



REPORT OF THE FAO HIGH LEVEL EXPERT CONSULTATION ON COCONUT SECTOR DEVELOPMENT IN ASIA AND THE PACIFIC

30 October – 01 November 2013
Bangkok, Thailand



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**Food and Agriculture Organization of the United Nations (FAO)
FAO Office for Asia and the Pacific
and
Asia Pacific Coconut Community (APCC)**

This publication brings together reports presented at the FAO-APCC High Level Expert Consultation on “Coconut Sector Development in Asia – Pacific Region” held in Bangkok, Thailand , 30 October – 1 November 2013. The consultation was sponsored by the FAO Regional Office for Asia and the Pacific.

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Content

I. Foreword	1
II. Executive Summary	2
a. Setting	2
b. Regional Strategy for the Development of the Coconut Sector in Asia and the Pacific	2
c. Recommendations for the Pacific Countries	5
d. Recommendations for the Asian Countries	7
III. Inaugural Session	11
IV. Technical Plenary Sessions	11
Annexes	26
1. Programme of the Expert Consultation	26
2. List of Participants	29
3. Regional Strategy for the Development of the Coconut Sector in Asia and the Pacific	35
4. Country Reports – Pacific Region (Samoa, Tonga, Fiji, Vanuatu and Solomon Islands)	53
5. Country Reports – Asian Region (Thailand, Indonesia, the Philippines, Sri Lanka, and Viet Nam)	107
6. Bibliography	176

I. Foreword

This exercise is a part of the implementation of one of the recommendations of the 31st Asia-Pacific Regional Conference, held 12-16 March 2012 in Viet Nam. The implementation process was initiated in late 2102. FAO fielded the first mission to the major coconut growing countries of the Pacific region to identify the current status, gaps and the way forward in order to put renewed focus on this crop in the current context of global agricultural development and economic growth. Apart from the Pacific countries FAO also conducted a study in the major Asian coconut growing countries with similar objectives. The whole exercise was conducted in close collaboration with the Asia Pacific Coconut Community (APCC).

This report summarizes the major findings of the three events: 1. Output of the mission fielded in Pacific countries (Samoa, Tonga, Fiji, Vanuatu and Solomon Islands); 2. Output of the mission fielded in Asian countries (Thailand, Indonesia, the Philippines, Sri Lanka, and Viet Nam); and 3) Output of the FAO High Level Expert Consultation - development of the Regional Strategy for the Development of the Coconut Sector in Asia and the Pacific.

The major output of this big exercise is the Regional Strategy for the Development of the Coconut Sector in Asia and the Pacific. It consists of: Strategy I. Increasing coconut production, farm productivity and farmers income; Strategy II. Promoting value-added coconut product processing and marketing; and Strategy III. Promoting capacity building and providing institutional support. Specific recommendations were identified and spelled out in each strategy.

These strategies and recommendations may be considered and acted upon by the respective national governments of coconut growing countries in Asia and the Pacific and regional/international technical agencies. We do hope that this report will provide guidelines to the member countries in order to develop national and regional programmes for speedy and sustainable coconut sector development with ultimate goals to enhance food and nutrition security of our people.

I would like to thank all participating countries and coconut experts of this region for their tireless support to make this important exercise useful. Special thanks goes to my colleagues Subash Dasgupta and Rosa Rolle for their coordination and technical contribution to this exercise.

Finally, I would like to thank Mr. Romulo N. Arancon, Senior FAO Consultant and Executive Director, APCC for drafting all three documents in consultation with the various experts, stakeholders and RAP staff.



Hiroyuki Konuma
Assistant Director-General and Regional Representative
FAO Regional Office for Asia and the Pacific

II. Executive Summary

a. Setting

The FAO High Level Expert Consultation on Coconut Sector Development in the Asia-Pacific Region was organized by the Food and Agriculture Organization of the United Nations Regional Office for Asia and the Pacific (FAO-RAP) in collaboration with the Asian and Pacific Coconut Community (APCC) and the Ministry of Agriculture and Cooperatives, Thailand. It was held 30 October – 01 November 2013 in Bangkok, Thailand.

A total of 46 participants from 13 coconut growing countries in Asia and the Pacific attended the Expert Consultation, including 8 Ministers, 1 Deputy Minister and a number of senior officials, coconut research institute directors, scientists and experts from both the government and private sectors.

The Ministers of Agriculture of participating countries delivered their statements in the technical session, while the senior technical officers presented their country statements highlighting the current status of coconut sector development in their respective countries including a review of the current policies, coconut development programmes, constraints, gaps and issues in coconut sector development as well as their recommendations to address the issues and constraints, and follow-up actions.

Five coconut experts also presented papers on technical subjects such as coconut breeding and research, coconut-based farming systems (CBFS) and the economics of CBFS, integrated management of pests and diseases in coconut, processing of value-added coconut products (in the food, beverage, pharmaceutical and spa industries, including bio fuel), and marketing and trade of coconut products. Plenary and working group discussions were held. FAO fielded a mission to several Asian countries (Thailand, Indonesia, the Philippines, Sri Lanka, and Viet Nam) and some countries of the Pacific region (Samoa, Tonga, Fiji, Vanuatu and Solomon Islands). The outputs gathered from Expert Consultation and country reports of the mission were valuable in crafting the Regional Strategy for Coconut Sector Development in Asia and the Pacific.

The conclusions and recommendations of each of the three documents: 1. Regional Strategy for the Development of the Coconut Sector in Asia and the Pacific (Annex 3); 2. Country reports of the Pacific region; and 3. Country reports of the Asian countries are summarized here separately, while the full reports are given in Annexes 4 and 5.

b. Regional Strategy for the Development of the Coconut Sector in Asia and the Pacific

Recommendations:

1. Use coconut mass selection techniques to choose good quality mother palms, seednuts and seedlings of elite local varieties for the replanting programme. Pursue coconut breeding and hybridization programmes/projects to produce dwarf x tall or tall x tall hybrids for specific

purposes (e.g., high nut production, high lauric-oil content, tolerance to abiotic stresses like drought or cold temperature and tolerance to abiotic stresses like phytoplasma diseases). Use molecular techniques to expand the genetic base for coconut breeding of hybrids with superior traits and develop a viable protocol for somatic embryogenesis to mass produce elite planting materials for the replanting programme.

2. Establish coconut seed gardens to mass produce hybrids and other good quality planting materials. This may be initiated by the respective governments in coconut growing countries. The private sector should also be encouraged to establish commercial coconut seedgardens.

3. Strengthen the coconut breeding facilities in the respective countries and establish a duplicate coconut genebank in the Pacific region (preferably in Fiji) in view of the Boga coconut syndrome disease in Papua New Guinea. Strengthen the three multi-site International Coconut Genebanks hosted by Papua New Guinea for the South Pacific, Indonesia for Southeast and East Asia, and India for South Asia with new additions through exchange of germplasm for breeding and operationalization of the International Treaty on Plant Genetic Resources for Food and Agriculture by FAO and the International Agreement on hosting the International Coconut Genebank signed by FAO, IPGRI and the host countries;

4. Promote the commercial utilization of coconut wood for house construction, furniture making and handicrafts. This should provide an economic incentive to cut and replant senile palms as the sale of coconut logs can provide additional income to the farmers. A pilot project on coconut timber utilization in collaboration with appropriate stakeholders in coconut growing countries may be explored. Mobile sawmills equipped with tungsten carbide saws may be piloted with the appropriate techniques and technologies in coconut logging, sawmilling (correct cutting patterns), drying and machining. A technical assistance project on this is desirable.

5. Provide capacity building and technical assistance to coconut breeders, scientists, extensionists and farmers in the region to effectively implement the above-mentioned recommendations.

6. Develop further Coconut-Based Farming Systems (CBFS) by intercropping of food security crops, cash crops and high value industrial crops (root crops, vegetables, banana, tropical fruits, spices, medicinal plants, cacao, coffee, etc.) which meet marketability and profitability criteria specific to each country.

7. Raising of livestock in coconut farms, including growing of improved grass-legume pastures under coconut and raising ruminants (goat, sheep, beef and dairy cattle) in pasture or in confinement on a cut-and-carry basis and poultry (native chicken ducks, etc.) for meat and eggs.

8. Adopt coconut-based agroforestry systems, including the planting of nitrogen-fixing trees like *Gliricidia* to enhance soil fertility, increase soil organic matter buildup, produce fuelwood to save forest trees and biomass to generate dendrothermal energy. Coconut-based agroforestry

systems should be promoted in coastal areas to prevent coastal erosion and to act as windbreaks and protect inland crops and other resources against strong winds/typhoons due to climate change

9. Adopt Good Agricultural Practices (GAP), including fertilization or the production and use of organic fertilizer from farm biomass and use of salt and chemical fertilizer augmentation as appropriate.

10. Establish an Integrated Pest Management (IPM) Network for Coconut Pests and Diseases and design and implement a programme for transfer of technology on IPM of coconut pests and diseases.

11. Provide technical assistance in conducting market surveys and in the preparation of location-specific project feasibility studies for value-added coconut processing business ventures.

12. Transfer of coconut processing technologies, especially from Asia to the Pacific countries, through the provision of experts on high-value products and creation of a Directory of Current and Retired Scientists and Technical Experts under South-South Cooperation. The Asian countries may help in arranging skill training and capacity building of trainers and coconut farmers/entrepreneurs on the processing of high-value coconut products; sourcing of appropriate processing machineries and equipment from reputable companies; establishment of demonstration/pilot projects on the processing of high-value products, especially in the Pacific countries; and on product quality standards assurance to meet market requirements.

13. Exploiting marketing platforms such as organic certification, fair trade certification, ISO certification, GAP/GMP/HACCP certification, Halal certification, non-GMO certification, and non-gluten and transfat-free coconut food products.

14. Conduct of medical research/clinical trials on the health benefits of coconut oil and heart disease, diabetes, Alzheimer's disease, HIV/Aids and others.

15. Consider coconut sector development as a high priority programme in the National Development Plan and provide adequate budget support for government investments in the coconut sector; provide a policy environment to encourage joint ventures (JVs), promote local and foreign investments, and Public-Private Partnerships (PPPs); provide financial incentives and access to credit assistance, especially for small and medium scale enterprises (SMEs); support market promotion activities, including awareness campaigns on the health benefits of coconut to increase domestic demand/utilization and export; strengthen the National Coconut Extension Service; facilitate and support the formation of economically viable Coconut Farmers' Cooperatives, Coconut Producer Societies or Coconut Producer Companies; facilitate the formulation of their respective Coconut Industry Strategic Plans and Roadmaps; and facilitate periodic agricultural surveys to ensure evidence-based policy formulation and program planning.

c. Recommendations for the Pacific countries

1. Evidenced-based policies and coconut sector development programmes must be formulated to address the declining production and productivity of coconut farms and ensure maximum economic returns from investments in coconut replanting/planting, coconut-based cropping systems including livestock integration and downstream value-added processing of coconut products. New agricultural surveys with focus on the coconut sector are recommended to provide essential inputs to policy formulation and programme planning.
2. To pursue the development policies in the coconut sector, proper institutional mandates and strengthening of the agricultural extension service and supporting agencies must be in place. A Coconut Sector Strategic Plan with verifiable targets and indicators of success supported with the appropriate government budget and private sector investment must also be in place.
3. While the relevant coconut productivity and rehabilitation programmes are in place and are on-going in some Pacific countries, it is recommended that technical assistance be provided on coconut varietal improvement through coconut genetic resource survey, coconut breeding research and proper selection methodology to ensure that only the best quality planting materials/seedlings are field planted.
4. Rehabilitation of the coconut sector should involve a coconut-based cropping system, crop diversification and livestock integration to ensure optimum productivity of the coconut farms and contribute to food security and the economic livelihood of the farming families.
5. While the coconut seedlings used in the on-going coconut replanting/planting and rehabilitation programmes are mainly local varieties, coconut hybrids as well as selected dwarf varieties for young tender coconut drinks may also be promoted.
6. Technical assistance for the production of technical manuals on the genetic qualities and production potential of various coconut varieties for specific uses/purposes is recommended.
7. The production of technical guides, posters, leaflets on coconut-based cropping systems, including livestock integration in coconut farms highlighting the GAP in the management of the intercrops/cash crops with coconuts is likewise recommended. Information materials on copra quality improvement techniques, hot-air copra dryers, the processing of value-added coconut products like virgin coconut oil, coconut flour, coconut water, coconut husk products and others should also be produced.
8. The Ministers of Agriculture and other stakeholders have recognized that there is a need to develop the coconut processing industry to stimulate better prices of coconut raw materials and provide economic incentives for coconut replanting/planting and increase coconut production. Product diversification, value-addition, domestic utilization and export are therefore recognized as the way forward.

9. In the case of the Virgin Coconut Oil (VCO) industry, it is recognized that the Direct Micro Expelling (DME) Process mostly used in the Pacific countries in the production of VCO needs to be scaled-up to promote efficiency, economies-of-scale, greater production to meet the supply requirements in the export market, while at the same time provide rural employment (especially among women and the youth) and ensure fair trade and better prices of whole coconuts as the raw material.

10. To help ensure strong backward linkages to the rural coconut farming communities, value-added coconut processing enterprises such as virgin coconut oil production, coconut flour processing, coconut oil-based soap making and others must be developed within the rural coconut farming communities. These rural coconut processing centers must be market-led or demand-driven and should be supported to meet domestic market demand and export opportunities.

11. The proposed ACP-EU Coconut Project will adopt the “whole nut concept” where an integrated coconut processing plant will be expected to process activated carbon from coconut shell charcoal, coconut milk/cream or desiccated coconut from the kernel, fiber and other coir-based products from the husk, and packaged coconut water. In the spirit of collaboration, other international donor agencies may provide technical assistance in the proposed project as needed.

12. To provide an economic incentive for replanting or cutting of senile and unproductive coconut palms, commercial coconut wood utilization should be encouraged and investment in this area must be promoted to provide lumber/coconut wood for housing and furniture making.

13. While copra is still the major coconut product being traded in the Pacific, a copra quality improvement strategy must be implemented through the provision of hot-air dryers, proper technical guidelines and appropriate training on copra drying, establishing national quality standards on copra following the APCC Code of Standards for Copra, and promotion of quality-based pricing among copra buyers and traders/exporters.

14. Given the very limited value-addition activities in the Pacific region, the fundamental question should focus on how to turn the whole coconut industry around from the current level to utilize the large quantities of raw materials to benefit the coconut farmers. Specific opportunities should therefore be explored around up-scaling VCO production and its product derivatives, desiccated coconut and/or coconut milk processing as well as packaging of coconut water, and the processing of coconut fiber products including coconut shell charcoal and activated carbon. Location-specific project feasibility studies should be undertaken to ensure success in these coconut processing business ventures.

15. To develop and expand the market for coconut products in the Pacific region, there is a need to raise the awareness among the Pacific people and other consumers on the health aspects of coconut products and the advantages as well the intrinsic value of using locally produced coconut products like VCO, coconut cooking oil, coconut flour, coconut-based soap, young tender coconut water, and others. Domestic utilization of coconut products must be vigorously promoted and pursued.

16. To encourage investments in the coconut sector, the government financial sector should provide support through the banking system for reasonable credit schemes for coconut processing business ventures. These investments must be market-led or demand-driven, and the support for financing must include professional guidance on branding, packaging and market-matching assistance.

17. To promote institution building, capacity development and training programs for coconut specialists/extensionists, coconut farmers and coconut processors must be provided with technical assistance from appropriate government agencies and international development or donor organizations.

18. To ensure efficiency and effectiveness in program implementation, the governments of the Pacific countries should strengthen their National Extension Services. The extension delivery services to coconut farmers and women in the coconut farming communities must be vigorously pursued.

19. The formation of coconut producers associations or cooperatives in the Pacific countries must also be facilitated/supported. This should ensure inclusive development among the rural coconut farming communities and at the same time promote greater efficiency and effectiveness in the delivery of extension services and capacity building activities.

d. Recommendations for the Asian countries

1. There is a need to rehabilitate senile and unproductive palms in coconut growing countries in Asia. This will require coconut replanting using selected elite local varieties and hybrids. Germplasm exchange and capacity building within the countries to develop capability on mass selection techniques, coconut breeding and hybridization should be pursued. Since coconuts can tolerate salinity and are highly adapted to the coastal zones, priority in replanting may be considered in these areas. This should contribute to the total carbon sink and prevent coastal erosion and massive sea water intrusion caused by climate change. Breeding for drought-tolerant varieties, high lauric oil content, precocity or earliness of bearing, and high nut production should also be pursued.

2. The lack of quality coconut planting materials must be addressed. This will require more seed gardens to produce high yielding and early bearing coconut hybrids. The private sector may also be encouraged to establish commercial seed gardens to meet the required quantities of good quality planting materials for the replanting program. Research on using somatic embryogenesis to mass propagate selected high yielding hybrids should also be vigorously pursued. The genetic base of coconut varieties should therefore be expanded and characterized for breeding and development of hybrids for specific purposes or uses. One immediate and practical option is the use of selected local elite varieties. Thus, capabilities in mass selection techniques must be developed among extensionists and the coconut farmers to enable them to choose the best quality planting materials from the existing local varieties. An accreditation system of coconut farms with good local elite varieties should also be put in place. Another option is to develop the capabilities of the farmers to produce coconut hybrids in their own

farms, as practiced in Sri Lanka and the Philippines. This usually involves crossing a yellow or red dwarf variety with a selected local tall variety using the dwarf variety as the female progenitor; selection of authentic hybrid seedlings is based mainly on the pigmentation (color) of the germinating hybrid seednuts. The mass production of hybrids by coconut farmers in their own farms should contribute to the number of improved quality materials for the coconut replanting program.

3. Commercial coconut wood utilization should be promoted. To provide an economic incentive for replanting or cutting of senile and unproductive coconut palms, there must be a buyer of coconut logs. Commercial coconut wood utilization should therefore be encouraged and investment in this area must be promoted to provide lumber/coconut wood for housing and furniture making. This should also provide a diversification strategy away from forest timber and avoid degradation of the forest and depletion of the forest resources in the Asian region. A pilot project on coconut timber utilization in collaboration with appropriate stakeholders in coconut growing countries may be explored. Mobile sawmills equipped with tungsten carbide saws may be piloted with the appropriate techniques and technologies in coconut logging, sawmilling (correct cutting patterns), drying and machining. A technical assistance project on this regard is desirable.

4. There is a need to develop strategies against emerging coconut pests and diseases. As pests and diseases cause low yields, research on environmentally friendly biocontrol strategies using natural predators, pheromones and biopesticides must be pursued. Farm sanitation and group efforts through Farmer Field Schools must be widely promoted and practiced. Research on breeding for tolerant varieties, especially against emerging/new coconut diseases, must be pursued.

5. Coconut-based farming systems models should be further developed, promoted and practiced. To ensure food security, good nutrition and additional income in coconut communities, coconut-based farming system models involving intercropping of food crops, vegetables, fruit trees and industrial crops like coffee and cacao in between the coconut palms, as well as raising livestock like goats, cattle, chicken, etc. in the coconut farms must be vigorously promoted and practiced. Produce from intercrops and cash crops together with income from livestock should ensure food security and a sustainable source of livelihood. Technical assistance and guidance must be provided to enable the coconut farmers to adopt Good Agricultural Practices (GAP) in coconut farming.

6. Value-added coconut processing must be promoted. To be resilient in times of price volatilities, coconut farmers must not depend on copra alone. Value-added processing of various coconut products can also add income to the farming family. Coconut value-added products like Virgin Coconut Oil (VCO), VCO-based soap and cosmetic products, coconut sugar, coconut vinegar, nata de coco, young tender coconuts, coconut shell charcoal and activated carbon, coir and coir-based products are some of the products that could add income to the coconut farmers. Technical assistance on coconut processing technologies, good manufacturing practices (GMP), promotion of quality standards and access to markets should therefore be provided to ensure the viability and sustainability of value-added processing

ventures in coconut communities. There is much potential to further develop the coconut husk industry (processing of coconut coir and coir-based products) especially in the Philippines and Indonesia, where so much raw material exists. The value-added processing of coconut shell charcoal into activated carbon (AC) has much potential as global demand for AC is increasing annually. The challenge is to focus on high value coconut products and by-products with health and environmentally friendly applications.

7. Promote joint ventures among coconut growing countries. To take advantage of the synergistic effects of sharing technologies (technical know-how and experience), raw materials, and access to niche markets, joint ventures within and among coconut growing countries should be encouraged. The government in collaboration with private stakeholders can play a facilitating role in this regard.

8. Promote the health attributes of coconut products through an aggressive awareness campaign and through joint R & D efforts in the conduct of clinical trials. Studies on coconut oil and its main components which are known as medium chain fatty acids, have shown that it is beneficial as a dietary oil, as a food supplement or functional food and as a therapeutic agent. Because it can speed up the metabolism, it can readily provide energy and can even be beneficial for weight loss. Coconut oil has been shown to enhance the immune system and has anti-microbial properties. Researchers assert that there is a scientific basis for the many testimonial evidences on the health attributes of coconut oil. However, many of these require further research using an adequate population sample size through the conduct of clinical trials /studies. Greater awareness of the beneficial qualities of coconut products should increase domestic and export demand.

9. Enhance market promotion in traditional and niche markets. Coconut products can be certified as organic, GMO-free, natural, healthy and environmentally friendly. To improve market access of coconut products, market promotional campaigns should be conducted in the buying countries and niche markets through participation in high-impact trade exhibitions, and technical seminars on the health and nutritional aspects of coconut products must be intensified. These efforts should contribute to the growth of the demand for coconut products.

10. Strengthen the National Coconut Extension Service. To ensure efficiency and effectiveness in programme implementation, the governments in the Asian countries should strengthen their National Coconut Extension Services. The extension delivery services to coconut farmers and women in the coconut farming communities must be vigorously pursued. Specialists/extensionists, coconut farmers and coconut processors must be provided with technical assistance from international development or donor agencies. This should include technologies in coconut replanting, varietal screening, coconut breeding, seedling selection, coconut-based cropping systems, Good Agricultural Practices (GAP) and others. In the processing sector, technologies on Good Manufacturing Practices (GMP), HACCP and ISO Certification, Organic Certification, and product quality standards must be provided.

11. Facilitate and support the formation of economically viable CBOs/Coconut Farmers' Cooperatives. The formation of coconut producers associations or cooperatives in the Asian countries must also be facilitated/supported. This should ensure inclusive development among the rural coconut farming communities and at the same time promote greater efficiency and effectiveness in the delivery of extension services, financing and capacity building activities. The establishment of nucleus estates or the adoption of the cluster approach to coconut farming and marketing may also be pursued.

12. To encourage investments in the coconut sector, the government, as a matter of policy, must consider coconut as a priority crop in its national agricultural development agenda. The government and the private financial sector through the banking system should provide support through reasonable credit schemes for coconut processing business ventures. These investments must be market-led or demand-driven, and the support for financing must include professional guidance on branding, packaging and market-matching assistance.

