAGASA Program Review and Analysis (PRA) was conducted simultaneously with the Planning Conference at Amihan Conference Room at Central Office of PAGASA on January 22-23, 2013 and the Midyear PRA on August 8-9, 2013 at the same venue. The review identified some key activity areas in the 2013 work plan that needed revision and some pressing concerns that needed immediate solutions. Priority Programs recommendations for incorporation in the 2014 Action Plan and those for consideration in the 2014 Financial Plan were likewise drawn` up while the Midyear PRA assessed the performance of each division for the first semester. Also, the pre-planning, conference was conducted in preparation for the annual PRA 2014. In the pre-planning the discussion was focused on the pilot implementation of Strategic Performance Management System (SPMS) in compliance to the Administrative Order no. 25 dated December 11, 2011, which is promulgated in the Civil Service Commission (CSC) Memorandum circular No.6 s. 2012 and Resolution no. 1200481 dated March 16, 2012, all government agencies are directed to establish and implement a unified integrated Results-Based Strategic Performance Management System (RBSPMS).

PAGASA's Strategic Performance Management System (SPMS) was conditionally approved by the CSC effective March 27, 2013. With this, the agency designated PAGASA Key Players and created the Performance Management Team (PMT) in order to put into practice the SPMS to familiarize each individual on the process.

Also part of the program was the conferment of award for field personnel of the Visayas PAGASA Regional Services Division (VPRSD) witnessed by the members of the Executive Staff led by Dr. Vicente B. Malano, the two Deputy Administrators, Division and Section Chiefs and representatives from the four regional offices.

The award was in recognition of the station's courageous and utmost commitment to the service in monitoring typhoon Yolanda at risk on their personal safety in the name of PAGASA's noble mission.

Mario Penaranda, Chief Meteological Officer (CMO), personally received the award in behalf of Tacloban City station. Tacloban station was the worst hit during the passage of Yolanda claiming the life of Salvacion Avestruz, 42, Weather Observer II, assigned at the station. Three other stations personnel were injured including the CMO himself.

The Guiaun radar station, which incurred damages in millions of pesos in terms of property values, was represented by CMO Marianito Macasa. Mr. Macasa almost suffered the same fate as the other Yolanda victims. The other heavily damaged station, Coron in Palawan, was also given the commendation award received by its CMO Jericho Francisco. Engr. Oscar Tabada, head of the VPRSD, assisted Dr. Malano in the awards presentation.

Other stations awarded were Borongan, San Jose, Roxas City, VISCA and Mambusao stations. The conferment of commendation awards is a PAGASA tradition to honor the dedication of its personnel in fulfilling their duties during in times of calamities.

Aside from the commendation award, personnel from the said stations received cash donation collected from the central office.

During the year, the members of the Executive Staff completed their training on Enhancing Management Competency of PAGASA funded by the Philippine Human Resource and Organizational Development Facility (PHARODF) -Australian Aid. The training helped them to come up with PAGASA's Leadership Organizational Brand with Agreed Leadership Behaviors; and revisited Vision, Mission, Values and Strategies. With this, the following outputs have been presented:

PAGASA leader is knowledgeable:

- He/she is able to provide accurate and reliable information
- Able to explain and understand the science of his/her field that projects authority when he/she speaks and writes
- Able to update oneself in his/her field of expertise
- Able to use resources at the right time and circumstances

The PAGASA Leader is credible:

- He/she is able to lead by example
- Able to gain respect and trust due to good performance
- Able to stand up for principles the agency believes in

The PAGASA Leader is innovative:

- He/ she is open to new ideas.
- Able to maximize the use of limited resources
- Able to come up with new ideas and solutions


- Able to identify and apply cutting edge technologies
- Able to deviate from conventional methods when warranted

The PAGASA Leader is visionary:

- He/she is able to project desirable future scenarios
- Able to face future challenges
- Able to anticipate future effects of current decisions

The PAGASA Leader is Passion for Public Service

- He/she is able to serve beyond the call of duty
- Able to render services with full enthusiasm
- Able to respond to the needs of stakeholders
- Able to serve with utmost dedication without expecting anything in return

# Local and International Linkages and Collaboration

The agency continues to foster stronger cooperation, closer linkages, and broaden its network on collaboration with local and international organizations. It has organized and participated in various activities related to scientific conferences in hydrometeorology and in disaster risk reduction. These activities helped enhance the technical and scientific knowledge of DOST-PAGASA personnel and to be utilized towards the improvement of the agency's services to the public.

## Conducted IEC on the use of Automatic Weather Station (AWS)

One of the components of DOST-ASTI-PAGASA collaborative project "Development of Hybrid Weather Monitoring System and Production of Weather and Rain Automated Stations" was the conduct of information, education and communication (IEC) seminar on the use of the Automatic Weather Station (AWS) and Automatic Rain gauge (ARG) data for disaster preparedness. These were conducted in Pagadian City, Bayog, Zamboanga, Coron, Palawan, Butuan City, Surigao del Sur, Sultan Kudarat, Cotabato, Zamboanga, Iloilo, Cagayan de Oro and Legaspi City, Albay. Among the topics discussed with the LGUs, teachers, students and the different barangay officials were Understanding of Hydrometeorological Hazards; Flood Early Warning System and Climate Change and Vulnerability; AWS Operation and Maintenance; Visualization and Hands-on Operation of AWS Website and Data Interpretation.


*Training room PAGASA, Quezon City*

*Bayog, Zamboanga*

*Legaspi City*

Pagadian City

Coron, Palawan

Bislig, Surigao del Sur

## Enhancing the Forecasting and Warning Capabilities of PAGASA through Effective Utilization of Weather Data – JICA -TCP.

The signing of Minutes of Meeting and Record of Discussion between the Detailed Planning Survey Team and the Authorities concerned of the Government of the Philippines on the Japanese Technical Cooperation Program (TCP) project "Enhancing the Forecasting and Warning Capabilities of PAGASA through Effective Utilization of Weather Data" was held on June 11, 2013 at the Administrators Conference Room, Administrator's Office. As a result of the signing, both parties agreed on the details of the Project and the main points discussed in the record of discussion. Both parties also agreed that PAGASA, the counterpart to JICA, will be responsible for the implementation of the project in cooperation with JICA, coordinate with other relevant organizations and ensure that the self-reliant operation

of the Project is sustained during and after the implementation period in order to contribute toward social and economic development of the Philippines.

## Responding better to disasters

PAGASA hosted an event for the development of a multi-hazard early warning system on October 3-4 2013. Headed by the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) and proposed by the Typhoon Committee, the Synergized Standard Operating Procedures for Coastal Multi-Hazards Early Warning System (SSOP) project aims to make operating procedures more synergized and understandable for authorities and communities.

Dr. Vicente Malano, Officer-in-Charge of the PAGASA Administrator's Office, welcomed the foreign guests and offered them the best practices that PAGASA can offer. The selection of the Philippines as the host country for the pilot workshop of the SSOP is apparent because of the country's extensive experience in different natural hazards. Like in other countries in the Asian region, the Philippines is prone to different typhoon-related hazards such as floods and storm surge. A yearly average 20 typhoons visit the Philippines and half of it affect the different parts of the country. Communities along the coastal areas face greater risks since the occurrences of storm surge and even tsunamis pose a strong damage to properties and threat to lives.

Mr. Olavo Rasquinho, Secretary of the Typhoon Committee, thanked the panel members for sharing their experiences on early warning systems and operating practices. "The Philippines is one of the most affected countries by natural hazards and the experience of the staff in charged of mitigating the consequences of those hazards frequently contribute disasters prevention, which is a great contribution to the aim of the SSOP Project."

During the 2-day workshop, the panel members discussed and reviewed their existing standard operating procedures and protocols. Aside from PAGASA, the participants of the workshop were the representatives from the Office of the Civil Defense (OCD), Department of Interior and Local Government (DILG), local government units (LGU's), Philippine Information Agency (PIA), Project NOAH and Philippine Volcanology (PHIVOLCS).

Stressing the importance of the media in disaster preparedness and mitigation, Ms. Helen Flores, reporter of the Philippine Star, gave a brief presentation about the role of media in information dissemination especially during inclement weather situations. She reiterated the need for openness between media practitioners and authorities in conveying information and readily available data.


