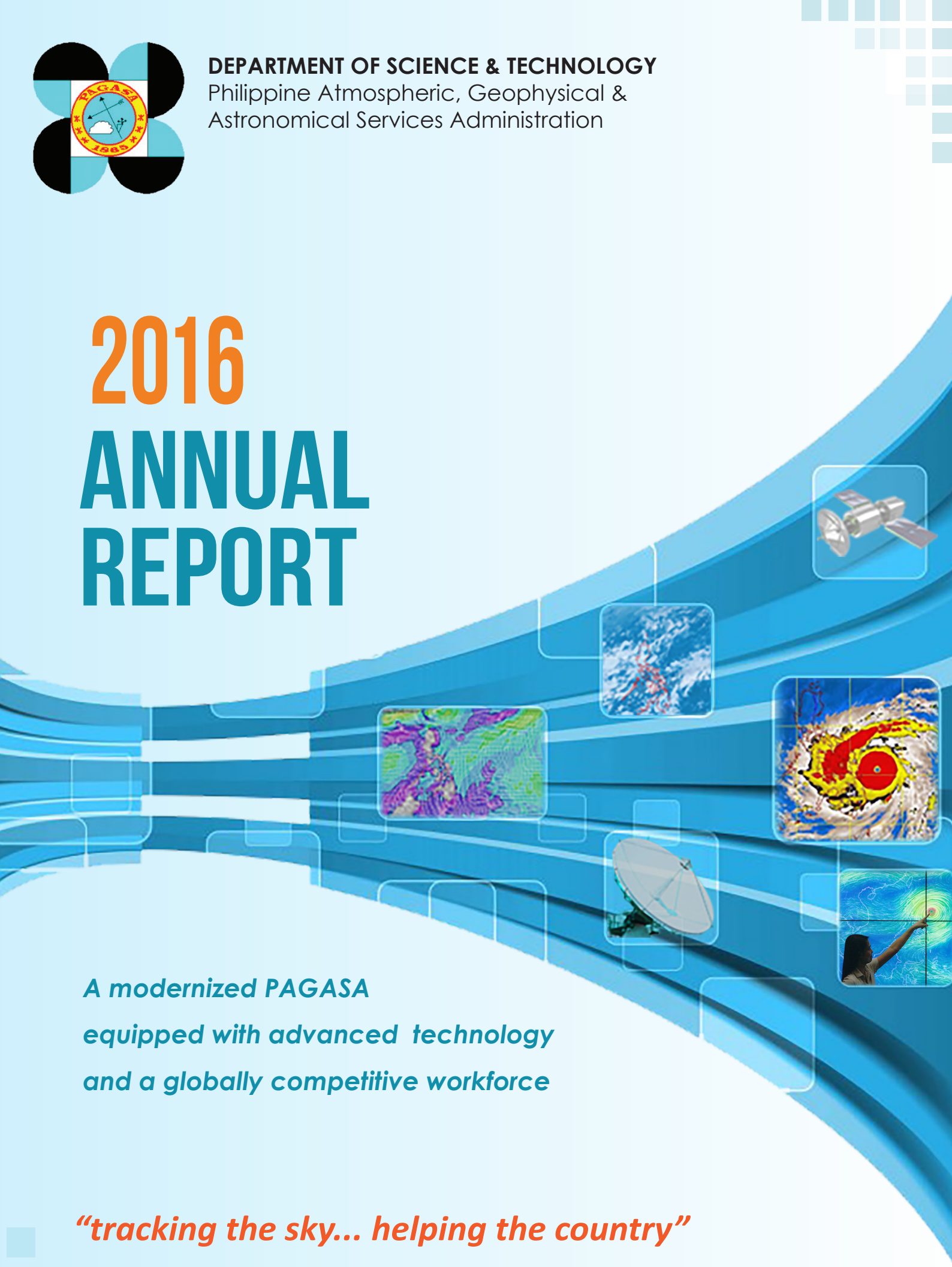
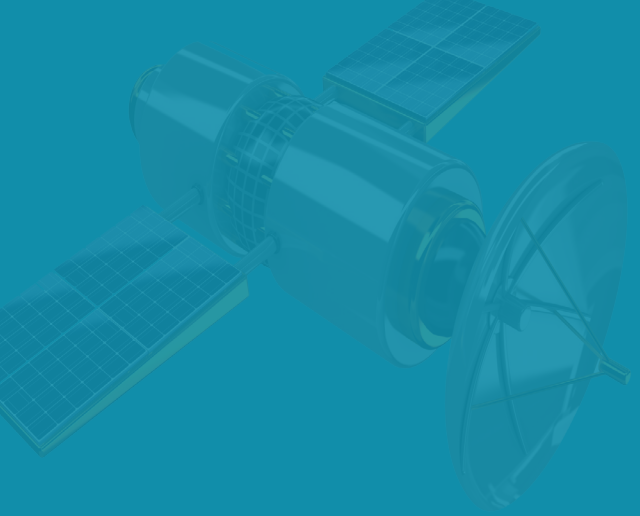
DEPARTMENT OF SCIENCE & TECHNOLOGY
Philippine Atmospheric, Geophysical &
Astronomical Services Administration

2016 ANNUAL REPORT



A modernized PAGASA
equipped with advanced technology
and a globally competitive workforce

"tracking the sky... helping the country"



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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

1. 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 sets 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 public access to information on our programs, activities and services through our website (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.

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**) 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. Fill out required form.	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 Sevices)

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

MESSAGE FROM THE

DOST SECRETARY

My warmest congratulations to the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) for another exceptional year!

The much improved and consistent performance of our weather scientists had been clearly manifested through their efficient monitoring of two powerful typhoons that struck the country namely, *Lawin and Nina*, and other weather disturbances which affected the country in 2016. The scientific information that PAGASA provided had significantly helped decision makers to implement mitigation measures to reduce the negative effects of these dreaded phenomena. These, along with the continued close monitoring of El Niño in the early part of the year, lessened the harsh impact of extreme weather conditions on our agriculture and the economy of our country. These commendable feats received citation and recognition from two valued stakeholders namely, Bangko Sentral ng Pilipinas (BSP) and the National Research Council of the Philippines (NRCP).

These achievements deserve a resounding commendation for the men and women of PAGASA. As in the past, they have proven to increase the level of their performance, resulting to enormous benefits for the country and the public. Clearly, they have consistently lived up to the expectations of improved service delivery and credibility.

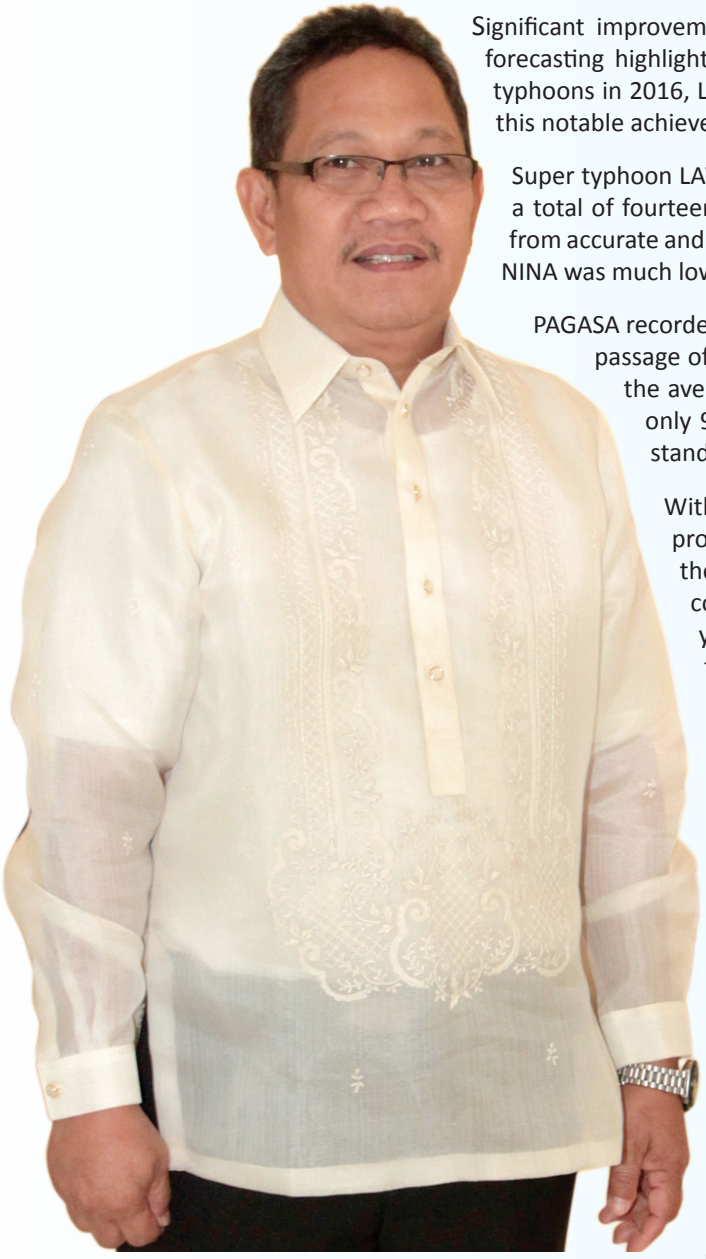
Allow me to express my elation over these remarkable accomplishments of PAGASA. I am confident that this Agency will continue to make us proud that it is a part of the Department of Science and Technology

Mabuhay!

FORTUNATO T. DE LA PEÑA

MESSAGE FROM THE

PAGASA ADMINISTRATOR



Significant improvement in the capabilities of PAGASA in terms of tropical cyclone forecasting highlighted the agency's accomplishments in 2016. A pair of powerful typhoons in 2016, LAWIN (Haima) and NINA (Nock-ten), serves as yardstick to gauge this notable achievement.

Super typhoon LAWIN, with the magnitude of typhoon YOLANDA (Haiyan), claimed a total of fourteen (14) lives, a very significant low number of casualties resulting from accurate and timely issuance of forecasts by PAGASA. Lost lives due to Typhoon NINA was much lower with only three (3) persons reportedly killed.

PAGASA recorded a 24 hour forecast track error of only 52.2 kilometers during the passage of typhoon LAWIN resulting to a near perfect accuracy. Overall on the average for the year, PAGASA has satisfied its target of 100kms with only 90.65 kms of the 24 hour forecast track error. The international standard is 120 kilometers track error.

With these increasing positive development, PAGASA is more than proud for having met the expectation of state authorities and the public who have expressed worthy trust about the agency's competence and sincerity to fulfill its mandate. Thus in the coming years, we can assure the people that PAGASA is in the right path towards total fulfillment of this commitment.

The forthcoming implementation of the PAGASA Modernization Act is expected to boost further the agency's capability with the projected acquisition of more advance technologies and establishment of flood forecasting facilities. Last year, the newly-installed Doppler Radar in Iloilo was inaugurated, while the Doppler Radar station in Zamboanga has been completed and is due soon for commissioning. As part of the PAGASA thrust to expand its services in flood forecasting, two (2) Warning Centers (FFWC) have been established in the cities of Tagum and El Salvador in Mindanao. Under the Modernization program, more of these facilities will be acquired together with the intensive training of technical personnel.

All these accomplishments have been accorded due recognition from various agencies and stakeholders. The Bangko Sentral ng Pilipinas (BSP) cited PAGASA as Outstanding Partner for Monetary Policy, while the prestigious scientific body National Research Council of the Philippines (NRCP) cited the agency as an outstanding institution. These pair of recognition reaffirmed PAGASA's consistent performance as a vital national agency.

In summary, for the past year, PAGASA's duty to serve the country and the people has been manifested through its hard work, efficiency and utmost dedication. In years ahead, the country is assured of the provision of adequate and timely forecasts to cope with the impact of natural calamities.

VICENTE B. MALANO

TOP PRODUCTS AND SERVICES OF THE YEAR

Operations and Services

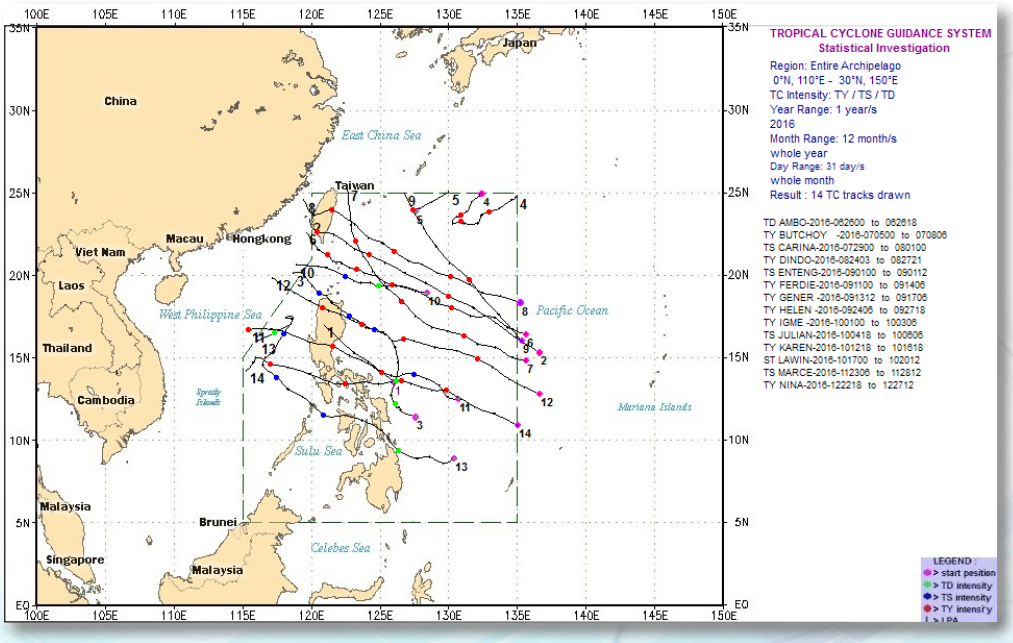
Weather Forecasting and Warning Services

With the approval of the modernization bill, PAGASA has several programs to upgrade the weather forecasting capability of the agency pursued and implemented through the Weather Division (WD) during the year under review. This is in line with its mandate to provide protection against natural hazards and utilize scientific knowledge to ensure safety, well-being and economic security of the people.

In addition, issuance of daily five-day weather forecasts for twelve (12) water resources regions of the country and sea conditions for each domestic shipping zone are provided to the Department of Agriculture as major component of their activities.

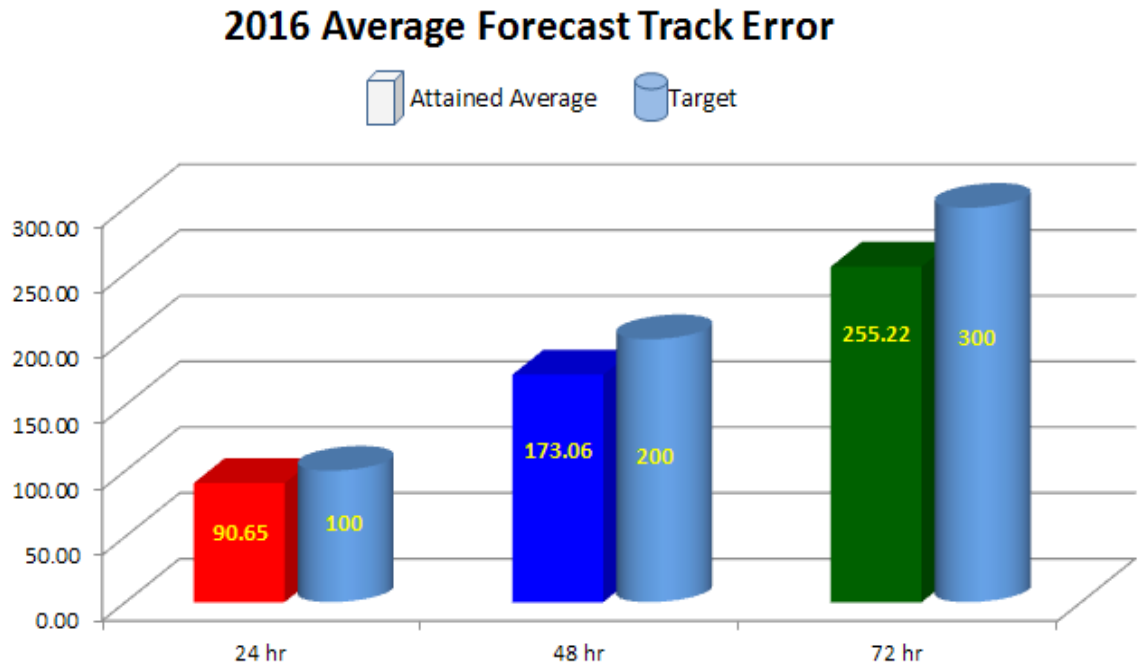
To strengthen its tropical cyclone (TC) forecasting capability, PAGASA embarked on an intensified radar rehabilitation program. Under the program, additional radar has proposed in order to cover areas not included in the area of coverage of the existing radar.

Regular activities such as timely and significantly issuance of weather advisories and severe weather bulletins were done in time. Fourteen (14) TC entered the Philippine Area of Responsibility (PAR) in 2016 namely, TD Ambo (June 26-27), Ty Butchoy (July 5-8), TS Carina (July 31-Aug. 1), Ty Dindo (Aug. 24-28), TS Enteng (Sept. 1), Ty Ferdie (Sept. 11-14), Ty Gener (Sept. 13-17), Ty Helen (Sept. 24-28), Ty Igme (Oct. 1-3), TS Julian (Oct. 4-6), TY Karen (Oct. 13-16), Ty Lawin (Oct. 17-20), TS Marce (Nov. 23-27), Ty Nina (Dec. 23-27). Eight (8) of them made landfall/crossed Philippine landmass. These were diligently tracked and monitored from the moment way-out in the Pacific Ocean in their incipient stage, to maturity and dissipation. Figure I: shows the tracks of the TCs for which, 181 warnings and 214 bulletins were issued. A total of 732 public forecasts and 732 shipping forecasts were prepared and issued during the year.



