Pacific Community
Communauté du Pacifique

BETTER FARMING AND RANCHING PRACTICES IN RA PROVINCE - DIAGNOSIS AND ACTION PLAN

RESCCUE

AGENCE FRANÇAISE DE DÉVELOPPEMENT

FONDS FRANÇAIS POUR L'ENVIRONNEMENT MONDIAL

The operator that is in charge of the implementation of the RESCCUE project in Fiji under the supervision of both SPC and the **University of the South Pacific** is a consortium of **four partners**:

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Front cover photo: Conservation Internation Fiji

Overview of the objectives and components of RESCCUE projet :

The *Resilience of Ecosystems and Societies to Climate Change* (RESCCUE) project is a regional project implemented by the Secretariat of the Pacific Community.

The overall goal of RESCCUE is to contribute to increasing the resilience of Pacific Island Countries and Territories (PICTs) in the context of global changes. To this end RESCCUE aims at supporting adaptation to climate change (ACC) through integrated coastal management (ICM), resorting especially to economic analysis and economic and financial mechanisms.

The RESCCUE project operates both at the regional level and in one to two pilot sites in four countries and territories: New Caledonia, Vanuatu, Fiji and French Polynesia.

RESCCUE is funded primarily by the *French Development Agency* (AFD) and the *French Global Environment Facility* (FFEM) for a duration of five years (01/01/2014 to 31/12/2018). The total project budget is 13 million Euros, including 6.5 million Euros from AFD/FFEM and about the same in co-funding.

RESCCUE Project sites in Fiji are RaProvince and Kadavu province. Ra has about 95 communties and Kadavu 73 communities. The following are the RESCCUEcomponents that will be implemented in these two sites

It is structured around five components:

Component 1: Integrated coastal management – supporting ICM implementation through ICM plans, ICM committees, and management activities concerning both terrestrial and marine ecosystems, capacity building and income generating activities.

Component 2: Economic analysis – using economic analysis to support coastal management and policy decisions.

Component 3: Economic and financial mechanisms – setting up economic and financial mechanisms to generate additional and sustainable funding for ICM: review of options (payment for ecosystem services, taxes, user fees, trust funds, quota markets, offsets, labels…); feasibility studies; implementation; monitoring.

Component 4: Capitalization, communication, dissemination of project outcomes in the Pacific – going beyond pilot sites activities in order to have impacts at the regional level, by fostering experience sharing between sites, cross-sectoral expertise, and communication and dissemination of the project outcomes.

Component 5: Project management – implementing and coordinating the project, by providing technical assistance, organizing local and regional steering committees, conducting audits and evaluations (mi-term and ex-post), etc.

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Executive Summary

The Province of Ra holds evidence of the largest traditional farming system that draws on traditional knowledge and wisdom in diverting mountain streams to irrigate mountain terraces and gardens. With strong history in agriculture production, the people of Ra Province continue to cultivate the land but have lost traditional knowledge and practices that are evident on the hill side of the Nakauvadra Range.

The Ra Integrated Coastal Management Plan (Ra ICM Plan, 2015) highlight resource management issues where burning and unsustainable agriculture are two of the eight environmental challenges in the Province. This report examines the current status of the agriculture sector in Ra Province, compares sector performance in Ra to neighboring Provinces that have similar population, weather condition and commodity types to identify commodities for diversification and improvement.

Assessment of current status are based on the National Agriculture Census Report 2009 and verified with field observations on the ground. Generally, current farm situation on the ground is not too different from the National Agriculture Census as development in Ra Province has been slow. Nevertheless, it is interesting to note that while sugar cane production continues to face many challenges, honey and temporary crop production has captured the interest of farmers while yaqona, taro and cassava continue to be the main commodities supporting a predominately subsistence mix cropping system.

The Province is a leader in the production of commercial beef but follows the Province of Ba and Nadroga in subsistence beef production. The province supports almost 20,000 heads of cattle for beef and dairy. Commercial beef is produced by large semi-commercial Government enterprise while subsistence beef and dairy production fall under small holder farmers. Livestock production in Ra Province is therefore largely aimed at beef production. Ranching in this report is viewed through the lenses of integrated systems where large tracks of land are dedicated to livestock, cropping (to include tree crops) or a mix of both.

Key issues affecting farm productivity include the lack of an enabling environment, farm issues such as level of skills and knowledge to improve farm efficiencies as well as the use of inefficient farming techniques. Underlying challenges include (1) clearance of virgin forest for agriculture expansion; (2) lack of farmer incentives due to limited or absence of market access; (3) low yields and low economic returns for core commodities. Core commodities are examined in detail as candidate crops for intervention. Four are entrenched within the farmers' production system and with the inclusion of temporary crops as a new entry post TC Winston. It is further suggested that an integrated system consisting of agroforestry and mix crop production be advocated. The agroforestry system will focus on kava, honey and temporary crop production.

The assessment concludes with an action plan aimed at advocating better farming and ranching in Ra Province through fulfilling the vision of the Ra ICM Plan through sustainable agriculture landscape program that demonstrates a net benefit for conservation and sustainable farm production. The vision is to support farmers in Ra become better stewards of the environment; improve production and farm efficiencies while securing market access.

1.0 Introduction

1.1 Background

The Province of Ra is located at the northern tip of Viti Levu and is one of eight (8) provinces found on the main island of Viti Levu. The Province of Ra is approximately 1,341 square kilometers or 12% of Viti Levu. The 2007 national census estimates population in Ra at 29,464 (Fiji Bureau of Statistics, 2008) with the majority consisting of Indigenous Fijians, followed by Fijians of Indian descent, dispersed across 19 districts and 93 villages. Ra is considered a rural province, with majority of the population directly dependent on the agricultural sector.

Poverty is a key problem in all of the provinces of Fiji, with the average poverty incidence estimated at 35% in 2003 (Fiji Islands Bureau of Statistics, 2008). A 2011 World Bank Report found that Ra Province is one of the most economically depressed areas in the country with an estimated 50% of its population falling beneath the poverty line – the third highest incidence of poverty among the country's 14 provinces. Intervention is critical to guide communities in sustainable economic development that integrates conservation and management of natural resources, as well as ecosystem-based adaptation approaches to climate change that bolster community resilience and enhance livelihoods.

Ra has a strong history of agricultural production, and boasts the largest complex of agricultural terraces ever constructed in Fiji – on the northern planks of the Nakauvadra Mountains (Kuhlken *et al.* 1999). Although no longer functioning, the extensive set of gardens and canals were once irrigated by diverting mountains streams, directing and drawing runoff from springs and seeps.

1.2 Institutional Framework and Enabling Environment

1.2.1 Import substitution program (Food Security)

In 2010 the government initiated the import substitution and the export promotion programme with initial funding of $3 million dollars (PriceWaterHouse Coopers, 2010). The main objectives of the programme focused on improving the quantity and quality of commodities both for domestic and exports markets. The program focused on reviving both crops and livestock component of the agriculture sector with special emphasis on import substitution commodities. Crops focused on rice and potato while livestock industry was targeted at improving the breeding of genetically superior livestock, provision of training on pasture feed management, good animal health practices and improve farm management techniques.

In the Ra Province the component of this project was mainly focused on diversification of traditional root crops through the planting of potatoes in Mataso District. No record could be obtained on the yields and production level of potato farming in Ra.

The Fiji Crop and Livestock Council (FCLC) was set up in July 2010 to support the import substitution program through working closely with 14 association of non-sugar famers estimated to consist of 30,000 members (Delaibatiki, 2015). The associations include pig, dairy, beef, sheep/goat, taro, yaqona, ginger, honey, vegetables, coconut, rice organics, cocoa, exporters and food processors. FCLC aims to represent the needs of the associations to Government through advocacy and the provision of specific and tailor made technical assistance to member of the 14 associations. Anticipated impact of the FCLC is to increase yield, increase quality and ultimately increase returns to members while improving the Agriculture sectors contribution to GDP. The FCLC works in partnership with the International Trade Centre and is funded by the European Union.

1.2.2 Fairtrade Scheme

Since 2011 sugarcane farmers from three main cane producer associations — Lautoka, Labasa and Rarawai-Penang have received $25 million dollars through Fairtrade Scheme which is a global initiative designed to assist farmers in low-income, developing nations (Chaudhary, 2015). Through this scheme farmers were paid premium of $US60/tonne by sugar buyers Tate & Lyle Sugars and funds were used to assist farmers reduce their farming costs through subsidies for fertilizer, weedicide, farming equipment and drainage. However this scheme came to end in 2016 when the main sugar buyers ceased purchasing Fairtrade sugar from Fiji Sugar Co-operation (FSC).

1.2.3 Ra Integrated Coastal Management Plan

Development priorities have given rise to increasing pressures on coastal zone that need to be managed in a strategic, integrated and sustainable way. Pressures include overexploitation of resources, lack of awareness and education, increase in population, pollution, legislation and enforcement, conflict over resource use, lack of resources (human and funding resources), lack of planning and coordination, unsustainable development practices, lack of alternatives for income needs and lack of assessment and information. To address such pressure in a coordinated and efficient manner, the Ministry of Tourism presented a case study to Cabinet highlighting the case of Coral Coast Nadroga where coastal resources were under immense pressure from development objectives. The Government approved the formation of the National Integrated Coastal Management Committee (ICMC) to be a subcommittee of the National Environment Council (NEC) and aligned to the Environment Management Act (EMA) 2005. The core role of the National ICMC is to coordinate the management plans for coastal areas and report to the NEC for feedback to Cabinet.

The National ICM Framework was adopted in 2011, outlining focal areas and activities that should be pursued to ensure sustainable development of coastal areas. It was also realised that the completion of provincial plans (in 14 Provinces) would be the building blocks to the compilation of a National ICM Plan. The Coral Triangle Pacific Project funded by ADB allowed ICM work to be undertaken in Ra commencing in 2012. A draft Ra ICM Plan will be presented at the next sitting of the Ra Provincial Council in August 2016. The Ra ICM Plan highlighted 8 key priority issues to coastal management as outlined in Figure 1.

Two key issues are directly linked to agriculture production; these include burning and unsustainable agriculture. It must be noted that except for marine issues; resource management challenges identified in the Ra ICM Plan are not restricted to coastal area but are also relevant to upland and interior areas.

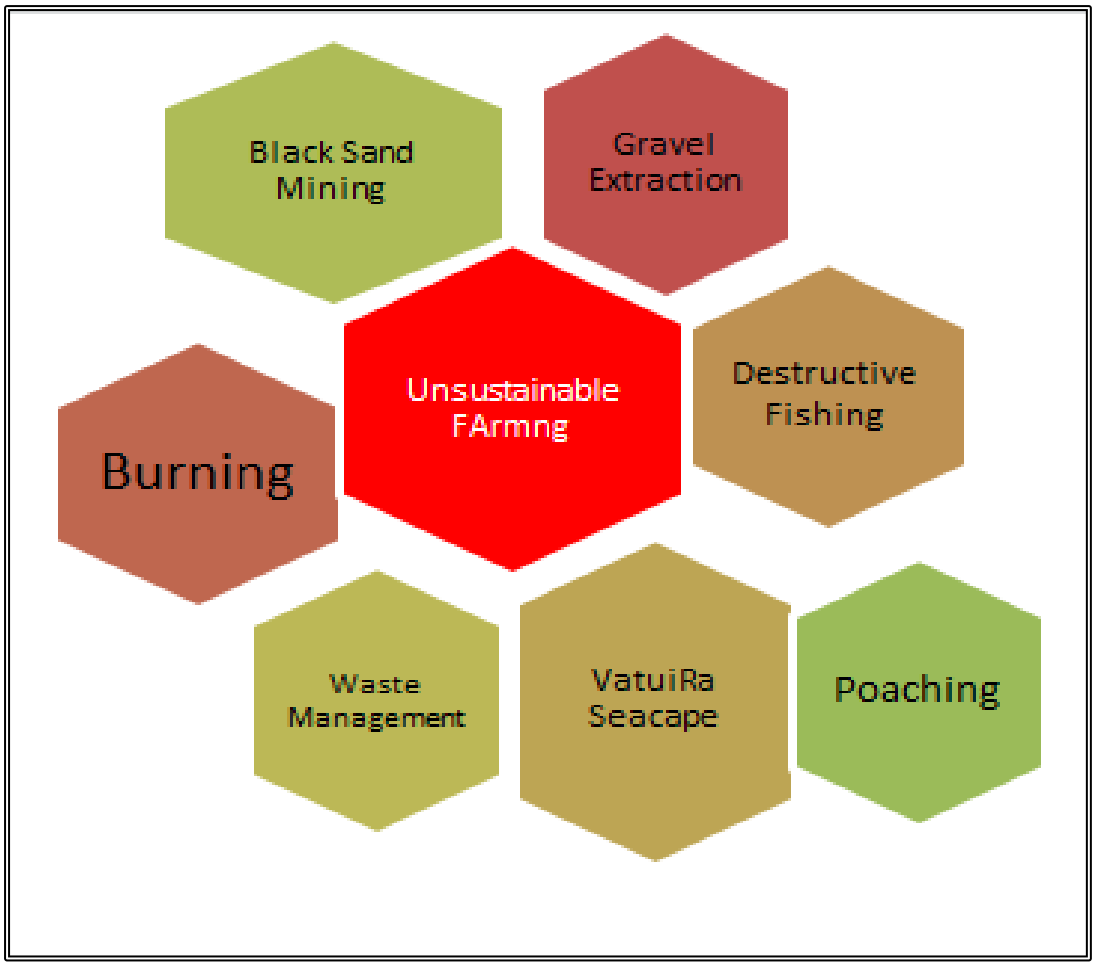


Figure 1: Key Issues highlighted in the Ra Integrated Coastal Management Plan

1.3 Macroeconomics of the agriculture sector

Fiji is classified by the World Bank as an upper middle income country[1] with Gross Domestic Product (GDP) averaging at 4.2billion FJD from 1988 to 2014[2]. In 2014, GDP is estimated at 8.5 billion FJD[2]. Based on World Bank data, the GDP per capita for 2015 is projected at 4,041.7 USD while the GDP adjusted by purchasing power parity is estimated at an average of 8,691.7 USD placing Fiji at 49% of the worlds' average[3].

Agriculture activities are widely scattered in the country and the economic function they perform in channeling the flow of goods from the producer to the consumer is of great importance. Agriculture activities accounts for a substantial proportion of the total economic activity, whether in terms of the sector to the GDP or in terms of its share of total employment and gross fixed capital formation.

[1] http://data.worldbank.org/country/fiji
[2] http://www.statsfiji.gov.fj/statistics/economic-statistics/national-accounts-gdp
[3] The latest estimate is available for 2015 at http://www.tradingeconomics.com/fiji/gdp

The national accounts for GDP measures agriculture sector as a cluster of activities under agriculture, fisheries and forestry. In 2015, agriculture sector is estimated to contribute 11.7 % of Fiji's GDP with the service sector in the lead at 70.2 % while industry contributed18.1 %[4]. The trend in GDP for agriculture has declined due to the performance of the sugar industry, the inability to cope with trade liberalization, the occurrence of natural disasters, pest and disease outbreaks, export trade restrictions, political instability, and inconsistent public sector support.

In 2012, the Fiji Bureau of Statistics undertook a study on agriculture, fisheries and forest industries to facilitate the estimation of the national accounts to re-base constant price of GDP for the sector. The report noted a few unique features of the sector to include high sensitivity to weather where natural disasters such as droughts, floods and hurricanes have a great impact on agriculture activities; the period of production is relatively long in some cases with longer cycles of value added activities as in the case of planted forest and forestry activities. Activities in the agriculture sector are carried out by a wide variety of units, from small to large businesses with small units catering for own consumption and consumer demands while large businesses are often preliminary consumer driven. The report also noted that sub-leasing of farms is prevalent and often common in sugarcane farms and that many small establishments go in and out of business with changing economic and seasonal factors. It also noted that many small businesses do not maintain proper records.