III. Inaugural Session

The FAO High Level Expert Consultation on Coconut Sector Development in the Asia-Pacific Region was organized by the Food and Agriculture Organization of the United Nations Regional Office for Asia and the Pacific (FAO-RAP) in collaboration with the Asian and Pacific Coconut Community (APCC) and the Ministry of Agriculture and Cooperatives, Thailand. It was held 30 October – 01 November 2013 at the Novotel Hotel, Bangkok, Thailand.

A total of 46 participants from 13 coconut growing countries in Asia and the Pacific attended the Expert Consultation, comprising of 8 Ministers, 1 Deputy Minister and a number of senior officials, coconut research institute directors, scientists and experts (Annex 2).

Mr. Hiroyuki Konuma, Assistant Director-General and Regional Representative (FAO-RAP), delivered the Opening Remarks during the Inaugural Session. He highlighted the need for a high level expert consultation to formulate a strategy for the development of the coconut sector in the Asia-Pacific region, as FAO's response to the recommendation of the 31st Asia-Pacific Regional Conference held in Hanoi, Viet Nam, in March 2012. He stated that FAO fielded a study mission in major coconut growing countries in Asia and the Pacific to assess the current status of the coconut sector and identify the gaps and commonalities and recommend opportunities for sectoral development in order to put a renewed focus on coconut in the current context of global agricultural development and economic growth. He discussed the specific objectives of the expert consultation as well as the expected outputs and assured the participants that the recommendations of the delegates will receive top priority from FAO as it stands ready to assist the governments of the Asia-Pacific region to implement the strategies and recommendations at both the national and regional levels.

The Honorable Siritat Kajornprasart, Deputy Minister of Agriculture and Cooperatives, Thailand, was the Keynote Speaker and Honoured Guest during the Inaugural Session, on behalf of the Minister. He said that the Ministry of Agriculture and Cooperatives was pleased to welcome all the delegates to the Expert Consultation and that the success of the consultation will largely depend on how we can develop a strategy for coconut sector development that will ensure optimal utilization of all components of the coconut tree to maximize its value and improve returns. He likewise highlighted the need for a value chain approach for coconut development in order to speed up the process of economic growth in the sector.

Mr. Vili A. Fuavao, Deputy Regional Representative, FAO-RAP gave the vote of thanks on behalf of FAO.

IV. Technical Plenary Sessions

The technical plenary sessions for 1: Asia and 2: for the Pacific were chaired by Mr. Romulo N. Arancon, Jr., Executive Director, Asian and Pacific Coconut Community, APCC. The Ministers of Agriculture of participating countries delivered their statements in the technical session while the senior technical officers presented their country statements highlighting the

current status of coconut sector development in their respective countries including a review of the current policies, coconut development programs, constraints, gaps and issues in coconut sector development as well as their recommendations to address the issues and constraints, and follow-up sections.

a. Brief country status (full country reports in Annex 4)

Samoa

An estimated 90 000 hectares of coconut plantations are recorded; a growing number of these trees are becoming senile and declining in yields. Recent provisional data from the 2009 Agricultural Census Tabulation Report has estimated that only 28 000 hectares of coconut are reportedly being maintained and harvested by farming communities.

As observed, most of the coconut plantings are situated around the coastal areas and low-lying areas. Some plantings are done further inland at the higher elevations and are less productive. Reports have indicated that coconut is grown in almost all inhabited areas of Samoa. However, only about 31 percent of the coconut growing area is actually being maintained and harvested by farming communities. Coconut, being a major traditional tree crop, is an integral part of the agriculture activity.

The Ministry of Agriculture and Fisheries has indicated that the major strength of coconut production in Samoa is that it is a traditionally important crop that is an integral part of the way of life in Samoa. At the subsistence level, it is seen as less responsive to world price fluctuations and is planted as a necessity. It can be intercropped with other economically important crops such as taro, banana, cocoa, coffee and pasture for grazing under coconuts. Coconuts are traditionally managed without chemicals and are easily certified as organic.

The major factor affecting the drop in coconut production is the drop in world prices, causing farmers to collect coconuts mainly for subsistence and livelihood. Some of the nuts have entered the Young Coconut Industry to make beverages which fetch a much better price than selling mature nuts. Senility of palms has also contributed significantly to the decrease in coconut production and productivity. There is therefore a need for coconut replanting. Access roads to many island plantations are also an issue. Droughts or low rainfall occurring for about 6 months in 2011 and 2012 also contributed to lower coconut production.

Tonga

Coconut in Tonga is regarded as the “Tree of Life.” Its importance in Tongan life is reflected in Tongan mythology and the products derived from the coconut are used in a variety of ways. The total annual nut production is about 29.4 million. If all agricultural land is harvestable then the potential production for the country is 15 000 tons. A survey carried out in 1982 estimated the total land under coconut at 35 347 hectares or 49 percent of the total land area. There is an existing Land Law that requires the planting of 200 coconuts per tax allotment. Reports have indicated that in the last 15 years, coconut planting has been declining by 25.6

percent or at a rate of 72 500 palms per year, due to mortality, urban expansion, felling for timber and others. Most of the reduction has occurred in the main islands of Tongatapu and Vavau. For many years, coconut has been the main export commodity. With the closure of the coconut oil mill, only mature coconut exports are still maintained. The export earnings from coconut exports have shown a major increase in previous years. However, there are only a few exporters of whole/mature coconuts. Young palms (less than 10 years old) account for 5 percent of the total coconut population. Bearing palms (10 – 60 years old) account for 50 percent and senile palms (over 60 years old) account for 45 percent. Senility of the palms, the varieties, poor agricultural management practices and natural calamities like low rainfall are some factors responsible for the declining coconut production and productivity. Coconut product diversification with Virgin Coconut Oil (VCO), including the production of coconut cooking oil, coconut oil-based soap and other products for the domestic market must be pursued. However, as in the case of any economic venture, a thorough project study must be made to ensure the technical and economic feasibility of the enterprise.

Fiji

Total coconut plantation in Fiji is estimated at 10 million including scattered coconut palms and plantation crops which cover an area of approximately 65 000 hectares. Around 70 percent of Fiji's coconut palms are more than 100 years old and are of the Fiji Tall Variety, while 6 percent of the coconut tree population is expected to be about 50 years old, comprising about 4 000 hectares each of Fiji Tall and Malayan Dwarf. Coconut hybrid varieties make up 10 percent of the coconut tree population and cover up to 2 000 hectares while coconut trees of mixed varieties comprise 14 percent of the total population and are a little under 30 years old. The average nut production is 25 - 30 nuts per tree per year for older trees, while younger palms below 40 years yield around 50 - 60 nuts per tree per year. Copra yields range from 1 to 2 tons per hectare, depending on the variety, age of palm, soil fertility, and farming system adopted. Established coconut producing areas are concentrated in the Eastern Division, the Northern Division and the coastal areas of the main islands (Viti Levu). Copra production continued to decline in the past five decades, dropping from around 41 000 tons in the 1950s to less than 7 000 tons in 2012. This drastic drop in copra production has affected the lives of an estimated 100 000 farmers and rural dwellers in coconut growing areas. Efforts by the government to revive the industry is recognized as a priority. Reasons for the reduced coconut production trend include: distance from the market with high transport/freight cost; scarcity of labour and low returns from copra; natural disasters; expiring land leases; industrial development; coconut timber harvesting from senile palms; and higher returns from more lucrative shorter term crops like dalo and yaqona. The scarcity of labour and low returns from copra has over the years shifted the bulk of copra production from large producers (estate owners) to smallholder producers who are now collectively producing the bulk of copra production, a turnabout from around 20 percent in yester years to 80 percent of production in recent years. Nevertheless, it is recognized that the recent upward trend in coconut product diversification should generate a significant increase in replanting, new planting and overall coconut diversification efforts in the near future of the coconut industry. In Fiji about 33 percent of the coconut production is converted into copra while the rest is utilized in the preparation of food for domestic purposes and in small quantities for making coconut cream.

The Government of Fiji is committed in its policies, programme planning, budgeting and over-all efforts in revitalizing the coconut industry. Structural reforms have been instituted, and coconut rehabilitation programs like the one million coconut tree planting/replanting program, coconut-based cropping and livestock diversification program, promotion of value-added coconut processing through the whole nut processing (training and demonstration) plant and specific funding support for these programs are concrete initiatives towards coconut industry development. It is therefore essential that the Government of Fiji receives the technical assistance that it needs to ensure the success of its policies and programmes.

Vanuatu

Approximately 24 000 households or 69 percent of those engaged in agricultural activities, are reported to have coconut sub-holdings. These sub-holdings are composed of 39 348 land parcels comprising 96 000 hectares. An estimated 9.7 million coconut trees were planted in these sub-holdings; about 91 percent are bearing trees with 82 percent of the bearing trees aged between 5-49 years while 18 percent were estimated to be 50 years and over. Copra production provisional figures for the December quarter in 2012 decreased in volume by 50 percent from 11 291 to 5 666 tons over the December quarter of 2011. Copra producer's price recorded a decrease of 36 percent from Vt46 000 to Vt29 000 in the December quarter of 2012 over the corresponding period in 2011 and 19 percent over the previous quarter.

There is a need for increased and sustainable coconut production and coconut farm productivity in Vanuatu to ensure food security among the coconut farming households and meet the demands of the processing industry and the trade sector. In view of the senility of coconut palms which is causing a decline in coconut production, a systematic National Coconut Replanting Programme is deemed necessary. Rehabilitation of the coconut sector should involve a coconut-based cropping system and livestock integration to ensure optimum productivity of the coconut farms and contribute to the economic livelihood of the farming families. The coconut palms should therefore be inter-planted with cash crops or food security crops including fruit trees and industrial crops like cacao and coffee. Focus should be on coconut-cropping systems and coconut-livestock integration for which Vanuatu has a comparative advantage. To help ensure strong backward linkages to the rural coconut farming communities, value-added coconut processing enterprises such as virgin coconut oil production, etc. must be developed and supported to meet domestic market demand and export opportunities. Technical assistance and support for market and cost-benefit analysis or project feasibility studies must be provided to potential groups of entrepreneurs prior to advocating new value-added coconut processing projects. Capacity building and training programs for coconut specialists/extensionists, coconut farmers and coconut processors must be provided with technical assistance from international development or donor agencies. This will include technologies in coconut replanting, varieties screening, seedling selection, coconut-based cropping systems, good agricultural practices and others. In the processing sector, technologies on Good Manufacturing Practices (GMP), HACCP and ISO Certification, Organic Certification, and product quality standards must be provided. The feasibility of establishing a centrally accredited product testing laboratory facility should be pursued. To ensure efficiency and effectiveness in program implementation, the government should re-establish the National

Extension Service. The extension delivery services to coconut farmers and women in the coconut farming communities must be strengthened. The formation of coconut producers associations or cooperatives must also be facilitated/supported. This should ensure inclusive development among the rural coconut farming communities and at the same time promote greater efficiency and effectiveness in the delivery of extension services and capacity building activities.

Solomon Islands

The total area under coconut cultivation in Solomon Islands is around 58 938 hectares, with an estimated 9 to10 million trees planted. The major coconut provinces in the Solomon Islands are Western, Isabel, Central Islands, Malaita, Guadalcanal, Makira and Temotu. Nearly 65-70 percent of the total population directly depend on the coconut industry for their economic and social well-being. The coconut industry contributed 7 percent to the national export earnings of the country. The value of copra and coconut oil exports doubled in 2011 reaching \$216 million compared to \$98 million in 2010. There are several factors affecting the level of coconut production in the country. These include: the increasing number of senile coconut trees and no replanting programme; low and unstable local prices of copra and coconut oil; and the scattered nature of the islands requiring an efficient land transportation network, shipping and infrastructure. It was indicated that the common practical problems encountered by farmers regarding coconut production and farm productivity in Solomon Islands currently are closely related to urban migration by young people which reduces the labour force for coconut production. Copra processing is a labourious task and not worthwhile when the price of copra is less than \$2.00 per kilogram. The downstream processing and value addition component of the industry has not taken off strongly enough for farmers to reap better prices for other products from coconut. In 2013, it was estimated that more than 50 percent of the country's coconut trees have already reached senile stages of growth and therefore are expected to have a declining rate of production per tree. While the Government of the Solomon Islands has already put up a Coconut Strategy document, a Coconut Rehabilitation Programme with specific guidelines and incentives for farmers has yet to be devised. To provide additional incentives to replanting or cutting of senile palms, commercial coconut wood utilization must be explored. While copra is still the major coconut product being traded in the country, a copra quality improvement strategy must be implemented. There is a need to scale-up the operation of Virgin Coconut Oil (VCO) processing in the country to ensure economic viability and sustainability. Technical assistance in this regard is recommended, including training and capacity building on Good Manufacturing Practices. Assessing the economics and the scale of the operation of any coconut downstream project through an objective feasibility study should be undertaken to avoid unnecessary failures.

Indonesia

Coconut plantations in Indonesia can be found in almost all regions of the country with the largest area in Sumatra which occupies 32.43 percent of the total area followed by Java (23 percent); Sulawesi (19.65 percent); Bali and Nusa Tenggara Barat (7.82 percent); Moluccas and Papua (9.7 percent); and Kalimantan (7.3 percent).

The total coconut plantation area in 2011 was estimated at over 3.8 million hectares and 98.16 percent belongs to smallholders and the rest is owned by the private sector (1.69 percent) and the government (0.14 percent). The Indonesian coconut plantation area is the largest in the world. However, with respect to production, it is still below its potential.

Indonesia's coconut area increased from 2006 to 2010 although the increase was not significant. The total area in 2006 was about 3.78 million hectares, and was estimated at 3.81 million hectares in 2011. On the other hand, coconut production in 2006 was 3.13 million metric tons (MT) in copra equivalent and increased to 3.29 million MT in 2011. There has been little increase in coconut production. The average production is around 0.90-1.10 tons of copra/hectare/year. Many technologies have been developed to increase the productivity of coconut palms, not only good coconut varieties which have the potential to produce 3–5 tons of copra/hectare/year (high yielding tall or hybrids), but also good cultivation practices and pest management. To accelerate the replanting/planting coconut in the future, more efforts are still needed to help the coconut farmers.

The coconut area is distributed in 33 provinces in Indonesia, mainly in Riau, East Java, North Sulawesi, Central Java, North Maluku, West Java, Central Sulawesi, East Nusa Tenggara, Lampung, Jambi, North Sumatra, South Sulawesi, and West Kalimantan Provinces.

The major weaknesses in coconut sector development are that approximately 98 percent of coconut plantations in Indonesia are smallholders, with limited cultivation technology, low productivity, and therefore are less efficient; coconut farms are located in the rural areas, far from urban centers, with facilities and infrastructure that have not been developed to production efficiency, especially transportation; qualities of palms are low because the source of seed is unclear from the traditional nursery; irregular spacing; the land used is not optimal; the population is below standard; education level of farmers is relatively low making it difficult to transfer technology in cultivation, processing and marketing; and farmers have limited capital and are easily influenced by money lenders in the rural areas. However, the productivity of the coconut crop is around 1 ton of copra/hectare/year or about 50 percent of its potential production, while the market demand in both domestic and export markets is high enough. The coconut crop land has the potential to be intercropped with food crops and include livestock raising. Wide potential exists in the diversification of underdeveloped products.

The Philippines

For the period 2009-2011, the average production was estimated at 14 743 billion nuts or 2.813 million MT copra equivalent. There is an increasing trend in the coconut sector due to massive planting and replanting. The total coconut area is estimated at of 3.564 million hectares with 1.122 million hectares or 31.49 percent in Luzon; 683 511 hectares or 19.17 percent in Visayas and 1.759 million hectares or 49.34 percent in Mindanao. There is also an increasing trend in coconut areas due to massive planting and replanting. There are 340 million bearing trees and the non-bearing trees below 6 years in age was estimated at 30 million. Some of the constraints/issues related to coconut production and farm productivity are: production of

high-yielding hybrids is now on a limited scale due to the high cost involved; limited production of seed nuts in Philippine Coconut Authority (PCA) seed gardens; and the need to accredit private farms as sources of good seed nuts. One of the policies to promote coconut farm productivity and increase farm income is soil conditioning. PCA is advocating for the use of coco dust as soil conditioner. Local government units are encouraged to provide funds for the hauling of coco dust from coco husk processing plants to coconut farms. PCA is now also promoting the use of salt, animal manure and coco dust combined as cheap fertilizer for coconut farms. Through the Kasaganaan sa Niyugan ay Kaunlaran ng Bayan (KAANIB) Program, PCA is promoting entrepreneurship and mixed farming in coconut communities to augment income from coconut farming and coconut community cooperatives are being developed to engage in product diversification, e.g., coco husk processing to produce coir, dust, coco mats, coco logs, etc. Considering manufactured oil and homemade oil/foodnuts domestic consumption against exports, 38 percent goes to domestic use and 62 percent to exports. If all domestic uses are accounted for, the ratio becomes 25 percent domestic use and 75 percent exports. The exports are general broken down as 15 percent for the desiccated and coconut oil processing and 60 percent for copra, crude coconut oil and CNO-based products. There are 63 coconut oil mills with a total capacity 4.5 MMT of copra per year. There are 38 coconut oil refineries with a total capacity of 1.435 MMT of oil per year. There are 10 desiccated coconut plants with a capacity of 159 609 MT of desiccated coconut per year. There are eight activated carbon plants with a capacity of 43 740 MT of activated carbon per year. There are 10 oleochemical plants with a capacity of 457 600 MT per year. There are 11 coco methyl ester manufacturers with capacity of 395 million liters per year. There are 12 coco coir producers with capacity of 144 576 kgs/year. There are 19 Virgin Coconut Oil manufacturers.

Sri Lanka

Coconut production in 2012 was estimated at 2.9 billion nuts or 554 493 MT copra equivalent. The area under coconut was estimated at 417 000 hectares or 20 percent of the total agricultural land in Sri Lanka. The major coconut growing areas are in the Coconut Triangle in parts of Western and North Western Provinces and in the Mini Coconut Triangle in Matara, Hambantota Districts in the south. The constraints/issues, problems and threats related to coconut production are identified as follows: adverse weather conditions and anticipated impacts of climate change on production; widely fluctuating farm gate prices, local market prices and global prices for coconut products; increasing input costs (production costs); susceptibility to pests and diseases; emerging new pests and diseases (black beetle, coconut mites, Asiatic palm weevil, slug caterpillar and the Weligama Coconut Wilt and Rot Disease); ineffective utilization of advanced technologies for production; insufficient usage of fertilizer and other inputs; fragmentation of coconut lands for industrial and urban development; and trends towards converting coconut lands for other economic purposes.

The Government of Sri Lanka has established a separate Cabinet Ministry for the development of the coconut industry portfolio through the Ministry of Coconut Development and Janatha Estate Development. The Ministry has already taken several initiatives to organize the coconut growers to reap maximum benefits from the “Mahinda Chinthana” Fertilizer Subsidy or Kapruka Diriya, introduced by His Excellency, the President. It is anticipated to plant

6 million coconut seedlings in CY 2013 by way of new plantings, under plantings and filling vacancies in the existing plantations. At present, the number of coconut palms in an extent of one acre is around 40, whereas the optimum density should be 64 palms – a shortfall of 24 palms that reduces the potential yield. Therefore, the Ministry has endeavoured to correct this situation through its coconut planting intensification programme. The Ministry has also embarked on several programmes aimed at improving the coconut-based industries. The programmes commenced by the Ministry envisages the upgrading of the socio-economic level of families dependent on coconut production and coconut-based industries. Special attention of the Ministry is directed towards encouraging the growers to undertake intercropping with high value crops and animal husbandry in coconut lands to increase land use efficiency and productivity. The Ministry has identified the need for introducing new technologies and providing opportunities to win local as well as international markets as priority requirements in the coconut industry. With these initiatives, the Ministry hopes to increase the annual coconut production to 3 650 million nuts by 2016. The Ministry has also taken action to preserve prime coconut lands and increase productivity through introduction of new varieties and methods of cultivation. It has provided financial assistance to undertake coconut cultivation using drip irrigation and has vigorously promoted intercropping in coconut lands. A Strategic Plan was presented by the new Ministry in 2011 with a view to developing the coconut industry.

Thailand

Coconut production in 2012 was estimated at 844 million nuts or 218 metric tons copra equivalent. The area planted to coconuts was estimated at 213 000 hectares. Coconuts are predominantly planted in the Southern Region of Thailand, mainly in the provinces of Prachab Kirikhan, Chumphon, Surat Thani and Nakorn Si Thammarat. Constraints related to coconut production and productivity include: senility of palms; pest and disease damage (mainly by the coconut hispine beetle – *Brontispa longissima*, coconut black-headed caterpillar, *Oryctes rhinoceros*, *Rhynchophorus ferrugineus* or the Asiatic palm weevil); and competition with more economically profitable crops like oil palm and rubber. Research and development programmes in the coconut industry include: improvement of coconut varieties/development of new hybrid varieties including the coconut aromatic makapuno; production of high yielding hybrids and aromatic coconut seedlings; production and promotion of edible and non-edible high value products from coconut like Virgin Coconut Oil (VCO) and VCO-based products, young tender coconuts as fresh fruits or processed and packaged coconut water, coconut milk, desiccated coconut, coir fiber products, coconut sap sugar, coconut sap cider vinegar, nata-de-coco, coconut shell charcoal and coconut shell charcoal-based activated carbon and others; transfer of new technologies in collaboration with the Department of Extension through the GAP system in order to improve yields and promote quality products to meet SPS standards and regulations of importing countries; product development research and promotion of the health aspects of coconut and VCO as functional food. The Government of Thailand through the Ministry of Agriculture and Cooperatives and its statutory bodies like the Department of Agriculture, Department of Extension and the Bureau of Agricultural Economic Research has drafted a Coconut Strategic Plan for CY 2013 – 2016. The production policy is to increase coconut production by replanting using hybrids and good coconut varieties to

improve the quality of coconut, increase yield and the income of coconut farmers. The production policy also stipulates the need to improve efficiency in the prevention and integrated management of coconut pests, and strengthening the capacity of coconut farmers groups, organizations or cooperatives. The marketing policy shall involve the production and promotion of value-added products from coconut. The production target is to increase coconut yield by at least 20 percent in the potential areas and to maintain a coconut harvest of not less than 900 kg/rai. The first strategic objective is to improve coconut production efficiency and the strategic plan is to adopt production system management (by zoning, farmer's registration database, etc), improve production efficiency and revenue, and improve product quality and safety. The second strategic objective is to develop a prevention and integrated pest management (IPM) system for major coconut pests. This includes capacity development on IPM; improving the early warning system for coconut pest infestation; developing the coconut farmers' and the community's capacity to manage pest infestations; and promoting self-reliance. The third strategic objective is market development for coconut products. The strategic plan involves a campaign for value-addition and consumption/utilization of coconut products and developing the capacity for the coconut industry's competitive advantage.

