



Philippine Atmospheric, Geophysical &  
Astronomical Services Administration  
(PAGASA)

The background of the cover is a vibrant, multi-colored geometric pattern of overlapping triangles and polygons in shades of red, orange, yellow, and blue. Overlaid on this pattern is a network of white lines connecting various points, representing a data or communication network. On the left side, there is a detailed illustration of a satellite dish antenna mounted on a complex metal structure. The overall aesthetic is modern and technological.

**Reaping honors  
and respect with  
improved capacity,  
total commitment &  
exemplary service**

*“tracking the sky...  
helping the country”*

**2015  
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

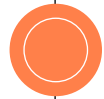
Center of excellence for weather related information and services.

## Mission

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

## Core Values

Integrity  
Commitment  
Patriotism





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# CITIZEN'S CHARTER

## I. Mandate/Mission/Vision/Values/Functions

### 1. 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.

### 2. Mission

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

### 3. Vision

Center of excellence for weather related information and services

### 4. Values

Integrity  
Commitment  
Patriotism

### 5. Functions

- Maintains a nationwide network pertaining to observation and forecasting of weather and flood and other conditions affecting national safety, welfare and economy;
  - 57 Synoptic Stations
  - 23 Agromet Stations
  - 8 Upper-air Stations
  - 16 Radar Stations
  - 2 High Frequency Doppler Radar (HFDR)
  - 2 Automated Observing System (AWOS)
  - 155 Automatic Weather Stations (AWS)
  - 187 Automatic Rain Gauge (ARG)
  - 47 Water Level Sensor (WLS)
  - 1 Wind Profiler
  - 2 Marine Buoys
  - 78 Climat/Rain Stations
  - 1 Background Pollution Monitoring Station
- Undertake activities relative to observation, collection, assessment and processing of atmospheric and allied data for the benefit of agriculture, commerce and industry;
- Engage in studies of geophysical and astronomical phenomena essential to the safety and welfare of the people;
- Undertake researches on the structure, development and motion of typhoons and formulate measures for their moderation; and
- Maintain effective linkages with scientific organizations here and abroad and promote exchange of scientific information and cooperation among personnel engaged in atmospheric, geophysical, astronomical and space studies.

## II. Performance Pledge and Feedback and Redress Mechanisms:

### 1. Performance Pledge

We, the professional and dedicated officials and employees of the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), commit to:

Provide service promptly, efficiently and with utmost courtesy by authorized personnel with proper identification from Mondays to Fridays. 8:00 AM to 5:00 PM, without noon break; for Administration support and other similar services and **24/7 whole year round for forecasting services**,

Adhere to strict compliance with service standards, with written explanation for any delays in the services we offered;

Give timely response to complaint about our services the soonest and take corrective measures accordingly;

Assure that every client's comments, suggestions and needs are given importance.

Satisfy our customers' needs by acting on their feedback and informing them of any developments first hand;

Allow the public access to information on our programs, activities and services through our website (**[www.pagasa.dost.gov.ph](http://www.pagasa.dost.gov.ph)**) or through SMS, and our hotline 434-RAIN (7246), 927-1335 and 434-2696, FOLLOW US ON TWITTER @dost-pagasa, <https://twitter.com/dost-pagasa>. LIKE US ON FACEBOOK DOST\_pagasa <https://www.facebook.com/PAGASA.DOST.GOV.PH>

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Above all, we pledge to serve everyone with utmost honesty, dedication, respect and understanding, for we believe that in so doing, we are also serving and honoring our country and God Almighty.

### 2. Feedback and Redress Mechanisms

Please let us know how we have served you by:

- a. Accomplishing our Feedback Form available at the lobby and put in the drop box located at the front desk or give to the employee of the division concerned.
- b. Sending your feedback through our website (**[www.pagasa.dost.gov.ph](http://www.pagasa.dost.gov.ph)**) or call our hotline 434-RAIN (7246), 927-1335 and 434-2696, FOLLOW US ON TWITTER @dost-pagasa, <https://twitter.com/dost-pagasa>. LIKE US ON FACEBOOK DOST\_pagasa <https://www.facebook.com/PAGASA.DOST.GOV.PH>

Your written/verbal complaints shall immediately be attended to.

Thank you for helping us improve our services.

# SERVICE STANDARDS

## I. Processed Data (Daily Summaries, rainfall maps, etc.)

Who May Avail of the Service : General Public

Fees : Minimum of P1,000 weather certificate first 3 pages  
 : Php 36.00/yr/parameter for monthly data  
 : Php 360.00/yr/parameter for daily data

How to Avail of the Service

Step	Client/Customer	Activity	Maximum Duration	Person In Charge
1	Register with the guard and seek the assistance of the personnel from the Section concerned.	Attend to the inquiries/needs of the client	30 minutes	Guard/Personnel from Section Concerned
2	A written request from the party.	Inquire from climate databank the availability of the data	30 minutes	Personnel from the Section concerned
3	Pay the Cashier at the 3rd floor	Process the request and the customer of the appropriate charges by preparing the Order of Payment	30 minutes	Personnel from the Section concerned
4	Execute conforme that data is to be used only for specified purpose.	Release data/maps to client upon presentation of receipt	15 minutes	Personnel from the Section concerned
5	Accomplish Feedback Form	Solicit client's appraisal of services provided	15 minutes	Personnel from the Section concerned

## II. Other Services (Calibration, Planetarium Services)

Who May Avail of the Service : General Public

Fees : Minimum of P510 depending on the instrument calibrated  
 : P25 per person for planetarium services

How to Avail of the Service

Step	Client/Customer	Service Provider	Maximum Duration	Person In Charge
1	Register with the guard and seek the assistance of the personnel from the Section concerned.	Attend to the inquiries/needs of the client	30 minutes	Guard/Personnel from Section Concerned
2	A written request from the party. Fill out required form	Consult with the Division in charge of the desired services	30 minutes	Personnel from the Section concerned
3	Conform with the arrangements discussed.	Discuss and finalize arrangement like fees, date services can be provided, the equipment and services needed, etc.	1 hour	Personnel from the Section concerned
4	Pay the Charges to the Cashier	Provide the services agreed upon	1 - 2 hours	Personnel from the Section concerned
5	Accomplish Feedback Form	Solicit client's appraisal of services provided	5 minutes	Personnel from the Section concerned

III. For weather forecast/reports/updates proceed to Weather Division at WFFC Building located a few meters from the PAGASA Main Office

**MARIO G. MONTEJO**  
**DOST Secretary**



My congratulations to DOST-PAGASA for a truly unprecedented year!

The timely passage of the PAGASA Modernization Act, as signed into law by President Benigno S. Aquino, affirms the weather agency's goal to become a world-class institution that protects the lives and properties of Aling Maria and Mang Juan from weather and other related hazards.

The much improved and consistent positive performance of our weather scientists had clearly manifested through their efficient monitoring of Tropical Storm Amang, and other weather disturbances that entered the Philippine Area of Responsibility this year, as well as through the close monitoring of the El Niño phenomenon that seriously threatens our country to this day. These have resulted into the agency's recognition and numerous commendations, such as from the prestigious Makati Business Club, and the President's SONA, among others.

Their bravery and dedication to public service have also been recognized by the House of Representatives, through House Resolution No. 196, commending the PAGASA personnel of Tacloban City station for heroism, for maintaining their post in the midst of Typhoon Yolanda.

This year of achievements merits a resounding commendation for the men and women of PAGASA. This should also serve as a challenge for the years ahead, that given the vastly upgraded equipment and expertise provided to them, they will be able to share the useful data they generate and provide others access to the same wealth of capabilities – so that we may exponentially increase its usefulness to the Filipino people.

Again, my warmest congratulations to all of you!



## VICENTE B. MALANO

### Acting Administrator

I will consider 2015 as indeed a significant year for PAGASA. With various recognition bestowed to us by different sectors in the country, reflected the valuable accomplishment we had related to our mandate. In 2014, PAGASA placed fourth in Makati Business Club (MBC) survey of government agencies, and from the accuracy of the services we provided, the agency proudly and consistently retained its position. Once again, the prestigious association cited PAGASA in 2015 as one of the top performing government agencies notching again the 4th position in a tie with the Department of Foreign Affairs (DFA). Last year likewise, PAGASA received a special citation from the Publishers Association of the Philippines (PAPI) for its outstanding performance.

During the last State of the Nation Address (SONA) in July, President Aquino narrated the achievement of PAGASA under his administration. The defining moment was his signing into law of the PAGASA Modernization Act in November last year.

The law affirmed the agency's direction towards comprehensive upgrading of its forecasting and warning services. This is a bold step to expedite the swift achievement of its goal to become a world-class institution mandated to provide protection of lives and properties from hydro meteorological hazards. With the timely passage of the law, PAGASA is now in a strong position to perform its mandate more effectively.

Prior to enactment into law, the perennial plan to modernize PAGASA always languished in both houses of congress due to lack of support from higher authorities.

During the year, the forecasting capabilities of PAGASA were put to serious test when the agency's Weather Division was highly considered for an issuance of ISO certificate for efficiency and quality standard of services. Subsequently, the strenuous requirement to gain the certification paid off as conferment of agency's Weather Division to ISO 9001:2008 was provided by TUV Rheinland Philippines Inc.

During the visit of Pope Francis to Tacloban, PAGASA was commended by the government due to its updated forecasts, warnings and information. The pope's visit to Tacloban was a success ensuring his safety even during the presence of Tropical Storm Amang. The newly acquired mobile radar provided the accurate weather information. It served as substitute to the heavily damaged Guiuan Doppler which was still inactive at that time.



# YEAR AT A GLANCE . . .

## For Public Benefits:

### Timely and significantly accurate issuance of weather advisories and severe weather bulletins

The tropical cyclones that entered the Philippine Area of Responsibility (PAR) in 2015 were diligently tracked and monitored starting from their incipient stages way-out of the Pacific Ocean. Thus, advanced and adequate advisories and warnings issued by the agency provided ample lead time to prepare threatened and affected population. This was especially demonstrated during the passage of Typhoon "Lando" and Typhoon "Nona" for which PAGASA merited commendation by the DSWD, other government agencies and the media for the timely and significantly accurate warnings provided for the two severe weather disturbances.

During the year, newly acquired mobile radar which will cover the blind spot areas in tracking tropical cyclones and other severe weather systems, was blessed on January 13, 2015 at the Weather and Flood Forecasting Center (WFFC) ground.

### Issuance of basin flood bulletins, dam operations flood bulletins and Metro Manila flood situationers

During the year, 106 flood bulletins for PABC river basins (for Pampanga 36; Agno 26; Bicol 20; and Cagayan 24) and 1,254 flood bulletin situationers were issued in connection with the passages of tropical cyclones "TD Amang", "T Ineng", "TS Kabayan", "T. Lando", "TS Nona", "TD Onyok" and occurrences of SW monsoon rains. Metro Manila flood situationers' are hydrological information on urban



*Blessing of mobile radar*

flash flooding issued by the PAGASA in collaboration with DPWH. Issuance of 9 dam flood bulletins and warning information (Angat 2; Binga/ San Roque 5 and Magat 2) were also made.

### Delivery of Climatological and Agro Meteorological Information Services

PAGASA issued a total of 305 Farm Weather Forecasts and Advisories (FWFA), 53 Tropical Cyclone Warning and Advisories (TCWA), 2 Weather Situation and Outlook (250 copies disseminated), 2 Seasonal Climate Outlook issued (250 copies

disseminated) and 12 Monthly Climate Impact Assessment (MCIA) bulletin for agriculture and other climate information packages and weather certification for different purposes. Farm weather information guides farmers to better management and planning of activities while tropical cyclone advisories help decision-makers and planners in the agricultural and business sector in the mitigation of the effects of drought and climate impact. Assessment Bulletin for Agriculture provides qualitative information on the current and potential effects of climate and weather variability and rain fed crops.

# OUR 2015 KEY PROGRAM AREAS...

The accelerated pace of industrialization set into motion by heavy influx of investments, both from within and outside the country, and the rapid growth in population raised the level and at the same time increased the variety of needs for weather, climate, hydrological and allied information. Consequently, PAGASA, as mandated, was necessitated to take a pro-active position to address these phenomena. Thus for the year 2015, an updated general programme of activities was laid out for implementation.

## Project 1: Philippine Climate Change Adaptation Project (PhilCCAP), World Bank, 2010-2017

- The project is aimed to develop and pilot-test adaptive strategies that will promote the climate resiliency of agriculture and natural resources management. It is also aimed to strengthen the capabilities of government agencies involved in climate change adaptation. The primary beneficiaries include farmers who often suffer from climate-related losses and communities in the uplands and coastal areas whose livelihood depend directly on natural resources.

One of the important components of the project involves improving the institutional capacity of PAGASA to provide climate risk information, and more broadly, to capture and analyze data including the utilization of modeling, to better understand climate change trends overtime for the information to be useful to policy makers, project managers, and public. This is also very timely, as climate change should be incorporated in the Comprehensive Land Use Planning (CLUP) of the Local Government Units. The updating of CLUPs includes wide range of land use related planning such as transportation, planning

and infrastructure design, water resources projects, environmental assessments, land use developments and municipal plans as first step towards mainstreaming Climate Change Adaptation and Disaster Risk Reduction. Climate projections generated by PAGASA are inputs that provides solid basis for guiding response and adaptation options and is a major asset in the decision-making process.

Climate Scenarios for the Philippines using Conformal Cubic Atmospheric Model (CCAM) developed by Australia was completed under the project, which contains various climate risks associated with the various climate change indices. Moreover, other significant accomplishments of the project were the generation of climate/weather related hazards and projections of future climate in 2050 and 2100, Technical Policy Brief and a book entitled "Climate Change in the Philippines using CMIP5".



*User's training/workshop on the use of climate information held on August 26, 2015 at the Amihan Conference Room*



*AWS, Installed in Mina, Iloilo under the PhilCCAP Project*

## Project 2: Utilizing Coupled Model Intercomparison Project Phase 5 (CMIP5) for Statistical Downscaling under MOSAICC (Phase 2), Food and Agriculture Organization – Assessment and Mapping of Impacts of Climate Change to Agriculture and Food Security, 2014-2015

Climate projections under ARF4-CMIP3 in 2014 were provided and submitted to FAO-Philippines under FAO-AMICAF Phase 1 Project. In 2015, PAGASA-DOST executed more recent CMIP5 climate models to reach

more end-users through provision of updated climate change projections for the country. Outputs of the project are transformed to different planning and policy-making strategies by various sectors that focus on water

resource management, agricultural market modeling, food insecurity vulnerability analysis and climate change adaptation planning.

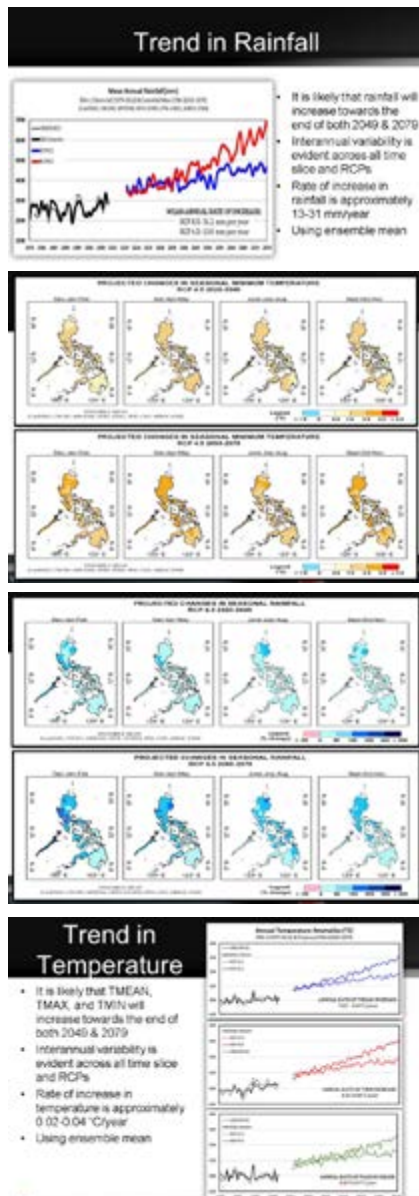
In addition, it statistically downscaled climate change projections base from the two Representative Concentration Pathways (RCPs) under the CMIP5's three participating Earth System Models

(ESMs) and spatially interpolated it at the provincial level. It also produced hind cast dataset from several CMIP5 models under AR5 and generated future climate projections for the period 2020-2049, and 2050-2079.

### Project 3: Wind Resources Assessment for Wind Power Systems, DOST-GIA, 2013-2015

This is aimed to assess wind energy potential at project sites for possible power generation through development of monthly and seasonal wind speed and direction including wind power density. It also supports the Philippine government efforts to promote the development and utilization of renewable energy resources in the country.

There were wind equipments installed in different provinces such as in Can-avid, Samar; San Vicente, Palawan; Lanuza, Surigao del Sur; Sta. Monica, Surigao del Norte and General Santos City under the project. Although, Typhoon Ruby devastated the wind equipment installed in Can-avid, Samar, still, it was rehabilitated on April 2015.



NRG Wind Monitoring Equipment at General Santos



NRG Wind Monitoring Equipment at Municipality of San Vicente, Palawan



### Project 4: Drought and Crop Assessment and Forecasting (DCAF), DOST-GIA, 2013-2015

The project monitors drought using a combination of in situ and satellite data and forecast drought 6-months ahead (or longer) using models with satellite data and in situ data assimilated. The importance of the project is focused on the investigation of the relationship between Satellite Derived Vegetation Index (NDVI) and crop phenology through validation studies. This is projected to produce the NDVI maps of the Philippines at 250m spatial resolution (2000-present), NDVI maps of the Philippines at 1km spatial resolution (1981-present), and schedule/s of crop rotation for the selected validation sites.

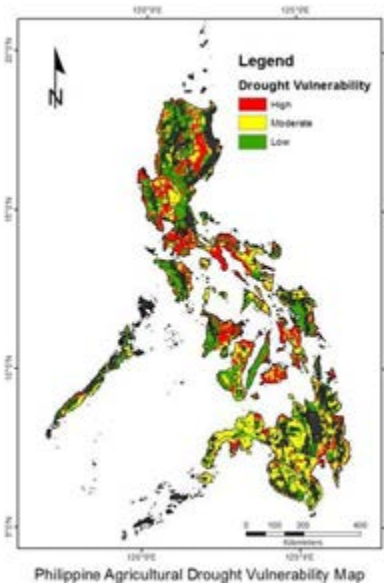
Other than that, the project is also aimed to detect drought vulnerable areas and to assess historical drought patterns through studies of seasonal and inter annual variability and trends in vegetation. It also investigates the influence of environmental parameters such as land surface temperature, precipitation and clouds, on the temporal and spatial variability of crops and its productivity to eventually produce a Drought-Vulnerability Map. In addition, the project evaluates the seasonal changes in evapotranspiration for the various crops of interest and the seasonal and spatial changes of soil moisture content through modeling studies. Also, it develops new drought indices/indicators, based on those currently used in other countries suitable to Philippine conditions which are more reliable in phenomenological and modeling studies.

Actual field validation was conducted on drought-affected areas like Iloilo,

Capiz, Negros Occidental and Occidental Mindoro. Through Key Informant Interviews (KIIs), the project team was able to gather historical records of drought on the said areas through Key Informant Interviews (KII). Furthermore, the crop classification in Central Luzon was done including the Vulnerability Map which is still being improved. Technology transfer will also be done to cooperating agencies for the sustainability of the project outputs.



