

COUNTRY REPORT: FIJI

**STRATEGIC APPROACH TO THE
IMPROVEMENT OF AGRICULTURAL
PRODUCTIVITY TOWARDS FOOD
SECURITY IN ASIA AND
THE PACIFIC – FIJI SITUATION**

Submitted to

**Fourth Session of the Technical Committee of APCAEM
10-12 February 2009, Chiang Rai, Thailand**

By

*Lakshman Mudaliar
Acting Director,
Land and Water Resource Management
Ministry of Primary Industries and Sugar
Suva, Republic of the Fiji Islands.
Email: lmudaliar@govnet.gov.fj*

Introduction

“Major challenges to food security for the small island states in the Pacific is to be more self – reliant . The rising food prices, higher cost of production and the challenge of climate change require greater innovation and investment in key sectors such as agriculture fisheries and forests. Adequate and secure access to land for development in a sustainable manner is vital to ensure food and nutritional security and generate economic growth. A more pro-active role needs to be played by the major stakeholders in the Pacific region.”¹.

Small Island Developing States (SIDS) are often characterized by having relatively large populations for the area they occupy with high growth rates and densities, poorly developed infrastructure and limited natural human and economic resources, and their dependence on marine resources for their livelihood needs. Most of their economies are reliant on a limited resource base and are vulnerable to external forces, such as changing terms of trade, trade liberalization, and migration flows. Adaptive capacity to climate change is generally low. Whilst the small island developing states are amongst those that contribute least to global climate change and sea level rise, they are amongst those that suffer most from the adverse effects of such phenomena.

Trends in extreme daily rainfall and temperature across the South Pacific for the period 1961 to 2003 show significant increases where detected in the annual number of hot days and warm nights, with significant decreases in the annual number of cool days and cold nights, particularly in years after the onset of El Niño, with extreme rainfall trends generally less spatially coherent than were those of extreme temperature (Manton *et al.*, 2001; Griffiths *et al.*, 2003). The maximum number of consecutive dry days is decreasing and the number of heavy rainfall events is increasing which is consistent with changes reported from global analysis of daytime and nighttime temperatures.

Past studies of adaptation options for small islands have been largely focused on adjustments to sea-level rise and storm surges associated with tropical cyclones. There was an early emphasis on protecting land through ‘hard’ shore-protection measures rather than on other measures such as accommodating sea-level rise or retreating from it, although the latter has become increasingly important on continental coasts. Vulnerability studies conducted for selected small islands (IPCC, 2001) show that the costs of overall infrastructure and settlement protection is a significant proportion of GDP, and well beyond the financial means of most small island states.

On small islands adaptation costs are high relative to GDP though experience gained from coping with past climate variability and extremes may be beneficial to adaptation planning. In some small islands, traditional methods of coping with environmental change and hazards are being reintroduced. Climate projections suggest a general increase in surface air temperature for the regions of small islands but the increase is not

¹ Statement by the Minister for Primary Industries and Sugar of the Republic of Fiji Islands at the Regional Conference of Ministers of Agriculture and Forestry held on the 8th and the 9th of September, 2008 at Apia, Samoa.

uniform. Precipitation projections show no consistent trend, with increase and decreases of more than 10 per cent projected for three 30-year periods by the end of this century.

Sea-level rise will exacerbate inundation, erosion and other coastal hazards threatening vital infrastructure, settlements and facilities that are predominantly based on the coast, thus compromising the socio-economic well-being of island communities and states. It will also negatively impact coastal ecosystems, such as coral reefs and mangrove forests, and commercial and artisanal fisheries based on those systems. Tourism is a major contributor to GDP and employment in many small islands, and dominates the economies of some. Surveys suggest that deterioration in environmental conditions, for example through erosion of beaches or coral bleaching, will reduce numbers traveling to such destinations.

Climate change will be a major impediment to the achievement of sustainable development in small islands, as all economic and social sectors are likely to be adversely affected and the cost of adaptation will be disproportionately high, relative to GDP. In attempting to mainstream adaptation strategies into their sustainable development agendas, small islands will be confronted by many challenges including insufficient resources, equity considerations, prioritization of adaptation measures and uncertainties over climate change projections and adaptation strategies.

While it is clear that implementing anticipatory adaptation strategies early on is desirable, there are obstacles associated with the uncertainty of the climate change projections. To overcome this uncertainty, Barnett (2001) has suggested a better strategy for small islands is to enhance the resilience of whole island socio-ecological systems, rather than concentrate on sectoral adaptation. Inhabitants of small islands, individuals, communities and governments, have continually adapted to inter-annual variability in climate and sea conditions, as well as to extreme events, over a long period of time. There is no doubt that this experience will be of value in dealing with the inter-annual variability in climate and sea conditions that will accompany the longer-term mean changes in climate and sea level.

The need to implement adaptation measures in small islands with some urgency has been recently reinforced by Nurse and Moore (2005), and also highlighted that risk-reduction strategies together with other sectoral policy initiatives in areas such as sustainable development planning, disaster prevention and management, integrated coastal zone management and health care planning should be employed. Since, number of projects on adaptation in several small island states and regions have adopted the aim of building capacities of individuals, communities and governments so that they are more able to make informed decisions about adaptation to climate change and to enhance their adaptive capacity in the long run.