Viet Nam

Coconuts in Viet Nam are mainly grown in the Mekong Delta region of the South and in the Central region with extent of about 147 210 hectares. Production is about 818 000 000 nuts/year (equivalent to 181 800 metric tons of copra). The Mekong Delta region contributes more than 75 percent of Viet Nam's coconut production. This also is the centre of the coconut industry in Viet Nam. The total production area in the Mekong Delta is approximately 110 000 hectares and Ben Tre has the greatest concentration of coconuts with 50 000 hectares of production land, almost 40 percent of the area of the Mekong Delta. The two main regions that produce coconut have different agro-ecological conditions. The Mekong Delta is characterized by water logging, fertile soil but often flooded and pre-disposed to salt-water intrusion, while the Central region is characterized by poor sandy soil and at times is affected by severe droughts or typhoons. In general, the Mekong Delta is more suitable for coconut cultivation in Viet Nam and many coconut processing facilities are located in this region. The land under coconut cultivation is 156 876 hectares, or roughly 4.1 percent of the total agricultural land of the country. There are about 4 000 000 Vietnamese people involved in the coconut business (production, harvesting, processing, marketing and distribution) or 4.6 percent of the population. The economic, social and ecological value of the coconut makes it an important crop in the country. The trend of production is increasing since the coconut-bearing palms are relatively young. However, the average coconut productivity is low, about 39 nuts/tree/year due to poor agriculture management. Coconut planting areas in Viet Nam are increasing steadily due to high demand in the local and international markets. Coconuts have higher adaptability to climate changes than other crops. Viet Nam is one of the top five countries severely affected by climate change. Accordingly, the coconut is the first choice in affected areas. Constraints/issues related to coconut production and farm productivity include: adoption of modern agriculture management systems and technology is still limited; farmers do not invest in their coconut farms because of financial problems; there is a trend to plant the dwarf coconut variety for beverages (price of tender nuts is also higher than that of tall mature nuts in the

market) and this affects the raw material for industrial processing; low coconut yield and production in the Central region is due to poor farm management, a higher percent of senile palms, poor soil, drought and infestation of *Brontispa*, and bad effects of climate change (sea water intrusion, drought, flood and typhoon) in both the Mekong Delta and Central regions. The government has also made policy decisions to increase coconut planting as a smallholding programme; increase national production and farm yield by providing quality coconut seedlings with high-yielding and high-value varieties; acceleration of coconut extension and poverty reduction programmes; pest control (*Brontispa*); recommendation for organic fertilizers application and intercropping with other crops such as cocoa, citrus, banana; land use rights (especially for the Central region); aromatic varieties were admitted to national varieties; promotion of value-added coconut processing for all parts of the coconut; link coconut farmers to the market (processors, traders, investors); capital/loans without interest for new coconut planting/replanting; and no export tax for coconut products.

b. Summary of technical papers

Five coconut experts also presented papers on technical subjects such as coconut breeding and research, coconut-based farming systems (CBFS) and the economics of CBFS, integrated management of pests and diseases in coconut, processing of value-added coconut products (in the food, beverage, pharmaceutical and spa industries, including bio fuel), and marketing and trade of coconut products. (Please refer to the Proceedings of the Expert Consultation.)

Dr. George V. Thomas presented a technical paper on coconut breeding and research. The paper stated that coconut, *Cocos nucifera* L., is an important plantation crop cultivated in India over an area of 1.89 million hectares with an annual production of 15 730 million nuts. Coconut research in India dates back to 1916 and the Central Plantation Crops Research Institute (CPCRI) under the Indian Council of Agricultural Research has the mandate to conduct research on production, protection and processing technologies of coconut. This is supported by the research programmes under the All India Coordinated Research Project on Palms implemented in 13 Centres located in nine State Agricultural Universities and one Central Institute.

CPCRI has collected a total of 415 coconut accessions, including exotic germplasm of 28 different countries. India also hosts the International Coconut Genebank - South Asia, one of the five multi-site gene banks of coconut. In addition, an in-depth study into local coconut ecotypes is in progress to promote *in situ* conservation of genetic resources in farmer's fields. The coconut germplasm is being evaluated for different traits, with special focus on tender nut water traits, drought tolerance/climate resilience, pest resistance and disease resistance. The germplasm base available in the country has been effectively utilized in the coconut improvement programme through the mass selection and hybridization approaches and the improved hybrids and varieties are capable of producing 1.8 to 4.6 tonnes of copra/ha/year. To date, about 24 improved varieties of coconut developed through the mass selection approach and 15 high yielding hybrids have been released for cultivation in India. Of these, Kalpa Jyothi, Kalpa Surya and Chowghat Orange Dwarf are dwarf tender nut varieties. Kalpa Samrudhi, Kera Chandra, Kalpa Pratibha, Kalparaksha, Kalpa Haritha, Gautami Ganga, Kera Madhura

and Kalyani Coconut are dual purpose varieties suitable for tender nut and copra production in different parts of India. Three disease-resistant varieties have been released, namely Kalpasree, Kalparaksha and Kalpa Sankara, for cultivation in root (wilt) disease-affected tracts in India.

Coconut embryo culture, plumule culture and pollen and embryo cryopreservation technologies have been standardized. Work on application of molecular technologies for marker assisted selection and molecular breeding is in progress. WRKY sequences and Resistant Gene Analogues are cloned and characterized and tall and dwarf specific primers have been developed for identification and validation of true hybrid progenies in the nursery. Further, coconut germplasm is being utilized to study response to elevated CO₂ and high temperature in order to develop climate-resilient varieties.

Dr. H.A.J. Gunathilake presented a paper on coconut-based farming systems (CBFS) agroforestry and the economics of CBFS. The paper stated that coconut is commercially cultivated in Asia and Pacific countries predominantly as a smallholder crop, which is associated with the lives of millions of coconut growers. Income and productivity of coconut directly affects the livelihood of these people. Generally, coconut lands are maintained as monoculture farming and recognized as an inefficient land use system. Coconut palms are generally spaced 8 m x 8 m apart, thereby 75 percent of the area remains below its production potential from the age of 20 years or so. Unlike other crops such as tea and rubber, opportunities to grow inter crops in coconut plantations are enormous. Coconut-based farming systems (CBFS) are well established and attractive to maximize land use efficiency, increase productivity and to optimize profitability over monoculture coconut farming. Hence, switching from monoculture to crop diversification is a must for income generation for all levels of coconut growers. Intercropping, multiple cropping, mixed cropping, alley cropping and mixed farming are the main systems in CBFS. Any one of these intensive well designed farming systems under good management practices would not affect coconut yield. Many coconut + intercrops + animal systems have shown complementary effects and benefits on coconut. Increasing soil fertility, improvement of coconut palm nutrients, creation of favourable micro-climate and increasing sustainability of coconut lands are discussed in detail. Coconut lands offer ample opportunities to grow a large number of crops, rearing animals and a combination of those including agroforestry systems. In CBFS, differences within a country, region to region are observed. Hence, a common approach is important to promote CBFS as a viable farming system to increase sustainability of coconut cultivation.

Dr. Amporn Winotai presented a paper on Integrated Pest Management (IPM) in coconut, describing IPM as a strategy that integrates various methods of cultural, physical, mechanical and biological control and selection of pesticides as the last option. IPM is not only cost effective but simultaneously prioritizes human and environmental safety. IPM is based on the farmer's local knowledge, acceptance and education. Several insects were reported as coconut pests in the Asia-Pacific region. Among these pests, rhinoceros beetle, red palm weevil, coconut hispine beetle, coconut black-headed caterpillar and coconut scale are currently causing severe damage to coconut palms in the region. Rhinoceros beetle, *Oryctes rhinoceros* Linnaeus (Coleoptera: Scarabaeidae) is native to South Asia and Southeast Asia. Management of this pest is a combination of sanitation in plantations and their surroundings, biological

control by using *Metarhizium anisopliae*, *Oryctes* virus and pheromone trapping. Red palm weevil, *Rhynchophorus ferrugineus* Olivier (Coleoptera: Curculionidae) outbreaks usually occur after infestation of rhinoceros beetle. Keeping the rhinoceros beetle under control results in keeping the red palm weevil under control too. Pheromone trapping has also been developed for reduction of this pest. Coconut hispine beetle, *Brontispa longissima* (Gestro) (Coleoptera: Chrysomellidae), is an invasive pest that occurs in Southeast Asia and the Pacific region. Biological control of the pest is recommended by releasing two species of parasitoids, *Asecodes hispinarus* Boucek (Hymenoptera: Eulophidae) and *Tetrastichus brontispae* Ferriere (Hymenoptera: Eulophidae). Coconut black-headed caterpillar, *Opisina arenosella* Walker (Lepidoptera: Oecophoridae) is one of the key pests of coconut in South Asia and invaded Thailand in 2008. Management of this pest in its native region consisted of: 1) removing and burning of the infested leaves; 2) biological control by releasing parasitoids such as *Goniozus nephantidis* (Muesebeck), *Bracon brevicornis* (Wesmael), and *Brachymeria nephantidis* Gahan; and 3) chemical control by trunk injection and applying systemic insecticides in the holes. *Bacillus thuringiensis* has been recommended for biological control of the black-headed caterpillar in Thailand. Coconut scale, *Aspidiotus destructor* Signoret (Hemiptera: Diaspididae) has been reported as a serious pest in in Philippines. Predators are significant biological control agents in limiting *A. destructor* populations. The most common natural enemies associated with the coconut scales are the coccinellid beetles *Chilocorus* spp., *Azya trinitatis*, *Cryptognatha nodiceps*, *Rhyzobius lophanthae* and *Pentilia castanea*. Local parasitoids, Comperiella, Aphytis and Encarsia also play important roles in keeping the pest under control. Application of insecticides could reduce the infestation of the scales. Biological controls are recommended for suppression of other coconut pests, such as slug caterpillars (Lepidoptera: Limacodidae) like *Parasa lepida* Cramer; coconut leaf moth, *Artona catoxantha* Hampton (Lepidoptera: Zygaenidae); and coconut leafminer, *Promecotheca cumingii* Baly (Coleoptera: Chrysomelidae).

A paper on value addition to coconuts (food, beverage, pharmaceuticals and spa industries) was presented by Mrs. Peyanoot Naka. The paper stated that the coconut (*Cocos nucifera* linn) is normally referred to as the “Tree of Life,” “Man’s Most Useful Tree,” “King of the Tropical Flora,” “Tree of Abundance,” etc. If properly utilized, it has the highest economic value among the various palm trees. This is because every part of the coconut tree and its fruit can be utilized for man’s use or converted into valuable products. Generally speaking, the main commercial use of coconut is in the processing of the fruit into various products such as copra; coconut oil; copra meal; desiccated coconut and milk/cream from the kernel; charcoal and activated carbon from the shell; coir-based products and coco peat block from the husk; vinegar from the coconut water. However, the increasing interest in healthy and natural products in developed countries led to the development of “niche” markets for Virgin Coconut Oil (VCO) and VCO-based soap, skin care products and aromatherapy/massage oils; and functional foods like coconut flour, coconut sap syrup and sugar, coconut water beverages and young coconut. This current development augurs well for the global competitiveness of the coconut industry inasmuch as the majority of the said products are priced much higher than other coconut products. Likewise, the processing and marketing of coconut water, a former waste product in the coconut milk and desiccated coconut processing plants, into a beverage adds to the profitability of the said plants. There are three possible

options in which higher income can be obtained from the coconut tree as an alternative to just producing copra. These are: a.) processing the mature and semi-mature coconut fruit into high value coconut food products such as coconut milk/cream, virgin coconut oil and coconut flour and processing the by-product coconut water into beverages; b.) harvesting the nut early and selling it as young coconut; and c.) tapping the coconut inflorescence for its nectar or sap and subsequently processing it into coconut sap syrup/honey, sugar or vinegar or all of the said products. The paper discusses the basic definition, characteristics and uses of coconut milk/cream, virgin coconut oil, coconut flour, coconut chips, coconut water beverage, coconut sap products (syrup, sugar and vinegar) and young coconut. It also provides information on the composition of the part of coconut which is used as starting material for the said products. The detailed steps on how they are processed to satisfy demands in the commercial market including the quality control points are likewise discussed.

Market and Trade of Coconut Products presented by Romulo N. Arancon, Jr., discussed the export performance (volumes and prices) of traditional and non-traditional or the emerging new coconut products in the world market in the supply and value chain, including their market prospects. These include virgin coconut oil, coconut water, coconut flour, coconut milk/cream and powder, desiccated coconut, coconut shell charcoal (CSC) and CSC-based activated carbon, coir fibre and coir-based products and coconut sugar. It is estimated that out of the total nuts produced, approximately 30 percent to 70 percent are utilized for household consumption; 30 percent to 75 percent for copra, 10 percent to 15 percent for desiccated coconut, coconut cream/milk and coconut water in various countries in Asia and the Pacific. The Philippines is the biggest exporter of coconut products, mainly crude coconut oil (CNO) and CNO-based products (approximately 60 percent) and desiccated coconut, coconut cream/milk and coconut water (approximately 15 percent of total production). Indonesia exports only about 20-30 percent as crude coconut oil, desiccated coconut, coconut milk/cream, coconut water and other CNO-based products. Sri Lanka and India are the biggest exporters of coconut coir and coir-based products, while the Philippines, Indonesia and Sri Lanka are three biggest exporters of desiccated coconut.

The Philippines is currently exporting about 38 coconut-based primary and downstream products and by-products from the coconut. The average foreign exchange earnings from coconut products for 10 years (2002 – 2011) amount to US\$ 1.113 billion. The high value coconut products from the Philippines include: a) virgin coconut oil; b) coconut milk powder; c) coconut flour; d) desiccated coconut; e) coconut milk/cream; and f) coconut shell charcoal-based activated carbon.

On export performance, coconut oil (CNO) remains the major product traded in the world market. As of December 2012, the world export of CNO was 1.6 MMT, mostly from the Philippines and Indonesia (82 percent) as the two major producing and exporting countries of CNO.

The Philippines, Indonesia and Sri Lanka are still the major exporting countries of desiccated coconut (DC). The estimated total DC export of the three countries in 2012 is 209 295 MT which is 6.4 percent higher than the exports in 2011 at 195 900 MT. China, India, Malaysia,

Samoa, Thailand and Viet Nam also export desiccated coconut to the world market but at lower volumes. The export price of DC in the Philippines ranged between US\$1 490 per MT and US\$2 678 per MT in 2012. The price of desiccated coconut generally follows the trend in the increase or decrease in the price of coconut oil.

World demand for activated carbon (AC) will rise 10.3 percent annually through 2016 to 1.9 M MT. Such increase is contributed to by increased food and beverage manufacturing as is the case in India and many other nations in Central and South America, Eastern Europe, Africa and the Middle East. The total import demand of AC for 2012 was 710 000 MT, up by 3 percent from previous year. Coco-based AC constitutes about 20 percent of the world demand for AC from other activated carbon raw material such as wood, coal and lignite. The USA is one of the biggest markets for AC with a demand of about 69 400 MT/year and is predicted to increase by more than 15 percent per year. The Philippines, Indonesia, Sri Lanka Malaysia, Thailand and India are the main suppliers of coconut-based activated carbon in the world market.

India and Sri Lanka are the two main players for coir products with a total estimated export volume of 532 151.8 MT in 2012. In terms of volume, India had an increase of 27 percent of coir products exports from 321,016 MT in 2011 to 410 853.9 MT in 2012. Most of the coir products experienced a positive growth except for coir rugs and carpets, which decreased significantly by volume and value in 2011 to 2012. The highest growth of India's coir product export was shown by coir rope, which increased by almost three times or 275 percent from 211.56 MT in 2011 to 792.82 MT in 2012.

Raw (mixed) fiber holds the second position in export volume after coco pith, which constitutes 29.13 percent of the total volumes of coconut products. Export of the raw fiber has increased 44 percent from 83 393.01 MT to 110 684.54 MT in quantity. The major export markets for coco coir are China, Taiwan, Hong Kong, Singapore, and Japan. China is still the major buyer of coir products in the world market which grew at a rate of 25.5 percent per annum during the period of 2004-2010. India and Sri Lanka are the main exporters of coco pith. In 2012, India coco pith export increased 31 percent in volume and 49 percent in value compared to the previous year. UK became a fast-growing market for coco pith with an increase of 161.63 percent from the previous year. In Sri Lanka, coir matting shows the most significant growth of export which increased by 170 percent from 5 004 MT in 2011 to 13 513 MT in 2012. As is the case of India, export of Sri Lanka coir rugs also experienced a major decrease by 49 percent from 843 456 MT in 2011 to 432 605 MT in 2012.

Philippines VCO production and export has expanded rapidly in the last seven years. Export volume grew from a mere 103 MT in 2003 to 1 693 MT in 2008, then increased by 80 percent from 2 737 MT in 2010 to 4 913 MT in 2011 and further increased by 22 percent to 6 002 MT in 2012. The fast-developing and high value niche market for virgin coconut oil offers a good prospect for improving the income of coconut farmers. Virgin coconut oil can also be produced on macro and micro village scales of operation. Major export destinations of VCO include the USA, France, Canada, Germany, United Kingdom, New Zealand, Finland, and Turkey, while Asia includes Hong Kong and Malaysia. Among those countries Hong Kong registered the highest increase in volume from 1.74 MT in 2011 to 18.28 MT in 2012.

The coconut water market has expanded rapidly. This can be attributed to the growing global health consciousness that sees coconut water as a healthy, rehydrating drink. The coconut water export of the Philippines increased remarkably from a mere 647 000 liters in 2008 to 1.8 million liters in 2010, then soared up to 17.94 million liters in 2012. The figure shows a growth of 27.7 times within 5 years with a total export value in 2012 of US\$18.5 million. The export price of coconut water also showed an increasing trend from US\$0.8/liter in 2008 to US\$1.02/liter in 2010, then to US\$1.03/liter in 2012. Brazil is one of the major exporting countries of coconut water in the world market. The Philippines, Thailand, Indonesia, Sri Lanka, India, Viet Nam, Malaysia are the countries exporting coconut water from the region. However, data are not yet readily available, except in the Philippines.

The global market for coconut sap sugar has been increasing, dominated by Indonesia, Thailand and the Philippines. There is an increasing demand for coconut sugar as an alternative sweetener, both in the local and international markets because of its health benefits. Coconut sugar has a Glycemic Index (GI) of less than 35 and is believed to be good for people who have diabetes. There is therefore good domestic and export market potential for coconut sugar. The greatest advantage of the coconut sugar industry is that the product can be produced by village or small- or medium-scale enterprises and cooperatives involving women's groups. Indonesia currently has well over 100 000 farmers within its population that rely on coconut sugar as their primary income. Those 100 000 plus coconut sugar producers bring over 50 000 tons of coconut sugar to market domestically every month. That's over 600 000 tons of coconut sugar produced and (mostly) consumed domestically in Indonesia every year.

The latter part of the technical sessions was devoted to discussions by groups and reporting of group outputs on the recommendations for the regional strategy for coconut sector development in Asia and the Pacific. A half day field trip was also conducted to visit and observe coconut processing plants (coconut milk/cream, coconut water, coconut chips, Virgin Coconut Oil (VCO), VCO-based cosmetics, soap, shampoo, etc) in Nakhorn Pathum Province near Bangkok, Thailand.

PROGRAMME

Day 1 (30th October, 2013)	
Time	Programme
08.00 – 09.00	Registration
09.00 – 10.00	Opening session <ul style="list-style-type: none"> • Welcome Address: Mr. Hiroyuki Konuma, Assistant Director-General and Regional Representative for Asia and the Pacific, FAO • Opening Address: Mr. Siriwat Kajornprasart, Deputy Minister, Ministry of Agriculture and Cooperatives, Thailand • Introduction of Participants • Vote of Thanks: Mr. Vili A. Fuavao, Deputy Regional Representative for Asia and the Pacific, FAO • Group photo
10.00 – 10.30	<i>Tea/Coffee Break</i>
Technical Session I: Present Status of Coconut Production Session Chairman: Mr. Romulo N. Arancon, Jr., Executive Director, APCC	
10.30 – 14.30	Country Report on Coconut Sector Development : Seven Countries, 20 minutes each India, Indonesia, China, Maldives, Sri Lanka, Thailand, and Viet Nam
13.00 – 14.00	Lunch
14.00 – 14:30	Open Discussion
14.30 – 18.00	Country Report on Coconut Sector Development: Five countries, 20 minutes each Fiji, Samoa, Solomon Islands, Tonga, and Vanuatu
16.00 – 16.20	<i>Tea/Coffee Break</i>
17.30 – 18.00	Open Discussion
18.30 – 22.00	Welcome Dinner Hosted by the ADG, FAO-RAP
Day 2 (31st October, 2013) Technical Session II:	
09.00 – 09.30	Coconut Marketing and Trade: Mr. Romulo N. Arancon, JR. , Executive Director, Asian and Pacific Coconut Community (APCC), Jakarta, Indonesia

09.30 – 10.00	Coconut Research and Breeding: Dr. George V. Thomas , Director, Central Plantation Crops Research Institute (CPCRI), Kasaragod, Kerala, India
10.00 – 10.30	Commercial Coconut Hybrid Seednut Production and Economics of Coconut Hybrid Farms: Mr. David Lobo , Chairman and Managing Director, DeeJay Group, Bangalore, India
10.30 – 11.00	Coconut Based Farming Systems (CBFS) and Economics of CBFS: Dr. H.A. Jayantha Gunathilake , Director, Coconut Research Institute (CRI), Lunuwila, Sri Lanka
11.00 – 11.30	Integrated Coconut Pest Management: Dr. Amporn Winotai , Director, Entomology and Zoology Group, Plant Protection Research and Development Office, Department of Agriculture, Bangkok, Thailand
11.30 – 12.00	<i>Tea/Coffee Break</i>
12.00 – 12.30	Value Addition to Coconuts (food, beverage, pharmaceutical & spa industries): Mrs. Peyanoot Naka , Assistant Director (and Coconut Processing Specialist/Senior Scientist), Horticulture Research Institute (HRI), Department of Agriculture, Ministry of Agriculture and Cooperatives, Bangkok, Thailand
12.30 – 13.00	Supply Chain Analysis of Coconut Biofuel: Findings from Fiji: Mr. Conan Hales , CFA, Consultant to the World Bank, Singapore
13.00 – 14.00	Lunch
14:00 – 14:30	Report of Coconut Study Mission in Asia and the Pacific: Mr. Romulo N. Arancon, JR. , Executive Director, Asian and Pacific Coconut Community (APCC), Jakarta, Indonesia
14.30 – 15.00	Regional Strategy Framework/Expected Group Discussion Outputs: Dr. Ponciano A. Batugal , Former Coordinator and Senior Scientist, COGENT/Bioversity and Current Chairman, Coconut R & D Cluster of The Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (PCAARD), Los Banos, Philippines
15.00 – 15.30	Open Discussion
15:30 – 16.00	<i>Tea/Coffee Break</i>
16.00 - 17:30	Breakout Sessions (three groups) <ul style="list-style-type: none"> • Coconut Breeding and Research • Coconut Based Farming Systems (CBFS) & Economics of CBFS, and Pests and Diseases of Coconut • Coconut Marketing and Trade
Day 3	
01 November 2013	
09.00 – 10.30	Group Presentations (three groups)

10.30 – 11.00	<i>Tea/Coffee Break</i>
11.00 – 12.00	Presentation/Discussion and Adoption of Draft Strategy of Coconut Sector Development
12.00 – 12.30	Closing Statements: - Honorable Minister Le Mamea Ropati Mualia, Ministry of Agriculture and Fisheries, Samoa - Honorable Minister Ahmed Shafeeu, Ministry of Fisheries and Agriculture, Maldives
12.30 – 13.30	Lunch
13.30 – 18.30	<i>Field trip</i> <i>1. Visit Theppadungpron coconut milk/cream and coconut water factory (Chaokoh Coconut Processing Plant), Nakorn Pathun</i> <i>2. Visit Tropicana Oil Co. Ltd. - virgin coconut oil and VCO based products factory, Nakorn Pathum</i>

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Regional Strategy for the Development of the Coconut Sector in Asia and the Pacific**Background**

The coconut is considered the “Tree of Life” and is a symbolic crop for the Asia Pacific Region both economically and biophysically, providing the poor people not only with food and economic livelihood but also environmental protection to the threats of climate change. The palm’s non-branching solitary stem and the effective spatial arrangement of its lush foliage provide beneficial shade to the intercrops planted underneath while allowing enough sunlight to pass through for their nutrition. As the planet’s temperatures are going to rise due to climate change, coconut-based farming systems will thus stabilize environmentally fragile agriculture landscapes.