A comparison of the percent change in Gross Output and Operating Surplus in 2011 – 2012 (of few core commodities) in the agriculture sector indicates that cassava, taro, goat, sheep, bee keeping and yaqona were the most lucrative commodity in 2012 (Figure 1). At the same time, operating surplus for sugar, beef, banana and vegetables were at a loss. The decline in the sugar industry was driven by farmers moving out of cane production while beef, banana and vegetables were driven by reduction in quantity produced.

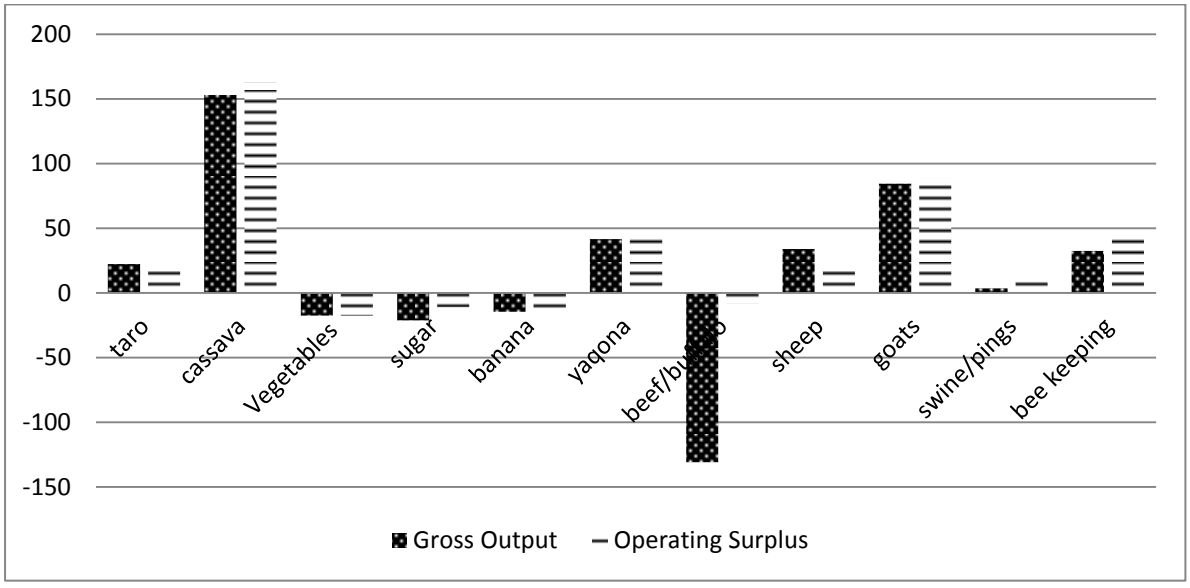


Figure 2: Percent Change 2011-2012 of Gross Output and Operating Surplus

[4] The latest estimate is available for 2015 at https://www.gfmag.com/global-data/country-data/fiji-gdp-country-report

2.0 Agriculture in Ra Province

Fiji Islands is divided into three major climatic/topographic regions which determine the types of crops that can be grown in each zone. Wet agricultural zones receive around 3,000 mm/year of rain, supporting horticultural crops such as ginger, cassava, taro, yaqona, bananas and breadfruits. It also support beef, dairy, poultry and pig farming. The intermediate zone receives around 2,000- 3,000 mm/year of rain and mostly support vegetables, cocoa, passion fruit, maize, sorghum, tobacco, watermelon, potatoes and turmeric with some beef/cattle. The dry zone receives less than 2,000 mm/year of rain with occasional droughts every few years. The Province of Ra falls in this category. Crops grown in the dry zone include sugarcane, irrigated rice, pulses, yams, citrus, pineapples and mangoes, with goats, sheep and beef/cattle as the predominant livestock.

In terms of agricultural land use, majority of the land in Ra Province is classified as un-arable land being unsuitable for agricultural cultivation due to steep slopes (> 30°). Agricultural land use is categorized into temporary crop, fallow land, permanent crop, pastures, coconuts, natural forest, planted forest and non-agricultural land. The National Agriculture Census Report (2009) [5] reported that the largest percentage of actual land use is for permanent crops (31%), pastures (19%) and natural forest (17%). A comparison of farm types indicates that majority (59%) of farmers in the Province of Ra are engaged with mixed crops; a sizable number (38%) are involved solely in crop production while a mere 3% are involved in livestock (Figure 3).

Table 1: Farmer Profile in Ra Province

Farmer Profile in Ra Province 2009		
Mean Age	40-59 year	
Average Farm Size	1-3 ha	
Gender	Male	96%
	Female	4%
Ethnicity	iTaukei	76%
	Indo-Fijian	23%
Marital Status	Never Married	10%
	Married	84%
	Widowed	4%
	Divorced	1%
Education	Juridical	0.20%
	Primary	45.80%
	Secondary	48.00%
	Tertiary	4.30%
	Agriculture Colleg	0.20%
	Never Attend	1.50%
Religion	Juridical	0%
	Methodist/Cathol	62%
	SDA/AOG	14%
	Hindu	20%
	Muslim	1%
	Other	3%
On farm salary/benefits	remuneration (self employed)	78%
	cash & Kind	5%
	In Kind	12%
	Cash	5%
% household income from farm	<50%	21%
	>50%	79%

[5] National Agriculture Census is undertaken every 10 years. The last inventory was undertaken in 2009. There is no available micro-level data after 2009. The data from the National Agriculture Census are used in this report to indicate the level of agriculture activity in Ra Province.

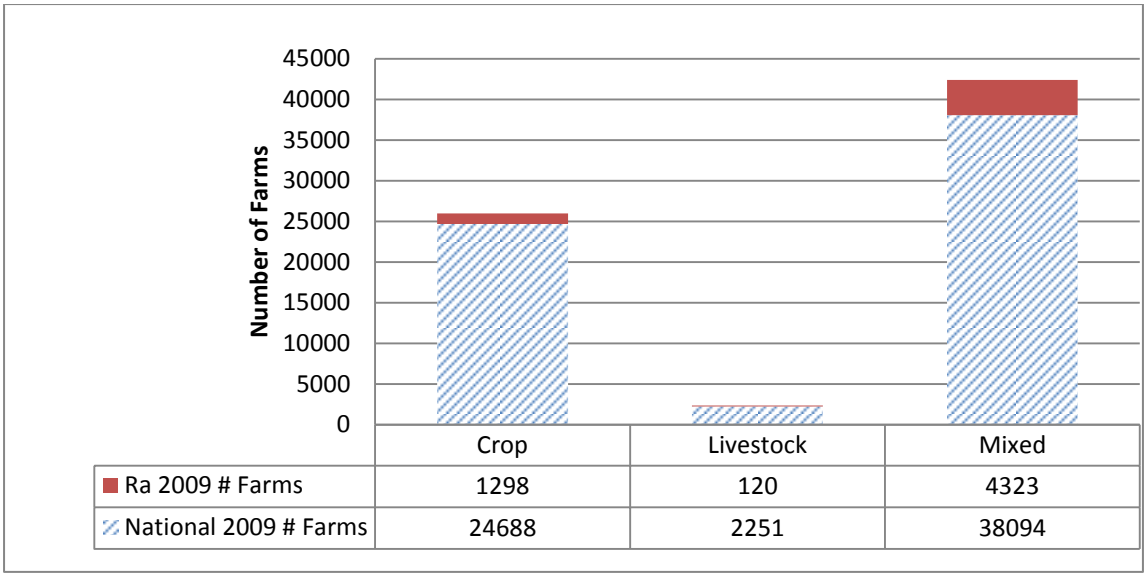


Figure 3: Comparison of Agriculture Farm Type in Ra against national level

The 2009 National Agriculture Census[6] reports a total of 65,033 farms in Fiji; a decline of 32% compared to the 1991 count. Average farm sizes have also declined to 3.9 hectares from 6.2 hectares in 1991. The rapid decline in agriculture land use is attributed to rapid urbanization, increase in residential and industrial property development in prime farm land, deregulation policies, low prices for crops and land tenure issues.

In the Province of Ra, there were 5,741 farmers in 2009, consisting of 8% of the national total. Majority of registered farmers are small holders owning between one to three hectares (Figure 4). Farmer profile in Ra is outlined in Table 1.

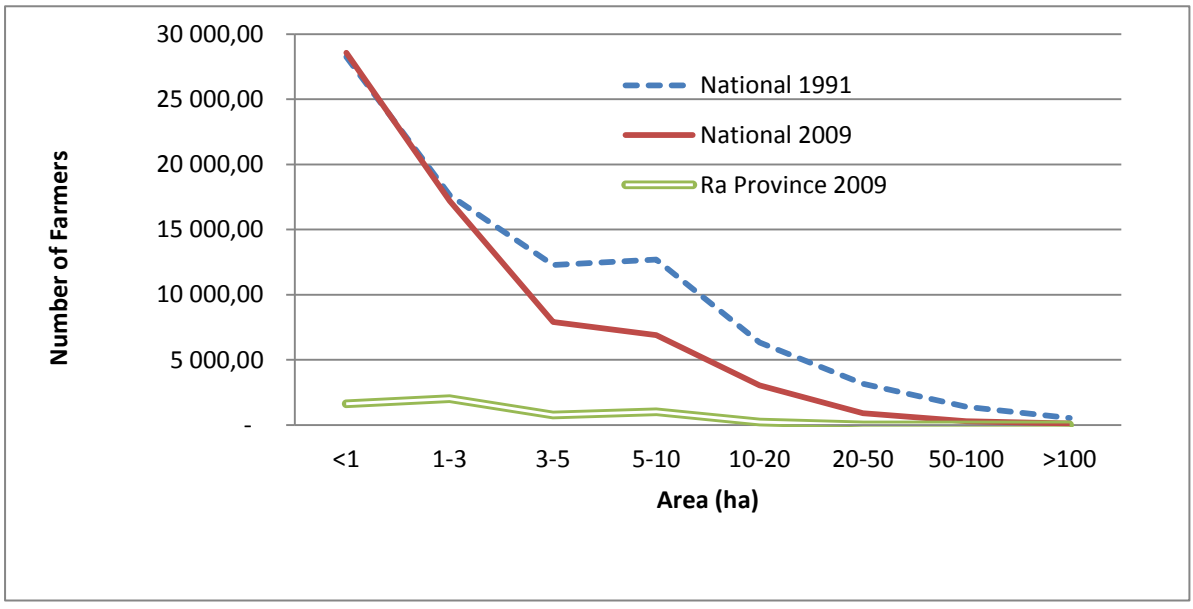


Figure 4: Number & Size of Farms in Ra: 1991 and 2009 Census estimates

[6] There is no alternative source of *detailed agriculture data* available from the Ministry of Agriculture except for the National Agriculture Census of 2009.

2.1 Mix Crop Farming

2.1.1 Sugarcane Framing

The sugar industry played a historical role in building Fiji's economy. It used to occupy over 50 percent of arable land (FAO, 2003), directly employs 13 percent of the labor force; contributes to around 9 percent of GDP and generates some 30 percent of total domestic exports (ADB, 2000). The sugar industry has since suffered from quality concerns, management problems, labour relations issues, non-renewal of land leases, shortages of harvest labour, and most importantly the phasing out of the preferential price agreement with the European Union leading to sugar price reductions of 36% and a decline in sugarcane production (ADB 2012). In 2010, the government began implementing industry reforms. These are making an impact, with sugar production increasing by 16.2% in 2013, reversing a contraction of 7.1% in 2012. At the end of 2013, contribution to GDP by the sugar industry was estimated at 1.4% of GDP and generating 8.1% of total export (Fiji Sugar Corporation Ltd. 2013).

The Fiji Bureau of Statistic (2015) estimated a major decline in sugar cane production with extensive impact on immediate consumption and gross output, compensation of employee, value added and operating surplus (Figure 5).

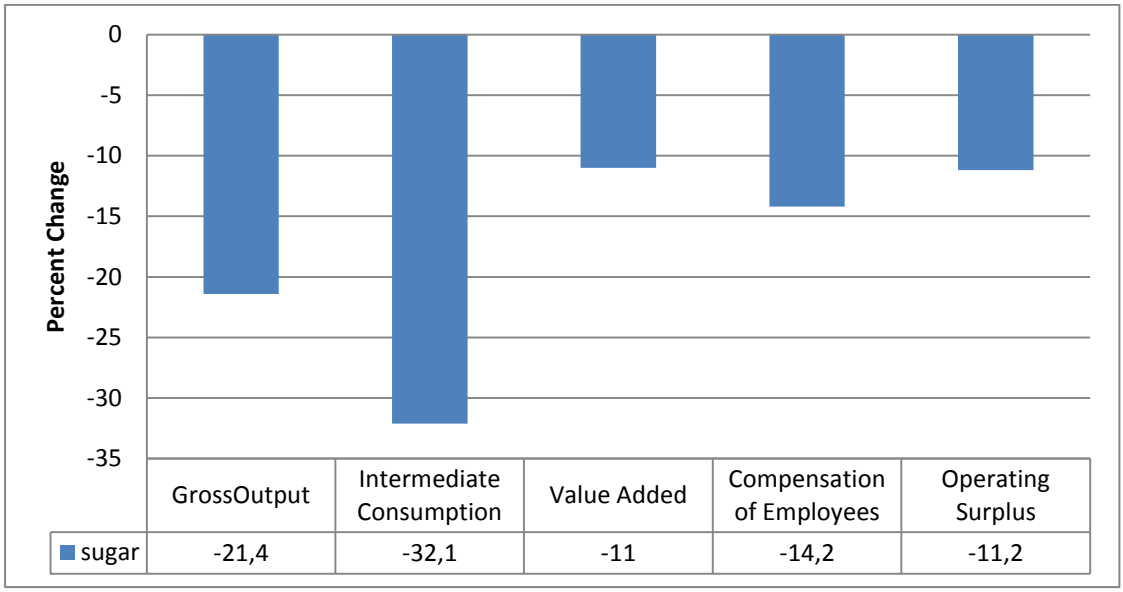


Figure 5: Percent Change in Macroeconomic Aggregates 2011 – 2012 for sugar cane

The above trends are confirmed at site level as the microeconomic aggregate evident in the 2009 National Agriculture Census indicates a decline in the area under sugarcane production from 112,192 hectares in 1991 to 57,177 hectares in 2009 with continued decline projected to the 2012 production levels. By 2013, this has further declined to 411,959 hectares (FSC 2013). The steep decline is attributed to loss of preferential market price as a result of changes in the world trading environment; the high cost of production, impacts of climate change ensuing flash floods, drought, production inefficiencies such as high levels of un-harvested cane, low mill efficiency in sugar extraction, and expiring land leases. The latter have directly contributed to rapid urbanization as tenant farmers leave the sugar industry in search of alternative sources of livelihood.

Arable land in the Ra Province can be found along the coastal parts of Rakiraki, Nakorotubu and Saivou districts and extend further to the flat plains of Nailawa district. In 2009, there were a total of 1, 866 registered cane farmers in the Ra Province, an area of about 5, 856 hectares with

an annual cane production estimated at 257,648 tonne; equivalent to over ten percent (10%) of the national cane production. Fifty percent of cane farms range from 5 to 10 ha followed by 3 to 5 hectares with less than two percent of the cane farms registering with area over 10 hectares.

Table 2 : Area and Production of Sugarcane by District in the Ra Province, 2009

DISTRICT	REGISTERED FARMS	AREA PLANTED (HA)	PRODUCTION (TONNE)
Nakorotubu	**75**	**145.79**	**6,639.41**
Nalawa	**85**	**190.03**	**8,667.45**
Rakiraki	**1152**	**3748.33**	**160,958.06**
Saivou	**553**	**1772.22**	**81,383.17**
TOTAL	**1866**	**5856.38**	**257,648.08**

2.1.2 Horticultural Crops

There is a major shift in the agriculture sector towards growing cash crops to supplement farmer income in view of the decline in sugar price. Production of cash crop is based on small holder farmer and over the years have been the fastest growing component of the agricultural sector in Fiji (FAO, 2003).

Agriculture is the backbone of Fiji's rural economy and is crucial to the provision of food security, economic livelihood and the reduction in imported food and vegetables. The top 5 commodities produced in Fiji include sugarcane, cassava, dalo, coconut and yaqona/kava. In comparison the top 5 common commodities in the Province of Ra include all the above except for coconut. Instead of coconuts farmers in Ra invest in banana. At the same time, commodities that draw the highest return at the national level include kava, dalo, cassava, banana and coconut. In comparison, commodities that draw big money in the Province of Ra include kava, cassava, dalo, banana and watermelon (Table 3).

