

Factsheet: Vol. 14

Solomon islands road network data 2021

The Project on Capacity Development for
Sustainable Forest Resource Management in Solomon Islands

[Overview]

Solomon Islands depends very much on the forest. By far forest becomes one of the biggest income generators for the country. Moreover, most people equally rely on forests for their livelihood. However, people's dependence and inadequate forest governance have caused deforestation to a level that is not sustainable. Commercial logging operations, for instance, have been one of the major causes of deforestation. And as the population increases, it also demands more forest resources consumption as well. The road network in forest area strongly reflects logging activities. Therefore, this data is essential for forest monitoring: it shows the road network in 2021.

[Method]

Step1 Preparation Generate Cloud-free image of 2021

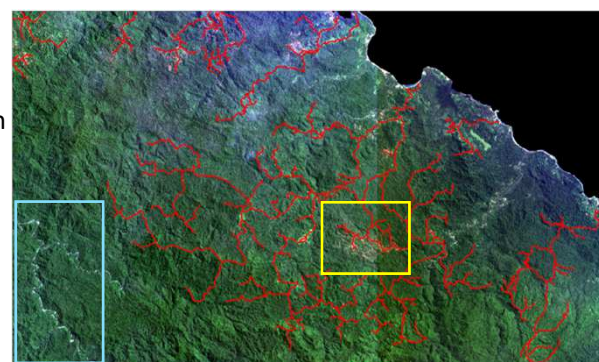
Planet scope satellite observes everywhere on Earth every day. Through Norway's International Climate & Forests Initiative (NICFI), the monthly mosaiced dataset can be accessed for tropical countries. Based on this dataset, we composed the cloud-free image of Solomon islands of 2021 using Google Earth Engine. The monthly mosaic images from January to October 2021 were used. The cloud-free image was a composed image. Therefore, it was not a real picture but reflected the condition of 2021.



The Cloud-free image composed using the images of Jan. - Oct. in 2021

Step2 Digitizing The road network was digitized on the cloud-free image manually

The road network data was created by the ministry of land (MOL). However, it did not include the road in the forest area. We used this road data as a base data for digitizing then added roads recognized in the cloud-free image of 2021. Not to confuse with river line without water, we used the watercourse data of MOL as a reference. Skidded lines in the logging area were not included. The new attribute: Code and Year were added to separate the road of MOL. The code is about vegetation conditions on the roads: 1 is the road covered by bare soil and 2 is mainly covered by vegetation. The year is about the confirmed year of the roads. It was 2021.



The digitized road on the cloud-free image. Skidded lines and watercourses were not digitized. See the examples in the yellow and light blue boxes respectively.