Given the urgency for adaptation in small island states, there has been an increase in *ad-hoc* stand alone projects, rather than a programmed or strategic approach to the funding of adaptation options and measures. It can be argued that successful adaptation in small

islands will depend on supportive institutions, finance, information and technological support.

The Pacific Island countries are already experiencing severe impacts of climate events as evidenced by cyclone damage of more than US\$1 billion during the 1990s. Thus, an adaptation strategy for the Pacific islands and indeed for Fiji islands need to include a strategy for precautionary adaptation since it is difficult to predict far in advance how climate change will affect a particular site, sector or community.

General Overview - Fiji

The Republic of the Fiji Islands lies in the Southwest Pacific Ocean, between longitudes 175° East and 178° West and latitudes 15° and 22° South. The Fiji Islands is made up of two major islands – Viti Levu and Vanua Levu with land areas of 10,429 and 5,556 square km² respectively (Fig 1).

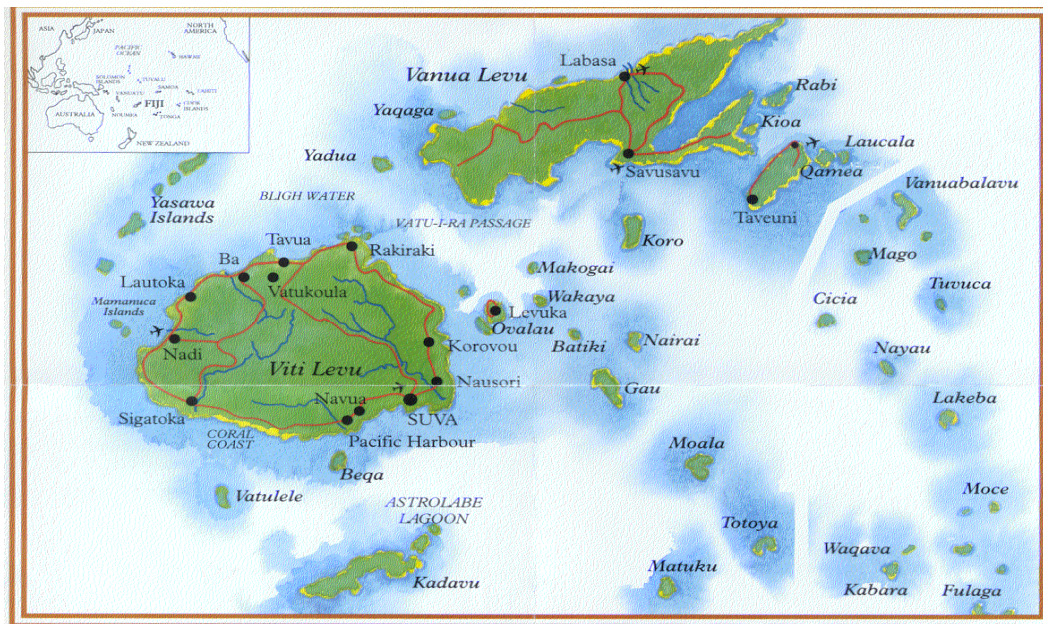


Figure 1 : **The Fiji Islands** (Fiji Visitors Bureau 2000).

Other main islands are Taveuni (470km²), Kadavu (411km²), Gau (140km²) and Koro (104 km²). The total land area of the Fiji Islands is 18,272 km². The Republic includes the island of Rotuma (43 km²), located 650 kilometers north-northwest of Suva. Fiji's Exclusive Economic Zone (EEZ) contains approximately 332 islands, of which one-third are inhabited. The Economic Exclusive Zone covers about 1.3 million km².

The Fiji Islands are composed of large mountainous islands, which are largely of volcanic origin, such as Viti Levu and Vanua Levu (which take up 87 per cent of the total land area), and numerous small volcanic islands, low-lying atolls and elevated reefs. The largest have a diverse range of terrestrial ecosystems, including extensive areas of indigenous forest. The high islands have distinct wet and dry sides due to prevailing wind patterns. Coastal ecosystems include mangroves, algae and sea-grass beds in shallow reef and lagoon areas, and various reef types such as barrier, fringing platform and atoll or patch reefs.

The climate of Fiji is generally categorized as an oceanic tropical climate. The South Pacific Convergence Zone (SPCZ), associated with high rainfall, fluctuates northeast and southwest of Fiji. Its location relative to the Fiji islands has a strong influence on both seasonal and inter-annual variations in climate, particularly rainfall. The El Niño-Southern Oscillation (ENSO) phenomenon influences the positioning of the SPCZ relative to Fiji. During the dry season (May to October) the SPCZ tends to be positioned more to the northeast of Fiji. In the rainy season (November to April) the SPCZ tends to be located over Fiji. In addition to these seasonal variations, there is also a high degree of inter-annual variability in rainfall, which is strongly influenced by ENSO and SPCZ fluctuations.