The workshop also included a discussion on strength, issues, gaps, challenges and needs of the existing SOP's of the different disaster-response agencies and warning authorities.

# PAGASA gears up in building community resilience to natural disasters

To beef up its efforts of protecting lives and properties against natural hazards, PAGASA participated in the "Building Community Resilience and Strengthening Local Government Capacities for Recovery and Disaster Risk Management" or "RESILIENCE Project". This is in line with the signing of the Memorandum of Agreement for the "Enhancing Multi-stakeholder Collaboration on Disaster Risk Reduction and Management towards Building Community Resilience" spearheaded by the National Disaster Risk Reduction and Management Council (NDRRMC) through the Office of Civil Defense (OCD). The MOA signing was held on March 7, 2013 at the PAGASA Science Garden in Quezon City.

The MOA's main objective is to sustain the operationalization of the disaster risk reduction and management which includes the integration of flood early warning system (EWS); sharing of response resources; and harmonization of land use policies.

Showing full support for the RESILIENCE Project, the MOA signing, headed by OCD Administrator and NDRRMC Undersecretary Eduardo del Rosario, was graced by UNDP Country Director Toshihiro Tanaka, CIDA Head of Cooperation Luke Myers, Metro Manila-Rizal Network Secretariat, and Local Chief Executives and Representatives. The event was covered by local and international media.

Former PAGASA Administrator Dr. Nathaniel Servando welcomed the participants and said in his message that the damages brought by Typhoon Ondoy last 2009 proved to be a powerful catalyst to reconsider the flood early warning services provided for Metro Manila. He added that the RESILIENCE Project was one of the many outpouring of support from foreign partners to capacitate LGUs to lessen the impacts of flooding disasters.

To help communities reduce risks from flood disasters, a simultaneous community flood drill was conducted yesterday. This activity tested the newly-installed EWS within the Pasig-Marikina-Tullahan River Basin. Residents of Barangay Nangka in Marikina City, Barangay Bagong Ilog in Pasig City, and Barangay San Roque of Cainta Rizal joined the community drills. Participating cities also included Quezon City, Malabon, Mandaluyong, Valenzuela, and Caloocan.



Through the continuous support of the United Nations Development Program (UNDP) and Canadian International Development Agency (CIDA), the RESILIENCE Project aimed to strengthen LGU capacities in Disaster Risk Reduction and Management (DRRM) towards building community resilience to disasters and reducing vulnerability to natural hazards, specifically for flood-prone areas. The project conducted DRRM trainings and information, education and communications (IEC) activities for LGUs, communities, and with public school teachers. It also created venue to review the DRRM policies of the three (3) LGUs, particularly with their local DRRM Plan, Contingency Plan and Comprehensive Land Use Plan.

# RESBACK for PAGASA

In recognition of its contribution in the RESILIENCE Projects of the National Disaster Risk and Reduction Management Council (NDRRMC), PAGASA was honored with the RESBACK Award during the Exit Conference of the project held on April 12, 2013 at Camp Aguinaldo, Quezon City.

Implemented for the past two years, the "Building Community Resilience and Strengthening Local Government Capacities for Recovery and Disaster Risk Management" or "RESILIENCE Project" aims to strengthen LGU capacities in Disaster Risk Reduction and Management (DRRM) towards building community resilience to disasters and reducing vulnerability to natural hazards,


*PAGASA Acting Administrator Dr. Vicente B. Malano (left) accepts the RESBACK Award from DND Secretary Voltaire Gazmin.*

specifically, for flood-prone areas. PAGASA has actively participated in these projects through a series of community awareness programs and partnerships with members of the Collective Strengthening of Community Awareness for Natural Disasters (CSCAND). Some of the projects included a simultaneous community flood drill conducted in the Pasig-Marikina-Tullahan River Basin, Barangay Nangka in Marikina City, Barangay San Roque in Cainta Rizal and Barangay Bagong Ilog in Pasig City. This activity tested the newly-installed EWSS and rain gauges in the area. Participating cities also included Quezon City, Malabon, Mandaluyong, Valenzuela, and Caloocan.

## A standard Pinoy time

After a grueling series of public hearings and consultations, the Filipino people can now claim to have an official and standard Philippine time.

President Benigno Aquino III signed on May 15, 2013 the Philippine Standard Time Act or Republic Act 10535 - an Act to set the Philippine Standard Time (PhST) in all official sources throughout the country. RA 10535 also states that a fund will be provided for the installation, operation and maintenance of synchronized time devices to be displayed in key public places. PAGASA, through its Time Service Unit, in coordination with the Department of Science and Technology (DOST), is mandated as the official time service agency of the country tasked to monitor, maintain and disseminate the PhST. Institutionalizing the value of time, the Act also declared that the first week of every year will be celebrated as National Time Consciousness Week.

To properly implement the PhST, an Implementing Rules and Regulations (IRR) was created by the Technical Working Group (TWG) composed of the DOST Legal Office and its counterparts in PAGASA. To further refine the IRR, representatives from government agencies such as the National Telecommunications Commission (NTC), Department of Transportation and Communications (DOTC), the Department of the Interior and Local Government (DILG), Department of National Defense (DND), Department of Health (DOH), Department of Education (DepEd), Commission on Higher Education (CHED), and Civil Service Commission (CSC), went through a series of deliberation to develop the IRR. Representatives from media organizations and the Kapisanan ng mga Brodkaster ng Pilipinas (KBP) took part in the discussion.


Before the approval of the IRR, required public hearings were conducted. The first leg of the consultation was held in Quezon City on August 7, 2013. The succeeding consultations were done in Cebu City and Pagadian City on September 3 and November 5, 2013 respectively. Feedback from the participants on the public consultation helped refine the IRR especially in coming up with the most tolerable and acceptable time deviation. The technical aspect of synchronizing the official timepieces and devices was settled by providing a tolerable difference of 5 seconds. While the violations and penalties are included in the IRR, the primary aim of RA 10535 is to promote the culture of punctuality and practicing wise time management allow more productivity at home, school and the workplace.

To stir awareness on the Philippine Standard Time, the first National Time Consciousness Week (NTCW) shall be celebrated nationwide on January 2014. PAGASA and the Science and Technology Information Institute (STII) of DOST, in collaboration with government agencies, shall organize activities for the observance of the NTCW every first week of the year. Some of the identified activities for the 2014 NTCW celebration are the New Year's countdown, simultaneous flag raising ceremony in all government offices and schools, and information and education campaign thru the social media such as facebook and twitter.

## PAGASA participates in 2013 DRRM Summit

The Disaster Risk Reduction and Management (DRMM) Summit 2013 was held in March 2013. The summit was divided in 2 categories; the pre-summit that was held on March 12-15 and the National Summit on March 20, 2013. According to the Office of the Civil Defense (OCD), the summit is in compliance with one of the seven directives issued by the President after typhoon "Pablo", calling for a conference where Local Chief Executives will discuss DRRM actions and tools as well as to specify their respective roles and responsibilities for the efficient and effective delivery of government DRRM services.

One of the objectives of the Summit was to define the mechanisms to achieve transparency and accountability of DRRM resources. It was in 2012 when Typhoon "Pablo" (Bopha) hit Southern Philippines that brought enormous loss of lives and damages to properties and livelihood of Filipinos, resulting in an estimated cost of damages amounted to 42.2 billion pesos.

The pre-summit was conducted to discuss the Four Pillars of DRRM such as: a) Prevention and Mitigation; b) Preparedness; c) Response; and d) Rehabilitation and Recovery.

In the Pre-summit, Mr. Oscar Cruz, tackled the Prevention and Mitigation through Hydro-Met Hazard Maps while Ms. Cecilia Monteverde, discussed the Preparedness on the Early Warning System (EWS).

In support to the different presentations, exhibitbooths were set-up featuring the different services and products of the Government Agencies including PAGASA, and other partners in DRRM, for the National and Local Chief Executives (LCEs).

The CSCAND agencies developed a wallet-type booklet on what to do in times of disasters as one tool for public preparedness. The booklet is intended for various Local Government Units throughout the country.

## Simultaneous community flood drill held in Cainta, Marikina and Pasig

A Simultaneous Community Flood Drills was held on March 7, 2013 as one of the activities of the RESILIENCE Project. The Project aims at "Building Community Resilience and Strengthening Local Government Capacities for Recovery and Disaster Risk Management".