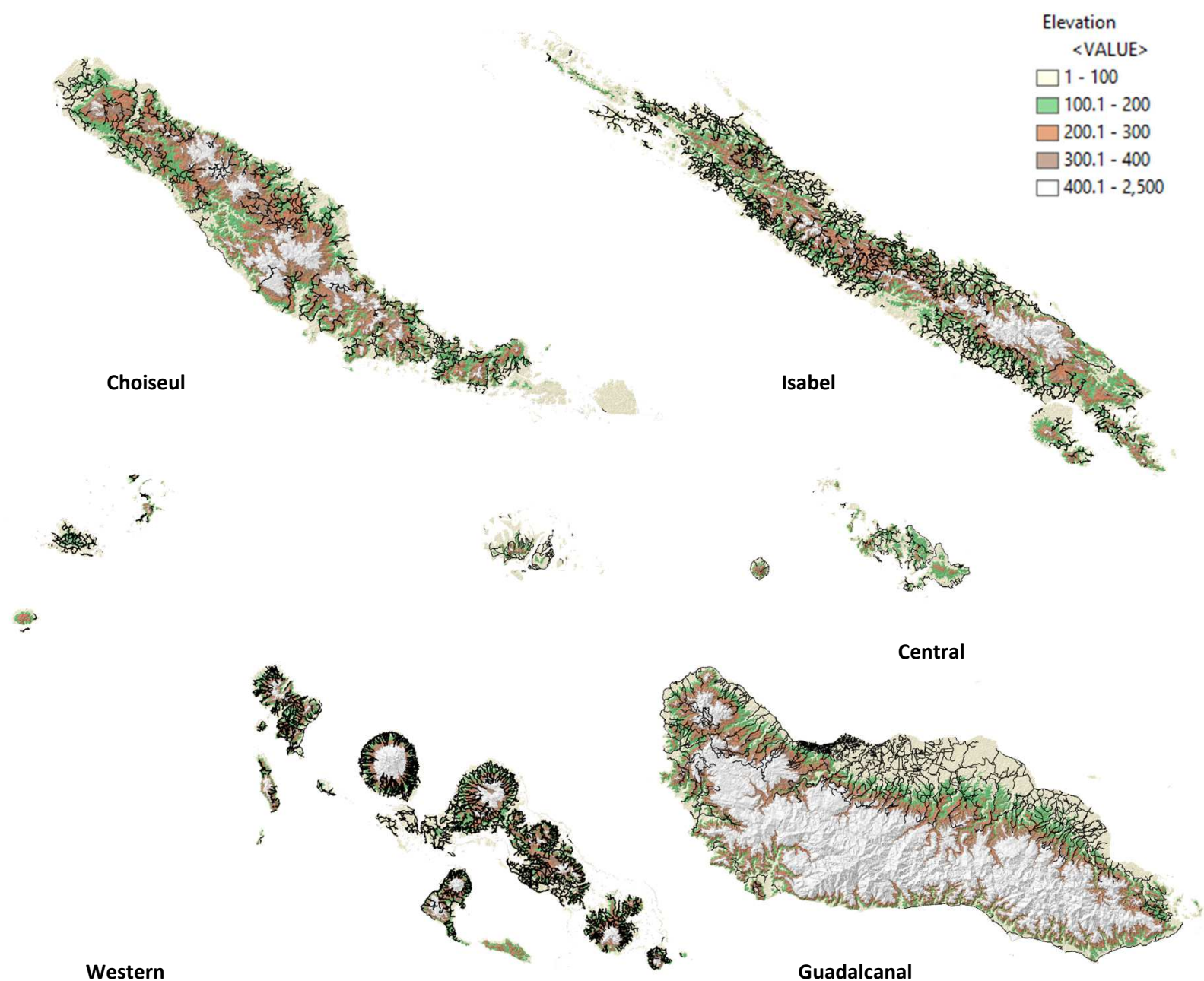
[Result]

The table shows the length and density of the road network by island. The total length of the road in Solomon islands was 19590.4 km. The average length by the islands was 2176.7 km. The longest road length was that of Western island (5619.8). The second and third were those of Isabel island (3470.3) and Guadalcanal islands (2948.7), respectively. The shortest was Rennell and Bellona (266.9). The average density was 0.67 km/km². As with the length, density was highest on Western island (1.02). The second and third were those of Central island (0.90), Isabel island (0.82), respectively. The other islands except Rennell and Bellona were around 0.55.