Fiji is also affected, often severely, by tropical cyclones and depressions which tend to track from the north and west. Fiji lies in an area normally traversed by tropical cyclones mostly during the November-April wet/cyclone season. Cyclones bring about flooding and multiple landslips which have major impacts on the economy and infrastructure, and many adverse effects for the people of Fiji. Although the west of Viti Levu is drier on average it can experience very heavy rainfall events and associated flooding during storm events.

El Niño events, which lead to a northeast positioning of the SPCZ, are the major cause of drought in Fiji. During an ENSO event, conditions drier and hotter than normal can be expected from December to February and drier and cooler conditions from June to August. While lower than normal rainfall can be expected over most of Fiji, the most severely affected areas tend to be in the west of the main islands.

Droughts in Fiji are strongly associated with negative phase of the SOI or with El Niño conditions. The maximum wind gusts associated with cyclones occurring in Fiji area show large inter-annual variability although previous 40-year records show a 14 per cent increase in maximum wind gusts. Such an increase is consistent with findings of Webster *et al.*, (2005) that the number and proportion of tropical cyclones in the South-West Pacific Ocean reaching categories 4 and 5 has increased over the past 35 years so as the observed increase in sea surface temperatures.

Projections of systematic changes in the average climate show significant increase in the frequency of extreme high sea levels, temperatures and winds are highly likely in the Fiji area in the coming decades. For instance, sea level is projected to increase by 11cm by 2025; 23cm by 2050; 36cm by 2075 and 51cm by 2100 while annual rainfall is likely to

change by 0.4 per cent by 2025; 0.6 per cent by 2050; 1.3 per cent by 2075 and 1.6 per cent by 2100. Maximum wind gusts are likely to change by 3.4 per cent by 2025; 6.8 per cent by 2050; 10.8 per cent by 2075; and 13.4 per cent by 2100 and temperatures are expected to increase by 0.3° C by 2025; 0.7° C by 2050; 1.1°C by 2075 and 1.4°C by 2100 in Fiji.

The country is very much reliant on other developed countries of the Asia region for most of its staple food such as flour, rice onions, potato etc for its dietary requirements. Its isolation, in terms of distance from major cities and countries in the Asian region and neighbors of Australia and New Zealand has major impact on freight cost, either by air or sea. The soaring fuel price globally has exacerbated the situation resulting in more people going into poverty.

The recent rise in fuel prices has had a chain reaction in provision of good and services and even the agricultural sector had not been spared. The cost producing raw materials for agriculture including value added commodities for agricultural and manufactured goods come at soaring prices. Developing countries like Fiji cannot compete with developed countries in producing their own food without assistance in terms technology advancement, funding and retaining its skilled manpower.

Development Sectors

Agriculture

Fiji is traditionally depended upon subsistence and cash crops for survival and economic development. Whilst subsistence agriculture provides local food security, cash crops (such as sugar cane, fisheries and forest products) are expected to earn foreign exchange. However, exports have depended upon preferential access to major developed country markets which are slowly eroding. Fiji has also experienced decrease in GDP contributions from agriculture, partly due to the drop in competitiveness for cash crops, cheaper imports from larger countries, increased costs of maintaining soil fertility and competing uses for water resources, especially with tourism (FAO, 2004).

Local food production is vital to small islands even those with very limited land areas. In the Pacific Islands, subsistence agriculture has existed for several hundred years. The ecological dependency of small island economies and societies is well recognized (ADB, 2004). A report by FAO's Commission on Genetic Resources found that Fiji's interdependence with regard to plant genetic resources is estimated at 65 per cent in Fiji as compared to 37 per cent in Vanuatu (Ximena, 1998).

Projected impacts of climate change include extended periods of drought, and on the other hand loss of soil fertility as a result of increased precipitation, both of which will negatively impact on agriculture and food security. In the study on the economic and social implications of climate change and variability for selected Pacific Islands, World Bank (2000, 2002) found that in the absence of adaptation, a high island such as Viti Levu, Fiji, could experience damages of 23 million to 52 million USD per year by 2050, (equivalent to 2-3 per cent of Fiji's GDP in 2002)

Agriculture has always been the largest sector in Fiji's economy, accounting for 43 per cent of Fiji's foreign exchange earnings in 1999. It provides 50 per cent of the country's total employment and contributes 19 per cent to Fiji's GDP. The decline in production of sugar (Fiji's largest agricultural export) due to the 1997-98 drought, created an economic crisis sending the economy into negative growth of 4 per cent. With the crop back to normal in 2000, the economy as a whole recovered with a 3-3.5 per cent growth that year. Similar patterns have emerged in previous years when good sugar production has been reflected in healthy economic growth overall. 16 per cent of total land area of Fiji is suitable for farming and is found mainly along coastal plains, river deltas and valleys of the two main islands, Viti Levu and Vanua Levu. Of the arable land, 24 per cent is under sugar cane, 23 per cent coconut and the remaining 53 per cent under other crops.