Table 3: Comparison of common parameters in Agriculture: Fiji and Ra Province

Parameter	Fiji	Ra Province
Hectares Under Agriculture	251,857	24,665
No of farms	65,033	5,741
No of farmers	63,622	5,728
No of jobs in the sector	215,436	14,699
Top 5 commodities in hectares (in descending order)	Sugarcane, cassava, dalo, coconut, kava	Sugarcane, cassava, dalo, kava, banana
Top 5 commodities in economic return ($) (in descending order)[7]	Kava, dalo, cassava, coconut, banana	Kava, cassava, dalo, banana, watermelon

Fiji National Agriculture Census (Department of Agriculture 2009) categorized horticultural crops into permanent and temporary crops. Permanent crops included fruit trees and other crops that are harvested over a period of time while temporary crops consist of plants and vegetables that are harvested within one cropping season. Permanent crops include yaqona and fruit trees such as banana and coconut. Majority of farmers in Ra cultivate temporary crops but when compared to neighboring provinces, more farmers in Ra engage in permanent crops

such as banana. The criteria for selecting provinces that are compared with Ra are based on (1) population density in rural area and household head count; (2) extent of natural resources (mainly forest) and (3) extend of degraded landscapes. In comparison the strong focus on temporary crops for Nadroga and Ba Province is a direct reflection of the strong vegetable market at these sites.

In the Province of Ra, 29% of the farms host temporary crop such as capsicum, carrot, Chinese cabbage, cow pea eggplant, English cabbage, French bean, Maize, Okra, pumpkin, rice, tomatoes, watermelon and others (Department of Agriculture 2009).

Majority of small holder farmers in the horticulture subsector grow traditional staple crops such as dalo (*Colocasia esculenta* or taro), yams (*Dioscorea*), ginger (*Zingiber*), and many varieties of tropical fruits and vegetables. Sweet potatoes (*Ipomoea batata* or kumala) are of lesser importance, but still a valuable subsistence food crop. Kava (*Piper methysticum* or yaqona), a crop of traditional importance, has been developed as an export crop. Dalo is commonly grown as a staple food crop, but in recent years has increased in importance as an export crop. Yaqona and Dalo are mainly grown on the alluvial flats or on newly cleared forested areas. Cassava (*Manihot spp.*), yams and sweet potatoes used to be grown predominantly for local consumption. However, there are efforts to develop these crops increase for export. New crops have also been introduced to the area such as potatoes (*Solanum spp.*) and rice (*Oryza spp.*) under the Import Substitution and Food Security program. With increase in population and the push by government for import substitution program traditional varieties of food crops such as yams and sweet potatoes have been largely displaced in favor of fast maturing varieties which are not resilient to extreme weather events.

In the case of taro there are 125 varieties in Fiji of which 70 are common among local communities. With the onset of commercialization, researchers have developed varieties that meet market demand. Hybrid varieties of taro (*Colocaia esculanta*) such as Maleka dina and Warasa dominate commercial and semi-commercial farms as popular export preferences that are displacing traditional varieties such as dalo ni tana (*Xathosoma sagittifolium*) and the giant swamp taro (*Cyrtosperma chamissonis*) among others. The Koronivia Research Station (KRS) maintains a Germ plasm bank (field) hosting 79 varieties of traditional varieties. There is no in-situ dalo field outside of KRS. Conservation International has been collecting taro suckers and other crop varieties from KRS for distribution to Ra communities as a measure to combat climate change. There is a need to systematically record and monitor yield performance of traditional varieties distributed to farmers and to ensure lessons learnt are captured and shared widely.

Efforts are currently underway to reintroduce traditional crop varieties to local rural farmers for food security.

The number of farms hosting different agriculture activities in Ra Province is indicated in Figure 4. Farmers in the Province of Ra have strong interest in the cultivation of permanent and temporary crops. Permanent crops include breadfruit, yaqona, noni fruits, avocado, mango, lemon and others. Temporary crops include dalo, cassava as well as all species of *Fabaceae, Solannaceae, Malvaceae, Amaranthus, Brassicaceae* and others. The number of farmers in Ra cultivating cassava is comparable to the number of farmers in neighboring Naitasiri Province (Figure 6). Cassava is the most common temporary crop among farmers in Ra. At the same time, the most popular permanent crops are yaqona and banana (Figure 7).

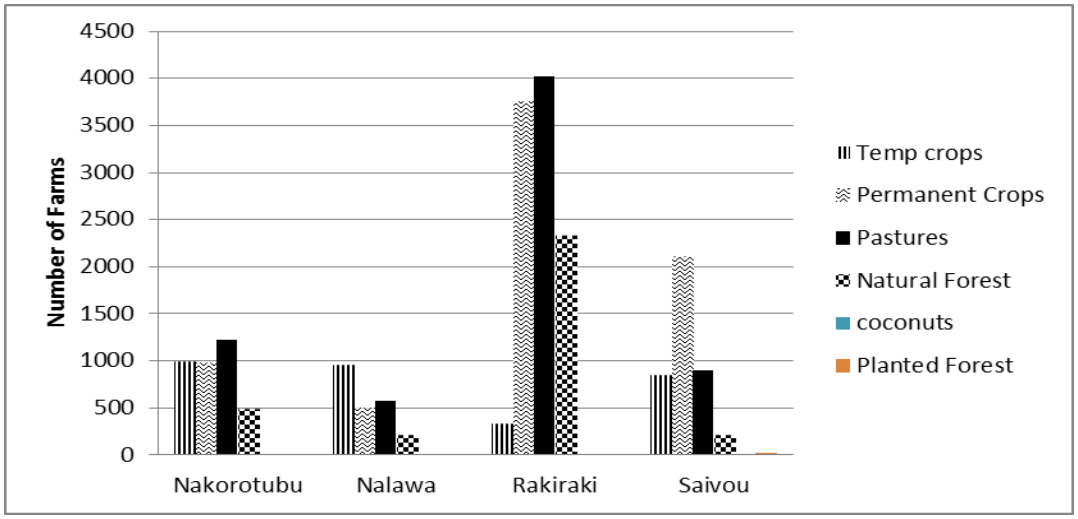
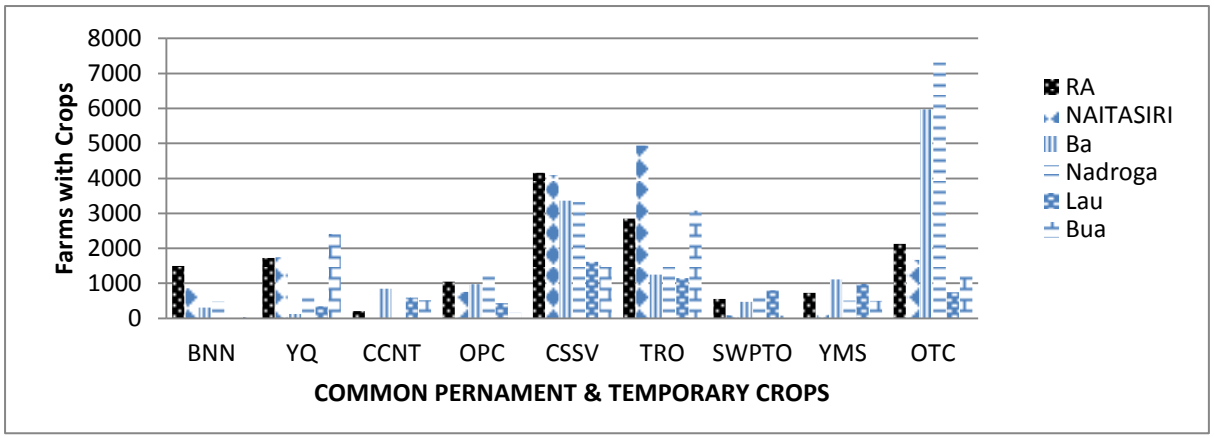


Figure 6: Number of the types of farms in each District in Ra Province



BNN: Banana; YQ: Yaqona; CCNT: Coconut; OPC: Other Permanent Crops; CCSV: Cassava, TRO: Taro; SWPTO: Sweet Potato; YMS: Yams; OTC: Other Temporary Crops.

Figure 7: Commodities for Temporary and Permanent Crops 2009

The most popular crops cultivated by farmers in Ra Province are cassava, taro, yaqona and other temporary crops. Cassava, taro and yaqona are comparable to neighboring Provinces of similar climate such as Naitasiri, Ba and Bua. "Other temporary crop" may be considered an outlier since Nadroga which lies in the dry climatic zone. Although the number of farmers in Ra cultivating cassava is at the same level as Naitasiri Province, the yield of cassava in Ra about a third of that in Naitasiri (Figure 8). This is attributed to the area cultivated by farmers in Naitasiri Province which averages at 1ha per farm against 0.5ha per farm in Ra. At the same time, disconnect in efficient supply chain and market linkage in Ra is also a major contributing factor to the low yield estimates as a substantial amount of cassava may not be recorded as it is gifted to family and friends of farmers in Ra Province. At the same time, the area of cultivation and yield for yaqona in Ra and Naitasiri are comparable despite the greater number of farms in Bua cultivating the crop. With the exception of Naitasiri the yield in Ra, Ba, and Bua are consistent with national trend. Low yields is a great concern to the Department of Agriculture and efforts are underway to improve yield through improved farming techniques such as the use of Aglime as a soil conditioner before planting.

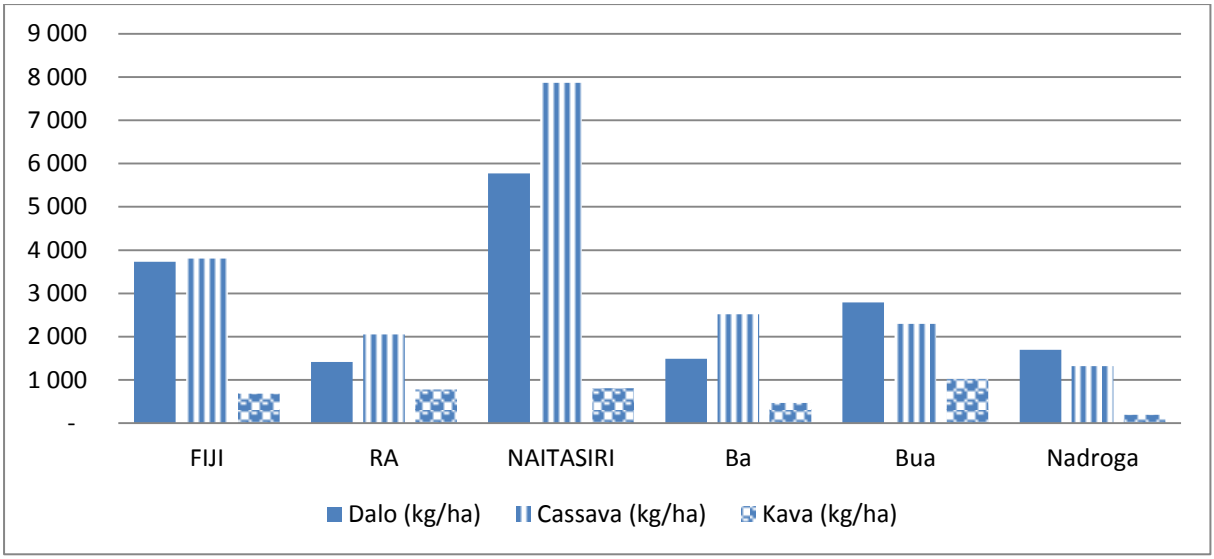


Figure 8: Yield of Selected Permanent Crops (kg/ha) in 5 Provinces

Although crop production has been successful to a degree it has been limited by the quality, volume and consistency of supply. In rural areas marketing and marketing network are either absent or weak coupled with the poor access to markets due to poor infrastructure. Lack of arable land, land-use planning and regulations has resulted in the clearing of forest in steep slopes causing soil erosion and decreasing productivity. In view of the cropping preferences of farmers in Ra Province, there is a positive opportunity to engage in Agroforestry and mix planting of permanent and temporary crop.

Key horticultural commodities produced in Ra Province are examined in the following sections.

1. Cassava

Cassava is an important source of revenue for the country. In 2009 Fiji produced 48,772 tonne of cassava valued at FJ$21 million (Department of Agriculture, 2009). It is the most ubiquitous crop in Fiji, with 32.3% of farms in the country planting it. The crop is grown on 15,446 hectares, or 36.6% of the total planted area in Fiji (Department of Agriculture, 2009). Total production in 2009 is recorded at 4.6 million kilogram valued at $2.26 million FJD. By 2012 production increased to 96.78 million kilogram valued at $77.42 million FJD (Fiji Bureau of Statistics 2015).

At the national level, cassava production recorded the highest percent change in 2011 – 2012 analysis of macroeconomic aggregates (Figure 1). The large and positive change in macroeconomic aggregates for cassava is driven by the increase in quantity of production and the 100% increase in price per tonne from 438 FJD (in 2011) to 800FJD by 2012. Positive spin off from increased cassava production is evident in the compensation of employees followed by value added (Figure 8).

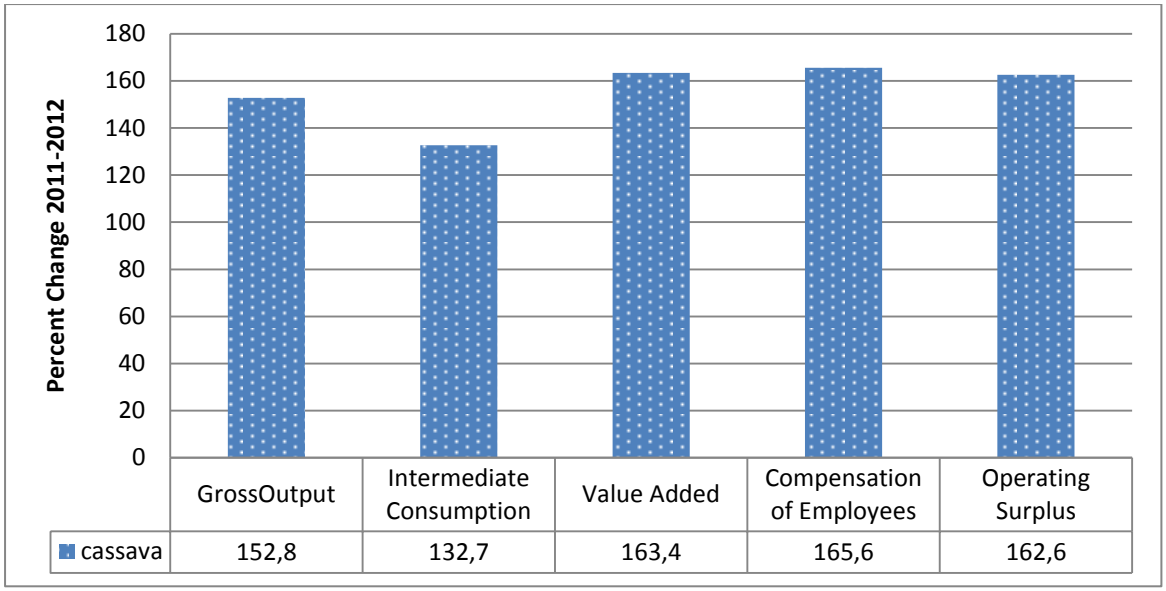


Figure 9: Percent Change in Macroeconomic Aggregates for Cassava 2011-2012

Cassava is one of the most popular crops among farmers in Ra with 39.9% of farms producing cassava on 2,245 hectares or 41.7% of the total area in the province. Cassava plot size in Ra averages at 0.5ha per farm and is often part of a diversified farming system in the province. Many sugarcane fields have been converted to cassava farms as indigenous farmers take over expired sugarcane leases. Approximately 90% of the production was sold in the domestic market (Department of Agriculture, 2009).