*Field validation activities on the selected drought affected areas (Iloilo, Capiz, Occ. Mindoro): Historical records of drought are also obtained during field validation through KIIs*



*Development of Drought Vulnerability Map: will still include irrigation, ET and RF data, reliability is being assessed during field validation*

### Project 5: Building Capacity for Weather Forecasts and Warnings to Improve Early Warning of Extreme Weather and Resilience to Climate Extremes Following Typhoon Haiyan in the Philippines, GAA, 2015-2016

The objective of the Department for International Development (DFID) Philippines project is to improve early warning systems as well as to provide new future climate information to help guide decision makers in the Philippines in building resilience to climate extremes. It is significant and timely because PAGASA and other DOST agencies will be able to feed into the 'Build Back Better' programme produced by the Philippine Governments Reconstruction Assistance on Yolanda (RAY) report. Planning for future climate-related risks will provide decision-relevant information and tools about future tropical cyclone risks and climate extremes, and associated impacts, to inform resilience building in the Philippines and to support improving the capacity of PAGASA and key stakeholders to use new climate and weather information and tools.

The project is divided into four work packages. Firstly, the synthesis of available climate hazard information to support short term rebuilding decisions. The Met Office Hadley Centre, in conjunction with PAGASA, will produce a report that will synthesize available information across regional



*DCAF write shop & monthly meeting held at the University Hotel in UP Diliman on October 9, 2015*

observations and projections of climate extremes to provide early information on the potential hazards associated with changing climate extremes. Secondly, again MOHC, DOST and PAGASA will evaluate the availability of current weather and climate related vulnerability information along with hazard studies. Thirdly, high resolution regional climate scenarios driven by future scenarios will be generated. Lastly, future climate related risks and risk mapping will be evaluated.

**Project 6: Downscaling of Climate Change Scenario using Coupled-Model Intercomparison Project (CMIP3 and CMIP5), GAA, 2013-2016**

The program is aimed to use the dynamical downscaling of high resolution of the climate scenarios of the Coupled-Model Intercomparison Project Phase 1 and Phase 5, CMIP3 and CMIP5, respectively. It will use the different Regional Climate Models (RCMs) namely: Providing Regional Climates for Impact Studies (PRECIS) – 25km resolution, Conformal Cubic Atmospheric Model (CCAM) – 12km resolution and the Regional Climate Model System (RegCM4) – 25km resolution. This project will ensemble the three RCM outputs to provide better understanding of the future climate projections for the Philippines.

The Global Climate Models (GCMs) have coarse resolution (~200km, 100km or 60km). Downscaling coarse spatial resolution models to high-resolution (~25km, 12km or 8km) is necessary to capture the local climate patterns for the policy and adaptation strategies.

Climate projections for the Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (IPCC) are made using the newly developed representative concentration pathways (RCPs) under the Couple Model Inter-comparison Project 5 (CMIP5), termed after possible radiative forcing until the end of 21st century. CMIP5-based projections reflect recent advancements in integrated assessment modeling to characterize future developments in Global Greenhouse Gas (GHG) emissions since release of the predecessor scenarios – CMIP3 known as the Special Report on Emissions



*Scoping and discussion with different stakeholders: Manila Observatory (upper left), NDRRMC (upper right) and DILG (lower left)*

Scenarios (SRES) reported to the IPCC. The RCP 4.5 is the medium range scenario (more plausible for developing countries) and the RCP 8.5 is the high range scenario.

High Performance Computing System (HPCS) was installed in the CAD computer room. CMIP3 was also post processed from netcdf files to grid files and dbf files.

**Project 7: South East Asia Climate Analysis and Modeling Study (SEACAM), Center for Climate Research Singapore (CCRS)/Met Office Hadley Center (MOHC-UK), 2013-2015**

The need for more climate change projections in South East Asia is the

main driving force in the creation of SEACAM framework. SEACAM brought together representatives from 8 of the 10 ASEAN member countries at a planning workshop in June 2012 at Singapore. The need for a project using Regional Climate Model (RCM) driven by several global models dedicated to Southeast Asia came out from the said meeting. Those who have attended the meeting decided to share the work load required to run the models. Six 150-year PRECIS Regional Climate Model experiments, nicknamed as DURIAN experiments were designed over a common domain which encompasses all ASEAN-member countries.

SEACAM is aimed at the production of climate projections for South East Asia whereas climate projections require climate models to be run in the future.



*Trainers and participants at the June 2012 workshop in Singapore*



*Trainers and participants of workshop held in Singapore on February 2015*

SEACAM's Regional Climate Modeling experiment provides high resolution (25km) information on future climate change projections for the South East Asia up to year 2100.

It produced technical report entitled "Dynamical Downscaling using PRECIS for the Philippines". The data generated in the project was also utilized by different projects of other agencies particularly the Climate Change Commission (CCC) namely Project Twin Phoenix, Rebuild Project and GMMA-READY Vulnerability and Adaptation Project.

### **Project 8: Climate Impact Assessment for Rice (non-irrigated) and Cornfields Site Validation using Geographic Positioning System (GPS), GAA, 2009-2016**

This program is part of the main activities of Impact Assessment and Application Section (IAAS) of CAD

which is aimed to issue regular monthly bulletin, entitled "Climate Impact Assessment for Agriculture in the Philippines". The said bulletin serves as a means to convert meteorological data into economic information that can be used as supplement to other available resources and is disseminated to



*Some interviewed farmers showed their farm fields affected by water shortage*



*Interview with farmers on selected municipalities in Antique held on April 2015*

agricultural sectors and posted to PAGASA website regularly. Actual site survey and interview with farmers and ground truthing on areas that plants rice and corns is conducted to validate on the analysis of the said bulletin.

The analyzed data gathered from the survey provides guidance during the monthly analysis of the bulletin, serves as validation and eventually provides ideas regarding the cropping calendar of a region's planting and harvesting periods.

### **Project 9: Climate Impact Modeling on Various Sectors (e.g. water, agriculture, health), UNDP, Jan-December 2015**

The climate impact modeling seeks to improve understanding of how climate affects human society through assessment of current climate variability and potential climate change impacts caused by anthropogenic emissions of greenhouse gases and aerosols. The three pilot cities of the project are in Metro Manila namely Marikina City, San Juan City and Pasig City, focused mainly on the sectors of Socio-economic and Health. The project is aimed to assess the existing vulnerabilities and capacities of the prioritized cities together with the existing Disaster Risk Reduction/Climate Change measures and interventions. Through this, more climate impact modeling tools, including usage, recommendations and limitations will be sought out.

As extreme climate events tend to have acute impacts on society, this research is focused on the predictability and its relationship to other aspects of global change. Such assessments add important context to changes in climate variables by translating them into societal impacts and in identifying populations with substantial risks and/or opportunities. More specifically, in this study, Climate Adaptation utilized a Science-policy informed approach thru a comprehensive evaluation of the consequences of any policy decision regarding societal preparation for either short term or long term climate impacts. This will increase the resilience of the three LGUs by strengthening their institutional capacities to manage disaster and climate change risk.

**Project 10: Downscaling using Providing Regional Climates for Impact Studies (PRECIS) Regional Climate Downscaling, GAA, 2015-2016**

Regional Climate Model Providing Regional Climates for Impact Studies (PRECIS) using 25km resolution which is one component of the Climate Change in the Philippines was utilized in this project. The Global Climate Models (GCMs) with spatial resolution of 200km, 100km or 60km was downscaled to higher resolution, 25km. This is necessary to capture the local climate patterns for policy and adaptation strategies. Further, it will provide a high resolution climate



*Demonstration of Tilapia Aquaculture Farm in BFAR Regional Office, Muñoz, Nueva Ecija (upper right) AWS installation procedure demonstration (lower right)*



**Project 11: Building Capacities for a Climate Resilient Tilapia Farming in the Philippines, FAO, 2015-2016**

This is a collaborative effort among three agencies namely United Nation Food and Agriculture Organization (UNFAO), Bureau of Fisheries and Aquatic Resources (BFAR) and Philippine Atmospheric Geophysical and Astronomical Services Administration (PAGASA) wherein PAGASA is involved in the Development of Climate-Smart knowledge database, forecast products knowledge sharing and the

provision of other related services to increase climate-resilience of Tilapia Farmers. The project contributes to increase the resilience of the tilapia sub-sector through capacity building on weather-related early warning systems.

Under the project, PAGASA has provided resource persons on a grometeorology/climatology in the farmer-experts workshop to meet the goal of developing Climate-smart Tilapia Technology guide; provided aquaculture farm advisories in relation to local weather forecast including agro-meteorology guide for aqua culturists.

Through the project, installation and launching of Automatic Weather Stations (AWS) were provided along with El-Niño forums at different sites such as in Nueva Ecija, Minalin, Pampanga and Iriga City, Albay.

change projections down to the provincial level and will update the report of PAGASA on Climate Change in the Philippines 2009.

Moreover, the project will provide high-spatial resolution climate projections in different time slice of various meteorological parameters to local climatology that is more accessible to various end-users especially in the agriculture and natural resources sectors. The scientific information will enable more accurate decision making for climate risk management, particularly data support for the mainstreaming activities in reviewing, signposting, and translating existing climate risk information to key stakeholders and the adaptation interventions carried out at the local level by improving mechanical capabilities of responsible institutions including PAGASA.



involved in the Development of Climate-Smart knowledge database, forecast products knowledge sharing and the



*Mr. Lucero discussing on Climate Change Scenarios Projected Changes in Temperature and Rainfall and how it will affect Tilapia Farming (upper right image) BFAR/FAO Training of Community Meteorologist Workshop with PAGASA representatives: Mr. Lucero, Ms. Abastillas, and Mr. Ruiz (lower image)*

### Project 12: Utilizing Geospatial Technology to Assess Health Vulnerability to Climate Change for Rural Population in Vietnam and Philippines, Asia-Pacific Network (APN) for Global Change Research, 2015-2017

Vietnam and Philippines are recognized as the most vulnerable to climate change due to regular flooding and frequent typhoons thus climate change-related disease are evident. Changes in temperature and precipitation are likely to alter the incidence and distribution of vector-borne diseases such as Dengue and Malaria. The project aims to map the health vulnerability of these diseases for rural populations in Philippines and Vietnam through development of geospatial database including temperature, precipitation, land cover, socio-economic conditions and other factors that affect the exposure of a region to the said climate change related diseases. Identification of epidemiological patterns, vulnerable locations and risk factors will also be conducted to contribute in mapping health vulnerability to Malaria and Dengue.

The said activities matched with APN's Focus Activities of developing high-resolution earth observational datasets that can contribute to supply data gaps as well as sharing of public health-oriented data. Moreover, the project results will help build science-based knowledge for adaptation planning and decision-making in health sector via informing risk and vulnerability.



*Field work in Rural Health Centers in Nge Anh Province to learn about Dengue and Malaria health care services and policies in November 2015*

### Project 13: Support for the Implementation of OSRO/RAS/401/EC Project Activities in Bicol, Caraga and Davao Regions, Philippines, Food and Agriculture Organization (FAO) under the consolidating capacities for Disaster Risk Reduction (DRR) in Agriculture in South East Asia, August – December 2015

FAO and PAGASA as service providers have agreed to provide certain services as contribution to the implementation of the project OSRO/RAS/401/EC which is aimed to enhance livelihood resilience of small-scale farmers and fisher folks in disaster-prone areas including the Philippines through institutionalization of DRR in agriculture. This enables DRR planning aligned in Agriculture across government levels in three regions (Bicol, Caraga, Davao Regions) and adapts pre-tested good farming practices and services for DRR in agriculture provided in Bicol and Caraga.

### Project 14: Assessment and Verification of Consortium for Small Scale Modeling (COSMO) Model Products Performance, GAA, 2014-2015

The COSMO Model was developed in Europe to meet high-resolution regional forecast requirements of weather services. It provides a flexible tool for operational and scientific applications on a broad range of time and spatial scale. Within the model, there is a special Local Ensemble Prediction System (LEPS) to support the downscaling of the model. The project utilizes the COSMO Models for operational weather forecasting and visualizes the real-time weather situation. This produces hourly to three days weather forecasts both in numeric and maps.



**Project 15: Refinement of the Japan Meteorological Agency Storm Surge Model, GAA, 2014-2015**

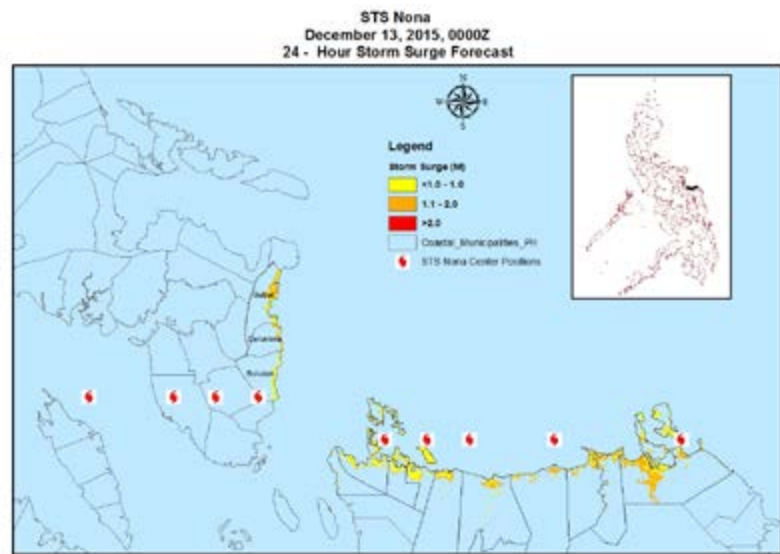
This project aims to refine the JMA Storm Surge Model to adapt to the Philippine situation. The project develops package of storm surge warning and advisories. This also creates a website for storm surge information dissemination. The outputs of this project such as storm surge hazard map and development of storm surge warning and advisories is beneficial to communities living along coastal areas at threat of storm surges.



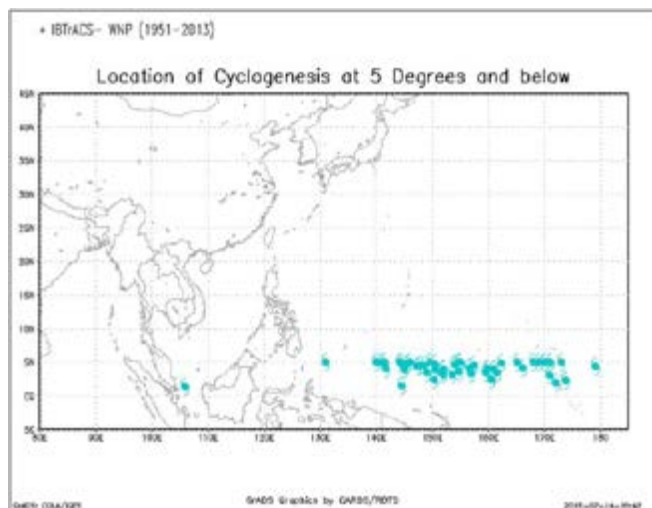
Homepage of the PAGASA Storm Surge Website (under construction)

**Project 16: An Investigation of Tropical Cyclogenesis at lower latitudes (locations below 5°N), GAA, 2014-2015**

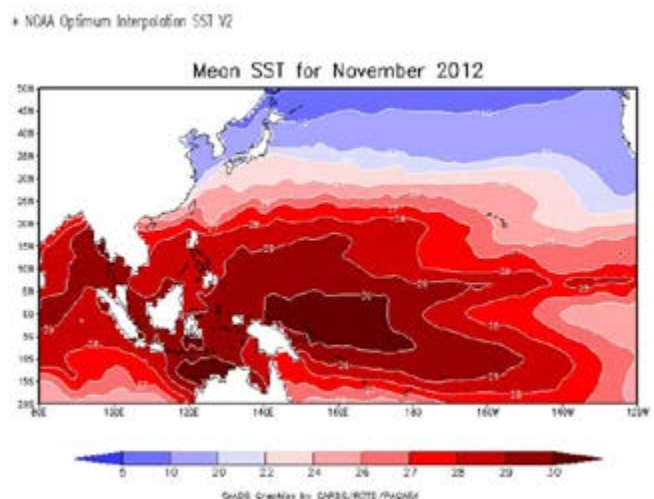
The study undertakes an investigation of the possible factors that contribute to the low level tropical cyclogenesis that occur at 5°N equator ward in the Western North Pacific Basin. This is aimed to improve understanding of TC low latitude formation and development by studying interactions with environmental flows such as vertical wind shear, SST and moisture availability.



Map of potential Storm Surge Inundation Areas



Genesis points of the 50 Tropical Cyclones formed 5°N and below in the Western North Pacific Basin from 1951 20 2013

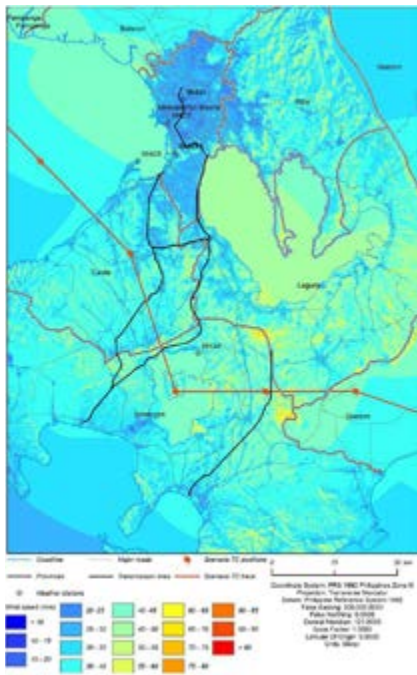


The mean SST during the cyclogenesis and development of TC Pablo in the month of November 2012

**Project 17: Energy Infrastructure Vulnerability Risk Analysis: Electricity Transmission Severe Wind Analysis Component (GMMA-RAP), DFAT-Australia, 2014-2015**

From the success of the previous RAP Project also funded by DFAT-Australia, the said donor extended its support to the Government of the Philippines to undertake an “Energy Infrastructure Vulnerability Study” as one of the components of the GMMA-RAP (Phase II) Bridging Project. This project is led by the Office of the Civil Defense (OCD) with CSCAND agencies (PHIVOLCS, PAGASA, MGB and NAMRIA) and GeoScience Australia (GA) that provided technical support and advice.

The project’s goal is to build capacities among PAGASA, including the Department of Energy (DOE) along with participating industry players from the transmission towers and to assess the impacts of tropical cyclone related severe wind to electricity transmission towers. New science being undertaken by PAGASA and PHIVOLCS is focused on the improvement of understanding the severe hazard exposure of critical infrastructure. The energy sector is the



Local maximum wind field for Typhoon Glenda. Wind speeds represent a 3-second gust wind speed, 10m above ground level.

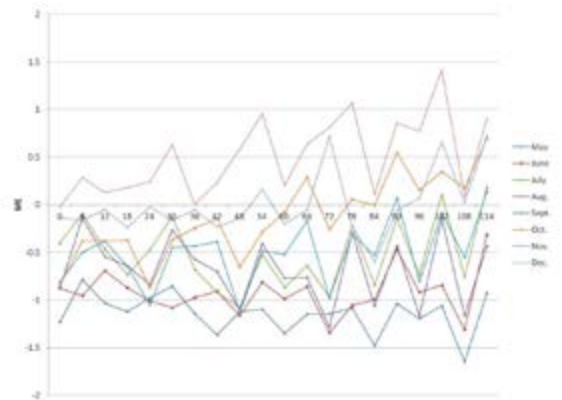


2-day workshop on Energy Infrastructure Vulnerability held at Richmonde Hotel, Ortigas on March 26, 2015

priority of this research as it plays a critical role in supporting communities, economic activities and other critical infrastructure sectors.

As the research matures, it provides the Government of the Philippines and industries with a better understanding on local hazard to assess risk and mitigation options for existing assets. It also strengthens the design processes for new assets to ensure that new facilities are designed and constructed compatible to local hazard. This also ensures that the infrastructure reliability associated with the return periods adopted for design is achieved.