*The Flood Early Warning System (FEWS) was tested and proved to be one of the effective tools to help protect lives and properties against flood/flashfloods, to make them more resilient to disasters particularly to the residents living in flood prone areas like riverbanks and coastal areas.*

The community flood drills were held in Barangay Nangka, Marikina City, Barangay Bagong Ilog, Pasig City, and Barangay San Roque, Municipality of Cainta, Province of Rizal to test the newly-installed Flood Early Warning System within the Pasig-Marikina-Tullahan River Basin.

The residents of Barangay Nangka were eager to participate in the flood drill in spite of the warm weather. The drill went on smoothly with the cooperation of the residents who experienced the fury of storm "Ondoy" with international name "Ketsana" on September 2009 where 78 fatalities was recorded.



## Stronger PAGASA weather facilities seen in Mindanao

Two of the country's disaster risk reduction and management departments entered into an agreement to further strengthen and


enhance the delivery of services in disaster mitigation and preparedness.

PAGASA witnessed the signing of the Memorandum of Understanding (MOU) between the Department of Science and Technology (DOST) and the Department of National Defense (DND). Held at the PAGASA Science Garden office, the MOU was signed in support of the National Disaster Risk Reduction and Management Council's (NDRMMC) Four-Point Action Plan for Disaster Preparedness.

The MOU is a strategic move for PAGASA to finally install a Doppler radar in Zamboanga. In his message, Dr. Nathaniel Servando expressed his appreciation for DND's commitment of cooperation by temporarily establishing the said radar in the Romulo Espaldon Naval Station which will support the agency in realizing the government's campaign for zero casualties during calamities.

DOST Secretary Mario Montejo, relating the severe damages caused by the recent Typhoon Sendong in several provinces in Mindanao, said that when completed in 2014, the Doppler radar is expected to effectively predict the direction, impact and intensity of weather disturbances including typhoons approaching the country.

DND, Secretary Voltaire Gazmin expressed appreciation on the MOU. Through DOST's Information and Communications Technology (ICT), the Doppler radar will enable the Armed Forces to maximize its capability in addressing threats to national security with the enhancement of the Philippine Navy's Coast Watch Information System.

PAGASA also signed an agreement for the "Enhancing Multi-stakeholder Collaboration on Disaster Risk Reduction and Management towards Building Community Resilience," spearheaded by the Office of Civil Defense (OCD). The MOA's main objective is to sustain the operationalization of the disaster risk reduction and management which includes the integration of flood early warning system (EWS), sharing of response resources, and harmonization of land use policies.

These strategic partnerships will strengthen PAGASA's capabilities to move towards a more effective, efficient and unhampered delivery of public service.

## 4th Bilateral Meeting on Cooperation in Meteorology between the Korea Meteorological Administration (KMA) of the Republic of Korea and PAGASA, 26 ~ 29 March 2013, Headquarter KMA, Seoul, Korea

At the kind invitation of Mr. LEE Woo-Jin, Director-General of Forecast Bureau of the KMA, the delegation from PAGASA, headed by Ms. Lillibeth B. Gonzales, participated in the 4th Bilateral Meeting on Cooperation in Meteorology between KMA and PAGASA held at the KMA headquarters on 27 March, 2013.

Mr. LEE Woo-Jin, Director-General of Forecast Bureau of the KMA, who opened the coordination meeting extended a warm welcome to the PAGASA delegation, and commended the cooperation between KMA and PAGASA in meteorology.

Ms. Lillibeth B. Gonzales expressed her gratitude to Mr. LEE Woo-Jin and his colleagues for hosting the 4th coordination meeting between KMA and PAGASA in Seoul. She also expressed appreciation to the warm hospitality accorded to the PAGASA delegation and KMA's excellent arrangements. She noted that the cooperation between the two sides has been improved on the basis of the principles identified in the MoU between KMA and PAGASA signed in 2007.

Mr. CHEONG, Seonghoon (KMA) and Ms. Nancy T. Lance (PAGASA), introduced their meteorological services, respectively, at the opening of the meeting.

During the meeting, a review was conducted on the cooperative activities since the 3rd Bilateral Meeting. Both sides noted with satisfaction that most of the cooperative activities agreed

at the 3rd coordination meeting have been successfully implemented in large. Both sides also discussed future cooperative areas and activities to be implemented after the 4th meeting, and agreed upon the following cooperative activities in the inter-session.

- Implementation of the KOICA Project

KMA has supported developing countries by providing Communication, Ocean and Meteorological Satellite (COMS) data receiving and analysis system and related technologies since the successful launch of COMS in June 2010. In line with this, the COMS data receiving and analysis system will be established in the Philippines from 2013 to 2014 with the support of KOICA.

In this regard, both sides agreed to do their best efforts to take the necessary measures as follows:

a) Facilitation of communication among the project stakeholders, including the KMA, PAGASA, KOICA, the Principal Investigator and local governments, to identify and fill the gaps and needs in implementing the project

b) Capacity building of PAGASA officials who are engaged in the operation and management of the systems to be established through the project

c) Outreach activities towards the Philippines government and the general public to draw their attention to the project

- Capacity Building

1) KMA has presented its plan of conducting training events for the National Meteorological and Hydrological Services (NMHSs) of developing countries. At present, it is expected to operate a training project related to Information Communication and Technology for 3 years starting 2013. This project will include various activities and both sides decided to provide necessary support for implementation of the following:

Compiling the information on the current meteorological technology status of PAGASA through visit, questionnaire, and onsite survey.

b) Opening training courses in Korea and possibly workshops in the Philippines

2) The Early Warning System was established in Metro Manila in 2012 jointly by PAGASA and KMA which planned to upgrade 5 regional centers. PAGASA would take these opportunities on the related training in order to maintain and operate the Early Warning System and improve the centers. Both sides agreed on the following:

If PAGASA personnel need a training to maintain this system concerning calibration, standardization of observation, etc, KMA, will gets the Korea Meteorological Industry Promotion Agency (KMIPA), an affiliate of KMA, to prepare the course.


In order to strengthen the capability of PAGASA's regional centers, KMA will take into positive consideration PAGASA's proposals on nowcasting, climate change, etc.

- Operation on Radar Operation and Application

It is important for each NMHS on radar operation and technology to predict severe weather. As part of ODA projects, KMA has operated a radar-related training course since 2012 which aims to encourage experts of developing countries to participate. This training also aims to enhance human capabilities on severe weather forecasting and warning by weather radar at NMHSs. Both sides reached consensuses on the following:

a) In connection with ODA project, KMA will invite one expert of PAGASA to participate in the radar training course in 2014, which includes lectures and case studies on weather radar observation and operation techniques.

b) Two or three experts from KMA will visit the Philippines to discuss the establishment of radar observation field and radar application, etc.

The meeting strengthened the relationship between KMA and PAGASA in terms of exchanging of scientific information and cooperation among personnel engaged in

the operation specifically in weather forecasting, research and development, financial aspects, and projects/ activities implementation. It also enhanced PAGASA personnel knowledge on advance technology which the KMA has been using when it comes to forecasting.


Onsite-tours provided an overview on how KMA operates, specifically, the weather forecasting department, satellite, radar and the super computer center. Tools and techniques for systematic approach using various model and operation and maintenance instrument, to maintain optimum level of operational condition of the system, development & application of technology including short range precipitation forecasting technology, quality control as well as public service work, were keenly imparted by the experts.


The delegates were able to establish linkages with KMA for continuing collaboration or future joint projects, data sharing as well as gaining information, experiences, practices and approaches being used by KMA.

## Empowering LGU's through media

After a successful run of the Media Seminar-Workshop in Davao, the event made another striking impression in the Visayas area. PAGASA together with the Department of Science and Technology (DOST), conducted another knowledge-enhancing seminar for the media professionals in Region VII. Held at Mabolo Cebu City, participants to the seminar came from the nearby provinces in the region.

In his message, Engineer Oscar Tabada, OIC of PAGASA-PRSD Visayas Station, reiterated the importance of media in Disaster Risk Reduction and Management or DRRM.

"We recognize the crucial role of the media in disseminating information to the general public, specifically during weather-related events, thus PAGASA brought this seminar-workshop in region 7 once again to create stronger ties with the media", Engr. Tabada said.

