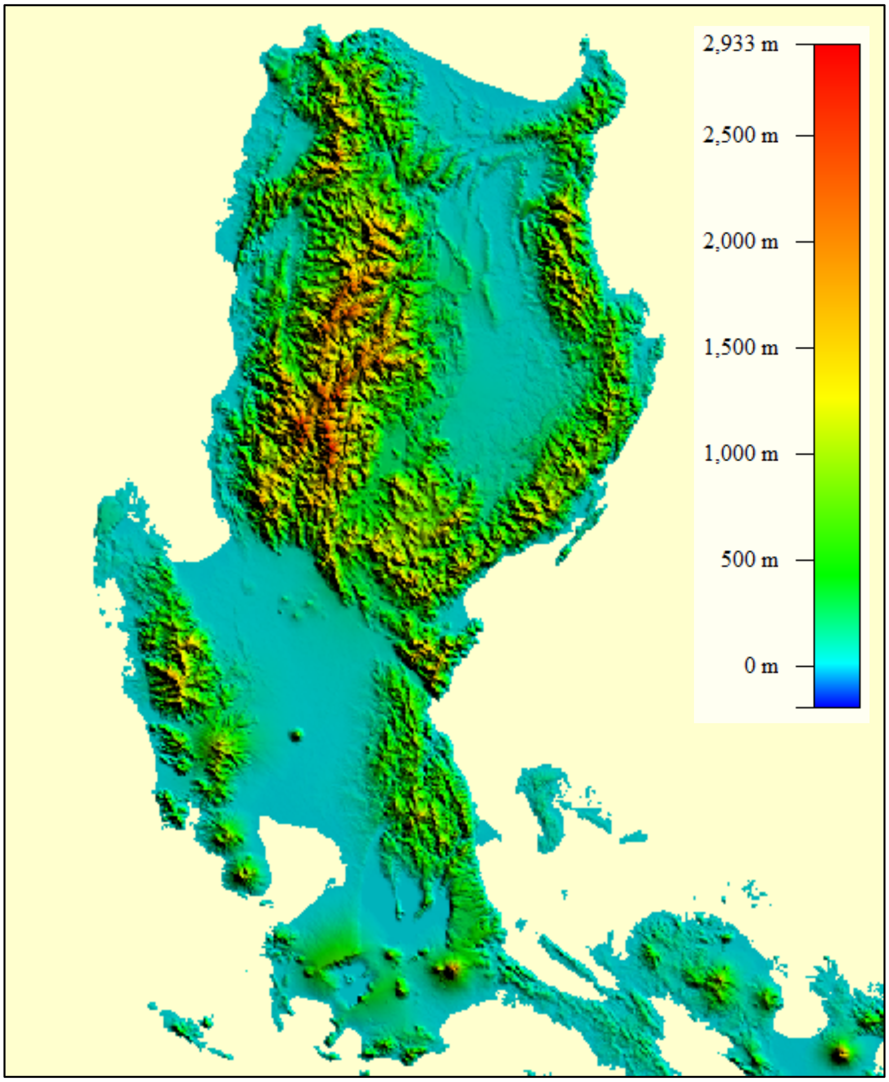
The following data were used to assess the areas damaged by Typhoon Lando and areas that can still be replanted. GIS and remote sensing were also used as major tools in the processing of data.

(1) Extent and depth of flooding were estimated using

  a. Rainfall intensity, amount and duration of Typhoon Lando using PAGASA data and data from remote sensing particularly from IMERG (Integrated Multi-satellitE Retrievals for Global Precipitation Measurement (GPM) Microwave Imager (GMI)). IMERG is a free remotely sensed data. Fig 3. Shows the hourly rainfall intensities of typhoon lando. Rainfall intensities will give us an idea how much rainfall is being poured by typhoon per hour. High rainfall intensity has high probability of flooding to lower areas. We can see on this map which areas has higher rainfall intensity and is more prone to flooding. We can see also the extent of rainfall and intensities from this map. Fig 4. Shows the amount of rainfall for 24 hours during typhoon lando. These data are inputs to flood models to determine the extent and depth of flooding.
  b. Topography and drainage network using Global Digital Elevation Model Version 2 (GDEM V2) from the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) of The Ministry of Economy, Trade, and Industry (METI) of Japan and the United States National Aeronautics and Space Administration (NASA). GDEM V2 is a free remotely sensed data. Fig.1 shows the digital elevation model of the Philippines. This map will give us an idea which areas are mountainous and relatively flat which are prone to flooding. Most of the production areas of rice and corn are located in lower elevation and are vulnerable to flooding, the rainfall from areas with higher elevation will move down to areas with lower elevation and adds up to the accumulated rainfall of lower elevation making that area flooded. this will also be an input to flood modeling
  c. Flood modeling.