Tracks of 14 Tropical Cyclones in 2016

In terms of forecasting efficiency, PAGASA has shown a significant improvement for the last 2 years. The annual average of the 24-hr forecast track error was reduced from 141.41 kms in 2014 to 94.8 kms in 2015 and 90.65 kms in 2016. A total reduction of 35.7% in two (2) years. This is way below the 120 km error of the WMO acceptable error for 24-hour forecast and way below the 100 km target error of PAGASA since 2015. STY Lawin has the lowest 24-hour forecast error at 52.2 km



Value are computed based on issued bulletin

Flood Forecasting and Warning

Implementation of the project entitled "Strengthening Flood Forecasting and Warning System (FFWS) for Bicol River Basin" for the improvement of flood forecasting and warning system of the agency is on-going. Likewise, on-going installation of water level gauge, water level sensor and automatic rain gauge in the 13 major river basin of the country. The innovation is in collaboration with DOST-ASTI.

PAGASA has vigorously issued 1,321 hydrological forecasts in Pampanga, Agno, Bicol and Cagayan (PABC) River Basins, through its telemetry and multiplex telecommunications network, and issued 2,151 general flood advisories for non-telemetered river basins during the year.

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

Climatological and Agrometeorological Services

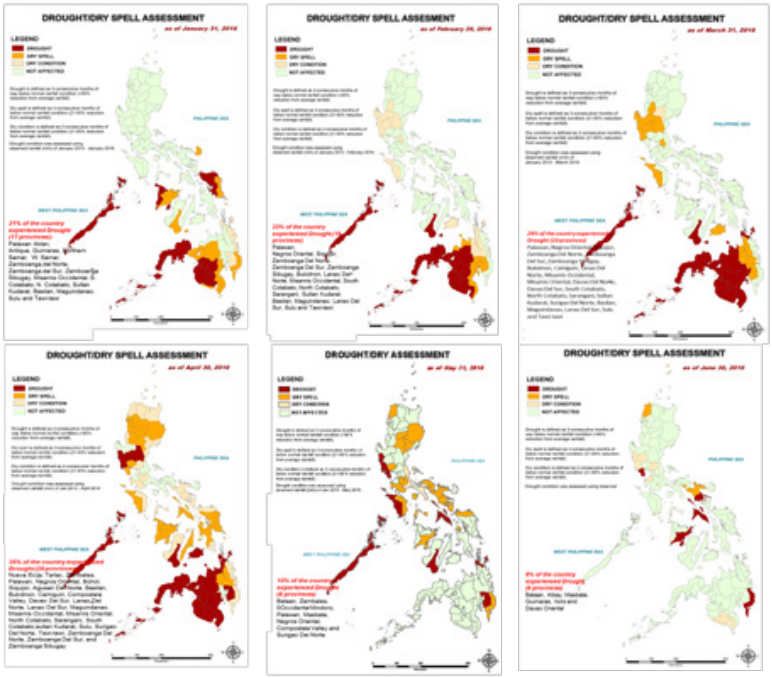
The Climatological and Agrometeological Division (CAD) of PAGASA has consistently carried out services for the agricultural sector, vital agro-meteorological information were disseminated to farmers for farming activities and proper farm management and necessary planning. Farmers make use of this information to increase income by avoiding weather induced losses and prevent unnecessary waste of time and material input. For the year, 366 Daily Farm Weather Forecasts and Advisories (FWFA) were issued to 243,450 recipients. Likewise, 10-day Regional-Agri weather forecasts and advisories for agriculture, 36 were issued and 7,776 copies disseminated, while 24 Weather Situation Outlook and one Seasonal Climate Outlook (7 El Niño Advisory, 7 Drought Dry Spell Assessment, and 10 Drought/Dry Spell Outlook) were also issued and 3,900 copies disseminated. Other beneficial climatological

information was also published. A total of 36 Philippine Ten-day Weather Agro-Climatic Review and Outlook issued and 7,776 copies were disseminated.

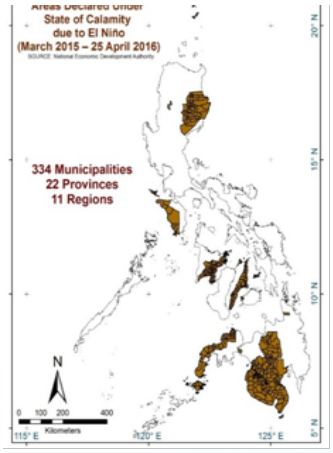
Increasing demand for climate forecasts as important inputs in agricultural planning for climate sensitive crops, such as rice and corn during the occurrence of extreme climate events, has been observed. Since the Philippines relies chiefly on rice and corn as staple food, the application of climate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

PAGASA's RESPONSE during the most recent strong El Niño (2015-2016)

The 2015-2016 strong El Niño had posed remarkable pressure on all the different socio-economic sectors of the Philippines including agriculture, environment, domestic food and water supply, health, and energy. The country had been well-forewarned and informed. There had been a high degree of preparedness owing to the cooperation and coordination of concerned government agencies; yet, the impacts had been numerous and substantial, if not enormous.



The government response during the most recent El Niño started from the PAGASA initiatives of providing monthly weather outlook, dry spell/drought assessment and outlook to member agencies of the National Task Force on El Niño. In 2015, the National Economic Development Authority (NEDA) led the National Task Force on El Niño and convened a series of inter-agency meetings to formulate an Action Plan and finalize the Roadmap to Address the Impact of El Niño (RAIN). This move was prompted by forecasts from PAGASA that the El Niño, which has been monitored since 3rd quarter of 2014, will intensify from moderate to strong in late 2015 until June 2016.



Given below are PAGASA initiatives and responses which led to intensive government efforts for policy development and planning for early preparedness, emergency and disaster mitigation until June 2016:

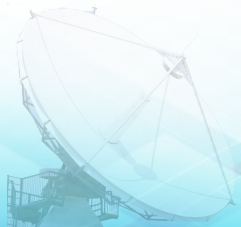
- Issued 17 El Nino Advisories and Final El Nino Advisory was issued in June 2016
- Issued 12 Press Statement
- Conduct of Climate Outlook Forum
  - National at the PAGASA Central Office (monthly);
  - Local Fora in partnership with part ner NGOs at various areas in the country (approx. 50 local fora)
  - Local Climate Forum for Regional Stakeholders thru PAGASA PRSD (3 fora- Northern Luzon, Southern Luzon and Mindanao)
- Membership/attendance to Technical Working Group (TWG) meetings;
  - National Task Force on El Nino
  - Department of Agriculture (thru PCAF meetings, Agripinoy Quarterly Planning Workshop, ATI Workshops, SWISA (Irrigators), BSWM)
  - TWG for Angat Dam thru the National Water Resources Board (twice monthly)
  - Food Security Committee on Rice thru NEDA
- Refresher Workshop on Climate Information and Seasonal Forecasting for PAGASA PRSD (Northern Luzon, Southern Luzon and Mindanao)

Astronomical Services

As the country's official time keeper, PAGASA is responsible for maintaining and disseminating the Philippine Standard Time (PST). It operates a precise standard clock from which the setting of time pieces may be referred. Under normal conditions, PAGASA Observatory broadcasts time signals every hour on the hour. For the year, a total of 2,562-time check requests, through telephone, mostly in Metro Manila, were accommodated including synchronization of time to all TV stations in Metro Manila.

The agency conducted free planetarium lectures/ shows that were given to 14,707 students (Male 6,794 and Female 7,913) and teachers from the different schools in the National Capital Region (NCR). A total of 1,998 viewers (Male 884 and Female 1,114) at the UP Astronomical Observatory for stargazing and telescoping sessions were accommodated. Portable/mobile planetarium lectures/telescoping tour and shows were also conducted to 5,561 visitors.

To promote Astronomy in the countryside, PAGASA conducted Portable/Mobile planetarium, planetarium shows, stargazing and telescoping activities for schools in Luzon with 5,561 visitors (students and science teachers) which generated an income of P 23,000.00. Likewise, the agency disseminated 319 astronomical information packages to students and science teachers which also generated an income of P 12,370.00. The agency disseminated a total of 4,420 astronomical information packages to students and science teachers nationwide and generated an income amounting to ₱15,160.00.



Dr. Malano welcomed the PAGASA PRSD personnel iduring the seminar / workshop on astronomical sightings and observations, events and services

Group picture of PAGASA Regional Services Division personnel in Understanding Astronomical Events during the National Astronomy Week, PAGASA Planetarium, Science Garden, Quezon City, 15-19 February 2016

2016 APU PUBLICATION REPORT (January – December)

PUBLICATIONS	Copies Reproduced	Copies Sold	Sales	Complimentary Copies
Philippine Astronomical Handbook	79	2	200.00	66
Almanac for Geodetic Engineers	209	120	12,000.00	4
Calendar Data	42	28	560.00	-
Tables of Sunrise/Sunset for Agromet Stations	23	-	-	23
Tables of Sunrise/Sunset, Moonrise/ Moonset for Selected Fishing Areas	20	-	-	19
Tables of Sunrise/Sunset, Twilight, Moonrise/Moonset for latitudes 5°-21°	86	1	100.00	80
Tables of Sunrise/Sunset, Moonrise/ Moonset for Ramadan	4	2	400.00	1
Tables of Sunrise/Sunset, Moonrise/ Moonset(Exact Time)	117	10	100.00	100
Sun Path	216	152	1,520.00	45
Astronomical Poster	-	-	-	78
Star Atlas	58	2	80.00	59
Daylight Duration Table	43	-	-	46
Desktop and Wall Poster Calendar 2017	1,500	-	-	1,500
Court Hearing Certification	2	2	200.00	-
TOTAL	**2,399**	**319**	**₱ 15,160.00**	**2,021**

Information Education and Communication (IEC) Campaign

Lecture with LGUs of Monagon Samar

An intensified Information Education and Communication (IEC) was undertaken by PAGASA during the year as part of the Information Education and Communication Program. As a member of the National Disaster Risk Reduction Management Council (NDRRMC), PAGASA is actively involved in pre-disaster and community preparedness and planning activities in mitigating the adverse effects of natural phenomena.

The various advisories and warning bulletins being issued by the agency serve to activate the national action plans to mitigate the impact of adverse weather phenomena such as typhoons, floods, storm surges and extreme climatic events. In coordination with the Office of Civil Defense (OCD), Department of Social Welfare and Development (DSWD), Department of Interior and Local Government (DILG), Philippine National Red Cross (PNRC), Provincial Disaster Management Risk Reduction Office (PDRRMO) and other disaster-oriented organizations, PAGASA provides resource persons in seminars and workshops for the members of the Management Disaster Risk Reduction Offices (MDRROs) on Disaster Prevention and Preparedness (DPP) planning and mitigation.

The agency is also actively engaged in public awareness program on natural hazards such as typhoons, floods, and extreme climatic events, like the El Niño and La Niña phenomena, including climate change, products and services. To continuously carry out its Information, Education and Communication (IEC) Program, the agency has to keep or maintain its information technology facilities for efficient use, thereby, benefiting management information system of the service which, indirectly, benefits the general public. In addition, PAGASA also conducted flood drill simulation in areas prone to flooding and enhance conduct of storm surge drill in nearby coastal areas. These activities have brought PAGASA closer to the public and likewise enhanced the participants' level of awareness on disaster reduction. Likewise, a total of 6,654 information materials such as pamphlets, maps, posters and brochures were distributed to the public to help sustain the agency's IEC campaign.

In addition, with the initiative of the Public Information Unit (PIU), under the Research and Development and Training Division (RDTD), PAGASA launched a new publication entitled "Patnubay sa Weder Forkasting" during the celebration of the "Typhoon and Flood Awareness Week "held at PAGASA in June 2016. The development of the information is for the Sustainability IEC Program in which one of the activities is the simplification/lemmatization of weather information. The information materials are written in Tagalog and soon will be translated into different dialects such as Bicol, Ilocano and Cebuano. Strengthening of ties with the media continues in support for a wider dissemination of information. Conduct of Seminar-Workshop for Media Men is a yearly endeavor of PAGASA to sustain the established partnership between the quad-media. With this, a pledge of support from the media men and women in its endeavor to serve the public better is assured by the agency.

Research and Development

Research and development (R&D) is a must for the agency in moving forward to total quality services which will ultimately reduce the impacts of extreme weather, climate and other related hazards. Research activities are geared towards generating and developing techniques to strengthen the operational forecasting and warning capabilities of the agency and must be designed to improve the accuracy of prediction in terms of time and space. Other research and development activities are designed to address problems and issues concerned with the socio-economic impacts of weather and climate-related extremes which is increasingly impacting our country. These include disaster causing phenomena such as climate variability and change, tropical cyclones, heavy rainfall, storm surges, landslides/mudflows and thunderstorm. Other research activities include basic and developmental programs in agriculture, hydrology, instrument development, water resources, energy, health, recreation, tourism, land and inland water transportation, DRR and security, coastal and marine activities. The following are completed and on-going projects being implemented and monitored by the agency:

Locally-funded Projects:

Completed:

1. **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 project is to build on the current Met Office PAGASA/DOST relationship to improve scientific and technical capability, and support Department for International Development (DFID) with increased knowledge on climate vulnerabilities in the region. Several workshops and building capacities were conducted that aimed to review available methods and climate model data for use in climate projections in the Philippines, to improve resilience to weather and climate extremes in the Philippines including Training of Trainers. Completed reports under this project are Summary for Policy Makers, Summary for Scientists and Workshop Report.

2. **Downscaling of Climate Change Scenario using CMIP5 (Coupled Model Intercomparison Project), GAA, 2013-2016**

   It aimed to use the dynamical downscaling of the climate scenarios of the Coupled-Model Intercomparison Project using different Regional Climate Model (RCMs) to provide better understanding of the future climate projections in the Philippines.

The downscaling of four Global Climate Models (GCMs) using 3 Regional Climate Models (RCMs) were completed and the ensemble of all available downscaled projections in the Philippines was computed through the project. Also, the updated Climate Projections in the Philippines was presented and communicated.

3. Climate Impact Assessment for Rice (non-irrigated) and Cornfields Site Validation using Geographic Positioning System (GPS), GAA, 2009-2016

The project aimed to issue regular monthly bulletin that represents method for converting meteorological data into economic information that can be used as supplement to information from other available sources. The project had actual surveys and interviews with farmers with 12 publications disseminated and posted. The data in the computation of GMI and YMI by station and the graphs and maps which included analysis were also updated.

4. Downscaling Using Providing Regional Climate for Impact Studies (PRECIS) Regional Climate Downscaling, GAA, 2015-2016

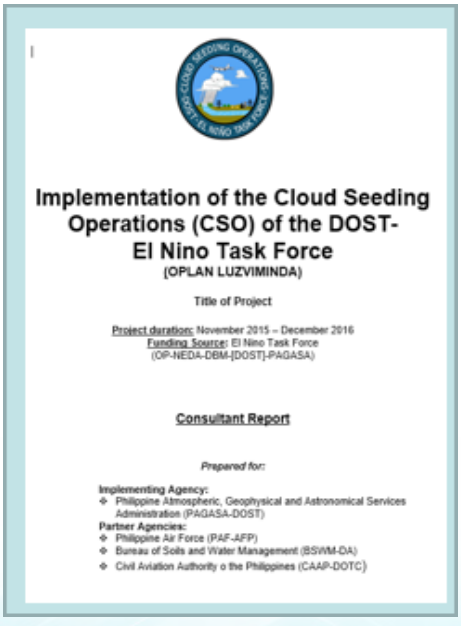
The project aimed to use the dynamical downscaling using the Regional Climate Model PRECIS (25km resolution) to capture the local climate patterns for the policy and adaptation strategies and to provide a high resolution climate change projection down to provincial level, it has completed the downscaling of PRECIS and CMIP5 with Regional Climate Models 4.5 and 8.5. It has also completed the post-processing of rainfall, minimum, maximum, average temperature (monthly, annual and seasonal)

5. River Basin Rainfall Prediction from PAGASA's Weather Research and Forecasting Numerical Model (PAGASA-WRF) Products, GAA, 2014-2016

The project created the Numerical Modeling Section Web Portal which host about 13 River Basins and other Numerical Modeling Products. The NMS Web Portal also supports the Numerical Modeling Products technical applications.

6. Implementation of the Cloud Seeding Operation (CSO) of the DOST El-Niño Task Force (DELTA), GAA, 2015-2016

This aimed to show scientific proof of the effectiveness of cloud seeding and its applicability to the country's effort to alleviate rainfall deficiencies during drought and near drought conditions.