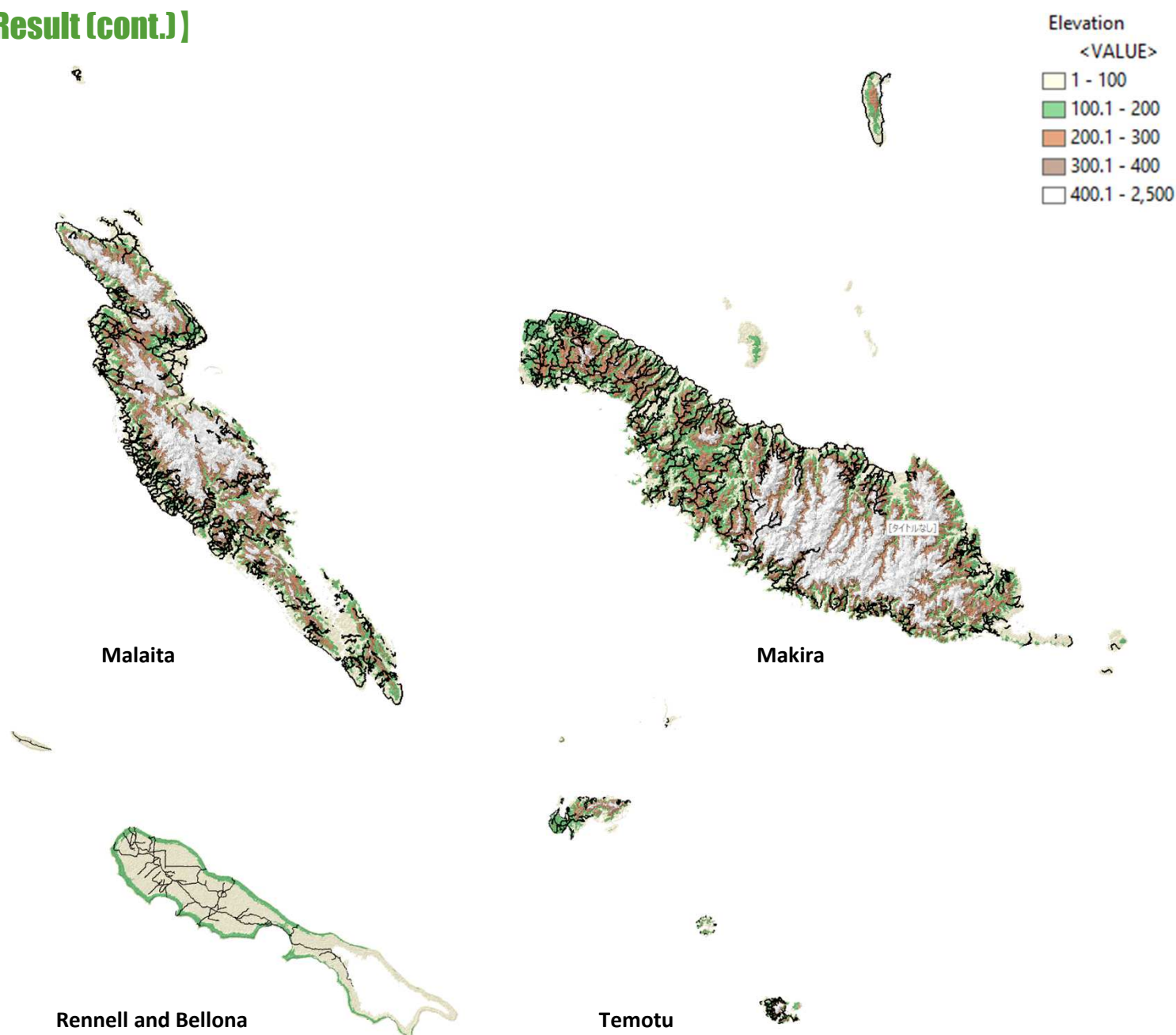
The maps show the road network in 2021 by the islands with the elevation (SRTM 30m resolution). Almost all road was built at an elevation of less than 400 meters.

Table. 1 The length and density of the road network

Name	Area (km ²)	Road network	
		Length (km)	Density (km/km ²)
Central	642.1	577.8	0.90
Choiseul	3303.9	1763.8	0.53
Guadalcanal	5374.8	2948.7	0.55
Isabel	4218.1	3470.3	0.82
Makira	3219.0	2064.4	0.64
Malaita	4213.1	2370.4	0.56
Rennell and Bellona	671.4	266.9	0.40
Temotu	898.8	508.4	0.57
Western	5507.6	5619.8	1.02
Total		19590.4	
Average		2176.7	0.67



[Result (cont.)]