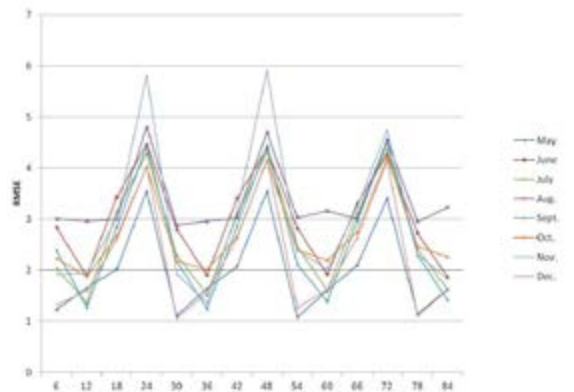
synoptic observations. Meteorological parameters such as temperature, wind and pressure were used for verification for selected synoptic stations. The models may have potentials for short term climate prediction in combination with statistical method.



Cosmo ME for MSLP in Mactan Station, 2013

**Project 18: Evaluation of Selected Dynamical and Statistical Models for Short Term Climate Prediction in the Philippines, GAA, January – December 2015**

The performance of three (3) Numerical Weather Prediction (NWP) Models used in operational weather forecasting at PAGASA-DOST, namely Global Spectral Model (GSM), Weather Research and Forecasting (WRF) and the Consortium for Small Scale-Modeling (COSMO) were assessed and validated using ground



GSM RMSE for temperature in Malaybalay Station, 2013

**Project 19: Digital Rain Gauge for Community-Based Early Warning System, GAA, 2014-2015**

Developing a digital rain gauge system is significant, considering its cost-effectiveness that will be used in community-based station which can be integrated in our network of rain gauges as additional basis for early warning system. This mechanical rain gauge includes digital display that indicates the measured rainfall observed at the desired time interval. The system includes the capability of transmission and reception of signal to change the mode of data transmitted to a dedicated receiver (specifically cell phone or server). The use of a microcontroller and the developed software will be the key in producing the desired output to help in the analysis of data generated. The project is aimed to develop a digital numeric display rain gauge that will measure the amount of rainfall at desired time interval of every 15 minutes, or hourly, and/or 3-hourly periods for use in a community-based station and has the capability of transmitting and receiving the data to a dedicated receiver usually a cell phone or server, which can be used to early warning system.



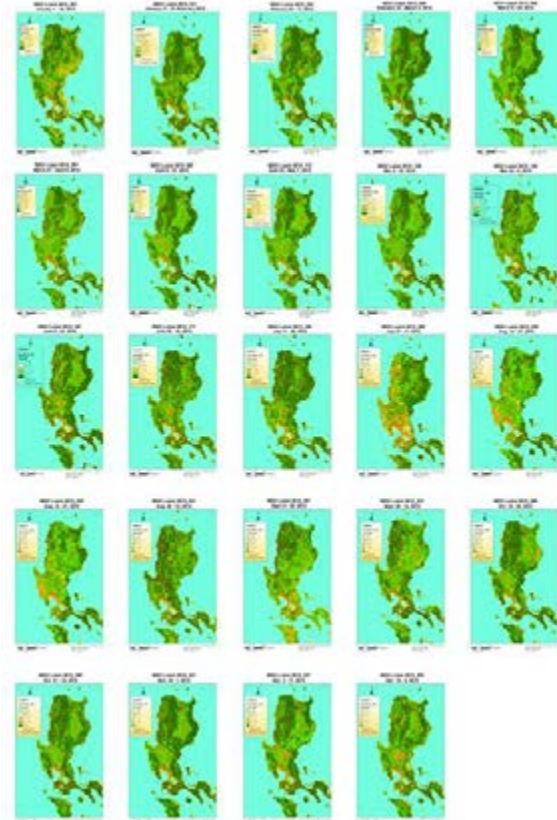
*Digital Rain Gauge at Science Garden*



*Digital Display at the panel board*

**Project 20: Development of Drought Monitoring Tool using Remotely-sensed Information such as Moderate Resolution Imaging Spectroradiometer (MODIS), GAA, 2014-2015**

Crop or vegetation monitoring by remote sensing provides direct spatial information on vegetation stress caused by drought condition. The success of this research project can contribute to providing timely and accurate picture of the agriculture sector, as it is suitable for gathering information over large areas with high revisit frequency. This project is aimed at utilizing remote sensing technology for vegetation and drought condition monitoring.



*MODIS time-series imagery to detect crop phenology*

**Project 21: Cloud Seeding Operation (CSO) Using Doppler Radar and Upper Air Sounding in Central Luzon, GAA (2015 Contingent Fund), 2015-2016**

Rainfall deficiency is the recurring trend experienced in many parts of the country due to Strong El Niño Phenomena. It seriously affects the freshwater requirements of several

*Upper Air Soundings to provide necessary inputs to cloud model for decision making regarding seeding or no-seeding day*



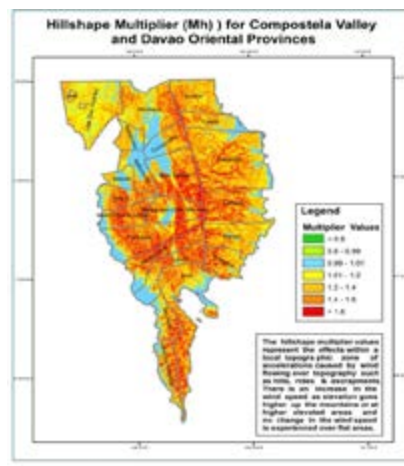
sectors of the society specially agriculture and water industry. This project is aimed to alleviate rainfall and freshwater deficiency in drought-stricken areas and will design a science-based cloud seeding operation using Doppler Radar, Radiosonde Sounding, Satellite Imageries, NWP and cloud model outputs and other facilities and expertise of PAGASA. Furthermore, this study is designed to show scientific proof on the effectiveness of cloud seeding operation and how it will apply to the country's effort to alleviate rainfall deficiencies during drought or near drought conditions. This project is implemented by PAGASA in collaboration with Philippine Air Force, Bureau of Soils and Water Management and Civil Aviation Authority of the Philippines.



Radars monitor the growth of seeded, non-seeded cloud; monitor the development of clouds into seedable clouds; locate seedable clouds for pilot's information where to seed

**Project 22: Tropical Cyclone Severe Wind Hazard Mapping for Compostela Valley and Davao Oriental, DFAT of Australia through UNDP, June – September 2015**

This project was conceptualized after the passage of Typhoon Pablo on December 2012 that caused devastating impacts due to severe wind in areas. It is aimed to develop an understanding of the hazard posed to the two provinces by severe winds generated by tropical cyclones. Regional Severe Wind Hazard maps can be used to update the wind zoning



Hillshape Multiplier Values for Compostela Valley and Davao Oriental Provinces

map of the Philippines and can be considered in building design as a guide for emergency managers and planners for evacuation planning. Local hazard maps can assist in the site selection for evacuation centers to ensure they are in safest location, but remain accessible to those in the community expected to utilize the centers.

**Project 23: Storm Surge Hazard Mapping for Selected Coastal Municipalities of Davao Oriental, UNDP & AusAid, June – September 2015**

Mindanao in the Southern part of the Philippines is not traditionally prone to typhoons but the onslaught of Tropical Storm Sendong (Washi) and Typhoon Pablo (Bopha) revealed that Regions 10 & 11 are not anymore geographically safe to natural hazards as it was before. Thus, the experience of the two regions gave emphasis on the importance of Climate Change Adaptation and Disaster Risk Management.

This project is aimed to assess the disaster vulnerabilities of the affected areas at both regions in Mindanao in terms of geological, meteorological and meteorologically-induced hazards in relation to climate change. This will



This beach used to have structures of weak materials such as houses and stores



The team interviewed Mr Marcelino Palmagil, Jr., Head Teacher III of Carag, National High School, CaraGa Davao Oriental, during the field survey.



Interview with an eyewitness



Wide gently sloping beach



Surge height measurement



a. Partly damaged seawall at Purok Dahlia; b. Sea waters along with wave run-up reached to as high as coconut trees; c. Totally damaged sea wall at the area; d. The Cabugao Island where pump boats were docked before Typhoon Pablo

generate storm surge hazard maps for the municipalities of Boston, Cateel, and Baganga in Davao Oriental that will be used for priority mitigation actions. This will also conduct Information, Education, and Communication campaign to raise the awareness of the general public on storm surge and its impacts.

An essential part of the methodology of the project is the conduct of "Storm Surge High Water Mapping and Ground Field Validation", carried out in the cities of Boston, Cateel and Baganga, Davao Oriental. This involved field works, visits to the municipality and affected coastal barangays, and interviews to the residents who personally witnessed the occurrence of the said severe weather disturbances.

Department of the said committee during the 44th session to establish an early warning system in the areas that was devastated by Typhoon Washi "Bagyong Sendong". Subsequently, a field investigation was conducted by the members of the Typhoon Committee in Cagayan de Oro, to conceptualize the methodology of Early Warning System (EWS).

This project supports the Hydrometeorology Division (HMD) of PAGASA in developing a hydrological tool such as Flash Flood Alert System (FFAS) and Automated Rainfall Alert System (ARAS) to improve the current establishment of early warning system in Cagayan de Oro. Furthermore, additional equipments such as CCTV

**Project 24: Establishment of Early Warning System for Flood and Flash Flood Areas of Cagayan de Oro (NDMI Project Phase 2), National Disaster Management Institute (NDMI/ MSPA)-South Korea, 2015-2016**

The Republic of Korea, one of the chairman departments of Disaster Prevention Subcommittee of the Typhoon Committee since 2005, was tasked by Disaster Prevention



Awarding of certificate on education training on Hydraulic and Hydrological Analysis Modeling



Group photo on education training on Hydraulic and Hydrological Analysis Modeling

and warning sirens has been installed in flood-prone areas along CDO River to enhance the monitoring and warning capability of HMD.

The project is aimed to provide hydromet equipments on Flash Flood Alert System and on Automated Rainfall Alert System. The project also conducts trainings on equipments and on Hydraulic Model.



Barb wires were added at the installed ARG at Pelaez Bridge for better protection (left photo). Intelligent CCTV that can measure water level changes installed at the rooftop of the CDO City Hall Annex. (right photo)

**Project 25: Enabling the Cities of Cagayan de Oro, Iligan and the Provinces of Compostella Valley and Davao Oriental to Cope with Climate Change (Climate Twin Phoenix Project), UNDP/AusAid/CCC, 2013-2015**

This is aimed to assess the disaster vulnerabilities of the cities of CDO, Iligan and the municipalities surrounding the CDO and Mandulog River Basins in Mindanao to geological, meteorological and meteorologically-induced hazards due to climate change. As one of the major elements of disaster-risk reduction, establishment of early warning system could save lives and help protect properties. Early warning systems are recognized as effective approach in reducing vulnerabilities, enhancing preparedness, and response to natural hazards.

The project supports the implementation of early warning systems thus it provides complete monitoring facilities such as rain gauges, water level gauges and



Ceremonial Switch on with Iligan City Mayor Regencia and Mr. Macapagal assisted by representatives from CCC, PAGASA and LGUs

telecommunication facilities for CDO River Basin and, telecommunication system for Mandulog River Basin.

This also conducts massive Information, Education and Communication campaign to raise the awareness of the public on climate change and its impacts, as well as, enhance the competencies of the LGUs on mainstreaming climate/disaster risk management into local land use and development planning and regulatory processes. To increase the resilience of vulnerable communities, the project supports the development of climate resilient livelihoods and risk sharing/transfer models.



Ceremonial Switch on with Mayor Moreno of CDO and Col. Monsanto assisted by representatives from CCC, PAGASA, and LGUs

**Project 26: Improvement of Capabilities to Cope with Natural Disasters caused by Climate Change (Strengthening of FFWS for Bicol River Basin – NPGA-Bicol Project), Government of Japan, 2014-2015**

The Bicol River Basins are part of the Agno, Bicol, and Cagayan River Basins FFWS Project (ABC Project) that were in placed in 1983 with funding under the Japan Bank for International Cooperation (JBIC, formerly known as Overseas Economic Cooperation (OECF). The recurrent floods in the basin have enormously changed the geomorphology and the hydrological characteristics of the river in particular and the basin in general. Deforestation and heavily siltation of river channels have reduced the carrying capacity of the rivers and therefore increased the frequency of flooding in the target areas. A significant number of the existing equipment and facilities have become obsolete and have deteriorated, which made the system very difficult to maintain. This project is aimed to upgrade or rehabilitate the existing Bicol FFWS which is urgent and timely due to the frequent flooding in the river basins.



Stakeholders meeting

**Project 27: Improvement of Flood Forecasting and Warning System for Magat Dam and Downstream Communities (NORAD Project), Government of Norway, 2012-2016**

The decision when to open the spillway for pre-release operation is an important option to undertake in anticipation of the peak flood. Pre-release is normally carried out to increase storage capacity of the reservoir and serves as a buffer to accommodate the expected inflow and thereby regulate the release of floodwaters, thus mitigate the impacts in the downstream areas.



*Project meeting at NIA Central Office*

The pre-requisites before any dam release operation is initiated includes the close monitoring of hydrometeorological conditions, both upstream and downstream areas of Magat dam. This eventually leads to the project's primary goal, that is, the timely issuance and dissemination of warnings to downstream areas. In order to attain this, it is necessary to have a reliable, dedicated, and

*Training on the Hydrological Database Management System held at WFCC Building on January 26-30, 2015*



*After meeting at SNAP*

disaster-proof communication system that will allow the transmission of data and information between PAGASA, Magat Dam Office, and vulnerable communities.

The project seeks to restore and enhance the communication of the Flood Forecasting and Warning System (FFWS) for Magat and Cagayan River Basins; to upgrade the existing network of rainfall and water level stations for flood forecasting and warning; to improve the operation of Magat Dam through the provision of inflow and flood forecasts with enough lead times using ground observations; to establish a decision support system for the operation of Magat Dam, and to enhance public information drive within the flood prone areas.



**Project 28: Japan's Non-Project Grant Aid for Provision of Japanese SMEs Products (NPGA Mindanao), GoJ/JICS, 2013-2016**

The NPGA of the Government of Japan has provided weather and flood early warning facilities in three (3) major river basins in Mindanao namely, Davao, Buayan- Malungon and Tagoloan in the last semester of 2014. The NPGA equipment was provided by the SMEs of Japan and administered by the Japan International Cooperation System (JICS), a general incorporated foundation for development assistance and support for developing countries such as, the Philippines. The equipment includes automatic weather stations (AWSs), water level sensors (WLs) and rainfall gauges (RGs). Such system was granted to the Philippine government through PAGASA to help mitigate flooding in the mentioned river basins.



*Delivery of NPGA Equipment at Davao Station*

PAGASA shoulders the installation of these monitoring facilities. These are software, civil works, and services for delivery to sites, installation, testing, integration, and commissioning. Through the project, risks of communities to the effects of hydro-meteorological hazards particularly flooding in a non-structural way are lessened.

**Project 29: Enhancing Greater Metro Manila's Institutional Capacities for Effective Disaster/Climate Risk Management towards Sustainable Development (GMMA-READY Project), UNDP/AusAid, 2010-2015**

The project aims to decrease the vulnerability of the Greater Metro Manila Area (GMMA) to natural hazards and increase its resilience by strengthening the institutional capacities of the Local Government Units, concerned National Government Agencies, academic institutions and civil society organizations to manage disaster and climate change risks.



*Installation of signage at Bulacan led by GMMA-READY Team*

It addresses the capacity gaps, both at the institutional and individual levels of key players on Disaster Risk Management/Climate Risk Management (DRM/CRM) in the GMMA. By addressing policy development, planning and programming requirements, of the concerned institutions and improving the competencies on disaster/climate risk management of the concerned individuals, including community leaders, the project is expected to put in place a GMMA-wide institutional network which is able to address the risks posed by multi-hazards, including those from climate change.



*GMMA-RAP Bridging Activity for Flood Workshop held at Tanza Oasis Hotel in Cavite on March 20, 2015*

**Project 30: Greater Metro Manila Area Risk Assessment Project (GMMA-RAP Bridging Project), AusAid/UNDP, 2014-2015**

As an offshoot to the achievements of the GMMA RAP, the Government of the Philippines (GoP), through CSCAND and the Government of Australia (GoA) have again entered into an Agreement that would facilitate the implementation of the "Greater Metro Manila Area Risk Analysis (Phase II) Bridging Project" for 12 months which started in July 2014. The Bridging Project builds on the successes of the GMMA RAP and aligns with the planned Disaster Risk Reduction (DRR) and Climate Change Adaptation (CCA) Program of both governments.

The project is aimed to develop an enhanced flood hazard and risk models. It is consisted of two main components: first, is the updating of flood hazard and risk maps in the upstream reaches of the San Juan River system and the Tullahan River catchment. Second, is the development of a 'fast' hydraulic model for the Marikina River system, to contribute to PAGASA's existing early warning systems in that basin. Practically, to run the system over short timeframes as required during flood events, the team also worked on the automation of the rainfall data input to the rainfall-runoff models, and automation of the outputs of the rainfall-runoff model to the hydraulic model.



*Vulnerability & Adaptation Validation Workshop held at Sequoia Hotel on Dec. 1-2, 2015*



### Project 31: Automation of Flood Early Warning System for Disaster Mitigation in Greater Metro Manila, KOICA, 2015-2017

Tropical Storm Ondoy (Ketsana) which passed through Metro Manila last September 26, 2009 caused Marikina River to reach its highest water level recorded, resulting to loss of lives and properties. TS Ondoy dumped 455 millimeters of rain in Metro Manila and its environs in just a span of 9 hours – the highest recorded in 42 years. A month's worth of rainfall in a single day washed away homes and flooded areas, standing thousands on rooftops in the city and elsewhere. There were 464 casualties and the damage was estimated to have reached \$100 million.

Flood Forecasting and Warning became an important adaptive measure for flood protection in a case where structural measures would be prohibited. The Ondoy episode became the wake up call to the national government as well as foreign donors to invest in flood forecasting and warning activities in mitigating the impacts of flooding in the country. The National Government has seen the importance of the non-structural measures in flood fighting activities.

There were allied rivers in Metro Manila that were also flooded. During Typhoon Ondoy in September 2009, CAMANAVA Area, were among the heavily flooded cities in the Metropolis. The heavy rainfall that registered in Quezon City caused the swelling of Tullahan River that inundated the said areas.

These areas are also affected by repetitive floods. Hence, the establishment of early warning system in these areas is also considered urgent.

This project is the extension of the early warning system for the mitigation of disaster to the repetitive flood zones of Greater Metro Manila and its environs.

With the expansion of the NCR-PAGASA Integrated Flood Information Control System (NCR-PIFICS) to monitor actual situation near the river banks, Greater Metro Manila and vicinity will have the early warning system for mitigation of the disaster that redounds to the mitigation of the damages in human and economic losses.

### Project 32: Deployment of Early Warning System in Disaster-Prone Areas (DEWS Project), DOST-GIA, 2014-2016

In view of the incessant annual occurrence of floods, there is a need to deploy a dense system of hydrometeorological devices (hydromets) to protect lives, property and likelihood. A highly granular system of hydromets leads to better flood models, which will enable forward-looking mitigating actions and plans. This project complements the original hydromet project which covers the 18 major river basins. Given that there are other river systems and secondary tributaries that are likewise problematic as evidenced by recent flood events, deployment of additional sensors is necessary to

serve more communities.

To complement this system of hydromets, an early warning system consisting of sirens and/or beacons is deployed in communities affected by floods. The use of sirens as early warning for natural hazards is a global best practice in informing and alerting unsuspecting communities. Once an agreed threshold has been reached, the warning system is activated either automatically or manually if there is a need for expert confirmation. This warning system is also used to complement existing hydromet deployments.