Implementation of the Cloud Seeding Operations (CSO) of the DOST-El Nino Task Force
(OPLAN LUZVIMINDA)

Title of Project

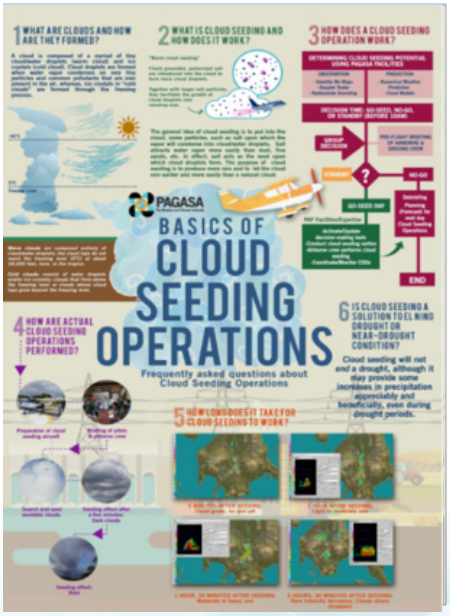
Project duration: November 2015 – December 2016
Funding Source: El Nino Task Force
(OP-NEDA-DBM-[DOST]-PAGASA)

Consultant Report

Prepared for:

Implementing Agency:
- Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA-DOST)

Partner Agencies:
- Philippine Air Force (PAF-AFP)
- Bureau of Soils and Water Management (BSWM-DA)
- Civil Aviation Authority o the Philippines (CAAP-DOTC)

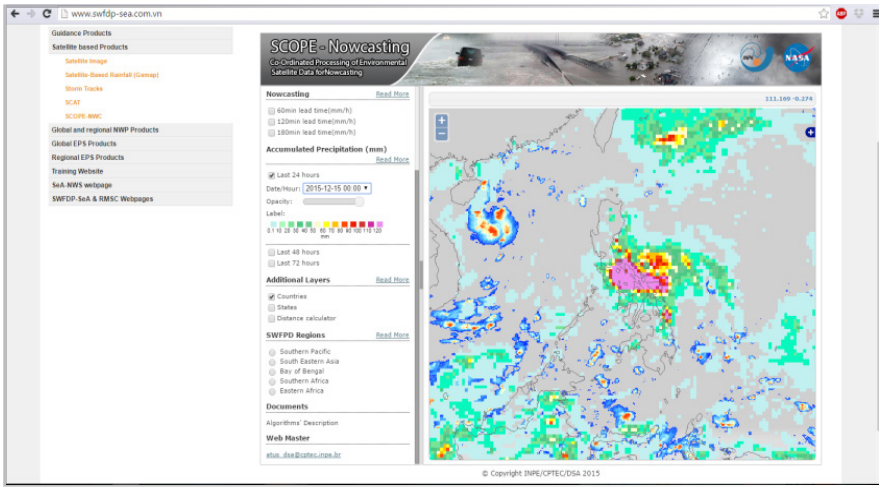


The project has conducted several Cloud Seeding operations particularly in Zamboanga City for the watershed, Batangas for the Sugar Planter's Association and Bohol-Cebu for the irrigation dams and reservoirs.

IECs were also conducted for several stakeholders. The Cloud Seeding Manual of Operations and flyers/ posters were produced.

7. Severe Weather Forecasting Development Project for Southeast Asia, January-December 2016

In the course of the project, severe weather events such as heavy rainfall and passage of Tropical Cyclones in all observing stations were monitored. NWP model forecast, EPS forecasts and daily guidance against observed data were also assessed. The SWFDP background and assessment of SWFDP products for various cases was presented to Southern Luzon and Northern Luzon PRSD personnel.

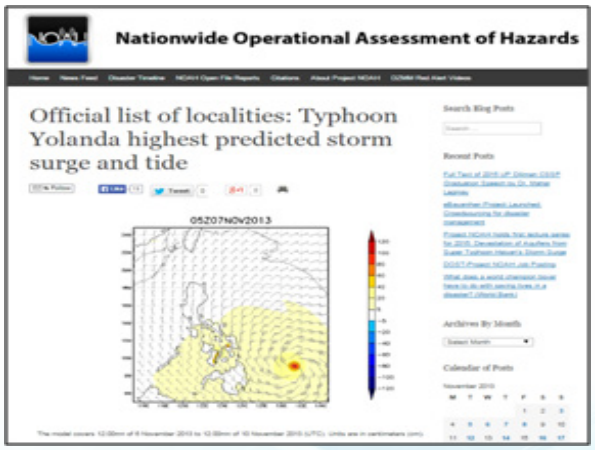


It received positive feedback from SWFDP users such as the Visayas and Mindanao PRSD on the usefulness of the website in forecasting. The WMO also recognized PAGASA's commitment and punctuality in submitting reports and Case Studies.

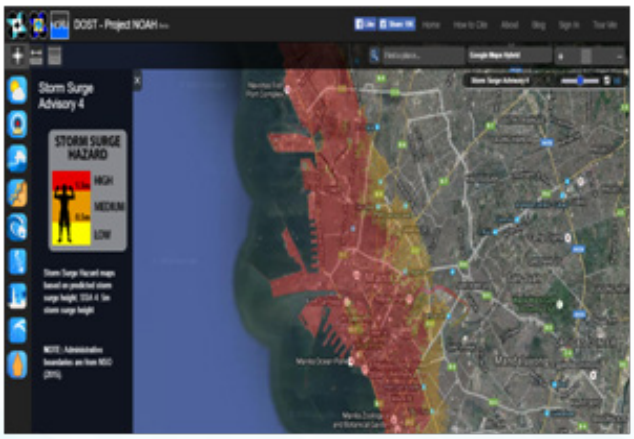
8. System to Identify, Quantify, and Map the Storm Surge Threat to Philippine Coasts, DOST-GIA, 2013-2016

The project aimed to enhance the disaster-forecasting capabilities of PAGASA through generation of detailed maps of storm surge and inundation susceptibilities to warn coastal communities threatened by approaching typhoon. It also guided plans in developing structures to protect existing housing and infrastructures in vulnerable areas including development of construction in areas that the maps indicated are safe. Storm Surge forecasts during the occurrence of various Tropical Cyclones such as Typhoon Yolanda in 2013, Glenda and Ruby in 2014 and Chedeng, Lando and Nona in 2015 were released on the website of Project NOAH. Also Storm Surge Hazard Maps on the municipal level of the Philippines could be viewed in the Project NOAH website including Storm Surge Inundation Maps of 66 coastal provinces identified as storm surge prone areas were produced.

Several capacity building trainings were conducted namely JMA Storm Surge Model Training, MIKE 21 Software Training, DELFT3D Software Training, GIS Spatial Data Processing Training and FLO2D Storm Surge Inundation Model Training under this project.



Storm Surge forecast of Typhoon Yolanda



Hazard Map of Manila under Storm Surge Advisory 4

On-going:

1. Deployment of Early Warning System (DEWS) in Disaster Prone Areas, DOST-GIA, 2014-2017
2. Enhancement of Farm Weather Services and Related Products for Agriculture, GAA, 2014-2017
3. Digital Rain Gauge for Community-Based Early Warning System, GAA, 2014-Continuing
4. Refinement of the Japan Meteorological Agency Storm Surge Model, GAA, 2014-Continuing
5. GIS-Based Flood Vulnerability Assessment, GAA, 2016-2017

Foreign-Assisted projects:

Completed:

1. **Philippine Climate Change Adaptation Project (PhilCCAP), World Bank, 2010-2016**

This aimed to improve the access of end-users, especially in the agriculture and natural resources sectors, to more reliable scientific information for an accurate decision-making for climate risk management. Also, it aimed to strengthen the capabilities of government agencies involved in climate change adaptation.

The project produced several significant accomplishments such as generation of Technical Policy briefs State of the Philippine Climate, Climate Change Scenario for the Philippines. It Also generated Hazard Maps in Surigao del Norte with identified areas susceptible to flooding, areas susceptible to sea level rise and areas susceptible to Storm Surge; Hazard Maps in Iloilo City with identified areas susceptible to flooding and areas susceptible to landslides; Guidance Manual on Scripts used for processing CCAM outputs such as scripts using Climate Data Operators and FERRET data visualization and analysis; Manual on Basic GIS mapping using manifold and Manual on Basic AWS Maintenance.

Ceremonial Handover of PHILCCAP Knowledge Products held at Novotel, Cubao, Quezon City

Training on Basic GIS Using Manifold System held at Hotel Roma, Tuguegarao City, on 03 August - 02 September 2016

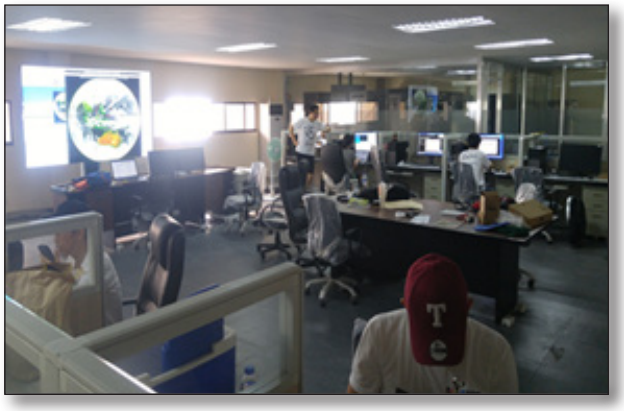
2. Support for the Implementation of OSRO/RAS/401/EC Project Activities in Bicol, Caraga, and Davao Regions, Philippines, FAO under the Consolidating Capacities for DRR in Agriculture in South East Asia, 2015-2016

Weather within climate that features 9-day/7-day municipal level forecasts for farm operations in areas covered by the project were produced and disseminated. Also, focal persons of the agency served as resource speakers in Climate Risk Management and Early Warning for DRR in Agriculture Training. Several Climate Forums were conducted in Naga City and Butuan City.

3. Establishment of Communications, Ocean and Meteorological Satellite Data Analysis (COMS Project), KOICA, 2014-2016

This project aimed to intensify monitoring and enhance the support of local weather forecast; to develop early warning system for hazardous weather and disaster; to provide meteorological information and analysis; to provide service and production of weather forecast through expansion and improvement of meteorological infra and its experts and to cope with climate partnership by acquiring the accumulated technical and operation know-how from Korea.

COMS equipment including the video wall at the 3rd floor of the Weather and Flood Forecasting Center and COMS Antenna at the WFFC compound were installed. Several trainings were conducted to capacitate selected PAGASA personnel such as the COMS Training on Satellite Data Analysis System in the Philippines and Training on post-processing of Numerical Weather Prediction which were both held in Korea. The Seminar on COMS Project and the 16 Products of COMS System was conducted here in the Philppines.



Installation of COMS by KOICA and Soletop at the 3rd of the WFFC

The COMS Antenna at Weather and Flood Forecasting Center

4. Enhancing Greater Metro Manila's Institutional Capacities for Effective Disaster/Climate Risk Management towards Sustainable Development (GMMA-READY Project), UNDP/AusAid

PAGASA, as part of the CSCAND agencies involved in the project, provided technical services such as the installation of various hydromet equipments in Laguna, Cavite, Bulacan and Rizal. Templates for health and socio economic vulnerability and adaptations for floods incorporating climate change projections for the cities of Pasig, San Juan and Marikina were established. Maps were also produced such as the 10k scale flood hazard maps in selected areas of 17 provinces, 10k storm surge hazard maps for Cavite, Manila and Bulacan and flood risk maps for Marikina, San Juan and Pasig. Selected LGUs particularly Disaster Management units of Rizal, Laguna, Cavite and Bulacan were also capacitated through IEC trainings and flood drills.

HMD personnel together with LGUs of Manila installed the Storm Surge signage near Manila Bay, Roxas Blvd., Manila

5. Establishment of Early Warning System for Flood and Flashflood in Areas of Cagayan de Oro – Phase 2, NDMI, 2015-2016

The project established the Flash Flood Alert System Software (FFAS) with the procurement of monitoring computers especially dedicated for the said software installed at FFWS Office in Quezon City and at Cagayan de Oro River Center in El Salvador City.

Several hydromet equipments were installed such as ARGs at Maasin Bridge, Cagayan de Oro River Basin and at Brgy. Taglimao and Bulao Bridge, Iponan River Basin in Cagayan de Oro City; Water Level Monitoring Sensors at Puntod-Kauswagan Bridge, CDO River Basin and at San Simon Bridge and Bulao Bridge, Iponan River Basin in CDO; Warning post at Brgy. Balulang, Brgy. Consolacion, Brgy. Bonbon, CDO River Basin and at Pagatpat Health Center, Iponan River Basin in CDO.

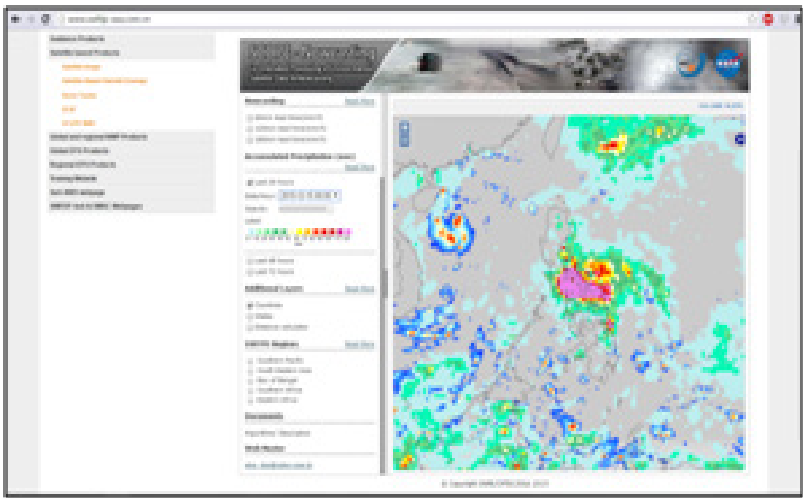
Flood Maps through river cross section surveys and hydraulic analysis were developed and Education Trainings were also conducted.

Water level observation system installed at San Simon Bridge, Iponan River Basin

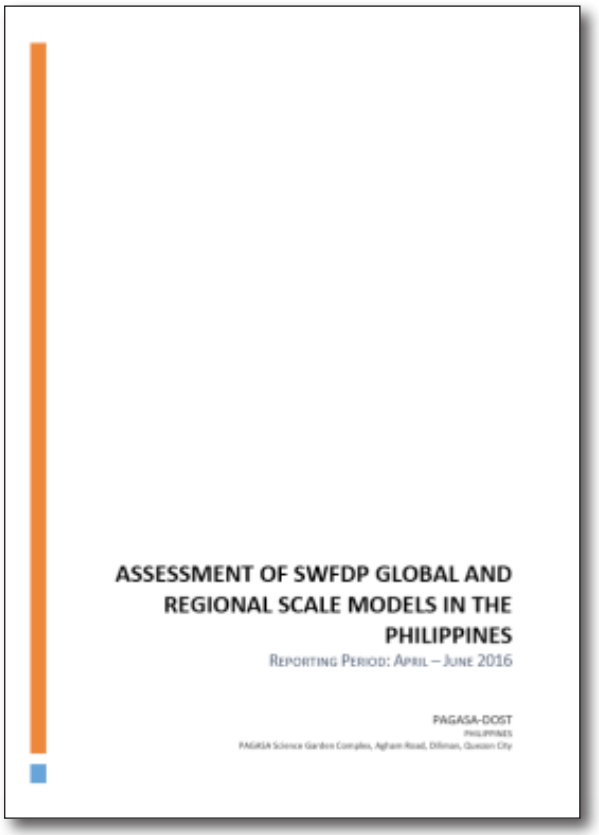
Conduct of river survey

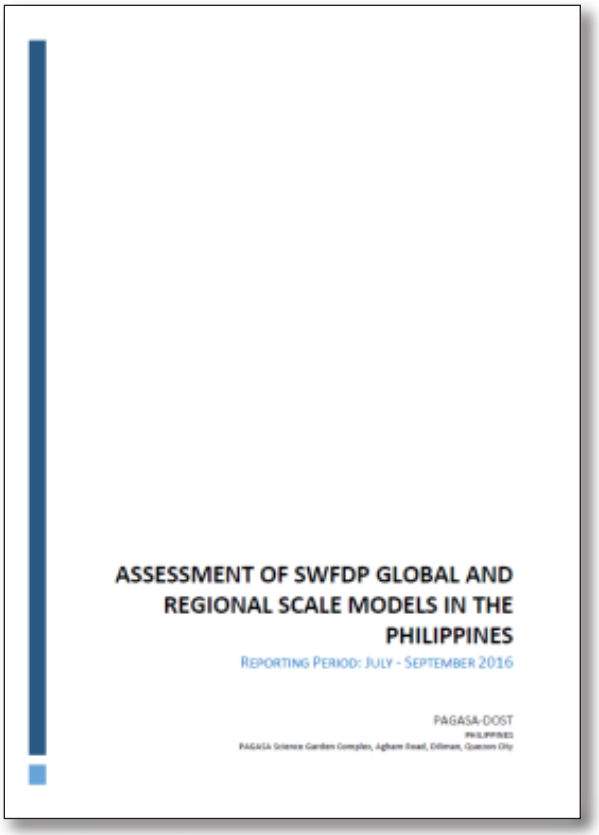
6. Severe Weather Forecasting Development Project, January-December 2016

The objective of the project is to contribute to the capacity-building of the National Meteorological and Hydrological Services (NMHS) and to help developing countries in using existing Numerical Weather Prediction (NWP) products through a "Cascading Forecasting Process".



Severe weather events such as heavy rainfall and passage of Tropical Cyclones in all observing stations were monitored. NWP model forecast, EPS forecasts and daily guidance against observed data were also assessed. The SWFDP background and assessment of SWFDP products for various cases was presented to Southern Luzon and Northern Luzon PRSD personnel. It received positive feedback from SWFDP users such as the Visayas and Mindanao PRSD on the usefulness of the website in forecasting. The WMO also recognized PAGASA's commitment and punctuality in submitting reports and Case Studies.

