Forest Cover Map 2015

Capacity Development Project for Operationalization of PNG Forest Resource Information Management System (PNG-FRIMS) for Addressing Climate Change

1. Introduction

A forest cover map is an important source of information about the current status of forest areas, that if updated regularly, becomes an effective tool in sustainable forest management and monitoring in Papua New Guinea (PNG). Although the national report of PNG on Forest Reference Level (FRL) is based on the analysis of the Collect Earth system, the forest cover maps in 2015 and subsequent years are still useful for the verification of the Forest Reference Level (FRL) Report and the development of relevant road map to progress REDD+ in PNG.

On the assumption that the forest cover map will be updated at five-year intervals, a method for updating forest cover maps was developed with the consideration of giving consistency to a series of maps. It is based on creating past forest cover maps and of constructing and integrating deforestation and forest degradation (DD) information into forest cover maps.

During this operation, the Forest Cover Map 2015 was created from the Forest Base Map 2012, based on forest degradation and forest cover gain. The Forest Monitoring Unit (FMU) was revised for the areas of Large-scale forest loss (Hansen loss greater than 20 hectares) after 2011, which was then applied to Land Use, Land Use Change and Forestry (LULUCF). For the areas of smaller scale forest loss (Hansen loss smaller than or equal to 20 hectares) after 2011, the FMU was revised only when the extension of the area of degraded strata was confirmed on the satellite imagery. Other minor forest loss information were added to the map as disturbance and the areas that contained obvious forest recovery were revised referring to Hansen gain data larger than 1 hectare.

2. Method

The procedure consisted of two parts:

1. Constructing DD information, in which the deforestation and forest degradation drivers information were identified for each map polygon (FMU) and;

2. Detecting land use/cover change area, in which changes in the land use areas were identified.

Data Preparation

Listed below are the datasets that were used during the process of creating the Forest Cover Map 2015, along with their respective sources from which these datasets were acquired.

Table 1: The datasets used for constructing Forest Degradation Information

Layer (Dataset)		Source
Forest Base Map		Developed by the Project[1]
Hansen Lossyear		Developed by the Project
LANDSAT AGP		Developed by the Project
RapidEye 2011		Procured by Grant Aid Program[2]
Google Earth Satellite Imagery		Google Earth
Reference data necessary for identifying drivers:	Mining	Mineral Resource Authority (MRA)
	Forest plantation (Qf) polygon in the Forest Base Map	Developed by the Project
	Plantation other than forest plantation (Qa) polygon in the Forest Base Map	Developed by the Project
	FCA and SABL polygon	Acquired from PNGFA
	Subsistence agriculture (O) in the Forest Base Map	Developed by the Project
	500m buffer from logging road (2000, 2000-2005, 2005-2011, 2011-2015)	Developed by the Project
	Concession (Current and Expired, purchase before 2014)	Acquired from PNGFA
	5 km buffer Census Unit	Developed by the Project
	Hansen Gain	Developed by the Project
	FireWatch PNG	University of Papua New Guinea Remote Sensing Centre

[1] Capacity Development Project for Operationalization of PNG Forest Resource Information Management System (PNG-FRIMS) for Addressing Climate Change.

[2] "The Forest Preservation Programme in the Independent State of Papua New Guinea" funded by the Government of Japan (2012 – 2013).

Procedure

Constructing Forest Degradation (DD) Information

1. Identify drivers of large Hansen Loss-year polygons (greater than 20 hectares)

In this step, the Hansen Loss-year polygons larger than 20 hectares for the targeted year of 2011-2014 are selected. The driver for each Hansen Loss-year polygon on the bases of the flow right (see Figure 1) was identified.