This integrated system incorporates the ASTI data logger to transmit the data gathered via GSM/GPRS to a central server and store the data for later retrieval when telecommunications are down.



Field familiarization on Hydrographic Survey



Group photo on training on calibration of instruments held at Amihan

### Project 33: Marine Weather Forecasting using High Frequency Doppler Radar, DOST-GIA, 2015-2016

Everyone these days know about the economic and socio-cultural importance of coastal and marine ecosystems. Accelerated sea level rise due to climate change in some areas in

surface temperature using state-of-the-art HF radar-based signal. This will also forecast internal ocean weather including a better knowledge and understanding of episodic waves also known as rogue waves.

Also, this will improve marine observations and forecasts and subsequently enhance the capability of PAGASA forecasters.



*Courtesy call of PAGASA Team, PCIEERD, SCRIPPS and UP Team to Rear Admiral Suarez, Chief Officer of NETC*

the Philippines have significant impact on the household, communities, including business establishments and ecosystems in its coastal areas. Furthermore, extreme rainfall events associated with the monsoons and tropical cyclone occurrences exacerbate the vulnerabilities of the coastal communities and ecosystems to floods. With this problem encountered by the Philippines, there is a need to come up with a programme that will sustain the coastal resources and on how to deal with it.

This project aims to measure the ocean wave height, wave direction and speed, ocean current and sea



*Re-alignment of Solar Panel Mounting Bracket at NETC*



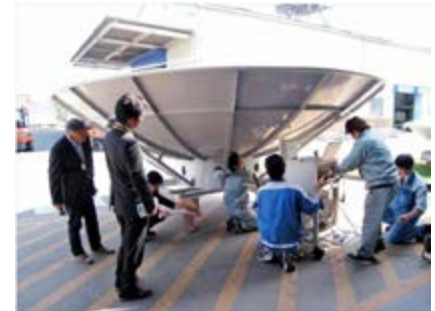
*Final installation and erection of receiver and transmitter antennas*

### Project 34: Sub-Project for the Rehabilitation of Meteorological Radar System in Guiuan (Programme for the Rehabilitation and Recovery from Typhoon Yolanda), JICA, 2014-2015

In November 2013, Typhoon Yolanda hit the Philippines and inflicted considerable damage on Guiuan Meteorological Radar System established under Japan's Grant Aid. JICA sent the Need Assessment Survey Team to the Philippines in order to study the need for recovery and reconstruction assistance and to collect information for the project formulation as well as emergency responses required. As a result, the rehabilitation of the Guiuan Meteorological Radar System has been confirmed as one of

the priority issues.

In response to the official request of the Government of the Philippines based on the Need Assessment Survey, the Japanese Government decided to conduct a survey of the project and entrust it to JICA.



*Factory inspection of Parabolic Antenna by the Consultant at the Manufacturer's Factory in Japan, April 23, 2015*

The main objective of the project is to ensure the resumption of normal weather observation by rehabilitation of the meteorological radar system in Guiuan.



*On-the-job Training for Meteorological Radar System for Meteorological Data Satellite Communication*

### Project 35: System to Identify, Quantify, and Map the Storm Surge Threat to Philippine Coasts (Storm Surge Project), DOST-GIA, 2013-2015

Storm Surge generation at any specific coast, and the magnitude of the inundation it experiences, involves numerous factors. This includes, but not limited to the movement and track of a typhoon; its area, the radius of its eye, and radius of its maximum winds, and wind speeds; its timing with respect to the tides; the geometric relationships of the typhoon trajectory and the configuration of the threatened coastline; the depths and slopes of

the adjacent sea floor; the topography of the coastal land; the absence or presence and structural integrity of coastal infrastructure; and the density and distribution of the threatened populace.

The project is in support of the presidential directives to reduce casualties through the provision of storm surge and inundation maps to warn coastal communities threatened by approaching typhoons. The maps will serve as guide for planners to develop structures to protect existing housing and infrastructures in vulnerable areas, and to expand or develop construction in areas that the maps indicate are safe. These maps will also be used in land use planning.



*SLOSH Training at Miami Florida, USA*

The objective of the project is to enhance the disaster-forecasting capabilities of PAGASA through generation of detailed maps of storm surge and inundation susceptibilities. The maps will be used to warn coastal communities threatened by approaching typhoons. It will also guide plans to develop structures to protect existing housing and infrastructures in vulnerable areas, and to expand or develop construction in areas that the maps indicate are safe.

**Project 36: Technical Cooperation Project (TCP) for Enhancing Capacity on Weather Observation, Forecasting and Warning (JPOW Project), JICA, 2014-2016**

The project was conceptualized to enhance the capacity of PAGASA to further strengthen and fully utilize the three procured radars and installed systems under the JICA Grant-Aid Project entitled "Project for the Improvement of Meteorological Radar System", in Virac, Aparri and Guiuan, for dissemination of meteorological



*Ground field work validation at Occidental Mindoro on March 29 – April 2, 2015*



*Mike 21 Software Training at PAGASA on May 12-15*

and disaster information to the public and disaster management agencies.



The project involves enhancement of the end-to-end warning system from observation, analysis, and forecasting up to dissemination and awareness-raising. A number of training activities will be done on operation and maintenance of radar and other meteorological instruments, radar data quality control and applications, and weather guidance/tools development. Upon completion of the project it is expected that the quality of observed data (synoptic and radar data) will improve as well as the forecasts accuracy and awareness of the people about meteorological hazards. Forecasting tool such as the use of SATAID, and Model Output Statistics (MOS) will be developed for the local setting.

*Mr. Ryusuke Taira, the expert on weather guidance from JMBSC, Japan Meteorological Business Support Center, was dispatched to PAGASA for his 3rd visit and held the intensive training course of weather guidance to 5 counterparts of PAGASA or weather guidance working group from WD and Numerical Modeling Section of RDTD in March*



*4th Joint Coordination Committee Meeting of JPOW held at SEAMEO Innotech Regional Headquarters, Commonwealth Avenue, Dil., Q.C.*

The project seeks to enhance the capacity of PAGASA Central Office including the PAGASA Regional Services Divisions in terms of weather observation, forecasting and warning.



*JPOW Awareness Seminar for Grades 5 and 6 held in JPOW target areas, Northern Samar and Sorsogon*

### Project 37: Establishment of Communications, Ocean and Meteorological Satellite (COMS) Data Analysis in the Philippines, KOICA, 2014-2016

Main role of PAGASA is to cope with climate change and to provide the local weather information. Recently, the demands on the intensive monitoring and the enhanced technology of weather prediction have been raised because the hazardous weather condition and severe weather activity become more difficult to predict due to the earth's environment change i.e. climate change. For the intensive monitoring, the real-time global observation data is required. Hence, satellite data is inevitable and the domestic needs about the acquirement, analysis and interpretation system of satellite data have been increased. Also, it is strongly required to build the database system and the international partnership for the analysis of the impact over local area by climate change.

The project will strengthen the meteorological information and

analysis through the establishment of COMMS system that will train concerned PAGASA employees on the operation of the system through the conduct of trainings by Korean expert for accurate operation.



COMS Antenna platform (left); Partial installation of COMS Antenna at WFFC (right)



Unloading of COMS equipment from the container van

The realization of these vanguard projects were approached through the regular key programs of agency, namely:

- **Observation and acquisition of meteorological, hydrological and astronomical data** – this involves collection of data from the existing meteorological instruments and the new technology acquired by PAGASA such as Automatic Weather Station (AWS), Automatic RainGauge (ARG), Wind Profiler, Doppler Radar, Water Level Sensor (WLS), High Frequency Doppler Radar (HFDR), Aeronautical Weather Observing System (AWOS), Met Buoy, etc.
- **Maintenance of a telecommunications network** dedicated for data collection from local and foreign weather stations and for data exchange to the outside world.
- **Weather forecasting and typhoon warning services** - this involves collation and analysis of real-time weather data, formulation and issuance of weather forecasts and severe weather warnings and advisories.
- **Flood Forecasting and Warning Services** - this involves monitoring of selected river basins (Agno, Cagayan, Pampanga, and Bicol) and major dams (Binga, Ambuklao, Magat, San Roque, Angat and Pantabangan) and issuance of flood warnings and advisories. This is PAGASA's contribution in securing safety and welfare of the people in the flood plains of the river basin and dam sites.
- **Astronomical Services** Dissemination of official time keeper Philippine Standard Time (PhST) is the focus of this program. Other activities include Planetarium shows, stargazing/telescope session and routine astronomical data for various development and planning purposes.
- **Natural Disaster Reduction Program** - this is designed for the conduct and participation in pre-disaster and community preparedness and planning activities for natural disaster reduction.
- **Research and Development and training** activities geared at generating and developing techniques on systems for strengthening operational forecasting and warning capabilities for improved delivery of PAGASA services.

# CAPITALIZATION

As in any organization, PAGASA relies on available resources for its operations to meet its goal for the year. Money, manpower, and physical assets were invested on its capitalization for projects and activities. Aside from these resources, the established relation with other organizations through which assistance flowed in support of the agency operation, was accounted for as part of the agency's capital for operations.

Part of PAGASA's 2015 capitalization came from the utilization of the expertise of core personnel with specialized trainings, here and abroad, on various scientific and technical fields. In particular, expertise on weather, climate and flood mitigating its effect and natural disaster cycle, were all very valuable in contribution to safety of life and property. Information transfer intended to increase the level of awareness of members of different communities in the country - through different fora and media - was also carried out.

In terms of manpower, year 2015 saw the mobilization of 994 individuals including Job Order (JO) of diverse expertise and skills, both in Central Office and in field stations. The distribution of personnel complement according to educational attainment is shown in Table 4 and figure 4a.

## PAGASA Human Resource Distribution as of December 2015

Reference: PLANTILLA OF PERSONNEL and JOB ORDER as of DECEMBER 31, 2015

Table 1: Summary of PAGASA Personnel

	No. of Personnel	Male	Female	%
<b>ADMINISTRATIVE</b>	<b>160</b>	83	77	15%
<b>TECHNICAL</b>	<b>834</b>	533	301	85%
<b>GRAND TOTAL</b>	<b>994</b>	616	378	100%

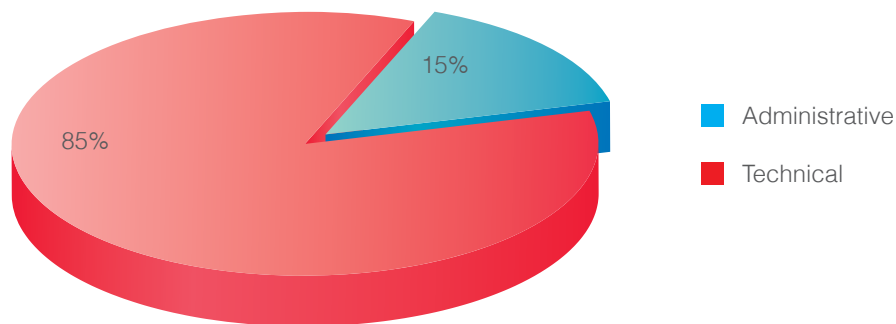


Figure 1: Summary of Technical Personnel and Administrative Personnel

Table 2: Distribution of Personnel by Sex

	No. of Personnel	%
<b>MALE</b>	<b>616</b>	62%
<b>FEMALE</b>	<b>378</b>	38%
<b>TOTAL</b>	<b>994</b>	100%

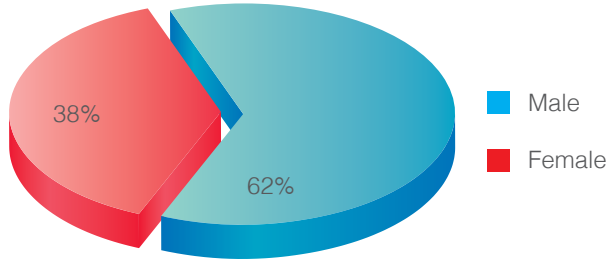


Figure 2a: Percentage Distribution of Personnel by Sex

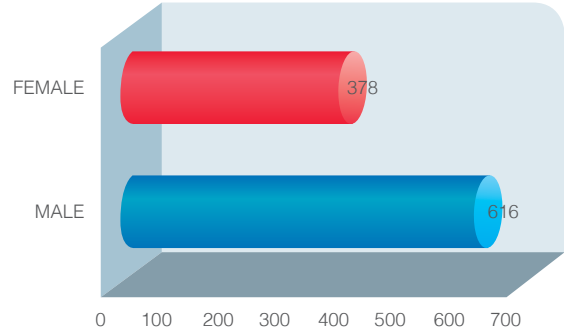


Figure 2b: Number of personnel distributed by sex

Table 3: Distribution of Personnel by Age & Sex

Age	No. of Personnel	Male	Female	%
20-30	178	111	67	18%
31-40	127	82	45	13%
41-50	200	131	69	20%
51-60	370	221	149	37%
61 & Above	119	71	48	12%
<b>TOTAL</b>	<b>994</b>	<b>616</b>	<b>378</b>	<b>100%</b>

AVERAGE AGE: 46

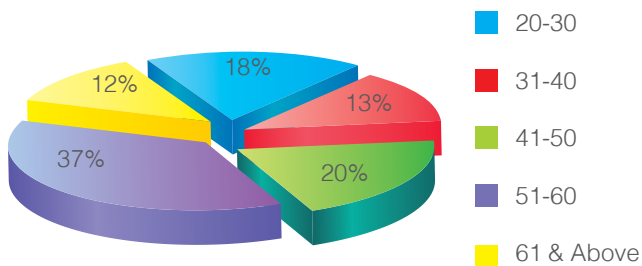
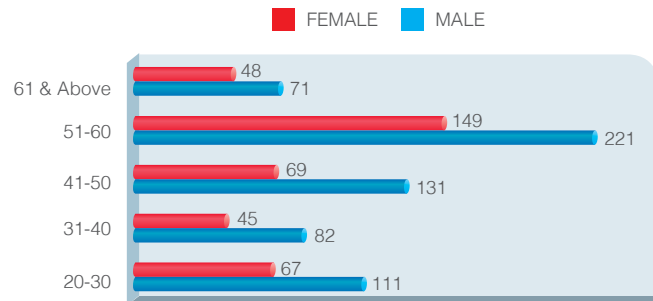


Figure 3a: Percentage distribution of personnel by age

Distribution of Personnel by Age & Sex



**Table 4: Distribution of Personnel by Education, Sex & Age**  
 Reference: PLANTILLA OF PERSONNEL and JOB ORDER as of DECEMBER 31, 2015

Level of Education	Male	Female	Total No. of Personnel	%	Age				
					21-30	31-40	41-50	51-60	61 & Above
PHD	5	4	9	0.9%	0	1	0	7	1
MS/MA	31	37	68	6.8%	4	13	21	27	3
BS/BA	318	243	561	56.4%	156	87	113	163	42
BELOW BS	262	94	356	35.8%	18	26	66	173	73
<b>TOTAL</b>	<b>616</b>	<b>378</b>	<b>994</b>	<b>100%</b>	<b>178</b>	<b>127</b>	<b>200</b>	<b>370</b>	<b>119</b>

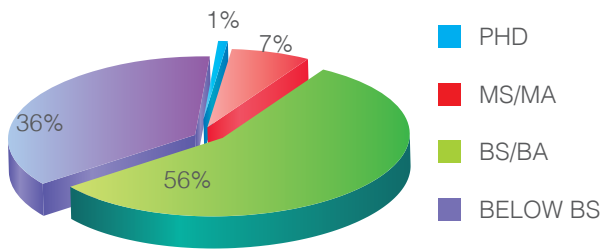


Figure 4a: Percentage distribution of personnel by education

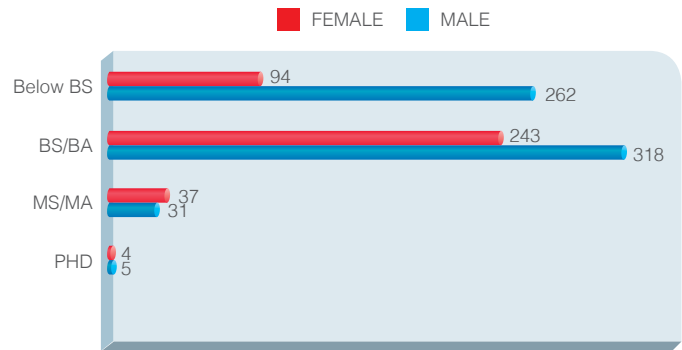
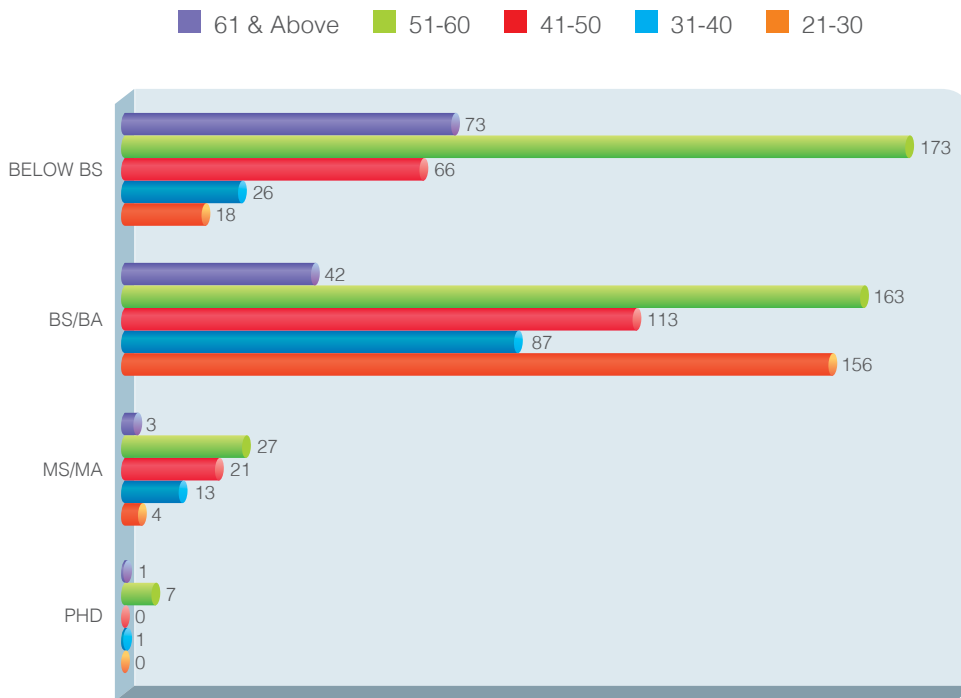


Figure 4b: Number of personnel distributed by sex & education

**Personnel Distribution by Age & Education**



**Distribution of Personnel**  
**Table 5: By Position Level, Sex & Education**

	Sex			Education				
	Male	Female	Total	PhD	MS/MA	BS	Below BS	Total
<b>3RD LEVEL OFFICIALS</b>	2	1	3	2	1	0	0	3
<b>2ND LEVEL OFFICIALS AND EMPLOYEES</b>	160	127	287	5	62	215	5	287
<b>1ST LEVEL EMPLOYEES</b>	454	250	704	2	5	346	351	704
<b>TOTAL</b>	<b>616</b>	<b>378</b>	<b>994</b>	<b>9</b>	<b>68</b>	<b>561</b>	<b>356</b>	<b>994</b>

