

Land cover Mapping of Pacific Island States



**FIG Pacific Small Island
Development States
Symposium, Fiji
Vilisi Qionitoga
SPC/SOPAC**



Secretariat of the Pacific Community



- SPC is an international organisation that works in public health, geoscience, agriculture, forestry, water resources, disaster management, fisheries, education, statistics, transport, energy, human rights, gender, youth and culture to help Pacific Island people achieve sustainable development.
- SPC's members are the 22 Pacific Island countries and territories that are the beneficiaries of its services, along with four of the original founding countries.
- SPC's work programme is determined by members, and all of its regional initiatives aim to support members' national policies and plans
- The SPC Applied Geoscience and Technology Division (SOPAC Division of SPC) is new, and began operation on 1 January 2011.



Overview

- **How it was initiated?**
- **Methodology and Data used**
- **Who does the mapping?**
- **Preliminary Results**
- **Constraints**
- **Digital Classification**
- **Conclusion**

Initiation

- SPC-GIZ CCCPIR Programme – Viti Levu
- Task carried out by Fiji DoA and DOF at SOPAC
- Scale – 1:50,000 (Viti Levu and Vanualevu)
- USAID Food Security funded project
- Currently – 1:10,000 for Fiji
- Scale – 1: 50, 000 (Solomon Islands)

Countries

- Fiji – Viti Levu, Vanualevu (1:50, 000)
– *Viti Levu, Vanualevu, Kadavu, Gau, Koro, Lau Group (1:10, 000)*
- Solomon Islands – Choisuel, Isabel, Western Province, Isabel, Malaita (1: 50, 000)
Renel, Temotu, Choisuel (1 : 10, 000)
- Samoa – Upolu and Savaii (1: 10, 000)
- Kiribati – all atolls (1: 10, 000)



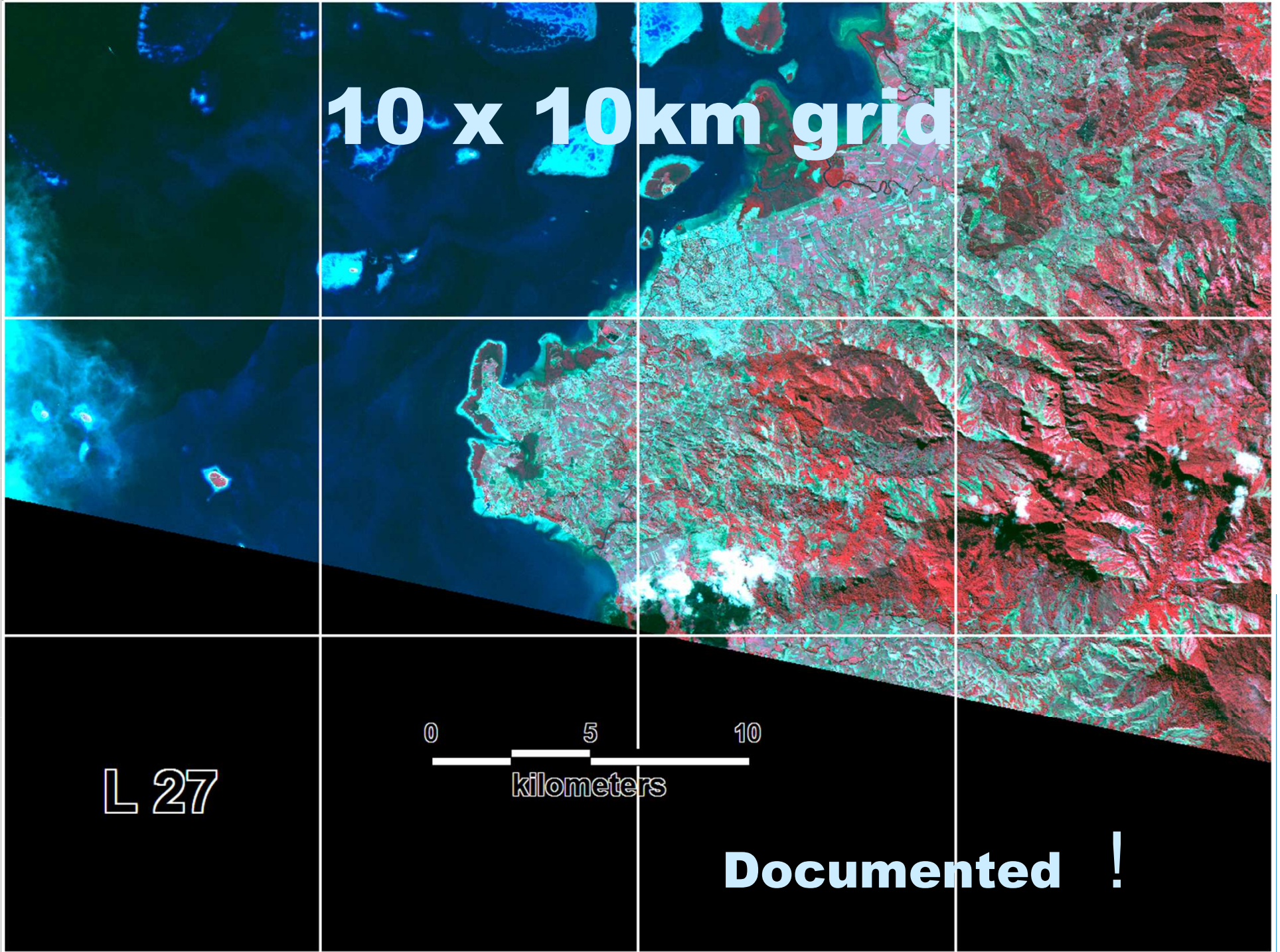
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Visual Interpretation

Comparison and Delineation in GIS Environment



10 x 10km grid



L 27

0 5 10
kilometers

Documented !