Opportunity exists to improve supply chain from farm to market through improving coordination among farmers and buyers. Unless market coordination is improved, cassava from Ra Province will continue to cater for the domestic market.

2.1.2 Taro

Taro is the most important horticultural crop for Fiji. In 2009, taro attracted $49.5million through production of 56,645 tones. By 2012 production increased to 82,145 tonnes valued at $82.145 million FJD (Fiji Bureau of Statistics 2015). Despite the increase in quantity of taro produced in 2012, the average market price remained stagnant at $1000 per tonne giving rise to a slight increase in the percent change of macroeconomic aggregates in 2011 – 2012 at the national level. As evident in Figure 9, the growth is driven by the quantity produced which directly contributed to the increase in compensation of employees, value added, gross output and operating surplus.

A significant increase in the intermediate consumption between 2011 and 2012 indicated that taro is an important staple crop for the country, playing an important role in the Fijian diet.

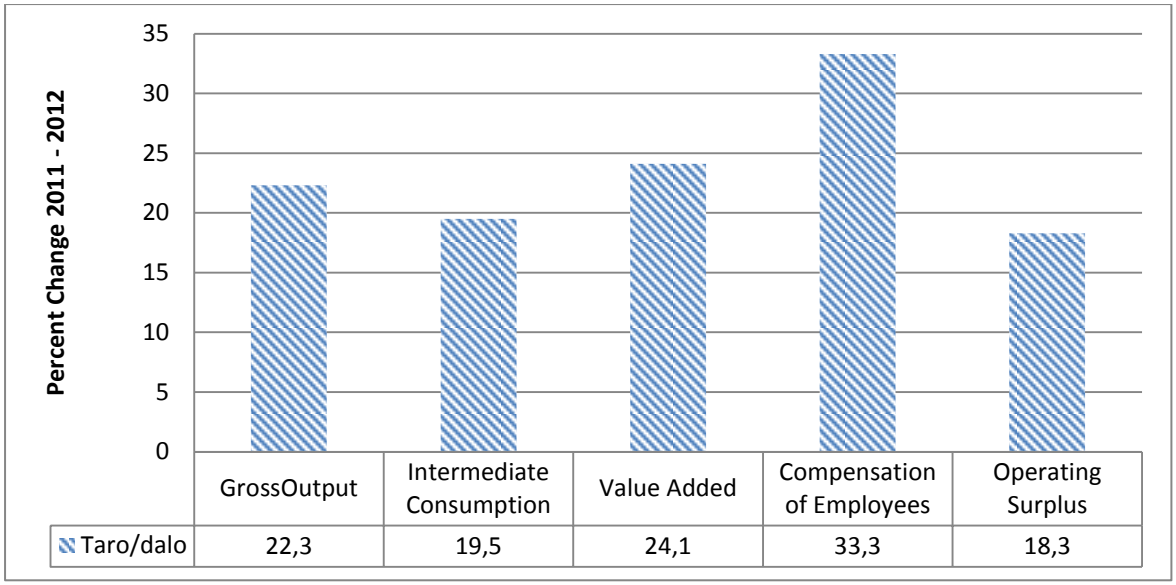


Figure 10: Percent Change in Macroeconomic Aggregates for Taro/dalo 2011-2012

At the project level the National Agriculture Census (2009) indicated a total of 2,849 farms in Ra Province producing taro. This represents 27.3% of farms in the province. Taro is cultivated in 1,294 hectares in Ra, or 29.8% of the planted area. Total production in 2009 was 1.83 tonne worth FJ$1.58 million to the local economy. Taro produced in Ra is more likely to be sold on the domestic market due to the remote location of Ra in relation to major market centers such as Suva and Nadi.

Similar to cassava, opportunity for growth exists if market access is made available to taro farmers in Ra Province.

2.1.3 Kava

Piper methysticum or Yaqona has the highest value of all permanent crops grown and is thus an important source of income for farmers in the region. As a permanent crop, rotation cycle takes 2-5 years for harvest and it is often planted as a complementary commodity to annual production.

In 2012 production was recorded at 3,101 tonnes valued at $99.235 million FJD (Fiji Bureau of Statistics 2015). Despite the increase in quantity of yaqona produced in 2012, the average market price remained stagnant at $35,000 per tonne for waka and $25,000 tonne for Lewena. As evident in Figure 10, the growth is driven by the quantity produced which directly contributed to the increase in value added, gross output and operating surplus. It is interesting to note that compensation of employees only made a slight increase and may be attributed to the low level of efforts farmers need to handle the produce before it is marketed as middlemen often procure yaqona directly at farm gate.

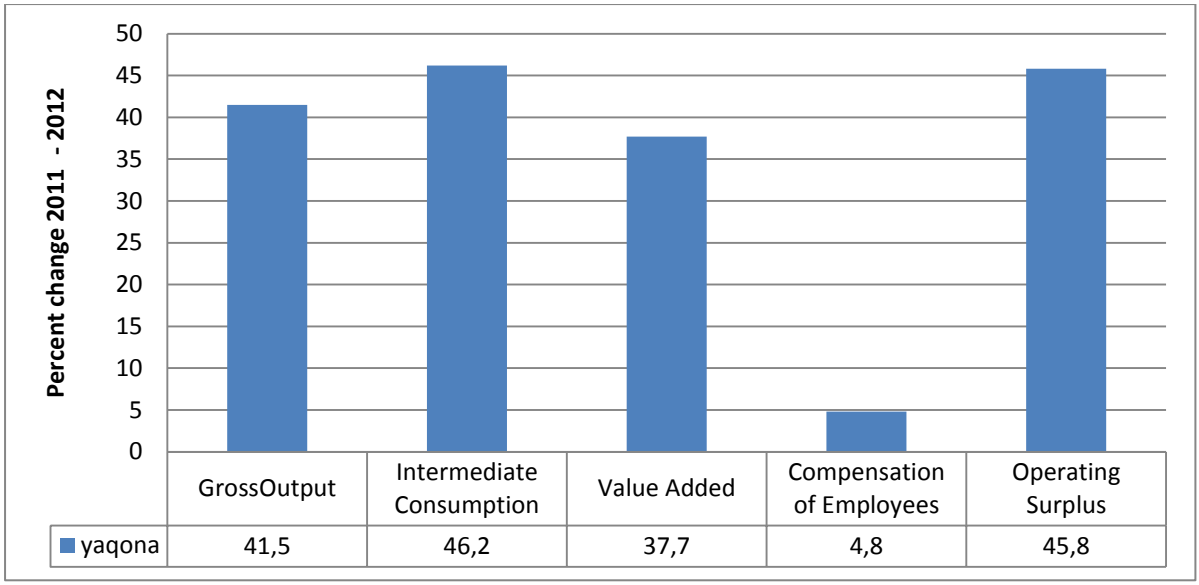


Figure 11: Percent Change in Macroeconomic Aggregates for Yaqona 2011-2012

At project level, the 2009 National Agriculture Census indicated a total of 1,722 farms in Ra Province cultivated kava representing 38.5 % of farmers in the region and covering 771 hectares (Department of Agriculture, 2009).

Kava provides significant economic benefits to smallholder producers in view of its market value and strong demand all year round. Kava plants may serve as an important source of ready finance for producers. A farmer having 1,000 kava plants in the ground can use this as "sweat equity" in accessing credit based on the dollar value of the number of plants in the ground. Kava has a high degree of liquidity since it can be harvested at any time during the year and there is always a ready market for it. It thus serves as an important source of emergency income for local producers.

However, sustainable cultivation presents some environmental challenges as producers believe that the best tasting kava grows virgin soils, or recently deforested areas. This is a popular belief that have no scientifically verifiable evidence but on which local farmer form management and expansion decision. Expansion of kava production thus places pressure on the remaining forest areas in Ra Province.

2.1.4 Ginger

Ginger is an important export crop for Fiji, but is relatively new to Ra Province and the Western Division. Ginger production is more advanced in the Central Division, where there is a stronger history of investment in horticulture crops. The 2009 agricultural census showed 582 farms in Fiji planting ginger, representing only 0.5% of all farms with a total of 217 hectares (Department of Agriculture, 2009). None of these farms were located within Ra Province. However, as disease outbreaks continue to affect ginger production in the Central Division, there are opportunities for introducing ginger in Ra Province where there is no history of disease. Ra Province is considered by the Department of Agriculture as a future "seed source" for ginger given its pest free status.

2.2 Apiculture (Beekeeping)

There are currently 1,000 beekeepers in Fiji and between 8,000 and 10,000 beehives (Panapasa 2013). The sector is highly organized, with members of the Fiji Beekeepers Association producing more than 80% of the honey in Fiji. Experts believe that there is vast potential for the

sector to reach 50,000 hives, produce 500 tonne per annum to generate an estimated FJ$21 million annually.

In 2012 production was recorded at 188 tonnes valued at $1.88 million FJD; an increase of 24% from 2011 (Fiji Bureau of Statistics 2015). Despite the increase in quantity of honey produced in 2012, the average market price remained stagnant at $10,000 per tonne. As evident in Figure 12 the growth is driven by the quantity produced which directly contributed to the increase in value added, gross output and operating surplus. It is interesting to note that similar to yaqona, the compensation of employees only made a slight increase and may be attributed to the low level of efforts farmers need to handle the produce before it is marketed.

By 2013 the level of production declined to produced 93.5 tonne of honey worth FJ$935,000 and accounting for 2-2.5% of national GDP (Panapasa, 2013; Rawalai, 2013). The decline is driven by inclement weather.

Fiji currently imports 2,860 kg of honey per year, valued at FJ$64,121 in revenue (Ministry of Agriculture, 2011). The government is actively promoting development of the sector to meet domestic demand. At the same time, the Department of Agriculture is seeking to boost honey production and expand export markets in Australia, US and Asia.

Beekeeping can offer smallholders a significant source of additional income. An average hive produces 25 kg of honey each year resulting in earning of FJ$250-300 per beehive each season (Lal 2013).

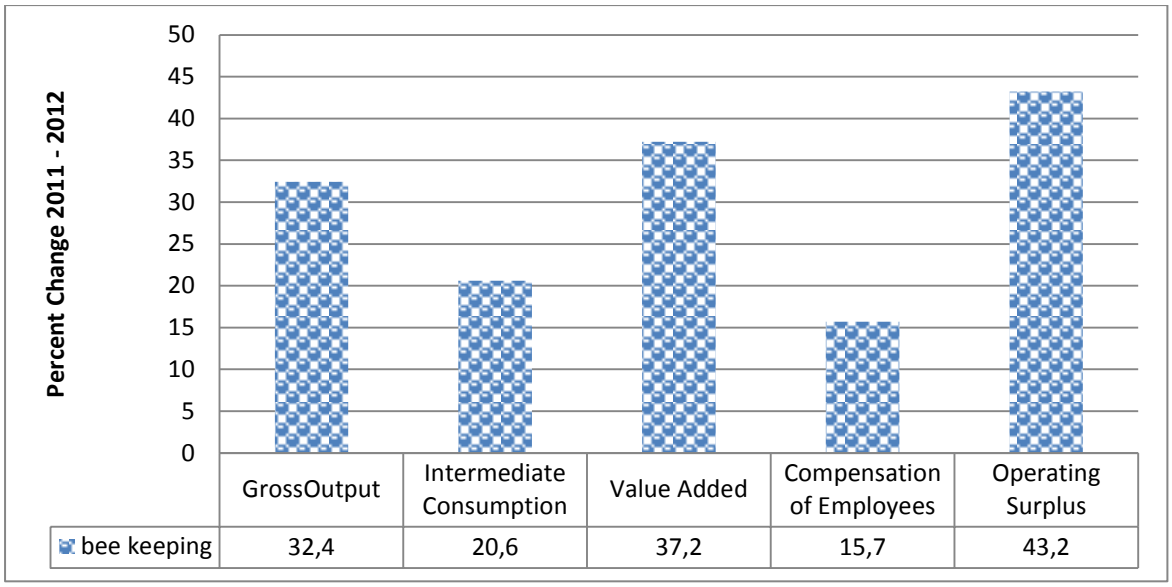


Figure 12: Percent Change in Macroeconomic Aggregates for Bee Keeping 2011-2012

In Ra Province there are two local markets available for honey. These include McKenzies Bee Line Lt. and Ishmael Ahmed. McKenzies Bee Line Ltd. is a major player as they provide inputs such as bee hives, queen bees and harvesting equipment. McKenzies Bee Line Ltd. also buys honey from local producers, process it (clean and bottle) and sell honey in the domestic market. Ishmale Ahmed also buys unprocessed honey from locals in Ra Province. When the demands are high, honey producers in Ra have secured better prices at markets in Suva and Nadi.

2.3 Livestock Farming

There has been a significant decline in livestock farming due mainly to the expiry of agriculture leases and the exit of tenant farmers from the agriculture sector. The Government has been committed in addressing the issue through the introduction of targeted programs such as the

Import Substitution Program to encourage farmers to engage while supporting the Dairy, Beef, Goat and Sheep Industries in Fiji.

In 2009 (Department of Agriculture), there was a total of 38,178 livestock (number of animals) in Ra Province consisting of cattle, goat, horses, pigs and sheep. The distribution of livestock is outlined in Figure 6 where cattle heads are noted to be the most common livestock in Ra. The number of cattle in Ra is comparable to Naitasiri while the number of goats in Ba surpasses all other provinces. It is also interesting to note that the number of horses in Ra, Nadroga, and Ba supports the assertion that large number of horses are required in the absence of mechanized tools where such livestock are kept as "work-horses" (plough and yarrow of fields) and transportation in to rural and inaccessible areas.