In a study comparing estimated costs of agriculture without cyclone Ami(2003) and related flooding and with damage from Cyclone Ami and related flooding in Fiji, it was shown that cyclones and related flooding cause considerable damage to both subsistence and commercial agriculture (McKenzie, E. Biman P., Kaloumaira A, 2005). They showed that in 2002, agricultural GDP as a share of total GDP was 16.2 per cent and agriculture trade balance, in terms of the value of agricultural exports less the value of agricultural imports, was US\$44.5 million. Sugar exports accounted for 64 per cent of the total agricultural exports. The total agricultural labour force included 132,000 workers, 40 per cent of the total labour force in 2002. Of the total labour force, around 21,246 people were sugar cane growers. The forecast for sugar production for 2003 was estimated at 930,600 tonnes of sugar.

With dramatic increases worldwide in the price of food, the Department of Agriculture is carefully monitoring fluctuations that could affect the livelihoods and incomes of Fiji's people.

Market surveys are conducted each week from offices around the country to gauge changes in price and supply, helping the Ministry to conduct the necessary analysis and planning of projects.

Consumers are fully aware of the price increase among the staple goods. Over the past few months, rice prices have seen a jump from approximately \$F1.25 to \$F1.48/kg in the central business district area, and it should be expected that prices will continue to rise over the course of the 2008. Likewise potatoes, cassava, taro, and flour have all seen significant price jumps.

Unfortunately, Fiji continues to remain highly dependent on imports of staple goods. In 2007, the total rice consumption was around 56,000tonnes, of which, rice imports amounted to 32,000tonnes, at prices which were consistently cheaper than domestic produce. Due to the sheer scale of production among the World's largest producers, production costs are lower than those faced among Fiji's producers. The country is now producing only 12,000 to 15,000 annually which represents only 24 per cent self reliant. The Department of Agriculture is trying to revamp Fiji's rice-production and to reduce

the strain upon the domestic industry to which funding is available (see below in Figure 4).

Fiji is also 100 per cent dependent on wheat and maize, with no local production of it's own. Imports in 2007 were 79,000 tonnes and 83 tonnes respectively. Unless Fiji's population is able to substitute these products for locally-available produce, Fiji will continue to remain highly dependent on imports, and subsequent fluctuations in world prices.

A recent report by the *Financial Times* noted that some governments have already begun substituting potatoes for grain as a result of rising cereal prices. Although Fiji does not grow potato, the other root crops of cassava, taro and yam all grow very successfully, to the extent where taro has developed into a thriving export product, and both cassava and taro are entering the processed food industry as chips.

Regretfully, these products are also experiencing price increases in the face of rising costs of transportation, farm inputs, inflation, and increased costs of living. Graphs illustrated below clearly indicate that apart from the price of taro, the rest of the commodities have all shown upward trend in terms of prices, thus, reducing the buying power of consumers.

Figure 2.

Average Domestic Retail Price of Taro:

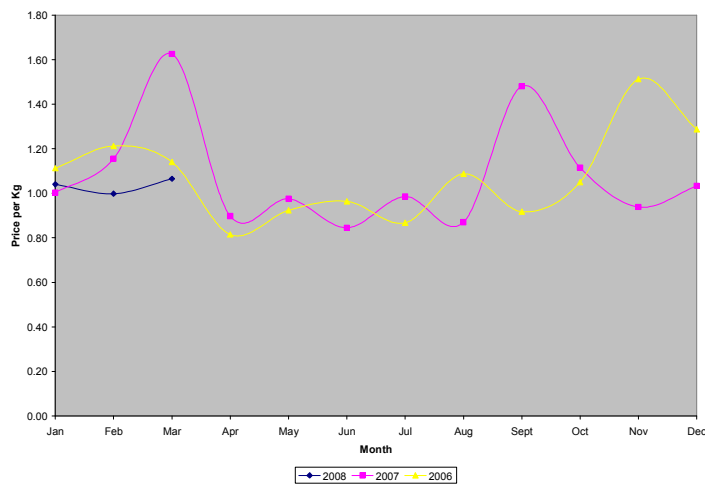


Figure 3
Average Domestic Retail Price of Cassava:

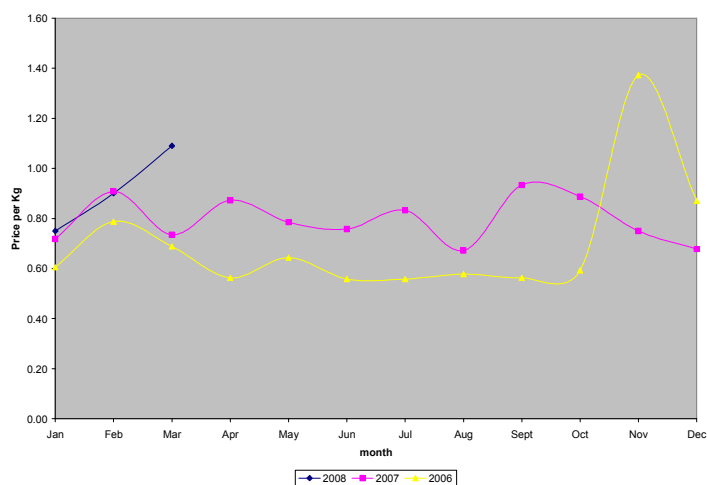
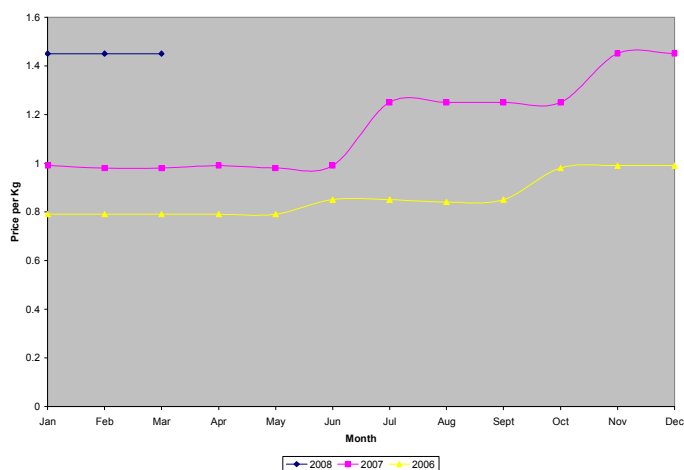


Figure 3
Average Domestic Retail Price of Potatoes:



Under these circumstances, it is important that Government takes a lead role in developing the agricultural sector. The new “Demand Driven Approach” being undertaken by the Agriculture Department aims to increase production and efficiency, while being fundamentally led by the private sector. \$3.3 million has been made available this year for export promotion and import substitution measures.

The Asian Development Bank (ADB) and the Food and Agriculture Organization of the United Nations (FAO) have identified the enormous export potential that the Fijian agriculture sector holds, particularly in high value niche export and traditional food crops. Of the \$3.3 million, \$2 million is ready for the development of products geared towards export, such as papaya, taro and ginger.

For import substitution, the Ministry recognizes that it is vital to increase Fiji's self-sufficiency. A number of studies have helped identify the food patterns of the population, and the growing importance of substituting locally available produce for imports.

Food patterns among both the Fijian and the Indian populations have not changed dramatically over the past two decades. Root crops, particularly cassava, continues to be the major staple consumed by Fijians. Among Indian households, rice continues to remain the most important staple, with cereals eaten approximately four times more than root crops.

Studies further show that lower income families attain a higher percentage of their food intake from root crops and cereals, while higher income households tend to have a large food intake from sugared foods.

Local staples are cheaper than cereals if one compares the costs with weight, and both taro and cassava have greater nutritional value than rice.

To help promote import substitution measures, \$1.3 million of Government funding is available for improving efficiency and productivity in products that are available locally but are also imported in large quantities. Such examples include rice, vegetables and livestock.

Figure 4

Average Price per Kilo of Selected Staple Crops

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Rice	2008	1.48	1.48	1.48									
	2007	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Flour	2008	1.13	1.19	1.29									
	2007	1.00	1.00	1.00	0.85	0.85	0.85	0.85	0.85	0.85	1.01	1.01	1.08
Potatoes	2008	1.45	1.45	1.45									
	2007	0.99	0.98	0.98	0.99	0.98	0.99	1.25	1.25	1.25	1.25	1.45	1.45
	2006	0.79	0.79	0.79	0.79	0.79	0.85	0.85	0.84	0.85	0.98	0.99	0.99
Sweet Potatoes	2008	0.94	0.97	1.30									
	2007	0.57	0.79	0.76	1.60	0.95	0.87	1.06	0.99	1.56	1.08	0.96	0.77
	2006	0.73	1.30	0.88	0.55	0.77	0.63	0.61	0.69	0.48	0.80	1.24	1.20
Cassava	2008	0.75	0.90	1.09									
	2007	0.72	0.91	0.74	0.87	0.79	0.76	0.83	0.67	0.93	0.89	0.75	0.68
	2006	0.61	0.79	0.69	0.56	0.64	0.56	0.56	0.58	0.56	0.59	1.37	0.87
Taro	2008	1.04	1.00	1.07									
	2007	1.00	1.16	1.63	0.90	0.98	0.85	0.99	0.87	1.48	1.12	0.94	1.03
	2006	1.11	1.21	1.14	0.82	0.92	0.96	0.87	1.09	0.92	1.05	1.51	1.29

Tourism

Tourism is now Fiji's most important industry and the largest foreign exchange earner apart from remittances that come into the country from seasonal workers and those on peace keeping duties overseas. The industry provides employment directly and indirectly to an estimated 40,000 people (15 per cent of the labour force) and contributes approximately 17 per cent of total production in the economy. The tourism industry achieved a record number of visitors with foreign exchange for 1998, the eighth year in a row. The country hosted 371,342 visitors with foreign exchange earnings over the half billion dollars. The visitor arrivals in year 2007 is expected to increase over a half million. Likewise, there has been a significant increase in money generated from the tourism sector. However, the leakage of funds from this sector is also high as the tourism industry remains within the control of the foreign entrepreneurs.