**Personnel Distribution by Sex and Level of Position**

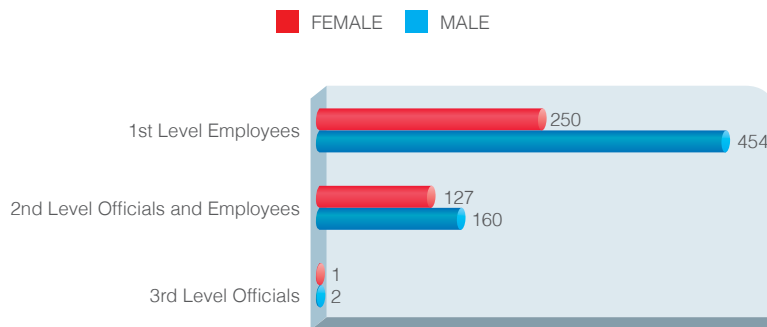


Figure 5a: Number of personnel distributed by sex and level position

**Personnel Distribution by Education and Level of Position**

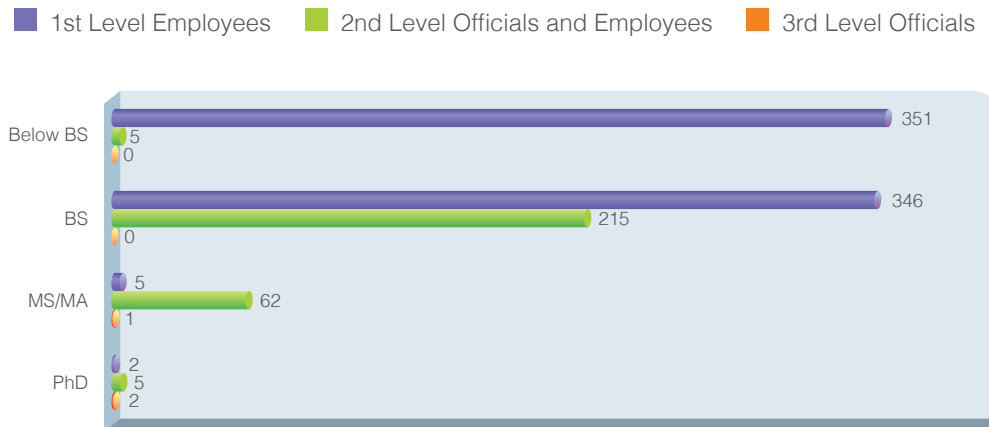


Figure 5b: Number of personnel distributed by education and level position



Table 6: Distribution of Personnel  
By S&T Function

Function	Level of Education				TOTAL
	Below BS	BS/BA	MS/MA	PhD	
S&T Service (STS)	236	351	30	3	620
Research and Development (R&D)	4	41	19	3	67
S&T Education and Training (STET)	3	6	1	0	10
General Administration and Support Service (GASS)	113	163	18	3	297
<b>TOTAL</b>	<b>356</b>	<b>561</b>	<b>68</b>	<b>9</b>	<b>994</b>

Distribution of Personnel by S&T Function & Education

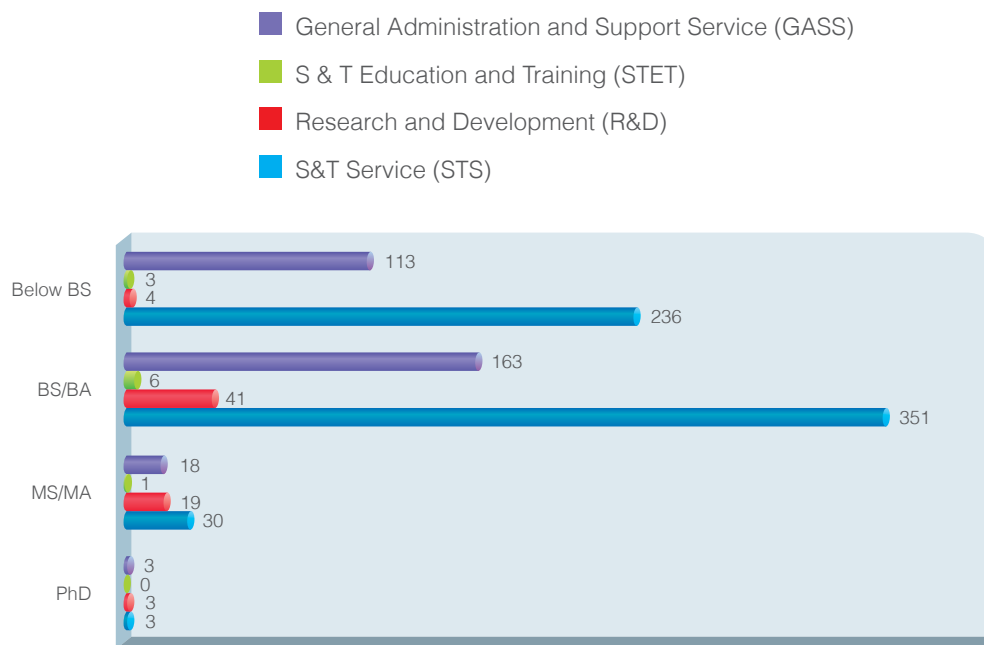


Figure 6: Distribution of personnel by S&T Function & Education

Funds spent for the 2015 operations were consisted of regular budgetary allocations of Three Billion Five Hundred Eighty Five Million Five Hundred Ninety Eight Thousand Pesos (**Php 3,585,598,000.000**) and budget from foreign assisted projects in the amount of One Hundred Ninety Seven Million One Hundred One Thousand Pesos (**Php 197,101,000**). Overall, for 2015, the total amount is Three Billion Seven Hundred Eighty Two Million Six Hundred Ninety Nine Thousand Pesos (**PhP 3,782,699,000.00**). Compared with the total expenditure in 2014, expenditure in 2015 increased at 172.80%. The increase in expenditures is mainly due to the implementation of infrastructure projects, the appropriations of which were taken from 2014 unspent capital outlay. The greater part of 2015 budget wherein half of the budget was spent to capital outlay specifically to all weather telecommunication equipment projects.

ACTUAL EXPENSES (In Thousand Pesos)				
	2014	2015	INCREASE/ DECREASE	
<b>PS</b>	<b>466,581</b>	<b>495,248</b>	<b>28,667</b>	<b>6.14%</b>
<b>MOOE</b>	<b>317,418</b>	<b>635,598</b>	<b>318,180</b>	<b>100.24%</b>
<b>Current</b>	<b>315,350</b>	<b>478,452</b>	<b>163,102</b>	
Regular	315,350	362,602	<b>47,252</b>	
FAPs		115,850	<b>115,850</b>	
<b>Continuing</b>	<b>2,068</b>	<b>157,146</b>	<b>155,078</b>	
Regular	2,068	75,895	<b>73,827</b>	
FAPs		81,251	<b>81,251</b>	
<b>CO</b>	<b>602,604</b>	<b>2,651,853</b>	<b>2,049,249</b>	<b>340.07%</b>
<b>Current</b>	<b>150,843</b>	<b>2,406,192</b>	<b>2,255,349</b>	
Regular	95,696	2,391,292	<b>2,295,596</b>	
LFPs	55,147	14,900	<b>(40,247)</b>	
<b>Continuing</b>	<b>451,761</b>	<b>245,661</b>	<b>(206,100)</b>	
Regular	387,915	223,697	<b>(164,218)</b>	
LFPs	63,846	21,964	<b>(41,882)</b>	
<b>TOTAL</b>	<b>1,386,603</b>	<b>3,782,699</b>	<b>2,396,096</b>	<b>172.80%</b>

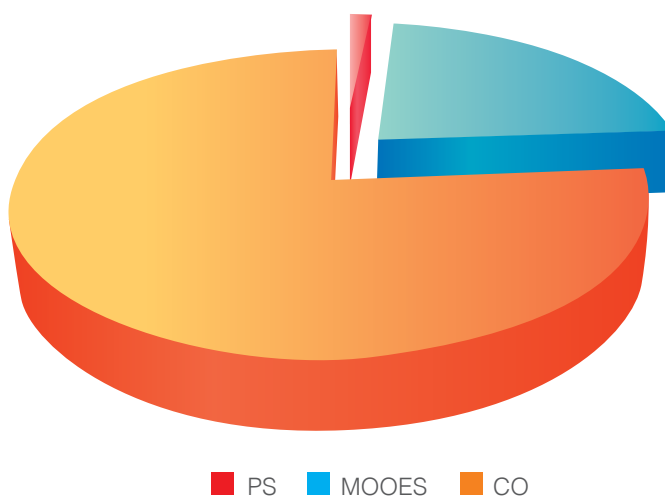


Figure 7: Representation of expenses classified by PS, MOOE and CO

# WHAT WE HAVE ACCOMPLISHED?

## IN THE DELIVERY OF PUBLIC WEATHER SERVICES

Observation and acquisition of meteorological data were undertaken round the clock on scheduled hours. This is a regular activity carried under international standards as prescribed by the World Meteorological Organization (WMO) among its members including the Philippines.

The real-time data gathered are utilized for weather analyses and forecasting and for the development of other information packages for specific purposes such as special forecasts for weather outlooks in relation to disaster preparedness and prevention e.g. in the Mt. Pinatubo area. More importantly, severe weather information is the severe weather advisories and warnings for the protection of life and property in the typhoon-prone communities in the country. Table 7 summarizes the volume of meteorological data observed and acquired through the national meteorological network.

Table 7: Summary of meteorological data observed and acquired through the national meteorological network

Data/Information	Total number issued
Surface weather observations	152,460
Upper air observation	5,139
Climate/rain observations	16,673
Radar observations	70,271
Aeronautical observations	98,430

Data included are those collected through a well-established international meteorological data exchange systems. On a daily 24-hour period basis, the average volume of data collected from foreign meteorological services is 150,139 synoptic weather observations. These are plotted for weather situations analysis with reference to a single time period, over a map covering an expanse of about 84 million square kilometers. There are almost a thousand land-based weather observation stations operating within this area at any one time of regular weather observations.

Aside from these are weather imageries received from geostationary meteorological satellite, weather radars tracking information and numerical weather prediction (NWP) models together with statistical models, among others, which are available as reinforcing tools for weather analyses and forecasting.

Delivery of weather forecasting and tropical cyclone warnings, as prime commitment of PAGASA in servicing a basic community need, topped the agency's accomplishments (See Table 8)

Table 8: Distribution of Public weather information released by the PAGASA for 2015

Public Forecasts	730
Shipping Forecasts	730
Tropical cyclone advisory /warning bulletins	15
International warning for shipping	243
Gale warnings	344
Aviation weather forecasts	23,825
Special weather forecasts for selected Asian cities/Philippines cities /municipalities	365
Significant Meteorological Information	105

These services are simplistic presentation which goes from the collation of meteorological data to preparation and analyses of weather maps to formulation and issuance of weather information data during the occurrence of Tropical Cyclones that entered PAR. All of these are for the convenience and welfare of the population.

During the year under review, there were 15 tropical cyclones that entered the PAR. Seven (7) of these TCs made landfall and caused losses in terms of life and property namely TD Amang”, “T Chedeng”, TS EGay, T Dodong “TS Kabayan”, “T. Lando”, and “T Nona”, Figure 8 shows the summary of Typhoon track for 2015.

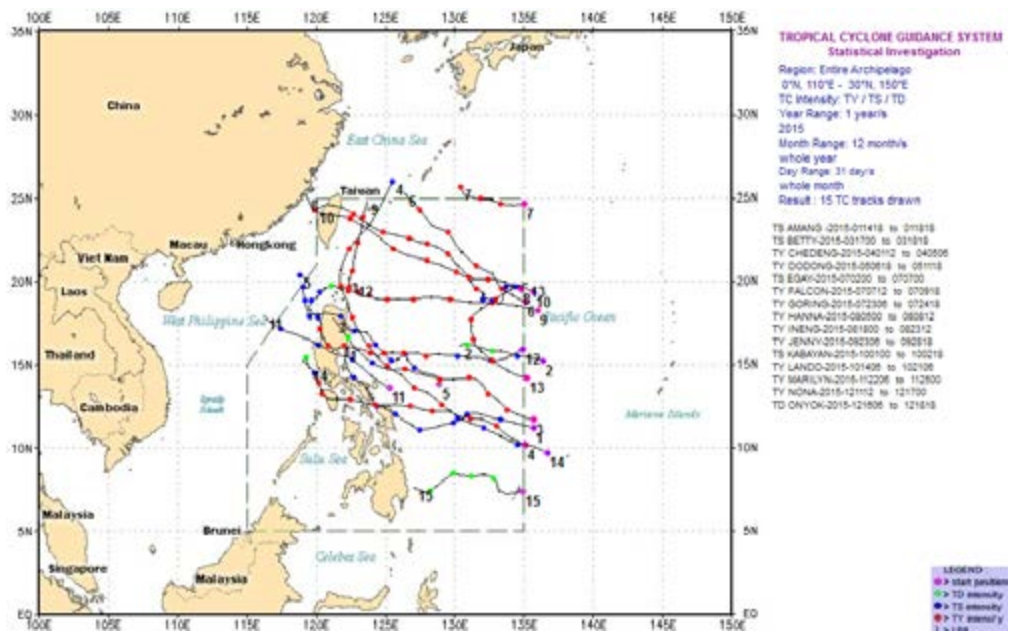


Figure 8: 2015 Tropical Cyclone Track

Benefits gained from the provision of forecasting and warning services in terms of preparedness and mitigation on the adverse impacts of tropical cyclones that reduced losses may not be truly expressed through words but the immeasurable gains are reflected on the benefits of the concerned communities in particular and the nation in general.

## IN RENDERING OPERATIONAL HYDROLOGICAL SERVICES

Hydrological services specifically, flood forecasting and warning services, were delivered, in limited real scope for safety and welfare of the population in flood prone areas. Two flood forecasting and warning systems are servicing the population in the PABC river basins and in the downstream areas of Pantabangan, Angat, Binga, Ambuklao and Magat Dams.

Information served for flood disaster preparedness, prevention and mitigation consisted of 106 basin flood bulletins ( 36 for Pampanga , 26 Agno, 20 Bicol and 24 Cagayan ), 2 flood bulletins for Angat Dam and

5 for Binga and San Roque. 1,254 flood situationers, in connection with the passage of Tropical cyclones and occurrences of Monsoon rains. In addition, operational hydrological services personnel conducted Information, Education and Communication (IEC) campaign activity (IEC) in the flood prone-prone communities. The activity focused on increasing the level of awareness of the population on flood hazard and the mitigation of its effects.

## IN PROVIDING ASTRONOMICAL SERVICES

By virtue of Batasang Pambansa Bilang 8 and RA No. 10535, PAGASA is declared as the official timekeeper of the Philippines and is therefore mandated to disseminate the Philippine Standard Time (PST). The acquisition of a Rubidium-based GPS timing system has enhanced the services of the agency in keeping and maintaining the standard unit of time and frequency in the Philippines. Synchronization of all timepieces in the country, especially through radio and TV broadcasts, will help enhance the awareness of men, women and children, including

policy-makers on the significant role of astronomy, particularly timekeeping, in our lives since time is one of the most important resources any organization can avail of.

For the year under review, 3,381 time checks were requested by clients, majority of whom were from the Metro Manila area. The figure is rather small in relation to the population of the Philippines. This may be attributed to the low level of interest among the populace in keeping precise time.

Solar observations were continuously undertaken as part of routine activities. In 2015, 365 observations for each component global radiation diffuse radiation, direct radiation, UV radiation and sunshine duration. Astronomical data cover a large area of applications. Geodetic engineers, architects, land-developers, mariners and amateur astronomers, among others have needs for astronomical data to carry out most of their activities. For 2015, the PAGASA published compilation of astronomical for various end-users. (See Table 9).

2015 Astronomical Publications				
PUBLICATIONS	Copies Reproduced	Copies Sold	Sales	Complimentary Copies
Philippine Astronomical Handbook	40	1	100.00	25
Almanac for Geodetic Engineers	228	202	20,200.00	16
Calendar Data	50	35	700.00	5
Tables of Sunrise/Sunset for Agromet Stations	3	-	-	1
Tables of Sunrise/Sunset, Moonrise/Moonset for Selected Fishing Areas	18	-	-	18
Tables of Sunrise/Sunset, Twilight, Moonrise/Moonset for latitudes 5°-21°	117	1	100.00	104
Tables of Sunrise/Sunset, Moonrise/Moonset for Ramadan	6	2	400.00	1
Tables of Sunrise/Sunset, Moonrise/Moonset (Exact Time)	-	-	-	99
Sun Path	265	247	2,470.00	1
Astronomical Poster	-	0	-	102
Star Atlas	142	8	320.00	103
Daylight Duration Table	11	-	-	2
Desktop and Wall Poster Calendar 2016	200	-	-	200
		<b>496</b>	<b>Php. 24,290.00</b>	<b>677</b>

Table 9: List of astronomical publications disseminated

It is noticeable that Philippine textbooks used in elementary and high schools provide very limited knowledge in the fields of meteorology, hydrology, oceanography and astronomy. There is a need to develop the Primary and Secondary knowledge on Science and Technology including Mathematics for Filipino children that should be integrated in the curricula of the said school levels. This could be made possible through the cooperation with the Department of Education and other concerned institutions.

To be able to promote interest and enhance awareness of men, women, boys and girls, in astronomy, PAGASA simulates planetary and stellar movements in the universe, through the PAGASA Planetarium shows. The conduct of telescope and stargazing sessions, lectures as well as mobile planetarium shows throughout the country, are also part of the program. Annual publications such as Almanac for Geodetic Engineers, Philippine Astronomical Handbook, calendars and other astronomical publications provide valuable information to various sectors of society, including the religious sector. Promotion of Astronomy in the

countryside will also be done through additional establishment of planetarium in Visayas and Mindanao.

The staff of the Astronomy Section is composed of men and women who are dedicated in promoting Science. Since the Rizal Technological University of the Philippines is the only university in the Philippines that offers degree in Master of Science in Astronomy and which began only in 2007, the knowledge in astronomy of the Astronomy staff is improved through their attendance in various training courses both local and international.

The importance of education and training programs in astronomy and space science is very important in the promotion of these sciences to the youth. Hence, there is a need to coordinate with other educational institutions and the local and global scientific community. The 45-cm computer-based telescope, donated by the Government of Japan, has enabled the agency to undertake valuable astronomical observations which serves as a good laboratory for the conduct of formal courses in astronomy.

## IN EXTENDING CLIMATE DATA AND INFORMATION SERVICES

At this time the whole world is very much concerned with global warming, climate data management has become an important activity. A major portion of the Agency's total man-hours was shifted into the monitoring of climate change and variability. This aims to have country studies that will have a local perspective even as this is shared with foreign institutions for drawing a global perspective.

An important package derived from the stored climatological data is Climate Impact Assessment Bulletin for Agriculture. These packages of climatological information were served for utilization by various sectors of the Philippine community mostly for development projects.

PAGASA continues to contribute in agricultural productivity for the benefit

of the farming sector. The agency issued 365 Farm Weather Forecasts and Advisories (FWFA) to help farmers calendar their activities for increasing agricultural productivity.

In addition, printed agroclimatic and meteorological information were provided to the farmers as major end-users. During the year, 36 ten-day agriweather and crop weather bulletin. Monthly agroclimatic information and 36 ten-day, Philippine weather and crop report summary were released. The FWFA, bulletins and agroclimatic information were made available to farmers and developers. Through the agro meteorological and field stations and radio broadcasting stations while later packages were released to the requesting parties.

During the year, 8 Climate forums and 11 El Nino forums were conducted by PAGASA with 718 and 1,203 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, the academe and weather and climate enthusiasts, respectively. The forums were represented by the different divisions and sections of PAGASA.

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



## IN CONTROLLING TO THE NATIONAL EFFORT OF NATURAL DISASTER

PAGASA's role is not confined to communication and warning services as provided for in the National Disaster Risk Reduction and Management Plan (NDRRMP) 2011-2028. With a major task of developing alert and warning notices/bulletins for consumption of the general public and specific sector, it participates in the larger task of addressing the issues of natural disaster reduction.