[Discussion and limitation]

The road network data is one of the key information to monitor activities in the forest such as logging. You can know the intensity of the activities by using the road length and density. And you can understand the characteristics of hot and cold spots of activities in the forest by comparing the data with satellite imagery, elevation, slope, current/past concession boundary, the location of communities, etc. This data shows the recognized road in the cloud-free image of 2021. It is not enough to understand the time-series change in road development. And the current version does not include the management status such as a manager, owner, etc. Those pieces of information are necessary for managing the activities for the sustainable use of forest resources. **The monthly or yearly update of the road network based on the data and satellite imagery such as Planet or Sentinel2 etc. contributes to monitoring the logging activities.**

Note: Imagery © 2021 Planet Labs Inc.

https://assets.planet.com/docs/Planet_ParticipantLicenseAgreement_NICFI.pdf

[Applications]

The data has been registered to MOFR SolGeo-FIMS. You can access the system from a web browser. On the system, you can overlay the road data to other layers such as elevation, river line, watersheds, estimated tree volume, tree cover loss year, land cover, satellite imagery, etc. (Fig.1). The application helps you to get a deeper insight into forest activities. If you need the spatial analysis using the road data, you can use the data with other layers on SolGeo-FIMS and/or data on your computer by using QGIS (Fig.2).

You can check the data not only as digital data but also as printed maps. The posters of the road network with Planet satellite imagery are displayed in the exhibition room in MOFR. Those sizes are A1 or A0 which are enough sizes for a discussion (Fig.3).