As an island nation with an open economy, Fiji is heavily dependent on transportation by sea and air services. The transport sector accounts for around 12 per cent of GDP. Government's major role in the transport sector is through the development of infrastructure (roads, jetties and airstrips), and providing the regulatory framework for the operation of all transport modes. As a shareholder in the airline industry, government assumes a planning role in relation to the aforementioned transport modes. Statutory bodies run the major airports and ports. Transportation services are mainly provided by the private sector, though government is also involved in inter- nation with an open economy, The government's major role is in island shipping, shipbuilding and ship repair.

Energy Sector

The energy provided for support of economic sectors are mainly from imported fuel. The transport and manufacturing sectors depend on diesel to provide services in the area of economic development.

Fiji's electricity provider, The Fiji Electricity Authority has so far been able to provide the electricity needs for just over 50 per cent of the people in the nation mainly located on the main islands. It generates a total of 767.44gwh annually, of which 65 per cent is generated by hydro, 21 per cent by diesel, 13 per cent by HFO and 1 per cent by wind and solar energy. As the fuel price increases globally, the challenges remain to develop infrastructure to generate renewable energy with local resources.

Although, the global price of fuel has shown a down trend, developing countries need to be cautious of being dependant on external fuel of energy provisions.

Problems and Issues

Fiji's geographical location and distance from its trading partners make the nation more vulnerable to its social economic calamities. Moreover, the extremities in climatic

conditions have exacerbated sufferings to the general populace. As if this was not enough, the soaring fuel prices have added miseries to the daily lives of people with high food cost and other purchasing commodities. Fiji buys around 1 billion dollars worth of fuel annually which is over half the government's annual operational budget. Over thirty per cent of the population live in poverty and their movement from rural to urban areas are causing social problems for the government of the day.

Impact assessments indicate that a number of key socio-economic sectors would be adversely affected in a variety of ways. These include coastal resources, water resources, agriculture and human health. Climate change and sea-level rise may lead to increases inland degradation, coastal erosion and coastal inundation, increased exposure of beaches to wave action (as coral growth lags behind sea-level rise), and in some cases the retreat of mangroves. Other climate change effects on coastal resources include:

- (a) Increased sea surface temperatures leading to an increase in coral bleaching. This, together with the lag in coral growth, may lead to a reduction in sediment production necessary for maintaining shoreline stability. Coral bleaching is also likely to have adverse effects on coastal biological diversity and fisheries.
- (b) Changes in the patterns of storminess, such as an increase in the frequency or intensity of tropical cyclones, may cause greater incidence of coastal inundation and erosion events. These processes may be exacerbated by reduced reef protection.
- (c) Reduction of coastal system resilience and low adaptive capacity to cope with or adapt.

Fiji, especially the main land(Viti Levu), already suffers from human-generated effects on the coastal zone. High population growth rates, intensive urban development, deforestation of catchments, pollution and increased exploitation of biological and physical coastal resources have exposed large areas of coast to erosion and inundation events. Accordingly:

- a) Coastal systems have reduced resilience to cope with climate variability,
- b) Coastal systems have reduced capacity to adapt to climate change, sea-level and human activities, and,
- c) Coastal populations and their assets are exposed to higher vulnerability to extreme events, such as storm surges, tsunamis, and high tides, not to mention sea-level rise.

Using the period from 1992 to 1999, as an analogue for future conditions under climate change, it might be assumed that over the next 50 years sugarcane production would decrease by up to one-quarter of expected production, implying difficulties for a large

sector of the population in the agricultural sector dependent on sugar production and associated industries.

Process-based model results of the impacts of climate change on dengue-fever epidemics indicated that climate change, through increasing temperature, would lead to increase in the risk of dengue-fever epidemics in Fiji while diarrhoeal disease may become more common if Fiji becomes warmer and wetter and if droughts and tropical cyclones occur more frequently, disrupting water supplies and sanitation systems. Additionally, nutrition-related illnesses are most likely to be affected by increase in frequency and/or magnitude of tropical cyclone and drought events. Further, it is also likely that if climate change leads to economic and social disruption and environmental degradation, disadvantageous effects on health may be serious.

Challenges to Food Security and Sustainability

Like agricultural production around the globe, Pacific Island Nations face new challenges along with existing forces and poses risks for the poor peoples livelihood and food security. Such situations calls for policy actions in various areas like social protection, investment in agriculture and trade reform. The economic viability of crop farming in island states is largely dependant on the efficiency of production. Production efficiency is achieved and sustained when farmers adopt good husbandry practices and have access to wide range of production technology to optimize yield with minimum input.

Opportunities for expanding agricultural production vary depending on specific circumstances in individual countries. In Pacific Island Countries, there is strong tourism sector, thus opportunities exist for supplying hotels with fresh produce which substitutes imports. Limited land for niche market for specific fruits and vegetables allow little flexibility for diversity or sustainable rotation to produce crops at an economical level.