On its 22nd run, the seminar aimed to strengthen the media's basic knowledge in meteorology and other PAGASA products and services. The seminar included lectures on Basic Meteorology, Weather Forecasting and Warnings, and Climate Monitoring and Prediction.

During the seminar, questions were raised about the involvement of local government units (LGU's) in DRRM. The media participants expressed willingness to help PAGASA in reaching out to the public, especially, during extreme weather events. Concerned about the response of LGU's, Mr. Ely Dejaresco, editor and publisher of the Negros Chronicles commented that the seminar should also be conducted for the LGU's. "Bring this (seminar) to the LGU's. If they are not interested, we will make them interested. This is not only for us; this is also for LGU's. Let's make them listen", Mr. Dejaresco said.

Meanwhile, a reporter from UNTV expressed his admiration for the dedication and commitment of PAGASA forecasters. The participants believed that the Media Seminar-Workshop should be regularly conducted so that the media and PAGASA can work well together in relaying accurate, timely and reliable weather-related information to the people.

# S & T Celebration

## Astronomy Week

The celebration of the 2013 National Astronomy Week (NAW) was held on February 18-23, 2013. The celebration was highlighted by the first Astrophotography contest participated by 16 Elementary and High School and 14 college students from different schools and Universities.

The event was divided into two categories: one for the elementary and high school students which was won by George Krizza Kionson of Colegio de San Juan de Letran taking home the first prize of P10, 000.00 followed by Richard C. Cornelio of Pasay City West High School who won 2nd prize of P7, 000.00, and Glette Yzak Muring, also from Colegio de San Juan de Letran who took home P5, 000.00 for the 3rd place.

The other category for college students was won by Rizal Technological University's Frank Fitzgerald S. Batin with P15, 000 cash prize. Other winners were Dean Martoni R. Galabon of UPLB and Jerome R. Sabidong who won 2nd and 3rd prizes, respectively. Consolation prizes of 1,000 pesos each were given to the rest of the participants.

The free Planetarium Shows held at the Planetarium Unit (PU), Science Garden was watched by 2,235 students and Astro enthusiasts, while Stargazing and Telescoping sessions were conducted at the PAGASA Observatory, UP Diliman participated by 373 students. Seminars and workshops on Basic and Observational Astronomy were also conducted for Public Science Teachers in Metro Manila attended by 48 Science Teachers.


PAGASA also extended their services to Legazpi City, Southern Luzon, PRSD where the Mobile Planetarium on Tour visited 16 different schools. In addition, the agency disseminated information materials to students and teachers. Table 1 shows information materials disseminated by PAGASA.

Table 1. Astronomical; information packaged distributed/ disseminated

| Name of Information Material | Total Number Disseminated |
|---|---|
| Almanac 2014 | 50 |
| Astronomical Posters | 742 |
| Philippine Star Maps Atlas | 215 |
| Daylight Duration Table | 19 |
| Tables of Moonrise and Moonset for Selected Fishing Areas, 2013 | 19 |
| Calendar Data, | 66 |
| Almanac for Geodetic Engineers, 2013 | 228 |
| Altitude & Azimuth of the Sun | 76 |
| Tables of Sunrise and Sunset / Moonrise /moonset for Agromet Stations, 2013 | 6 |
| Lunar Certifications | 2 |
| Philippine Astronomical Handbook | 36 |
| Ramadan Data | 5 |
| TOTAL | 1,464 |

# National Science and Technology Week (NSTW): The Road to a Smarter Philippines

Innovations. Inventions. Ingenuity. These were the words that best described the National Science and Technology Week (NSTW) held at the SMX Convention Center on July23 - 27, 2013.

Organized by the Department of Science and Technology (DOST), the NSTW 2013 aimed to further expose the different innovations, interventions and inventions of Filipino scientists, engineers and various works by the entire scientific community. This year, NSTW gave more attention to DOST's solutions to the pressing needs of various sectors like agriculture, transportation, industry, services and climate change.

With the theme "Science, Technology and Innovation: The Road to a Smarter Philippines," the activities of the NSTW included a series of activities that included fairs and exhibits focusing on Science and Technology, workshops on disaster management and communications, showcase of learning tools, and knowledge-enhancing forums.

Launched last year, Smarter Philippines is a program which uses Information and Communications Technology (ICT) in providing reliable and efficient services to the public through components such as Smarter Governance, Smarter People, Smarter Computing and Smarter Disaster and Mitigation Public Safety. For its part, PAGASA launched its project entitled BLTB (Bagyo, Lindol, Tsunami and Baha which aims to further simplify the technical terms used in weather advisories and bulletins of the weather bureau.


Placing equal-importance for healthy living, the DOST also advocates for a healthier lifestyle through its "Smarter Living Campaign". This project aims to promote science and technology as a way to live a healthy and active lifestyle that will lead to a responsive and alert thinking during disaster events.

In coordination with the Food and Nutrition Research Institute (FNRI), headed by Dr. Mario Capanzana, who serves as Chair of the Smarter Living Campaign, PAGASA promotes smarter living as a tool in achieving a Smarter Philippines. Dr. Vicente B. Malano, OIC, Administrator's Office, PAGASA said that he believed that a healthy lifestyle leads to exceptional focus and performance at work.

During the promotion of the Smarter Living Campaign, a new dance workout entitled Yeba was also introduced to the public. Yeba is a dance exercise inspired by different Filipino folk dances. "Like in other government agencies, PAGASA employees value the benefits of healthy living through setting aside time for exercise, sports activities and occasional nutrition counseling", Dr. Malano said.

Since Smarter Philippines also means smart management of time, the Republic Act 10535 or the Philippine Standard Time Act of 2013 was also launched. Through PAGASA's Time Service Unit, the official source of PhST, the law aims to set the official time and be displayed in key public areas in

both local and national government offices and enjoining the TV and Radio Stations to synchronize with PhST.

The road to a smarter Philippines is possible, with the help of science and technology in cementing its way.

## Fun-filled PAGASA activities for the 2013 World Meteorological Day

Celebrations and recognitions filled the celebration of National/World Meteorological Day PAGASA on March 22, 2013.

ALL HYPED UP

Kicking off the 63rd World Meteorological Day, PAGASA officials and employees paraded along Agham Road in Quezon City to create awareness about the said event with the theme "Watching the Weather to Protect Life and Property. Adding further interest for the 50th World Weather Watch, the different divisions of PAGASA selected their muses to represent their respective groups, only this time, the selected muse was 50-years old and above. The parade was followed by a Holy Mass conducted at the PAGASA Science Garden grounds.

Knowing the importance of good health for every employee, PAGASA invited The Food Nutrition Research Institute to conduct nutrition counseling. Other activities such as aerobics and fun games added enjoyment for the day.



## Then and Now

Also celebrating its 148th year of existence, PAGASA conducted an exhibit of its old and new weather forecasting equipment. The exhibit was viewed by students and stakeholders, as well as foreign guests. Visitors were amazed by the old equipment and images dating back since the early years of the weather bureau in the 1800s.

A scientific and technical symposium was also held in the afternoon, facilitated by weather specialists from PAGASA. Topics discussed were the history, current and future weather forecasting and monitoring system of the agency. Dr. Medel Limsuan, the resource person from the National Grid Corporation of the Philippines (NGCP) talked about the storm tracking alert and relay system.

## Advancing with Time

Expecting to provide faster weather information, PAGASA's newest project, the Visual Weather Forecaster's Workstations and the Consortium for Small-scale Model (COSMO), was launched during the 2013 World Meteorological Day celebration.

Having a more realistic and better numerical forecasting than its 2009 predecessor, the COSMO model is highly sophisticated with accurate and high resolution numerical weather prediction that can initialize an hourly forecast. The COSMO model addresses the demands for better integrated climate information that can mitigate the increasing vulnerability of society, economy and infrastructure in severe weather conditions.

Understanding the evolving role of forecasters, PAGASA also created the Forecaster's Workstation to manage the workflow and coordination of the PAGASA main office and its regional services divisions. Taking advantage of the latest technologies and programs, communication and data transfer of the different regions are now more interactive and timely in terms of the data available for forecasting and corresponding analysis.