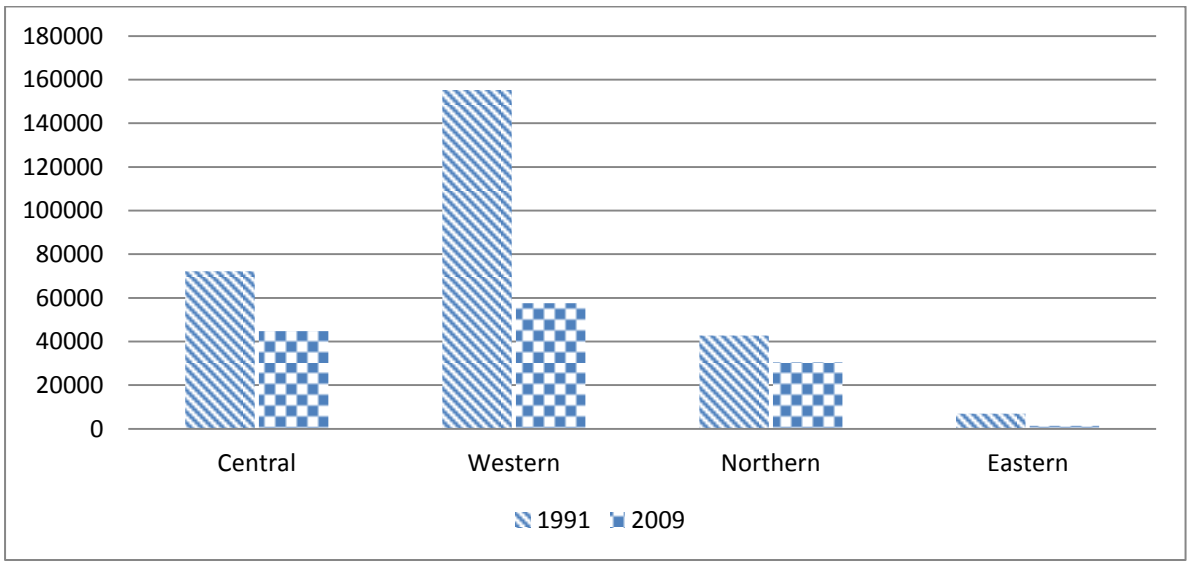


Figure 13: Trend in Number of Livestock Farms 1991 - 2009

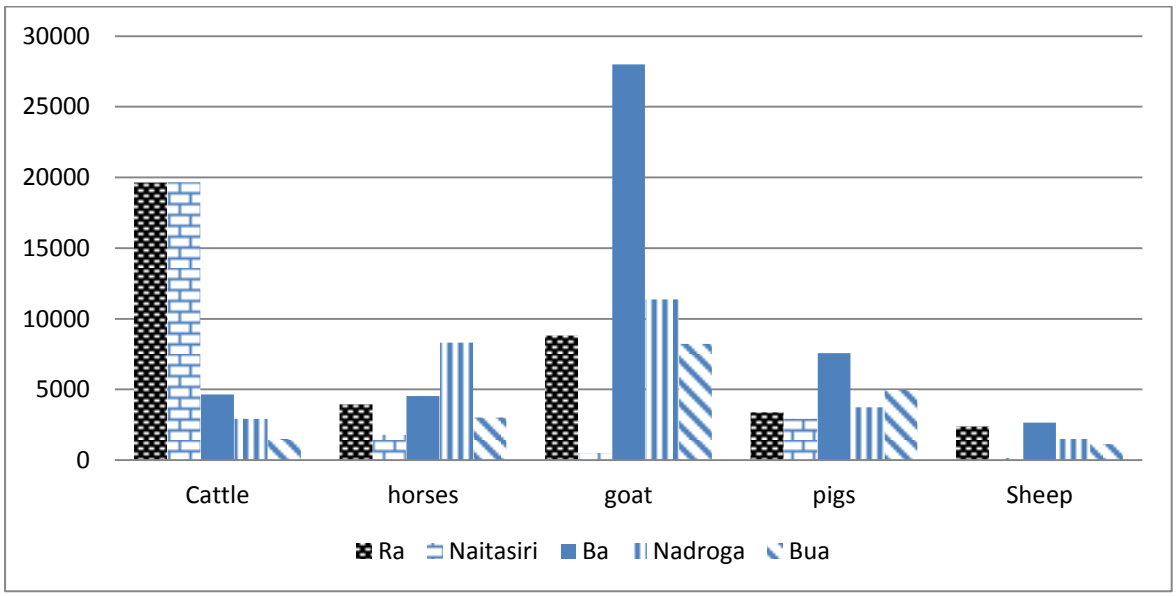
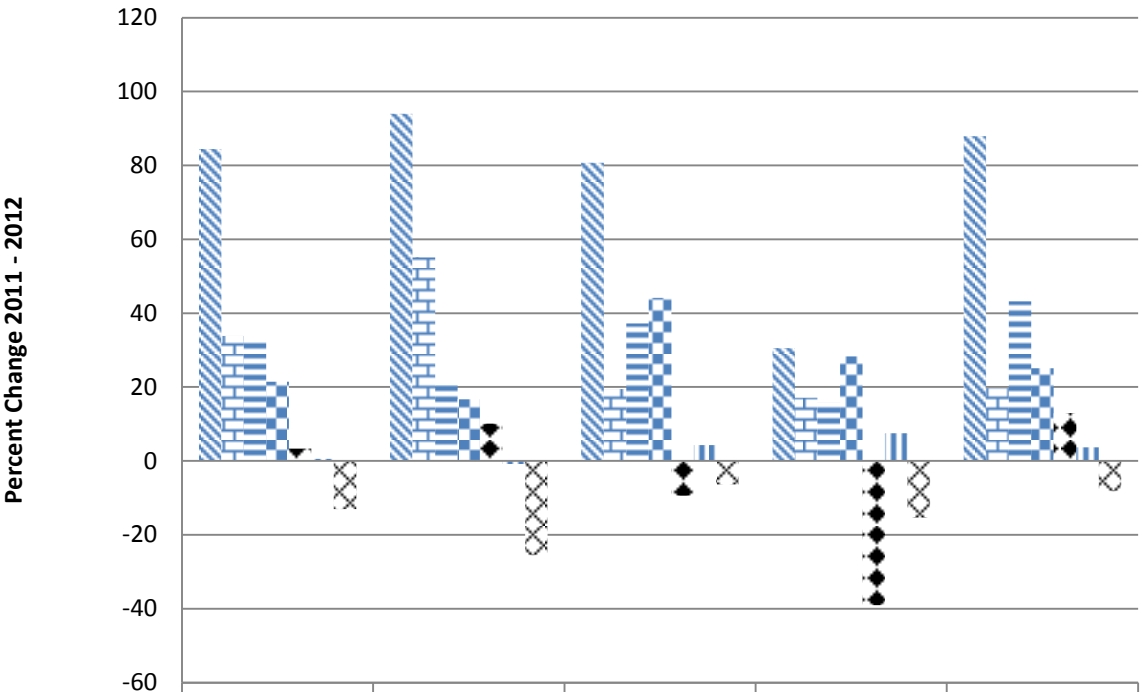


Figure 14: Number of Livestock in Selected Provinces

2.3.1 Livestock

At the national level, productive activities under livestock include breeding of cattle and buffaloes, production of raw cow milk from cows or buffaloes, raising and breeding of sheep, raising goats, swine/pigs, poultry, eggs and bee keeping. The macroeconomic aggregates of the above activities over the period 2011 – 2012 (Figure 15) indicate that goat rearing has the

highest percent increase in gross output, value added and operating surplus. This is followed by bee keeping, eggs, sheep, pigs and poultry. It is interesting to note that eggs is more lucrative than poultry while beef/buffalo has the lowest gross output and operating surplus.



	GrossOutput	Intermediate Consumption	Value Added	Compensation of Employees	Operating Surplus
goats	84,4	94	80,7	30,5	87,9
sheep	33,8	55,1	19,4	17,1	19,7
beekeeping	32,4	20,6	37,2	15,7	43,2
eggs	21,4	16,7	44,1	28,3	25,1
swine/pings	3,3	10,1	-9,4	-39,1	12,9
poultry	0,5	-0,8	4,3	7,5	3,7
beef/buffalo	-13,1	-25,5	-6,4	-15,4	-8,2

Figure 15 : Percent Change in Macroeconomic Aggregates 2011 – 2012 for livestock production

The majority of farms in Ra rear cattle for beef. In 2009 3,233 farms hosted a total of 19,650 cattle heads of which 44% for subsistence beef while 27% were commercial beef farmers (Department of Agriculture 2009). At the same time, a small yet significant number of farmers raised cattle for subsistence dairy products. The low "commercial dairy" production is attributed to the long distance to processing center in Suva. However with the recent installation of a milk chilling plant in Ba, commercial dairy production is expected to increase. The plant belongs to Fiji Dairy Limited and operated by Southern Cross Foods Limited. The Chief Executive Officer of Southern Cross Foods Limited – Mr. Sharma is reported to have rationalized that "… an existing farmer can easily accommodate five to seven cows, producing an average of 40 litres of milk per day. This can earn around $200 a week"[8]. The company anticipates opening a second plant at Yaqara Pastoral Company complex perhaps on a sub-lease arrangement.

[8] http://fijisun.com.fj/2013/04/13/pm-opens-first-milk-chilling-centre-in-the-west/

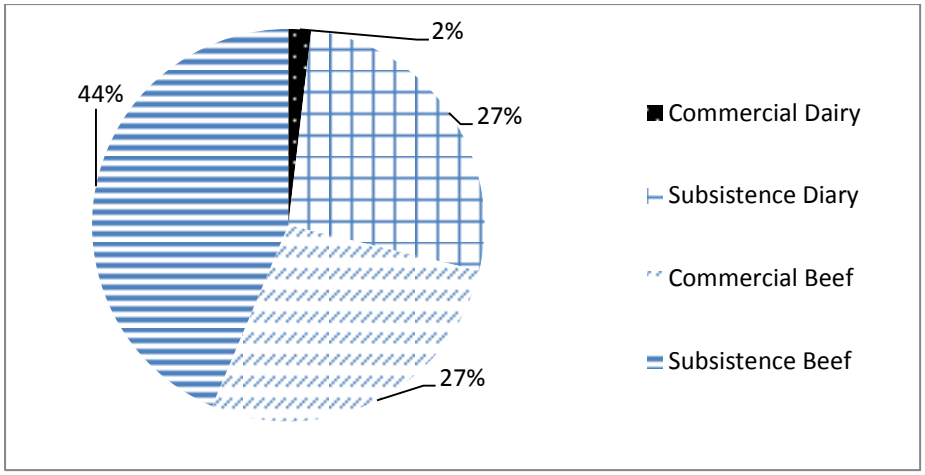


Figure 16: Types of Cattle Producers/Products in Ra Province

A comparison on the number of cattle heads in selected Provinces indicates the subsistence nature of cattle farming in rural areas. Subsistence beef and dairy farms are common among all selected Provinces indicating an active sub sector in rural areas.

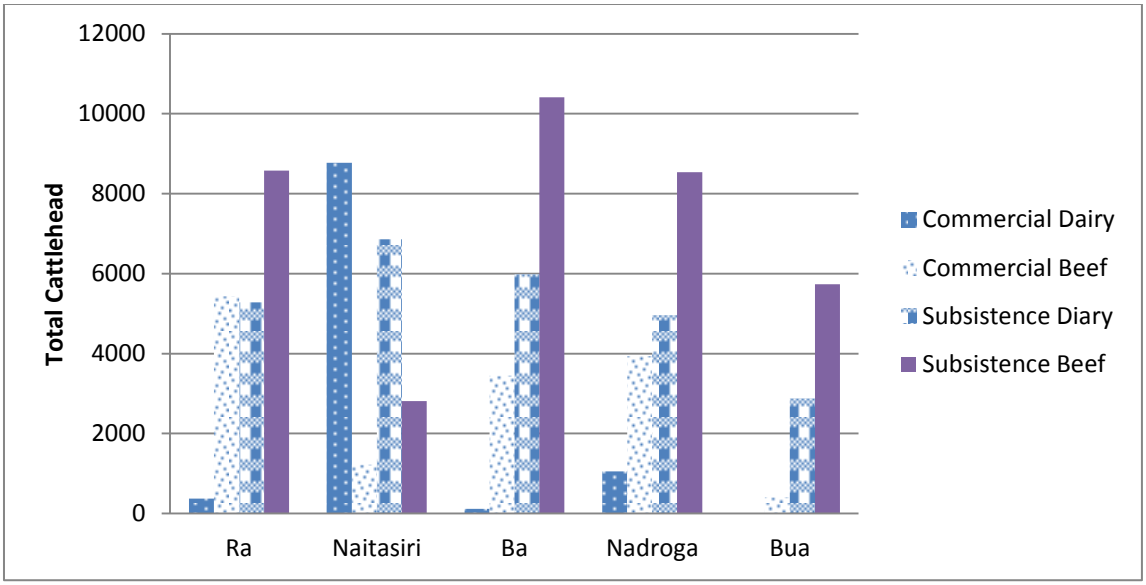


Figure 17: Commercial & Subsistence Dairy/Beef Production in Selected Provinces

Other commodities in the livestock sector include chicken and ducks. In 2009, the number of poultry was reported to be at 3.7 million (Department of Agriculture 2009) however by 2012 this has significantly increased to 126.552 million (Fiji Bureau of Statistics 2015). The growth was driven by increase in the quantity produced. It is interesting to note that the percent change in intermediate consumption for poultry was estimated at -0.8% with an increase in value added at 4.3%. This indicates that poultry are mostly raised to supply the market. The largest chicken and duck producers are located in the Province of Ba attributing to over 85% of production. The Province of Ra makes a very small contribution to the total amount of chicken and ducks in the country.

Table 4 Comparison of chicken and duck stocks

Selected Provinces	chicken	duck
Fiji- National	3,668,326	66,509
Ra	7,152	3,139
Naitasiri	162,535	1,409
Ba	3,142,384	36,453
Nadroga	20,361	1,667
Bua	1,482	2,348

2.3.2 Ranching

Farm size distribution of the livestock industry is consistent with other agriculture subsectors where small holder farms outnumber large commercial operations with the majority of farms ranging between 1-10ha. The small holder farms operate 98% of the livestock sector through semi-commercial operation inclined towards subsistence farming.

In this assessment, ranching is defined as areas with more than 50ha (Aregheore, 2005) used for purpose of rearing livestock or cultivating crops. Ranches in Fiji therefore take up a mere 2% of the total farms. These include the Yalavou Cattle Scheme, the Uluisaivou, Yaqara Pastoral Company Ltd. and other privately owned properties in the Northern Division. This section will examine livestock and tree crop ranches in the Province of Ra.

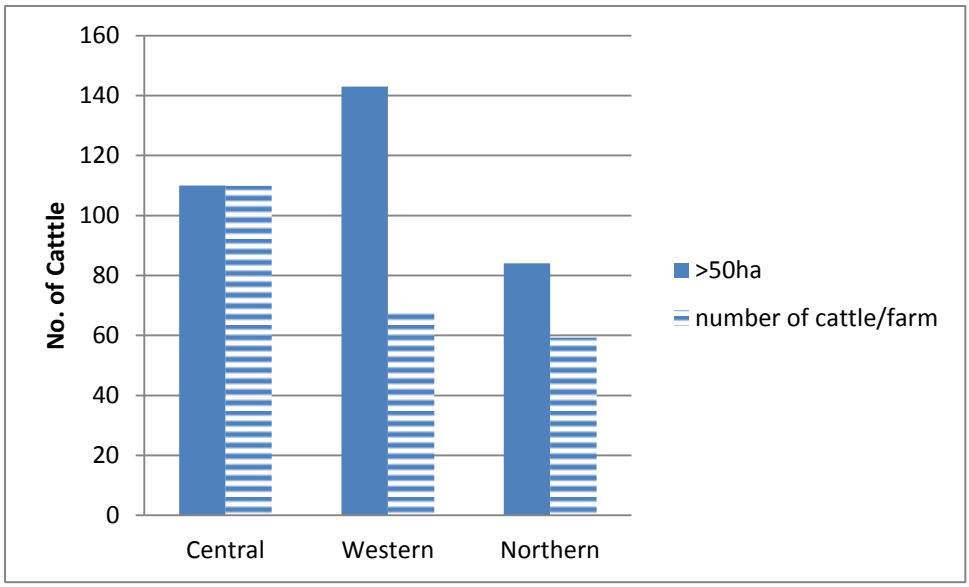


Figure 18: Average cattle head/farm for Ranches in Fiji (> 50ha)

2.3.3 Uluisaivou Beef Scheme

The Uluisaivou Corporation was established in 1979 under Section 23 of the Land Development Act 1961. The purpose of Uluisaivou is to encourage the development of land and resources in collaboration with resource owners to promote self-reliance and economic independence among rural communities. Modality for local engagement was envisioned to be through collateral shares of mataqali land consented to be incorporated by the corporation.

The Uluisaivou Corporation was located in the District (Tikina) of Tokaimalo. It was one of the major cattle ranching development in the province of Ra. The site land-use plan divided the area into three blocks; (1) the fertile talasiga grassland; (2) the forest area and (3) the steep rocky areas. All three blocks have pockets of arable land some of which were allowed for the community to plant with crop such as sugar cane, maize, peanut, yams, chilly, kava and cocoa

(Review and Evaluation Report, 1979). The project was expected to host 1000 cattle heads and produce 1000 tonne of sugar per annum. However, the Project failed after 20 years due to a number of factors including mismanagement and theft of the cattle stocks.

2.3.4 Yaqara Pastoral

The Yaqara Pastoral Company is owned by the Government of Fiji and located in the Province of Ra. It was established in 1973 with over 4,000ha (10,000acre) located between Rakiraki and Tavua Town.

Its core role is to be the premier breeding center for small holder farmers with assistance through the Ministry of Agriculture's strategic alignment of bilateral assistance from various sources such as AusAID, NZAID, French Government and others. Breeding program is envisaged to improve productivity and meet the tourism industry demand for premier beef cuts. The Yaqara Pastoral Company provides 100 improved breed of bulls to small holder farmers at a cost on an annual basis[9].

In addition to cattle, the company has diversified to sheep farming which now has the largest flock of sheep with 900 heads in the country (Baoa, 2013). There are reports that the company will diversify into fruit trees and other commodities (Delaibatiki, 2009).

During the 2014-2015 droughts the farm was badly affected due to lack of pastures. Stray cattle from the farm caused significant damage to the adjacent vegetables and cane farms which resulted in the Yaqara Pastoral Company Ltd. compensating 109 farmers from $100.00 to $11,000.00 (Delaibatiki, 2016)

2.3.5 Nakauvadra Community Based Reforestation Project

The Nakauvadra Community Based Reforestation Project by Conservation International (CI) was first implemented in Ra Province in 2009 to reforest an area of 1,135ha.