The coconut is environment friendly as it serves as an effective carbon sink, contributes towards control of erosion of mountains and coastal soils due to its massive and extensive fibrous root system, and help support watersheds in water-deficient communities. Coconuts planted along the coast serve as windbreak and protect inland areas from strong winds/typhoons. Among fruiting commercial crops, the coconut is one of the best crops that could be commercially grown in the coastal zones as it could tolerate salty soils and yields of up to 15 percent higher than in the inlands (Magat, 1997) and the poorest people live along the coast. Aside from providing food, nutrition and livelihood to millions of coconut farmers and their families, in rural communities, the coconut can be used in non-food applications and, lately in the biofuel industries. Products from the coconut kernel, husk, shell, water and even stem could be produced at the community level and sold to generate income for poor coconut farmers.

The Need for a Regional Coconut Development Strategy for Asia and the Pacific

Coconut is grown in about 12 million hectares worldwide with 90 percent grown in the Asia Pacific Region. Over 90% of coconut farmers are smallholders cultivating 1-3 hectares or less and are considered resource-poor. Coconut production is dwindling due to low yields caused by palm senility, natural calamities such as typhoons, floods, drought, pest and diseases, and the use of unselected varieties and poor quality planting materials. Equally important is the low income of coconut farmers. Most of the coconut farmers are mainly dependent on copra income and there is very little value-adding of coconut products at the community level. There is also minimal intercropping such that coconut farm productivity is not maximized.

Due to these problems of low income of coconut farmers and the declining coconut production and farm productivity in the coconut growing countries, and in view of the recommendations of the last APCR meeting held on 12 – 16 March 2012 in Viet Nam, the Food and Agriculture Organization of the United Nations (FAO) has fielded a study mission in the major coconut growing countries in Asia and the Pacific to assess the current status of the coconut sector and identify the gaps, commonalities and recommend opportunities for sectoral development in order to put a renewed focus for coconut in the current context of global agricultural

development and economic growth.

The FAO in collaboration with the Asian and Pacific Coconut Community (APCC) has also organized a High-level Expert Consultation in Bangkok, Thailand on October 30 - November 1, 2013 to formulate a Strategy for the Development of the Coconut Sector in the Asia Pacific Region. Ministers of Agriculture and senior technical officers of coconut growing countries in the Region were invited to present their statements and country papers. Experts and resource persons were likewise invited to present technical papers to identify problems and opportunities in the coconut industry.

Based on the field study mission report, the country presentations and the statements of the Agriculture Ministers, including the reports of the six experts and resource persons from the private sector, as well as the intensive discussions and recommendations during the Expert Consultation, a Regional Strategy for the Development of the Coconut Sector in Asia and the Pacific was formulated.

Coconut Resource Base in the Asia – Pacific Region

Coconut Area

The total global land area planted to coconuts is estimated at 12.44 million hectares. The Asia-Pacific countries constitute 89.4 percent of the total global coconut area with 11.12 million hectares. Some countries in the region especially in Asia have exerted efforts to replant senile coconut palms and also added new areas for coconut planting. The Philippines for example has expanded its coconut land area from 3.380 million hectares in 2008 to 3.574 million hectares in 2012. India has likewise increased its total area planted to coconuts from 1.903 million hectares in 2008 to 2.039 million hectares in 2012. Sri Lanka has likewise been quite aggressive in expanding its total coconut hectareage from 395 000 hectares in 2008 to 417 000 hectares in 2012. Thus, while other countries in the region have either been virtually stagnant or have decreased their coconut hectareage, these countries have increased their coconut lands.

The expansion in new areas in these countries is facilitated through the implementation of focused coconut new planting programmes in addition to their coconut replanting and rehabilitation programmes to replace senile palms (60 years old and above), and replacement of disease-affected palms like the rootwilt disease in India, the weligama wilt disease in Sri Lanka, cadang-cadang disease in the Philippines and other palms affected by severe infestation of coconut pests such as the *Brontispa longissima*, and those that were felled by strong typhoons.

Table 1. Area of Coconut, 2008 – 2012 (in 1000 Ha)

Country	2008	2009	2010	2011	2012
A. APCC Countries	10 567 r	10 628 r	10 819 r	10 717	10 886
F.S. Micronesia	17	17	17	17	18
Fiji	60	60	60	60	65
India	1 903	1 895	1 985 r	1 896	2 039
Indonesia	3 799	3 854	3 808	3 808	3 796
Kiribati	29	29	29 r	29	29
Malaysia	112 r	100	106 r	109	112
Marshall Islands	8	8	8	8	8
Papua New Guinea	221	221	221	221	221
Country	2008	2009	2010	2011	2012
Philippines	3 380	3 402	3 567 r	3 562	3 574
Samoa	93	102	102 r	99	97
Solomon Islands	59	59	38 r	38	38
Sri Lanka	395	395	395	395	417
Thailand	247	239	232 r	216	214
Tonga	8	8	8	8	9
Vanuatu	96	96	96	96	92
Viet Nam	141	143	147	155	157
B. Other Countries					
Africa	641	641	641	641	651
America	672	672	672	672	671
Asia	130	130	130	130	130
Pacific	104	104	104	104	104
Total	12 114	12 175	12 366	12 264	12 442

r: revised

Sources: Compiled from information provided by APCC member countries and FAO Trade Yearbooks (APCC Coconut Statistical Yearbook 2012)

While other Asia-Pacific countries have similar coconut planting and replanting programs, the availability of planting materials and good quality seedlings of improved variety is a constraint . It is also observed that some coconut farmers have replaced their coconut palms to more lucrative crops like oil palm and rubber such that the total coconut land area in some countries have decreased. This is particularly the case in Indonesia and Thailand. Indonesia's total coconut land area has decreased from 3.808 million hectares in 2011 to 3.796 million hectares in 2012 while Thailand's coconut land area decreased from 216 000 hectares in 2011 to 2114 000 hectares in 2012. Thailand's coconut land area five year ago (2008) was reported at 247 000 hectares.

Coconut Production in Whole Nuts and Copra Equivalent

World coconut production in 2012 in whole nuts is estimated at 71.3 billion nuts or 12.5 million metric tons in copra equivalent. The Asia-Pacific region account for approximately 88.5% of total global nut production.

The global coconut production has been fluctuating due to various factors from 64.3 billion nuts in 2008 to 64.93 billion nuts in 2009 then increased to 66 billion nuts in 2010 but decreased to 64.14 billion nuts in 2011 and increased again to 71.3 billion nuts in 2012.

Table 2. Production of Coconuts in Whole Nuts, 2008 -2012 (in 1000 Ha)

Country	2008	2009	2010	2011	2012
A. APCC Countries	54,140,680	55,630,650	56,466,804	54,870,980	61,895,999
F.S. Micronesia	40,000	40,000	40,000	40,000	40,000
Fiji	150,000	188,000	165,000	160,000	162,500
India	14,744,000	15,729,750	16,918,000	16,943,000	21,892,000
Indonesia	16,235,000	16,498,000	16,253,000	15,249,000	16,256,000
Kiribati	131,300	131,300	131,000	131,000	131,000
Malaysia	455,000	379,000	550,000	577,000	570,000
Marshall Islands	39,200	35,800	34,000	29,500	29,750
Papua New Guinea	1,495,000	1,495,000	1,495,000	1,101,000	1,495,000
Philippines	15,320,000	15,668,000	15,510,000	15,245,000	15,862,000
Samoa	180,000	200,000	267,750	267,000	266,500
Solomon Islands	100,000	100,000	100,000	100,000	100,000
Sri Lanka	2,909,000	2,853,000	2,619,000	2,707,000	2,741,108
Thailand	1,186,000	1,104,000	997,704	845,000	806,000
Tonga	88,400	88,000	86,900	86,100	82,000
Vanuatu	307,700	307,700	481,250	450,000	447,000
Viet Nam	760,080	813,100	818,200	940,380	1,015,141
B. Other Countries	10,186,568	9,297,951	9,539,963	9,512,847	9,403,420
Asia	1,060,618	915,182	974,242	958,270	964,577
Bangladesh	109,860	95,640	101,750	100,000	101,789
Brunei Darussalam	496	388	431	430	432
Cambodia	88,625	76,693	81,926	82,000	82,115
China	358,744	315,195	330,698	325,000	327,400
Maldives	2,500	6,229	5,137	5,135	5,133
Myanmar	471,960	396,497	428,075	420,000	421,850
Pakistan	10,770	9,216	9,900	9,750	9,756
Singapore	163	143	151	155	152
Timor Leste	17,500	15,181	16,173	15,800	15,950
Pacific	300,976	259,408	276,905	278,950	278,806
American Samoa	5,875	5,097	5,430	5,300	5,312
Cocos Islands	9,500	8,241	8,780	8,850	8,837
Cook Islands	2,500	2,088	2,285	2,250	2,274
French Polynesia	111,116	95,668	101,925	105,000	104,800
Guam	66,600	57,657	61,468	62,500	62,375
Nauru	2,324	1,860	2,079	2,000	2,081
New Caledonia	20,812	17,662	19,043	18,625	18,625
Niue	3,287	2,773	3,000	3,000	2,976
Palau	70,000	60,726	64,692	63,250	63,258
Tokelau	3,750	3,253	3,466	3,500	3,523
Tuvalu	2,162	1,797	1,961	1,975	1,977
Wallis etc	3,050	2,586	2,778	2,700	2,768
Africa	2,108,151	2,048,919	1,978,452	2,031,842	1,945,830
America	6,716,824	6,074,442	6,310,363	6,243,785	6,214,207
TOTAL	64,327,248	64,928,601	66,006,767	64,383,827	71,299,417

r: revised

Note: Data refer to total production of coconut, whether consumed fresh, processed into copra or desiccated coconut. Estimated for non-APCC countries was calculated by converting the nut weight into whole nuts given in the FAO Production Yearbooks, by using a conversion factor of one ton of husked nuts – 1 250 whole nuts.

Sources: Compiled from information provided by APCC member countries and FAO Trade Yearbooks (APCC Coconut Statistical Yearbook 2012)

Coconut production is influenced by many factors. The main factor influencing the annual increase or decrease in nut production is rainfall. Drought brought about by long dry months or the El Nino phenomenon can create water stress on the palms in a given year will have an effect in decreasing nut yields 12 months after or in the succeeding year. Senility of the palms also affect production as the palms tend to produce less nuts as they grow past their economic bearing stage at 60 years or older.

It is estimated that on the average, global coconut production has increased by about 2 percent in the last 5 years. However, experts have estimated that the global demand for vegetable oils will increase by 10 percent per year in the next 20 years due to population growth and increase in industrial development.

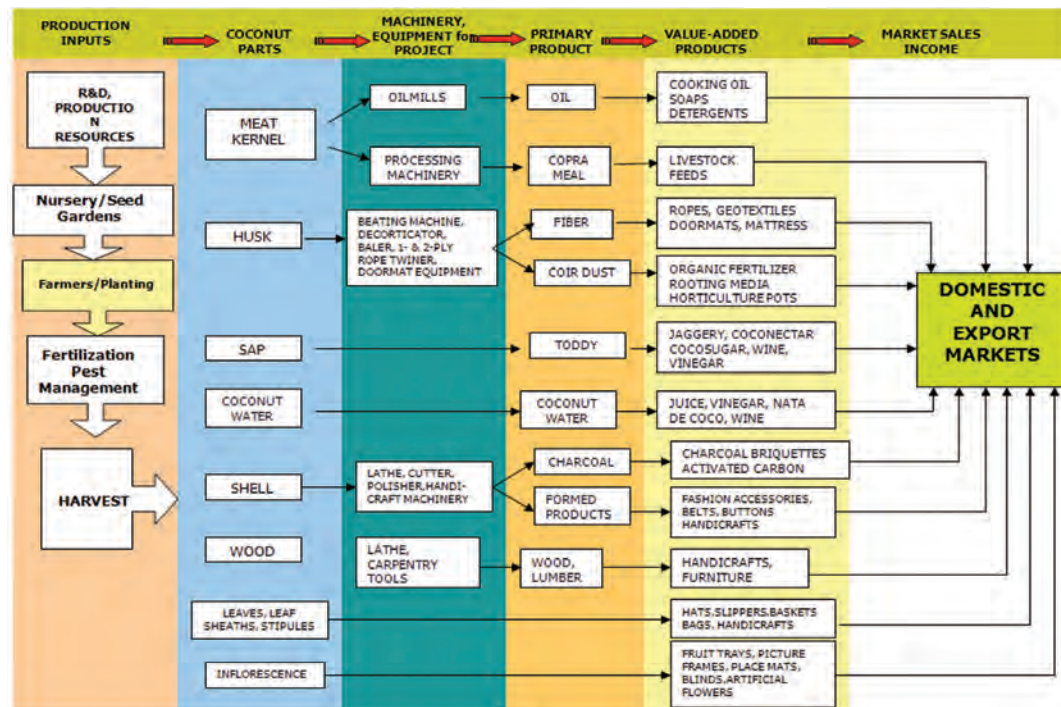
India has the highest nut production in 2012 at 21.8 billion nuts followed by Indonesia at 16.2 billion nuts and the Philippines at 15.8 billion nuts. The highest producer of coconut in the Pacific region is Papua New Guinea at 1.5 billion nuts.

Coconut Supply-Value Chain Analysis in the Asia – Pacific Region

The coconuts produced in the countries are either consumed as fresh mature nuts for cooking or young tender coconuts for drinking. The majority of the mature coconuts are either used for cooking or processed into copra for the production of coconut oil and other coconut oil- based products. Some mature coconuts are also processed into desiccated coconut, virgin coconut oil, and coconut milk/cream or coconut milk powder. The by-product of coconut oil processing is copra cake or copra meal. This product is utilized as livestock feed and is exported to hog-raising and cattle-raising countries. The by-product of virgin coconut oil processing is fresh coconut residue which could be further processed into high value coconut flour.

Below is a graphical presentation of the supply and value chain of the coconut.

Fig 1. Coconut Industry: Supply-Value Chain



Source: APCC and PCA

The graphical presentation of the value chain of coconut shows the magnitude and potential for commercial coconut processing and value addition in the coconut industry. The challenge is to explore and produce more value-added coconut products rather than just copra. While there is really no data derived from actual survey, it is estimated that out of the total nuts produced, approximately 30 percent to 70 percent is utilized for household consumption; 30 percent to 75 percent for copra, 10% to 15 percent for desiccated coconut, coconut cream/milk and coconut water in various countries in Asia and the Pacific.

The Philippines is the biggest exporter of coconut products, mainly crude coconut oil (CNO) and CNO-based products (approximately 60%) and desiccated coconut, coconut cream/milk and coconut water (approximately 15% of total production). Domestic consumption of coconut products in the Philippines is only approximately 25 percent of total production. Indonesia on the other hand consumes approximately 70 percent to 80 percent of its total production for cooking and household consumption. Only about 20 percent - 30 percent is exported as crude coconut oil, desiccated coconut, coconut milk/cream, coconut water and other CNO-based products.

Sri Lanka has the highest per capita consumption of coconut at 116 nuts per person per year. Thus, Sri Lanka also domestically consumes 70 percent of its total production. Sri Lanka and India are the biggest exporters of coconut coir and coir-based products while the Philippines, Indonesia and Sri Lanka are three biggest exporters of desiccated coconut.

The Philippines is currently exporting about 38 coconut-based primary and downstream products and by-products from the coconut. The average foreign exchange earnings from coconut products for 10 years (2002 – 2011) amount to USD 1.113 Billion. The high value coconut products from the Philippines include a) virgin coconut oil, b) coconut milk powder, c) coconut flour, d) desiccated coconut, e) coconut milk/cream, and f) coconut shell charcoal-based activated carbon.

Table 3. Comparative Export Performance of High Value Coconut Products from the Philippines

COMPARATIVE EXPORT PERFORMANCE OF HIGH VALUE COCONUT PRODUCTS				
PRODUCT	Ave. (2002 – 2011)		2012	
	Volume MT	Unit Price USD/MT	Volume MT	Unit Price USD/MT
Desiccated Coconut (DC)	118,963	1,292.48	98,876	2,020.09
Activated Carbon (AC)	28,764	1,173.30	41,449	1,733.82
Liquid Coconut Milk (LCM)	1,902	1,413.05	3,104	1,814.26
Coconut Milk Powder (CMP)	1,563	2,868.28	1,599	3,610.99
Virgin Coconut Oil (VCO)	1,422	3,490.89	6,002	4,082.43
Coconut Flour (CF)	790	1,059.28	564	2,384.95

Source: PCA and UCAP

Desiccated coconut is used as an ingredient in five major industries. These are in confectionary products, bakery goods, frozen food, consumer food processing and general food processing. Coconut shell charcoal-based activated carbon is used in big quantities in water treatment/purification, mineral processing, oil and fats, food and beverage, pharmaceutical, electroplating industries and others.

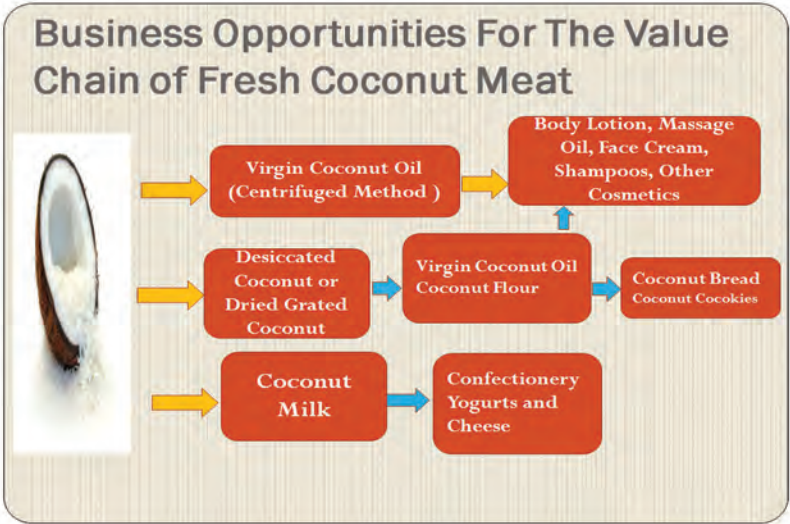
Coconut milk products are used as ingredients in the preparation of various dishes like exotic curries and other dish mixes. It is also used in the preparation of refreshing drinks and smoothening diluted with ice and mixed with nata de coco. It is likewise used in onfectionaries, bakery products and native delicacies.

Virgin coconut oil (VCO) has multi-functional uses thereby providing flexibility in marketing. VCO can be utilized in all edible and non-edible applications. A lot of people all over the world are now ingesting VCO as a food supplement to boost their immune system, assist in mitigating symptoms of several diseases and other health benefits. It is used as a base for hypoallergenic cosmetics, soaps, skin care products, aromatherapy and massage oil including as body lotion, body scrub and as hair and skin conditioner.

It is estimated that depending of the value of the end products in the export market, the average price to be paid for one whole coconut should be approximately 11 US cents if sold for coconut crude oil processing including copra meal, 33 US cents if sold for desiccated coconuts and 55 US cents if sold for the processing of coconut milk and water (Chand, V., 2012). An analysis on the value of raw and mature coconuts for processing into Virgin Coconut Oil (VCO) would reveal that at an FOB price of USD 5.00 per litre and on the assumption that 12 coconuts will produce one litre of VCO, the additional value of one coconut would be 42 US cents. Assuming a production cost of 5 US cents per coconut, the value of one whole coconut should be 37 US cents.

There is also economic potential to use the residue in the processing of VCO. This by-product can be further processed into high value coconut flour. A kilogramme of coconut flour can have an FOB price of US\$ 6 instead of just throwing it or using it as feed to livestock.

Fig 2.



The husk can also be processed into coconut coir fiber for rubberized mattress, geotextiles for the control of soil erosion, and coconut pith for horticulture use as planting medium or as organic fertilizers. Coir fiber can fetch an average FOB price of US\$ 350 per metric ton, while coconut pith or cocopeat can fetch an average FOB price of US\$ 300 per metric ton.

Fig 3.

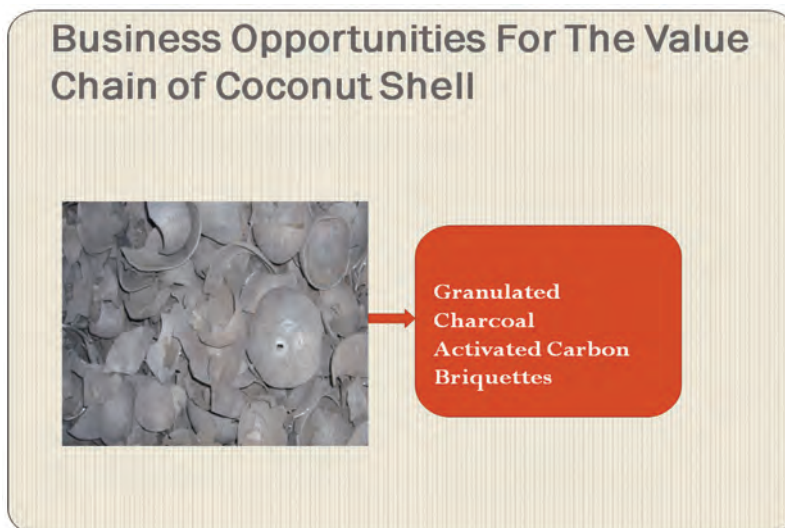


Fig 4.



The coconut shell can likewise be processed into charcoal and coconut shell charcoal-based activated carbon. Charcoal can fetch an average FOB price of US\$ 500 per metric ton while the average price of coconut shell based-activated carbon is US\$ 2 100 per metric ton. All these value-added products from the mature whole coconuts should increase the value of the raw material at the farm gate level.

Fig 5.