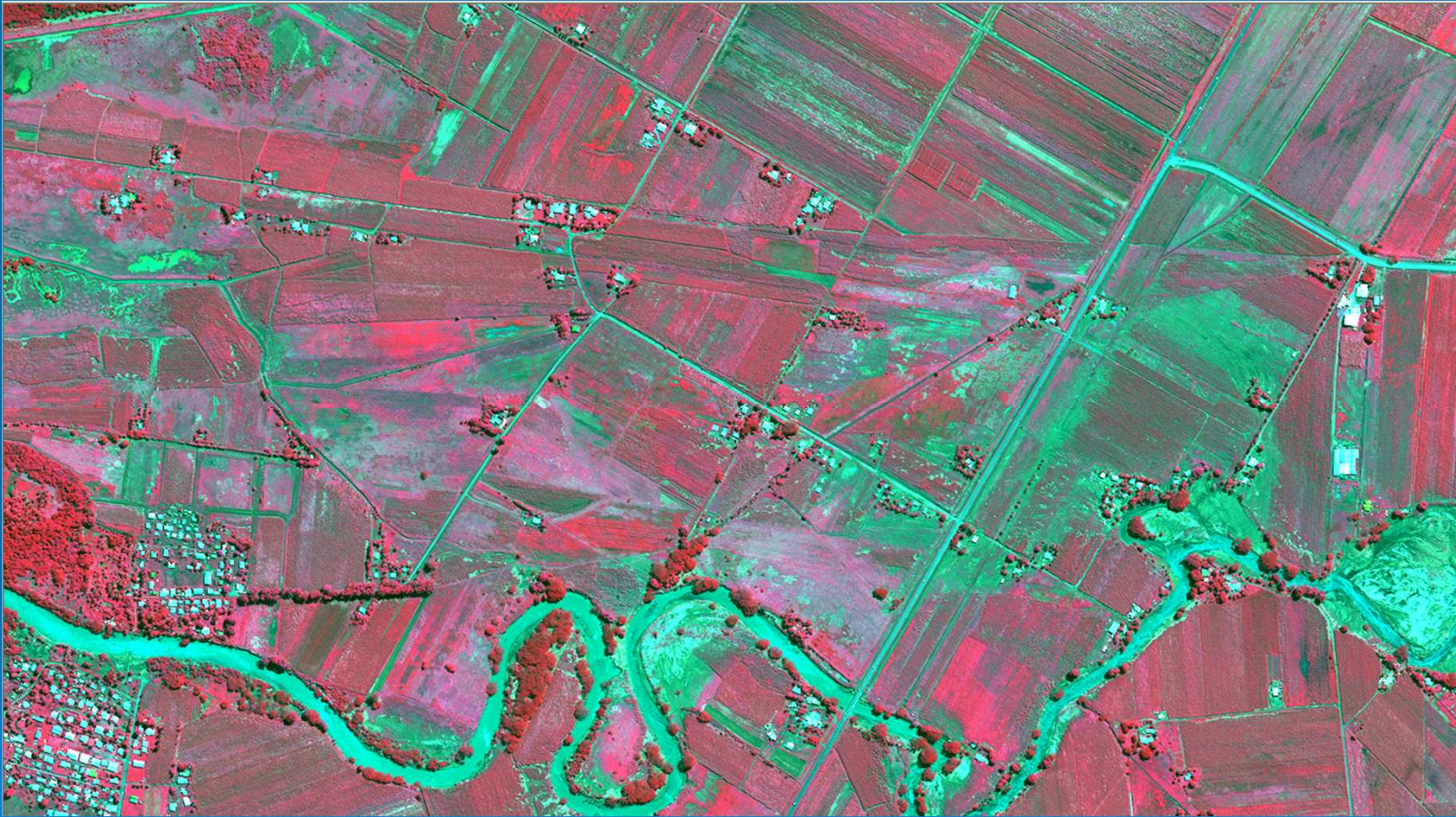
Pre-Processing

- Image Stitching
- Haze removal
- Atmospheric correction
- Pan-sharpening
- Ortho-Correction