## Recognizing Loyalty and Support

Concluding the World Meteorological Day celebration, an awarding ceremony for the fun games and best muse followed late in the afternoon. Over seventy PAGASA employees were awarded for their outstanding contribution in service, starting from 15 years to 40 years. Around twenty retirees were also recognized during the event.

In recognition of outstanding contribution of individuals and organizations in disaster-risk management projects of PAGASA, the annual Wind Vane Award was presented in the evening celebration. Hosted by GMA-7's Mariz Umali and Joel Reyes Zobel, the Wind Vane Awards were given to the Science Education Institute (Education and Training), Australian Aid (Technical and System Support), Panahon TV (Weather Broadcasting), Mr. Ellaquim Ausan Adug (Commitment to Public Service, PAGASA Retiree), and DOST Undersecretary Fortunato dela Peña (Human Resource Development).

PAGASA looks forward to another year of celebration, in accordance with the World Meteorological Organizations' vision of providing safety and well-being of people throughout the world and to the economic benefit of all nations.

# Typhoon and flood awareness week

In line with the observance of the typhoon and flood awareness week, PAGASA conducted a media seminar workshop in Mindanao area.

As a media practitioner, I really appreciate [the seminar] and I am so thankful to the PAGASA-DOST team who exerted efforts for this media seminar- workshop. It's very informative and I obtained more knowledge."

Those were the kind words that one participant shared after attending the media seminar-workshop entitled "Southern Mindanao Media Seminar-Workshop" which aimed to create stronger ties with the media and strengthen their basic knowledge in meteorology and other PAGASA products and services, held in Davao at the Grand Regal Hotel on June 14-16, 2013.

## Teaching The Basics

In her opening remarks, Ms. Edna Juanillo, OIC of the Climatology and Agrometeorology Division, recognized the fundamental role of the media in working together with PAGASA-DOST in "providing timely, accurate, and reliable weather-related information to the people and helping them prepare for any impending threats and mitigate the causes of natural hazards".

Now on its 21st edition, the seminar was attended by almost 50 participants from different regions in Southern Mindanao. Providing support for the event was the team from the DOST Region XI headed by Ms. Elsie Mae Solidum, Assistant Regional Director.

Ms. Venus Valdemoro, OIC of the PAGASA Public Information Unit, requested the participants to introduce themselves and cite their expectations for the seminar. The participants all agreed that they wanted to learn more about PAGASA and understand how weather forecasting works.

A lecture on Basics of Meteorology was conducted by Mr. Niño Relos, Weather Specialist II of the Weather Division. It was followed by a presentation of the Project NOAH entitled "NOAH as a Tool in NDRMM" facilitated by Mr. Oscar Victor Lizardo. The open forum that ensued involved discussions on hazard maps, danger zones and necessary preparedness plan. Participants were made aware of the specific responsibilities of the different government agencies in disaster risk-reduction and management. PAGASA, for its part, reiterated that necessary monitoring and warnings were consistently performed by the Agency and were timely relayed to the general public.

Aiming to "disturb the sensibilities" of the media, Mr. Mario C. Garcia, a long-time media consultant of PAGASA, delivered a brief but enlightening talk about the crucial role of media in disseminating weather information. Mr. Garcia emphasized the need for more responsible news reporting especially during severe weather disturbances in the country. He added that media practitioners like him should practice the culture of elevation or encouragement instead of participating in a "culture of disgust". After his talk, the first day of the training ended with a dinner fellowship.

## Stronger Ties

On the second day of the training, one participant volunteered to share what she learned so far. Ms. Julia Sta. Romano, Science and Technology Correspondent of GMA News Online, showed her tweets (messages) posted at a social networking site www.storify.com. Some of her messages include "Made it to DOST-PAGASA workshop for media. Ready to report the weather better!"


Adding further knowledge for the media participants were lectures about PAGASA's Weather Forecasting and Warning System by Mr. Rene Paciente; Flood Events, Mitigation, Forecasting and Warning System by Ms. Rosalie C. Pagulayan; Climate in the Philippines by Ms. Daisy F. Ortega of Mindanao-PRSD, Global Warming and Climate Variability by Ms. Edna L. Juanillo; and the Astronomical Services of PAGASA, as well as an introduction of the Philippine Standard Time, both discussed by Mr. Mario M. Raymundo. The participants were also able to learn the basics of typhoon tracking through a brief exercise conducted by Mr. NiñoRelos. Included in the seminar was an orientation on the Republic Act 10344 otherwise known as "The Risk Reduction and Preparedness Equipment Protection Act" facilitated by Ms. Valdemoro.

The seminar-workshop for the media hoped to reach other provinces in the country, especially in the typhoon and disaster prone areas. The partnership between the media and PAGASA would certainly result to dependable and effective dissemination of weather updates and could lead to more prepared and informed communities.

As one participant testifies "sustain and continue this kind of activity, considering that we have to learn more. It is informative and interesting. Thank you for the opportunity."

The media seminar was part of the 2013 Typhoon and Flood Awareness Week organized by PAGASA with the theme "Kaligtasan sa Bagyo at Baha: Isulong Saan Mang Sulok ng Bansa". A similar orientation was also conducted for teachers and students held at the Amihan Conference Room of the PAGASA Science Garden in Quezon City on June 28, 2013.



# PAGASA Bowling Teams dominate the 2013 Sec. M. G. Montejo Tenpin Bowling Cup Tournament

The PAGASA Men's Bowling Team emerged as champion in the Sec. M. G. Montejo Tenpin Bowling Cup Tournament 2013 while the PAGASA Women's Bowling Team bagged 2nd runner-up in the Women's Division Group A in the event held on August 30, 2013.

The Men's Team won the championship for the third consecutive year with the Technology Resource Center (TRC) and DOST Central Office men's team finishing 1st runner-up and 2nd runner-up, respectively.

Aside from their gold trophy, the men's team achieved the record for the highest team triple and Mr. Larry Clemente, the best scorer of the tournament, and made the highest individual triple. Mr. Hilton Hernando (5th) and Mr. Jose "Pepe" Mendoza (7th) also landed among the Top 10 scorers after the elimination round.

The women's bowling team, meanwhile, ranked third this year following Technology Application and Promotion Institute (TAPI) which emerged as champions and Forest Products Research and Development Institute (FPRDI) which ranked second.

Individual recognition were given to Mesdames Tess Millanes and Tess Sañez for placing seventh and 10th, respectively, in the Top 10 top scorers for the Women's Division.

Besides the main tournament, a special Master's Event was held on August 16, 2013 where Mesdames Millanes and Flordeliza Clemente won as champion and 2nd-runner up, respectively in the women's division while Mr. Conrad Aldovino placed 2nd runner-up for the men's division. All games for the tournament were held at the Astrobowl in Metropolis Starmall, Alabang, Muntinlupa City.

The PAGASA women's table tennis also did well winning 2nd runner–up.

# Capitalization

## Manpower Resources

The DOST-PAGASA has a workforce of 863, with 777 or 90% personnel occupying permanent positions and 86 or 10% part-time in 2013. The total personnel complement is broken down into: 198 or 23% for administrative functions; 86 or 10% for Research and Development activities; 570 or 66% for Science and Technology Service delivery (STS) and 9 or 1% engaged in Science Technology Education and Training (STET) Program as shown in Table 2.