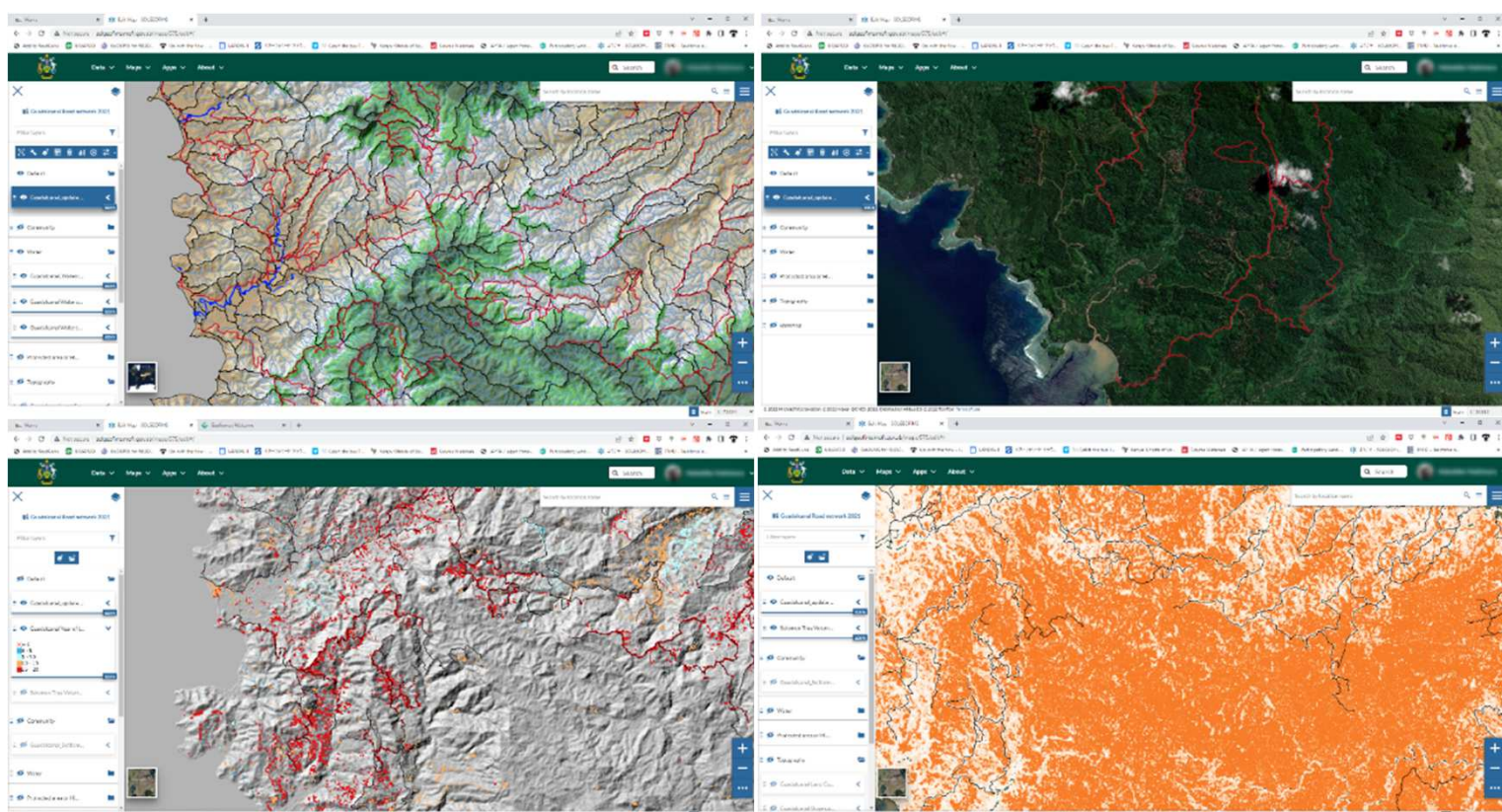


Fig1. The road data on SolGeo-FIMS. UL: with Elevation, river, watershed, UR: with Satellite imagery, LL: Tree cover loss Year (Hansen et al. 2013), LR: Estimated tree volume.

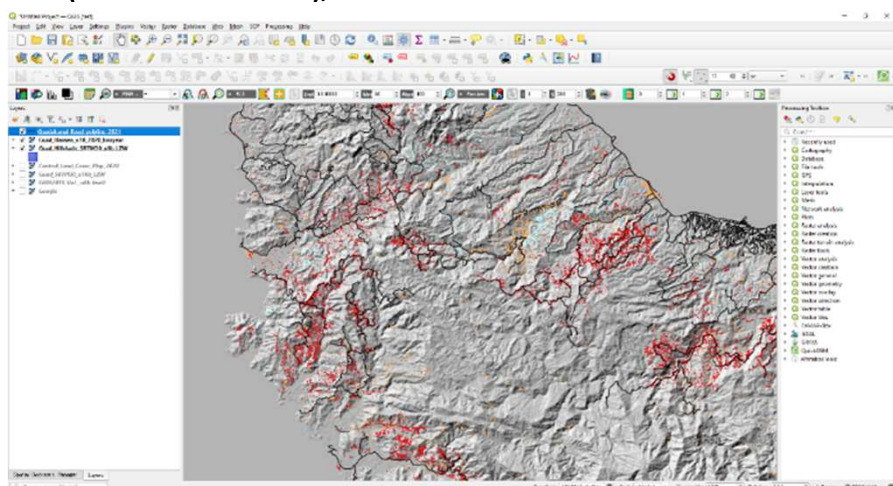


Fig2. Road data analysis using QGIS. The data are called from SolGeo-FIMS

Tree cover loss: Hansen, M. C., P. V. Potapov, R. Moore, M. Hancher, S. A. Turubanova, A. Tyukavina, D. Thau, S. V. Stehman, S. J. Goetz, T. R. Loveland, A. Kommareddy, A. Egorov, L. Chini, C. O. Justice, and J. R. G. Townshend. 2013. "High-Resolution Global Maps of 21st-Century Forest Cover Change." *Science* 342 (15 November): 850–53.



Fig3. The printed maps in the exhibition room