With predicted climate change, incursions of new pests and diseases are more likely to intensify. Therefore, crop protection need to be given priority to prevent incursion of exotic pests, diseases and weeds that threaten food security. Integrated pest management regimes with minimum pesticides need to be developed and piloted.

Only 16 per cent of Fiji's land is suitable for agricultural purposes and these land lie around the coastal zone, thus, highly vulnerable to effects of sea level rise. It is predicted that sea level rise the rate of 5mm per year in the Pacific and Fiji's productive agricultural land which lie within 1meter of the mean sea level would be the victim of this occurrence. The need to develop infrastructures and agricultural engineering technology will now be a more pressing issue for the government.

Increased movement of people from rural to urban areas in search of quick and regular income poses a greater challenge to the sustainability of agricultural production and food security. Economical and affordable technology need to be developed and applied under local conditions and promoted to ensure continued survival of the farming community, most of whom live within the poverty level.

Approaches to Address the Issues

Based on vulnerability and adaptation studies undertaken previously in Fiji, numerous sectoral adaptation options have been identified in coastal resources and coastal zone management, agriculture, water resources, human health to address the climate change and sea level rise issues. Adaptation options range from better understanding of the impacts of climate change on development sectors to the implementation of adaptations measures to cope with or improve adaptive capacity and resilience of sectors to adverse impacts of climate change.

Also, rather than being reliant on developing countries for fuel and oil to generate energy, vigorous studies are being pursued for various other options to generate energy, such as wind energy, hydro-power, and bio-fuels from coconut, cassava and sugar. The Chinese government has agreed for joint venture with the government of Fiji to set up factory and production chain to develop cassava as an industry for ethanol production. In addition, the Fiji Sugar Corporation is finalizing another joint venture project with a Japanese Company to produce ethanol from sugarcane. In the private sector arena, another international company is proposing to invest over one hundred and seventy four million dollars in a bio-fuel project using pongamia tree to produce oil which will replace fuel for diesel engines.

The Fiji Electricity Authority which is the country's only licensed energy supplier aims to provide total clean and affordable renewable energy by 2011. It plans to invest over two hundred and fifty million dollars to construct another hydro power dam. Furthermore, wind turbines are showing positive results and plans are to increase the number. In addition, feasibility study is being proposed to explore wave energy as an alternative. This will at least reduce the import bill on fuel by 60million dollars annually.

Sustainable Development Policies and Programmes

Fiji's sustainable development policies are entrenched in its Strategic Development Plan 2003-2005 (SDP), a rolling development plan, which is updated every three years with emerging needs and priorities of government. The policies embedded in the SDP are consistent with the Millennium Development Goals adopted in September 2000 and emphasizes that sustainable development is achieved through policies that are economically sound, socially balanced and environmentally friendly.

In the last SDP plan period, a number of policies and programmes relevant to the agricultural sector enhancement were pertinent to sustainable development and economic growth, including Rural and Outer Island Development (ROI); Land Resources Development and Management; Environment; and Disaster Mitigation and Management.

The main objective of the ROI was to ensure provision of minimum and affordable basic needs for rural and outer island populations and plans for 100 per cent provision on a

participatory basis, of potable piped water to rural areas and to ensure food and income security for all.

Department of Land Resources Planning and Development, Ministry of Primary Industries, undertook planning, development and management of land resources. A land-use plan is expected to be completed for the whole country by 2010. The increase in population over the years has increased demand for agricultural land and consequently has put a significant amount of pressure on arable land. This has resulted in land degradation, reduced productivity, lower yields, reduced food security and an increase in poverty. Thus it will need a land use policy including rural land use policy, watershed management master plan. Policies for the sustainable development and management of land resources include:

- a) Ensuring sustainable utilization and development of land;
- b) Creating a leasing system that is mutually beneficial to both landowners and tenants;
- c) Minimizing degradation of land; and
- d) Consolidating and updating all land databases and information.

The proper management of the environment and sustainable use of its natural resources is critical for sustainable development of Fiji's largely natural-resource-based economy. The Department of Environment is responsible for better coordination, effective formulation and implementation of national environmental policies. Issues of serious concern include loss of biodiversity, inappropriate waste management, pollution of air and waterways, land degradation and climate change. Policies for the sustainable management of the environment include:

- a) Minimizing degradation of natural resources and protecting Fiji's biodiversity
- b) Promoting and supporting sustainable waste management;
- c) Mitigating the effects of climate change; and
- d) Strengthening the Environment Management Act

Climate change and sea-level rise is considered as one of the main environmental problems as well as the expansion of agricultural lands causing land degradation in Fiji. The main policy objective is to minimize degradation of natural resources and protection of biodiversity. Towards this end, an Environment Management Act has been developed which includes a requirement for all development projects to have environmental impact assessments. Furthermore, efforts have been made to mainstream environment management issues into the national development decision-making process.

Fiji has signed and ratified 19 International and Regional Conventions that emanated from the Earth Summit; and formulated 17 international and regional plans of actions, 25

national policies and plans and 17 national implementation programmes addressing sustainable development.