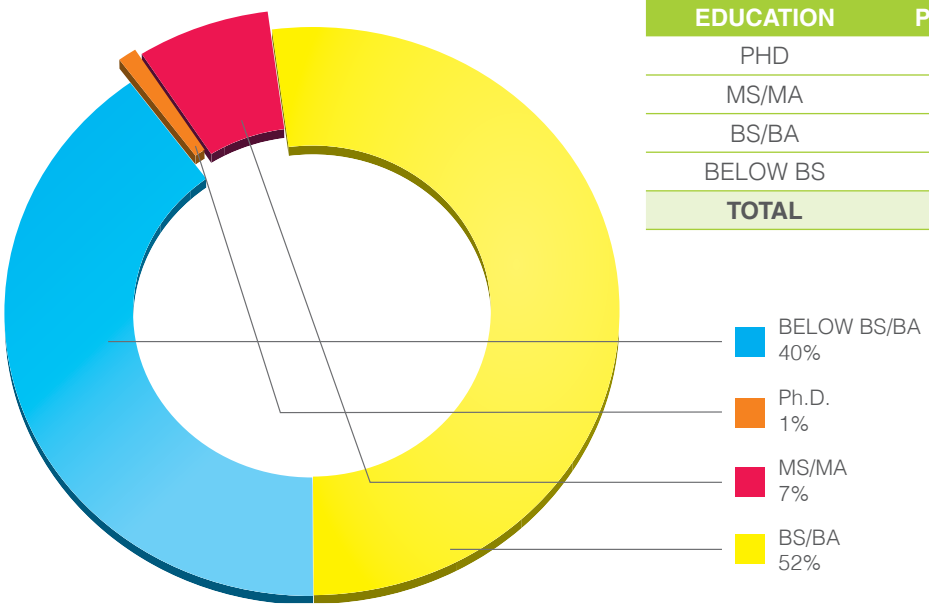
Table 2: Personnel Distribution by Level of Education and S&T Functions as of December 2013
*Reference: WARM BODIES and ACTUAL DEPLOYMENT as of DECEMBER 31, 2013*

| CATEGORY OF PERSONNEL | LEVEL OF EDUCATION | | | | TOTAL |
|---|---|---|---|---|---|
| | BELOW BS | BS/BA | MS/MA | PHD | |
| S&T Service (STS) | 242 | 286 | 37 | 5 | 570 |
| Research and Development (R&D) | 28 | 48 | 7 | 3 | 86 |
| S&T Education and Training (STET) | 3 | 5 | 1 | 0 | 9 |
| General Administration and Support Service (GASS) | 68 | 112 | 16 | 2 | 198 |
| **TOTAL** | **341** | **451** | **61** | **10** | **863** |

By level of education, 10 have PhD degrees, 61 with MS/MA degrees, 451 with BS/BA degrees and 341 are below BS as shown in Table 3.

Table 3: Personnel Distribution by Level of Education
*Reference: WAM BODIES and ACTUAL DEPLOYMENT as of DECEMBER 31, 2013*

| LEVEL OF EDUCATION | NO. OF PERSONNEL | % |
|---|---|---|
| PHD | 10 | 1 % |
| MS/MA | 61 | 7 % |
| BS/BA | 451 | 52 % |
| BELOW BS | 341 | 40 % |
| **TOTAL** | **863** | **100%** |



Personnel Distribution by Level of Position, Gender & Education
*Reference: WAM BODIES and ACTUAL DEPLOYMENT as of DECEMBER 31, 2013*

| | GENDER | | | EDUCATIONAL ATTAINMENT | | | | |
|---|---|---|---|---|---|---|---|---|
| | MALE | FEMALE | TOTAL | PHD | MS/MA | BS/BA | BELOW BS | TOTAL |
| 3RD LEVEL OFFICIALS | 2 | 1 | 3 | 2 | 1 | 0 | 0 | 3 |
| 2ND LEVEL OFFICIALS AND EMPLOYEES | 150 | 125 | 276 | 5 | 56 | 209 | 5 | 275 |
| 1ST LEVEL EMPLOYEES | 353 | 232 | 585 | 3 | 4 | 242 | 336 | 585 |
| **TOTAL** | **505** | **357** | **863** | **10** | **61** | **451** | **341** | **863** |

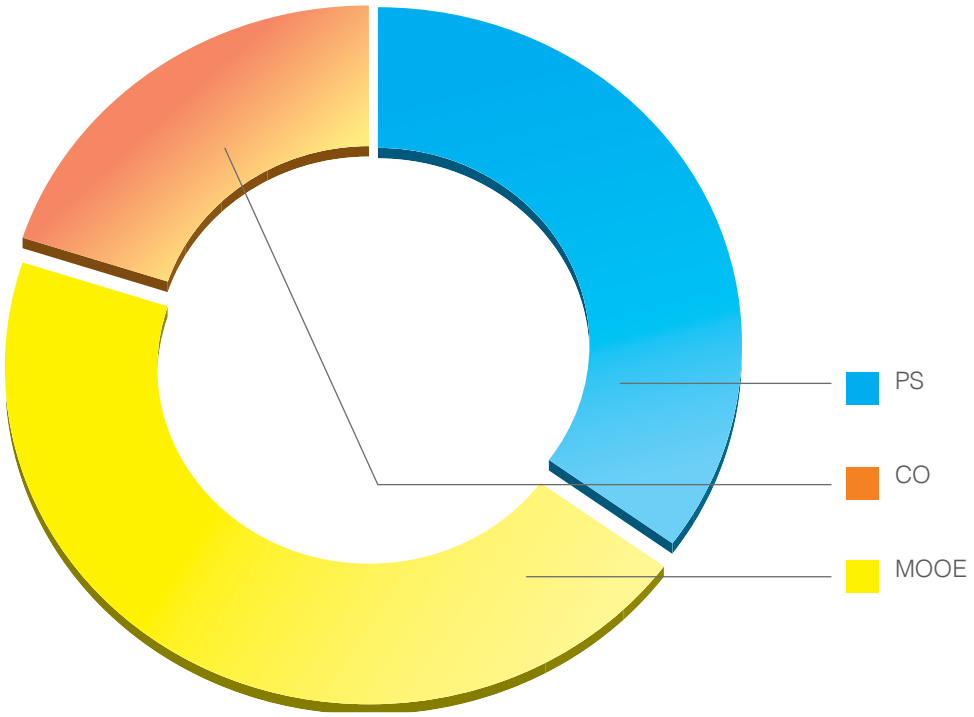
# Financial Resources

The DOST-PAGASA, as in other government agencies, relies on its annual budget passed by Congress to support its operations and activities. In addition, the agency also exerts serious efforts to generate funds from other sources such as the calamity fund, partnership with LGUs and ODA funds from various funding agencies. For the year, the agency has a total budget of Php1.4B. With 62% allotted for operation and services, 38% for General Administration Support and Services (GASS). There is an increase of 12.21% budget for the year 2013 due to the additional allotment in the maintenance of the additional Doppler radars.

FY 2013 Breakdown of Budget by MFO / Expense Class (as per NEP)

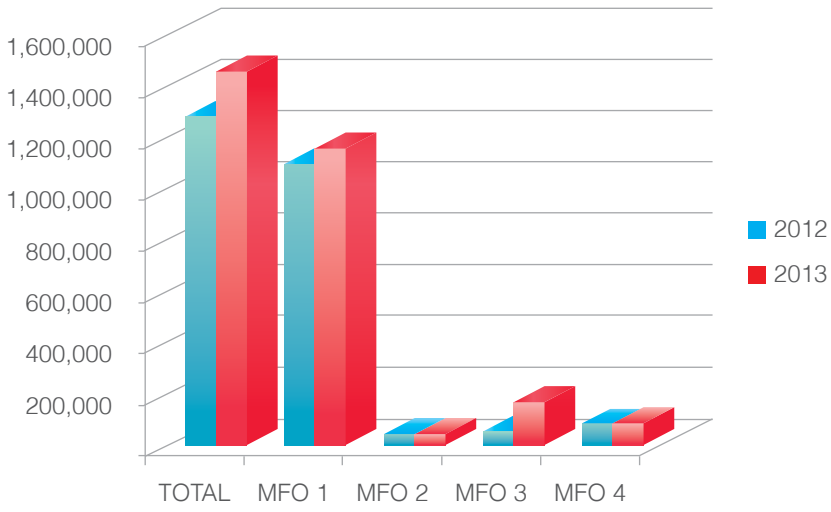
| Particulars | PS | MOOE | CO | TOTAL | % Share |
|---|---|---|---|---|---|
| **MFO 1** | **258,542** | **360,653** | **535,871** | **1,155,066** | **79%** |
| Forecast and Warning Services on Weather, Flood, Climate, Astronomy and Extreme Weather Events | | | | | |
| MFO 2 | 23,868 | 24,257 | - | 48,125 | 3% |
| Hazard Mapping and Risk Assessment Services | | | | | |
| MFO 3 | 47,832 | 17,551 | 102,390 | 167,773 | 12% |
| Research and Development | | | | | |
| MFO 4 | 24,925 | 60,906 | 5,410 | 91,241 | 6% |
| Disaster Preparedness, Risk Mitigation and Other Services | | | | | |
| **TOTAL** | **355,167** | **463,367** | **643,671** | **1,462,205** | |
| **% Share** | **24%** | **32%** | **44%** | | |

FY 2013 Budget by Expense Class




Comparative Budget by MFO

1. Forecast and warning services on weather, flood, climate, astronomy and extreme weather event
2. Hazard Mapping and Risk Assessment Services
3. Research and Development
4. Disaster Preparedness, Risk Mitigation and Other Services




| | Total | MFO 1 | MFO 2 | MFO 3 | MFO 4 |
|---|---|---|---|---|---|
| **2012** | 1,283,646 | 1,101,821 | 44,011 | 53,353 | 84,461 |
| **2013** | 1,462,205 | 1,155,066 | 48,125 | 167,773 | 91,241 |

# Challenges and Directions for the coming year

## Programs and Projects

The economic and social consequences of natural disasters caused by extreme weather events are very discouraging. A significant part of the economy is always threatened by these climatic events. During 2013, the country suffered tremendous damages from a series of meteorological-related disasters. Typhoon "YOLANDA" brought havoc to the country particularly in Eastern Visayas provinces of Tacloban and Guiuan, Samar. Thousands of death and significant agricultural and economic losses were recorded.

