

**Presentation
on**

**Land Use Mapping and Coconut Resource Field
Inventory Sample Plots Using World View-2
Image Data – Vava'u Is, Tonga**

**for
Regional Conference on GIS & RS - 2015**

Introduction

- Forestry, MAFF has strong interest on the sustainability of the coconut resource because of ongoing palm clearance and lack of replanting
- Urgent requirement for quantitative data to decide on the future management of the resource in view of food security, livelihoods, economy, and climate change impacts

Background

- Coconut (*Cocos nucifera*) are ubiquitous and regarded as “tree of life”
- Importance is reflected in Tongan mythology, and products are used in a wide variety of ways
- Significant decline in coconut population
- Project was funded by USAID and implemented by SPC
- Conducted from 6 July to 02 August 2015

Objectives

- To identify the following parameters;
 - Vegetation, coconut cover and other land uses
 - Extent of coconut cover by palm density classification
 - Current level of coconut clearance and replanting
 - Coconut population and age class distribution
 - Estimation of coconut products

Method

- New design incorporating VHR satellite image data
- Mapping of coconut area base on 1:50,000 scale of high resolution image data
- Coconut cover stratifies into 3 main density classes
- Two teams; one for field inventory and the other to do forming factor

Palm density classification

Density Classification	Palms / ha
Dense	≥ 150
Medium	50 – 149
Low (Scattered)	25 - 49

Field survey

- Field survey followed the standard method but with some important modifications
- Random plot locations are marked on 'api boundary maps
- 100 plot sites have been randomly selected to be measured – plot size is 50 m x 50 m
- Accurate measurement and recording of stem size is essential

Table 01: Land cover of Vavau Island Group

Land Use	Area (ha)	%
01 Forest	1196	10.4
02 Mangrove	371	35.5
03 Dense coconut	1092	9.7
04 Medium dense coconut	3679	31.8
05 Scattered coconut	1117	9.4
06 Shrub	4104	3.2
Sum Vegetation	11,559	85%
07 Settlement	658	33.3
08 Bare land	835	42.2
09 Water body	333	16.8
10 Unclear (clouds)	151	7.6
Sum Non Vegetation	1,977	15%
Total	13,536	

Summary of Land Cover

Island	Total Area (ha)	Other land use (ha)	Coconut cover (ha)
Vava'u	13,536	7,648	5,888 (43%)

Coconut population

Class (Density)	Area (ha)	Palms/ha	Palms
Dense	1,092	278	303,576
Medium	3,679	74	272,246
Low (Scattered)	1,117	31	34,627
Total	5,888		610,449
1995 Inventory	9,604	78	749,112
(+/-)	(3,716) 39%	(91 mean density)	(138,663) 19%

Total nut production

<i>Stratum</i>	<i>Area (ha)</i>	<i>Palms/ha</i>	<i>Total Palm Population</i>	<i>Nuts/Palm/ Yr</i>	<i>Tot. Nuts Production</i>
Dense	1,092	278	303,576	34	10,321,584
Medium	3,679	74	272,246	35	9,528,610
Low (Scattered)	1,117	31	34,627	38	1,315,826
Total	: 5,888		571,020		21,166,020
1995 Inventory	9,604	78	749,112	25	18,727,800
(+/-)	(3,716) 39%		(178,092) 24%		2,438,220 13%

Copra Production

<i>Stratum</i>	<i>Av. Nuts / HA / Year</i>	<i>Area (ha)</i>	<i>Nuts Year</i>	<i>Copra / Year (t)</i>
DE	3,227	1,092	3,523,884	705
SD	1,908	3,679	7,019,532	1,404
SC	1164	1,117	1,300,188	260
Total		5,888	11,843,604	2,369
1995 Inventory	1,950	9,604	18,727,800	3,746 t
(+/-)			6,884,196 (37%)	1,377 (37%)

Timber Volumes

Density	Volume [m ³ /ha]	Area [HA]	Volume [m ³]
DE	38.9	1,092	42,479
SD	24.0	3,679	88,296
SC	12.0	1,117	13,404
Total		5,888	144,179
1995 Inventory	135/72	9,604	1.3 m/0.7 m

Major Findings

- Coconut cover decreases by 39%
- Coconut population reduces by 19%
- Annual deforestation is ~ 693,315 palms
- Very little or no replanting
- Nut production increases by 13%
- Timber volume decreases

Vinaka