One of the key objectives has been to ensure key tangible benefits are generated for communities. As part of the livelihoods component of the project, CI has worked extensively with communities and farmers in the project zone to provide training and support in the development of new livelihood enterprises and sustainable agricultural practices, and has included the distribution of over 300,000 seedlings of assorted species to encourage crop diversification, with fruit plants and traditional root crops to benefit families while improving food security. The livelihoods component included the development of model farms and other livelihood diversification as outlined in Table 5. The project was audited by SCS Global Services and was accredited under the Climate, Community and Biodiversity Alliance (CCBA) Framework in 2013.

Table 5 : Summary Intervention through Nakauvadra Community Based Reforestation Project

	Reforestaton (ha)	BeeHIves (Units)	Sandalwood (plants)	Pineapple (plants)	Fishpond (units)	coconut (plants)	Ginger (acre)	Cassava	Dalo	Yams	Sweet patato	Pandanus (plants)	Pawpaw (Plants)	Ecotourism
Naroko	255	20	0	8500	0	0	1.5	15	1	1	7	500	0	1
Naiyalayala	107	15	330	0	0	0	5	0	0	0	0	800	0	0
Tokaimalo	674	0	70	15500	3	800	5	0	0	0	0	0	500	0
Rakiraki	99			100	500									
TOTAL 2013	1135	35	400	24000	3	800	11.5	15	1	1	7	1300	500	1
TOTAL2015		120	800	0	3	800	21.5	0	0	0	0	2500	0	1

[9] http://fiji.gov.fj/cgi-bin/cms/exec/view.cgi/63/3992/printer

The project zone for Nakauadra Community Based Reforestation Project covers a total of four Districts and 26 communities. Communities that were directly involved with reforestation include: Nabalabala, Vunisea, Nayaulevu, Naraviravi, Naivutu, Navuniyaumunu, Navavai, Narauyaba and Maniyava in Tokaimalo; Vatukacevaceva, Rewasa, Drana, Narara and Nanokonoko in Naroko; Naseyani and Nananu in Naiyalayala; and Vatusekiyasawa in Rakiraki. Villages were involved with the livelihoods component of the project such as the planting of traditional varieties of root crops, fruit trees, sandalwood; pandanus, bee keeping and aquaculture include Nailawa and Namataveikai in Tokaimalo; Draunivau, Vaidoko and Naboutolu in Naroko and Togovere, Drauniivi, Rabulu and Narauyaba No II in Naiyalayala. A map of the project zone with communities and reforestation plots (shaded red) is outlined in Figure 19.

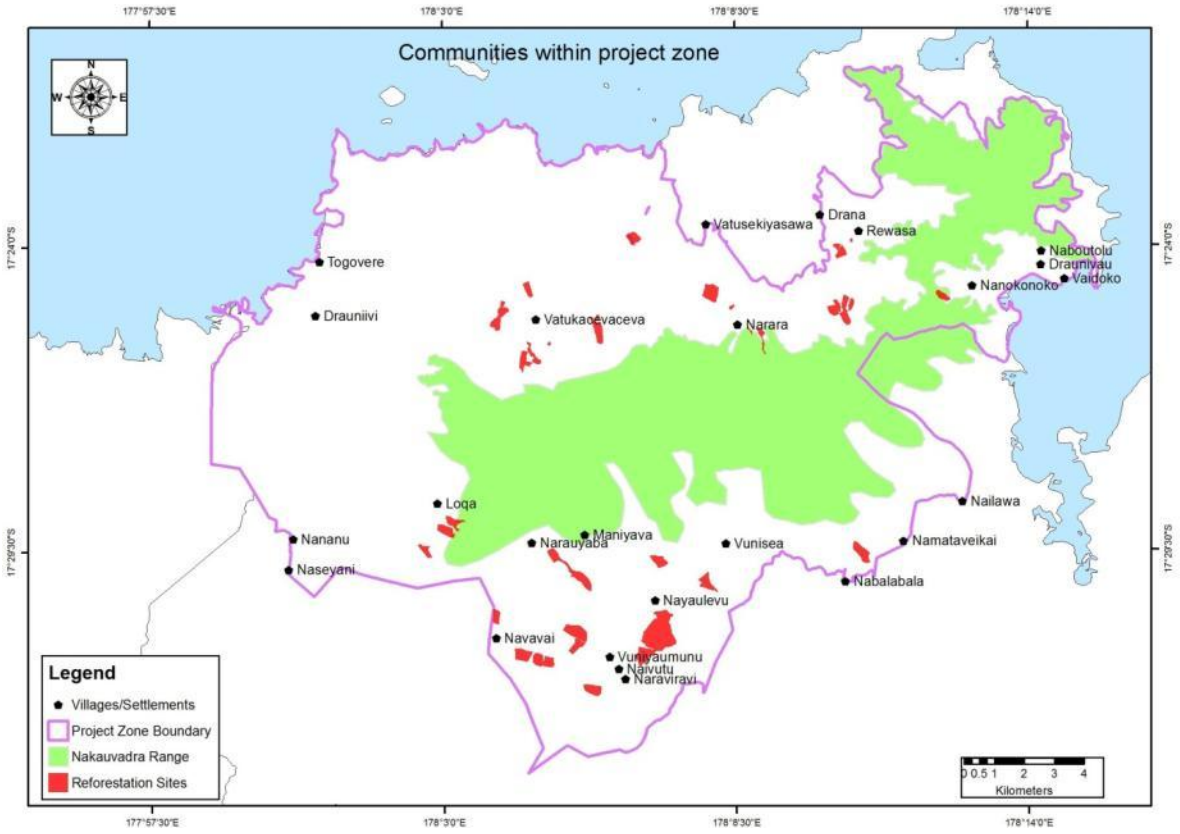


Figure 19: Map of Nakauvadra Community Based Reforestation Project Zone

3.0 Key Issues restricting better farming and ranching

3.1 Enabling Environment

3.1.1 Land Tenure Security

Unlike many other countries beyond the South Pacific region, land tenure in Fiji is almost exclusively under communal ownership. Of the total land area, 7% is Crown Land, 10% is held as freehold and the rest falls under the iTaukei landowning units (native land), holding 83%. Given the small portion of state and freehold land and the need to engage land for agricultural production, native land, which is inalienable, was opened up for agricultural expansion through

leasing arrangements. Such land were leased out to tenant farmers under the provision of the 1880 Native Land Ordinance, then through the Native Land Trust Board and the Native Land Trust Act of 1940, and later under the Agricultural Land Ordinance of 1966 and the Agricultural Landlord and Tenant Act (ALTA) of 1976 (Naidu, 2002). Majority of the cane farmers in Ra are leased on native land and in the year 2000 majority of these leases expired. Some leases were renewed, other issued to new tenants whilst others were not renewed at all. Tenure insecurity has led to the drop in farm productivity through the lack of farm capital investments (Reddy, 2003).

3.1.2 Limited extension programs

Extension programs are limited. The Ministry of Agriculture supports extension services to farmers. In the Ra Province there are 5 officers for agriculture, 3 for livestock, 1 for forestry and 1 for aquaculture/fisheries to service 100 villages and 40 Indo-Fijian settlements. According to the National Agriculture Census (Department of Agriculture 2009) 9.9% of farmers were assisted by the Ministry of Agriculture. At the most, each farmer can be seen twice a year, some only once and others are not seen at all. At the same time, the Extension Officers are trained in farm management and agronomics, but not on business and marketing. Coupled with the distance of farmers to the market, the lack of market information has led to the strong subsistence nature of production in Ra Province. In terms of resource management, responsibility for the environment sits with the Department of Environment and the Landuse Division of the Ministry of Agriculture stationed in Suva who reach out to rural agriculture stations on funded request or special projects. The Extension Officers are isolated from critical opportunities to build capacity for effective advisory services to rural communities. Lastly, the Ministry of Agriculture provides subsidy program to farmers through tractor rentals at $28 per hour compared to $60-90 hourly average cost in the market. Demand for tractor services is high but the limited number of tractors available has seen some farmers missing opportunities to plant at the right time.

3.1.3 Farmer Organizations

Farmer organization into cooperatives or village level companies is still quite nascent in Ra Province as most farmers sell their product individually to either middlemen or take it directly to the market. While market cooperatives do exist in Fiji, there is a perception within the country that cooperatives are limited to village stores with a general lack of awareness about market and other types of cooperatives. There is strong commitment by the Ministry of Agriculture to support and reinvigorate the role of co-operatives in community development and poverty reduction. One example of a successful cooperative is the Friends Chutney Cooperative. CI is interested in such a set-up to assess synergies and determine if it can serve as a model for the producers/farmers involved in the project. CI is currently engaged in assisting the formation of clustered farming where groups of farmers are assigned specific commodities with consistent market supply. The National Centre for Small and Microenterprise Development promotes formation of village level companies as an alternative to cooperatives or selling product individually. The advantages of each model need to be further explored to understand which offers the most promise for the farmers and communities engaged.

At the national level, the Fiji Crop and Livestock Council (FCLC), formed in 2013 to support 14 farmer associations has had little or no penetration into the Province. This may be attributed to the strong subsistence bias of farmers in Ra Province. However, it will be necessary for farmer cooperatives to link with appropriate associations under the FCLC in due course for advocacy and capacity building opportunities.

3.1.4 Credit Access

Access to credit is a concern among farmers. The National Agriculture Census records that 2.6% of farmers in Ra Province requested loans for development to cater for chemical inputs, new crop varieties and new breed where an estimated 0.5% of farms had problems with the loan.

The Fiji Development Bank is the only bank making agricultural investments. The Reserve Bank of Fiji released a policy that directs all commercial banks to have 4% of their portfolio invested in the agriculture sector however all financial institutions are struggling to find clients with sufficient collateral. Farmers are using leased land and kava plants as collateral to access credit. Microcredit organizations that rely on group guarantees have the potential to fill this gap, given their ability to work with higher risk portfolios.

3.1.5 Market Access

Majority of the farmers in Ra Province are rural based small holder farmers where the marketing of their products have always been a major problem. This has been further constrained by inadequate infrastructure such as roads. Other challenges include poor product handling practices, absence of local cool-stores and packing facilities which lead to severe deterioration during transport from farm to the market especially for high perishable goods.

3.2 Farmer Issues

3.2.1 Farmer demographics

Farmer demographics show an aging population of farmers and a lack of interest in farming by the younger generation with 10-19 year olds making the majority of household members in Ra Province (Department of Agriculture 2009). The most recent census noted a 50% drop in the number of farmers since the previous survey (Fiji Islands Bureau of Statistics, 2008).

Farms in Ra Province are predominantly owned by males with 5% of farms ranging from 1-3ha belonging to women. At the same time 1.2% of farmers have no education while 2.7% have completed high school. Distribution of tasks on the farm indicates heavy work is done by males while females undertake lighter duties. The National Agriculture Census (Department of Agriculture 2009) also noted a total of 12,260 labors of which 26% are compensated with in cash and kind. Majority of the labor force are not paid as farmers work in their own farms. The distribution of age and gender per household in Ra Province is of much concern as young adults are often drawn to other careers outside of the farm.

3.2.2 Financial literacy of farmers

Financial literacy of producer communities is quite low, with farmers generally lacking basic record-keeping for both production and sales. An estimated 5.2% of farmers are illiterate while 6.5% have completed Secondary Education (Department of Agriculture 2009). CI has taken steps to provide financial literacy training for communities involved in the project by contracting the National Centre for Small and Microenterprise Development to facilitate capacity building. More awareness and education is needed on farm management.

3.3 Farming Systems

3.3.1 Decreasing farm productivity

The lack of proper land-use planning and regulations together with the lack of arable land has led to the loss of forest cover and forest degradation as farmers cultivate steep slopes. Productivity in slope lands has decreased significantly due to soil loss. At the same time, lack and absence of sustainable farming techniques has resulted in depleted soils as the use of chemical fertilizers continues to increase. Slash and burn land preparation expose and degrade soil structures.

3.3.2 Poor pastures for grazing livestock

Poor beef production has been attributed to poor pastures resulting in poor productivity per head and per hectare (FAO, 2009). Dry zone pastures are dominated by Mission Grass (*Pennisetem polystachon*) and Nadi Blue Grass (*Dicanthium caricosum*). This has been further

exacerbated by the high level of weed infestation in paddocks resulting in the reduction of grazing areas.

3.3.3 Vulnerability to adverse weather conditions

The Ra Province is located on the drier side of the island and is susceptible to droughts during the dry season associated with El Nino events. There have been several droughts experienced in the western side since 1989 as recorded in 1992, 1997-98, 2003, 2010 and 2015. The most recent 2015 drought lasted for 16 months resulting in water rationing and carting of emergency water supplies to many areas. Cane crops were severely affected resulting in the decline in production at the Penang Sugar Mill. Communities in the area are dependent on sugar industry either through farming or work in the sugar mill and associated activities. When sugar-cane crop fails during a drought it has a negative flow-on effect to the communities through the loss of food crops and livestock.

Flood is another extreme weather event which is usually associated with tropical depressions and cyclones. It has adverse effects on local communities. Flooding has been further exacerbated by lack of rainfall interception due to reduced vegetation on the catchment and gravel extraction which increases stream-flow during extreme rainfall events. When flooding occurs the farms are inundated, residents are cut off, property and crops are destroyed resulting in the loss of lives, property and livelihood. In addition to this, stream bank erosion occurs resulting in loss of arable land to plant, crops lost/damaged or buried under silts, sedimentation of the river that may badly affect adjacent coral reefs on the coast.

The recent Tropical Cyclone Winston a category 5 cyclone caused havoc on the already ailing sugar industry by inflicting over $75 million dollars of loss and damage (Government of Fiji, 2016). The cyclone caused significant damage to the Penang Sugar Mill in Rakiraki. Due to the inoperability of the Penang Mill for the 2016 crushing season farmers will have to cart their cane all the way to the Rarawai Mill in Ba which will further burden the farmers. The Fiji Sugar Corporation have recently put forward a number of incentives such as paying for the cartage costs from Penang Mill to the Rarawai Mill (Chaudhary, 2016),

At the national level, TC Winston has contributed $335.4 million FJD[10] in damage and loss in crops, sugar, livestock and forestry with a reconstruction and recovery bill estimated at FJ$96.2m (Government of Fiji 2016). The crops subsector sustained an estimated 40 percent of total damage, sugar cane (14 percent), forestry (5 percent) and livestock (3 percent). Permanent crops, such as kava and coconut, were the most impacted by the cyclone. Annual crops (cassava, dalo) and seasonal vegetables also suffered significant losses especially in the Province of Ra, Ba, Cakaudrove, Lau and Lomaiviti. Damage to the livestock subsector occurred mainly in the Western and Central Divisions in the Province of Ra, Ba and Lomaiviti, particularly affecting beef, poultry, pigs and apiculture. Similarly, high winds damaged infrastructure and trees in the Western Division causing adverse impact to the forest industry.

Rehabilitation is estimated in recovery and reconstruction cost where the fore is based on supplying emergency inputs that will enable farmers to get back on their feet immediately while reconstruction is based on medium- to long-term infrastructural works and building technical

[10] The total damage and loss on the agriculture sector is estimated at FJ$542 m including the fisheries subsector which is not discused in this review,

capacity for a resilient agriculture sector to withstand future shocks. For crops, rehabilitation is estimated at $30.3m; sugar at $12.4m; livestock at $1.2m while forestry is assessed at $3.4m. At the same time, reconstruction for crops is $9.4m; sugar at $28.7, livestock at $9.6m and forestry $1.2m (Government of Fiji 2016).

Extensive destruction of annual and permanent crops by TC Winston has a serious impact on household income, food security and nutrition. In view of the largely subsistence agriculture sector in Ra Province, the extensive damage sustained may have an adverse impact on welfare implications for a large number of rural households. It is therefore imperative to provide support and assistance that will not only provide relief in the short term but ensure that communities are resilient to future shocks.