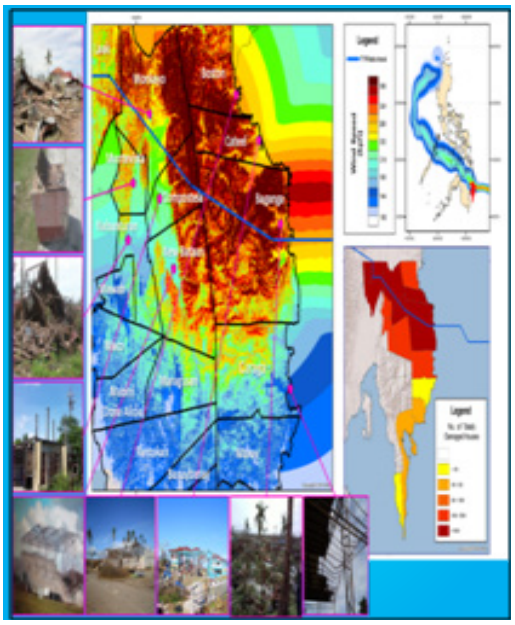




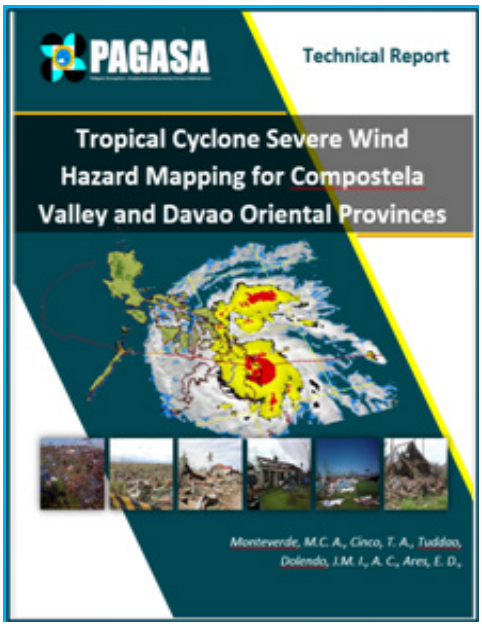
7. Tropical Cyclone Severe Wind Hazard Mapping for Compostela Valley and Davao Oriental, UNDP, 2015-2016

This aimed to develop an understanding of the hazard posed to Compostela Valley and Davao Oriental by severe winds generated by Tropical Cyclones.

Tropical Cyclone Severe Wind Hazard Maps (Regional/Local wind speeds) for the said provinces were generated including wind flyers/posters. IECs for selected LGUs and Science Teachers were also conducted.



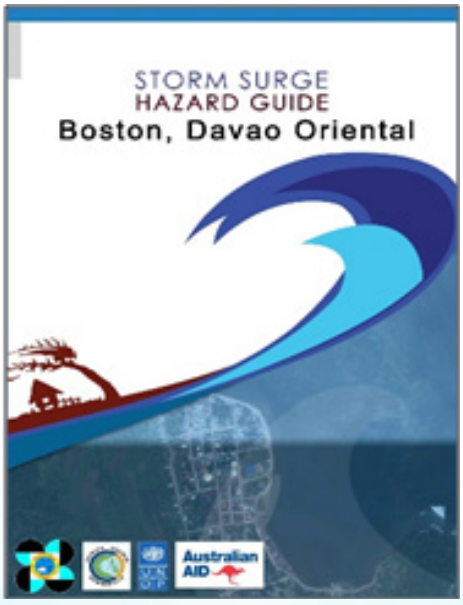
Severe wind hazard maps for Compostela Valley and Davao

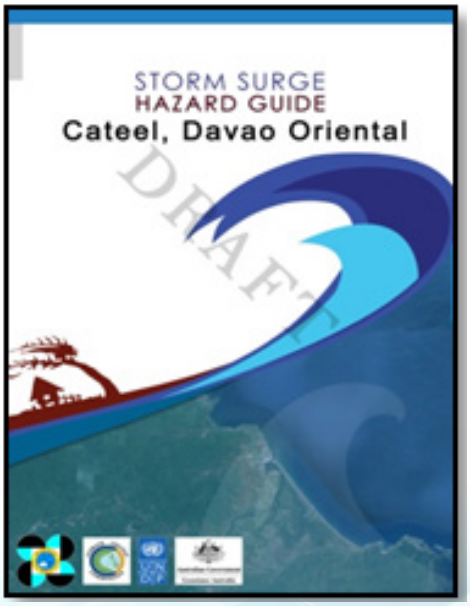


Technical Report of Tropical Cyclone. Severe Wind Hazard Mapping for Compostela Valley and Davao Oriental Province

8. Storm Surge Hazard Mapping for Selected Coastal Municipalities of Davao Oriental, UNDP & AUSAID, 2015-2016

This aimed to assess the disaster vulnerabilities of the affected areas of Regions 10 and 11 in Mindanao to geological, meteorological and meteorologically induced hazards due to climate change.





The project generated Strom Surge Hazard Guide for the municipalities of Boston and Cateel, Davao Oriental which included basic facts on Storm Surge, Typhoon Pablo 2012 Inundation Maps and Storm Surge Hazard Maps. It also produced Technical Note on the Development of Typhoon Pablo 2012 Surge Inundation Maps and Storm Surge Hazard Maps.

On-going:

1. Utilizing Geospatial Technology to Assess Health Vulnerability to Climate Change for Rural Population in Vietnam and Philippines Asia-Pacific Network (APN) for Global Research, 2015-2017
2. Building Capacities for a Climate Resilient Tilapia Farming in the Philippines, FAO, 2015-2017
3. Technical Cooperation Project (TCP) for Enhancing Capacity on Weather Observation, Forecasting and Warning (JPOW), JICA, 2014-2017
4. Rehabilitation of Equipment for the Project to Strengthen Flood Forecasting and Warning System in Bicol River Basin, Government of Japan
5. Japan's Non-Project Grant Aid for Provision of Japanese SMEs Products, JICS, 2013-2017
6. Automation of Flood Early Warning System for Disaster Mitigation in Greater Metro Manila, KOICA, 2015-2017
7. Development and Implementation of User-Friendly End-to-End Hydrological Forecast Generatioin and Application System for Disaster Mitigation on the Philippines, Government of India through RIMES, 2014-2017

New Projects:

1. **Scaling-up Risk Transfer Mechanisms for Climate Vulnerable Agriculture-based Communities in Mindanao (WIBI Mindanao Project), UNDP, 2016-2017**

   The Philippine Crop Insurance Corporation (PCIC) in partnership with the United Nations Development Programme (UNDP) is implementing this project in collaboration with PAGASA to focus on the development of Weather Index Based Crop Insurance (WIBI) package in Regions X and XI particularly Bukidnon, Misamis Oriental, Misamis Occidental, Camiguin, Davao del Norte, Compostella Valley, Davao Oriental and Davao del Sur.

   It recognizes that farmers need to be prepared for less-damaging but high-probability climate events through planned adaptation as well as low probability but high-impact (or catastrophic) climate events through combination of disaster risk management and climate-resilient farming practices, not only as critical in reducing climate vulnerability in their own right but as pre-requisites for effective functioning and sustainability of the Weather Index-Based Insurance (WIBI) as they correspond to the important basis risks that need to be addressed.

   The main objective of the project is to provide relevant data needed for the computation of the weather-based index as well as establishing a national preliminary correlation function for banana, sugarcane, coconut and cacao in major crop growing areas. Also, it aims to provide historical weather data in Regions X and XI necessary for designing and pricing of products in WIBI Mindanao Area

5th WIBI Development Team Workshop

National Stakeholders' Forum

2. **GIS-Based Flood Vulnerability Assessment, GAA, 2016-2017**

This study aims to present an approach to assess vulnerability to flood risk using spaced-based technology and GIS applications which play a crucial role in risk reduction and disaster mitigation. It started in January 2016 and will end on December 2017.

This is an agency-funded study that aims to assess and map vulnerable areas in Naga City, Camarines Sur, using identified indicators. It will identify elements at risk relevant to flood vulnerability assessment especially in residential areas and will utilize the space technology and Geographic Information System (GIS) applications for risk assessment.

3. **"Resilience and Preparedness towards Inclusive Development" under the Project Climate Twin Phoenix RAPID Program, UNDP, 2016-2017**

The Climate Change Commission (CCC) in partnership with the United Nations Development Programme (UNDP) and the Australian Government (AusAID), is implementing the project which is a capacity development program in support of the long-term recovery of LGUs and communities in Yolanda-affected areas. PAGASA, as implementing partner of the project, specifically the Hydro-Meteorological Division (HMD) will perform river profiling and cross section surveys as well as to produce flood inundation models.

The main objective of the program is to assess the climate/disaster vulnerabilities of the target areas, *Laberanan, Calbasag, Daguitan, Bincay, Hibuga, Balocaue* and *Ibaon River* Basins draining to the municipalities of *Dulag, Mayorga* and *Macarthur* in the province of Leyte, to geological, meteorological and meteorological-induced hazards due to climate change. A necessary and basic requirement to generate this output is to produce the integrated flood model for the river basins traversing the said municipalities. This will also provide the physical and socio-economic vulnerabilities of the concerned population and socio-economic support systems to meteorological and meteorologically-induced hazards, and their intensification because of climate change.

4. Strengthening Capacity of Integrated Data Management of Flood Forecasting and Warning, JICA, 2016-2019

PAGASA has introduced the Flood Forecasting and Warning System (FFWS) in the Pampanga, Agno, Bicol, Cagayan and Pasig-Marikina River Basins. In 2013, PAGASA started to establish River Flood Forecasting and Warning Centers (RFFWC) on river basins which are out of the said five major river basins. Consequently, PAGASA has a need to establish FFWS having meteorological and hydrological monitoring with certain quality at new RFFWCs. Among the new RFFWCs to be established, the Cagayan de Oro and the Tagoloan river basins have the highest priority and construction of RFFWC building with installation of monitoring stations. As the number of monitoring stations increases and volume of meteorological and hydrological data drastically expands, it is necessary to efficiently store and improve the quality management of meteorological and hydrological data.

This aims to contribute in strengthening capacity of integrated data management and utilization of FFWS in the entire PAGASA through realization of key issues namely strengthening capability of development plans for FFWS and quality in management/ utilization of meteorological and hydrological data in PAGASA-HMD; standardization of RFFWC's organization/staffing and installation of equipment/facility; strengthening of FFWS in the Cagayan de Oro/Tagoloan RFFWC; and capacity building of required data management for FFWS in the Cagayan de Oro/ Tagoloan RFFWC.

5. Action Ready Climate Knowledge to Improve Disaster Risk Management for Small Holder Farmers in the Philippines, ACIAR, 2016-2019

More and more activities are being undertaken by the Philippine Government to address Disaster Risk Reduction (DRR) and Climate Change Adaptation (CCA) at a national and local scale in partnership with NGOs and donor countries. As the strategy corresponds closely with the Australian Aid agenda which is to promote prosperity, reduce poverty and enhance stability, the Government of Australia through Australian Centre for International Agricultural Research (ACIAR) collaborated with various Philippine agencies such as the Philippine Atmospheric Geophysical and Astronomical Services Administration (PAGASA) and the Department of Agriculture (DA) – Agricultural Training Institute (ATI) to reinforce the responsibility of the Philippine Government to plan and fund their own economic development and poverty reduction strategies.

PAGASA is using advances in communication technology to collate and communicate current and historical climate information which includes networks of local weather stations. There are also Significant investments in enhancing warning for extreme rainfall and cyclones and ongoing. Developments in reducing the lead time and accuracy of forecasts based on El Niño Southern Oscillation. Although the agency was involved in numerous projects, more often, PAGASA's role was more on data provision. Since PAGASA expressed interest in being actively involved as part of The research program, the agency will assist in developing action-ready knowledge that directs Research to investigate who is taking action, what options are available and how climate Information can assist. PAGASA as having the ground experience in communicating climate information to agricultural stakeholders, through its own activities and through partnerships, the Strength of the project includes PAGASA as a research partner working with economic agencies and universities on the value of information and exploring better means of communication.

6. Implementation of Forecast-based Financing and Emergency Preparedness for Climate Risks (FbF) in the Philippines

The Forecast-Based Financing and Emergency Preparedness for Climate Risks initiative in the Philippines is focusing on understanding climate risks, indicators, thresholds and impacts, and ensuring that these scientific information are systematically analyzed and translated into appropriate preparedness actions. The discussions and consultations are national in scope, and actions will be piloted in 10 selected provinces identified as prone to climate-related hazards.

WFP is working closely with the local government units to develop or enhance Standard Operating Procedures (SOPs) for early warning and early action. WFP is in close coordination with the national government through its relevant agencies to ensure support to local initiatives, and ensure alignment of these with national mandates and programmes.

PAGASA's participation

EWS baseline study

PAGASA as part of Technical Working Group, provided inputs in FbF's early warning systems (EWS) baseline study to understand (1) climate risks and impacts in the pilot provinces; (2) current warning systems and preparedness protocols at national, regional and provincial levels; and (3) policy environment, and how policies are aligned and complied with at all levels.

The study covered 10 provinces (Batangas, Benguet, Cagayan Valley, Compostela Valley, Davao Oriental, Iloilo, Laguna, Maguindanao, Misamis Oriental and Sorsogon), and involved review of documents and series of meetings with local executives, Disaster Risk Reduction and Management Officers (DRRMOs), planners, agriculturists and nutritionists.

WFP will facilitate continuous dialogue throughout 2017 to facilitate sharing and utilization of lessons learned from different stakeholders, ensure alignment or link between local and national systems, and develop appropriate early warning protocols.

Attended 3 TWG meetings (April, May 2016 and July 2016)

The first TWG meeting provided a venue for in-depth discussion on forecast-based financing and emergency preparedness, and resulted in the development of an agency map outlining the different roles, mandates and programmes of the agencies.

The second TWG meeting provided a venue to share and validate the baseline assessment report, and initiate SOP development discussions.

The third TWG meeting focused on La Nina preparedness, and helped in ensuring scientific forecast is used to develop concrete and concerted early actions at the national and local levels. Specifically, the meeting aimed at:

- increasing awareness on La Niña, and enable LGUs to use the forecast for preparedness
- identifying links between national agency plans and local seasonal livelihood plans
- tracking the flow of scientific information from national level to local level, and identify existing protocols.

Development of SOPs and conduct of simulation exercises

On-going consultations with Provincial and Municipal Local Government Units

WFP commissioned an expert group to facilitate the conduct of workshops and the development of SOPs, in which PAGASA acted as Resource Persons during the workshop and simulation exercises. Consultations with LGUs and agencies were conducted in eight out of ten provinces (Batangas, Benguet, Laguna, Sorsogon, Iloilo, MisOr, Davao Oriental, and Compostela Valley). Workshops and simulation exercises will be held in the ten provinces to complete the development of SOPs. WFP will continue to work with the national agencies and local governments to ensure adoption of the SOPs at the national and local levels.

Participated in Dialogue Platforms (December 2016)

Participated by: Engr. Catalino L. Davis and Mr. Joseph Basconcillo (Geneva, Switzerland)

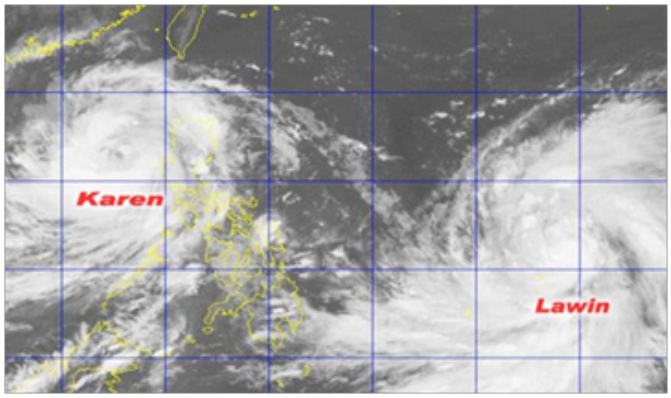
The Dialogue Platform works on establishing a space for solutions on climate change adaptation by drawing together the ideas of experts from a range of disciplines.

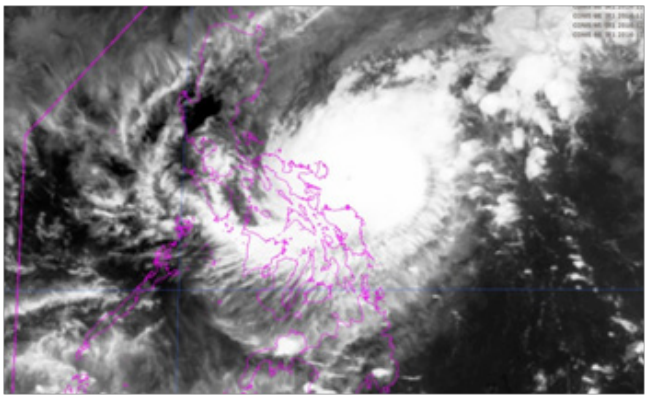
The first and second workshop in 2015 brought together over 80 humanitarian practitioners, climate scientists, donor agencies and government representatives. Experience from current pilots was blended with scientific expertise to fine-tune the FbF concept and share lessons and expertise.

In the third workshop expertise on the practice of developing and implementing standard operating procedures (SOPs) based on probabilities was surfaced. The pilot projects' experience and lessons learned will be used to shape a methodology with which to apply the FbF mechanism in a broader context.

The fourth workshop aimed at consolidating the progress made so far and developing a roadmap for FbF in the future, to focus attention on providing clear guidance and practical tools for practitioners and policy-makers. WFP Philippines was invited to present during the Practitioners' Panel to share experiences and lessons learned from piloting the project in the Philippines.