Negation or reduction of natural disasters is indeed a plus factor for the national development because adverse effects of disasters are taken as significant factor that deters development. PAGASA's role is undeniably apparent in the contribution to natural disaster preparedness

prevention and mitigation in 2015.

The area of training on meteorological and hydrological hazards (typhoons, floods, storm surge etc.) are considered as the better primary approach to disaster reduction. This was coordinated in the conduct of disaster management trainings and workshops (by making available resource person) with a total of 18,843 participants representing different sectors of the society. The Regional Meteorological Training (RMT) room in Quezon City, alone, has more than 50,611 walk-in visitors, mostly students and teachers, who were identified with additional knowledge on tropical cyclone and flood hazards. In PAGASA field stations, a total of 69,662 visitors were attended. Overall a total of 139,116 learners were educated.

## LINKAGES AND COLLABORATION

### REGIONAL CONFERENCE ON FRENCH TECHNOLOGIES IN METEOROLOGY (SOFITEL HOTEL, HANOI, VIETNAM)

PROMETEO aimed to gather some 12 French companies working in the field of meteorology and environment to provide access to a comprehensive offer covering the whole spectrum of meteorological needs as follows:

- Observation equipment,
- Meteorological Information Systems,
- Public Weather Services capacity development,
- Know How Transfer and Training, and





- Turn and integrated solutions and projects

Through PROMETEO, decision-makers in the fields of meteorology, environment, hydrology and oceanography could easily access the very best of French Technologies and to get in touch with relevant French companies to fulfill their needs.

The conference which was organized by UBIFRANCE and the worldwide network of French Trade Commission, through PROMETEO, aimed to impart knowledge and introduction of new technologies in Meteorology to participants and a possible loan fund for Met Offices in Asian countries. Ten of the most important French companies in the sector, under the umbrella association PROMETEO, gathered together in the conference and presented their state-of-the-art technologies and shared their technical know-how with

the different representatives from the National Meteorological and Hydrological Services of Indonesia, Brunei, Cambodia, Malaysia, Papua New Guinea, Philippines, Singapore, Thailand and Vietnam.

The Conference aimed to widen the knowledge of the participants on the new technologies offered by each French company.

The Philippine representative presented a short overview about PAGASA, its Programs, Projects, Current Development, and Strategies for better services, and plans for specific needs in meteorology.

French companies/ members of PROMETEO were able to address the needs of various organizations in their field of activities (hydrology, oceanography and environment) such as National Hydro Meteorological Services, Civil Aviation Authorities, research centers, universities or Armed Forces ( air, navy, army, artillery) all around the world.

The site tours of the city and visit to the French Embassy in Hanoi, Vietnam gave a chance for the delegates from Asian countries namely: Malaysia, Laos, Cambodia, Philippines,

Myanmar, Vietnam and Thailand to mingle and talk about tradition and culture and see the beauty of Hanoi. The B to B meetings between the regional delegates and the French company representatives gave an opportunity for the participants to discuss their needs in terms of upgrading their forecasting capabilities and how to avail of the new equipment such as weather forecasting, data transmission, and as well as strategies on how to obtain products. Tools and techniques for systematic approach, using various model and operation and maintenance instrument, to maintain optimum level of operational condition of the system, were keenly imparted by the French company representatives.

Acquiring the knowledge and information on the new technologies, approaches and strategies will be of great help in the improvement of PAGASA's operations, products and services.

For the follow-up actions, it shall be the primary concern of the participants to be involved in any activities of the agency to make use of the knowledge gained in the conference. Likewise, information should be shared to the personnel concerned particularly in the



*International Seminar on Enhancing Resilience against Multi-hazards through Effective Mitigation System and Adaptation Strategies, Quezon City, 24-25 February 2015*

field of meteorology and hydrology with this new technologies offered by the French Technologies, and also those involved in research, personnel in Research and Development Training Division of the Agency (RDTD especially, meteorologist



*Training on severe weather events - effective planning (UKMO)*





## Fourth Meeting of Global High Frequency Radar Network held in Heraklion, Crete, Greece on September 22-23, 2015

The 4th meeting on Global High Frequency Radar Network attended by Dr. Landrico U. Dalida, Jr., OIC, Deputy Administrator for Operations and Services and Ms. Nancy T. Lance, Asst. Weather Services Chief, Finance, Planning and Management Division (FPMD), aimed to gather countries working in ocean dynamic to share their experiences using the HF radar and to discuss the main goals of the global HF radar network.

The goals of Global HF radar network are the following:

- 1) Increase the number of coastal radars,
- 2) Ensure HFR data is available in a single standardized format in near-real-time,
- 3) Assimilate data into ocean and ecosystem models,
- 4) Promote a set of easy to use standard products,
- 5) Promote a Worldwide Quality Standards, and
- 6) Develop emerging uses of HF radar.

Each country presented their updated output on the program/projects/activities on HF radar including issues and concerns encountered during the implementation of the project. Some were still on the ongoing process and others were operational. Discussion on the milestone was conducted by Dr. Hugh Roarty, Ph.D. in Ocean Engineering from Stevens Institute of Technology Research, Project Manager at Rutgers University, with 13 years experience working with HF Radar. European and American participants presented the following for discussion for each goal:

- 1) Increase the number of coastal radars
  - HF radar “Dardanos” measuring the outflow of the Black Sea in the Aegean
  - European Coordination for Coastal HF Radar: EuroGOOS HF Radar Task Team”
- 2) Ensure HFR data is available in a single standardized format in near-real-time,
  - Status of the US radar



- Coordination of Coastal radar network at national level: The RITMARE project experience in Italy
- 3) Assimilate data into ocean and ecosystem models
  - SOCIBHF radar : A Key Contribution to Multi-Platform Ocean Observation
  - HF radar observation of ocean currents, waves and winds in Australia
- 4) A set of easy to use standard products
  - HF Monitoring Systems and response against Marine Oil Spills in Malta Channel
  - Progress on Short Time prediction from Basque Country HFR Network
- 5) Worldwide Quality Standards
  - HF Radar Quality and Analysis Quality and analysis efforts
- 6) Develop emerging uses of HF radar
  - Description of the Spanish HF radar Network
  - HF radar in the Red sea: Present and Future Applications

It is but timely that national weather services, like PAGASA, participated in the meeting. It was the first time that the Philippines participated in this kind of gathering in relation to marine forecasting. The Global High Frequency Radar Network is a vision for a global operational system measuring ocean

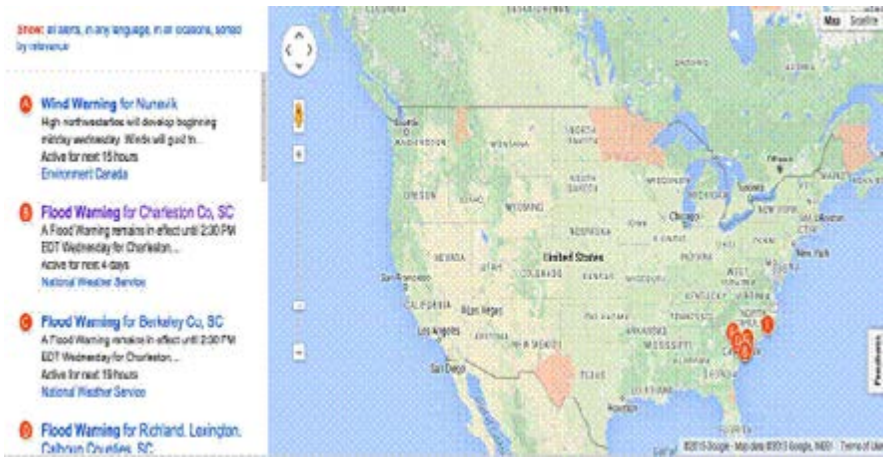
surface currents to support monitoring of marine and coastal ecosystems. The measurement of ocean currents is fundamental to ocean forecasting. High Frequency (HF) radar has proven to be an efficient tool for measurement of surface currents along coasts out to 200 kilometers.

The site tours of the city and visit in one of the archeological museums for the participants from USA, Germany, Spain, Switzerland, Italy, Malta, Portugal, Saudi Arabia, United Kingdom, Greece and Philippines, gave them the chance to mingle and talk about tradition and culture while enjoying the beauty of Heraklion, Crete, Greece.

### **A 3-day discussion on Google Crisis Response Program and Common Alert Protocol (CAP), Google, Inc. 1600 Amphitheatre Parkway Mountain View, CA 94043, USA.**

The 3-day discussion on Google Crisis Response Program and Common Alert Protocol (CAP) was attended by Ms. Nancy T. Lance, OIC of Plans and Programs Development Unit. The activity highlighted by the following:

1. Overview of Google Public Alerts
  - o Briefing and discussion of the common Alerting Protocol best practices in the USA as a common platform being used by the National Weather Services



Example: Current Flood Alert



- o Discussion of Google program as a CAP integrator based on WMO recommendations and best practices
- 2. National Weather Service (NWS) & CAP
  - o NWS provides 50+ alert types
  - o NWS in process of upgrading to CAP 1.2 specification
  - o Demand for NWS alerts is increasing. CAP utilized by many 3rd parties - including American Red Cross, The Weather Channel.

National Weather Service. Tools and technique for systematic approach using Application Program Interfaced (API)

Acquiring the knowledge and information on the approaches, strategy and best practices can be of great help in the improvement of PAGASA products and services.

For the follow-up actions, it shall be the primary concern of the participants to be involved in any activities of the

The discussion also widened the knowledge of the participants on the importance of Public Alert, specifically, to countries prone to disasters like Philippines. Google has helped PAGASA in the dissemination of information on disasters such as typhoons, floods etc.

Onsite-tours at the Google Headquarters provided the participants an overview on how Google operates, specifically, discussion of the common alerting protocol best practices in the USA as a platform being used by the



agency to make use of the knowledge gained in any collaboration, meeting and discussion. Likewise, an echo seminar shall be conducted to the personnel, particularly; those involved in weather and flood forecasting and warning operation such as the personnel in Weather Division (WD), Hydrometeorological Division (HMD) and Information Communication and Technology (ICT) personnel.

PAGASA shall take actions on the following:

- o KML for typhoon forecast cone
- o Google PAGASA Partnership Phase 2:
  - Flood Alert KML
  - Other Hazards
- o Dr. Lagmay on Project NOAH to:
  - Offered feedback and help on expanding alert availability
  - Inclusion of Project NOAH



**Fifth Bilateral Meeting on Cooperation in Meteorology Between the Korea Meteorological Administration (KMA) of the Republic of Korea and the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA)**

**15-17 April 2015, Quezon City, Philippines**

The KMA delegation headed by Mr. JUNG Hong-Sang, Vice-Administrator of the KMA, visited PAGASA from 15 to 17 April 2015 to participate in the 5th bilateral meeting on Cooperation in Meteorology between KMA and PAGASA.

Dr. Flaviana D. Hilario, Acting Deputy Administrator for Research and Development of PAGASA extended a warm welcome to the KMA delegation and expressed appreciation and gratitude to the continued cooperation between KMA and PAGASA in meteorology.

Mr. JUNG Hong-Sang of KMA expressed his gratitude to Dr. Hilario and her colleagues for hosting the 5th coordination meeting between KMA and PAGASA in Quezon City, Philippines. He also expressed appreciation to the hospitality accorded to the KMA delegation and the excellent arrangements. He 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.



Ms. Nancy T. Lance (PAGASA) and Ms. KIM Jeongsun (KMA) presented the Achievement, Current Development and the Way Forward of their meteorological services respectively during the opening of the meeting.

Review of Cooperative Activities since the 4th Bilateral Meeting - Both sides noted with satisfaction that most of the cooperative activities agreed at the 4th coordination meeting have been successfully implemented in large. The review of the previous activities was presented and discussed during the meeting.

Future Cooperative Activities - Both sides discussed future cooperative areas and activities to be implemented after the 4th meeting, and have agreed

upon on the following cooperative activities in the inter-session.

Cooperation on the development of COMS data receiving and analysis system in PAGASA - KMA has supported partner countries by providing COMS (Communication, Ocean and Meteorological Satellite) data receiving and analysis system and related technologies since the successful launch of COMS in June 2010.

In line with this, KMA supported the KOICA project which implemented COMS receiving and analysis system in the Philippines from 2014 to 2015. KMA provided training on COMS ground system operation and data utilization in March 2015 and has offered more trainings and technical consultations for the success of the project.

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

- a) KMA's technical support for the stable reception and application of COMS data.
  - COMS algorithm theoretical baseline documents (ATBD) for meteorological elements will be provided to PAGASA in 2016.



- For the system operation, technical consultation will be provided to PAGASA from the implementation until the stabilization phase.
- b) Active utilization of COMS data by PAGASA through the implemented system.
  - Utilize COMS data for disaster monitoring and forecast, and share the performance with KMA.
  - Maintain the system by spreading the operating technique and related knowledge within PAGASA.

Capacity Building - As part of the KOICA project, a multi-year training course on Information and Communication Technologies (ICT) for meteorological services has been conducted by KMA from 2013 to 2015. This course is to maximize the use of resources by enhancing ICT and NWP capacity of partner countries including the Philippines. To achieve its objectives, both sides agreed on the following :

- a) Five staff members of PAGASA are invited to participate in the third training course to be held in October 2015 in Seoul, Korea. PAGASA will select the personnel qualified for the purpose of the program and to increase its effectiveness.
- 2) The establishment of Early Warning System (EWS) in Metro Manila in 2012 by PAGASA and KMA was completed. With this, a proposal was submitted to replicate the EWS entitled "Automation of Early Warning System in Greater

Metro Manila" specifically in Tullahan River Basin in Valenzuela City. PAGASA would also like to take advantage of the related training in maintenance and operation of the Early Warning System and improvement of the centers. It is decided that both sides agreed on the following:

- a) If PAGASA personnel need training on maintenance concerning calibration, standardization of observation, etc., KMA will explore supporting a relevant training program.
- b) To strengthen the capability of PAGASA's regional centers, KMA will take into positive consideration PAGASA's proposals related to EWS including nowcasting, climate change, etc.
- c) PAGASA suggested future cooperation items including the enhancement of capacity on blended radar, satellite data assimilation and blended QPF/QPE.

Cooperation on Radar Operation and Application - Radar operation and technology are important for each NMHS to predict severe weather. And as part of ODA projects, KMA has operated a radar-related training course since 2012 to encourage developing countries' participation. This training aims to enhance human capabilities on severe weather forecasting and warning by weather radar at NMHSs. In this regard, both sides reached a consensus on the following:

- a) In connection with ODA project, KMA will invite one expert of PAGASA to participate in the radar training course in 2015, which includes lectures and case studies on weather radar observation and operation techniques.
- b) KMA will consider providing consultation to PAGASA through experts' visits regarding the establishment of radar observation network in the Philippines and the development of radar data application technology through the ODA projects.

Cooperation on typhoon forecast technology for typhoon disaster reduction - Every year the Philippines suffers from the impact of typhoons resulting in loss of lives and considerable damage to properties, especially during Typhoon Haiyan in 2013. Korea is also prone to natural disasters and frequently visited by typhoon causing death and damage to properties. In this regard, in order to cooperate for the reduction of typhoon disaster through typhoon-related technical exchange and capacity building, the following cooperative activities are proposed:

- a) KMA invites forecasters of PAGASA to provide a training program on typhoon forecast technique, conducted by the National Typhoon Center.
- b) Collaboration for the development of typhoon analysis and prediction technologies.

## Storm Chasers



*STORM CHASERS general Assembly*



ISO 9001-2008 Awareness Seminar and Internal Quality Audit Seminar Workshop



37th Meeting of the Asean Sub-Committee for Meteorology & Geophysics, Kuala Lumpur, Malaysia., 25-27 August 2015, Dr. Flaviana D. Hilario, Acting Deputy Administrator for Research and Development (2nd from left) and Ms. Ma. Elena V. Tan, Sr. Weather Specialist (1st from left)





*Regional Security and Development Study, Norway, 10 to 19 May 2015, Mr. Socrates F. Paat, Jr., Sr. Weather Specialist (front row, 2nd from right)*

*21st Conference of the Parties (COP21) to the UNFCCC, Paris, France, 30 November – 4 December 2015, Ms. Edna L. Juanillo, OIC, Climatology and Agrometeorology Division (1st from left)*



*17th World Meteorological Congress, Geneva, Switzerland, 25 May - 12 June 2015, Dr. Flaviana D. Hilario, Acting Deputy Administrator for Research and Development*



**Workshop on  
Uncertainty Quantification in Climate Modeling and Projection  
13-17 July 2015 Miramare - Trieste, Italy**

*Workshop on Uncertainty Quantification in Climate Modeling and Projection held at ITCP participated by Marcelino Villafuerte II*



*Gender Day at 17th World Meteorological Congress, Geneva, Switzerland, 5 June 2015, attended by over 50 delegates and WMO staff which started in a working breakfast, enjoying the opportunity to meet and discuss, in an informal setting, issues around gender equality and the empowerment of women in NMHSs and at WMO, with Dr. Flaviana D. Hilario, Acting Deputy Administrator for Research and Development (1st row, rightmost)*



*17th World Meteorological Congress, Geneva, Switzerland, 25 May - 12 June 2015, Petteri Taalas (right), Director-General of the Finnish Meteorological Institute was voted by the members of the Congress as the next Secretary - General of WMO for a four-year term starting 1 January 2016. David Grimes (left) of Canada was re-elected as President of WMO.*



*Dr. Cynthia P. Celebre, Chief, Research & Development and Training Division, presented the Philippine country report during the Plenary Session of the 8th GEOSS Asia Pacific Symposium, Beijing, China, 9 - 11 September 2015*



*8th GEOSS Asia Pacific Symposium, Beijing, China, 9 - 11 September 2015, (3rd row, 11th and 12th from L to R), Dr. Cynthia P. Celebre, Chief, Research & Development and Training Division and Ms. Edna L. Juanillo, OIC, Climatology and Agrometeorology Division, respectively.*



A group photo of the participants of Working Group 5 on the topic GEOSS Asia Water Cycle Initiative (AWCI), Beijing, China where Ms. Edna L. Juanillo, OIC, Climatology and Agrometeorology Division presented the Flood Early Warning System in the Philippines. Seated third and fourth from L-R are Dr. Cynthia P. Celebre, Chief, Research & Development and Training Division and Ms. Juanillo, respectively.