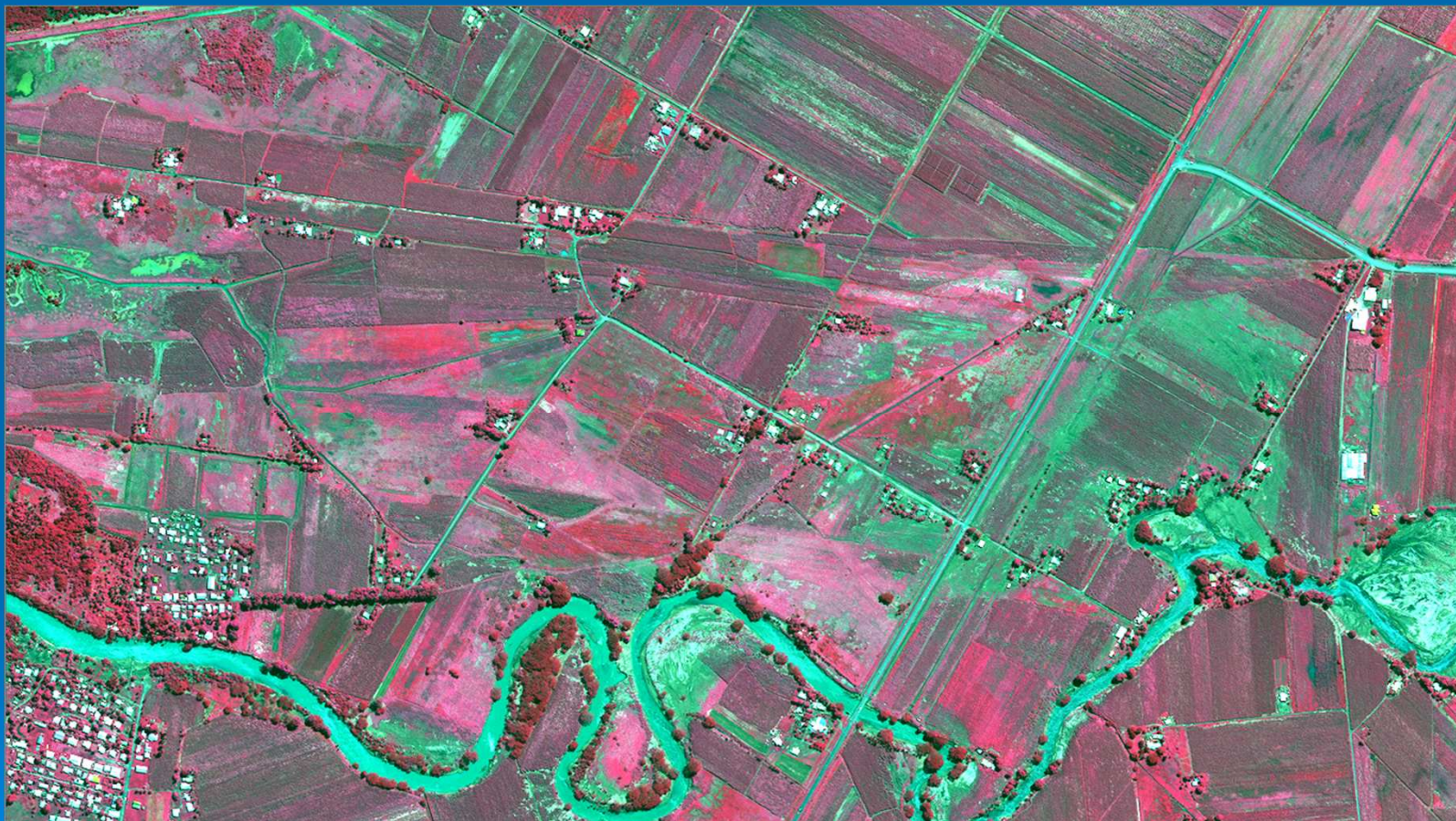
BND 2, 3, 5 Natural C



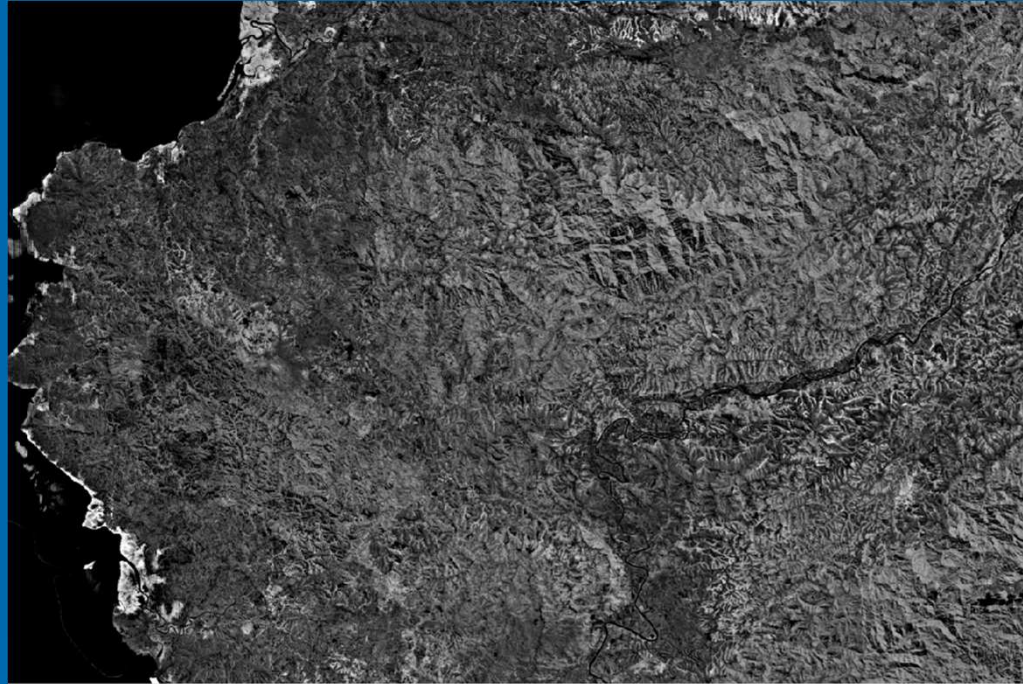
BND 3, 5, 7 FCIR



BND 3, 5, 6 FCIR RE



Vegetation Index



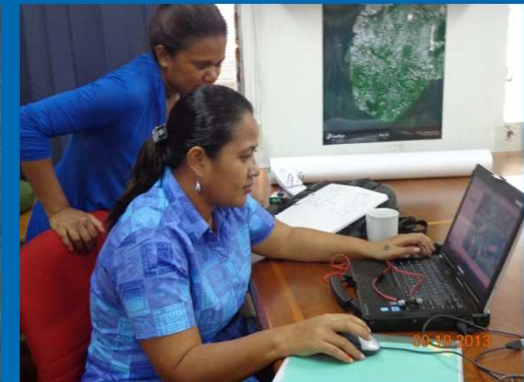
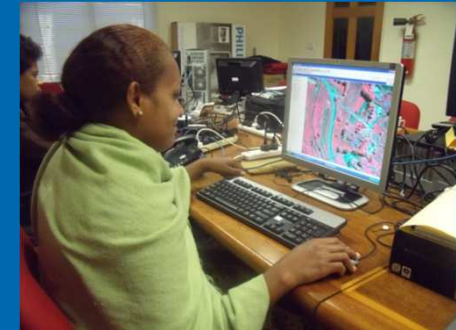
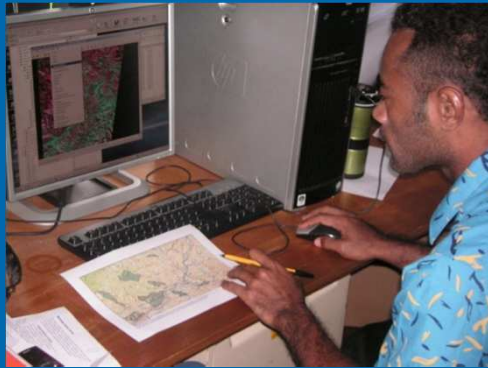
$$\text{NDVI} = \frac{\text{NIR} - \text{RED}}{\text{NIR} + \text{RED}}$$