However, the hazards could have been prevented from becoming disasters through timely and reliable forecast and warnings and if appropriate actions are followed. The occurrences of these natural hazards cannot be prevented, but through the understanding of the processes in their evolution and their impacts, the damage they cause can be minimized. There is always a need to protect human and socio-economic resources to reduce loss of lives and properties to achieve sustainable national development.

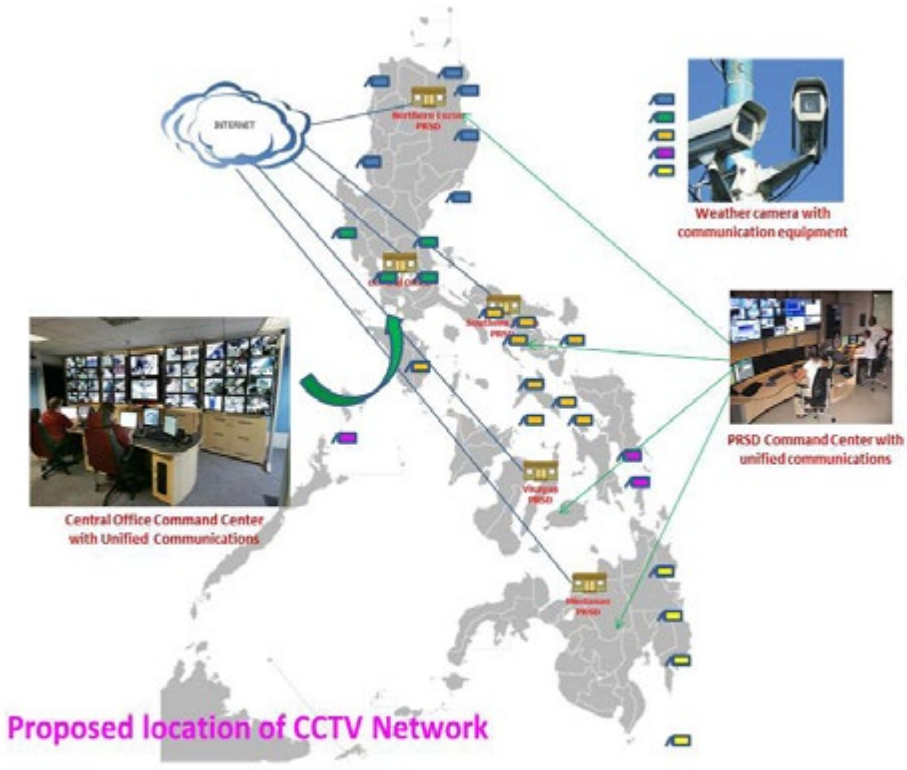
Up to date weather forecasting involves a combination of computer models, observation and knowledge on the trends and patterns. Gathering of observation data from various parts of the atmosphere helps generate a more graphic illustration of weather. The most important component of forecasting, the need for reliable data is vital for more accurate weather and climate data.

The agency identified a set of priorities which are consistent with the DOST's vision and within the framework of the Philippine Development Plan 2011-2016, specifically, on climate change adaptation and disaster risk reduction, preparedness and hazard mitigation with the following programs and projects to be implemented for the 2014 and beyond.

### Enhancement of Weather Forecasting Capabilities

**Automated Data Integration, Analysis and Display System for Timely and Reliable Weather Information for Disaster Mitigation and Decision Support**

1. Severe storm prediction system
2. Integration of 10 radars by 2014
3. Continue implementation of the project "Enhancing the forecasting and Warning Capabilities through Effective Utilization of Weather Data" - JICA-TCP funded project
4. Installation of Wind tunnel
5. Establishment CCTV network
6. Acquisition of lightning detector
7. Micro satellite space raft



**Doppler Weather Radar Program**

1. Completion and operationalization of four (4) additional radars (Zamboanga, Busuanga, Iloilo and Quezon, Palawan) [Iloilo Radar & Infra requirement for Zamboanga & Busuanga are funded out of Disbursement Acceleration Program (DAP) while Quezon, Palawan GAA funded.
2. Additional Installation of Doppler Radar in Daet, Camiguin/Sequijor, Dinagat/Siargao, and Zamboanga del Norte
3. Radar data validation/calibration

**Enhancement of Observation network**

1. Repair/rehabilitation:
   - Synoptic stations – Tacloban City; Catbalogan and Borongan Samar; Maasin, Eastern Samar; Roxas, Capiz; Cuyo and Coron Palawan; and San Jose, Mindoro
   - Agromet stations –Mambusao, Capiz and Visca, Leyte
   - Doppler radar station – Guiuan, Samar
   - Weather instruments – Barometer, thermometer, Anemometer, rain gauge, barograph ,sling psychrometer, etc

Micro-Satellite Spacecraft


Lightning Detector

**Rolling-out of Automated Weather Stations, Rain gauges, and Water level sensors**

1. Installation of more AWS, WLS and RG (in collaboration with ASTI and DOST ROs.)
2. Indentified probable sites for AWS, ARG, and WLS
3. Data validation
4. Conduct of IEC
5. Conduct testing and calibration

**Warning system for Marine Navigation and Transport**

1. Procurement and Installation of 2 locally fabricated Meteorological Buoys (in coordination with ASTI).
2. Identified and surveyed probable sites

**Redundant Communication System**

1. Redundant Communication System
2. PAGASA Unified Information System (PUMIS)
3. VSAT Interconnectivity

## HRDP- Improving capacities of PAGASA FORECASTING personnel

Increasing the pool of operational forecasters/hydrologists
Ph.D/M.Sc graduates (Foreign Universities)
Meteorologist Training Course
Meteorological Technician Training Course-MTTC
Hydrologist Training course

## Strengthening Flood Monitoring, Forecasting and Warning System

Upgrading of the Cagayan River Basin telemetered FFWS
Continuous implementation of upgrading the Bicol River Basin telemetered FFWS
Continuous installation of more WLS in 13 major River Basins (in collaboration with ASTI)
Continuous establishment of FFWS in major river basins in the country

