**NASA DEVELOP National Program**

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NOAA National Centers for Environmental Information

*Spring 2017*

**Short Title: Philippines Disasters**

**Subtitle:** Utilizing NASA and NOAA Earth Observations to Enhance the United Nation’s Office for the Coordination of Humanitarian Affairs in Storm Preparation and Disaster Relief Planning Methods in the Philippines

**VPS Title:** Eyes on the Storm: A Gender Vulnerability Analysis of Tropical Cyclone Impacts in the Philippines

**Project Team & Partners**

**Project Team:**

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**Advisors & Mentors:**

Dr. Carl Schreck (Cooperative Institute for Climate and Satellites-North Carolina, NOAA NCEI)

Dr. L. DeWayne Cecil (Global Science & Technology, NOAA NCEI)

**Partner Organizations:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Organization** | **POC (Name, Position/Title)** | **Partner Type** | **Boundary Org?** |
| United Nations Office for the Coordination of Humanitarian Affairs (OCHA) | Rowena Dacsig, Gender Advisor | End-User | No |
| United Nations Institute for Training and Research, Operational Satellite Applications Program (UNOSAT) | Rohini Swaminathan, UNITAR GIS Technical Expert | Collaborator | Yes |

**Project Details**

**Applied Sciences National Applications Addressed:** Disasters, Weather

**Study Area:** Philippines

**Study Period:** September 1982 – December 2016

**Earth Observations & Parameters:**

Shuttle Radar Topography Mission (SRTM)—DEM for use in risk analysis

NOAA Precipitation Estimation from Remotely Sensed Information Using Artificial Neural Networks, Climate Data Record (PERSIANN-CDR) – precipitation estimates

**Ancillary Datasets Utilized:**

* NCEI International Best Track Archive for Climate Stewardship (IBTrACS) – tropical cyclone climatology
* NCEI Global Historical Climatology Network – validation of satellite precipitation estimates
* Public/partner *in situ* data – OCHA-Philippines Population Demographic Data for cyclone hazards risk map

**Software Utilized:**

* ESRI ArcGIS – raster manipulation/analysis, map creation
* R – statistical comparisons
* Python – index calculation, statistical comparisons

**Project Overview**

**80-100 Word Objectives Overview:**

The Philippines and its surrounding area are threatened by tropical cyclones each year which often have the potential to cause mass destruction and population displacement. To further understand the threats introduced by these cyclones, this project aims to combine tropical cyclone tracking and intensity climatologies with population vulnerability statistics related to gender. Combining these statistics with other demographic data such as socioeconomic status, building and government response capabilities, and population distribution, will enable our partners to predict the areas of greatest vulnerability in future cyclones events.

**Abstract:**

A comprehensive understanding of where sensitive populations and demographics are threatened by natural hazards is necessary for the assessment and prevention of disasters. The island nation of the Philippines is often threatened by tropical cyclones, which have had disastrous consequences in the past (e.g., Tropical Cyclone (TC) Haiyan in 2013 claimed over 6,000 lives). This project aimed to assess areas of greatest disaster risk in the Philippines with a special focus on gender. Using a combination of archived tropical cyclone data from the International Best Track Archive for Climate Stewardship (IBTrACS) dataset, precipitation estimates from both the Global Precipitation Measurement Mission (GPM) and the Precipitation Estimation from Remotely Sense Information using Artificial Neural Networks Climate Data Record (PERSIANN-CDR), and population demographic data from the Philippines, this project aimed to determine where intense tropical cyclones are most prone to make landfall and what areas and populations are most sensitive to cyclone events of a given strength based on gender and socioeconomic status. These results will be used by the United Nations Office for the Coordination of Humanitarian Affairs (OCHA) to target areas of greatest need for further development in disaster response and mitigation techniques.

**Keywords:**

Tropical cyclones, gender vulnerability, population analysis, United Nations, OCHA, IBTrACS, PERSIANN

**Community Concerns**

* About 19 tropical cyclones enter the Philippine Sea each year, and an average of six to nine make landfall in the Philippines.
* Cyclones are common natural hazards in the Philippines, causing extensive societal consequences, such as population displacement, which can lead to serious health, social, and economic consequences.
* Due to the high risk of traumatic impacts, people of the Philippines seek to improve their ability to prepare for and recover from land-falling tropical cyclones.
* The category five tropical cyclone Typhoon Haiyan/Yolanda (November 2013) proved to be the deadliest storm to ever hit the Philippines, killing over 6,000 people.

**Current Management Practices & Policies**:

Currently, our partners utilize hazard information (e.g., threat maps) generated by the Nationwide Operational Assessment of Hazards (NOAH), an organization launched in 2012 by the Filipino Department of Science and Technology in response to President Aquino’s goal to implement a disaster prevention and mitigation program. Since its launch, the NOAH project has installed over 500 pieces of weather equipment, such as automated weather stations (AWS) and automated rain gauges (ARG). Despite these efforts, hazard management is not reaching all venerable populations. To address this issue, we are working with UN-OCHA to use additional datasets including tropical cyclone tracks, satellite derived precipitation estimates and various population statistics to focus on gender vulnerability.

**Decision Support Tools & Benefits:**

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| --- | --- | --- | --- |
| **End-Product** | **Earth Observations Used** | **Benefit & Impact** | **Software** **Release** |
| Philippines Cyclone Climatology Maps & Figures | IBTrACS archived tropical cyclone data/tracks, precipitation from PERSIANN-CDR, GPM | Climatology maps & figures will be used by UN-OCHA to better understand typical cyclone tracks, intensity, and impacts | N/A |
| Cyclone Hazards and Vulnerabilities Map | Satellite Radar Topography Mission SRTM | Vulnerability map used in decision making regarding the allocation of emergency management resources | N/A |