Digitizing



Apply geo-science and technology to realise new opportunities for improving the livelihoods of Pacific communities.

Who does the mapping?

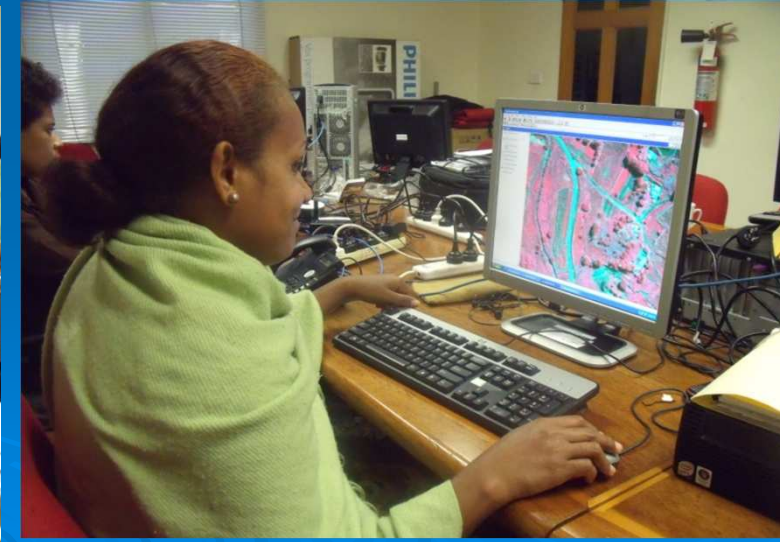


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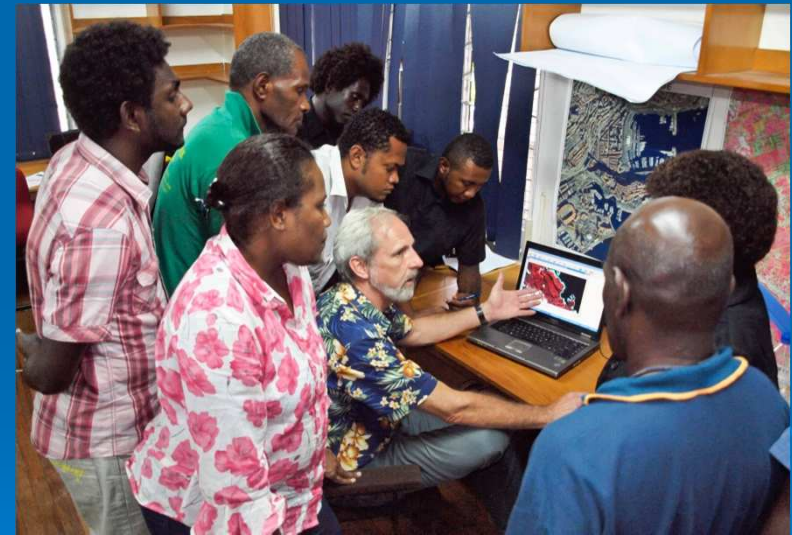


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Fiji Land cover Mapping



Solomon Islands Land cover Mapping

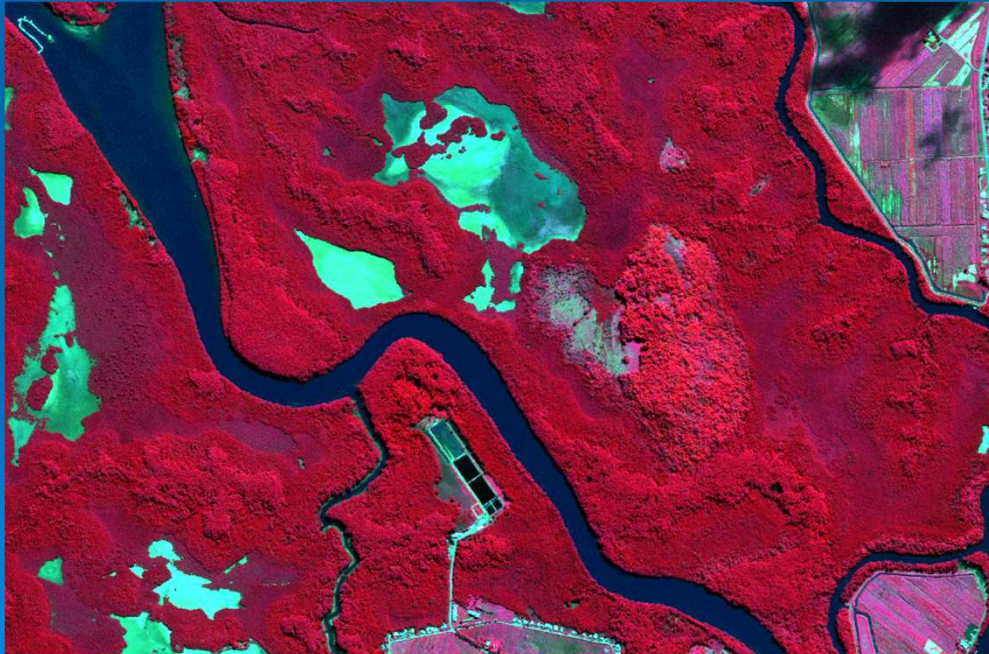


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Data access



Apply geo-science and technology to realise new opportunities for improving the livelihoods of Pacific communities.