GROWTH GATHERS PACE





Full –on activity has been PAGASA's response to the global environment, management crisis, nearly after the occurrence of a disaster Super Typhoon "Lawin"". This year marks the passage of the first official Super Typhoon (STY), Lawin (International name: Haima), and first issuance of Tropical Cyclone Warning Signal No. 5 after the revision of tropical cyclone classification and warning system. STY Lawin affected Regions I, II, III, V and CALABARZON and the total cost damage to agriculture and infrastructure was Php16.260B with 23 casualties. Two other tropical cyclones which caused heavy impacts on properties were Typhoons Karen (Sarika) and Nina (Nock-ten) with a total damage amounted to Php3.957B and Php5.184B, respectively.

Highlights of Monthly Activities

January

Aside from the annual conduct of Program Review and Analysis and Planning Conference and shortly after the approval of the modernization bill, now known as RA 10692 or the PAGASA Modernization Act of 2015, the agency focused on crafting the Implementing Rules and Regulations (IRR) of the said act including its programs encompassing the following components for submission and approval of the President of the Philippines to be implemented in three (3) years:

a. **Upgrading of Physical Resources and Facilities and Operational Techniques**
   - State-of-the-art instruments, equipment & facilities

b. **Enhancement Research and Development Capability**
   - Rationalized, integrated approach and indentified activities

c. **Establishment of Regional Weather Service Centers**
   - Establishment of Flood Forecasting and Warning Sub-centers in Strategic Areas

d. **Establishment of PAGASA Data Center**
   - Establishment of a Technology-Based Data Center

e. **Enhancement of Weather Data Collection and Information Dissemination Services**
   - Development and Use of an Effective Weather Information Method
   - Collaboration and Linkages

f. **Human Resource Development Program**
   - New Salary Scale for PAGASA personnel
   - PAGASA Personnel Retention Incentive
   - Scholarship Program

g. **Development of Regional and International Cooperation Program**
   - Collaborative arrangements with relevant regional and international bodies and government institutions

February

In February, the celebration of the 2016 National Astronomy Week (NAW) was conducted.

This is an annual activity organized by the Research and Development Training Division (RDTD). This is an effort by the RDTD as well as the agency to captivate the interest of the general public especially students on astronomical objects and phenomena.

In 2016, the said event was conducted from 15th to 19th of February brimming with different activities. The free stargazing/telescoping session was one of the main activities attended by 242 students and astronomy enthusiasts. Fortunate visitors of the activity had a chance to see bright stars like Vega and Sirius including planets such as Jupiter, Venus, Saturn, Mercury and Mars.
Free Planetarium shows were also conducted to selected students to give scientific concept on the Universe including the size and content of the observed universe, its creation, history and the development of the solar system. To broaden the planetarium services, mobile planetarium shows were exhibited through mobile planetarium on tour which was conducted to 378 students of the Caloocan City Science High School.

Another main feature of the said event was the conduct of seminar/workshop on astronomical sightings and observations, events and services to PAGASA field personnel. This aims to enhance the knowledge and skills of PAGASA field personnel to appropriately address queries from media and the general public regarding astronomical events, sightings and other related astronomical phenomena within their respective areas. This was held at the Planetarium Building, Science Garden, Diliman, Quezon City on 18th to 19th of February 2016 which was attended by 43 field personnel.

March

2016 National and World Meteorological Day (NWM Day)

March 23 is World Meteorological Day (WMD). The World Meteorological Organization (WMO) and its member states celebrate the WMD to commemorate the entry into force on 23 March 1950 the Convention creating the WMO as the successor to the International Meteorological Organization established in 1873. The same day of every year was also proclaimed in the Philippines as National Meteorological Day (NWMD) by virtue of Presidential Proclamation No. 549.

Each year, the WMO chooses a theme for the celebration to focus on a relevant meteorological issue affecting the society and the environment. The theme of the 2016 celebration is “HOTTER, DRIER, WETTER, FACE THE FUTURE”, chosen to draw the attention of Governments and the world community on the impact of Climate Change on natural resources, humans and environment. It highlights that, without urgent action to cut emissions, the trend of increasing temperatures and the frequency and intensity of extreme events will accelerate.

PAGASA, as one of the members of WMO, led the commemoration of WMD in the Philippines.

Some of the significant activities of NWM Day were the conduct of Scientific Forum, awarding ceremonies for the PAGASA Gawad and Loyalty, and conferment of PAGASA Wind Vane Awards. The Philippine Weathermen Employees Association sponsored activities in the form of games to add fun to the celebration.

The Scientific Forum consisted of topics which fittingly harmonized with the WMD theme were presented by resource persons, as follows:

- Update on El Niño by Mr. Joseph Anthony Lucero, Sr. Weather Specialist, OIC, CLIMPS, Climatology & Agrometeorological , Division (CAD), PAGASA
- Impact of Weather to MERALCO's Operations by Mr. Primo P. Alonzo, AVP & Head, System Control Center, MERALCO
- Climate Trends & Projections by Dr. Marcelino Q. Villafuerte, II, Weather Specialist II, OIC, IAAS, CAD, PAGASA

A total of 70 persons actively participated in the Forum representing various sectors of the society like the academe, agriculture, disaster preparedness and private sectors.

The Loyalty awards were bestowed to employees who have served the Government for 10, 15, 20, 25, 30, 40 and 45 years. Awards for compulsory retirement, optional retirement and posthumous were also given during the event. There were a total of 174 awardees.

The PAGASA Gawad Awards were presented to employees for their exemplary performance, valuable contributions to the achievement of organizational effectiveness and efficiency and for having demonstrated unquestionable commitment, dedication and integrity in the pursuit of public service. The award has two (2) categories, PAGASA Wide or Over-all, which has 48 awardees and Division category with 104 awardees from the 13 Divisions of PAGASA.

Lastly, the Wind Vane awards were conferred to outstanding individuals/organizations for valuable assistance to PAGASA. The awardees were Honorable Ralph G. Recto, Senate President Pro-Tempore, 17th Congress; Honorable Victor J. Yu, District Representative, Zamboanga del Sur; Mr. Antonio S. Rola, National Mango Action Team (NMAT); DOST Legislative Liaison Office; and the Philippine Navy.

The keynote speaker during the conferment was Usec. Alexander P. Pama, Administrator Office of Civil Defense and Executive Director, National Disaster Risk Reduction and Management Council.

The culmination of the WMD celebration was a binding proof of a world level cooperation.

National Women's Month

"Kapakanan ni Juana, Isama sa Agenda!" was the Philippine Commission on Women's (PCW) theme for the 2016 National Women's Month Celebration (NWMC). The theme was very timely and reflective of the current mood as the nation is set to elect its new set of national leaders. This year's NWMC aims to generate renewed awareness and attention so that women's concerns shall be included in the upcoming leadership platforms and government agendas.

In support of this advocacy, the PAGASA Gender and Development Focal Point System (GFPS) actively participated in various activities lined up for the NMWC. To jumpstart the celebration, the agency started posting tarpaulins in Central office gates which carry the theme. Various reading materials were also posted on the GAD corners.

T-shirts with PCW suggested designs were provided to PAGASA employees who will represent the agency at the centralized assembly sponsored by the government. A total of 56 PAGASA employees (45 females and 11 males) attended the gathering organized by the PCW. This was held at the Quirino Grandstand, Luneta Park, Metro Manila last March 16, 2016 which started as early as 6:00 in the morning.

The event's declared objective was to "celebrate the achievements, gains and accomplishments with regards to bridging the gender gap and promoting women's empowerment." It focuses on the chosen agenda of women attendees which were written in distributed ballots. Each attendee was requested to choose five items/ agenda for the ceremonial balloting after which the PCW will tally accordingly.

Thirty-three PAGASA employees (22 females and 11 males) accompanied by the GFPS focal point Chairperson Dr. Flaviana D. Hilario, attended the DOST-wide WMC held at the DOST compound, in Bicutan, Taguig City last March 31, 2016.

"Improved education, awareness-raising and women's participation in gender-responsive climate change adaptation and disaster risk reduction and management towards building resilient communities" was the chosen agenda of the PAGASA employees. This was printed in a tarpaulin and on balloons that later on were released as part of the scheduled parade around the DOST grounds.

Our home grown talents Ms. Marie Kris T. Toliongco, Ms. Helen Lou A. Sañez, and Ms. Joanna Marie B. Cayas sang as part of the two-minute presentation for each agency. Aside from the participation to the Women in Leadership forum, Zumba, Photo Booth, Balloting and Thumb Printing, PAGASA representatives were tasked to facilitate parlor games for the participants during the whole day celebration.

As fulfilled like the GFPS, the participants mentioned that it was indeed another memorable Women's Month celebration for the PAGASA officials and employees. These further encouraged employees to take active roles in upcoming Gender and Development (GAD) celebrations

April

On April 28, 2016, the ceremonial signing of the Deed of Donation of real property between the heirs of Ms. Basilia Tubig namely Eleuterio and Cesario Bungabong and PAGASA officials headed by Dr. Malano, Dr. Hilario and Engr. Davis was held at Bohol Tropics Resort, Basacdacu, Alburquerque, Bohol. Said donation is for the establishment of Doppler Weather Radar Station.

According to the National Internal Revenue Code of 1997 (NIRC) and BIR-NEDA Regulations No. 181, the National Economic and Development Authority (NEDA) is tasked to formulate and implement the National Priority Plan (NPP). The NPP is a list of Programs, Projects and Activities (PPAs) in several sectors such as education, health, youth and sports development, human settlements, science and culture and economic development and a modality to mobilize private sector participation in national development, and financing of government expenditure thrust. Private sector donors/donations for PPAs in the NPP are entitled full tax deduction.

In this regard, the agency submitted this donation to NEDA for possible inclusion in the National Priority Plan (NPP). The said entry of PAGASA to the NPP along with four other entries from DOST-attached agencies was declared Priority PPAs and included in the 2017 National Priority Plan. NEDA also noted that the installation of Doppler Weather Radar in Bohol is supportive to the objectives of the Updated Central Visayas Regional Development Plan, 2014-2016, to build up the adaptive capacity and resilience of Central Visayas communities to disasters.

May

PAGASA acquired two X-band mobile radars in 2016 to enhance the weather data gathering and forecasting capabilities of the agency. In May, the turnover of two X-Band Mobile Radars was conducted including the two (2) service vehicle to be used by the PRSD.

One X-band mobile radar was deployed at Baler Radar Station to temporarily serve the Baler radar coverage whtich was destroyed by Typhoon Lando while the other one was situated at the PAGASA Central Office.

Mobile X-Band Weather Radar System could cover blind-spot areas of land-based radars that need investigations due to its deployability especially during the occurrence of severe weather events. It could also monitor the earliest stages of the formation and development of thunderstorms, a short-lived shallow low pressure area (SLPA) and other severe/hazardous weather phenomena because of its sensitivity to moist air which is hardly detectable by C-band and S-Band land based radars.

June

PAGASA launches first-ever Filipino weather dictionary

Daluyong bagyo, pana-panahong hangin.

With the launching of the first-ever weather dictionary "Patnubay sa Weder Forkasting", the public can now have a reference book for technical weather terms which are simplified and translated into Filipino.

An initiative by the Komisyon sa Wikang Filipino (KWF), headed by no less than the country's National Artist for Literature Mr. Virgilio S. Almario, the "Patnubay sa Weder Forkasting" is also a response to fomer President Benigno Aquino III's call for a more understandable weather forecasting.

The project, which was closely coordinated with the technical experts from PAGASA, aims to strengthen the campaign for a simplified forecast so that the public can understand the warnings about the weather condition

These are the Filipino terms for storm surge and monsoon, words that are usually heard in weather forecasts.

Aside from Filipino, the "Patnubay sa Weder Forkasting" contains terms that are taken from other languages and local dialects such as Ilokano and Bikolano.

PAGASA Mobile Apps and Simplified Information Materials

PAGASA also introduced the upgraded version of the PAGASA Mobile Apps.

A light version of the PAGASA website, the mobile app contains vital weather information and flood warnings.

The app, which can be installed using an Android phone, can be downloaded from the Google Play store. This project is one of the components of the technical cooperation between PAGASA and the Japan International Cooperation Agency (JICA)-JPOW Project.

Other products unveiled are the simplified information materials developed through the collaborative efforts of PAGASA and USAID's Be Secure Project.

The brochure-type materials and posters contain information and illustrations about La Niña, El Niño, Rainfall Warning System (RWS), Flood, PAGASA Profile, and the updated Tropical Cyclone Warning System (TCWS).

Be Secure Project is a four-year activity that promotes good governance and capacity-building for long-term water security, improves access to water and wastewater treatment services, and builds more resilient communities. It also provides support to the DOST-PAGASA technical staff through capacity-building and trainings.

These events are just part of the kick-off activities for the observance of the Typhoon and Flood Awareness Week (TFAW) under Presidential Proclamation 1535. Other activities include the La Niña Forum, Media Seminar-Workshop, and an open-house of the PAGASA facilities.

July

Eagle award for PAGASA from Bangko Sentral ng Pilipinas (BSP)

PAGASA was bestowed the Outstanding Partner for Monetary Policy by the Bangko Sentral ng Pilipinas (BSP) during its 13th Awards Ceremony and Appreciation Lunch for BSP Stakeholders in the National Capital Region held on 13 July 2016 at the BSP Assembly Hall, BSP Complex Manila. The awards were given to BSP's outstanding partner institutions recognizing their strong support and contribution to the statistical undertakings, information requirements, and advocacy programs of the BSP, as well as the effective delivery of its functions. The theme for this year's ceremony is "Sustained Partnership, Sustained Economic Growth." PAGASA was specifically recognized for providing relevant information regarding typhoons and floods which BSP utilizes to determine the disasters impact on the economy. On hand to receive the award were PAGASA Administrator Dr.Vicente B. Malano and Mr. Jose Daniel C. Suarez, Officer-in-Charge, Financial, Planning and Management Division (FPMD).

August

The secretary of the Department of Science and Technology (DOST), Secretary Fortunato T. de la Peña, visited PAGASA during the agency's conduct of Mid-year Performance Review and Analysis and Planning Conference held at the Amihan Conference Room on August 04-06, 2016.

Program/Performance Review Analysis is being held semi-annually, Program Review and Planning Conference in January and review of performances in July vis a vis targets set by all Divisions during the start of the year.

September

Closing Ceremony of the Meteorologist Training Course (MTC), Class 2015-2016

The culmination of the Meteorologist Training Course (MTC) class of 2015-2016 was held at the PAGASA – WMO Training Center, PAGASA Central Office on September 27, 2016. A total of 42 trainees graduated from this year's MTC including four foreign participants from Vanuatu, two from Fiji and from Tonga and three from the Philippine Air Force.

The program started with an opening remarks by Dr. Flaviana D. Hilario while the graduating trainees were provided w/ inspirational talk by Dr. Vicente B. Milano. Mr. Nathaniel A. Cruz, GMA Network's resident meteorologist was the guest speaker of the said graduation. Among the 42 trainees who finished the course, Mr. Robb Gile topped the class.

Information, Education and Communication (IEC) Campaign of DEWS Project

The Deployment of Early Warning System in Disaster Prone Areas (DEWS Project), a DOST-GIA funded project, conducted IEC campaigns on the operations and warning protocol training including flood drill at Palo Municipal Function Room, Palo, Leyte and at the Conference Room of the Provincial Governor's Office, Borongan, Samar on September 12 and September 15, 2016, respectively. The target participants of said IECs were Local Government officials and employees with a total of 117 participants in Leyte and 89 in Samar. Said capaign provided the LGU of Samar and Leyte knowledge on the operation of early warning instruments installed under the project and the proper protocol on when and how to evacuate a particular area during a flooding event.

October

JPOW, 6th Joint Coordination Committee (JCC) Meeting

The Technical Cooperation Project on Enhancing Capacity on Weather Observation, Forecasting and Warning between JICA and PAGASA also known as JICA-PAGASA on Weather Project (JPOW) started last 10th May of 2014 and will end in May of 2017 with an aim to mitigate weather related disaster.

The JPOW Project, 6th JCC meeting was held last 18 October 2016 at the Amihan Conference Room in PAGASA Science Garden Complex Agham Road Diliman, Quezon City.

The primary agenda of the meeting is to discuss the result of the Joint Terminal Evaluation conducted from 28 September 2016 to 17 October 2016. The purpose of the evaluation is to assess the status of each output in relation to the project's targets and provide recommendations for attainment of the project's goal until its termination on May 2017.

The highlights of the recommendations are to operationalize the traceability at the local station through coordination between the Engineering and Technical Services Division (ETSD) and the Research & Development and Training Division (RDTD) in ensuring the utilization of the calibrated instruments after its installation and to continue educating personnel of synoptic station on the use of newly installed instruments including the importance of quality control to assure the accuracy of meteorological instruments; To ensure that the regular maintenance and the equipment status report of the radar site as well as the status of meteorological instruments at the Synoptic stations shall be regularly submitted to ETSD as written in Manual on Surface Synoptic Observation (MASSO); To conduct a workshop on the assessment of existing warning criteria of Southern Luzon PRSD, collection of needed data from the newly installed Automatic Rain Gauges (ARG) and introduction of Quantitative Precipitation Estimate (QPE); To have a precipitation guidance in the future as it is needed to assure the archiving of precipitation data; To achieve issuance of quantitative forecast through stable introduction of fully automated temperature guidance and incorporating it in the Forecaster's Assistant Tool (FAST); To achieve full utilization of radar through a suggestion of change in the elevation angle to capture not only typhoon structure but also the rain clouds and lastly, to achieve easy access of meteorological information, through recommendation to promote mobile application and mobile website not only in NCR but also in provinces. There is also a recommendation that local DRRMOs should be involved in IEC activities as member of the Technical Working Group to complement resources of the Project.