The business opportunities discussed above illustrates that value addition and more income can be derived from various products in the value chain. In the current practice of traditional copra production, one ton of copra would require approximately 6 000 nuts or 6 nuts to a kilogrammes of copra. Given an average copra price of US\$ 500 per metric ton of copra, this will translate to only 8 US cents per nut, at the oil mill. In turn, the farm gate price will only be 5 or 4 US cents depending on the distance of the farms and the quality of the copra produced. At this price level, the farmers will not have much incentive to harvest or gather the coconuts and process/dry the coconut kernel into copra much less replant their senile coconut palms.

It is estimated that more than 25 percent of the coconut palms in the Asia and the Pacific are senile (more than 60 years old) and have passed their economic production years and need to be replanted, but farmers do not have access to quality planting materials. There is a need to develop a system to produce sufficient quantities of planting materials to replant senile coconuts and to expand planting especially in coastal areas.

Most of the coconuts are grown from unselected varieties and are seldom fertilized, resulting in low yields and marginal incomes for farmers. As stated earlier, many coconut farmers do not practice intercropping. Due to this situation, there is a need to increase coconut farm productivity to expand the coconut farmers' food and income base to reduce poverty.

Due to the low coconut yields and the consequent low income (estimated at about US\$ 500 per hectare per year), the coconut farmers are also food-vulnerable. This situation is aggravated by the rising food prices. This is exacerbated by climate change whose impact can dramatically intensify food insecurity. Scientific research warns that the world will be a lot warmer by the end of the 21st century—if we do not abate greenhouse gas production. This means that the crop growing season temperature in the Asia-Pacific region will rise, significantly decreasing crop yields. Coconut offers a tremendous potential to evolve a resilient, coconut-based holistic and secure food and income systems that can adapt to climate change and other stress factors in the Asia-Pacific region.

Gaps, Issues and Common Problems in the Coconut Sector in the Asia – Pacific Region

The following table outlines the gaps, issues and common problems in the coconut sector in the Asia-Pacific Region and the probable causes:

Particulars	Regional Gaps, Issues and Common Problems	Reasons and Contributing Factors (Probable Causes)
Production and Farmers Income	<ul style="list-style-type: none"> - Low Coconut Production - Low Farm Productivity, and - Low Farmers Income 	<ul style="list-style-type: none"> - Senile palms - Lack of quality planting materials - Low price of copra - Poor farm management practices - No intercropping - Lack of coconut-based farming systems models - Poor technology transfer programmes; weak extension service - Pest and diseases - High cost of inputs - Natural calamities: drought, typhoons, flooding due to climate change - Indiscriminate cutting of coconut trees - Conversion to more profitable crops like oil palm, rubber, etc. or other commercial use of land - Land tenure problems - Absentee land-owners
Processing of Value-Added Coconut Products	<ul style="list-style-type: none"> - High cost of machineries - Lack of capital and financing - Lack of access to appropriate machineries - Limited knowledge and skills in appropriate coconut processing technologies - Economy viability and sustainability of small-scale processing ventures - Insufficient logistics and poor infrastructure 	<ul style="list-style-type: none"> - Limited access to credit - Not bankable farmers (smallholders) - Not organized as viable CBO's/ coops - Lack of knowledge on GMP, HACCP and Quality Standards - Too small in size (needs to be scaled up to be economically viable) - Scattered small islands - Availability of electricity, transport facilities and high cost of shipping

Particulars	Regional Gaps, Issues and Common Problems	Reasons and Contributing Factors (Probable Causes)
Marketing of Traditional and Emerging High Value Coconut Products	<ul style="list-style-type: none"> - Low farm gate prices of copra and other coconut products - Poor marketing system - Low domestic utilization - Low domestic market demand - Lack of access to markets 	<ul style="list-style-type: none"> - Multi-layered copra trading (chain of middlemen) - Smallholders not organized as marketing cooperatives for bulk trading - Competition from other vegetable oils - Lack of knowledge on health benefits of coconut products - Lack of knowledge on environment-friendly products from coconut - Remoteness of farms, poor infrastructure, high transport / shipping costs - Lack of market information - Limited market promotion
Institutional Support	<ul style="list-style-type: none"> - Lack of Policies and Government Support - Lack of Focused Coconut Development Programs - No National Coconut Strategic Plan - Lack of Economic Incentives/ credit assistance, and Financial Support for Agri-Inputs and Investments - Lack of Infrastructure Facilities - Lack of Economically Viable Coconut Farmers Cooperatives / CBO's 	

Proposed Regional Strategies for Coconut Sector Development and Recommendations

To develop the coconut sector in the Asia-Pacific Region, the following strategies and recommendations are proposed: Strategy I. Increase coconut production, farm productivity and farmers income; Strategy II. Promote value-added coconut product processing and marketing; and Strategy III. Promote capacity building and provide institutional support.

Strategy I. Increase Coconut Production, Farm Productivity and Farmers Income

Recommendations

I.1. Increase the rate of replanting senile palms with good quality and elite planting materials to include the following components:

- a) Use coconut mass selection techniques to choose good quality mother palms, seednuts and seedlings of elite local varieties for the replanting programme;
- b) Pursue coconut breeding and hybridization projects to produce dwarf x tall or tall x tall hybrids for specific purposes (e.g. high nut production, high lauric-oil content, tolerance to abiotic stresses like draught or cold temperature and tolerance to abiotic stresses like phytoplasma diseases);
- c) Establish coconut seedgardens to mass produce hybrids and other good quality planting materials. This may be initiated by the respective governments in coconut growing countries. The private sector should also be encouraged to establish commercial coconut seedgardens;
- d) Use molecular techniques to expand the genetic base for coconut breeding of hybrids with superior traits and develop a viable protocol for somatic embryogenesis to mass produce elite planting materials for the replanting programme;
- e) Strengthen the coconut breeding facilities in the respective countries and establish a duplicate coconut genebank in the Pacific region (preferably in Fiji) in view of the Borgia coconut syndrome disease in Papua New Guinea;
- f) Strengthen the three multi-site International Coconut Genebanks hosted by Papua New Guinea for the South Pacific, Indonesia for Southeast and East Asia, and India for South Asia with new additions through exchange of germplasm for breeding and operationalization of the International Treaty on Plant Genetic Resources for Food and Agriculture by FAO and the International Agreement on hosting the International Coconut Genebank signed by FAO, IPGRI and the host countries;
- g) Promote the commercial utilization of coconut wood for house construction, furniture making and handicrafts;

This should provide an economic incentive to cut and replant senile palms as the sale of coconut logs provide additional income to the farmers.

A pilot project on coconut timber utilization in collaboration with appropriate stakeholders in coconut growing countries may be explored. Mobile sawmills equipped with tungsten carbide saws may be piloted with the appropriate techniques and technologies in coconut logging, saw milling (correct cutting patterns), drying and machining. A technical assistance project on this regard is desirable.

- h) Provide capacity building and technical assistance to coconut breeders, scientists, extensionists and farmers in the region to effectively implement the above-mentioned recommendations.

I.2. Develop further Coconut Based Farming Systems (CBFS) by intercropping and livestock raising, including coconut based agro-forestry systems, and promote CBFS in all coconut growing countries to include the following components:

- a) Intercropping of food security crops, cash crops and high value industrial crops (root crops, vegetables, banana, tropical fruits, spices, medicinal plants, cacao, coffee, etc.) which meet marketability and profitability criteria specific for each country;
- b) Adopt avenue planting and wider spacing for planting coconuts to provide more sunlight to support income generating intercrops;
- c) Raising of livestock in coconut farms including growing of improved grass-legume pastures under coconut and raising ruminants (goat, sheep, beef and dairy cattle) in pasture or in confinement on a cut-and-carry basis and poultry (native chicken ducks, etc.) for meat and eggs;
- d) Adopt coconut based agro-forestry systems including the planting of nitrogen-fixing trees like Gliricidia to enhance soil fertility; increase soil organic matter buildup, produce fuelwood to save forest trees and biomass to generate dendrothermal energy. Coconut based agro-forestry systems should be promoted in coastal areas to prevent coastal erosion and to provide as windbreak and protect inland crops and other resources against strong winds/typhoons due to climate change;
- e) Adopt Good Agricultural Practices (GAP) including fertilization or the production and use of organic fertilizer from farm biomass and use of salt and chemical fertilizer augmentation as appropriate.

I.3. Establish an Integrated Pest Management (IPM) Network for Coconut Pests and Diseases to:

- a) Gather and document information (both technical and local knowledge) on the management of coconut pests and diseases;

- b) Develop Technical Guidelines for the integrated management of coconut pests and diseases;
- c) Facilitate to cooperation, collaboration, and assistance on:
 - Exchange of natural enemies or providing initial culture of natural enemies, predators and parasitoids for biological control of coconut pests;
 - Exchange of scientists and sharing of technical knowledge and experience on the integrated management of coconut pests and diseases;
 - Development of warning system to prevent pest invasion.
- d) Design and implement a program for Transfer of Technology on IPM of coconut pests and diseases

Strategy II. Promote Value-Added Coconut Product Processing and Marketing

Recommendations

II.1. Provide technical assistance on the following:

- a) Market surveys and in the preparation of location-specific project feasibility studies for value-added coconut processing business ventures;
- b) Transfer of coconut processing technologies especially from Asia to the Pacific countries through provision of experts on high-value products; and creation of a Directory of Current and Retired Scientists and Technical experts;
- c) Skills training and capacity building of trainers, coconut farmers/entrepreneurs on the processing of high-value coconut products;
- d) Sourcing of appropriate processing machineries and equipment from reputable companies;
- e) Establishment of demonstration/pilot projects on the processing of high-value products especially in the Pacific countries;
- f) Product quality standards assurance to meet market requirements through:
 - Adoption of national quality standards,
 - Establishment of a testing laboratory in the respective countries, and
 - Assistance in packaging, labelling and branding;
- g) Exploiting marketing platforms such as:
 - Organic certification,
 - Fair trade certification,
 - ISO certification,
 - GAP/GMP/HACCP certification,
 - Halal certification,

- Non-GMO certification,
 - Non-gluten and transfat-free coconut food products.
- h) Conduct of medical research/clinical trials on the health benefits of coconut oil and heart disease, diabetes, Alzheimer’s disease, HIV/Aids and others.

Strategy III. Promote Capacity Building and Provide Institutional Support to Ensure Sustainability Of Development Interventions

Recommendations

III.1. National Governments should:

- a) Consider coconut sector development as a high priority programme in the National Development Plan and provide adequate budget support for government investments in the coconut sector;
- b) Provide policy environment to encourage joint ventures (JV’s), promote local and foreign investments, and Public-Private Partnerships (PPP);
- c) Provide financial incentives and access to credit assistance especially for small and medium scale enterprises (SMEs);
- d) Support market promotion activities including awareness campaign on the health benefits of coconut to increase domestic demand/utilization and export;
- e) Strengthen the National Coconut Extension Service;
- f) Facilitate and support the formation of economically viable Coconut Farmers’ Cooperatives, Coconut Producer Societies or Coconut Producer Companies;
- g) Facilitate the formulation of their respective Coconut Industry Strategic Plan and Roadmap;
- h) Facilitate periodic Agricultural Surveys to ensure evidence-based policy formulation and program planning.

The Way Forward

The above-mentioned strategies and recommendations may be pursued by the national governments of the coconut growing countries in Asia and the Pacific. Regional technical assistance projects may also be pursued by the FAO and the APCC in the context of South-South Cooperation. TCP projects may also be designed to pursue the recommendations indicated in the regional strategy.

It is proposed that the FAO and the APCC collaborate to plan and implement the strategies and recommendations for coconut sector development in the Asia-Pacific Region. FAO has the technical expertise and the institutional capacity to lead while the APCC through its 16-member countries has the institutional mandate and local knowledge to support the program. The APCC Secretariat in collaboration with the countries in the Asia – Pacific region may therefore be tasked to prepare the relevant project proposals for consideration by the APCC Session, the FAO and other international technical and funding agencies.

Country Reports – Pacific Region

EXECUTIVE SUMMARY

The Coconut Study Mission in the Pacific was undertaken in five (5) countries (Samoa, Tonga, Fiji, Vanuatu and Solomon Islands) to assess the coconut sector in the Pacific Region and identify gaps, commonalities and opportunities for sectoral development through the value chain approach in the respective countries and in the Pacific Region.

Meetings with Senior Government Officials, private sector stakeholders, NGOs, smallholder coconut farmers, representatives of regional bodies like the Secretariat of the Pacific Community, the European Commission, the World Bank, the Asian Development Bank and other donor-governments like AusAid, as well as visits to coconut production and processing sites were undertaken.

There is good potential for the rehabilitation and development of the coconut sector in the countries studied and in the Pacific Region, in general. The conducive factors include the growing commitment and leadership in the Ministry of Agriculture and related government agencies, supported by strong advocacies by NGOs, international donors, investments from the private sector and increasing awareness by coconut farmers. These factors along with appropriate coconut development policies and programmes, institutional reforms and strengthening, private sector investments, linkage to the market and technical assistance throughout the value chain can certainly contribute to the development of the sector.

However, the coconut sector is faced with several challenges. Among them are the continuing decline of coconut productivity due to senility of the palms, poor management of the farms, natural calamities, labor shortage, remoteness of the farms, poor infrastructure, high transport cost, access to market, poor technical knowledge, among others. Coconut or copra production alone has become unprofitable due to low market prices. There is very little value-adding of coconut products in the villages. The existing coconut processing enterprises in the villages are rather too small in scale. Their economic viability and sustainability are at risk.

In spite of the challenges, the coconut has remained as an integral part of the way of life and food security of the majority of the rural population. To develop a sustainable coconut sector in the Pacific countries, the value chain approach must be explored. Coconut replanting (including commercial coconut wood utilization), crop diversification and coconut-based cropping systems and coconut-based livestock integration must be implemented as profitable investments both by government and the coconut farmers.

Analysing the value chain in the coconut sector should enable us to improve the value of the end product, promote quality and efficiency as well as competitiveness and profitability. Value chain analysis should therefore concentrate more on value creation, innovation, product development and marketing while supply chain analysis should give primary focus on cost reduction and efficiencies of supply.

Copra and to some extent, crude coconut oil are still the main products that are traded in the Pacific Region. There is very little value-addition and the Pacific Region is viewed mainly as a source of raw materials. This makes the region vulnerable to the fluctuations of prices of vegetable oils in the global fats and oils market. Price volatilities in the last 30 or 40 years have left the small coconut farmholders to remain poor due to very low prices of copra. Copra production has in many instances, become unprofitable or non-competitive. There is therefore the challenge to move away from copra and add value to the coconut products.

The scale of commercial coconut processing and value addition in the Pacific Region is extremely limited. The challenge therefore is to explore and produce more value-added coconut products rather than just copra. While there is really no data derived from actual survey, it is estimated that out of the total nuts produced, approximately 15 percent is utilized for household consumption; 50 percent for copra, 5 percent for VCO production, and around 30 percent are not harvested, gathered or collected in the field due to various reasons like low prices, difficulty in collecting the nuts in the bushes, remoteness of the farms, poor infrastructure and others.

Only under circumstances of more value addition can we expect that large quantities of the coconut materials in the region can be utilized more significantly to benefit the coconut farmers, including foreign exchange earnings for the country.

It is estimated that depending on the value of the end products in the export market, the average price to be paid for one whole coconut should be approximately 11 US cents if sold for coconut crude oil processing including copra meal, 33 US cents if sold for desiccated coconuts and 55 US cents if sold for the processing of coconut milk and water (Chand, V., 2012). An analysis on the value of raw and mature coconuts for processing into Virgin Coconut Oil (VCO) would reveal that at an FOB price of US\$ 5.00 per litre and on the assumption that 12 coconuts will produce one litre of VCO, the additional value of one coconut would be 42 US cents. Assuming a production cost of 5 US cents per coconut, the value of one whole coconut should be 37 US cents.

There is also economic potential to use the residue in the processing of VCO. This by-product can be further processed into coconut flour. A kilo of coconut flour can have an FOB price of US\$ 6 instead of just throwing it or using it as feed to the livestock.

The husk can also be processed into coconut coir fiber for rubberized mattress, geotextiles for the control of soil erosion, and coconut pith for horticulture use as planting medium or as organic fertilizers. Coir fiber can fetch an average FOB price of US\$ 350 per metric ton, while coconut pith or cocopeat can fetch an average FOB price of US\$ 300 per metric ton.

The coconut shell can likewise be processed into charcoal and coconut shell charcoal-based activated carbon. Charcoal can fetch an average FOB price of US\$ 500 per metric ton while the average price of coconut shell based-activated carbon is US\$ 2 100 per metric ton. All these value-added products from the mature whole coconuts should increase the value of the raw material at the farm gate level.

The production of value-added coconut products and their exports using the value chain approach in coconut sector development in the Pacific Region is influenced by several cross cutting issues. These include the availability of infrastructure and logistic services, appropriate technology and good management practices, market development, both at the domestic level and in niche markets outside the country.

While the raw materials in the Pacific Region are comparatively low priced, attention must be given to ensure that the value-added products coming from the Pacific region must be competitive to those of other coconut producing countries. This analysis suggests that it seems unlikely that new opportunities are bright for crude coconut oil unless one has a special market like China, or unless the refined, bleached and deodorized (RBD) cooking oil to be produced can compete with the much lower priced imports and competing products like palm oil, soybean oil and others.

The way forward may be in speciality virgin coconut oil and its derivative products for niche markets in New Zealand, Australia, USA and Europe including the domestic market. Women in Business in Samoa, Pure Fiji Ltd in Fiji, an NGO called National Youth Congress in Tonga are good examples of successful initiatives in value-added coconut products for niche markets.

Although there may be some opportunities to explore desiccated coconut, coconut milk, coconut shell charcoal briquettes and coconut shell charcoal- based activated carbon including coir products and coconut timber and wood processing, investments in these areas have to be thoroughly evaluated and location-specific project feasibility studies must be conducted to ensure competitiveness and sustainability. The need to scale up existing coconut processing ventures in the Pacific Region should be given attention to ensure economies-of-scale, efficiency, better quality control, profitability and long-term sustainability.

At the national level it is recommended that:

1. Evidenced-based policies and coconut sector development programmes must be formulated to address the declining production and productivity of coconut farms and ensure maximum economic returns from investments in coconut replanting/planting, coconut based cropping systems including livestock integration and downstream value-added processing of coconut products. New agricultural surveys with focus on the coconut sector are recommended to provide essential inputs to policy formulation and program planning.
2. To pursue the development policies in the coconut sector, proper institutional mandates and strengthening of the agricultural extension service and supporting agencies must be in place. A Coconut Sector Strategic Plan with verifiable targets and indicators of success supported with the appropriate government budget and private sector investment must also be in place.

3. While the relevant Coconut Productivity and Rehabilitation Programmes are in place and are on-going in some Pacific countries, it is recommended that technical assistance be provided on coconut varietal improvement through coconut genetic resource survey, coconut breeding research and proper selection methodology to ensure that only the best quality planting materials/seedlings are field planted.
4. Rehabilitation of the coconut sector should involve coconut-based cropping system, crop diversification and livestock integration to ensure optimum productivity of the coconut farms and contribute to food security and the economic livelihood of the farming families.
5. While the coconut seedlings used in the on-going Coconut Replanting/Planting and Rehabilitation Programmes are mainly local varieties, coconut hybrids as well as selected dwarf varieties for young tender coconut drink may also be promoted.
6. Technical assistance on the production of Technical Manuals on the genetic qualities and production potential of various coconut varieties for specific use/purpose is recommended.
7. The production of Technical Guides, Posters, Leaflets on Coconut Based Cropping Systems, including Livestock Integration in Coconut Farms highlighting the Good Agricultural Practices in the management of the intercrops/cash crops with coconuts is likewise recommended. Information materials on copra quality improvement techniques, hot-air copra dryers, the processing of value-added coconut products like virgin coconut oil, coconut flour, coconut water, coconut husk products and others should also be produced.
8. The Ministers of Agriculture and other stakeholders have recognized that there is a need to develop the coconut processing industry to stimulate better prices of coconut raw materials and provide the economic incentives for coconut replanting/planting and increase coconut production. Product diversification, value-addition, domestic utilization and export are therefore recognized as the way forward.
In the case of Virgin Coconut Oil (VCO) industry, it is recognized that the Director Micro Expelling (DME) Process mostly used in the Pacific countries in the production of VCO needs to be scaled-up to promote efficiency, economies-of-scale, greater production to meet the supply requirements in the export market, while at the same time provide rural employment (especially among women and the youth) and ensure fair trade and better prices of whole coconuts as the raw material.
9. To help ensure strong backward linkages to the rural coconut farming communities, value-added coconut processing enterprises such as virgin coconut oil production, coconut flour processing, coconut oil-based soap making and others must be developed within the rural coconut farming communities. These rural coconut processing centers must be market-led or demand driven and should be supported to meet domestic market demand and export opportunities.

10. The proposed ACP-EU Coconut Project following the “whole nut concept” where an integrated coconut processing plant will be established is expected to process activated carbon from coconut shell charcoal, coconut milk/cream or desiccated coconut from the kernel, fiber and other coir-based products from the husk, and packaged coconut water. In the spirit of collaboration, other international donor agencies may provide technical assistance in the proposed project as needed.
11. To provide an economic incentive for replanting or cutting of senile and unproductive coconut palms, commercial coconut wood utilization should therefore be encouraged and investment in this area must be promoted to provide lumber/coconut wood for housing and furniture making.
12. While copra is still the major coconut product being traded in the Pacific, copra quality improvement strategy must be implemented through the provision of hot-air dryers, proper technical guidelines and appropriate training on copra drying, setting-up of national quality standards on copra following the APCC Code of Standards for Copra, and promotion of quality-based pricing among copra buyers and traders/exporters.
13. Given the very limited value-addition activities in the Pacific region, the fundamental question should focus on how to turn the whole coconut industry around from the current level to utilize the large quantities of raw materials to benefit the coconut farmers. Specific opportunities should therefore be explored around up-scaling VCO production and its product derivatives, desiccated coconut and or coconut milk processing as well as packaging of coconut water, processing of coconut fiber products including coconut shell charcoal and activated carbon. Location specific project feasibility studies should be undertaken to ensure success in these coconut processing business ventures.
14. To develop and expand the market for coconut products in the Pacific region, there is a need to raise the awareness among the Pacific people and other consumers on the health aspects of coconut products and the opportunity as well the intrinsic value of using locally produced coconut products like VCO, coconut cooking oil, coconut flour, coconut-based soap, young tender coconut water, and others. Domestic utilization of coconut products must be vigorously promoted and pursued.
15. To encourage investments in the coconut sector, the government financial sector through the banking system should provide support through reasonable credit schemes for coconut processing business ventures. These investments must be market-led or demand-driven, and the support for financing must include professional guidance on branding, packaging and market-matching assistance.
16. To promote institution building, capacity development and training programmes for coconut subject matter specialists/extensionists, coconut farmers and coconut processors must be provided with technical assistance from appropriate government agencies and international development or donor organizations.

17. To ensure efficiency and effectiveness in programme implementation, the Governments in the Pacific countries should strengthen the National Extension Service. The extension delivery services to coconut farmers and women folks in the coconut farming communities must be vigorously pursued.