Result of Stratification

1 : 50, 000

- Sugarcane
- Forest
- Mangrove
- Cultivated land
- Grassland
- New forest
- Shrubs
- Settlement
- Urban
- Bare land
- Pasture

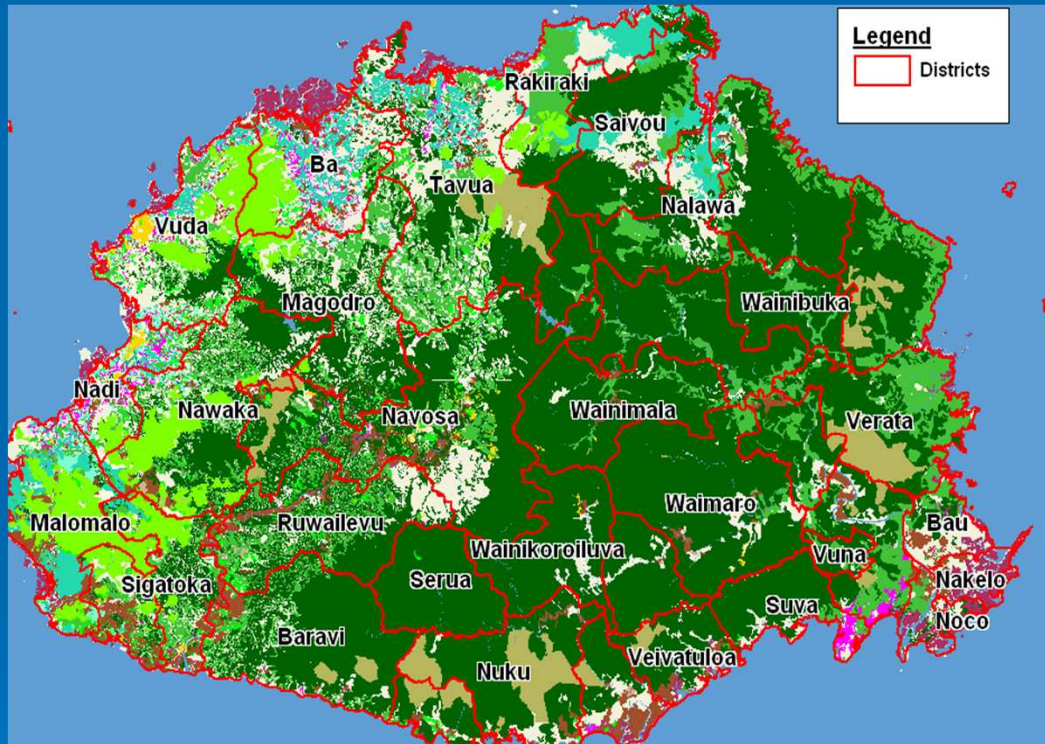
(Not Coconut)

1: 10, 000

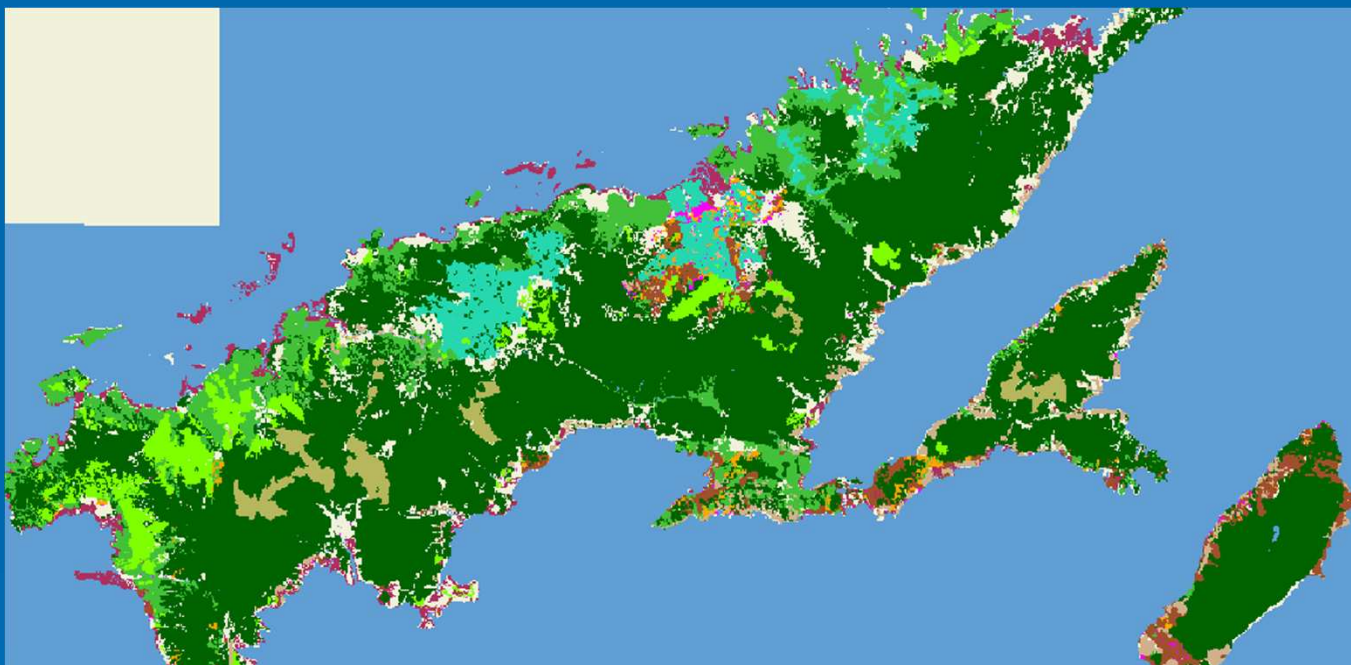
- Forest (further stratified)
- Mangrove (further stratified)
- Sugarcane
- Grassland
- New forest
- Shrubs
- Settlement
- Urban
- Bare land
- Pasture
- Coconut
- Root Crops