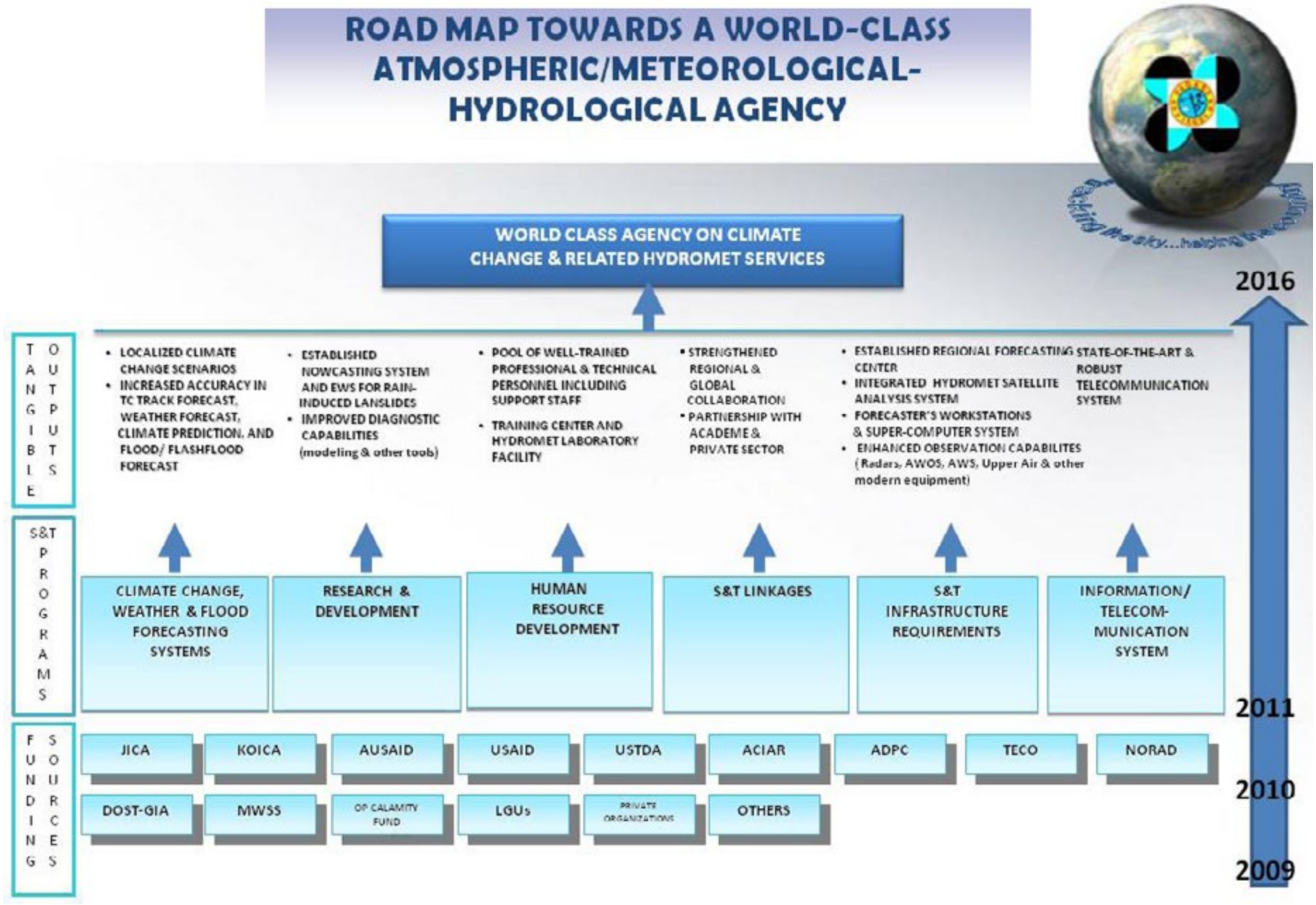
## R&D: Strengthening Support to Climate Change Adaptation Related Measures

Rolling-out of Climate Change Projection Scenarios information
Climate Seasonal Forecast
Continue conduct of Climate Change Projection Scenario and Modeling and IEC

## DRR Related S&T Program/Awareness Promotion

Hazard mapping using GIS
IEC on storm surge, TC and other severe weather hazards
Media Seminar Workshop
Documentary film and infomercial/video on DRR

# ROAD MAP TOWARDS A WORLD-CLASS ATMOSPHERIC/METEOROLOGICAL-HYDROLOGICAL AGENCY




Road map shows the medium-term plans of PAGASA for the period of 2009-2016

# PAGASA-DOST 2013
# Directory of Key Officials

**VICENTE B. MALANO, Ph. D.**
Acting Administrator,
9294865/4349040
vmalano58@yahoo.com

**CATALINO L. DAVIS, MPA**
Acting Deputy Administrator,
Office of the Deputy Administrator
for Administration and Engineering Services
4342579/ 4343039
cl_davis1999@yahoo.com

**FLAVIANA D. HILARIO, Ph. D.**
Acting Deputy Administrator,
Office of the Deputy Administrator
for Research & Development
4342537/ 9291953
fhilarioph@yahoo.com

**SUSAN R. ESPINUEVA**
Chief, Hydro-Meteorology Division (HMD)
9265060
srespinueva@gmail.com

**ROBERTO S. SAWI**
Officer-In-Charge, Weather Division (WD)
9271541/ 9271335
r_sawi@hotmail.com

**CYNTHIA P. CELEBRE, Ph. D.**
Chief, Research & Development and Training Division (RDTD)
4342675/ 4349843
cynthia_celebre@yahoo.com

**EDNA L. JUANILLO**
Officer-In-Charge, Climatological and
Agrometeorological Division (CAD)
9291953/ 4340955
ejuanillo@yahoo.com

**ENGR. EDWIN F. MANRESA**
Officer-In-Charge, Engineering and Technical Services Division (ETSD)
9286461
efmanresa@yahoo.com

**LILIBETH B. GONZALES, CPA**
Chief, Financial, Planning and Management Division (FPMD)/
4342632/ 4341882
fpmd_pagasa@yahoo.com

**SYLVIA N. DAVIS, MPA**
Chief, Administrative Division (AD)
4364033/ 4343830
viaviang@yahoo.com

**ENGR. FREDOLINA D. BALDONADO**
Officer-In-Charge, Northern Luzon – PRSD
Provincial Capitol Compound
Regional Government Center, Carig Sur, Tuguegarao City
(02) 9275343
fredolina_baldonado@yahoo.com

**LANDRICO U. DALIDA, JR., Ph. D.**
Chief, Southern Luzon – PRSD
Airport Cmpd. Legazpi City, Albay 4500
(052) 4814471; (052) 8206726
landrico_dalidajr@yahoo.com

**ESPERANZA O. CAYANAN, Ph. D.**
Officer-In-Charge, National Capital Region (PRSD)
PAGASA Science Garden, Agham Road, Diliman, Quezon City
433-14-56
eocayanan@gmail.com

**ENGR. OSCAR C. TABADA**
Officer-In-Charge, Visayas – PRSD
Airport Road, Pusok, Lapu-lapu City, Mactan Cebu
(032) 3404143; (032) 3401868
oscartabada@yahoo.com

**RICARDO A. MERCADO**
Chief, Mindanao-PRSD
Juan Luna St. Cagayan de Oro City
(08822)- 745164
ric_mercado58@yahoo.com


**Plans and Programs Development Unit (PPDU)**

Nancy T. Lance  Renely L. Basiño
Roque E. Adora  Isabella Angelica A. Millanes  Ramon C. Agustin

## PAGASA KO

Ganap mong adhikain
Kaligtasan ng buhay
Sa pagbabago't
Pagtugon ng kalikasan

Agham na kaakibat ng talino at husay
Sa pinsala'y nagsisilbing
pananggalang

KORO

Sa pagdilim ng mga ulap
Sa gitna man ng unos ay kabalikat
Kaagapay kang lubos
Sa pagtaas ng mga alon
At maging sa tag-tuyo
Sa bawat panahon
Makakaasang PAGASA ko

Ang `yong paglilingkod
Sa bayan na pinag-inam
Ay katiyakang dulot ay kapanatagan

Agham na kaakibat ng talino at husay
Sa pinsala'y nagsisilbing
pananggalang

Sa pagdilim ng mga ulap
Sa gitna man ng unos ay kabalikat
Kaagapay kang lubos
Sa pagtaas ng mga alon
At maging sa tag-tuyo
Sa bawat panahon
Makakaasang PAGASA.....

Sa pagdilim ng mga ulap
Sa gitna man ng unos ay kabalikat
Kaagapay kang lubos
Sa pagtaas ng mga alon
At maging sa tag-tuyo
Sa bawat panahon
Makakaasang PAGASA ko

**DEPARTMENT OF SCIENCE & TECHNOLOGY**
Philippine Atmospheric, Geophysical &
Astronomical Services Administration

PAGASA Bldg, Science Garden
Agham Road, Diliman Quezon City

Tel. Nos:
**439-9040 / 927-9308**

Fax. No:
**929-4865 / 434-2696**

Website:
**www.pagasa.gov.ph**

Dial-A-Weather:
**434-ULAN (8526)**

Follow us on
**twitter.com/#!/dost_pagasa**

Like us on
**facebook.com/pages/dost_pagasa**