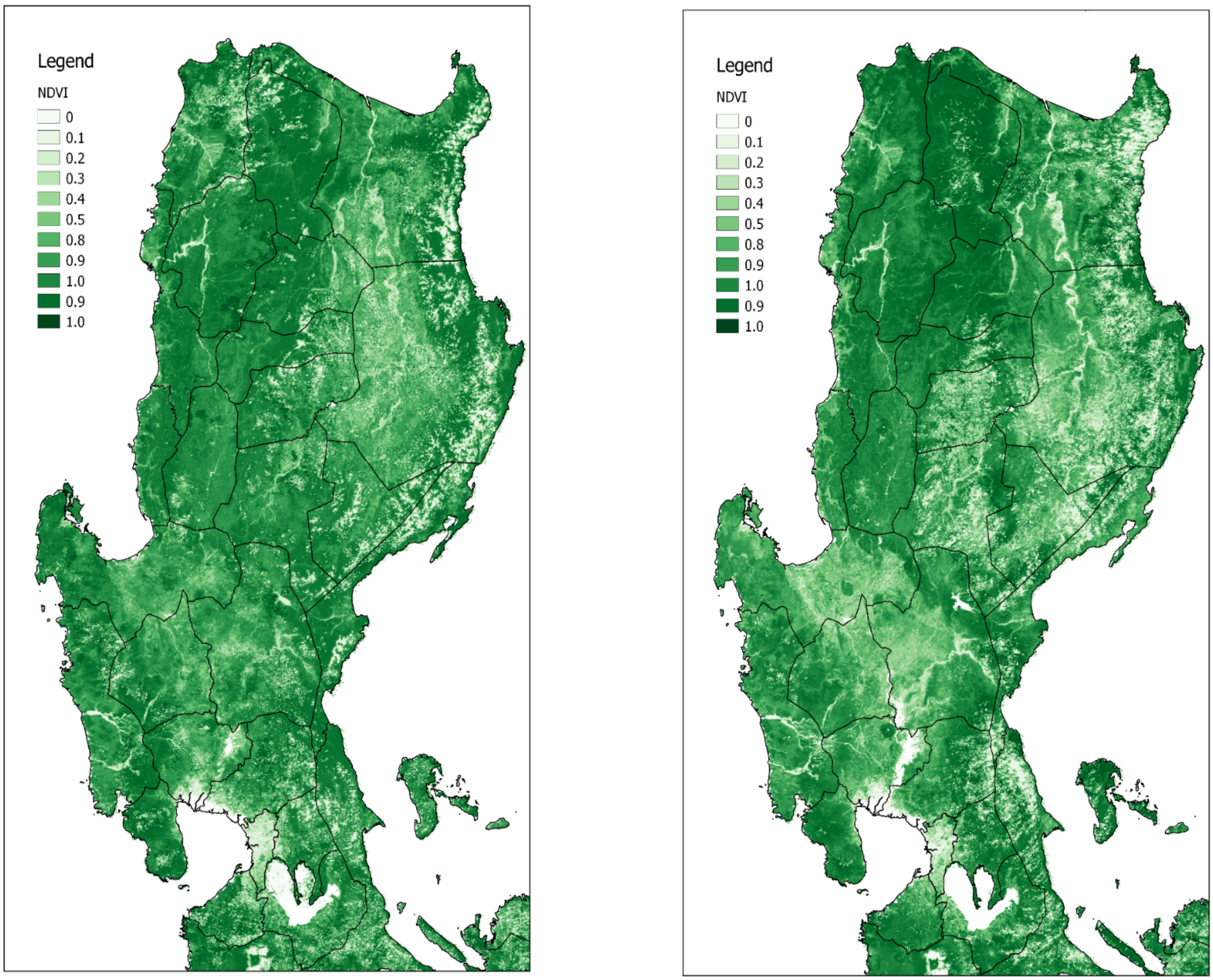
2. Identification of areas with standing crops and their growth stages were done using MODIS NDVI (MODerate-resolution Imaging Spectroradiometer Normalized Difference Vegetation Index), also a free remotely sensed data. NDVI maps shows areas with vegetation and NDVI values gives us an idea of the health status of the vegetation. Fig 2 shows the NDVI map of the Philippines before and after typhoon lando. The changed in NDVI value which is manifested by the changed in color of the map is due to typhoon lando. The changed in NDVI values were calculated and the damaged production areas of rice and corn were determined. Table 1 shows the summary of the damaged production areas of rice and corn and the damaged areas which can be replanted.

Fig 1



Digital elevation model (DEM).