Preliminary Results

- Viti Levu – 1:50,000



• Vanualevu Levu – 1:50,000

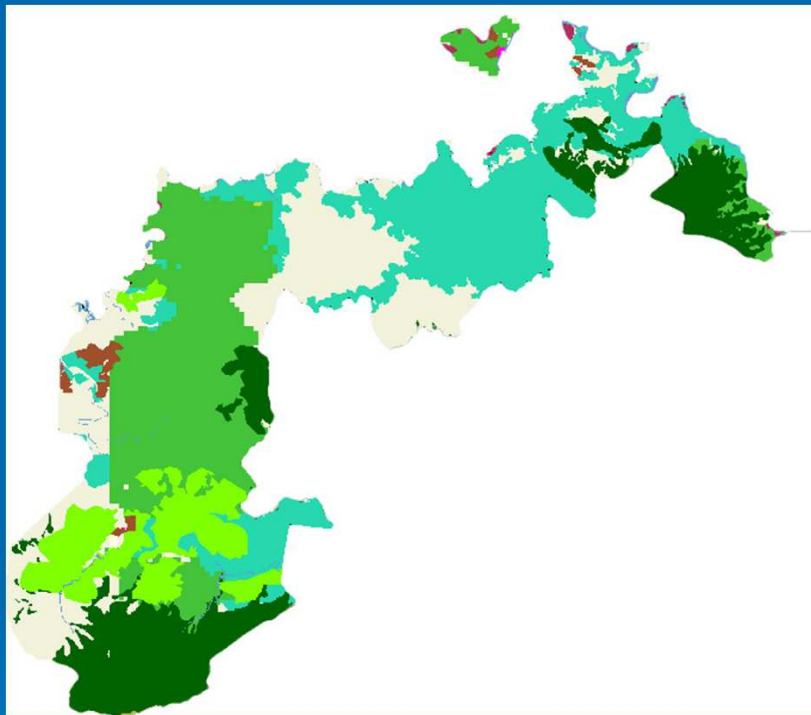


Legend	
Class_Names	
	Forest
	Mangrove
	Cultivated Land
	Grassland
	Sugarcane
	Shrubs
	Urban
	Settlement
	Bareland
	Pine Plantation
	Hardwood Plantation
	Coconut
	Non-Forest
	Water Bodies



District Level

Rakiraki



Legend	
Class_Names	
	Forest
	Mangrove
	Cultivated Land
	Grassland
	Sugarcane
	Shrubs
	Urban
	Settlement
	Bareland
	Pine Plantation
	Hardwood Plantation
	Coconut
	Non-Forest
	Water Bodies

Land cover Class	Area (ha)
Natural Forest	5516.313
Mangrove	175.6875
Cultivated Land	327.625
Grassland	7167.625
New Forest	4.1875
Pasture	0
Sugarcane	7231.5
Shrubs	0
Urban	0
Settlement	12.4375
Bare land	17.3125
Pine Plantation	2924
Temporary Sugarcane	0
Hardwood Plantation	17.125