11th Integrated Workshop on Improving Typhoon Impact-based Forecasting and Warning

On October 24-27, 2016, PAGASA hosted the 11th Integrated Workshop (IWS) of the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP)/World Meteorological Organization (WMO) Typhoon Committee which was held at the Waterfront Cebu City Hotel and Casino. The theme of the workshop is "Improving typhoon impact-based forecasting and warning".

Said workshop allowed participants of the three working groups, which include Working Group on Hydrology (WGH) and Working Group on Disaster Risk Reduction, together with the Advisory Working Group to discuss the progress of their Annual Operating Plans (AOP), cross-cutting issues as well as the strategic plan, budget allocation and governance of the Committee.

Said activity consisted of opening ceremony on the first day with messages provided by Gov. Hilario P. Davide III, Provincial Governor of Cebu; Dr. Vicente B. Malano, PAGASA Administrator; Dr. Cho Hyosoeb, Han River Flood Control Office – Korea; Mr. Yu Jixin, Secretary of Typhoon Committee, Mr. Taoyong Peng, Chief of Tropical Cyclone Programme of WMO and by Secretary Fortunato de la Peña, Secretary of DOST. Other activities included lectures on Innovative Strategy on Mitigating Typhoon-related Impacts, member's report, working group meetings and discussion on TC cross-cutting issues. A total of 75 participants from several countries such as China, USA, Malaysia, Hongkong, Vietnam, Korea, Singapore, Thailand, Japan, Camboadia and LAO PDR took part of this important event.

November

PHILCCAP celebrates Contribution to PH's Climate Change Adaptation Efforts

The Philippines Climate Change Adaptation Project (PhilCCAP), a foreign-funded program implemented in close collaboration by several government agencies, including the environment and agriculture executive departments and the state weather bureau, held its culminating event on Tuesday, November 29, 2016, to celebrate the project's contribution in the climate change adaptation efforts of the country. The celebration took place at the Novotel Manila, Araneta Center Cubao, Quezon City. Entitled "Adapt. Survive. Now. #ThePhilCCAPStory," the culminating event featured a ceremonial hand over and mass distribution of launched PhilCCAP knowledge products, and a presentation of the project's successful demonstration of various climate change adaptation (CCA) programs.

Among the products distributed are the Good Climate Change Practices Manual of the Climate Change Commission (CCC), the program manual for the Enhanced Climate-Smart Farmers' Field School (ECSFFS) by the Bureau of Soils and Water Management (BSWM), a toolkit for assessment and analysis on climate change adaptation, and communication materials on the Weather Index-Based Crop Insurance (WIBCI) of the Philippine Crop Insurance Corporation (PCIC).

Management plans and monitoring and evaluation plans for the Peñablanca Protected Landscape and Seascape (PPLS) and Siargao Islands Protected Landscape and Seascape (SIPLAS) of the Biodiversity Management Bureau (BMB) were part of the products to be distributed. Also included were the technical reports on Philippine climate patterns, a policy brief, and a manual for Local Government Unit (LGU) on Geographic Information System (GIS) mapping, developed by PAGASA, the state weather bureau.

Over 300 guests from national government agencies and their respective regional offices, local government units, non-government organization, and state universities and colleges received sets of the products.

World Bank representatives and government officials including DENR Assistant Secretary for Foreign Assisted and Special Projects Rommel Abesamis, and DA Undersecretary for Agribusiness and High Value Crops Evelyn Laviña also graced the event and shared with the guests the significance of the project's outputs that will hopefully empower the country in facing climate change.

Promotion of PhilCCAP Success Stories

Apart from the distribution activity, PhilCCAP's implementing agencies also shared their successes in implementing various CCA programs that catered to different sectors.

The CCC presented its achievements in putting up the Community of Practice (CoP), an online knowledge management system which intends to be the government's official repository of all climate-related information and practices, from forecasts to general research.

The NIA focused on promoting its success in providing recommendations on the retrofitting and redesigning climate-proofed facilities for two river irrigation systems (RIS) in Cagayan and Iloilo. Adoption of these recommendations translated into civil works which significantly improved the water distribution to rice and corn fields for both sites, and increased collection for the agency.

Improved agricultural extension services through the Enhanced Climate-Smart Farmer Field School were the center of the Agricultural Training Institute (ATI)'s presentation. ATI has trained farmers in Regions 2 and 6 with climate-smart farming practices and thus improving their capacity to cope with the effects of climate change.

The BSWM, on the other hand, told the story how the program manual for ECSFFS was developed and disseminated. The manual incorporates the lessons derived from the practical courses on climate change taught in ATI's farmers' field school program.

Success of pilot-testing the weather index-based crop insurance was highlighted by the PCIC. Using rainfall levels as basis for payout, the crop insurance product has helped in the rapid delivery of cash to rice and corn farmers in the pilot areas affected by abnormal rainfall, regardless of the actual damages sustained.

The Department of Environment and Natural Resources (DENR) Regions 2 and 13 showcased its feats in implementing CCA strategies and providing climate-responsive livelihood programs to stakeholders living within two protected areas – the Penablanca Protected Landscape and Seascape (PPLS) in Cagayan and the Siargao Islands Protected Landscape and Seascape (SIPLAS) in Surigao del Norte.

Some of these programs include the introduction of agroforestry to upland communities in PPLS, and provision of ecologically sustainable marine-based livelihood projects and rehabilitation of mangrove sites in SIPLAS.

PAGASA shared its success in producing climate-information such as projections and forecasts relevant to the implementation of the projects' other activities, particularly the delivery of agricultural extension services. Also part of their success is providing capability-building programs for the project's stakeholders to understand climate and weather information necessary for their planning activities.

The activity concluded with a message from Mr. Maurice Rawlins, World Bank Task Team Leader for PhilCCAP who lauded the achievements of the project partners and challenged the stakeholders to sustain the gains.

December

PAGASA strengthens its flood forecasting and warning capabilities

Every year, the country is severely hit by tropical cyclones and extreme climate events and is affected by widespread flooding.

PAGASA, in partnership with the Japan International Cooperation Agency (JICA), established the first Flood Forecasting and Warning System (FFWS) in the country located in the Pampanga River basin in 1973. The FFWS aims to forewarn the people about possible flood occurrences, especially, those who are living in low-lying areas, nearby rivers and dams. The FFWS was also established in Agno, Bicol, Cagayan and Pasig-Marikina river basins.

To enhance the nationwide FFWS, PAGASA has established the River Flood Forecasting and Warning Centers (RFFWCs) in 2013. The RFFCWs has been conducting public information campaigns for the communities and collaborates/ cooperates with local institutions involved in flood disaster mitigation and other related activities. The eighteen (18) centers are strategically located in different parts of the country. Among the river centers to be established are the Cagayan de Oro and Tagoloan Misamis Oriental river basins. These areas have higher priority due to the past flood damages and so that the RFFWC's facility and monitoring equipment in the two river basins were developed prior to the other basins.

As the number of monitoring stations increases and the volume of hydro-meteorological data dramatically expanding in the near future, PAGASA saw the need to further strengthen its capabilities by efficiently storing and improving the quality of its hydro-meteorological data management.
Through the Project for Strengthening Capacity of Integrated Data Management of Flood Forecasting and Warning (FreeDAM project), jointly implemented with JICA, PAGASA aims to improve its data management for a more accurate and timely flood warning system.

After detailed planning studies in 2014 and 2015, the Project started in June 2016 and will be completed in June 2019.

All data coming from the RFFWCs and other PAGASA regional offices will be integrated and centralized in the PAGASA Hydro-Meteorology Division (HMD) at the Quezon City main office.

The expected outputs of the Project include the enhanced capacity of formulation of FFWS development plan of PAGASA-HMD, enhanced capacity of PAGASA and RFFWC on quality management/storage of data, standardized organization/staffing and equipment/facility of RFFWC according to the development levels of FFWS, and the enhanced capacity of PAGASA-HMD on the FFWS of Cagayan de Oro and Tagoloan river basins.

For the month, the project conducted the first seminar on the Role of Flood Forecasting and Warning Systems (FFWS) in Flood Risk Management under the project ''Strengthening Capacity of Integrated Data Management of Flood Forecasting and Warning''. The FFWS seminar aims to deliver reliable flood information to the local government unit as well as to the general public while the Flood Forecasting and warning services aim's to provide full level of operations throughout the county. The seminars were attended by the representative from NPC, NWRB, NEDA, JICA and LGUs.

Signing of the Memorandum of Agreement (MOA) with the office of National Police Commission (NAPOLCOM) on the sharing of hydro meteorological data and flood information and co-location of radio communication to able to reach the data to stakeholder

S & T GOVERNANCE AND MANAGEMENT FOSTERING

PAGASA recognizes that good governance enhances services to deliver strategy, generate stakeholder value and safeguard the environment.

At the start of the year, Program and Review Analysis (PRA) of the functional units of the agency was conducted simultaneously with the Planning Conference for FY 2016 Programs and Priority Thrust for 2016-2017. The review identified some key activity areas in 2016 work plan revision and some pressing concerns which needed immediate solutions. Priority programs and recommendations for incorporation in the 2016 Action Plan and those for consideration in 2016-2017 Financial Plan were also drawn up.

Also, the organization structure as well as manpower requirements and plans of each division in connection to the modernization act of PAGASA were presented.

Moreover, during the Planning activity, the discussion was focused on identifying the plan to be prioritized for 2016. Likewise, the midyear PRA was conducted to assess the performance of each unit for the 1st semester on August 04-06, 2016, held at the Amihan Conference Room, Central Office PAGASA, Quezon City.

National Climate Forum

In 2016, the Agency, through the Climate Information, Monitoring and Prediction Section (CLIMPS) of the Climatological and Agrometeorological Division (CAD), organized and conducted the National Climate Outlook Forum, which has become a regular monthly gathering among representatives of government agencies and corporations, private companies and NGOs. It primarily aims to provide an update on the Weather and Climate Outlook for the coming months of the year. In particular, the forum provides information and updates on potential or evolving extreme climate events such as el Nino and La Nina to help decision policy makers in the formulation of preparedness and mitigation measures. The regular presentations included latest weather update and weather outlook for the next 3 to 5 days, status of monitored major dams, review of the climate conditions, climate outlook for the next six (6) months and open forum for the participants to give suggestions, comments, and recommendations that might serve as input for the continuous improvement of PAGASA's climate products and services.

It also serves as venue where various issues and concerns are presented and discussed in relation to the products and services of PAGASA. Based on feedbacks from the participants, the usefulness of climate information, in terms of content and substance, are assessed and used in further improving climate services and products. With the holding of a regular forum, it is envisioned that PAGASA could learn from the continuing interaction on users and on how it can best meet the user needs and expectations as response to the Climate change thrust of the country.

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

A FORCE FOR GOOD

For 2016, PAGASA implemented a total of 35 programs and projects benefitting close to 5,020 individuals and 1,217 communities.

Majority of these programs and projects fall under distinct categories of forecasting and warning, Information, Education and Communication campaigns and regarding environment.

Forecasting and warning

- **Automation of Flood Early Warning Systemfor Disaster Mitigation in Greater Metro Manila (GMA) – KOICA funded**

Kick-off meeting on Automation of Flood Early Warning System for Disaster Mitigation Greater Metro Manila held at Amihan Conference Room, Central Office, PAGASA on February 02, 2016

- **Completion and Inauguration of the newly installed Doppler radar in Iloilo**

PAGASA inaugurated its Doppler radar in Iloilo City in February 2016 seen to boost the country's weather-forecasting capabilities. The Doppler radar and synoptic station is located at the Western Visayas Agricultural Research Center in Jaro district in Iloilo. The installation of radar in Iloilo would enhance PAGASA's capability to provide more accurate weather data for the Visayas region ensuring the safety of communities from natural hazards such as typhoons and floods.

The radar will provide more accurate forecasting to enable farmers and farming communities to prepare ahead of time for coming typhoons, providing for detailed data to predict the amount of rainfall in particular areas at a particular given time.

The new Doppler radar would make possible nowcasting since the radar is capable of scanning and monitoring rain clouds as far as the provinces of Sorsogon and Masbate in the north and Surigao and Davao in the south. This means that local authorities will be able to track down a typhoon at least three (3) hours before it hits land, giving LGUs time to evacuate the residents, especially, in vulnerable communities.

Apart from weather monitoring, the Iloilo Doppler radar would provide data sets which would be helpful in managing crop planting with farmers having knowledge of weather conditions suitable for planting, applying fertilizer and harvesting. The radar was the 13th of 15 radars set to be inaugurated before the end of the year to help PAGASA enhance its capability to mitigate the impact of El Niño in 2016 by detecting rain clouds used for cloud seeding to induce rain. With the sophisticated weather equipment, the supply of water for irrigation and agriculture will be assured and water shortage can be averted.

The inauguration of the Iloilo Doppler radar was made part of the DOST Science Nation Tour Western Visayas Leg, held from 22-24 February 2016, which aimed to showcase the DOST-developed scientific and technological advancements in every region of the country.

In full implementation of PAGASA's modernization program, it is highly expected that the agency will be able to further improve and upgrade its weather forecasting by covering the entire Visayas region. The Iloilo Doppler Radar and Synoptic Station in Barangay Buntatala, Hamungaya, Jaro, Iloilo City was inaugurated by DOST Secretary Mario G. Montejo and Iloilo Province Governor Arthur D. Defensor Sr.

- **Marine Weather Forecasting using High Frequency Doppler Radar (HFDR) project (DOST-GIA funded)**

Testing Commissioning and Capacity Building

The Scripps-USA (technology supplier) conducted the commissioning and start-up operation of the HFDR System with the presence of local stakeholders like PAGASA, UP-EEEI, UP-MSI, and AFP. Key activities included the following:

- Physical Inspection
- System Operation Inspection
- Raw Data Gathering
- Verification of CODAR products
- Reliability Testing

HFDR installed at National Education Training Center (NETC) in Zambales

For the capacity building, selected personnel from PAGASA, UP-EEEI, UP-MSI and AFP undergo in-depth training on the operation, maintenance, troubleshooting of the system. The training provided by Scripps/CODAR was held at Amihan Conference Room, PAGASA Central Office, Quezon City on 30-31 March from 9:00am to 5:00pm and on site hands-on Demo at NETC and Masinloc, Zambales on 01-03 April 2016.

Operation and Visualization

The container van where monitor and accessories are put in place. The SCRIPPS representatives are setting to start the operation with the presence of local stakeholders like PAGASA, UP-EEEI, UP-MSI, and AFP.

The variable to be measured is wave height and wave current. These data can be assimilated and can be inputted to wave model for visualization and for the measurement of the vector quantity of wave that is the speed and direction. The data represent the HF radar reflectivity with the following:

- Transmission of signal through HF-radar transmitter.
- Reception of signal through the HF-radar receiver.
- Data received will be encoded and analyzed through visualization software
- Forecasters will create forecast out of the data received and data model output run and eventually disseminate to end users
- Monitoring of Southwest and Northeast Monsoon relationship with the wave patterns in the study area

PAGASA-DOST reiterates awareness on a hotter, drier, and wetter future

The Dry season has just officially started as declared by the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA). For some, it may mean the start of vacation from school, or the best time to hit the beach. As safety tips for summer outdoor activities, PAGASA encourages the public to increase their awareness on the different effects of climate change and to help contribute in minimizing its effects.

According to the World Meteorological Organization (WMO), "Climate Change is disrupting the natural pattern of the seasons, and it is increasing the frequency and intensity of certain extreme weather events".

Heatwaves are felt in many regions of the world, with temperature record of 46.2 oC, drought contributed to extreme wildfires, and worst-ever flooding are experienced because of heavy rainfall events.

Unfortunately, some parts of the Philippines have been suffering from drought and dry spell brought by the existing El Niño, with damages in crops due to lack of water supply and low level of water in dams.

To further promote the issues on climate change, PAGASA, as a member of WMO, is commemorating World Meteorological Day (WMD), with the theme "Hotter. Drier. Wetter. Face the Future", simultaneously with all the members of the WMO community.

As part of the WMD celebration, PAGASA conducted a Scientific Forum which focused on El Niño and on how weather patterns are affecting the day-to-day lives of the people.

Held annually, the WMD commemorates the coming into force on March 23, 1950 of the Convention establishing the World Meteorological Organization, and in PAGASA, by virtue of Presidential Proclamation Number 549 declaring March 23 every year as the National Meteorological Day.

To help mitigate the adverse impacts of climate change, PAGASA advised the general public to revisit the importance of recycling, reusing, and reducing. Water conservation and energy saving management are a must especially during the dry season.

Different efforts are being done by the government, as well as in other countries, to address the effects of climate change. The future now depends on the contribution of every individual to support actions for climate resilience, adaptation and mitigation.

PAGASA Tropical Cyclone Simulator: an interactive learning tool

Storm signals that can be controlled in just one click and the path of the storm can be changed with just a swipe – well, at least in the virtual world.

The Tropical Cyclone Simulator (TCS) from the PAGASA is just one of the many technologies featured in the interactive exhibit during the 2016 National Science and Technology Week (NSTW).

Headed by the Department of Science and Technology (DOST), the annual NSTW is conducted every third week of July, by virtue of Presidential Proclamation 169, series of 1993.

With the over-all theme "Juan Science, One Nation", the event was held simultaneously on 25-29 July 2016 at the DOST Complex in Bicutan, Taguig City and other DOST regional offices nationwide, as well as in Manila, Los Baños and Quezon City Science Communities (QCSC).