4.0 Opportunities for Improvement

Farmers in Ra are largely subsistence farmers with a very diverse mix cropping agricultural system, seeking opportunities for new market such as vegetables, ginger and honey.

Limiting factors outlined above can be categorized into three underlying challenges that farmers in Ra confront on a daily basis;

i. clearance of virgin forest for agriculture expansion;
ii. lack of farmer incentives due to limited or absence of market access;
iii. low yields and low economic returns for core commodities.

Each of the opportunities presented below is based on the hypothesis that diversified farming systems should continue to be promoted within Ra Province as a way of buffering producers against market and climate shocks. These opportunities also reflect a belief that agricultural production can be synergistic with environmental conservation, and that increasing production does not need to come at the cost of forests, rivers or reefs.

4.1 Mix Crop Production

4.1.1 Organic ginger and temporary crops

At least one ginger exporter is looking for sources of organic ginger in Fiji to meet export demand. Ginger is a relatively new crop to Ra Province. It is therefore considered prudent to introduce ginger via an organic rotation system with cassava and taro. It is important that such systems also manage and monitor erosion associated with production.

Devastation of crops resulting from the aftermath of TC Winston has brought food security to the top priority for recovery efforts. As part of our intervention for community assistance after TC Winston, Conservation International has supported the Ministry of Agriculture to establish cluster farms that focus on production of an assortment of temporary crops such as English cabbage, cucumber, watermelon and others. The cluster farms have also formed cooperatives to support medium to long term business development. The farmers are keen to adopt organic and sustainable practices such as crop rotation that will ensure resilience to future shocks. Recognising that market access is a critical link that have been absent and lacking in past interventions; a private business operator with proven record in vegetable production, marketing and export was approached to provide advisory services to the construction of hurricane proof nurseries and the possibility of developing appropriate marketing channels for local farmers.

4.1.2 Organic CASSAVA and TARO

Organic cassava and taro would be by-products of the move to produce organic ginger in Ra as they form part of the rotation necessary to maintain healthy, productive soils. The initiative would need to work with export companies to assess and meet market opportunities for these commodities.

4.2 Livestock

4.2.1 Ranching

Grazing under trees such as coconuts, mangoes and cocoa have been practiced in Fiji, Samoa and other countries in the Pacific (FAO, 1998). Coconut plantations have proven to be one of the best and most popular areas to develop (Lee, 1995) for silviculture. Some villages along the coast of Ra Province have large blocks of coconut which can be utilized for rearing livestock.

There is considerable potential for extending pastoral areas within Ra province. The Uluisaivou grasslands have not been effectively utilized since the liquidation of the cattle scheme. Farmers are cultivating portions of the land under small scale farming of cash crop. Plots of planted tree crops (CI reforestation) are located within the Uluisaivou scheme.

CI's reforestation project has managed to plant more than 1,000 ha of native trees. This could become potential sites for ranching if it will not affect the carbon objectives of the project.

4.3 Agroforestry

4.3.1 Conservation YAQONA/KAVA

There is an opportunity to develop a conservation kava initiative that promotes forest conservation, agroforestry and mixed crop production systems. This model would promote increased production on existing kava lands as well as the development and promotion of agroforestry-based production systems. The initiative would promote sustainable practices and develop and implement a marketing campaign to raise awareness within the market place and among consumers of the links between kava and deforestation. It could apply conservation agreements to engage with communities and identify appropriate incentive structures to drive behavioural change among producers. The provision of technical assistance for agriculture production could prove to be an incentive for conservation of the remaining forest area managed by the community.

4.3.2 Honey

Honey production could be expanded and quality improved through a concerted effort to provide training and incentives for producing honey away from sugarcane fields and closer to forested areas. Honey production could form part of an initiative designed to encourage farmers participating in the forest restoration initiative to visit the sites frequently and maintain them. There is some belief that honey from these sites may be of higher quality due to the proximity of the hives to forest areas. There is also significant opportunity to engage women in production and form producer cooperatives to assist with marketing efforts.

5.0 Way forward based on opportunities

5.1 Enabling Environment

5.1.1 Production Overview

In view of the fact that 76% of farmers are of iTaukei origins, it is important to incorporate socio-cultural interest and way of life into any intervention and recognise that not all farmers

are the same where some are more committed to farming activities while others share their time between farming and social obligations to the church and vanua.

Maintenance and improvement of subsistence farming through targeted diversification of crops can provide a buffer against climate, economic, or other shocks and build from a long tradition of agricultural production in the region. The selection of crops is therefore critical to ensure farmer engagement in the long run. Agroforestry system can be integrated into the current mix planting regime while new crops are added to diversify production. Agroforestry system is recommended to focus on kava/honey with existing mix farms. Crop diversification may be attained though improving production of temporary crops and incorporating ginger using organic fertilizers to support production.

Table 6: Production overview for core commodities

Production OVerview	Agroforestry			Crop Productivity		
	Yaqona	TempCrop	Honey	Ginger	Taro	Cassava
FIJI WIDE						
Hectares	3,601	42,164	125	217	15,195	15,447
No. Farms	21,306	120,005	1,000	582	37,106	38,757
Volume (kg)	6,066,833	137,814,919	93,500	1,945,538	56,644,614	58,771,606
Average Yield (kg/ha)	1,685	3,269	748	8,966	3,728	3,805
RA PROVINCE						
Hectares	771	4,339		6	1,294	2,245
Farms	1,722	10,420		9	2,849	4,159
Percent of all farms in Ra	30%	29%		0.2%	50%	72%
Volume (kg)	603,270	7,888,555	NA	NA	1,834,615	4,610,403
Average Yield (kg/ha)	782	1,818	NA	NA	1,418	2,054
Gap in yield for Ra Province	High	High	High	High	High	High

Production gaps (Table 6) are evident in yaqona, ginger, temporary crops, taro and cassava where opportunities exist to increase yield to meet the national average. For kava (processed yaqona) the 2009 agricultural survey indicated that yield of yaqona in Ra does not compare well with the broader country yield: 782 kg/ha vs the national mean of 1,685kg/ha (Department of Agriculture 2009). Farmers in Ra may benefit from production support for yaqona, ginger, dalo and cassava to reach yields achieved elsewhere in Fiji.

The yield gap in these core commodities should be made known to farmers in Ra and strategies collaboratively determined with clear goals, actions and commitments. Conservation International is actively aligning specifics needs to potential donors in support of improving agriculture systems in Ra. In addition, inland districts at the foot of Mt. Tomanivi are also targeted for honey production, yaqona and taro as well as diversification to temporary crops. Discussions are underway to support diversification into temporary crops that are linked to existing private marketing channels. In terms of root crops, efforts will focus on increasing yield as opposed to increasing acreage through the use of organic fertilizers. At the same time, CI is working towards providing technical support and incentives to help farmers increase the number of bee hives in Ra by 150 boxes.

5.1.2 Economics of Production

A simple cost benefit analysis of the proposed crops outlined above indicates that the highest potential return to farmers is from yaqona, ginger and honey. Traditional root crops do not have a large margin of return however gains may be obtained if preparation costs are reduced. The introduction of yaqona/honey to complement existing mix systems may be a lucrative diversification strategy to farmers in Ra.

Table 7 : Simple Economics for core commodities

Economics of Production	Agroforestry		Crop Productivity		
	Yaqona	Honey	Ginger	Taro	Cassava
Ra Average Yield (kg/ha)	1685	750	8,966	3,727	3,805
National Av. Market Price (FJ$/kg)	29.54	8.00	1.50	0.97	0.84
Land Preparation Costs (FJ$/ha)	18,957	4,560	10,000-15,000	6,317	4,621
Potential Farmer Income (FJ$/ha)	49,768	6,000	13,449	3,615	3,196

Leslie (2013) estimated the gross margin analysis for potential crops that can be used to diversify from sugar cane. The gross margin is concerned only with derived income and the direct cost associated with the product. Such analysis does not provide profits and lost but an indication of the potential rewards that farmers may expect from a product, It may be used as a decision making tool to decide promising alternatives. Once the product or "diversification crops" are identified, farmers may budget at farm scale to assess viability of the enterprise. A number of temporary crops that may interest farmers in Ra are listed in Table 8. Such a list will be useful to discuss with farmers while ensuring alignment with markets through private sector engagement.

Table 8: Gross Margin Analysis for selected temporary crops11

TempCrop	Assumptions		Gross Margin Estimates					
	plant density (plnt/ha)	min. yield (kg/ha)	average price ($/kg)	income ($/ha)	direct cost ($)	labour input ($)	Gross margin ($)	Return per labour input
capsicum	20000	10000	7	70,000.00	4,209.00	1,840.00	63,951.00	695.00
chillies	33000	4,500.00	9.00	40,500.00	3,269.00	2,600.00	34,631.00	266.00
cucumber	33000	11,500.00	1.60	18,400.00	3,856.00	3,200.00	11,344.00	71.00
eggplant	30000	22,500.00	1.30	29,250.00	4,759.00	2,300.00	22,191.00	193.00
english cabbag	26000	17,500.00	1.50	26,250.00	4,421.00	1,600.00	20,229.00	252.86
french bean	30000	8,500.00	2.50	21,250.00	3,789.00	3,000.00	14,461.00	96.00
patato	44000	13,500.00	1.25	16,875.00	5,363.00	2,340.00	9,172.00	78.00
pumpkin	3000	12,500.00	1.80	22,500.00	5,099.00	1,400.00	16,001.00	228.00
rockmelon	5000	10,000.00	2.40	24,000.00	5,123.00	1,600.00	17,277.00	215.00
spring onion	250000	11,000.00	5.00	55,000.00	3,066.00	1,400.00	50,534.00	721.00
sweet corn	70000	3,250.00	3.00	9,750.00	3,812.00	1,600.00	4,338.00	54.00
tomato	22000	10,000.00	2.00	20,000.00	3,361.00	3,600.00	13,039.00	72.00
watermelon	3300	17,500.00	2.00	35,000.00	5,583.00	1,560.00	27,857.00	357.00
zucchini	33000	9,000.00	3.50	31,500.00	5,181.00	2,520.00	23,799.00	189.00

5.1.3 Market Demand

Martyn (2013) examined factors that need to be taken into consideration to ensure local farmers meet market demand of the growing local urban and tourist market. Key recommendations include the need to ensure pre and post-harvest production to satisfy specific attributes that the market demand; improve quality control, timely delivery of produce and ability to provide credit to buyers without hindering farm production. The report also suggests the formation of large farmer association to increase capability to meet market demands, coordinate quality control and provide credit services. Further, to meet local demand,

11 Adopted from Leslie, M. D. 2013. Gross Margin for Selected Fruit, Vegetable and Root Crops for the Sugar Cane Belt in Fiji. Secretariat of the Pacific Community.

consideration of consumer convenience may increase value adding and food processing such as pre-chopped vegetables and frozen crop such as taro, cassava and others that may provide opportunities for new product lines and development of niche markets.

Market demands remain high for honey and the Department of Agriculture is actively engaged in expanding the honey sector to increase this by 2% per year to 2020. In the past year a total of 30 beekeeping trainings were conducted; reaching a total of 470 farmers in the Province. The Department of Agriculture has assisted producers with disease surveillance, quality control and analysis, provided extension and advisory services, as well as facilitating market connections for locally produced honey.

The Fiji Government has set a 6% increase objective for root crops. In order to meet this target, an estimated 20% of farmers in Ra will need to increase area of production by 4,000ha (for taro and cassava), ginger by 150ha, yaqona by 1,000ha and bee hives by 1,500. The number of farmers that would be expected to be involved in this massive exercise is estimated at 1,200 from the pool of existing farmers. Such projections are ambitious given the economic environment in Ra Province and in the wake of TC Winston. It would be appropriate therefore to suggest a phased approach where intervention is focused on one Tikina. Intervention should include improved technology, farm inputs and equipment for field demonstration, linkages to markets, as well as the development of communication material to capture and share lessons learnt for the benefit of other farmers.

Table 9 Projected Demands for core commodities

Market Demand	Agroforestry		Crop Productivity		
	Yaqona	Honey	Ginger	Taro	Cassava
Government Production Target (%/yr)	NA	2%	NA	6%	6%
Government Production Target (kg/yr)	250,000	500,000	700,000	3,398,677	3,526,296
Current Imports (kg)	269,000	2860	NA	NA	NA
Export Market Demand (kg/yr)	216,000	NA	200,000* O	NA	10,400,000
Ra Market Demand (kg/yr)		3750	NA	NA	NA
CI assessed Projected potential increase in area (ha) in Ra Province	1,134	1,500	150	2,109	1,913
CI Projection of POTENTIAL additional volume from Ra (kg)	887,570	37,500	1,343,250	2,990,098	3,928,391

*Organic Ginger

5.1.4 Potential Partners

Market chain analysis for yaqona, honey, ginger, taro, and cassava identified 10 key potential processors/exporters. There may be others not listed in this report. Local companies such Kaiming Agro Processing, Baltham Group, Fresh Pak and Ben's Trading deal with a variety of vegetables and crops. Kaimin Agro Processing has expressed an interest in organic ginger stating the high demand in international market for such commodity. Ben's Trading anticipates an immediate increase in demand if market access to Woolworth and Coles Supermarket Chain is made available to Fiji.

Taki Mai is a local company based in Ovalau that produces kava drinks called "Taki Mai". The company is currently accepting raw yaqona from Ovalau and have not opened opportunities to other areas. Further the variety of yaqona demanded by Taki Mai is not readily available and prior engagement with the company will be necessary for entry.

Joes Farm is a local company that has evolved from a humble farm produce distribution enterprise into hydroponic vegetable production, retailing, wholesaling, distribution, importing,

exporting, and re-exporting of farm fresh produce, frozen goods, hydroponics products, processed/manufactured food, liquor, and general groceries. Joes Farm brings a number of expertise in one package including improved production technology (hurricane proof nurseries and irrigation systems), farm management, post-harvest processing and market connections.

Bee Line Honey, located in Rakiraki is always ready to procure local honey from farmers as demands in the domestic market are never satisfied.

Table 10: Market Players for core commodities

	Agroforestry			Crop Productivity		
	Yaqona	TempCrop	Honey	Ginger	Taro	Cassava
Processors / Exporters		Joes Farm	Bee Line Honey	Kaiming Agro Processing	Kaiming Agro Processing	Kaiming Agro Processing
				Baltham Group	Ben's Trading	Ben's Trading
		Mahens		Fresh Pak		Baltham Group
Export Market Actors	Taki Mai	Expoters		Buderim's		Woolworths
		Bula Islands		Reeds Ginger		Coles
		Food Supply		Ginger People		

5.2 Farmer Issues

5.2.1 Social Impact

Social impacts were assessed in terms of income generation, gender sensitive, food security and livelihood diversification.

Yaqona, honey and ginger all rated highly under income generation through the combination of high market value and new revenue in the local economy. Although the market price for ginger is not comparable to yaqona and honey it can generate two streams of revenue from one crop cycle through the production of baby ginger and mature ginger.

Women are often the prime carers of beehives but not influential in the production of yaqona and root crops. Although women may participate in site preparation and planting of root crops, the men make decision on harvest time and market opportunities. Hence women are considered to have very low impact on yaqona and root crops.

Women are anticipated to be influential in temporary crop production as it not only provide alternative livelihood opportunities but address basic food security at household level. Intervention will work with willing farmers and advocate the involvement of women at all levels of operation.

Taro and cassava are planted in 50% of the farms in Ra. These crops primarily serve as staple food for farm households with excess sold in the market. Taro and cassava therefore will ensure that farmers have food security. However, it should be noted that taro and cassava have limited nutritious value hence communities may not meet the full spectrum of food security that other food sources will provide.

In view of the fact that yaqona, temporary crops, taro and cassava are already in farming system in Ra; livelihood diversification will be provided by honey and ginger. The success of these commodities in the Province of Ra will depend on farm-site technical skills training and demonstration for farmers.