18. The formation of coconut producers associations or cooperatives in the Pacific countries must also be facilitated/supported. This should ensure inclusive development among the rural coconut farming communities and at the same time promote greater efficiency and effectiveness in the delivery of extension services and capacity building activities.

Country: SAMOA

I. Coconut Production

- I.1. An estimated 90 000 hectares of coconut plantation is recorded with the growing number of these trees becoming senile and declining in yields. Recent provisional data from the 2009 Agricultural Census Tabulation Report has estimated only 28 000 hectares of coconut reportedly being maintained and harvested by farming communities.
- I.2. As observed, most of the coconut plantings are situated around the coastal areas and low lying areas. Some plantings are done further inland on the higher elevation and are less productive. Reports have indicated that coconut is grown in almost all inhabited areas of Samoa. The total land area for Samoa is about 292 588 hectares and about 30 percent of this land area is grown with coconut. However, only about 31 percent of coconut area is actually being maintained and harvested by farming communities.
- I.3. Samoa's population is around 180 000 and about 70 percent is employed in agriculture. Coconut being a major traditional tree crop is an integral part of the agriculture activity for these agricultural holdings.
- I.4. The Ministry of Agriculture and Fisheries has indicated that the major strength of coconut production in Samoa is that it is a traditionally important crop that is an integral part of the way of life in Samoa. At the subsistence level, it is seen as less responsive to world price fluctuation and is planted as a necessity. It can be intercropped with other economically important crops such as taro, banana, cocoa, coffee and pasture for grazing under coconuts. Coconuts are traditionally managed without chemicals and are easily certified as organic.
- I.5. Production in Whole Nuts and Copra Equivalent. Data is shown in Table 1.

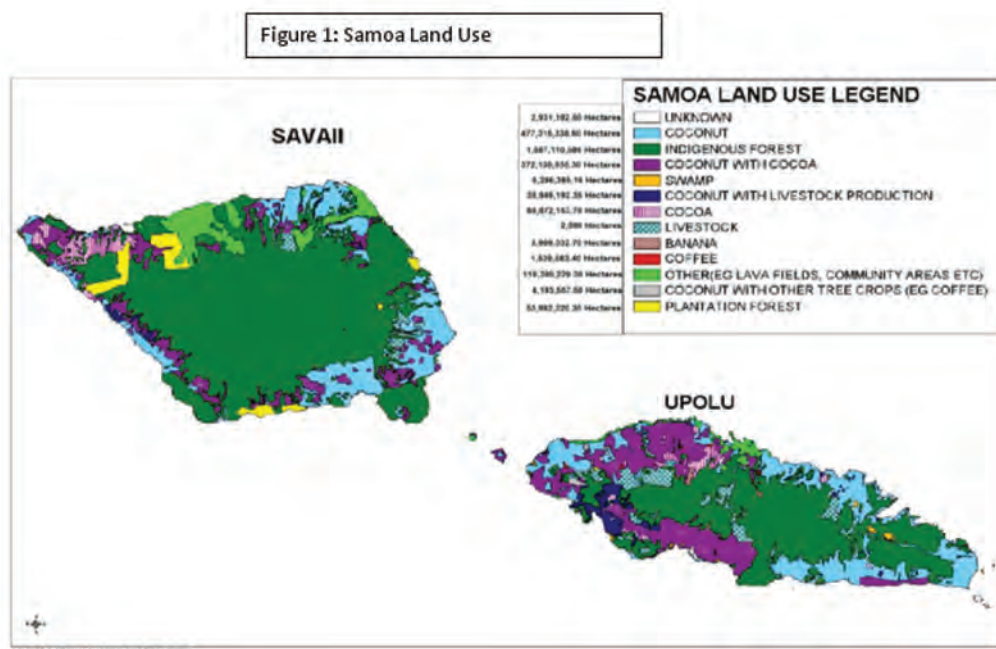
Table 1. Area and Production of Coconut 2004 – 2010

Year	Area In 1000 Ha	Production of Coconut	
		Million Nuts	Copra Equivalent in 1000 MT
2004	96	190	55
2005	93	180	55
2006	93	180	55
2007	93	165	33
2008	93	180	60
2009	102	200	65
2010	104	200	65

Source: CBS, MAF

- I.6. Factors Affecting Coconut Production and Productivity:
- The major factor affecting the drop in coconut production is the drop in world prices causing farmers to collect mainly for subsistence and livelihood. Some of the nuts have entered the Young Coconut Industry for drinking which have fetched a much better price than selling mature nuts.
 - Senility of palms has also contributed significantly to the decrease in coconut production and productivity. There is therefore a need for coconut replanting.
 - Access roads to many island plantations is also an issue.
 - Drought or low rainfall reaching to about 6 months in 2011 and 2012 also contributed to lower coconut production.

I.7. Land Use in Samoa Depicting the Coconut Areas is shown on Figure 1.



I.8. Age Profile of Coconut Palms. An estimated 25 percent of the current fruit bearing coconut palms are senile (more than 60 years old). This percentage is expected to drop once the current replanting programme trees begin to bear fruit.

The estimated area under coconut by age of the palms is shown on Table 2.

Table 2. Estimated Area (ha) under Coconut (Single & Mixed) by Age of Trees

Age of Coconut Palms	Area in Hectares
Less than 8 years	3 200
8 – 14 years	3 640
15 – 39 years	10 528
40 – 59 years	3 100
60 years and over	1 128
Not stated	5 972

Source: Agriculture Census Tabulation Report 2009 – SBS

II. Policies, Programmes and Activities to Promote Coconut Farm Productivity and Increase Farmers' Income

II.1. The Government of Samoa has a Coconut Replanting Scheme under its Stimulus Package Programme, which targets at least 2 acres per household of new coconut as the primary and compulsory crop, intercropped with cocoa, coffee and selected fruit trees as options. A bonus payment on year 2 and year 4 was approved as an incentive and to assist in maintenance costs as well as ensure good survival rate of planted coconut seedlings in the field.

The outcomes expected would be to generate household income to improve livelihoods as well as promote food security in the rural communities; and to provide sustainable supply of coconuts to the coconut processing firms such as for virgin coconut oil production under the Women in Business Development, Inc. (WIBDI) administration, the coconut oil and bio-fuel under the Samoa Coconut Products Ltd and Pacific Oil Ltd.

Seedlings are provided free and delivery is also free. Technical assistance is provided through the extension advisory services of the Ministry of Agriculture and Fisheries. The target area for this pilot initiative is 1 000 acres.

II.2. The Annual Agriculture Show, one for Upolu Island and another for Savaii Island highlights coconut farm competition, farm and intercropping or mixed farming concepts. According to the Minister of Agriculture, these activities are intended to create greater awareness for the love of farming especially among the youth.

II.3. The World Food Day and Coconut Planting Day for school age children is an annual event that also highlights the different coconut varieties and the promotion of replanting/ planting of coconut. Market promotion, information dissemination and the distribution of free coconut planting material are held during this event. Traditional food is also prepared and consumed to celebrate World Food Day featuring food prepared using coconut as a cheaper and healthier option.

III. Coconut Processing

III.1. Table 3 shows the Production of Various Coconut Products in Samoa from 2004 to 2010.

Table 3. Production of Various Coconut Products 2004 – 2010 (In MT)

Year	Copra	Coconut oil	Copra Meal	Coconut Cream
2004	11 000	600	144	622
2005	11 000*	1 067	430	531
2006	11 000	1 300	400	560
2007	11 000	39.3	-	510
2008	-	21.1	47	463
2009	-	1 811	492	315
2010	-	2 154	648	316

* *Export figures* *Source: CBS*

III.2. Table 4 shows the Production and Exports of Non-Traditional Coconut Products in Samoa from 2008 to 2010.

Table 4. Volume and Value of Exports of Non-Traditional Coconut Products

Virgin Oil	2008	2009	2010	2011	2012
Volume (MT)	12.6	24	16	12	26
Value (1 000 FOB)	182	233	148	123	295

Drinking Nuts	2008	2009	2010	2011	2012
Value (1 000 FOB)	83	84	69	86	na

Mature Coconut	2008	2009	2010	2011	2012
Value (1 000 FOB)	454	455	440	583	na

III.3. Prices of Coconut Products

With the expectation that prices for coconut oil and coconut products will rise, the industry will respond to this favourable situation. If prices continue to be less competitive to other agriculture enterprises, it was indicated that farmers will shift their attention to other investments for higher income earnings.

III.4. The average FOB Value of Major Coconut Products in Samoa for CY 2008 – 2012 is shown in Tables 5 to 8.

Table 5. Exports of Copra, Volume & Value in Samoa for CY 2004 – 2017

Year	Volume (MT)	Value (Tala '000, FOB)
2004	1 000	654
2005	1 000	1 354
2006	1 000	817
2007	1 000	899

Source: CBS

Table 6. Exports of Coconut Oil, Volume & Value in Samoa for CY 2004 – 2012

Year	Volume (MT)	Value (Tala '000, FOB)
2004	600	739
2005	1 067	1 198
2006	39	53
2007	39	56
2008	21.1	54
2009	1 809	1 950
2010	2 535	3 549
2011	2 509	6 979
2012	3 935	8 002

Source: CBS

Table 7. Exports of Copra Meal Volume & Value in Samoa for CY 2004 – 2012

Year	Volume (MT)	Value (Tala '000, FOB)
2004	144	37
2005	430	85
2006	-	-
2007	-	-
2008	47	53
2009	1 100	329
2010	1 252	468
2011	3 061	440
2012	1 509	277

Source: CBS

Table 8. Exports of Coconut Cream Volume & Value in Samoa for CY 2004 –2010

Year	Volume (MT)	Value (Tala ‘000, FOB)
2004	622	2 561
2005	531	2 277
2006	560	2 386
2007	510	2 338
2008	463	2 068
2009	315	1 405
2010	316	1 492

Source: CBS

III.5. Coconut Processing Plants. The existing coconut processing plants in Samoa include:

- A. Women in Business Development, Inc. (WIBDI) – Virgin Coconut Oil and Cosmetics
- B. Pacific Oils Ltd. – Crude Coconut Oil, Copra Meal, RBD Coconut Oil but refining is done in New Zealand
- C. Samoa Coconut Products Ltd. – Crude Coconut Oil, Cooking Oil, Soap, Cosmetics, Biofuel
- D. Strickland Brothers, Inc. – Coconut Timber/Cocowood Furniture but operation is minimal due to lack of resources

IV. Coconut Product Utilization and Marketing

- IV.1.** From the 2009 Agricultural Census of Samoa, a total number of about 92 656 households were recorded with 63 144 agriculturally active households. About 81.9 percent of households use coconuts for cooking at 46 coconuts per week per household. For feeding animals, 62.3 percent of households use coconuts for animal feed at an average of 128 nuts used per week per household.
- IV.2.** From the 2009 Agricultural Census, it was estimated that 27 567.2 hectares of coconut are farmed/maintained in Samoa, an estimated 0.1 percent of coconuts are consumed for cooking, 0.5 percent utilized for animal feed and an estimated 60 percent average of the maintained farms are utilized for coconut oil, copra, coconut cream, biofuel and other coconut products.
- IV.3.** It is interesting to note that the Scientific Research Organization of Samoa (SROS) has been conducting research work on the use of Coconut Methyl Ester (CME) as biofuel (coconut bio-diesel or CME mixed with petro-diesel) primarily for gensets to generate electricity in Samoa, and also for transport vehicles. This should create bigger domestic demand for coconut oil in the country, and provide greater economic incentives to replant/plant more coconuts and increase production. Since Samoa is 100 percent dependent on imported petro-diesel, the use of coconut biofuel is also a brilliant move towards import substitution and savings on foreign exchange.

- IV.4.** It was reported that there are a lot of un-harvested coconuts in the farms due to socio-cultural reasons, low price of coconut and difficulty in collecting nuts in the bushes. However, when prices of coconuts are high and when there will be greater demand for coconut raw materials for the processing industry, it is expected that farmers, including the youth, will have the economic incentives to collect the fallen nature nuts in the field. Thus, the coconut processing industry must be developed to provide better prices for the whole nuts as raw materials. This should then provide greater economic incentives for the farmers to increase coconut production.
- IV.5.** The market destinations of various coconut products from Samoa are mainly to New Zealand, USA, Australia, Japan, Malaysia and Europe (United Kingdom).
- IV.6.** The Government of Samoa has an open trade policy as it accedes to the WTO.

V. Recommendations

- V.1.** While the coconut seedlings used in the on-going Coconut Replanting/Planting Programme are the selected local Samoan Coconut Tall Varieties, discussion with MAF officials reveal that coconut hybrids as well as selected dwarf varieties for young tender coconut drink may also be promoted.

The Government of Samoa may therefore need to pursue coconut hybridization with appropriate technical assistance. The other alternative is to teach progressive farmers how to produce coconut hybrids in their farms, as practiced in other countries like the Philippines and Sri Lanka.

- V.2.** Intercropping coconuts and other crops is inbuilt into the Stimulus Package Programme that will give farmers a better incentive to integrate other crops of economic importance such as the Tahitian Lime, Rambutan, and others. Cattle grazing under coconuts are commonly practiced in Samoa, especially the well established coconut fields with trees out of reach of grazing cattle. Intercropping of cash crops and food security crops like taro, yams, cassava, bananas, etc is also done but could still be expanded.
- V.3.** The Minister of Agriculture and other stakeholders have recognized that there is a need to develop the coconut processing industry to stimulate better prices of coconut raw materials and provide the economic incentives for coconut replanting/planting and increase coconut production. Product diversification, value-addition, domestic utilization and export are therefore recognized as the way forward.

In the case of Virgin Coconut Oil (VCO) industry, it is recognized that the Director Micro Expelling (DME) Process used by the WIBDI in the production of VCO needs to be scaled-up to promote efficiency, economic-of-scale, greater production to meet the supply requirements in the export market, while at the same time provide rural employment (especially among women and the youth) and ensure fair trade and better prices of whole coconuts as the raw material.

Thus, a scaled-up process technology for VCO production including access to appropriate machinery/equipment suppliers and may be an area for technical assistance to VCO processors in Samoa.

- V.4.** There is also a need for more technical assistance in Good Manufacturing Practices (GMP) among VCO producers. Training and capacity building in this area may be provided.
- V.5.** VCO production in Samoa is increasing due to the efforts of WIBDI, an NGO assisted by the Governments of New Zealand and Australia, with organic and fair trade certification and has a marketing link with Body Shop Cosmetics in the United Kingdom.

With the increase in VCO production, a sizeable volume of the coconut meat residue, a by-product in VCO processing, is also produced. This is just being sold as feed to the pigs. In other countries, this residue is processed into coconut flour and is used in baking nutri-buns or breakfast bread at 20 – 25 percent blend with wheat flour.

Coconut flour is more nutritious, high in fiber and high in protein, and thus, good for the Nutrition Programme among children. Technical assistance may be provided to Samoa to exploit this high-value coconut product.

- V.6.** In the oil milling sector, it was observed that copra quality can still be improved. Technical assistance, training and capacity building in this area may be provided.

It is recognized that if all copra in the country are produced using hot-air dryers, copra quality will be greatly improved such that refining the coconut oil for use in cooking may not even be necessary.

- V.7.** It is remarkable to note that most of the cooking oils found in the supermarket in Samoa are imported vegetable oils like Canola, Soybean Oil, Palm Oil and others. As the country campaigns for support for the local economy, local products like coconut cooking oil must be made available to the local people at competitive price. This may be achieved by improving copra quality, so that the added cost of refining (RBD process) may be avoided. A campaign for greater awareness on the goodness and health benefits of coconut oil must also be pursued.
- V.8.** Discussions were also held with the Ministers of Agriculture and the Ambassador of Samoa to the EU on the proposed ACP-EU funded Coconut Project following the “whole nut concept” where an integrated coconut processing plant will be established. As whole nuts will be purchased and delivered to the processing plant, several products are expected to be processed, namely activated carbon from coconut shell charcoal, coconut milk/cream or desiccated coconut from the kernel, fiber and other coir-based products from the husk, and packaged coconut water. In the spirit of collaboration, other international donor agencies may provide technical assistance in the proposed project as needed.

- V.9.** To provide an economic incentive for replanting or cutting of senile and unproductive coconut palms, there must be a buyer of coconut logs. Commercial coconut wood utilization should therefore be encouraged and investment in this area must be promoted to provide lumber/coconut wood for housing and furniture making.

A pilot project on coconut timber utilization in collaboration with appropriate stakeholders like the Strickland Brothers, Inc. may be explored. Mobile saw mills equipped with tungsten carbide saws may be piloted with the appropriate techniques and technologies in coconut logging, saw milling (correct cutting patterns), drying and machining. A technical assistance project on this regard is desirable.

- V.10.** Technical assistance in extension training, capacity building and farmer leaders' training may be provided, including the production of technical manuals, posters, and flyers to promote increased awareness on the appropriate technologies on coconut production and on the processing of value-added products from coconut.

Country: TONGA

I. Coconut Production

- I.1.** Coconut in Tonga is regarded as the “Tree of Life”. Its importance in Tongan life is reflected in Tongan mythology and the products derived from the coconut are used in a variety of ways.
- I.2.** A survey carried out in 1982 has estimated the total land under coconut at 35 347 hectares or 49 percent of total land area. There is an existing Land Law which requires the planting of 200 coconuts per tax allotment.
- I.3.** Reports have indicated that in the last 15 years, the coconut plantation has been declining by 25.6 percent or at a rate of 72 500 palms per year, due to mortality, urban expansion, felling for timber and others. Most of the reduction has occurred in the main islands of Tongatapu and Vavau.
- I.4.** Area under coconut
- Tongatapu : 19 268 ha (55 percent)
 - Vavau : 9 604 ha (27 percent)
 - Haapai : 6 476 ha (18 percent)
- Total Area : 35 347 ha

I.5. Contribution to the Economy

For many years, coconut is the main export commodity. With the closure of the coconut oil mill, only mature coconut export is still maintained. The export earnings from coconut export show a major increase in previous years. However, there are only a few exporters of whole/mature coconuts.

I.6. Coconut Production

The total annual nut production is about 29.4 millions. If all agricultural land is harvestable then the potential production for the country is 15 000 tonnes.

I.7. Coconut Age Profile

Young palms (less than 10 years old) account for 5 percent of the total coconut population. Bearing palms (10 – 60 years old) account for 50 percent and senile palms (over 60 years old) account for 45 percent.

I.8. Factors Affecting Coconut Production and Productivity

These include senility of the palms, varieties, poor agricultural management practices and natural calamities like low rainfall.

11. Policies, Programs and Activities to Promote Coconut Farm Productivity and Increase Farmers' Income

II.1. While Coconut Replanting is recognized as the key to future sustainability of the coconut sector in Tonga, there is no official Coconut Replanting Programme with a specific budget appropriation by the Government. However, the Ministry of Agriculture, Food, Forestry, and Fisheries has indicated an annual coconut replanting target of 600 hectares or an estimated 100 000 palms/seedlings to be field-planted.

III. Coconut Processing

III.1. Because of the low price of coconut oil in the early 1990's, the oil mill in Tonga stopped its operation in 1993.

III.2. The main marketing activity is the export of whole mature nuts to New Zealand and Australia, as well as mature nuts and young tender coconuts for drinking in the local market.

III.3. The development of non-traditional coconut products like virgin coconut oil is still in its infancy. The Tonga National Youth Congress (an NGO) has undertaken a business project on the processing and export of virgin coconut oil using the Direct Micro Expelling (DME) Process. The volume of production is still small but there is very good potential for expansion. Technical assistance for a scaling-up the VCO processing technology, Good Manufacturing Practices (GMP), and quality control techniques/assurances is desired.

III.4. A small entrepreneur producing VCO via the fermentation process and selling the VCO with scent/perfume as body and hair oil in the local hotels and duty free shop is apparently doing good business and has plans for expansion.

III.5. No coconut cooking oil is available in the local store or supermarket. Most of the cooking oil is imported like canola, soybean oil, palm oil and others. There is therefore opportunity to process coconut cooking oil at a competitive price to similar or lower than the retail price of imported cooking oil.

III.6. Since only mature and young coconuts are traded, there is no copra production in the country.

IV. Coconut Product Utilization and Marketing

- IV.1.** With a total nut production of about 80 million and a total population of about 100 000 people in Tonga, the total household consumption is estimated at 30 million nuts.
- IV.2.** Excess nut production from 2.217 million palms not required for domestic consumption is estimated at 55 million nuts per annum. There is therefore a raw material resource base for product processing and value-addition. The only trading is on the export of dehusked mature coconuts and domestic sale of both young coconuts for drinking and household use. A small quantity is used for the emerging virgin coconut oil processing business.

V. Recommendations

- V.1.** While Tonga’s Ministry of Finance and National Planning has come up with the Tonga Strategic Development Framework” (TSDF) 2011 – 2014, it is recommended that a specific and more focused Coconut Sector Strategy and Development Plan be developed to guide and generate support for the development of the coconut industry in Tonga. Technical assistance in the formulation of the strategy design which should be participatory and evidence-based may be provided.
- V.2.** To promote evidence-based policy formulation and development planning for the coconut sector, an Agricultural Survey is necessary. It may be noted that the last survey was carried out way back in 1982. It is desirable that the Government of Tonga with the assistance of international donor agencies undertake this Agricultural Survey for effective planning and programme implementation.
- V.3.** While some research work have been done on the collection of coconut varieties in the past, it is recommended that a varietal screening research be conducted to support the local and export market for young tender coconut, mature nuts and for the emerging enterprises such as virgin coconut oil and others.
- V.4.** In line with the Ministry of Agriculture’s objectives and priorities as spelled out in its Management Plan for 2012 – 2013 which includes, among others, increase in production of local produce for food security and for export, import substitution and sustainable income generating activities for the rural communities, a Coconut-Based Cropping and Diversification Programme including Livestock Integration in Coconut Farms must be pursued. Support for the strengthening of the extension delivery services in the coconut sector through capacity building and practical training programmes must be provided.

- V.5.** Discussions with the Chairman and the General Manager of Tonga Forest Products, Ltd., a government-owned saw milling facility has revealed that if and when a massive coconut replanting were in place, the Company may be able to undertake coconut logging and saw milling for commercial coconut wood/lumber production. Technical assistance on the appropriate machineries and proper training of saw mill operators and technicians will certainly promote more efficiency and success in the operation. Appropriate market studies in the domestic and export demand for coco wood/lumber for housing and other applications including furnitures for export is also recommended.
- V.6.** In the area of coconut processing, the existing technology used by the Tonga National Youth Congress and other VCO producers should be scaled-up for greater efficiency and economic viability. Technical assistance on this regard is recommended including training on good manufacturing practices to ensure good quality standards.

Coconut product diversification with virgin coconut oil, including the production of coconut cooking oil, coconut oil based soap and others for domestic market must be pursued. However, as in the case of any economic venture, a thorough project study must be made to ensure technical and economic feasibility of the enterprise.