Front row, 1st from L is Dr Cynthia P. Celebre, Chief, Research & Development and Training Division together with the participants of the Directors of WMO Regional Training Centers held in Langen, Germany, 16-20 March 2015, after the Welcome Dinner



Dr. Cynthia P. Celebre, Chief, Research & Development and Training Division presented the 2014 major accomplishments and barriers of the Philippine RTC as the Training Component, including that of the Institute of Environmental Science and Meteorology (IESM), University of the Philippines-Diliman, which is the University Component of the RTC, WMO Regional Training Centers, Langen, Germany, 16-20 March 2015



A group photo taken inside the JRC Laboratory during the Factory Acceptance Test (FAT) of Mobile X-Band Pulse Compression Dual Polarization Doppler Weather Radar System with KU-Band Satellite Communication Facilities held in Nagano, Japan, 7-11 December 2015. From L-R: Mr. Satoshi Okawara, Engineer of the Radar Equipment Group, Ms. Ma. Cecilia A. Monteverde, Assistant Weather Services Chief, Dr. Flaviana D. Hilario, Acting Deputy Administrator for Research and Development



A photo taken at the rooftop of JRC Bldg. during the Factory Acceptance Test (FAT) of Mobile X-Band Pulse Compression Dual Polarization Doppler Weather Radar System with KU-Band Satellite Communication Facilities in Nagano, Japan, 7-11 December 2015. From L-R: Mr. Mark Ryan F. Lazaro, Senior Telecom Engineer, JRC, Dr. Flaviana D. Hilario, Acting Deputy Administrator for Research and Development, Dr. Cynthia P. Celebre, Chief, Research & Development and Training Division, Ms. Ma. Cecilia A. Monteverde, Assistant Weather Services Chief, an official of JRC, Administrator for Research and Development, Engr. Catalino L. Davis, Acting Deputy Administrator for Administrative & Engineering Services and Mr. Oscar Tabada, Assistant Weather Services Chief







A group photo taken in front of the Microsemi Office in Boulder Colorado, USA during the Factory Training and Acceptance Testing of the Microsemi Time Scale System, 13-17 April, 2015. From L-R: Mr. Kirk Montgomery (Microsemi), Engr. Mario M. Raymundo, Weather Specialist II, Engr. Arnel R. Manos, Weather Facilities Specialist III, Dr. Cynthia P. Celebre, Chief, Research & Development and Training Division, Engr. Dario L. dela Cruz, Assistant Weather Services Chief, Engr. Lester Kim M. Lagrimas, Weather Facilities Specialist I and at the back is Mr. Edgardo A. Lagoc, Weather Observer II.



Participants in the Regional Forum on Meteorological Services for Aviation Safety in Southeast Asia, Jakarta, Indonesia, 29 April 2015, Dr. Esperanza O. Cayanan, OIC, Weather Division (front row, leftmost)

*KOICA training course on "Establishment of Communication, Ocean & Meteorological Satellite Analysis System in the Philippines held in Korea, 1 - 7 March 2015, Dr. Esperanza O. Cayanan, OIC, Weather Division (1st row, 3rd from left)*



*WMO 3rd International Monsoon Heavy Rainfall Workshop held in New Delhi, India on 22-24 September 2015, Dr. Esperanza O. Cayanan, OIC, Weather Division*



*Volcano, Ocean, Typhoon & Earthquake (VOTE) Technical Working Group Meeting held in Taipei, Taiwan on 8-11 March 2015, Dr. Flaviano D. Hilario, Acting Deputy Administrator for Research and Development(6th from left), Dr. Esperanza O. Cayanan, Weather Services Chief, Weather Division(1st from right)*

# CATERING THE SERVICES FOR SPECIFIC PURPOSES

Various sectors of the national community have been dependent on meteorological and hydrological services. Not a few of them need open growth investment areas for further development of atmospheric, geophysical, astronomical and related field programs. The needs of those particular sectors will continue to be real. Thus, it is essential that PAGASA must be able to respond to meet such changes which vary with time.



## Agriculture

Crop and livestock production have always been affected by weather and climate. But the utilization of atmospheric, geophysical, and astronomical information to crop and livestock production has not been widespread. Agricultural practices have been designed to minimize the disadvantages of unfavorable weather and to maximize the advantages of favorable weather during stages of production.

Adequate awareness on the use of comprehensive agro meteorological information will greatly help boost food production. Total education of those engaged in agriculture for utilization of information technology, are therefore, in order.

## Air transportation

The aviation industry assumes an important role in national development in this fast changing world. This is particularly true in archipelagic country, like the Philippines, where other modes of transport may not cope with specific demands of the various sectors of society in terms

of convenience, transport time and safety. For the past decade, leisure-related activities have become an integral part of the economic aspect of the industry's role in nation building. More wide-bodied aircraft are being utilized in increasing frequency, such that the potential for a major loss of life from a single aircraft disaster has also increased.

The aviation industry needs accurate weather information industry need accurate weather information to help ensure safe, regular and economic flight operations. In the near future aerodrome forecasts may have to include specific information for relatively short-period operations.



## Building and Construction

Civil engineering jobs are mostly done outdoors. All related activities, especially, major ones, will therefore be subject to the prevailing weather. Construction engineers would be well-advised to avail of weather data



to reduce the cost of delays caused by unfavorable weather conditions and maximize the use of extended periods of fine weather.

Climatological and astronomical data will also be of utmost concern to architects, engineers of various disciplines and zone planners in urban design and development. New demands on weather and hydrological services will be focused on the long-term influence of weather on power consumption for cooling, degradation of materials levels, human comfort, both in and out of the buildings and the production, dispersal and accumulation of air and water pollutants.

There is also a growing need for more detailed astronomical information in architectural and engineering design of civil structures.



### Water Resources

Water greatly influences peoples' lives. Lack of it causes droughts and too much of it causes floods. In between these extremes lies the important task of the meteorological and hydrological services in the prudent and effective utilization and management of the country's water resources in cooperation with other concerned agencies.

As the population increases rapidly, policy directions must be in place on the different needs for water such as for drinking, food production, waste disposal, energy generation; as avenues for transportation; and for recreation. The need for guidelines in pursuit of such policies will be acutely needed under extreme conditions, e.g. during time of floods and extended drought periods in food production areas. The PAGASA may have to work closely with concerned government agencies in the assessment of water resources and its variability in terms of time and quantity and the systematic monitoring and evaluation of human impact on water resources.



### Energy

Guidance of water hydrology experts will be of great significance to energy planners in the next decade. This

fact has become apparent in the light of worldwide concern about increasing levels of greenhouse gases in the atmosphere with consequent effects on future climate giving rise to renewed interest in options for hydro-electric power and other less economically viable alternative energy sources such as wind, solar, ocean swell, ocean thermal energy, and waves and tidal changes.

Another policy aspect of equal degree of significance is in the field of energy conservation. The utilization of PAGASA technical information will prove indispensable for scheduling the production, distribution and use of energy



### Health, Recreation and Tourism

Given the prospect for a more stable peace and order situation in the country, the tourism industry offers great possibility for economic advancement by way of direct infusion of hard currency into the country's economic lifeline. In the promotion of existing places of interest and development of new growth areas, tourism planners will certainly demand advice from weather experts. Long-term averages of weather parameters and more recently, urban air pollution levels will be areas of concern.



### Land and Inland Water Transport

Much of the total transport needs for bulk goods and passengers are borne by land transportation. Time and again, however, this mode has been subject to disruptive conditions caused by adverse weather. Highway engineers will surely appreciate the advice of experts on such risk aspects as rain-induced landslide and flood-susceptible road paths in order to optimize transport flow.

To lesser extent, river-borne traffic and inland transport across major lakes of the country will likewise benefit from the nearest PAGASA station.



### Marine and ocean Activities

For the next decade the Global Maritime Distress and Safety System, a program implemented by the International Convention for the Safety of Life at Sea, will introduce innovations resulting to safe and economic operations in marine and oceanic areas. Fishing, coastal shipping and pleasure boating, offshore drilling and sea bed exploration, exploitation and coastal engineering.

This will be made possible with the increasing use of satellite communication and high seas forecasts and warnings.

# ASPIRATIONS OF THE AGENCY

The past can never be altered. Yet, it somehow portrays bits and pieces of events with abundant lessons. There are, indeed, lessons from both failures and success which could be explored for utilization. While the future may not be predicted with very high degree of certainty, the present reveals probable trends that may give some clues about what the future might be.

With these parameters taken totally as a philosophical motivating factor, the agency may, after weighing the results of scanning the present environment, assessing its strength and weaknesses, analyzing its present and future environment, begin detailing its aspirations to meet the level of world class meteorological agency in three years time. "What might be done that would be supportive of the country's thrust on sustainable development?"

As one of the aspirations of the agency is the approval of the PAGASA modernization bill, the agency wish list has to be translated into realities so that at the end of the decade there would already be evident signals for a fully developed PAGASA services. The agency would be remembered for its reliable accurate forecasts. When it says there will be rains, people will bring their umbrellas. On November 3, 2015, the House Bill for PAGASA modernization was signed by President Benigno Aquino and enacted as Republic Act 10692. The Modernization Act has the following components:

(a) Modernization of Physical Resources and Operational Techniques. – This shall entail the acquisition and/or upgrade of state-of-the-art instruments, equipment, facilities and systems, with emphasis on weather and flood monitoring and warning system and agro-meteorological

observation system to strengthen services for agriculture and food security: Provided, That prior to such acquisition and/or upgrade, an inventory of all existing government and private weather instruments nationwide shall be undertaken: Provided, further, That the acquisition of new instruments, equipment and systems shall be harmonized with the phase-out of uneconomical and obsolete instruments, equipment and systems in the PAGASA inventory;

- (b) Enhancement of Research and Development Capability. – This shall involve the enhancement of research and development capability through a more rationalized and totally integrated, approach and identified activities, with focus on improvement of operations, as well as the development of specialized services with cost recovery measures:
- (c) Establishment of Regional Weather Service Centers. – This shall include the establishment of flood forecasting and warning sub-centers in strategic areas in the country to broaden the agency base for delivery of service to the countryside;
- (d) Establishment of PAGASA Data Center. – This shall include the centralization of the different technical outputs which include facts, figures and statistics derived from the PAGASA operations and systems, through the establishment of a technology-based data-center that is consistent with international standards in order to make atmospheric, astronomical and weather-related information accessible and readily available to all government agencies involved

in climate change adaptation and disaster risk reduction and management, the academe, researchers, media and the general public.

- (e) Enhancement of Weather Data Collection and Information Dissemination Services. – This shall involve the development and use of effective weather information method using local dialects, nontechnical terms and familiar graphical presentations that will ensure the delivery of accurate, up-to-date and timely atmospheric, astronomical and weather-related information to create greater public awareness and draw appropriate response for disaster risk reduction: Provided, That PAGASA should partner with, other government agencies and private entities for the collection and dissemination of weather data and information.
- (f) Creation of a Human Resource Development Program. – This component shall include the following:
- (i) New Salary Scale for PAGASA Personnel. – The Department of Budget and Management (DBM) shall develop a new salary scale for PAGASA personnel in consonance with Republic Act No. 8439, otherwise known as the "Magna Carta for Scientists, Engineers, Researchers and other Science and Technology Personnel in Government" with a corresponding increase in the base pay, allowances and other benefits;
- (ii) PAGASA Personnel Retention Incentive. – An additional incentive to be known as

the “Personnel Retention Incentive” shall be provided to qualified PAGASA personnel, to be determined by PAGASA in consultation with DBM in an amount not exceeding twenty percent (20%) of the monthly basic salary subject to the implementing rules and regulations (IRR) which shall be hereinafter formulated; and

(iii) Scholarship Program. – Not later than three (3) years from the enactment of this Act, scholarships shall be provided for undergraduate and graduate studies in meteorology and related fields as well as for specialized

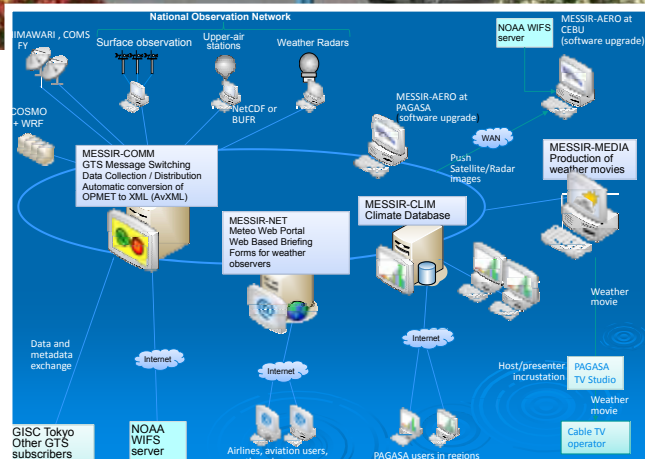
training programs, in coordination with the DOST, Commission on Higher Education (CHED) and Higher Education Institutions (HEIs). Cooperation on human resources upgrading and capability enhancement with regional and international organizations shall also be undertaken.

(g) Development of Regional and International Cooperation Program. – This shall entail the development of appropriate collaborative arrangements with relevant regional and international bodies and government institutions to complement the national effort for modernization.



*Met-Hydro Telecommunication Network*

*National Meteorological Climate Center*



*PAGASA – Possible extensions with MESSIR*



*Integrated High Performance Computing System*

# SCIENCE AND TECHNOLOGY ANNUAL EVENTS

## THE NATIONAL ASTRONOMY WEEK..

The celebration of National Astronomy Week facilitated by PAGASA is definitely one of the most anticipated annual events by astronomical enthusiasts, students and teachers, due to bundle of activities organized for the said activity. This year, the one-week event was held on February 16-20 and is aimed to revivify the interest of the public and help them widen their awareness to Astronomy. To make the objective possible, the Space Science and Astronomy Section (SSAS) of the Research Development and Training Division (RDTD) organized astronomically inspired and totally free of charge activities.

The PAGASA Observatory at UP Diliman showed the constellation of stars through a conduct of Free Stargazing and Telescoping sessions attended by 147 students and astronomical enthusiasts. In addition, Planetarium shows were also organized at the Planetarium located in Science Garden and in Laoag City, Ilocos Norte. There were 520 students and Astro enthusiasts who benefitted the said Planetarium show at Science Garden while the Mobile Planetarium was administered to 40 different schools in Laoag City and enticed 633 students.

Supplemental to the celebration of NAW was the conduct of Seminar/Workshop on Basic Astronomy designed for Public School Science Teachers which was held at Don Mariano Marcos Stadium at Laoag City, Ilocos Norte. The seminar capacitates 60 Science Teachers in Basic Astronomy.

The most pompous event held was the Star Party Contest consisted of five different games namely: On the Spot Painting, Astro Quiz Bee, Search and



Centered Selected Celestial Object, Astro Henyo and Group Contest participated by six High School Science Students and two Teachers/Coaches from each school. Two of the students from each participating school were oriented in the operation of telescope to be able to play the mechanics of "Search and Centered Selected Celestial Object Contest."

The points were accumulated based on the scores gathered by each participating schools from the five games that consisted the Star Party Contest. Bacarra National Comprehensive High School got the highest accumulated points with 74.13 and bagged the first prize worth 15,000 pesos. Mariano Marcos State University Laboratory HS – Batac and Mariano Marcos State University Laboratory HS – Laoag got the 2nd and 3rd place with 69.2 and 68.3 points, respectively. The second prize winner took home 10,000



pesos while the third prizewinner took home 5,000 pesos.

## THE NATIONAL WOMEN'S MONTH CELEBRATION

### Towards a more Gender Responsive Agency

Breaking stereotypical roles, equal power distribution, gender neutral job opportunities --- these are the signs of progress. Things are changing hence; we have to take it one step at a time. The National Government Agencies (NGAs) are implementing the Gender and Development (GAD)



*Ms. Reina Olivar, Philippine Commission on Women (PCW) Gender and Development (GAD) consultant facilitates the two-day Gender Sensitivity Training (GST) at the PAGASA Amihan Conference Room.*

program promoting gender receptive environment.

And the timing could never have been better. Just as the country is buzzed with talks of efforts to bridge the gap between and amongst gender, the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), one of the attached agencies of the Department of Science and Technology (DOST) conducted a number of Capacity Building Trainings and activities in coordination with the Philippine Commission on Women (PCW), Civil Service Commission (CSC), and DOST.

A two-day Gender Sensitivity Training was conducted at the Amihan Conference Room at the PAGASA Central Office and was facilitated by Ms. Reina Olivar, GAD Consultant of the PCW. Thirty (30) employees attended the seminar and were given certificates

of participation and in unison acclaimed the seminar is truly long anticipated. "Sana tuloy-tuloy na ito", said one of the participants. A statement of fact rather than just something to look forward to as PAGASA's GAD Programs, Activities and Projects (PAPs) for 2015 are all set for implementation.

In 2014, the agency launched its PAGASA GAD Focal Point System (PGFPS) members headed by the GAD Focal Point Person, Dr. Flaviana D. Hilario, Deputy Administrator for Research and Development with the Executive Committee and Technical Working Group (TWG). A room was established, specifically designated for the GAD Center.

Before conducting its trainings for PAGASA employees, a database was created concerning the definite needs of each target participant, members and executives of the PGFPS. A

gender analysis and capacity building seminar for this purpose was held on September, 2014. Results were then collated and submitted to PAGASA Executives for verifications, and served as the basis for the PAGASA GAD Plan and Budget for 2015.

For the year 2015, the PGFPS submitted their annual GAD Plan and Budget which is endorsed through the DOST to the PCW. The following activities were held in March 2015 in line with the celebration of the Women's Month such as the Livelihood seminars, Fun runs, Free Wellness checkup, conferences, and workshop-discussions tackling Women's Leadership and Decision Making headed by the Guest Speaker from the Commission on Audit (COA), Assistant Commissioner LOURDES M. CASTILLO.

PAGASA also participated in DOST's Women's Month Celebration and provided officials and employees t-shirts following PCW's theme entitled "Juana, Desisyon Mo ay Mahalaga sa Kinabukasan ng Bawat Isa, Ikaw Na!". Events such as partner agency parades around the DOST Central Office compound, dance marathon, poster making contests, and forums also tackling Women's Leadership were held.

Reconstructions of previously shared comfort rooms into separate toilet facilities are also ongoing in five (5) PAGASA Regional Services Divisions (PRSDs) particularly in Baguio,



*PAGASA Officials and Employees take part in the celebration of the National Women's Month.*





## *Gender Sensitivity Training*

*May 5-6, 2015*

*Amihan Conference Room, PAGASA Central Office*

Legazpi, Cebu, Davao and Cagayan De Oro City. Currently, the PGFPS is gathering data for the proposed Child Minding Center.

Indeed, the PGFPS has a lot under its sleeves to make PAGASA a more gender responsive agency. And it is counting on all its executive and employees to make this a reality in the near future.

## **WMO/NATIONAL METEOROLOGICAL DAY**

### **It's a "sunny" day for PAGASA's 150-year anniversary**

No bad weather can dampen the spirit of the men and women of PAGASA as they celebrated the 150th year of the national meteorological service in the country.

Coinciding with the World Meteorological Day (WMD) with the theme "Climate Knowledge for Climate Action", the celebration on March 23 was loaded with fun and enriching activities.

Employees of the Agency were treated with an early aerobics dance

and group games, followed by a thanksgiving mass and a motorcade around Elliptical Road in Quezon City.

The general public also had a chance to participate in the celebration by checking out the week-long exhibit in PAGASA featuring the products and services of the Agency. The exhibit also included the winners of the poster-making contest. This nationwide contest for high school students was in collaboration with the Department of Education.

The public also had the opportunity to watch in the Planetarium for free and visit the different technical facilities of PAGASA.

Focusing on the theme of the WMD, a Scientific Forum featured a discussion on climate change, disaster prevention and mitigation, agricultural issues, and the El Niño Phenomenon.

The dedicated employees of PAGASA were also honored with a Loyalty Award, specifically those who have rendered service for 10 to 45 years.

The highlight of the event was the conferment of the 2015 Wind Vane Awards. The Wind Vane Awards is conducted every year to recognize the

contribution and support of individuals and organizations to the disaster-risk reduction and management projects of PAGASA.

This year, the recipients of the award were DILG Secretary Manuel A. Roxas II, OCD Administrator and NDRRMC Executive Director Alexander P. Pama, PAGASA Former Chief Claro S. Doctor, Rice Watch and Action Network Secretariat Coordinator Hazel Arandez-Tanchuling, Legazpi City Mayor Noel E. Rosal, UNTV Reporter Reynante A. Pelayo, Cagayan de Oro CDRRMO Mario Verner S. Monsanto, PAHRODF, and DOST Secretary Mario G. Montejo.

### **Press launching of new services**

Meanwhile, a press launching was held for the new services of the Agency, the Storm Surge Warning Signals, Modified Tropical Cyclone Warning System, new PAGASA website, Simplification of Weather/Climate Information Materials, and the meteorological glossary "Patnubay sa Weder Forkast".