Table 11 Anticipated Social Impacts of core commodities

	Agroforestry			Crop Productivity		
	Yaqona	Honey	TempCrop	Ginger	Taro	Cassava
Income Generation	High	High	High	High	Low	Low
Women's Empowerment	Low	High	High	Low	Low	Low
Food Security	Medium	Medium	High	Medium	High	High
Livelihood Diversification	Medium	High	High	High	Low	Low

5.3 Farming Systems

5.3.1 Environmental Impact

The following table illustrates the relative impact of each commodity on the environment. Environmental impacts are assessed by the potential of each crop to reduce soil erosion, improve water quality, reduce deforestation, maintain reforested sites and resilience to climate change.

The analysis is based on assessment of temperature, rainfall, altitude, and soil temperature to gauge environmental impacts. Generally, honey production will have the least foot-print on the environment while ginger is expected to be a risk to soil loss and water quality. Positive impacts will be generated from yaqona on the assumption that the farmers will adopt shade-grown kava in an agroforestry system. These impacts provide guidance on mitigation strategies when planning crop cycles with farmers.

Table 12 Anticipated Environment Impact for five core commodities

Environmental Impact	Agroforestry		Crop Productivity		
	Yaqona	Honey	Ginger	Taro	Cassava
Reduce Soil Erosion	Medium	Low	High	Medium	Medium
Improve Water Quality	Medium	Low	High	Medium	Medium
Reduce Soil Erosion	High	Low	Medium	Medium	Medium
Maintain Reforestation sites	High	High	Low	Low	Low
Resilience to Climate Change	Low	High	Low	Medium	Medium

5.3.2 Risks

The close proximity of sugar cane to bee hives may pose a challenge to quality control as the honey from Rakiraki is reported to be darker than elsewhere with a tangy after taste of burnt cane. However, such complaints have not affected the sale of honey from Ra Province.

Market price for ginger is determined by its size and colour hence it is important to keep the ginger clump intact when transporting to the market. The long and bumpy road from the farm to market places the quality of ginger at high risk of being downgraded. Other risks for ginger include the relatively high start-up cost, low and stagnant demand, lack of farmer cooperatives or associations in Ra to provide farm to farmer support.

Although temporary crops are widely cultivated in Ra, there is a high level of investment needed to move from subsistence to semi-commercial level. Lack of capital and difficulty of accessing credit facilities are identified as key constraints. However, in the wake of TC Winston, there is increased level of coordination from Department of Agriculture Extension Officers; increased willingness of farmers to combine forces and embrace the concept of cluster farms and the establishment of cooperatives with positive intensions to address food security and build resilience to future shocks. Conservation International is currently working through the FAO-

GEFPAS 4 project to identify and train local champions as well as to collect success stories that demonstrate resilience to climate change. The local champions are envisaged to become community based advocacy agents for environmental protection and sustainable practices.

At the same time, cassava turns black on prolonged exposure and need to be delivered to the market soon after harvest to secure good price. The lack of demand for organic cassava or taro limits the opportunity to advocate for sustainable cultivation techniques.

Generally, all five commodities require close supervision and advisory services from Agriculture Extension staff, particularly for new crops such as ginger and new techniques that integrate yaqona farming in an agroforestry system.

Table 13 Anticipated risks associated with full production of five core commodities

Risks	Agroforestry			Crop Productivity		
	Kava	Temp Crop	Honey	Ginger	Taro	Cassava
Quality Control		Need High level of attention, technical & infrastructure inputs	Proximity to sugarcane	Disease control Breakage of mature	Fumigation	Blackening
Environment	Deforestation			Soil erosion Forest degradation	Soil erosion	Soil erosion
Market demand		High		Low growth	Lack of organic market	
Extension Services	Lack of extension agents, need additional intervention					
Farmer Organization	Lack of farmer cooperatives or associations, willing farmers to adopt concept					
Consistent Supply	Inconsistent delivery in timely manner, willing farmers to rotate production					
Finance	High start-up costs					
Leadership	Lack of strong farmer and community leadership, willing farmers to diversify product					
Incentives/Motivation	Attrition of farmers over time					

6.0 Action Plan

Conservation International has invested a lot in the District of Tokaimalo, Naiyalayala and Naroko through the Fiji Water Funding. Exhaustive participatory land use planning exercises were carried out in these three districts resulting in the formulation of district based land use plan. The land use plan was then used as a basis for CI's work in the three districts. Majority of the work that have been undertaken are small scale and most were at a pilot phase as a proof of concept. Lessons learnt from these earlier works are informing and shaping strategies to upscale the work should funding become available.

6.1 Rationale

CI will focus intervention on inland communities of Tikina Tokaimalo and coastal farmers in Tikina Saivou/Nailawa. Recognizing the need to address issues outlined in the Ra ICM Plan to support the adoption of sustainable agriculture; noting the scope of RESCCUE project and alignment of CI commitment to RESCCUE; the following discussion outlines the broad scope, vision and objective of attempts to meaningfully engage with farmers in Ra to change farming perception and expectations.

The proposed intervention is focused on capacity building in both knowledge and skills. Intervention will be aimed at increasing farmers' knowledge and understanding on sustainable farming techniques; improve farmers awareness knowledge of local resources, challenges and

sustainable solutions; facilitate skills training to increase technical capacity of farmers to improve yield as well as connecting farmers to market. It is also important to support the establishment of farmers association and improve efficiency of existing cooperatives. It is also important to establish community/farm based demonstration of agroforestry system for the benefit of farmers from within the Province and to demonstrate resilience to climate change. Intervention will also focus on gathering site specific data to support farm management monitoring based on committed activities. Further, farmer engagement agreements will be registered to formalize and secure engagement with each participant farmer.

Given the scope of RESCUE activities, there are synergise and linkages to other components of RESCUE project as listed in Table 14. The synergies have complementary outcomes but are not dependent on each other. For instance, the key action proposed in component "L1.4 Capacity building and awareness plan" is similar in intent, advocating for effective dialogue to improve, strengthen and establish mechanisms to support the Ra ICM and climate change adaptation activities outlined in RESCUE component L1.5.

To improve better farming and ranching in the Province of Ra, a number of proposed activities are listed in Table 15. The activities listed are flagged to provide a holistic approach to fulfil the overall scope, vision and objectives outlined below. Not all activities are expected to be addressed through RESCUE but are listed as placeholders in order to capture the overall intent – to improve farming and ranching in the Province of Ra.

Table 14: Synergies with other components of RESCUE Project

RESCUE COMPONENT	KEY ACTIONS PROPOSED	SYNERGIES WITH L2.1 BETTER FARMING AND RANCHING
L1.4 Capacity building & awareness plan	Effective dialogue and engagement with local authorities and private sector in eliciting views of the best means to establish and implement financial and economic mechanisms that facilitates ICM activities and CCA.	Strengthen farmers' understanding of ecological processes of current practices to support self-motivated adoption of sustainable agricultural practices; Strengthen farmers' understanding of financial and economic mechanism that enhances and sustain ICM and CCA activities in the Ra Province.
L1.5 Study on Climate change impacts and adaptation actions Ra	Coastal and hillside erosion control measures through forestry; Enhanced food security and alternative income opportunities; Use existing and develop Ra specific education materials on climate change and adaptation:	Integration of trees into the farming system as soil erosion control measure; Promotion of the vegetable farming among able farmers to support food security; Support development of awareness material for RESCUE project

RESCUE COMPONENT	KEY ACTIONS PROPOSED	SYNERGIES WITH L2.1 BETTER FARMING AND RANCHING
L2.2 Feasibility study on Financial and Economic Mechanisms	Investigate other income generating farming options (e.g. organic or alternative enterprises) in the Province, alongside complementary certification, to provide new/additional income streams but also reduce their impact on the environment.	Engagement through community conservation agreements and advocacy market intervention to support the sustainable development of alternative income streams.

6.2 Scope and Objectives

The project scope is to fulfil the vision of Ra Integrated Coastal Management Plan: "To sustainably manage the natural resources of Ra" through the development and implementation of sustainable agriculture landscape program in Ra Province that demonstrates the ability to achieve a net benefit for conservation and sustainable farm production that can serve as a model for replication across Fiji. The vision is to support farmers in Ra become better stewards of the environment; improve production and farm efficiencies while securing market access. The aim of the project will be to (1) address agricultural drivers of deforestation and degradation of ecosystem services; (2) improve market linkages for farmer/ communities while increasing resilience to climate change and market shocks; (3) improve farm efficiency for core agricultural products including yaqona, honey, temporary crops, ginger, taro and cassava.

6.3 Site Selection and Matrix

Project site will be selected among able farmers in Tikina Saivou and Nalawa. Selection criteria include a willing yaqona farmer with mixed cropping system consisting of temporary crop, taro, cassava with a farm size of 1-5ha. Further, the farmer must be a member of an existing cooperative or have the expressed willingness to join a farmers' cooperative. Although CI has identified lead farmers from each community, farmer selection will be made in consultation with local Agriculture Extension Officer and the Conservation Officer from the Provincial Office. Project outcomes (impacts) and outputs (activities) are outlined in Table 14. Project Outcomes/ Outputs that will be addressed through the RESCCUE project are identified and those that will require external donors are listed to demonstrate and rationalize the scope of the intervention. At the moment FAO AAD poses higher possibilities while the QUT/SPC/USP/DOF/CI is still at conceptual stage with site selection to be determined in the near future. CI will try to argue site selection to support communities that have Protected Areas in their backyard. The following actions are proposed under RESCUE:

1. demonstration of agroforestry & no net loss of forest on demonstration farm
    a. increased knowledge and understanding on sustainable farming techniques
        i. community awareness on sustainable resource management, farming systems
    b. improved knowledge on local resources, challenges and sustainable solutions
        i. community resource mapping and planning to identify agroforestry site
        ii. on site agroforestry farm mapping and planning
    c. increased knowledge and technical capacity of farmers to improve yield

        i. Farm training on Yaqona, diseases and treatment, harvest and quality control
    d. community/farm based demonstration of agoforestry system
        i. establish agroforestry system integrating yaqona, honey, ginger, taro and cassava
2. monitoring framework to track farm efficiency
    a. availability of site specific data to support farm management monitoring
        i. Farm survey to establish base line information on crop/trees on farm, potential commodities, farming practice, farming techniques etc.
    b. agreed monitoring framework based on committed activities
    c. develop monitoring plan to track milestones

An opportunistic approach is adopted to secure potential donors. Two potential partners are being cultivated as follows:

i. GCP/INT/157/EC- Action Against Desertification a multi country project including Fiji with objectives for (i) poverty alleviation; (ii) ending hunger; and (iii) improving resilience to climate change in drylands and other fragile ecosystems in ACP countries, using a landscape approach. Anticipated results include (1) creating enabling environment and capacity of relevant governmental and non-governmental organizations to carry out effective cross-sectoral work, planning, financing, budgeting, implementation, monitoring and evaluation of sustainable land/forest management and restoration efforts at the landscape level; (2) facilitate improved sustainable land/forest management practices and technologies, as part of the implementation of their Great Green Wall action plans and UNCCD National Action among local communities, governmental and non-governmental stakeholders (including youth, women and civil society) in selected landscape; and (3) improve knowledge and awareness among key target audiences and stakeholders on the causes and appropriate measures for combating desertification and land degradation and improving resilience to climate change, while promoting sustainable livelihoods. The GEF-PAS Forestry and Protected Area Management Project (GEF-PAS FPAM) implemented by FAO and the Fiji Government is the principal co-financer for this project. Sites have been identified to include the Greater Tomaniivi, Greater Delaikoro and Taveuni. Greater Tomaniivi lies to the west of Ra Province and 90% landowners targeted for the expansion of existing protected area in Wabu and Tomaniivi Nature Reserve are from the Province of Ra. The project will run for 4 years commencing 2015 with the total budget roughly estimated at two (2) million Euros.

ii. ACIAR: Promoting Sustainable Community-based Agroecological Intensification on Sloping Lands in Fiji and Vanuatu. The proposal is at concept development phase. Partners collaborating on the concept included Queensland University of Technology, Secretariat of the Pacific Community, Department of Forest in Fiji and Vanuatu, University of the South Pacific and Conservation International (QUT/SPC/USP/DOF/CI). The project is designed to develop recommendations for mixed species agroforestry (including silvopastoral) systems consistent with ecological intensification principles and supported by demonstrations from community project sites, and technical and extension materials on estimated financial and triple bottom line cost-benefit performance of these systems.

i.

Table 15: Matrix of Action Plan

scope	vision	Key Problem to address	objective	GOAL	outcomes	outputs	Donor Support
Fulfil the vision of Ra Integrated Coastal Management Plan: "To sustainably manage the natural resources of Ra "	support farmers in Ra become better stewards of the environment; improve production and farm efficiencies while securing market access	increasing clearance of virgin forest for agriculture expansion that pose a threat to the forest of Nakauvadra and Greater Tomaniivi	(1) address agricultural drivers of deforestation and degradation of ecosystem services	By Dec 2017 demonstration of agroforestry & no net loss of forest on demonstration farm	increased knowledge and understanding on sustainable farming techniques	community awareness on sustainable resource management, farming systems	RESCCUE
						training on agroforestry systems high light compatibility and interdependence of plants	Other Donor – possibly ACIAR
					improved knowledge on local resources, challenges and sustainable solutions	community resource mapping and planning to identify agroforestry site	RESCCUE
						on site agroforestry farm mapping and planning	RESCCUE
					increased knowledge and technical capacity of farmers to improve yield	Farm training on ginger cultivation, diseases and treatment, harvest and quality control	Other Donor
						Farm training on bee keeping, diseases and treatment, harvest and quality control	Other Donor
						Farm training on Yaqona, diseases and treatment, harvest and quality control	RESCCUE
						Farm training on Taro, diseases and treatment, harvest and quality control	Other Donor
						Farm training on Cassava, diseases and treatment, harvest and quality control	Other Donor
					community/farm based demonstration of agoforestry system	establish agroforestry system integrating yaqona, honey, ginger, taro and cassava	RESCCUE

scope	vision	Key Problem to address	objective	GOAL	outcomes	outputs	Donor Support
		lack of farmer incentives due to limited or absence of market access	(2) improve market linkages for producer farmer/communities while increasing resilience to climate change and market shocks;	By June 2017; external donors secured supporting market access	Secure private partner to support improved farm input technology and marketing of temporary crops	Establishment of temporary crop farming systems with cooperative farmers who have a stake in protection of Greater Tomaniivi and Nakauvadra Range	Other Donor – possibly FAOAAD
					improve knowledge and capacity to negotiate farm gate price	Financial literacy training -Farmer training on calculating basic financial margins for yaqona, ginger, taro, cassava and honey	Other Donor – possibly FAOAAD
					Farm Business Plan developed	Business Management Training - development of Farm Business Plan and develop 36 month activity plan to support agroforestry system	Other Donor – possibly FAOAAD
					farmers access microfinance and start small business	Financial literacy training - community awareness on available microfinance service providers	Other Donor
					farmers inspired to improve production, a least on supply agreement secured	Financial literacy training - invite identified market partners to talk to farmers about commodity specific supply chain mechanism and market demands x 3 training (1) yaqona (2) honey (3) temporary crops (4) ginger and root crops	Other Donor – possibly FAOAAD
					improve farmer appreciation of available resources for better farming	Farm Management Training - improved mix crop faming technique to sustain Climate change and market shocks, ethnobotany farm survey to identify existing system and gaps	Other Donor – possibly FAOAAD

scope	vision	Key Problem to address	objective	GOAL	outcomes	outputs	Donor Support
						for improvement	
					Farmers in Ra Province link to national policy program initiatives	Farm Management Training - invite association reps and FCLC to present to farmers on sector goals x 4 training (1) ginger(2) Beekeeping (3) root crop (4) yaqona	Other Donor
		Low yields, low economic returns	(3) improve farm efficiency for core agricultural products including yaqona, honey, temporary crops, ginger, taro and cassava	By Dec 2016 monitoring framework to track farm efficiency	availability of site specific data to support farm management monitoring	Farm survey to establish base line information on crop/trees on farm, potential commodities, farming practice, farming techniques etc.	RESCCUE
					Available information for other farmers to make informed decision	undertake cost benefit analysis on farm inputs, outputs and yield from agroforestry system	Other Donor – possibly ACIAR
					agreed monitoring framework based on committed activities	develop monitoring plan to track milestones	RESCCUE

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