Fig 2

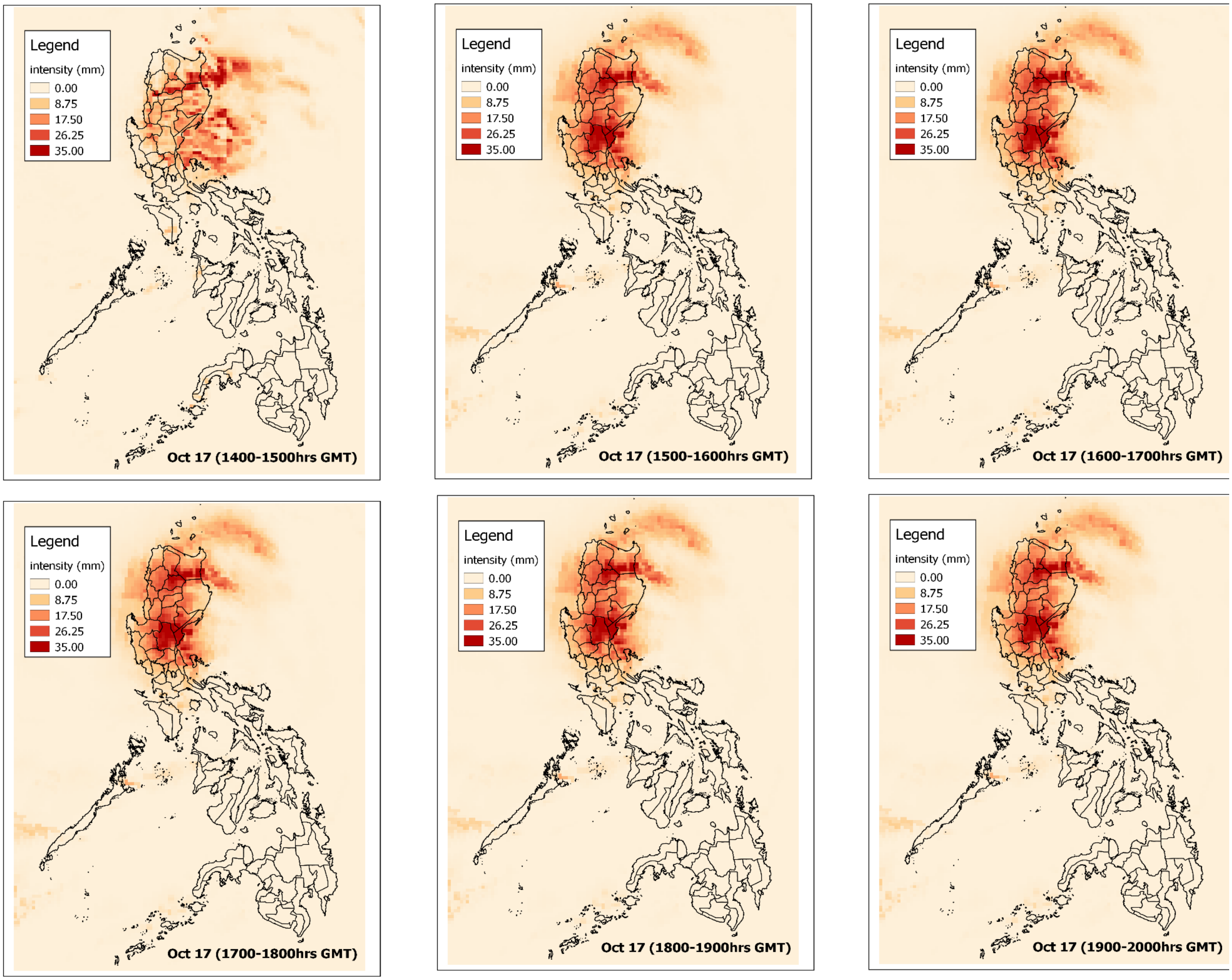


NDVI before Typhoon

NDVI after Typhoon Lando.