The Government of Fiji is fully committed to the implementation of the UNFCCC. It has also embarked on an economic growth policy which is focused on improving its economic and environmental performance, education, private sector development and creation of employment, agricultural opportunities, social structure, infrastructure and services, tourism and public sector efficiency. The Government of Fiji is also fully cognizant of the need to pursue a development strategy that focuses on sustainable development and wise use of its resources and environmental products and services over the long term. In this context, a number of policies and programmes have been developed to shape its development trajectory. These include:

- a) Climate change policy which aims to promote understanding of, and to formulate appropriate responses to climate change by mainstreaming climate change concerns/issues in all environmental, social and economic processes including enactment and amending of current legislations. The policy also focuses on adaptation to and mitigation of climate change.
- b) National Environment Management Act 2005 which established the National Environment Council with multi-stakeholders representation and includes provisions for mandatory environmental impacts assessments for development projects.
- c) Sustainable Development Programme such as European Union-funded National Strategy for Sugar (NASS) and Asian Development Bank-funded Alternative Livelihood Project (ALP) and Rural and Outer Island Development Project.

The main goals of the National Adaptation Strategy for Sugar is to achieve an effective transition to a sustainable sugar cane industry over the period 2006-2013 and to achieve macro-economic stability through a highly competitive sugar-industry and an integrated, well-balanced rural development programme including specifically tailored crop diversification programmes profiting from market opportunities for export. Adaptation for sugar in Fiji is in direct response to the EU sugar reform will have wide ranging impact on the sugar industry and economy of Fiji. Thus, phased reduction in the price of sugar exports to the EU will imply a corresponding loss of foreign exchange export earnings that will be around 65 million F\$ from 2009-2010 onwards. The loss of exports earnings will have macro-economic consequences that could reduce government's ability to meet socio-economic targets.

The Alternative Livelihood Project seeks to address the needs of poor rural people in the Western and Northern Divisions of Fiji whose conditions have been further jeopardized by problems of lease renewals and the prospective restructuring of the sugar sector. Thus food production and food security is a high priority. ALP is closely aligned with the SDP

2003-2005. The Rural and Outer Island Project focuses on infrastructure rehabilitation in rural and outer islands of Fiji.

In agriculture and water resources sectors, adaptations include development of flood-control measures (drainage systems) to cope with extreme high-rainfall events including such measures as diversion channels, building of weirs, cut-off channels, retarding basins and dams and river-improvement activities such as channel widening, dyke construction or river-bed excavation, catchment management including reforestation, land-use controls, protection of wetlands and soil conservation and control of flood-damage potential by regulating development on flood plains and promoting flood-proof building design. Various activities at community level can improve awareness of water conservation and emergency response and institutional development such as the creation of catchment and water authorities would help build capacity to improve the management of water resources particularly in intensive farming areas of Fiji.

Due to Fiji's small economy and small agricultural holdings, little emphasis is given to farm mechanizations except for in the sugar industry where machineries are used for land tilling, crop management, harvesting, transportation and milling. For other agricultural commodities, small machines and equipment are available on ad-hoc basis, mostly for cultivation purposes. This area needs to be vigorously perused in providing affordable machines and equipment to farmers, mainly in the subsistence category to enhance their capacity in making a better living.

Conclusion

Improvement of agricultural productivity for food security requires approaches from various angles to ensure its success and sustainability. In fact, the rising cost of making available food on the table is affecting both, the developed and the developing countries, therefore, there need to be a joint effect in addressing these issues. More particularly, for Fiji, the following needs urgent attention;

- Reviewing of drainage criteria in view of the sea level rise and climate change, as most of the low lying area are intensively cultivated for agricultural production which is now under threat,
- Vigorous perusal of renewable energy to offset the fuel hike import which is currently the main source of energy to service all sectors. Increased self reliance on renewable energy will provide stability to economic growth and confidence in development sectors for long term investment,
- Identifying appropriate and affordable technology to reduce cost of agricultural production and increase crop yield,
- Emplacing infrastructures to mitigate the impacts of extreme climatic conditions that result in floods and droughts.

It is very clear, that to achieve long term agricultural growth, medium to long term investment in this sector is imperative, otherwise island state countries will continue to suffer with increased levels of poverty and become more reliant on developed nations for their survival.

References

In-country consultation draft report on Pacific Adaptation to Climate Change(Fiji)- 2007

Fiji Visitors Bureau report -2007

Resolutions of Third Regional Meeting of Agricultural Ministers in Samoa- 2008

Sugar National Adaptation Strategy Feasibility Study Report - 2008

Rising Food Prices – International Food Policy Research Institute(Policy Brief)- 2008

Fiji Electricity Authority Annual Report – 2005

Fiji Government Strategic Development Plan- 2003-2005

Piloting Climate Change Adoption to Protect Human Health in Fiji - 2007

Lakshman Mudaliar

Acting Director,

Land and Water Resource Management

Ministry of Primary Industries and Sugar

Suva, Republic of the Fiji Islands.

Email: lmudaliar@govnet.gov.fj