Assessment of the forest cover and the deforestation rate in Suriname

Foundation for Forest Management and Production Control, November 2015

1. History (before 2012)

Before 2012, estimates on the forest cover were based on the *Preliminary vegetation map* produced by Celos in 1998. The forest cover was estimated to be 14.8 million ha. At this moment there was no unit in Suriname in charge of measuring the forest cover and monitoring the deforestation rate.

For reporting (e.g. for the Forest Resource Assessment of FAO), numbers based on scientific publications were used. Two publications estimate the annual deforestation:

- 4200 to 5380 ha per year (Becker et al 1999)
- 4800 to 9600 ha per year- based on small-scale gold mining and field expertise (Peterson and Heemskerk, 2001)

2. Period between 2012-2015

Background information

In 2012 the ACTO-project: "Monitoring deforestation, logging and land use change in the Pan Amazonian Forest" started. This project helps countries to strengthen their capacities to monitor the forest cover using satellite images in order to provide updated information.

In March 2012 a training took place in CRA/INPE in Belem, Brazil where we learnt about the methodology used by INPE to monitor the Brazilian deforestation on an annual basis with open source software and freely available Landsat images.

In June 2012, first steps were taken to establish the Forest Cover Monitoring Unit, based at the Foundation for Forest Management and Production Control, which became operational from September 2012 onwards, and was officially inaugurated by the Minister of RGB in September 2013.

During the first regional encounter of observation rooms in Lima, October 2012, it was agreed that two regional maps would be produced: a base map for 2000 and a deforestation map for 2009. Unlike the other countries that had a well-established methodology for forest cover monitoring, Suriname had to start from scratch. The maps had to be finished by the beginning of 2013.

In 2013, the ACTO project was extended for another four years with financing from the Brazilian Development Bank (BNDES). Its actual name is: "Monitoring the forest cover in the Amazon region". Most operational costs of the FCMU (or Observation Room) are compensated by this project. During the second regional encounter of observation rooms in Paramaribo, October 2013, it was agreed that a third regional map would be produced, showing the deforestation for the period 2009-2013. The input for this map was finished by January 2015.

Methodology used: to produce those maps, Suriname used Landsat images (Landsat 5 and 7) and a methodology comparable to the methodology used by Inpe. We choose to include following classes: forest, non-forest, clouds, hydrography, shifting cultivation and deforestation. As a forest definition we used the UNFCC definition, using following thresholds: minimum surface: 1 ha, minimum tree crown

cover: 30%, minimum tree height: 5m. Shifting cultivation can be perceived as a sustainable use of the forest, therefore while reporting regionally it was included in the forest-class. For national purposes, it remains a separate class which will allow us to migrate it, or further sub classify it, if needed.