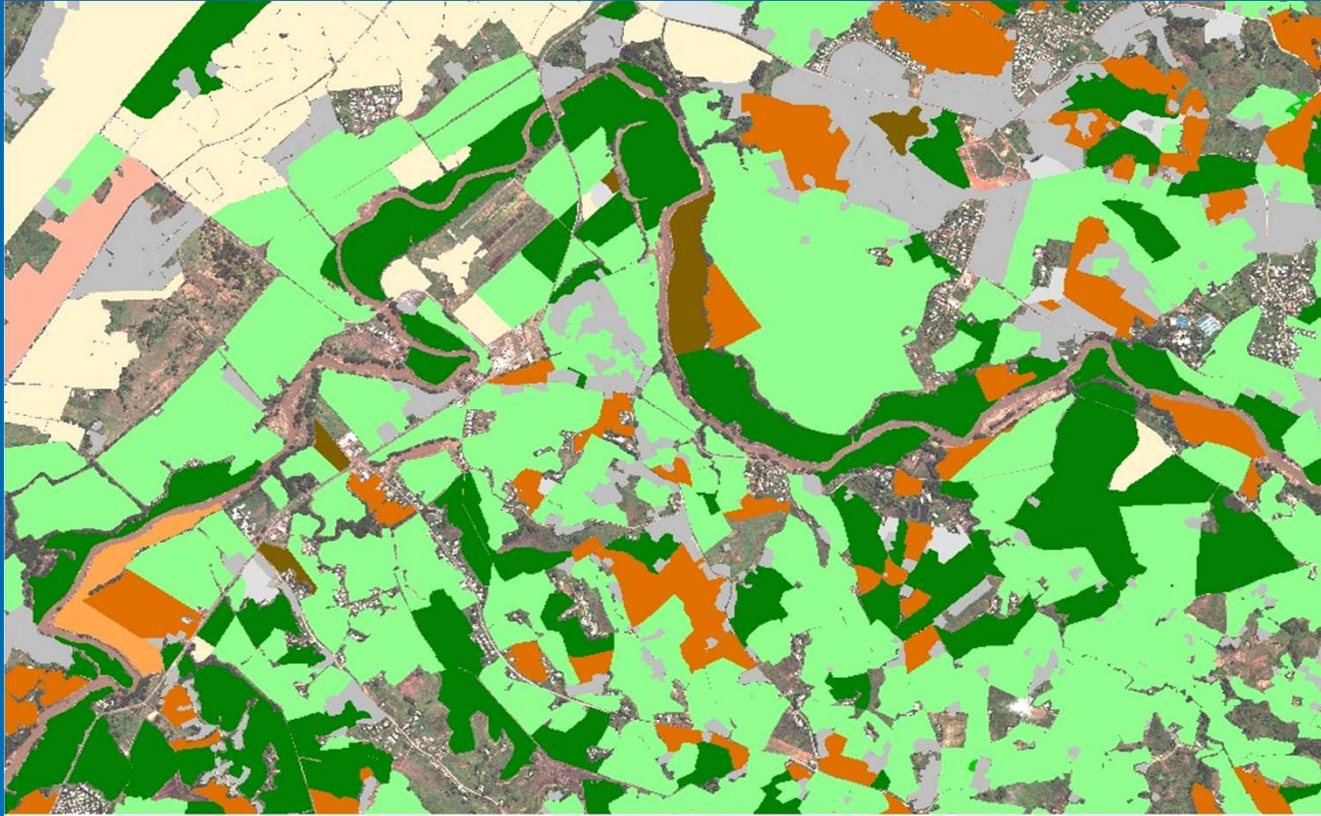


Solomon Islands



1:10,000 Mapping

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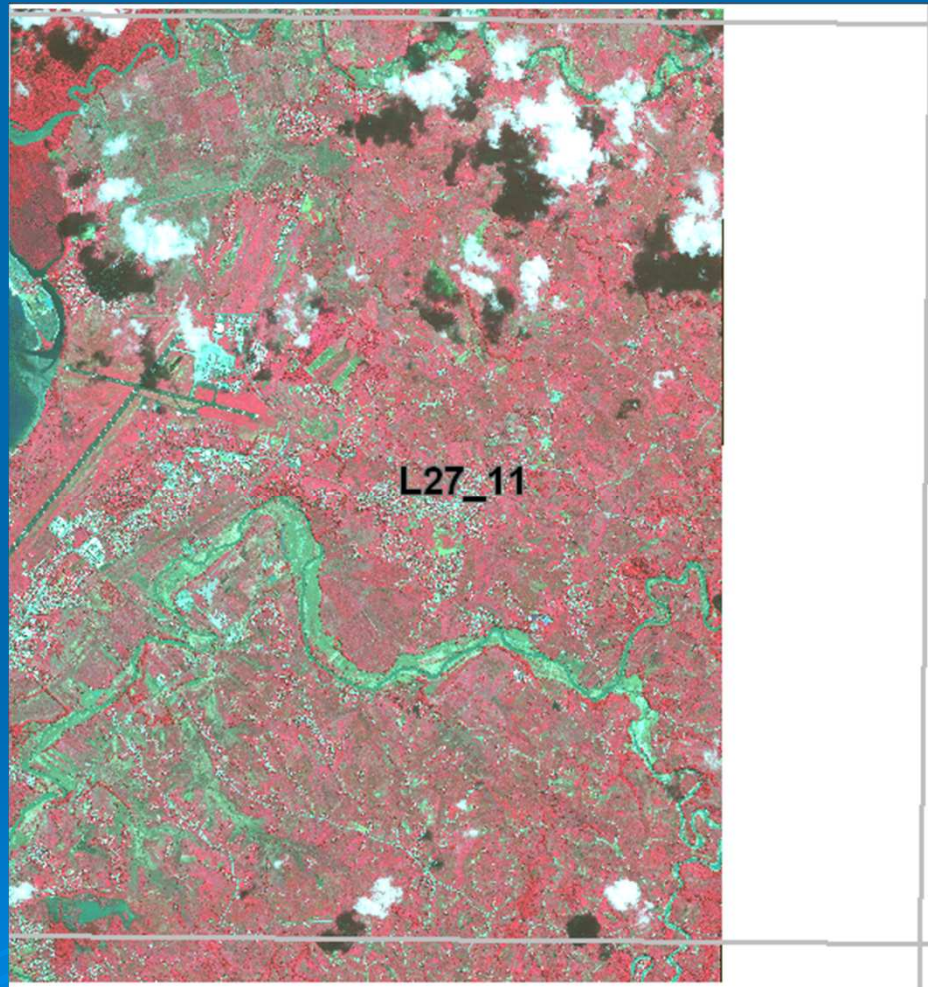
Map Legend

Light Grey	Bareland
Yellow	Commercial
Orange	Crop
Dark Brown	Cultivated
Light Orange	Fallow
Dark Green	Grassland
Yellow	Pasture
Light Green	Sugarcane
Grey	Settlement
Bright Green	Shrubs
Pink	Urban

Land cover Mapping – 1:10,000

- SPC – USAID Project - Enhanced Climate Change Resilience of Food Production Systems– Fiji, Kiribati, Samoa, Solomon Islands, Tonga and Vanuatu
- WV2 – 8 Spectral bands
- Geo-eye 4 band multi-spectral