Country: F I J I

I. Coconut Production

- I.1.** Total coconut plantation in Fiji is estimated at 10 million as scattered coconut palms and as a plantation crop which covers an area of approximately 65 000 hectares.
- I.2.** Around 70% of Fiji's coconut palms are more than 100 years old and are of the Fiji Tall Variety while 6% of the coconut tree population is expected to be about 50 years old, comprising about 4 000 ha each of Fiji Tall and Malayan Dwarf.
- I.3.** Coconut Hybrid varieties make up 10 percent of the coconut tree population and cover up to 2 000 ha while coconut trees of mixed varieties comprise 14 percent of total population and are a little under 30 years old.
- I.4.** The average nut production is 25 - 30 nuts per tree per year for older trees while younger palms below 40 years yield around 50 - 60 nuts per tree per year. Copra yields range from 1 to 2 tons per hectare depending on variety, age of palm, soil fertility, and farming system adopted. Established coconut producing areas are concentrated in the Eastern Division, the Northern Division and the Coastal areas of the main islands (Viti Levu).
- I.5.** Copra production continued to decline in the past five decades dropping from around 41 000 tonnes in the 1950s to less than 7 000 tonnes in 2012. This drastic drop in copra production from the 1950s has affected the lives of an estimated 100 000 farmers and rural dwellers in coconut growing areas. Efforts by government to revive the industry is recognized as a priority.
- I.6.** Reasons for the reduced coconut production trend include: distance from the market with high transport/freight cost, , scarcity of labour and low returns from copra; natural disasters; expiring land leases; industrial development; coconut timber harvesting from senile palms, and higher returns from more lucrative shorter term crops like dalo and yaqona.

The scarcity of labour and low returns from copra has over the years shifted the bulk of copra production from large producers (estate owners-80 percent) to small - holder producer who are now collectively producing the bulk of copra production, a swap from around 20 percent in yester years to 80 percent of production in recent years.

Nevertheless, it is recognized that the recent upward trend in coconut product diversification should generate a significant increase in replanting, new planting and overall coconut diversification effort in the near future of the Coconut Industry if Fiji.

- I.7.** In Fiji about 33% of the coconut production is converted into copra while rest is utilized in the preparation of food for domestic purpose and in small quantity for making coconut cream. The annual coconut production in Nut and Copra Equivalent is shown in Table 1.

Table 1. Annual Coconut Production in Nut and Copra Equivalent

	Annual Nut Production (in million nuts)	Annual Production in Copra Equivalent (MT)
2008	150	25 000
2009	270	45 000
2010	100	16 666
2011	165	27 500
2012	250	41 666

Fiji's nut to copra conversion ratio is 6 nuts: 1 kg copra

II. Policies, Programmes and Activities to Promote Coconut Farm Productivity and Increase Farmers' Income

- II.1.** The government through its initiative in reviving the ailing coconut industry has formed a Coconut Industry Task Force which is chaired by the Permanent Secretary for Finance. The Coconut Industry Development Authority (CIDA) has been integrated/merged with the Extension Division to allow for a better coordination in the overall implementation of the coconut based crop diversification programme.
- II.2.** There is a Crop and Livestock Diversification Programme under coconut which is recognized as a way forward in order to maximize return from the current coconut covered areas.
- II.3.** The Government of Fiji has recently (January 2013) launched the One Million Coconut Seedlings Planting Programme. This initiative is targeted to raise the awareness of the importance of coconut replanting/planting at the community level. To accelerate coconut replanting and planting programme, the government is working on the introduction of replanting subsidy for farmers to motivate replanting of coconut in new areas. This should be finalized this year (2013) before Cabinet endorsement.
- II.4.** The Government has approved a funding support of USD 370 000 to ensure achievement of targeted replanting programmes and completion of the Whole Nut Processing Pilot (Demonstration) Plant at the Taveuni Coconut Research Center (TCC).

Encompassed in the 2012-2015 Coconut Development Programme Action Plan are:

- A. The establishment of a nursery for 123 000 nuts to be ultimately distributed to farmers.
- B. The conduct of 30 farmer trainings on all facets of the coconut industry in a concerted effort.
- C. Setting up of 5 new VCO sites and construction of 20 copra driers.

II.5. It is recognized that Coconut Rehabilitation in Fiji can only be successful through intercropping and livestock integration. The return from crops makes coconut a viable commodity. Coconut stand alone is not viable if copra is the only end product. Ministry of Ministry of Agriculture, Fisheries & Forest, and Provincial Development believes that livestock and crop Integration will not only enhance soil fertility but will also assist in weed control which on the other hand will facilitate the collection/gathering of coconuts.

Ministry of Agriculture, Fisheries & Forest, and Provincial Development has also indicated that it is not viable to apply fertilizer in smallholder coconut from due to excessive price of agro inputs and low returns from coconut. The introduction of coconut diversification programmes through intercropping and livestock integration approaches is believed to indirectly enhance soil fertility.

II.6. Promotion of VCO production, handicraft and other value added products is gaining momentum and fetching a better return for farmers especially the womenfolk.

Commissioning of the Whole Nut Processing Centers will entail production of VCO, husk, coconut water & shell products. It was indicated that a Feasibility Study has been done by FAO in 2008. Plant Protection collaboration with SPC/Koronivia Research Station Collect parasites, build up biological control population, field release of control and gauge effectiveness. Coconut Genetic Resource Survey Joint study between MPI/SPC. Began 2006 and ongoing

III. Coconut Processing

III.1. Production and Export of Traditional Coconut Products

The main coconut product in Fiji is copra, all of which is utilized in the country. All coconut meal produced is also used locally for animal feed formulation. Farmer's copra are sold to one of the two main mills for coconut oil production and small biofuel plants established in the Maritime islands, the bulk of which ends up for export while a portion is used locally for the manufacture of soaps, detergents, body oils and food. Table 2 shows the volume of production of various coconut products/by-products and their export value.

Table 2. Production and Export of Traditional Coconut Products

	Production (MT)	Exports (MT)	Production (MT)	Exports (MT)	Production (MT)(Oct)	Exports (MT)(Oct)
Copra	13 192	Nil	10 316	Nil	5 842	Nil
Coconut Oil	6 763	6 152	5 900	4 423	3 329	3 100
Copra Meal	4 047	Nil	3 301	Nil	1 811	Nil
Coconut Milk/Cream	41 897	1 920	48 271	2 880	50 853	5 760

Source-FBOS 2012

III.2. The volume of coconut oil used domestically has noticeably increased as a result of the production and marketing of coconut based products. An obvious example is the local soap manufacturing company, Ocean Soaps Limited, which has secured the Pacific regional market for the marketing of its coconut based products. Consequently, the increase in its output/market outlet will concurrently result in an increase in coconut oil consumption by the company.

Table 3. Fiji's Coconut Oil Mills and Their Capacity

Name	Capacity
Copra Millers Fiji Ltd	24 MT
Ocean Soap	8 MT
Biodiesel Group Fiji Ltd	5 MT
Niu Industries	2 MT
Koro Biofuel	2 MT
Cicia Biofuel	2 MT
Rotuma Biofuel	2 MT
3 Other Mills (Vanua Balavu, Gau, Lakeba)	6 MT
TOTAL	51 MT

III.3. Figures for the production of non-traditional coconut products and export of downstream value added products like coconut shampoo, coconut body cream and hair conditioner are not available at the Fiji Bureau of Statistics.

However, it was indicated that Mr. Garry Tarte of Wainyaku Estate in Taveni is the only Certified Organic producer of Virgin Coconut Oil. A total of 400 tons of Organic Virgin Coconut Oil is produced and exported annually from his own nuts. This can be valued at US\$ 2m in return as it is being sold at US\$ 5.00 per liter in his export market. He is intending to increase production by outsourcing coconuts from his neighboring farm, but the recent cyclone Evans had a detrimental effect on production.

III.4. There is concerted effort by the Government to reduce dependency on fossil fuel imports. This government endeavour has yielded the formulation of rural development policies that support the establishment of a number of mini biofuel mills in the outer islands. It is estimated that the Koro Biofuel, Cicia Biofuel and Rotuma Biofuel Projects has the capacity to produce 2 MT of coconut biofuel (Filtered Crude Coconut Oil). The mini mills use coconut oil to generate electricity for rural village lighting.

III.5. Number of Coconut Processing Plants and Their Capacities

There are seven (7) Coconut Oil mills with installed capacity of 11 040 (tons) and actual annual utilization of 5 842 (tons) as indicated in Table 3.

There is only one Coconut Cream processing plant with installed capacity of 60 000 (ltrs) and actual annual utilization of 51 000 (ltrs).

III.6. The growing popularity of VCO production and other coconut products and bi-product had triggered a subtle charge amongst coconut growers to either replant senile/logged palms or plant new areas.

III.7. Fiji can simultaneously expect a surge in planting and replanting of coconut trees in the near future as a ramification of recent investor interest in establishing a Tender Coconut Water Factory in Fiji and the setting up of a number of Bio Diesel mills on smaller islands.

IV. Coconut Product Utilization and Marketing

IV.1. Total estimated whole nut production is 250 million nuts per year, which is equivalent to 41 600 tons of copra if it is all dried. Out of the total nuts produced, approximately 35 percent is used for household consumption; 15 percent for copra, 5 percent for VCO production and around 45 percent are un-harvested due to various reasons like low prices of nuts/copra, difficulty in collecting the nuts and other reasons.

IV.2. A small percentage of Fiji's Crude Coconut Oil is used in the country for the processing of products like soap, detergents, and biofuels, while the bulk of it is exported.

IV.3. Average FOB Price of Major Coconut Products for CY 2009, 2010, and 2011.

The average FOB price of major coconut products per metric ton from 2009 to 2011 is shown in Table 4.

Table 4. Average FOB Price of Major Coconut Products, 2009 – 2011 (MT)

Commodity	2009	2010	2011
Copra (FJD)	546	652	802
Coconut Oil (FJD)	1428	1831	-

IV.4. Table 5 depicts the main traditional coconut product markets while non traditional – value added products such as VCO and body cream, end up mainly in the Australian, New Zealand and USA niche market outlets.

Table 5. Major Market Destinations for Traditional and Non-Traditional / Emerging Coconut Products In 2010

Commodity	2010
Copra	Export to Australia with a return of USD 0.2m
Coconut Oil including VCO production	Australia (RBD), Europe (Crude) Valued at USD 7m
Coconut Milk/Cream	New Zealand, Canada, Australia, Kiribati and USA

IV.5. The Government of Fiji has adopted the APCC Quality Standards of various coconut products like copra, virgin coconut oil, etc. as a part of the National Coconut Quality Standard. This was endorsed by the Cabinet and is expected to eventually elevate the quality of copra produced which in turn will have a positive effect on the quality of associated downstream products and these will ultimately result in better returns to both copra producers and processors.

IV.6. While there is tax charged on coconut products, there is no export fee imposed on coconut products to encourage expansion in this area by potential investors.

V. Recommendations

The Government of Fiji is apparently committed in its policies, programme planning, budgeting and over-all effort in revitalizing their coconut industry. Structural reforms have been instituted, and coconut rehabilitation programmes like the one million coconut tree planting/replanting programme, coconut-based cropping and livestock diversification programme, promotion of value-added coconut processing through the whole nut processing (training and demonstration) plant and specific funding support for these

programmes are concrete initiatives towards coconut industry development. It is therefore essential that the Government of Fiji gets the technical assistance that its needs to ensure success of its policies and programmes.

- V.1.** While the relevant coconut productivity and rehabilitation programmes are in place and are on-going, it is recommended that technical assistance be provided on coconut varietal improvement through coconut genetic resource survey, coconut breeding research and proper selection methodology to ensure that only the best quality planting materials/seedlings are planted in the field. It was reported that there is an on-going Coconut Genetic Survey jointly conducted by the Ministry of Agriculture, Fisheries & Forest, and Provincial Development (MAFFPD) and the Secretariat of the Pacific Community (SPC). This should be pursued.
- V.2.** Technical assistance on the production of Technical Manuals on the genetic qualities and production potential of various coconut varieties for specific use/purpose is recommended. The Technical Manuals should also include the guidelines on proper mother palm – seednut – seedling selection methodology. These manuals will be useful for the training of coconut extension workers and coconut farmers.
- V.3.** The production of Technical Guides, Posters, Leaflets on Coconut Based Cropping Systems, including Livestock Integration in Coconut Farms highlighting the Good Agricultural Practices in the management of the intercrops/cash crops with coconuts is recommended. Information materials on copra quality improvement techniques, hot-air copra dryers, the processing of value-added coconut products like virgin coconut oil, coconut flour, coconut water, coconut husk products and others should also be produced. These information materials will be useful in the training of farmers, housewives, entrepreneurs and should create greater awareness in the technologies and the economic opportunities for coconut product diversification.
- V.4.** A specific request was made for technical assistance on the IPM of major coconut insect pest, *Graeffea crouanii* (Le Guillou). It has been reported that this pest prefers coconut palms over other host plants in the palm family and has become one of the destructive coconut pests in Fiji. It is recommended that technical assistance be provided to the Extension and Training Division of the Ministry of Ministry of Agriculture, Fisheries & Forest, and Provincial Development, Department of Agriculture to undertake a farmer-participatory integrated pest management (IPM) approach using non-formal extension methodology, and a farmer-driven research to manage pest. Technical assistance to pursue research on the identification, collection, introduction, mass rearing and field release of bio-control agents is likewise recommended.

V.5. Another specific request is technical assistance on the proposed project on “Coconut Value-Addition through Rural Community Based Participatory Research and Extension Approach: Product Development, Diversification and Promotion. The proposed Whole Nut Processing (and Demonstration) Center likewise needs technical assistance to ensure that the appropriate technologies as proven in more developed countries are properly adopted, including good manufacturing practices. The technical and economic feasibility of the Whole Nut Processing Center must be carefully studied to ensure sustainability of the project. The SPC-EU-IACT Project should be able to provide technical and marketing assistance to this initiative.

Country: VANUATU

I. Coconut Production

- I.1.** Approximately 24 thousands households or 69 percent of those engaged in agricultural activities are reported to have coconut sub-holdings. These sub-holdings are composed of 39 348 land parcels comprising 96 000 hectares. An estimated 9.7 million coconut trees were planted in these sub-holdings, about 91 percent are bearing trees. 82 percent of the bearing trees aged between 5 – 49 years while 18 percent were estimated to be 50 years and over.

Table 1. Age Profile of Coconut Trees in Vanuatu

Age of Trees	Total Number of Trees in Thousands	Total Bearing Trees in Thousands
0 – 4 years	165	54
5 – 19 years	2 149	1 910
20 – 29 years	3 185	2 916
30 – 49 years	2 444	2 261
50 years and over	1 726	1 603
Total	9 668	8 744

I.2. Copra Production

Copra production provisional figures for December quarter 2012 decreased in volume by 50 percent from 11 291 to 5 666 tonnes over December quarter of 2011.

Copra producer's price recorded a decrease by 36 percent from Vt 46 000 to Vt 29 000 in the December quarter of 2012 over the corresponding period in 2011 and 19 percent over the previous quarter.

Table 2. Exports of Copra, Coconut Oil and Coconut Meal from Vanuatu in MT (2010 – February 2013)

Year/Quarter	Copra	Coconut Oil	Coconut Meal
2010	12 133	10 325	5 232
2011	13 596	12 000	6 917
2012	16 336	10 011	6 082
2011 1 st	3 768	3 461	1 172
2 nd	4 526	1 956	2 534
3 rd	3 033	2 299	2 137
4 th	2 269	4 284	1 074
2012 1 st	6 188	1 674	1 079

2 nd	4 588	2 696	1 628
3 rd	3 791	2 423	1 708
4 th	1 769	3 218	1 667
Year/Quarter	Copra	Coconut Oil	Coconut Meal
2012 Jan	2 071	900	616
Feb	664	714	308
Mar	3 454	60	155
April	350	992	513
May	1 656	890	428
June	2 583	883	688
Jul	1 001	1 132	737
Aug	1 680	24	643
Sep	1 109	1 267	329
Oct	1 003	1 791	1 009
Nov	-	9	-
Dec	766	1 418	658
2013 Jan	1 274	350	491
Feb	119	936	709

Source: Department of Customs and Inland Revenue

II. Policies, Programmes and Activities to Promote Coconut Farm Productivity and Increase Farmers' Income

- II.1.** The new leadership in the Government of Vanuatu, together with the appointment of the new Minister of the Ministry of Agriculture, Livestock, Forestry, Fisheries and Biosecurity, has indicated that after a series of consultations with the private sector and other stakeholders, a National Policy Framework for Agriculture and a Corporate Plan up to 2020 will be endorsed by the Cabinet soon. A review of the Overarching Productive Sector Policy – OPSP (2012 – 2017) shall therefore be undertaken.
- II.2.** The Overarching Productive Sector Policy – OPSP (2012 – 2017) has identified three (3) policy goals, namely:
- 1) Revitalize the productive sector, including strengthening local food production and marketing systems;
 - 2) Improve farm incomes and livelihoods with particular focus on gender equity and vulnerable groups; and
 - 3) Support low carbon, equitable, broad-based sustainable economic growth and improve the balance of trade.

It has also identified 8 priority thrusts, namely:

- 1) Sustained Access to Markets;
- 2) Improved Product Quality and Safety;
- 3) Improved Production and Productivity;
- 4) More Processing and Value Adding;
- 5) Environmental Services and Resilience;
- 6) Infrastructure Development;
- 7) Capacity Building and Training;
- 8) Policy Development, Coordination and Monitoring.

II.3. Two major directives of the new Minister of Agriculture that will have impact on the coconut sector involves the:

- 1) Re-establishment of the National Extension Service by 2014; and the
- 2) Setting-up of the National Cooperative or Farmers Associations by 2014.

II.4. The Government of Vanuatu has conducted a National Census in 2007 and is currently undertaking (2013) an Agriculture Survey by the National Statistics Office with the support and technical assistance of the European Union. This survey should objectively be useful in the formulation of evidence-based policy and agri-development programs.

II.5. There is no official National Coconut Rehabilitation Programme. However, the Vanuatu Commodities Marketing Board (VCMB) has been mandated to develop and promote the marketing of primary agricultural commodities (including copra and coconut oil) in collaboration with the Ministry of Agriculture, Livestock, Forestry, Fisheries and Biosecurity. VCMB's operation on coconut was mainly limited to trading and provision of price subsidies to cushion the fluctuating effects of commodity prices in the world market. The mandate and role of the VCMB is currently being reviewed. There was therefore no significant agri-development programme in the coconut sector. Some coconut research work, however, were undertaken at the VARTC in collaboration with CIRAD but CIRAD has also ended its collaborative research work with VARCT some years ago.

III. Coconut Processing

III.1. The CL Oil Mill crushes 1 800 to 2 000 MT of copra per month for export of crude coconut oil to Europe.

Socometra (UNELCO) also crushes approximately 35 to 50 MT of copra into oil and processed into coconut biofuel for use by the UNELCO, the main electricity company in Vanuatu with its main generators in Port Vila, Vanuatu.

The Vanuatu Coconut Products Limited (VCPL) crushes approximately 300 tons of copra per year to produce washing/laundry, bath soap, and a variety of body and cooking oil.

III.2. The coconut processing technology in Vanuatu is limited to crushing of coconut oil, and processing of coconut oil into biofuel. The production of soap and other products are based on the knowledge and experience within the company involved in production of these products.

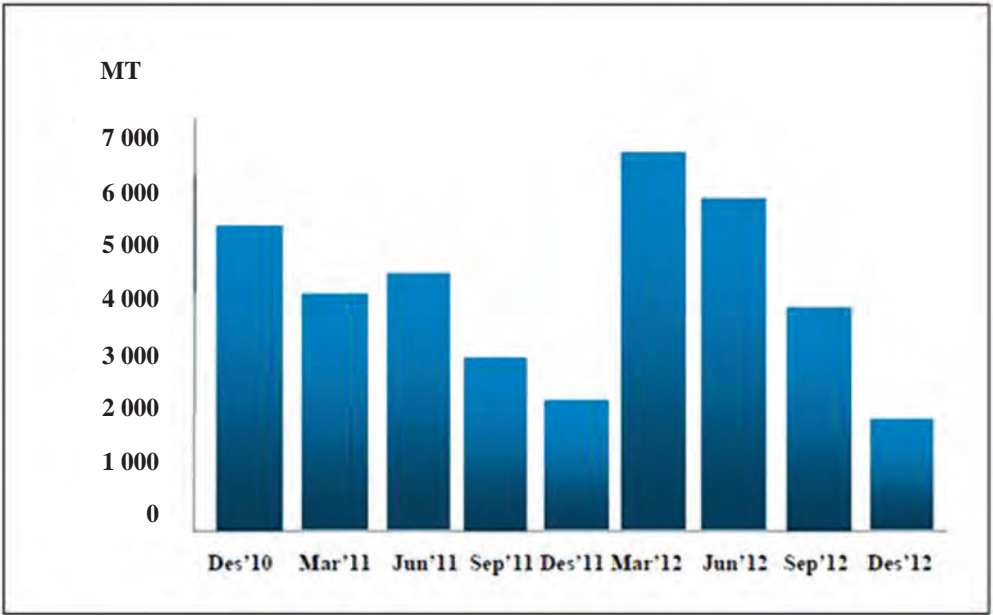
IV. Coconut Product Utilization and Marketing

IV.1. In the December quarter of 2012, copra exports declined by 22 percent or 500 tons in quantity from 2 269 to 1 769 tons over the December quarter of 2011.

Copra exports in value declined dramatically by 39 percent over the same period in 2011 from Vt169 million to Vt102 million in December quarter of 2012. This decline was correlated by the fall in copra average price at 22 percent from Vt 74 000 to Vt 58 000 over December 2011, and this is supported by world market price decreases.

Copra export receipts constituted 9 percent share of the total domestic exports value in the December quarter of 2012.

Fig.1. Copra Exports, December Quarter 2010 to December Quarter 2012 (Quantity in MT)

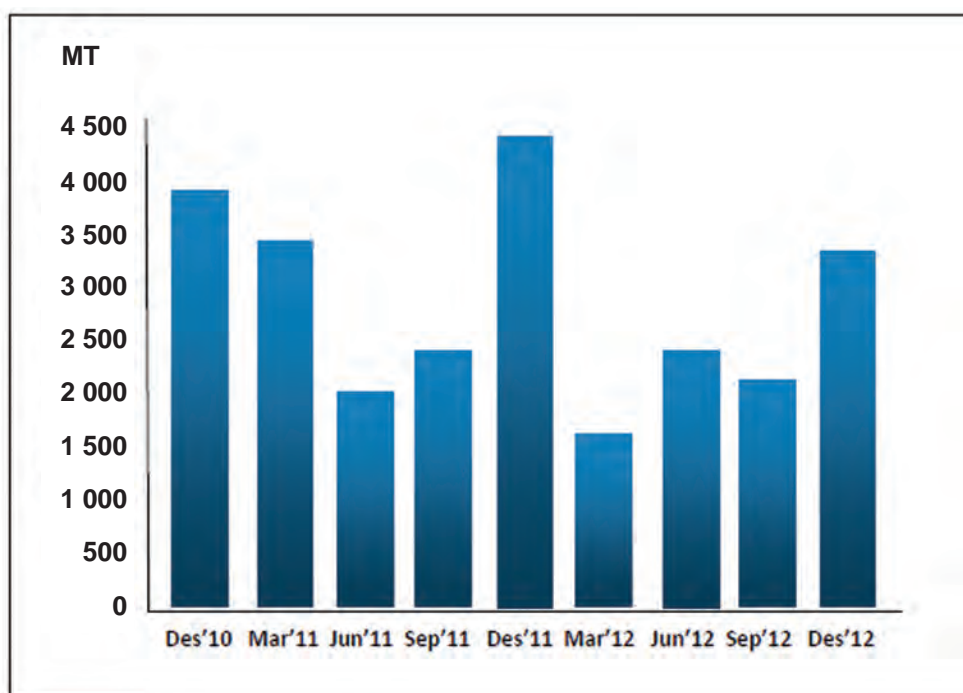


IV.2. Coconut oil exports decreased in quantity by 25 percent over the December quarter of 2011 from 4 284 to 3 218 MT in the December quarter of 2012. However, it recorded an increase of 33 percent when compared to September quarter of 2012.