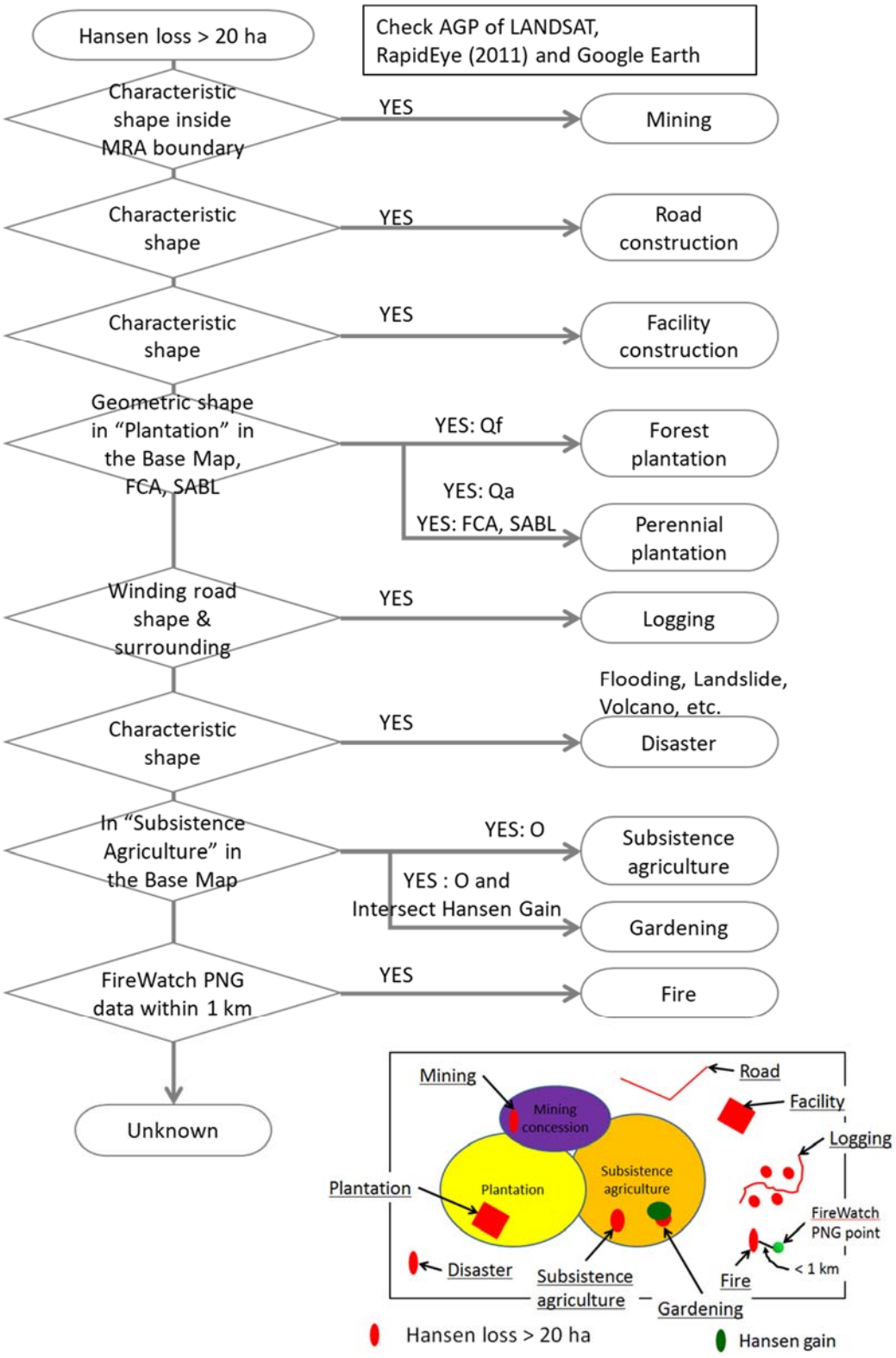

Figure 1: Flow of Driver analysis for Hansen loss-year polygons larger than 20 ha.

2. Identify drivers of small Hansen Loss-year Polygon (smaller than or equal to 20 hectares)

This next step involved the selection of; (I) Hansen Loss-year polygons smaller than or equal to 20 hectares for targeted years 2011-2014, and (II) the identified drivers for each Hansen Loss-year polygon, on the flow right (see Figure 2) by overlaying analysis with reference data.