Also secondary forest was included in the "forest class", this was not yet subclassified as a separate class during these first sessions.
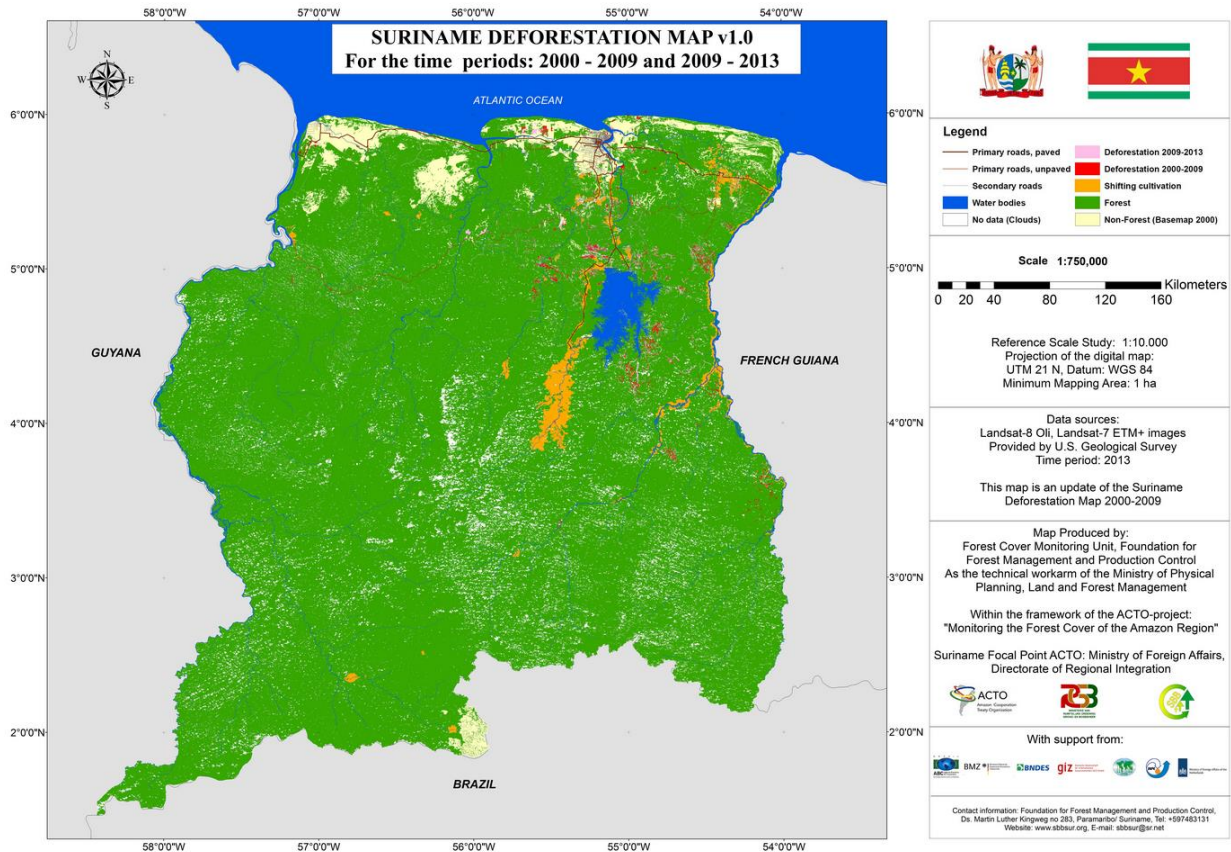
After finishing the deforestation maps in 2013, we invested lots of time in capacity building and the formulation of the National Plan for Forest Cover Monitoring. This plan shows the planning between 2014 and 2018, and is currently carried out by the FCMU.

(http://sbbsur.com/wp-content/uploads/2015/06/Forest_Cover_Monitoring_Plan_FCMP_Suriname.pdf)

Another study that was recently carried out, was a regional study within the ONFi-project "REDD+ for the Guiana Shield" to assess the impact of gold mining on the forest cover and the freshwater. The methodology used is scientifically solid and can be used as a basis for further monitoring of this important driver of deforestation. A link to the report of the gold mining study can be found here: https://reddguianashield.files.wordpress.com/2015/09/gold_mining_final_report_site.pdf

During this study following numbers were found:

Total area deforested by gold mining: 53668.9 ha (0.33% of the total territory). The accuracy of this number (verified by a third party) is 90.4%. Because they have been verified by a third party, these numbers are official numbers.

Calculations of the preliminary numbers of total forest cover and deforestation

Because no third party review has yet been finalized for the deforestation maps, the numbers that are published are still only preliminary.

The original data that we extracted from the maps for 2000 and 2009:

National class	Area (1000 hectares)	
	2000	**2009**
Forest	15054.874	14811.520
Clouds	175.824	361.978
Non-forest	667.464	666.354
Shifting cultivation	167.373	189.629
Inland water bodies	0.000	29.763
Land acquisition (between 2000-2009)	0.000	11.645
Inland water bodies	316.465	316.465
Total forest cover	**15222.247**	**15001.149**
Total land area	**16065.535**	**16070.889**
Total country area	**16382.000**	**16387.354**

The reason why the total country area is varying, is because the coastline of Suriname is very dynamic. In the future we will exclude it from this reporting. Therefore we are currently carrying out a baseline study (in collaboration with the Anton De Kom University) to assess the minimal coastline. Using this line as the northern boundary will allow us to always report for exactly the same area.