Large Image Size



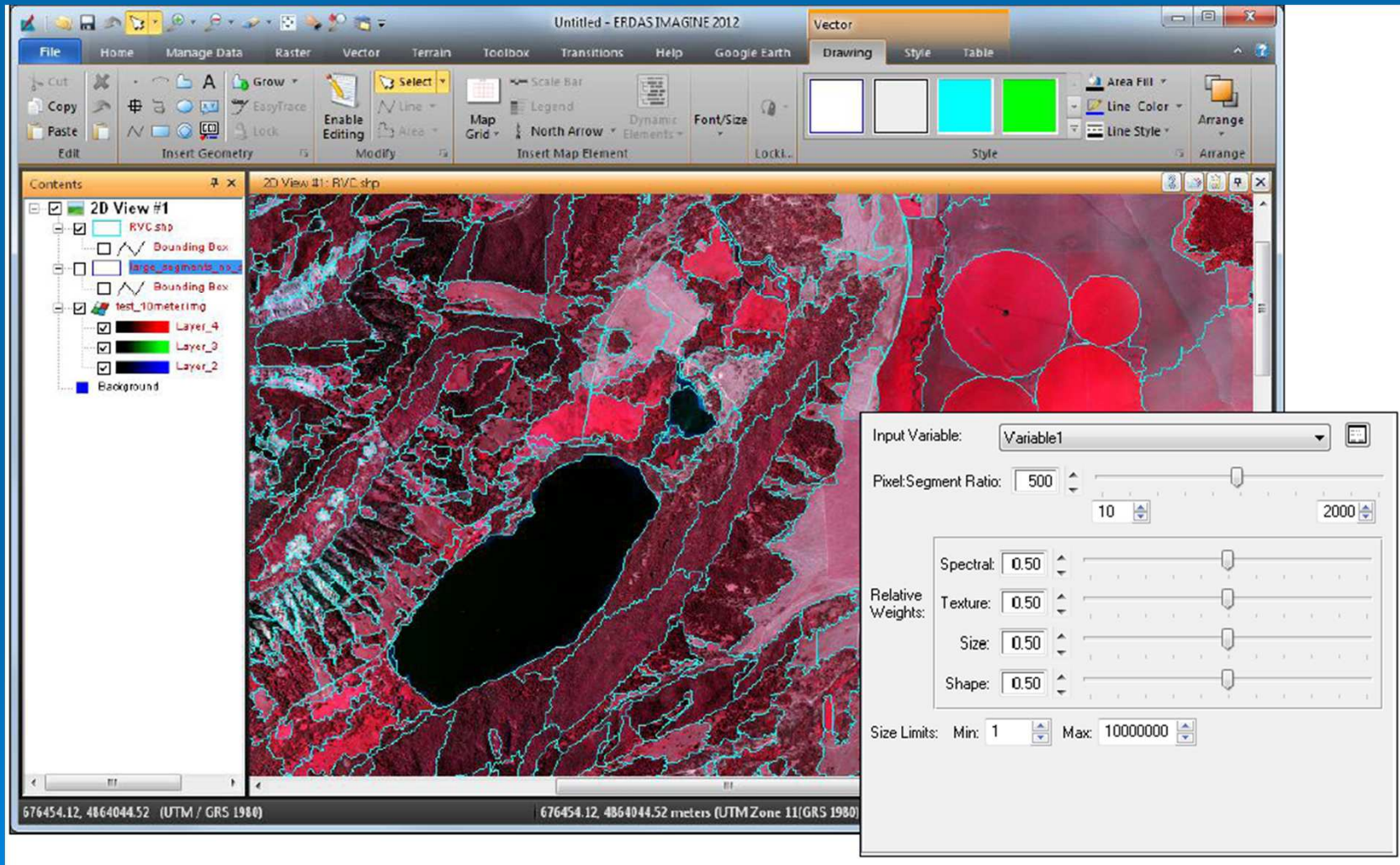
More detail – More time !



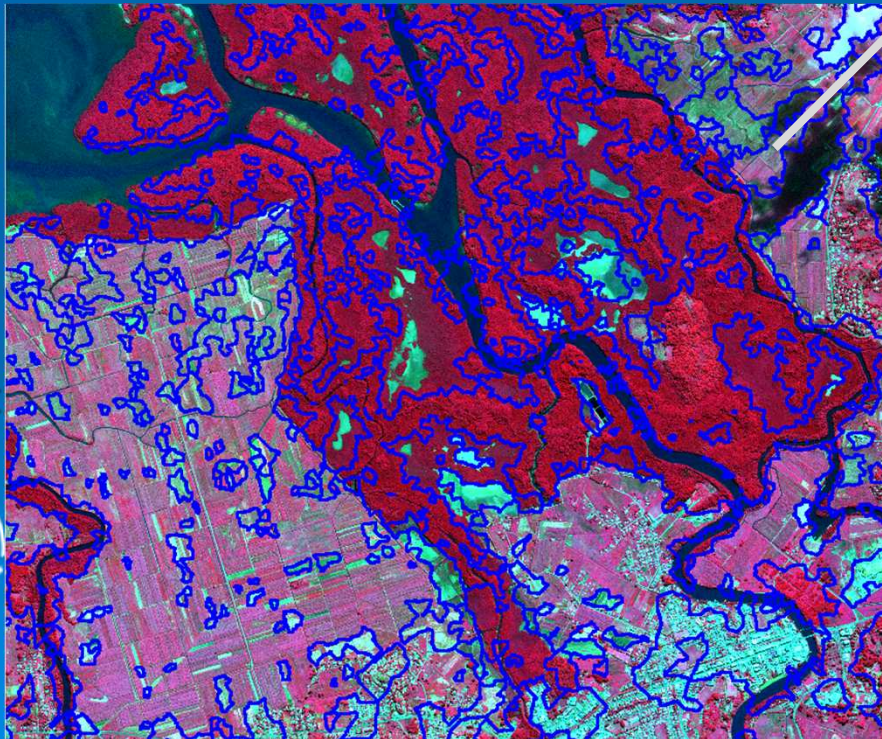
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ERDAS Imagine 2013 extension “Objective”



Visual Interpretation after Segmentation



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Summary

- Fiji DoA using satellite imagery
- Standard baseline for Climate Change
- Local knowledge of Fiji DoA and Forestry used.
- Communication and data sharing of vegetation and land cover information is facilitated between government departments.
- With various government ministries and departments involved in the interpretation, this facilitates collaboration and product consistency important for aggregating multi-scale vegetation data from local planning units to regional and national scales.
- Capacity building