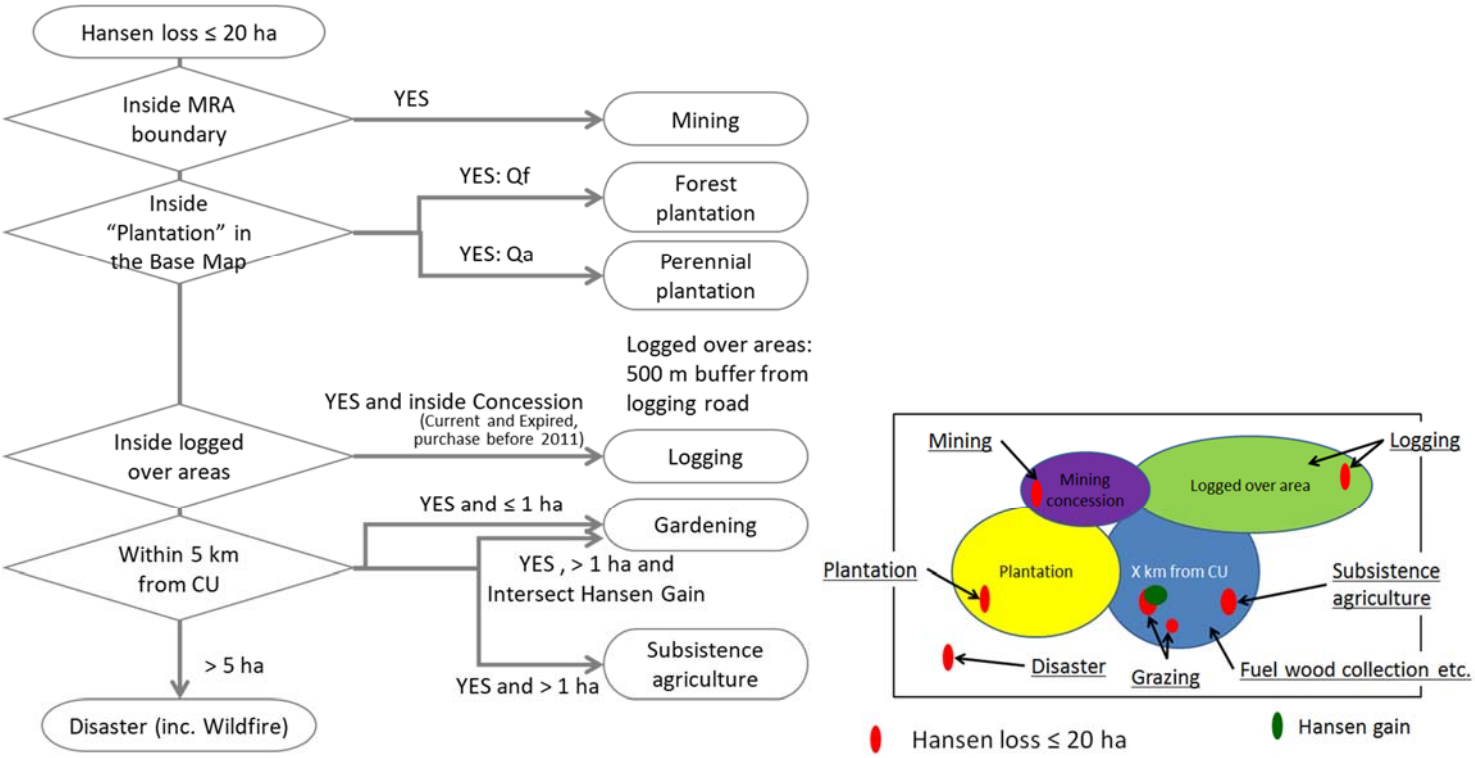

Figure 2: Flow of Driver analysis for Hansen loss-year polygons 20 ha and smaller.

3. Merging

This step involved the merging of the mapping files created in the steps 1 and 2.

4. Input driver information

This step involved integrating DD information for each FMU of the Forest Base Map by overlaying Loss-year polygons prepared in step 3.

5. FMU which do not intersect Hansen Loss polygon

This step involved identifying the drivers for each FMU on the basis of flow right (see Figure 3) by overlay analysis with reference data. FMU with no driver information were considered as intact forest.

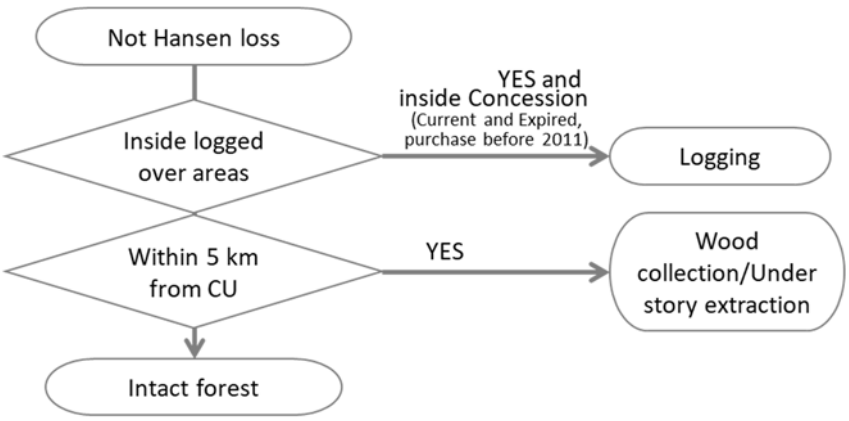

Figure 3: Flow of Driver analysis for Map polygons which do not intersect Hansen loss