For the QCSC, the week-long NSTW celebration included an S&T exhibit at the PAGASA Main Office Building featuring different technologies from the Advanced Science and Technology Institute (ASTI), Philippine Institute of Volcanology and Seismology (PHIVOLCS), Philippine Nuclear Research Institute (PNRI), Philippine Science High School (PSHS), and other S&T exhibitors.

Focusing on the NSTW-QCSC sub-theme "Juan Science, One Disaster Resilient Nation", PAGASA highlighted the TCS during the said exhibit.

The TCS is a customized computer system that shows the effects of a tropical cyclone wherein users can control its location and strength.

To create a simulation of the storm, users can simply push the 5 color-coded buttons on the TCS that correspond to the different tropical cyclone signals.

The 32" inch LCD monitor of the TCS displays the effect of a storm on a specific area by just swiping the storm icon located in another 21" inch touchscreen enabled monitor.

A specialized high-speed fan can be controlled to simulate the 5 tropical cyclone categories.

For signal number 3, the TCS will show roof sheets starting to be blown away while simulation for signal number 5 displays extreme damages of the storm to houses or infrastructures.

Interactive learning materials such as the TCS are a strategic tool to educate the general public. Aside from the fact that it is visually appealing, the information is presented in a creative way that can stir the interest of the user.

PAGASA hopes to come up with more interactive materials that the Agency can use for its information, education and communication (IEC) campaign.

Future weather experts

To further promote the weather forecasting profession, PAGASA also conducted a Weather Observation Contest for Grades 9 and 10 students.

Qualified contestants from different schools were lucky to be part of this activity as they were able to undergo a crash course on meteorology. Their newly-acquired forecasting skills were immediately put to test during the contest proper.

Dr. Vicente B. Malano, PAGASA Administrator, noted that the Weather Observation Contest is very unique as it challenges the youth to get to know more about weather forecasting. Through the contest, Malano hoped to promote the science of meteorology and to inspire the youth to pursue a career on weather forecasting.

Kirsten Denise Santos, a Grade 10 student of Caloocan National Science and Technology High School (CNSTHS), won first prize, followed by Christian Briones of Ramon Magsaysay High School (RMHS). Two students tied for the third spot, Cedric Tuason of CNSTHS and Jericho Rodriguez of RMHS.

Disaster preparedness

One of the highlights of the QCSC-NSTW celebration is the conduct of the Disaster Summit.

The summit entitled "Disasters: How Prepared Are We?", held at the PHIVOLCS Auditorium, brought together representatives from different government institutions involved in prevention and mitigation, disaster preparedness, response and rehabilitation.

In his message, DOST Secretary Fortunato de la Peña reiterated the importance of the DOST agencies in preparing and responding to disasters. He cited some of the latest innovations and technologies that are prepositioned to provide aid to affected residents, and for resources to be already positioned in nearby areas.

Other activities included in the NSTW celebration of PAGASA were the free planetarium show, telescoping sessions at the PAGASA Astronomical Observatory, and an open house of facilities in the QCSC-DOST agencies.

NRCP 83rd General Assembly

PAGASA was awarded as the most outstanding institution for Science and Technology Services in recognition of the agency's contribution in strengthening disaster preparedness and awareness among our people through the upgrading of its weather forecasting capabilities; thus, fortifying the reliability of its scientific endeavors.

Generously extending her services to critical socio-economic sectors, Ms. Juanillo continued to promote meteorology and to elevate it to a more scientific level that helps improve the Filipino people's appreciation of weather and climate hazard preparedness and awareness.

The awarding for outstanding institution and achievement award was given on 16 March 2016 during the National Research Council of the Philippines (NRCP) 83rd Annual General Membership Assembly and Scientific Conference at the Philippine International Convention Center (PICC).

City Mayors from different municipalities visited PAGASA for a briefing on weather and flood forecasting/warning and other weather-related information.

Gawad and Loyalty Awardees

Financial, Planning and Management Division (FPMD)

Administrative Division (AD)

Administrator's Office (AO)

Engineering and Technical Services Division (ETSD)

Climatological and Agrometeorological Division (CAD)

Research and Development and Training Division

Hydro-Meteorology Division (HMD)

Weather Division (WD)

PAGASA Regional Services Division (PRSD) – Northern Luzon

PAGASA Regional Services Division (PRSD) Southern Luzon

PAGASA Regional Services Division (PRSD) - Visayas

PAGASA Regional Services Division (PRSD) – Mindanao

PAGASA Regional Services Division (PRSD) – National Capital Region (NCR)

The Gawad Award for the support group is Ms. Evangeline B. Asis, for the Research and Development is Ms. Rosalina G. de Guzman and for Operations and Services is Mr. Renito B. Paciente. Mr. Paciente is also the overall PAGASA GAWAD award.

Innovation Award

The Weather Division (WD) and Hydro-Meteorology Division (HMD) won the Division presentations by interpreting the musical Broadway "The CATS"

HUMAN RESOURCE DEVELOPMENT

PAGASA continued to adhere to its mandate of employing a pool of highly qualified and globally-competitive and well-trained scientists, technical and administrative personnel, keeping in pace with emerging scientific and technological development and responding to the increasing demands for new and improved services.

Scholarship

The PAGASA Scholarship program aims to provide higher education and training opportunities to its staff. During the year, nine (9) personnel availed of the scholarship pursuing Master's Degree Program at the University of the Philippines including one (1) foreign fellows. 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. Likewise, five (5) personnel availed of the foreign assisted scholarship program while four (4) availed of the Philippine Australia Human Resource and Organization Development Facility (PAHRODF) with the goals to enhance human resource capabilities, create optimistic changes and improve delivery of services (www.pahrodf.org.ph). For 2016, three successful recipients of this scholarship completed their masteral degrees in one of the most prestigious universities in the world, The University of Sydney (www.sydney.edu.au), (picture below) and in addition one (1) is pursuing a Doctoral Degree Program at the University of Griffith while another one (1) at the Tokyo Metropolitan University.

Jorybell A. Masallo
Master of Environmental Science
(July 2015 – December 2016)
Assigned at Climate Monitoring and Prediction Section (CLIMPS/CAD)

Daizyree A. Baran
Master of Environmental Science
(July 2015 – December 2016)
Assigned at Cagayan de Oro, Mindanao PRSD

Netherlen C. Saletrero
Master of Environmental Science
(July 2015 – December 2016)
Assigned at Cebu, Visayas PRSD

During the farewell ceremony of more than 70 international students from 27 countries held at The Great Hall, The University of Sydney, Australia.

Capacity Building

To further enhance the skills and improve the capabilities of its personnel, PAGASA continued to implement its in-house training programs. Specialized training opportunities in various relevant fields are currently undertaken on an ad hoc basis, usually, under the auspices of the WMO Training program. In order to accelerate future staff training, PAGASA will initiate a new specialization training program in various fields such as computer-based modeling for weather and hydrological forecasting, interpretation and utilization of satellite atmospheric and geophysical imagery, and calibration and maintenance of meteorological and related instruments, including telecommunication to gain better understanding on the latest technological advances relevant to the field of specialization. For the year under review, 31 specialized in-house training courses (19 technical while 12 non-technical courses) were conducted by the agency for a total of 934 PAGASA participants. The following were the in-house training courses conducted by the agency in 2016:

1) Meteorologist Training Course	Oct. 20 -Sept 20, 2016	PAGASA Training Room	42
2) Training on Operation and Maintenance of Basic Meteorological Instruments for NCR	March 1-2, 2016	Doña Luz Beach Resort Barangay Binulasan, Infanta, Quezon	16
3) Training on Government Radio Operator Certification (GROC)	April 6, 2016	PAGASA Training Room	83
4) Training Course for Aeronautical Meteorology Forecasters	April 18 – 29 ,2016	PAGASA Training Room	19
5) Training for Operation and Maintenance of Basic Meteorological Instruments & PAGASA Unified Meteorological Information System (PUMIS) for Min-PRSD	April 19 – 20, 2016	Mallberry Suites Business Hotel, Robinson Mall, Limketkai Center, Cagayan de Oro	20
6) Rainfall Warning System (RWS) for Vis-PRSD	April 25 – 27, 2016	Montebello Villa Hotel, Banilad, Cebu City	25
7) Training/Seminar on El Niño, Cloud Seeding and other Mitigation Measures	April 27 , 2016	Bohol	45
8) Training for Operation and Maintenance of Basic Meteorological Instruments & PAGASA Unified Meteorological Information System (PUMIS) for Vis-PRSD	April 28 – 29, 2016	Montebello Villa Hotel, Banilad, Cebu City	23
9) Training Common Alerting Protocol (CAP) on a Map - “Improving Institutional Responsiveness to Coastal Hazards through Multi-Agency Situational Awareness	May 4, 2016	PAGASA Amihan Conference Room	23
10) Joint Seminar/Workshop on Marine Meteorological Services for Seafarers and Stakeholders	May 18, 2016	Philippine Coast Guard Headquarters, Port Area	39
11) Training/Seminar on El Niño, Cloud Seeding and Other Mitigation Measures	May 19, 2016	Cebu City	31
12) Training for Operation and Maintenance of Basic Meteorological Instruments & PAGASA Unified Meteotological Information System (PUMIS) for Northern Luzon-PRSD personnel	May 25 - 27, 2016	Valley Hotel, Alimannao Hills, Pinablanca, Cagayan	42
13) Training on Scaling-Up of PAGASA Storm Chasers Capacity for Tropical Cyclone Reconnaissance	June 13 – 17, 2016	PAGASA Training Room	22

14) Simulation and Testing of the Sahana Alerting and Messaging Broker (SAMBRO) System", Common Alerting Protocol (CAP) on a MAP: Improving Institutional Responsiveness to Coastal Hazards through Multi-Agency Situational Awareness	July 11-14	July 11 - WMO/RTC Training Room July 12 - PHILVOCS/OCD July 13 - ARMADA Hotel July 14 – Subic International Hotel	42
15) Training on the Localization of Climate Services and the Climate Resiliency Field Schools (CRFs)	July 18-22	PAGASA Training Room	12
16) Refresher on Rainfall Warning and Climate Workshop for SL-PRSD Personnel	Aug. 31-Sept. 2	LKY Resorts and Hotel, Inc. Taysan Hills, Sto Niño Village, Legaspi City	26
17) 11th Integrated Integrated Workshop - Improving Typhoon Impact-Based Forecasting and Warning	Oct. 24-28	Cebu City	91
18) Training on Rainfall Warning System and Climate Workshoop for NL-PRSD Personnel	Nov. 23-25	Hotel Roma cor. Luna and Bonifacio Streets, Tuguegarao City	37
19) Disaster Risk Reduction Management Training for PAGASA Employees	Nov. 21-25	PAGASA Training Room	30
NON-TECHNICAL COURSES			
20) Harmonized GAD Guidelines (HGDG) Assessment cum Workshop to Integrate Gender and Development (GAD) in Program Concept in Monitoring Report	January 28-29, 2016	PAGASA AO Conference Room	13
21) Gender Sensitivity Training for Northern Luzon and NCR PRSD	May 4-5, 2016	Hotel Salcedo de Vigan, Vigan City, Ilocos Sur	33
22) Re-Orientation and Values Orientation Workshop for Northern Luzon and NCR PRSD	May 31-June 1, 2016	Sol Y Viento Mountain Hot Spring and Resort, Pansol, Calamba, Laguna	22
23) Gender Sensitivity Training	June 20-21, 2016	PAGASA, Amihan Conference Room	26
24) Harmonized GAD Guidelines (HGDG) Mid-Year Assessment Workshop	August 15-2016	PAGASA Amihan Conference Room	15
25) Gender Sensitivity Training for Southern Luzon, Visayas and Mindanao PRSD	August 24-2016	St. Mark Hotel, Cebu City	26
26) Re-Orientation and Values Orientation Workshop for Southern Luzon, Visayas and Mindanao PRSD	September 5-8, 2016	The Royal Mandaya Hotel, Davao City	20
27) Gender Mainstreaming Evaluates Framework (GMEF) Workshop	September 30, 2016	PAGASA Amihan Conference Room	14
28) Re-Orientation and Values Orientation Workshop for Southern Luzon, Visayas and Mindanao PRSD	October 10-13, 2016	The Legend Palawan Hotel, Puerto Princesa, Palawan	33
29) Gender Sensitivity Training for Southern Luzon, Visayas and Mindanao PRSD	October 20-21, 2016	The Royal Mandala Hotel, Davao City	20
30) Orientation cum Values Orientation Workshop (New Entrants)	November 7-10, 2016	PAGASA Amihan Conference Room	28
31) Gender and Development (GAD) Planning and Budgeting (2016 AR Writeshop & 2018 GAD Plan and Budget)	November 28-29, 2016	PAGASA Amihan Conference Room	16
		TOTAL	934

CODAR Training

In line with the implementation of the project entitled "Marine forecasting using High Frequency Doppler Radar (HFDR), a training on Coastal Ocean Dynamics Applications Radar (CODAR) Basic Training Course was held at the Amihan Conference Room, PAGASA Central Office, Quezon City on 30-31 March from 9:00am to 5:00pm and on site hands-on Demo at NETC and Masinloc, Zambales on 01-03 April 2016.

Among the topics discussed were Seasonde/ CODAR Overview, Radar Site Selection , Seasonde Radial suite Software Overview-Applications data processing flow, Antenna Calibration Pattern Measurements (APM), Hardware overview – Receiver and Transmitter Electronics , Dome Antennas and Long Range Antennas, Setting up Transponder for Antenna Pattern Measurements – (Hands Demo (HD)), Basic transmitter and electronics troubleshooting, Basic Antenna troubleshooting HD, Diag Display and Diagnostics data discussion

On site hands demo highlights of the activities were the perform visual inspection of the antenna, cables and electronics, verify settings, hardware operations, checking the site infrastructure and local environment for any potential effect on antenna pattern position, checking the solar panels and power supply,

Breaking Barriers One GAD Activity at a time

"Gender roles, expectations and perceptions box women and men into situations that constrain their capacity to do and capacity to be, hindering, in turn, their potentials to attain a full and satisfying life." - Ms. Reina P. Olivar, PAGASA's GAD consultant mentioned in her GST lecture

Gender Sensitivity Training (GST) is one of the basic activities the PAGASA Gender and Development Focal Point System (GFPS) Technical Working Group (TWG) has been conducting. It started with the Philippine Commission on Women's (PCW) endorsement of the agency's 2015 GAD Plan and Budget.

The training focuses on defining the existing gender relations, differentiating genetic and socially learned behaviors, gender biases and gender roles that resulted in unequal relations between women and men. It also addresses obstacles of both sexes endure through implementing the said training. This develops insights and awareness specifically on women's human rights and women economic empowerment.

Last August 24-25, 2016 the GFPS-TWG flew to Cebu City to conduct two-day training. It is one of the GST Regional series for Visayas, Mindanao and Southern Luzon PAGASA Regional Services Divisions personnel. It was facilitated by Ms. Olivar, was held at St. Marks Hotel, Cebu City, with 5 female and 21 male employees participating.

The whole training became more relevant because the participants openly shared their personal experiences. The seminar was indeed breaking barriers for the PAGASA employees because this was their first time experiencing a training that is not only work-related but also significant to their day to day life as well.

"We have experienced gender biases and role assignations many times in the course of our lifetime but we came to know if such only through the training. More importantly, we can now better handle the issues when faced with the similar circumstances" one participant said.

Up to this year, PAGASA's GAD Plan and Accomplishment Reports have been endorsed by the PCW and are receiving continuing support by the PAGASA management and the Department of Science and Technology (DOST). More activities are being lined up in the PAGASA's GAD plan. It is hoped that more gender sensitive and responsive projects shall be conceptualized this year and onwards for the benefit of not just PAGASA employees but wide reaching as its clients.

Other Relevant Trainings

JPOW TRAINING

Government Radio Operator Certification (GROC), PAGASA-WMO Regional Training Center, 6 April 2016

Astrophotography Training

Training Course for Aeronautical Meteorology Forecaster held at PAGASA Regional Meteorological Training (RMT) Room on April 22, 2016

Training Course Operation and Maintenance of Basic Meteorological Instruments and PAGASA Unified Meteorological Information System (PUMIS) for MPRSD, Mallberry Suites Business Hotel Robinson Mall,Limketkai Center, Cagayan de Oro, April 19- 20, 2016

Training on Astrophotography for PAGASA personnel, PAGASA Regional Training Center on April 14-15, 2016.

Training for Operation and Maintenance of Basic Meteorological Instruments for NCR-PRSD

Training on Rainfall Warning System (RWS) and Climate Workshop for VRSD Cebu, April 25-27, 2016

Employees Orientation Seminar and Values Orientation Workshop (VOW)

Disaster Risk Reduction and Management (DRRM) Training for PAGASA employees held at WMO Regional Training Center, 2nd floor, PAGASA Central Office, Agham Road, Diliman, Quezon City on November 21-25, 2016.