The Storm Surge Warning System is the newest service of PAGASA. It's a shift from general weather forecast to working towards the impact-based

storm surge forecasting and warning. It is similar with the current color-coded Rainfall Warning System of the Agency and is classified according to the level of severity and required actions to minimize risks.

Incorporating the risk analysis of Dr. Leoncio A. Amadore, former director of PAGASA, the modified Public Storm Warning System will focus on the Super Typhoon category and will emphasize on an impact-based warning system.

In compliance with Administrative Order No. 39, mandating all government agencies to migrate to the government webhosting service (GWHS) of the DOST-Information and Communications Technology Office, PAGASA also launched the new website under igov.

The Be Secure Project, the newest addition to PAGASA's efforts in simplifying technical terms, will ensure that climate information is understood by decision makers and the general public. Be Secure Project also provides technical support to DOST-PAGASA to improve its weather forecasting and simplification of its climate forecasts.

And finally, "Patnubay sa Weder Forkast", a glossary of meteorological terms in Filipino was presented for the first time. The said glossary was created by Komisyon ng Wikang Filipino, in consultation and coordination with DOST-PAGASA.

### 150 years of dedicated service to the Filipino people

With simultaneous activities for the celebration, DOST-PAGASA definitely traced back its roots.

The humble beginnings of the Weather Bureau actually started in 1865. Through the efforts of the Jesuit scholars in Ateneo Municipal de Manila, the bureau became an important tool in weather forecasting. Because of the growing demands of the Observatory's services, it became an institution in 1894. In 1972, under Presidential Decree 78, the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) was established.

And after transferring to various departments, PAGASA, under Executive Order 128, was finally transferred to the Department of Science and Technology.

Withstanding the tests of time, PAGASA, in its 150th Anniversary, continued to remain dedicated and committed in serving the Filipino people.

For more details about the activities, please call the PAGASA Public Information Unit at telefax numbers 927-9308 or 434-2696.

## TYPHOON AND FLOOD AWARENESS MONTH

### Increasing typhoon and flood awareness in Mindanao

"The seminar-workshop is very informative. It tackled the most important thing to do as radio broadcasters..."

This was the comment of a participant during the Media Seminar-Workshop for Mindanao held in Misamis Oriental last June 18 to 20, 2015.

Held annually, the event aimed to create stronger ties with the media and equip them with the basic knowledge in meteorology that can be useful in weather reporting. The seminar-workshop also coincided with the celebration of the Typhoon and Flood

Awareness Week (TFAW).

In his opening message, Dr. Landrico Dalida, Jr., PAGASA OIC of the Office of the Deputy Administrator for Operations & Services, briefly recalled that in 2009, thousands of families in Mindanao were displaced by severe flooding. And in 2011, Tropical Storm Sendong also left an unbearable destruction, followed by typhoon Pablo in 2012 and Yolanda in 2013.

Dr. Dalida emphasized the role of the media in disaster preparedness. He said that "coordination and communication with different disaster frontliners such as the local government units are crucial, but most importantly, the wider grasp of the media to the public is indispensable. Thus, we are also grateful to have the media as our partner in information dissemination."

Attended by 40 participants from the different regions in Mindanao, the workshop also served as a venue for the media and PAGASA resource speakers to clearly discuss the different products and services of the weather bureau and to address several issues about weather forecasting.

With much appreciation from the participants, the activity proved to be an effective measure in strengthening the link of the media and PAGASA in delivering the most-updated and relevant weather information to the general public.



*Seminar-workshop for Mindanao Mediawomen in conjunction with the celebration of "Typhoon and Flood Awareness Week" held on June 18-20, 2015 at Initao, Misamis, Oriental*

# ORGANIZATION

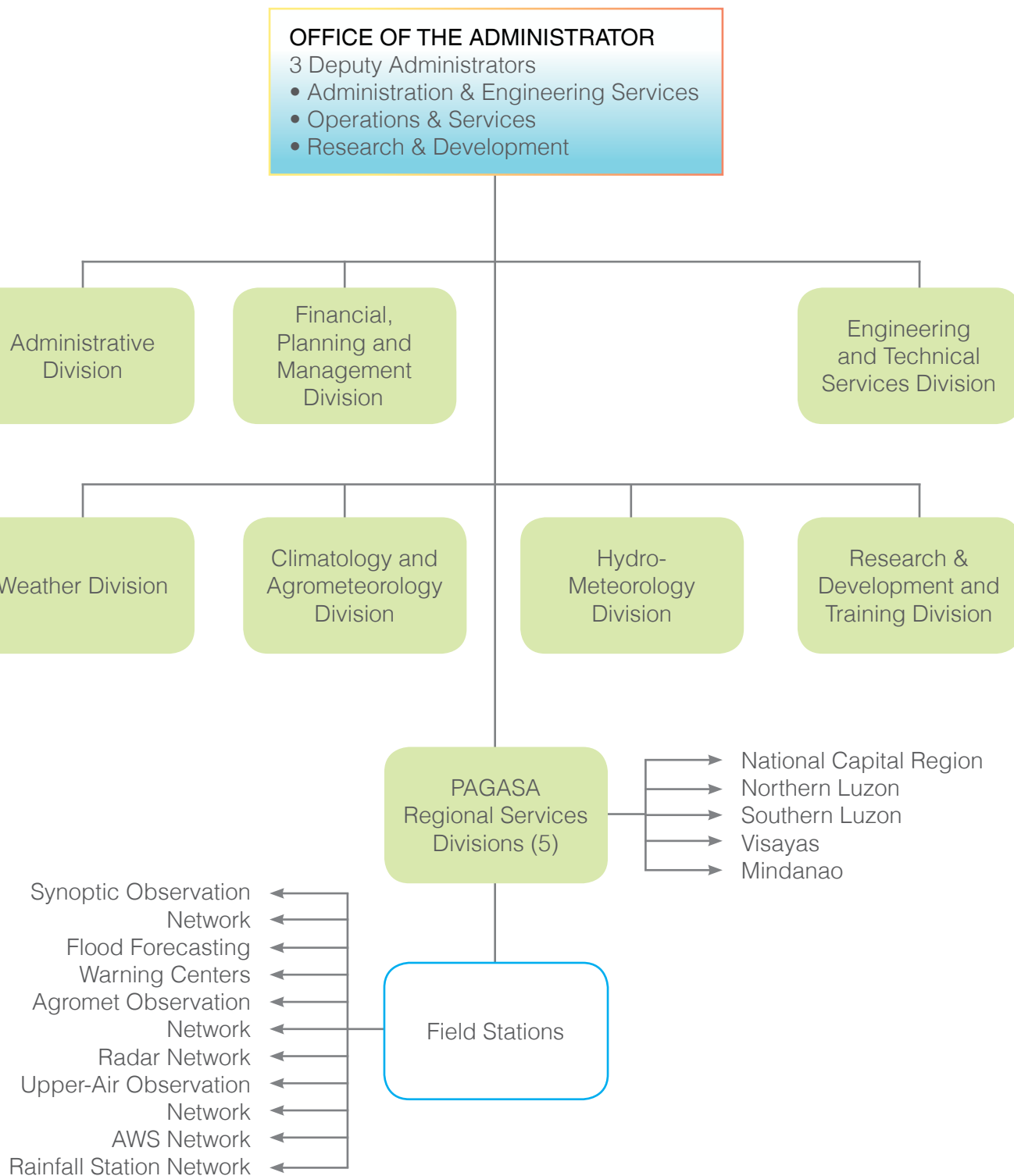
## ORGANIZATIONAL

### History

#### BRIEF HISTORY

- 1865** start of regular meteorological observations
- 1884** officially a government agency under Spain
- 1901** the meteorological service was formally named as Weather Bureau
- 1972** abolition of the Weather Bureau and the creation of the PAGASA under DND (P.D. 78)
- 1977** addition of TMRDO and NFFO to the PAGASA (P.D. 1149)
- 1984** transfer of the PAGASA to NSTA (E.O. 984)
- 1987** Recognition of the NSTA to the present DOST (E.O. 128)

# Organization Chart



## HUMAN RESOURCES

PAGASA continued its development of manpower, through trainings and scholarship program, for efficient and effective delivery of services and to keep its personnel abreast with the development of new technology. Personnel training for employees of PAGASA continued to attain technical proficiency. The agency conducted in-house training courses for its technical and administrative support personnel. Various training programs through fellowship/scholarship grants, are continuously availed by personnel local and abroad. The agency also implemented the PAGASA Scholarship Program and administered the World Meteorological Organization (WMO) Regional Meteorological Training Center for the South West Pacific.

### Scholarship

In 2015, fifteen personnel availed the scholarship program. Ten scholars are still pursuing their Masters Degree at the University of the Philippines and one of them is a foreign student. The grant of fellowship to foreign nationals is a commitment of the Philippine Government to the WMO Voluntary Cooperation Program (VCP) as a member of the WMO. On the other hand, two graduated their programs, Master of Arts in Public Administration and Master of Science in Human Resource Management, at the University of Santo Tomas in May 2015. Also, one graduated Master in National Security Administration (MNSA) at National Defense College of the Philippines in October 2015. Under the Philippine Australia Human Resources Development Facility Fund (PAHRODF), three are taking Masters Degree and one Doctoral degree while one scholar is taking up a postgraduate study on Nano Satellite for Doctoral Degree in Engineering at the Tokyo University in Japan.



*Ms. Eleonor F. Duque, M.S. in Human Resource Management, University of Santo Tomas, (June 2013 – May 2015)*



*Ms. Cynthia R. Paltuob, M.A. in Public Administration, University of Santo Tomas, (June 2013 – May 2015)*



*Mr. Socrates F. Paat, Jr., Master in National Security Administration (MNSA), National Defense College of the Philippines (October 2014 – October 2015)*

### Capacity Building

To get abreast of new development in science and technology and to further improve the capabilities and enhance the skills of its personnel, the agency conducted seventeen (17) specialized in-house training course which benefitted six hundred thirty one (631) participants. The course covered a range of topics from observation and monitoring weather, climate, flood other related phenomena, modeling, climate prediction tools to basic computer operations, communication, management and software development. In addition, a total 181 attended training courses, workshops and seminars held locally while 252 officials and employees participated in international experts training and meetings. The list of in-house training conducted by PAGASA is shown below.

#### 17 In-house Technical Training Courses conducted to 631 participants

Course Title	Total number of participants
Meteorologist Training Course Batch 1 - 30 Batch 2 - 28	58
Training on the Calibration Automatic Rain Gauge (DEWS project)	36
Forecaster Refresher Course	35
Storm Surge Modeling	10
Rainfall Warning and Climate Workshop for SLPRSD personnel	35
Rainfall-run-off Inundation Model for PAGASA and it cooperating agencies for Flood Forecasting and Warning System for Dam Operation	50
Training Course with Foreign lecturers - Severe Weather Events Effective Planning Workshop on Building Resilient Communities through 4G's Good: Good Forecast, Good, Good Communication, Good Decision and Go and Take Action	32
High Performance Computing and Tutorial of the Weather Research and Forecasting Data Assimilation System	24
Post- processing of Numerical Weather Prediction (NWP) Model output	25
Workshop of CAP on Map- Improving Institutional Responsiveness to Coastal Hazards through Multi-Agency Situational Awareness -	29
Satellite Animation and interactive Diagnosis (SATAID) -	32
Int'l seminar on Enhancing Resilience Against multi-hazards through Effective Mitigation System and Adaptation	55
International Seminar on Enhancing Resilience Against Multi-Hazards Through Effective Mitigation Systems and Adaptation (UNESCO)	58
APCC Training Workshop on CLIK (Climate Information tool kit) Seasonal Prediction and its localization	15
APEC Climate Symposium 2015	81
APEC Typhoon Symposium	56
<b>TOTAL</b>	<b>631</b>

# AWARDS AND RECOGNITIONS



*Special Honor Citation in Recognition of its fealty to the public welfare through its exemplary weather forecasting services that help keep Filipinos constantly informed and forewarned of possibly disastrous weather developments, which are vital for their safety and security from The Publishers Association of the Philippines, Inc*



*PAGASA received awards from the House of Representative under House Resolution #196 commending the employees of the PAGASA Tacloban Station for not abandoning their posts when typhoon Yolanda (international name Haiyan) pummeled the city in November 2013, awarded by Speaker Sonny Belmonte.*



*PAGASA Weather Division is ISO 9001-2008 certified.*

In the passing of years, PAGASA was able to acquire important equipment and facilities to upgrade its services and efficiently accomplish its mandate. This resulted to the strengthened delivery of services to our nation earning recognition and respect from our countrymen. This transformation though not in a fast pace gradually but eventually achieved its goal to become a reliable and efficient organization that it is.

As a living proof of its constant and continued transformation, PAGASA had already been audited and recommended to be successfully ISO 9001-2008 certified after one year of preparation for the requirements of ISO.

The official certificate will be issued after the technical review and approval by Systems Certification Department. This landmark feat was achieved after a long-time dream to become an ISO certified organization.

Over the years, PAGASA has proven to be consistent in its gradual rise to prominence as far as service to the country is concerned.



*PAGASA awarded for unwavering support and assistance to the various undertakings of the OCD, Region 8 which greatly contributed to the successful accomplishment of its mission most particularly in the pursuit of disaster risk and reduction management in Eastern Visayas given on October 01, 2015 during the International Day for Disaster Reduction at ARGPVU Palo Leyte*

## PAGASA Highlights for 2015

## RECOGNITION

In October 2015, the head of the UN Office for Disaster Risk Reduction (UNISDR) praised the Philippines for its successful efforts to reduce mortality and the numbers of people affected by Typhoon "Lando" which swept across the country despite storm surges, heavy rains, floods and landslides. The UNISDR also acknowledged that "the communication of early warnings in the Philippines has improved significantly since Typhoon Haiyan (Typhoon Yolanda) claimed over 6,000 lives in November 2013".



## AWARDS AND RECOGNITIONS





*PAGASA recognized by the Philippine Air Force Headquarter 900th Air Force Weather Group a reorganization was awarded for valuable support given to PAGASA by providing technical expertise weather data and information, lecturer's and instructors that contributed in the enhancement of unit's capability particularly in monitoring disturbance and weather forecasting . Given on December 29, 2015 at Philippine Air force Multi-purpose Gymnasium, Colonel Jesus Villamor Air Base, Pasay City by Col. Lauro N. Tianchon, PAF (GSC) Group commander*

Title of Scientific Paper	Author	Name of Journal	Country
<b>2015</b>			
Significant influences of global mean temperature and ENSO on extreme rainfall in Southeast Asia	Marcelino Q. Villafuerte II	Journal of Climate	U.S.A.
Changes in extreme rainfall in the Philippines (1911–2010) linked to global mean temperature and ENSO	Marcelino Q. Villafuerte II	International Journal of Climatology	United Kingdom
Statistical Downscaling in the Tropics Can Be Sensitive to Reanalysis Choice: A Case Study for Precipitation in the Philippines (Manuscript in final form 19 January 2015)	co-author – A.Lucero and C. Limbo	Journal of Climate	Spain
Enhancement of Rainfall Warning System: Intercomparison and Validation of Radar Rainfall Estimates Using Rain Gauge Data for Metro Manila	Lorenzo Moron Ma. Cecilia A. Monteverde Cynthia P. Celebre	African Journal for Agricultural Sciences and Technology (AJAST) Published: June 2015	Africa
Validation of Cosmo Model 24 H Forecast Rainfall Using Rain Gauges Estimated Precipitation During Occurrence of Typhoon Santi	Lorenzo Moron Ma. Cecilia A. Monteverde Lourdes Sulapat Cynthia P. Celebre	African Journal for Agricultural Sciences and Technology (AJAST) Published: June 2015	Africa



*Dr. Marcelino Q. Villafuerte II was awarded for his two (2) published research/study namely: Significant influences of global mean temperature and ENSO on extreme rainfall in Southeast Asia and Changes in extreme rainfall in the Philippines (1911–2010) linked to global mean temperature and ENSO from the National Academy of Science and Technology (NAST)*

# PAGASA Highlights for 2015

## SERVICES

### Completion of the Social Media Policy

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### Definition of Terms

**Account** refers to PAGASA Social Media Account

**Activities** refers to all Social Media activities

**Regular post** refers to all information posted on social media sites by PAGASA

**Special post** refers to additional information other than the required as defined in the duties and responsibilities of the personnel

**Extreme events** refer to the weather condition caused by the presence of tropical cyclones (TC), low pressure areas (LPA), monsoon rains and all cold front, weather systems with associated hazards

**General Public** refers to all recipients of the information issued by PAGASA (this includes social communities)

**Misinformation** refers to inaccurate information that is spread unintentionally. It is distinguished from disinformation, which is intended to mislead.

**Typographical error** often shortened to typo refers to a mistake made in the typing process (such as a spelling mistake).

**Interactive** refers to allowing a two-way flow of information/ conversation between social media (Facebook, twitter) and the general public, responding to a user's comment/inquiry.

**Responsible and abusive statements** refers to a negative defaming statement or phrase.

## AGENCY POLICY

The popularity of Social Media platforms such as Facebook and Twitter became apparent in the Philippines because of this popularity PAGASA decided to use this new media platform to reach more people. Using this platform has an advantage such as reaches more people and quick dissemination of information and disadvantages such as abusive use of information and misinformation. In order to minimize the disadvantage of Social Media platform PAGASA need to make its policy on the use of Social Media Platforms. After PAGASA attended the introductions of Module on Social Media for Development of UN APCICT in South Korea had created its Social Media Team to draft the PAGASA Social Media Policy. Last April 29 to May 1, 2015 the team held a writeshop to prepare the policy using the bottom-up approach by preparing the policy from every divisions and make the policy for the whole PAGASA. After a series of meeting and intellectual discussions of the technical working group (TWG) prepared the final draft in early 2016.



*Mayor's Special Award during the 78th Charter Day Celebration of Cebu City on February 26, 2015 at the Cebu Waterfront Hotel and Casino, Cebu City*

## SPORTFEST

### PAGASA stand tall in bowling

The PAGASA men's bowling team successfully defended the Sec. Mario G. Montejo Ten Pin Bowling Cup Tournament last year. The team again ruled the bowling tournament, one of the highlights in the 2015 DOST Sports Fest. This was the fourth consecutive years of the men's team to win the championship.

Meanwhile, the PAGASA women's team bagged the second runner-up honors in the distaff category of the tournament. The women's team is a consistent top placer in the bowling tournament of the sportsfest. The event was held at Alabang Metropolis, Muntlupa City in May 2015.



*PAGASA men and women bowling teams during the final DOST Secretary Montejo Tenpin Bowling Cup tournament in May 2015.*



*PAGASA women bowling team with the bowling legend Paeng Nepomuceno during his visit to the bowling alley in Robinson Malate, Manila.*



*PAGASA bowling team posted during the one day bowling tournament in line with cooperative month celebration tournament in October 2015*

In celebration of the 2015 National Women's Month, the women's team participated in the bowling competition of the 4th Inter-Government Agency Female Employees Sports Fest conducted by the Philippine Sports Commission. It placed second on its rookie year besting other veteran competitors. During the tournament the team had the rare opportunity to pose for souvenir picture with the country's bowling legend Rafael "Paeng" Nepomuceno when he visited the place. The finals were held in Robinson's Manila and the awarding was held at Rizal Memorial Stadium in May 2015.



*Champion - DPWH, PAGASA - 1st runner up and DFA - 2nd runner up.*



*PAGASA Team during the awarding of winners held at Rizal Memorial Sports Complex, Malate, Manila.*

The PAGASA team also bagged the crown in the 2015 Quezon City Cooperative Month bowling championship in celebration of the Cooperative month.



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## **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

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