Detecting Land Use/Cover Change area

This particular process revised the area of Large-scale forest loss and area expansion after 2011. This was done by selecting Hansen Loss polygons (2011-2014) larger than 20 hectares that had expanded after 2011. For the Loss-year polygons, the changed areas (polygons) were cut, and identified as new landuse by referring to satellite imagery and reference data.

With regard to areas with obvious forest recovery, the changes were revised by referring to the Hansen Gain polygons that are larger than 1 hecatares, and satellite imagery.

3. Results

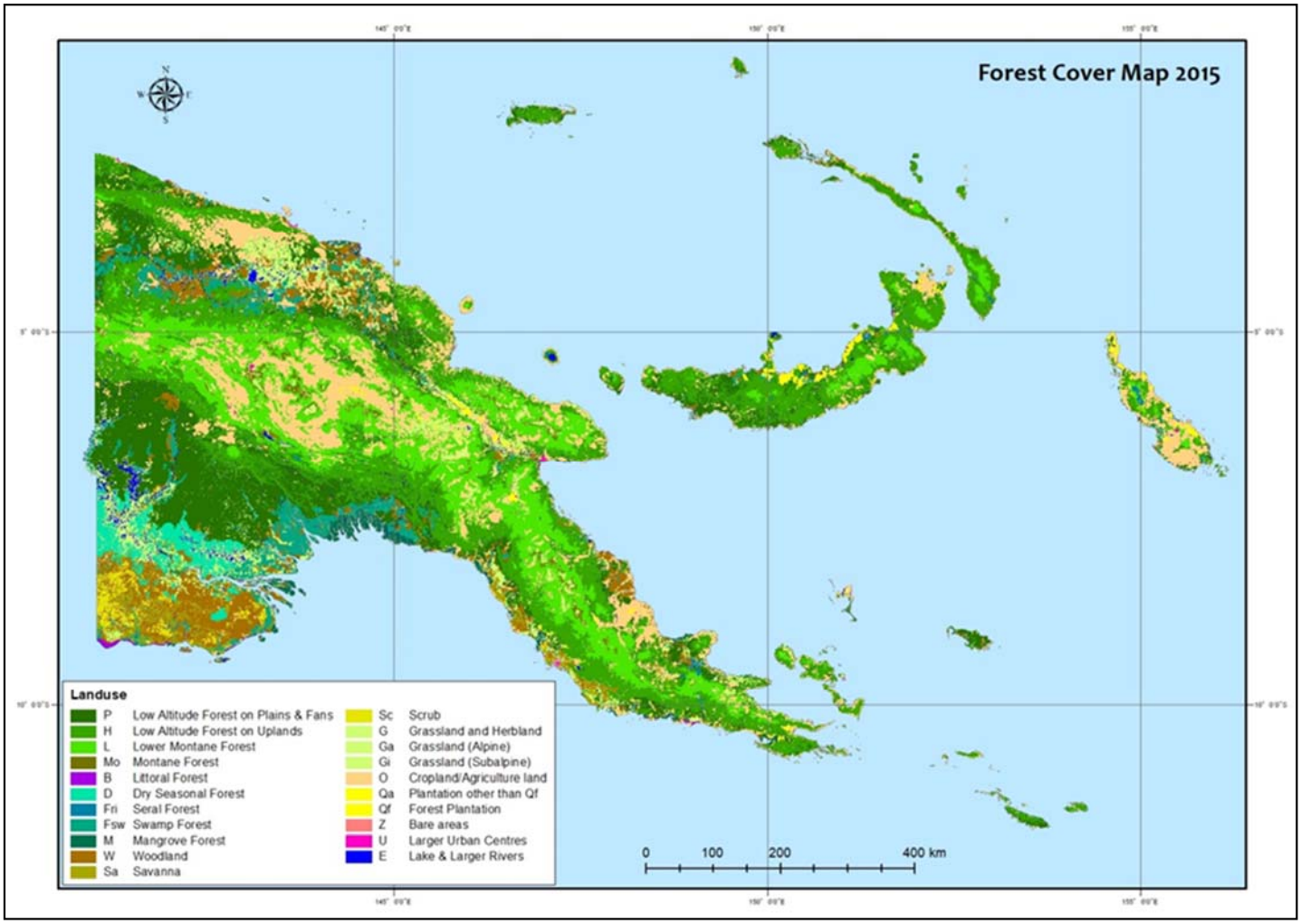

Figure 4: Forest Cover Map 2015 showing different landuse.

VEG	VEGNAME	Area (Ha)
P	Low Altitude Forest on Plains & Fans	8,133,318
H	Low Altitude Forest on Uplands	11,603,863
L	Lower Montane Forest	7,465,348
Mo	Montane Forest	354,495
D	Dry Seasonal Forest	935,207
B	Littoral Forest	66,616
Fri	Seral Forest	147,631
Fsw	Swamp Forest	1,989,886
M	Mangrove Forest	518,964
W	Woodland	2,989,010
Sa	Savanna	635,125
Sc	Scrub	391,709
G	Grassland and Herbland	3,005,981
Ga	Grassland (Alpine)	107,065
Gi	Grassland (Subalpine)	86,977
O	Cropland/Agriculture land	6,577,558
Qa	Plantation other than Qf	422,484
Qf	Forest Plantation	67,951
Z	Bare areas	24,151
U	Larger Urban Centres	38,332
E	Lake & Larger Rivers	599,488
	SUM	46,161,159

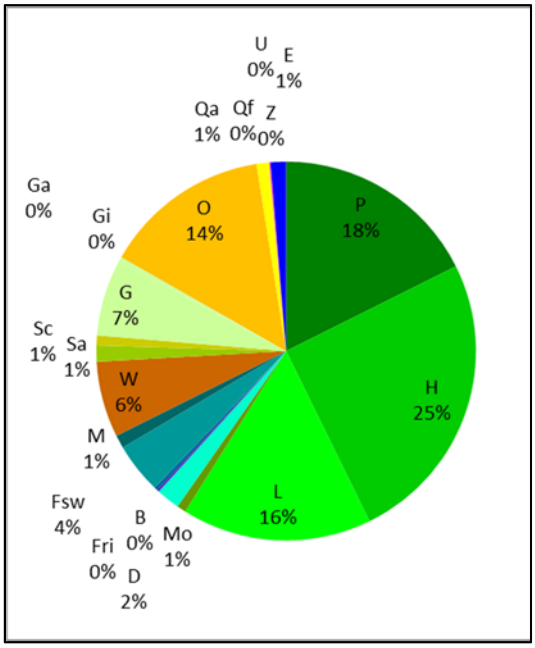

Figure 5: The vegetation cover with their corresponding area in hectares for the Forest Cover Map 2015.

4. Discussion

- The Forest Cover Map with Forest Degradation information has been updated for entire PNG, so that possible misclassification due to technical limitations in the Forest Base Map could be revised.
- Technical and operational findings from this trial and error work will be considered as a great help in the monitoring of forest resource for the future.
- Future forest cover maps should be updated on the basis of this method, but also by innovating new technologies.

5. Conclusion

Forest cover maps are very essential in forest monitoring and planning. The forest cover maps from subsequent years and 2015 have significantly aided in climate change control and has also paved a dynamic path for REDD+. Thus, it is very important that forest cover maps should be updated (upon assumption to be updated every five years) to keep track of changes in forest resources and related information in Papua New Guinea.

6. References

JICA and PNGFA, 2016, 'Papua New Guinea Forest Base Map 2012 - JICA-PNGFA Forestry Project 2014-2019 Fact Sheet No.2'. Papua New Guinea Forest Authority, Port Moresby, Papua New Guinea

JICA and PNGFA, 2019, 'Forest Monitoring Unit (FMU) in Papua New Guinea Forest Cover Map - JICA-PNGFA Forestry Project 2014-2019 Fact Sheet No.4'. Papua New Guinea Forest Authority, Port Moresby, Papua New Guinea

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Last updated on July. 2019