Training/Workshop for Geomorphic Impact Modeling, Enhancing Greater Metro Manila's Institutional Capacities for Effective Disaster/ Climate Risk Management towards Sustainable Development Project, Cocoon Boutique Hotel, Quezon City, 10-11 March 2016

Professional Certificate Program in Archives and Records Management, UP School of Library and Information Studies, UP, Diliman Quezon City, 11 - 22 July 2016, Conducted by UPSLIS in partnership with the National Center for Culture and Arts (NCCA), with Ms. Rosalie A. Albacite, Administrative Officer III (4th from right)

SCIENTIFIC AND TECHNICAL LINKAGES AND COLLABORATION

Visit to Helzel GmbH's Headquarters and Factory in connection with the project entitled "Establishment (Supply, Redelivery, Installation, Commissioning and Training) of Initial Nationwide Network of High Frequency Radars and Remote Sensing Observation of Coastal Sea State" Hamburg, Germany on May 30-June 03, 2016

The agency continued to foster stronger cooperation and closer linkages, and broadened its network through collaboration with local and international organizations. It has organized and participated in various activities including scientific conferences in hydrometeorology and in disaster risk reduction. These activities helped enhance the technical and scientific knowledge of DOST-PAGASA personnel for the improvement of the agency's services to the public. During the preparation of the plan, proposals to strengthen 90% of existing linkages/partnership within the scientific community and establish new linkage/ partnership per year should be achieved through the following:

- Strengthening of collaboration with regional and global organizations;
- Enhancement of strong linkages and partnerships with local and international academe, institutions and advanced meteorological research centers for conduct of collaborative research;
- Bilateral and regional exchange programs,

The following were some of the linkages and collaboration undertaken by the PAGASA personnel:

PAGASA delegates with Thomas Helzel and his staff in one of the installed HFDRs in Sylt island

At the kind invitation of Mr. Thomas Helzel of WERA to visit Helzel Messtechnik GmbH's headquarters and factory located in Carl-Benz-Strasse 9, D-24568 Kaltenkirchen, Germany from May 30 – June 3, 2016, the PAGASA delegates, headed by Ms. Nancy T. Lance, Asst Weather Services Chief, visited Hamburg, Germany from May 30 to June 03, 2016, 2013 to discuss upcoming installations of WERA systems for the Philippine Nationwide Network of High Frequency Radars for Remote Sensing Observation of Coastal Sea-State and the current status, ongoing project planning and upcoming next installation steps and demonstration on capabilities of the system (the operational WERA) in the island of Sylt.

Technical Discussion and Factory Inspection at WERA, Kaltenkirchen

The factory inspection initially discussed through a presentation of the basic principle of High Frequency Doppler Radar propagation near the coastline. The discussion focused on the identification and provision of ocean current direction and wave height data for the four coastal areas identified in the project namely: Batangas sea lane, Dumaguete, Matnog and Surigao areas. The group tackled the requirement of storm surge identification and the inclusion of other critical areas named by local government units at the Dumaguete- Zaboangita junction.

The PAGASA delegates mentioned the requirement for the provision of a visualization software to be used by local government units which are interested in the monitoring of sea state in their areas. Mr. Helzel mentioned that the system is provided with a web server that can provide such information but only on a limited scope, meaning, a number of users shall be identified and shall be given access through a user account to be managed by PAGASA. The data viewer is also a web-base application with observed data processed and displayed between 10 to 25 minutes depending on the configuration.

Inspection was made on the first WERA HFDR equipment at the production area wherein materials for the modules and production method was discussed through an actual test procedure on the HFDR equipment with serial number 101. Method of testing was also discussed including demonstration of actual tests using a Spectrum Analyzer and Frequency counter.

Discussion also touched on the requirement for ship tracking wherein another algorithm or software is essential in order to comply with this need. This application particularly addresses the needs for Search and Rescue efforts, tracking of drifting containers, pollution drift such as oil drift and simulation and analysis of incident scenario. The use of this software for Coast Guard applications shall entail re-configuration of the equipment as well as operational frequencies since "echo" peaks are different for ocean dynamic requirements. It was suggested that a separate system be used for ship tracking.

Site Visit to an HFDR Installation at Sylt Island

Actual site visit was made at an HFDR station wherein inspection on the following items was made on the actual site condition of the station:

- Container van / housing condition
- Electrical power supply
- Communication antenna / equipment (lease line and VSAT)
- Indoor cooling system
- Indoor equipment rack
- Antenna cable run
- Transmitter antennas
- Phase Array Receiving antennas
- Cabling and termination

Aside from the discussion and factory visit, a meeting was held with the German BSH Federal Maritime and Hydrographic Agency www.bsh.de in Hamburg and the Helmholtz Centre for Materials and Coastal Research www.hzg.de in Geesthacht. They presented their profiles on services and programs, and current developments which are of interest to the PAGASA delegates.

Discussions were made for coastal observing systems and were presented by Dr. Jochen Horstmann and his colleagues. He specifically discussed on Marine Radar for Coastal Application in Germany as well as the Coastal Observing System for Northern Baltic Sea - COSYNA. He also discussed on the different observing systems currently being operated in Germany such as:

- Satellite Borne Synthetic Aperture Radar (SAR): Range - 500km (swath); Resolution of up to 1 meter; wind field - 300 meter
- High Frequency Radar: Range of up to 120 km; Resolution of 1.5 km; current, ship tracking (waves)
- Very High Frequency Radar: Range of up to 25 km; Resolution of 50 meter; current (wind)

- Marine Radar: Range of up to 4 km.; Resolution - 1.5 meter; Winds, waves, current and bathymetry

The coastal observing network provides information on different ocean dynamic parameters that range from significant wind speed and direction, significant wave height. Other Hydrographic parameters retrieved from marine radars are wave spectra, currents (RDCP), sea ice, winds (WiRAR), bathymetry, surface features. The other parameters measured are ocean temperature, salinity, oxygen content using wave gliders.

The discussions focused on the essential elements that a coastal observation network should have. For PAGASA, it was recommended that the most important ocean monitored parameters are those that involve early warning systems from waves and storm surges, current direction and velocity.

Moreover, a visit was made to the DLR station in Oberpfaffenhofen in Southern Germany www.dlr.de and conducted meeting with the company IBL Software Engineering in Bratislava, Slovak Republic, www.iblsoft.com which works with PAGASA on the WERA data integration into the national weather forecasts. IBL Software Engineering is a leading company in Meteorological IT services and software development. IBL has supplied systems in meteorological telecommunication, visualization software and pilot briefing software for many meteorological offices around the world, including UK Meteorological Office Deutcher Wetterclieng, NMIT Brazil, and Bureau of Meteorology Australia. The following were the result of the discussion with IBL:

Discussion on the feasibility of assimilating HFDR raw data on the PAGASA Forecaster's Workstation (Visual Weather) for wave forecasting and other ocean dynamic information to be used by the PAGASA Marine Forecasting Section. Other topics were Wave Model generation, storm tides alerting which will be incorporated into the Visual Weather Workstations.

Also discussed were the assimilation of other data sources such as lightning data into the Forecaster's Workstation. IBL, mentioned that other data sources can be assimilated into the Visual Weather but need to activate additional features in the Visual Weather since these were not included in the original contract. PAGASA shall study other parameters or features of the Forecaster's Workstation that need to be activated in line with the requirements of the PAGASA Forecasting Section for regional and local requirements.

A technical meeting was held at Nowcast, Munich on Lightning Detection System

Discussions were focused on the feasibility of incorporating or assimilating lightning data into the Visual Weather. The lightning data format is converted to three (3) primary formats which are: Text, ASCII and KML. This can also be exported to other applications. The lightning detection system has an effective range from 180 - 250 km with nanoseconds response accuracy. It has a 3kA peak current sensitivity at 180 km range wherein it sends data packet every 5 seconds at 16kbps minimum data rate.

8th International Cooperation Workshop 2016

The 8th International Cooperation Workshop 2016 was held in Jeju Island, Republic of Korea on November 9-11, aimed to share the international cooperation plan of each participating country and to maintain the strong relationship among the National Meteorological and Hydrological Services (NMHSs). The workshop was hosted by the KMA International Cooperation Division. Participating countries were Malaysia, Mongolia, Vietnam, Japan, Indonesia, Myanmar and the Philippines.

The workshop highlighted the importance of the need to strengthen international co-operation among Asian countries, specifically, on sharing of experiences such us technical knowhow, capacity building, operational procedures, to have an identified theme for each year, and to conduct with other Asian countries organizing and planning.

Acquiring the knowledge and experience on the approaches and strategy can be of great help in the improvement of PAGASA products and services.

The International Cooperation Program provided an avenue to the National Meteorological Centers to discuss the country's current issues or projects about national cooperation affairs, innovations, plans and initiatives including the implementation of existing bilateral and multilateral cooperation program. It promoted collaboration and mutual assistance of common interest. The KMA has been continuously rising in their status in the international community through strengthening of collaboration in the development of new meteorological technologies and sharing support with the neighboring developing countries.

Onsite-tours of other institutes of KMA, like the National Meteorological Sciences (NMS) and the National Typhoon Center (NTC), provided an overview on how they operate, specifically, the weather forecasting department which demonstrated their operations such as data transmission, and strategies implemented to obtain products. Tools and techniques for systematic approach using various models and operation and maintenance of instrument, to maintain optimum level of operational condition of the system, were thoroughly shared the experts.

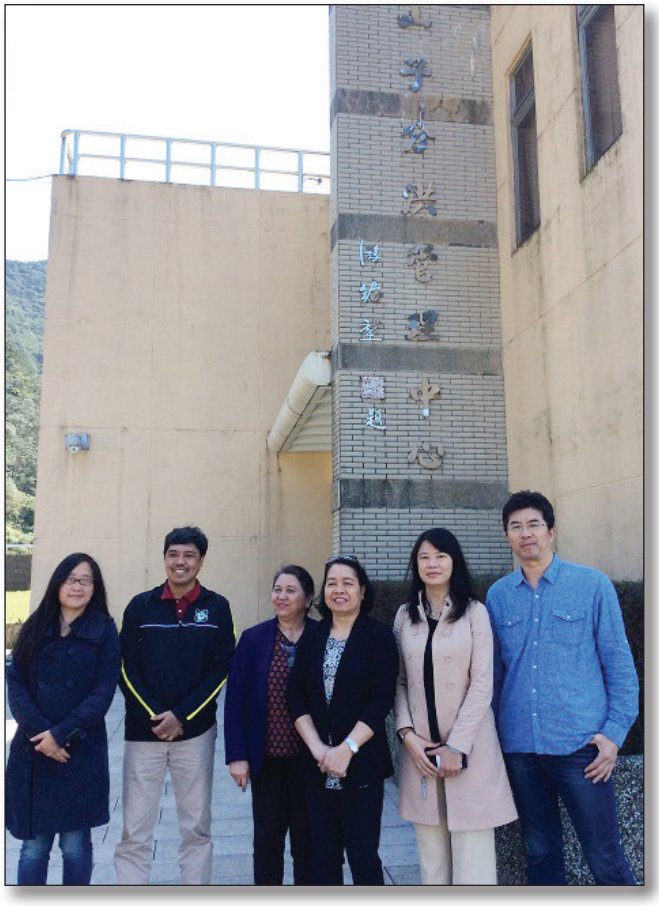
The delegates were able to establish linkages not only with KMA but with the other participating agencies for continuous and possible collaboration or joint projects in the future, data sharing as well as gaining information, experiences, practices and approaches being used by each country.

Other International Participations

Advanced Analytical Methods in Cosmology and High Energy Physics School (AIMHI), Chiang Mai, Thailand, 27 - 30 June 2016, with Ms. Ma. Rosario D. Ramos, Senior Weather Specialist (2nd row, 1st from left)

2016 International Conference on Landslide and Debris Flow Disasters (ICLDFD), KINTEX, Ilsan, Goyang, Gyeonggido, Republic of Korea, 16 – 18 November 2016, with Mr. Oskar D. Cruz, Senior Weather Specialist (2nd from left)

Fourth Meeting of the Intergovernmental Board on Climate Services Management Committee (IBCS-MC/4), Darmstadt, Germany, 17-19 October 2016, with Dr. Flaviana D. Hilario, Deputy Administrator for Research and Development (1st row, 6th from left)



1st Organizing Committee Meeting of the 2016 APEC Typhoon Symposium (APTS), Taipei, Taiwan, 1-4 March 2016, Ms. Lily of ACTS Taipei, Engr. Arnel R. Manoos, WFS III-ETSD; Ms. Edna L. Juanillo, OIC-CAD; Dr. Cynthia P. Celebre, Chief, RDTD and government officials of Taiwan Water Agency.

38th Session of the ASEAN Sub-Committee on Meteorology and Geophysics, Yangon, Myanmar, 29-31 August 2016, with Dr. Cynthia P. Celebre, Chief, Research & Development and Training Division, Ms. Ma. Elena V. Tan, Chief of Staff, Administrators Office, Dr. Renato U. Solidum, Jr., Director, PHIVOLCS, Dr. Flaviana D. Hilario, Deputy Administrator for Research and Development and Mr. Alex of ASEAN Secretariat. (from left to right)

Post Processing of Numerical Weather Outputs - the Philippines, Seoul City South Korea, 9-22 October 2016, with Mr. John A. Manalo, Ms. Teresa A. Millanes, Ms. Hannah Lorraine R. Salvador, Mr. Christian Mark S. Ison, Ms. Sheila Joy L. Go-oc, Ms. Mary May Victoria M. Calimoso, Ms. Shirley J. David, Mr. Victor B. Flores, Jr., Mr. Raymond C. Ordinario, Ms. Loriedin A. Dela Cruz, Ms. Analiza C. Clauren, Mr. Jose P. Frivaldo, Jr., Ms. Vhan Therese L. Singson, Ms. Vivian Gay C. Aggasid, Mr. John Mark I. Dolendo (from left to right)

Commission on Climatology Management Committee Meeting, Yerevan, Armenia, 6-8 September 2016, with Dr. Flaviana D. Hilario, Deputy Administrator for Research and Development (1st row, 2nd from left)

PAGASA Factory Acceptance Test for the Cray Inc. Supercomputer, Wisconsin, USA, 2-9 December 2016, with Ms. Shirley J. David, Officer-in- Charge, Numerical Modeling Section, RDTD, Dr. Cynthia P. Celebre, Chief, Research & Development and Training Division, and Engr. Arnel R. Manoos, Weather Facilities Specialist III, ETSD (from left to right)

APEC Climate Symposium 2016, Piura, Peru, 16-18 September 2016, Dr. Flaviana D. Hilario, Deputy Administrator for Research and Development, Ms. Edna L. Juanillo, Officer-in Charge, Climatology and Agrometeorology Division, and Dr. Cynthia P. Celebre, Chief, Research & Development and Training Division (5th from left to right)

Generated Resources

Monitoring and evaluation process was attained. Generated resources through the PAGASA's various initiatives resulted in the total amount of P 976,882,770.00. Broken down into: Foreign funding (KOICA, GOJ-JICA-TCP, WMO-VCP) amounting to P 969,248,970.00; and DOST-GIA P 7,633,800.00 Likewise, the Agency generated resources from its products and services such as customized climate information, weather certifications, astronomical publications, lectures and planetarium shows, solar radiation data/map and sunshine cards for a total amount of P 6,864,434.00.

Human Resource Management

The total work force of the Agency for the year was 1,012. This includes, 790 permanent, 65 part-time, 126 Job order/ contractual, 2 consultants and 29 JO project-based. The personnel complement for the regular employees are broken down into: 182 who work for administrative functions; 64 for research and development activities; 599 for Science and Technology Service (STS); and 10 engaged in Science and Technology Education and Training (STET) Program.

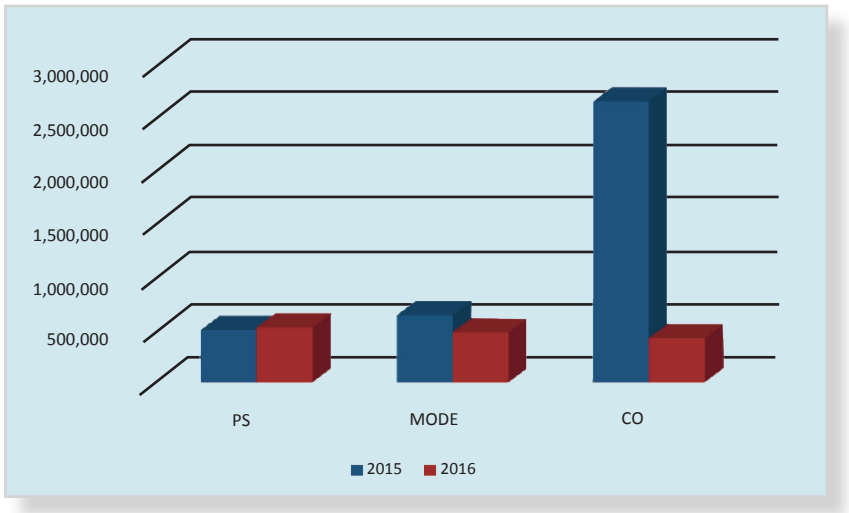
By level of education, 9 are with PhD degree, 69 with MS/MA degree, 498 with B.S. degree and 279 are below BS/BA.

Financial Position Profile

The agency's consolidated total resources as of December 2016, amounted to 1.408,520 Million lower than 63% for 2015 mainly due to capital outlay, specifically, the funds spent for the Mateo-Hydro Telecommunication Network to be established nationwide amounted to 1.8 Million. Moreover, funds for 2016 were focused on the Personnel Services Maintenance and Other Operating Expenses (MOOE).

COMPARATIVE EXPENSES
(In Thousand Pesos)

	2015	2016	%
PS	495,248	518,238	5%
MOOE	635,598	473,389	-26%
Regular	*437,564*	*454,424*	
Foreign-Aqssisted Projects (FAPs)	*197,101*	-	
Cloud Seeding Operations	*933*	*18,965*	
CO	2,651,853	416,893	-84%
Regular	*2,614,639*	*404,363*	
Locally-Funded Projects (LFPs)	*36,864*	*1,923*	
Cloud Seeding Operations	*350*	*10,607*	
TOTAL	**3,782,699**	**1,408,520**	**-63%**



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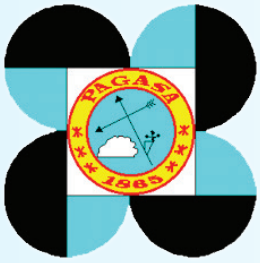

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