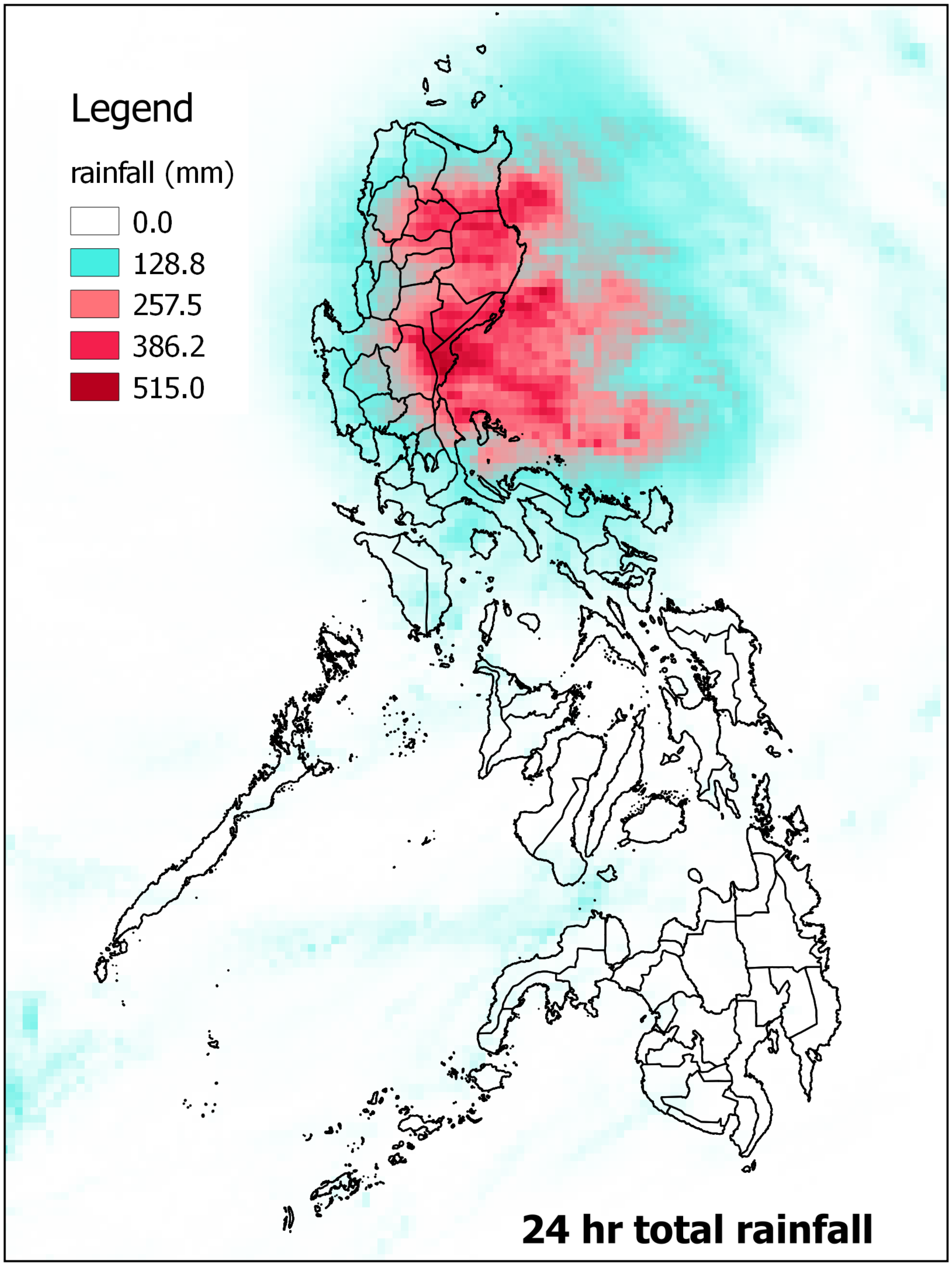
NDVI before and after Typhoon Lando. (*Source*: *MODIS*)

Fig 3



Hourly rainfall intensities of Typhoon Lando from Oct 17 1400-2000 hrs

Fig 4



Total 24 hr rainfall for Typhoon Lando. (*Source: IMERG*)

Table 1

The table below is the initial damage assessment of Project SARAI.

PROVINCE	DAMAGED AREAS (Ha)		DAMAGED AREAS that can be replanted (Ha)	
	Rice	Corn	Rice	Corn
CAR	572	1,136	549	1,036
Abra	10	4	10	4
Apayao	428	142	411	128
Benguet	18	0	17	0
Ifugao	43	512	40	461
Kalinga	48	328	47	305
Mountain Province	25	150	24	139
ILOCOS REGION	58,419	1,737	55,604	1,585
Ilocos Norte	1,649	227	1,599	205
Ilocos Sur	398	260	382	242
La Union	6,873	75	6,598	70
Pangasinan	49,500	1,174	47,025	1,069
CAGAYAN VALLEY	33,571	9,377	32,208	8,607
Batanes		2		
Cagayan	3,082	2,193	2,958	1,996
Isabela	25,942	6,049	24,904	5,565
Nueva Vizcaya	2,026	365	1,925	340
Quirino	2,522	768	2,421	706
CENTRAL LUZON	199,973	892	191,112	804
Aurora	2,560	78	2,406	71
Bataan	5,770	26	5,481	24
Bulacan	19,774	1	18,587	1
Nueva Ecija	123,122	54	118,197	50
Pampanga	12,983	242	12,463	218
Tarlac	32,610	484	30,979	436
Zambales	3,156	6	2,998	6
CALABARZON	2,806	374	2,689	334
Batangas	83	37	79	33
Cavite	125	12	121	11
Laguna	1,087	9	1,044	8
Quezon	592	312	563	281
Rizal	919	3	882	
TOTAL	295,341	13,515	282,162	12,366