Additionally it should be mentioned that for the NFMS it is critical that we get a shapefile with the official country's borders approved by the commission in charge of the determination of these borders. This shapefile has been requested formally by the SBB to the MI-GLIS, but no response was received yet.

To report on forest cover and deforestation, classes were merged, while the no-data cloud class was incorporated by assuming an equal distribution of clouds over the country. Beside this, the country area and inland water bodies area need to correspond with the official numbers. The following table shows the result as reported for FRA 2015:

Categories	Area (000 hectares)					
	1990	**2000**	**2005**	**2009**	**2010**	**2015**
Forest	15430	15391	15371	15355	15351	15332
Other wooded land	n.a.	n.a.	n.a.		n.a.	n.a.
other land	636	675	694	710	714	734
… of which with the tree cover	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

| Inland water bodies | 316 | 316 | 316 | 316 | 316 | 316 |
| **Total** | **16382** | **16382** | **16382** | **16382** | **16382** | **16382** |

For the 2013 map, this detailed calculation still needs to be carried out, because the FRA 2015 was compiled before this data was available.

Overall the preliminary annual deforestation found for the different years is:

Period	Preliminary total deforestation	Preliminary annual deforestation	Deforestation rate (% of total forest cover)
2000-2009	30459 ha	3384 ha	0.02%
2009-2013	38367 ha	9591 ha	0.06%

Subtracting non-forest 2000 from the area impacted by gold mining, we come to the estimation that ca. 73% of the total deforestation is caused by gold mining.

Due to the small deforestation rates, the percentage of the country covered with forest has remained constant at 94%. As mentioned before, this number include shifting cultivation and secondary forest.

3. Current situation and next steps

Update of deforestation map

Based on the lessons learnt, the capacity built and the research done throughout the last three years, we decided to improve our protocol for the generation of deforestation maps. Even though in our national plan, we indicated that we will only monitor every 2 years, recently it was regionally decided to produce a deforestation map on a year basis. Currently we are preparing the deforestation map 2013-2014, and the deforestation map 2014-2015 will be generated subsequently. The originally used protocol is adjusted were needed, focusing on a more efficient, repeatable and transparent approach. With this protocol the FCMU will develop the forest cover map for 2014, which will have a very limited number of clouds. The idea is, that this map will serve as a basis for the forest mask, and to assure consistency, adjustments might be needed on the previously generated maps. After finalizing this process, we need to find funding to carry out the third party review or an independent person (who did not participate on the map generation) within our team can carry out this review. The protocol for this review was formulated in collaboration with ONFi and our team. We plan to publish a scientifically solid report with the official numbers throughout 2016.

An important step in this process it to come to an approved definition of "forest". Therefore we need funding to do the stakeholder consultation. This needs to be done in a close collaboration with the REDD+-office

Assessment of drivers of deforestation

An assessment of the deforestation caused by gold mining has been done and a solid basis has been established for further monitoring. We need to agree nationally how often we want to monitor this driver, ideally it becomes part of our annual deforestation monitoring. The availability of high resolution images is hereby crucial, but the Sentinel-2 imagery (10m spatial resolution) which will be freely available might solve this in the near future.

Currently we are also assessing infrastructure of 2014, based on the available satellite images. Within a few months we will publish a report on this driver.

Additionally within the ACTO-project, it has also been decided that beside the forest/ non-forest maps, also more detailed maps need to be produced. By 2016 regional maps for 2000, 2010, 2013 and 2014 showing the land cover classes beside the deforestation will be produced. We still need to develop a detailed protocol on how to implement this nationally.

Nevertheless to do this in a significant way, the institutional relations need to be further strengthened, because this exercise will require a more thorough knowledge on socio-economic processes. The preparations to this could be supported by the REDD+-office.