The reported value of coconut oil exports decreased by 37 percent over December quarter of 2011. However, there was an increase of 27 percent over the September quarter of 2012. The decreases in exports value in December quarter of 2012 reflect lower export price.

Coconut oil receipts constituted 30 percent share of total domestic export value in the December quarter of 2012.

Fig.2. Coconut Oil Exports, December Quarter 2010 to December Quarter 2012 (Quantity in MT)



IV.3. Table 3 shows the value of exports for copra, coconut oil and coconut meal in Vanuatu (2009 – February 2013 in Million Vatu)

Year/Quarter	Copra	Coconut Oil	Coconut Meal
2009	569	275	0
2010	579	933	54
2011	1 065	1 592	87
2012	1 087	1 162	92

2011 1 st	306	432	14
2 nd	385	292	33
3 rd	205	302	26
4 th	169	565	14
2012 1 st	434	208	14
2 nd	298	317	26
3 rd	253	280	28
4 th	102	356	23
2012 Jan	139	113	8
Feb	59	86	4
Mar	236	10	2
April	26	114	7
May	112	98	7
Year/Quarter	Copra	Coconut Oil	Coconut Meal
2012 June	160	105	11
Jul	74	137	14
Aug	131	3	10
Sep	48	140	5
Oct	71	197	14
Nov	-	1	-
Dec	31	158	9
2013 Jan	37	38	7
Feb	40	49	10

Source: Department of Customs and Inland Revenue

V. Recommendations

- V.1.** There is a need for increased and sustainable coconut production and coconut farm productivity in Vanuatu to ensure food security among the coconut farming households and meet the demands of the processing industry and the trade sector.

In view of the senility of coconut palms which is causing a decline in coconut production, a systematic National Coconut Replanting Programme is deemed necessary.

- V.2.** Rehabilitation of the coconut sector should involved coconut-based cropping system and livestock integration to ensure optimum productivity of the coconut farms and contribute to the economic livelihood of the farming families. The coconut palms should therefore be inter-planted with cash crops or food security crops including fruit trees and industrial crops like cacao and coffee. Focus should be on coconut-cropping systems and coconut-livestock integration for which Vanuatu has a comparative advantage.

- V.3.** To help ensure strong backward linkages to the rural coconut farming communities, value-added coconut processing enterprises such as virgin coconut oil production, must be developed and supported to meet domestic market demand and export opportunities.
- V.4.** Technical assistance and support for market and cost-benefit analysis or project feasibility studies must be provided to potential groups of entrepreneurs prior to advocating new value-added coconut processing projects.
- V.5.** As in the case of Samoa, the Government of Vanuatu, through its Ambassador to the EU, has proposed for a Coconut Processing Project following the “Whole nut Concept” where an integrated coconut processing plant will be established. As whole nuts will be purchased and delivered to the processing plant, several products are expected to be processed, namely activated carbon from coconut shell charcoal, coconut milk/cream from the kernel, fiber and other coir-based products from the husk and packaged coconut water. In the spirit of collaboration, other international donor agencies may provide technical assistance in the project as needed.
- V.6.** Capacity building and training programmes for coconut subject matter specialists/extensionists, coconut farmers and coconut processors must be provided with technical assistance from international development or donor agencies.

This will include technologies in coconut replanting, varieties screening, seedling selection, coconut-based cropping systems, good agricultural practices and others. In the processing sector, technologies on Good Manufacturing Practices (GMP), HACCP and ISO Certification, Organic Certification, and product quality standards must be provided.

The feasibility of establishing a centrally accredited product testing laboratory facility should be pursued.

- V.7.** To ensure efficiency and effectiveness in programme implementation, the Government should re-establish the National Extension Service. The extension delivery services to coconut farmers and women folks in the coconut farming communities must be strengthened.
- V.8.** The formation of coconut producers associations or cooperatives must also be facilitated/supported. This should ensure inclusive development among the rural coconut farming communities and at the same time promote greater efficiency and effectiveness in the delivery of extension services and capacity building activities.

Country: SOLOMON ISLANDS

I. Coconut Production

- I.1.** Data from the Commodities Export and Marketing Authority (CEMA) has indicated that the total area under coconut cultivation in Solomon Islands is around 58 938 hectares with an estimated 9 to10 million trees planted. The major coconut provinces in the Solomon Islands are Western, Isabel, Central Islands, Malaita, Guadalcanal, Makira and Temotu.
- I.2.** Nearly 65-70 per cent of the total population directly depend on the coconut industry for their economic and social well-being. According to the Central Bank Solomon Islands (CBSI) 2011 Annual Report, the coconut industry contributed 7% to the national export earnings of the country. The value of copra and coconut oil export has doubled in 2011 with USD216 million compared to US\$ 98 Million in 2010.
- I.3.** The copra production data by province from 2006 to 2011 is shown in Table 1.

Table 1. Solomon Islands: Production of Copra by Province (2006 – 2011)

Province	2006	2010	2011
Western	3 325	4 682	
Smallholder	3 325	4 682	
Plantation	-	-	
Santa Isabel	1 437	957	
Smallholder	1 437	957	
Plantation	-	-	
Central Islands	4 460	3 745	
Smallholder	4 460	3 745	
Plantation	-	-	
Guadalcanal	5 970	6 815	
Smallholder	5 970	6 815	
Plantation	-	-	
	3 140	6 815	
Malaita	3 140	6 815	
Smallholder	-	-	
Plantation	1 520	2 011	
Makira	1 520	2 011	
Smallholder	-	-	
Plantation	500	76	
Temotu	500	76	
Smallholder	-	-	
Plantation	915	2 851	
Choiseul	915	2 851	
Smallholder	-	-	
Plantation	21 267	25 389	
Total	21 267	25 389	35 565
Smallholder	-	-	35 565
Plantation			

Source: CEMA

I.4. There are several factors affecting the level of coconut production in the country. These include:

- increasing number of senile coconut trees and no replanting programme,
- low and unstable local prices of copra and coconut oil,
- scattered nature of the islands requiring efficient land transportation network, shipping and infrastructure,

It was indicated that the common practical problems encountered by farmers regarding coconut production and farm productivity in Solomon Islands currently are closely related to urban migration by young people which reduces labour for coconut production. Copra processing is a laborious task and not worth it when the price of copra is only less than US\$ 2.00 per kilogramme. The downstream processing and value addition component of the industry has not taken off strongly enough for farmers to reap better prices of other products from coconut.

I.5. The area under coconut by province is shown in Table 2.

Table 2. Total Area under Coconut Cultivation

Province	Hectares	% HA	Planted Palm Trees
Western	14 454	25	2 093 000
Isabel	5 230	9	817 000
Central	7 909	13	1 287 000
Guadalcanal	12 758	22	1 825 000
Malaita	11 980	20	1 980 000
Makira	3 555	6	540 000
Temotu	3 032	3	470 000
Solomon Is	58 938	100	9 012 000

Source: Commodities Export and Marketing Authority

I.6. In 2013, it is estimated that more than 50 percent of the country's coconut trees have already reached senile stages of growth and therefore, are expected to have declining rate of production per tree.

II. Policies, Programmes and Activities to Promote Coconut Farm Productivity and Increase Farmers' Income

II.1. The Government of the Solomon Islands has developed a National Coconut Sector Strategy. This initiative involved more than 100 stakeholders including farmers, processors and support institutions from the Western, Malaita and Guadalcanal Provinces. The Ministries of Agriculture and Livestock, Commerce, Industry, Labour and Immigration, Rural Development and National Planning and Aid Coordination were also involved. The main technical agency providing support to the Solomon Islands Government for participatory strategy design was the International Trade Centre (ITC).

In conjunction to the National Coconut Sector Strategy, the Government of the Solomon Islands has formed a Coconut Sector Industry Secretariat (SICIS) composed of stakeholder-elected members representing private and public institutions. This was the first time a national private public body composed of actual beneficiary representatives (including farmers) has been given the mandate by the Government to represent a sector. Since 2009 the SICIS has worked on a voluntary basis to lead the strategy development process and plan for implementation using ITC's market-led participatory approach. The strategy focuses on capitalizing in existing opportunities for improved income generation for the rural areas as well as in promoting investment for the development and strengthening of the processing and value added industries.

- II.2.** The Ministry of Agriculture and Livestock has an approved 2013 development budget of over SBDUS\$ 16.7 million towards the rehabilitation of the coconut industry in Solomon Islands. In the 2013 MAL Annual Work Plan, this budget allocation's top priority will be the implementation of the components of the National Coconut Strategic Plan and the Coconut Replanting programme. The Coconut Replanting Programme has a target to achieve a total area of 5 000 hectares of coconut over a duration of 10 years (2013-2022) period. The Ministry is prepared to push the National Coconut Replanting Programme. However, the details of the replanting scheme including the replanting technologies have yet to be devised.

III. Coconut Processing

- III.1.** Over the years, coconut processing in the Solomon Islands has been mainly on copra for export. However, there is high potential and many opportunities for coconut downstream processing and value addition in the country. Already a few private initiatives have taken the opportunity and are moving into downstream processing and value addition. These initiatives include the Blue Lagoon Soap firm, Solfish Coconut Oil Mill, Solomon Tropical Products Ltd, Mala Soap, the Auki Biofuel pilot project and others. There are also similar operators producing Virgin Coconut Oil around the country.

- III.2.** Table 3 shows the export of copra, its destination and volume (2006 – 2011).

Table 3. Export of Copra: Destination, and Volume (2006 – 2011)

Country of Destination	2006	2007	2008	2009	2010	2011
A. Volume in MT	19 830	19 302	41 810	21 212	23 466	35 565
Uk	11 096	-	-	-	-	-
Others	8 734	19 302	41 810	21 292	23 466	35 565
Other Countries	-	-	-	-	-	-
Singapore	-	19 302	41 810	21 292	23 466	35 565
Japan	8 734	-	-	-	-	-
Philippines	4 205	n.a	19 624	6 480	11 235	30 857
Others	32 536	47 013	155 743	52 166	89 100	216 000

III.3. Table 4 shows the export of coconut oil, its volume and value (2006 – 2011).

Table 4. Export of Coconut oil, Volume and Value (2006 – 2011)

Year	Volume (MT)	Value (SBD\$000 FOB)
2006	2,500	10 000
2007	741	21 089
2008	505	21 678
2009	634	22 202
2010	124	1 123
2011	470	4 355

Source: Ministry of Finance

III.4. Table 5 shows the quarterly export prices of copra (2006 – 2011) SBD US\$ per MT.

Table 5. Quarterly Export Prices of Copra 2006-2011(SBD\$ per MT)

Month	2006	2007	2008	2009	2010	2011
1 st Quarter	1 609	1 994	3 318	2 476	1 679	916
2 nd Quarter	1 580	2 407	3 504	2 501	1 980	951
3 rd Quarter	1 709	2 898	4 549	2 606	2 378	476
4 th Quarter	1 805	2 841	3 310	2 450	5 153	595
Average	1 676	2 535	3 670	2 508	2 798	735

Source: Ministry of Finance

III.5. The production of Virgin Coconut Oil (VCO) started a few years back in the Solomon Islands. The Kokonut Pacific, Solomon Islands is the major promoter and exporter of VCO in the country. Its aim is to provide remote island communities with the Direct Micro Expelling (DME) technology that enables them to produce pure virgin cold-pressed coconut oil on their farms for local markets and for export.

III.6. The Asian Development Bank (ADB) has provided funding and technical assistance to a Coconut Biofuel Project at Auki Power Station as a pilot demonstration on renewable energy and rural electrification.

The project used locally produced coconut oil (CNO) as a substitute for imported petro-diesel. The CNO used was analysed in on-site laboratory and then processed in a filtration unit to remove any residual water using a vacuum process. The CNO is then stored in a heated day tank. Heating the coconut biofuel prior to combustion is intended to minimize the risk of incomplete combustion caused by the higher viscosity of the CNO.

While the project report indicated technical and economic feasibility, the project has not been continued or commercialized after the pilot stage. There seems to be no sufficient source of coconut oil in the island.

Table 6. Production of VCO and Coconut Meal 2008 – 2012

Year	Nuts	Virgin Coconut Oil (Kg)	Coconut Meal (Kg)
2008	386 266	22 524	25 326
2009	802 248	47 872	52 659
2010	439 908	26 329	29 498
2011	1 219 950	78 958	82 581
2012	1 403 573	88 448	91 804

Source: Bob Pollard, Kokonut Pasifik

IV. Coconut Product Utilization and Marketing

- IV.1.** There is no data available for coconut utilization in the Solomon Islands. However, coconut is commonly used for making copra and for household consumption; some copra and coconut are converted into oil, with the remaining for other social and medicinal uses. Reports have indicated that approximately between 70-80% is used for copra making, 10% for household uses and 5 -10% for oil production and other uses.
- IV.2.** The main market destinations of Solomon Islands copra since 2007 is the Philippines. Crude Coconut Oil (CNO) and Virgin Coconut Oil (VCO) are mainly exported to Australia and New Zealand.

V. Recommendations

- V.1.** While the Government of the Solomon Islands has already put up a Coconut Strategy document, a Coconut Rehabilitation Programme with specific guidelines and incentives for farmers have yet to be devised. It is therefore recommended that programme guidelines be formulated to facilitate the proper utilization of the approved Government budget for the coconut sector.
- V.2.** The Coconut Rehabilitation Programme in the Solomon Islands should include not only replanting or planting of selected local coconut varieties but must also include coconut-based cropping systems or the intercropping of cash crops and food security crops including livestock integration. Strengthening of the Agriculture Extension Service is recommended to efficiently and effectively implement the Coconut Rehabilitation Programme.
- V.3.** To provide additional incentives to replanting or cutting of senile palms, commercial coconut wood utilization must be explored. This should provide for a diversification strategy away from forest timber and avoid degradation of the forest and depletion of forest resources.

- V.4. While copra is still the major coconut product being traded in the country, copra quality improvement strategy must be implemented. This may include the provision of hot-air dryers, proper technical guidelines and appropriate training on copra drying, setting-up of national quality standards on copra following the APCC code of standards for copra, and promotion of quality-based pricing among copra buyers and traders/exporters.
- V.5. There is a need to scale-up the operation of VCO processing in the country to ensure economic viability and sustainability. Technical assistance on this regard is recommended including training and capacity building on good manufacturing practices.

Assessing the economics and the scale of the operation of any coconut downstream project through an objective feasibility study should be undertaken to avoid unnecessary failures.

VALUE CHAIN ANALYSIS OF THE COCONUT SECTOR IN THE PACIFIC

1. Coconut Resource Base in the Pacific

The Pacific region is endowed with tremendous coconut based resources. The agro-climatic condition in the Pacific region is highly suitable to growing coconuts. Adverse conditions can lead to reduction in yields in certain periods of time lasting for two or more years but the coconut palms are so resilient to stresses due to climate change like drought, cyclones and flooding that they remain as the dominant crop in the Pacific landscape.

Because of under utilization and low prices, the region has a surplus of production including unharvested or uncollected nuts. Due to their remote locations and poor infrastructure facilities, many areas not readily accessible. Under these circumstances, it is obvious that the main motivation to harvest, collect or gather coconuts in the field is price. If the price of whole nuts or copra increases, the farmers and their household members respond positively and collect or gather the nuts for the market.

It is estimated that the Pacific region has a resource base of about 2.6 billion nuts per year (APCC Statistical Yearbook, 2011). However, given the low farm gate price, it is understandable that production data tends to be underestimated vis-à-vis actual production as thousand if not millions of nuts in the region are not harvested, collected or gathered in the field.

Coconuts remain valuable as a source of food and for other uses. The coconut as a crop is also valuable to the island nations as a natural resource adaptable to climate change and as a protection to sudden sea water intrusion, flooding, erosion and other stresses.

About 30 to 50 percent of the coconut palms in the Pacific region have passed their economic bearing age of 60 years and are therefore senile and are less productive. However, farmers have shown very little motivation in replanting their ageing or senile coconut palms. With low commercial value of their coconut harvest, there is not much reason for them to undertake coconut replanting. It is argued that it is only when the coconuts will have greater value that the farmers will find every possibility to maximize his yields and productivity.

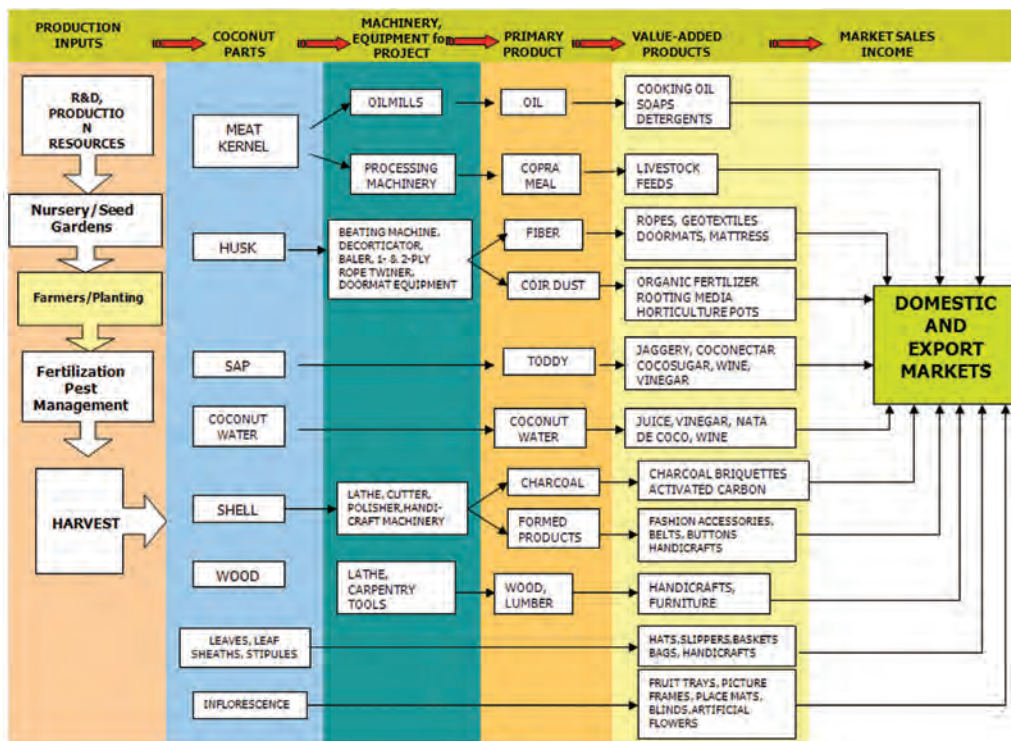
Most governments in the Pacific endeavour to assist the coconut farmers in their coconut replanting/planting programme but the availability of good varieties or quality planting materials or hybrids is limited. The coconut development road map of the government should therefore ensure the availability of quality materials to accelerate the replanting programme. To provide more incentives for replanting, adequate commercial incentives to add value to coconut as a natural resource base must be pursued. It should be recognized that there are tremendous possibilities to exploit the potential value-added products of coconut in the value chain.

2. Value Chain Concept and Value Chain in the Coconut Sector

The value chain as a set of interlinked value-adding activities should provide the opportunities to convert inputs into outputs which in turn add more worth of the product and help create competitive advantage. Identifying and analysing the value chain in the coconut sector should enable us to improve the value of the end product, promote quality and efficiency as well as competitiveness and profitability. Value chain analysis should therefore concentrate more on value creation, innovation, product development and marketing while supply chain analysis gives primary focus on cost reduction and efficiencies of supply.

Below is a graphical presentation of the supply and value chain of the coconut.

Coconut Industry: Supply-Value Chain



Source: APCC and PCA

3. Potential Value-Added Coconut Products in the Value Chain of the Coconut Sector in the Pacific

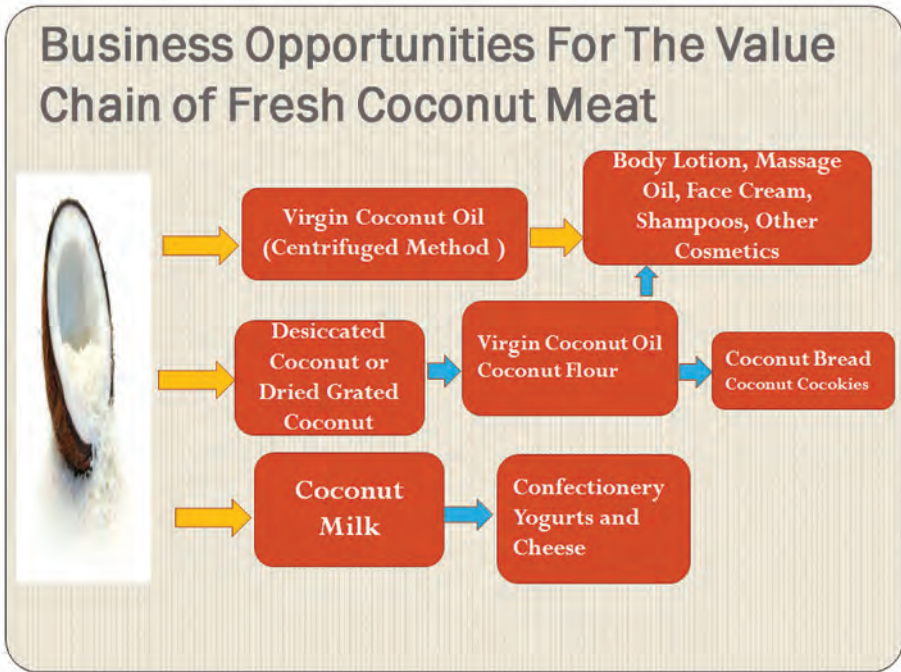
Copra and to some extent, crude coconut oil are still the main products that are traded in the Pacific region. There is very little value-addition and the Pacific region is viewed mainly as a source of raw materials. This makes the region vulnerable to the fluctuations of prices of vegetable oils in the global fats and oils market. Price volatilities in the last 30 or 40 years have left the small coconut farmholders to remain poor due to very low prices of copra. Copra production has in many instances, become unprofitable or non-competitive. There is therefore the challenge to move away from copra and add value to the coconut products.

The graphical presentation of the value chain of coconut shown in VI.2 suggests that the scale of commercial coconut processing and value addition in the Pacific region is extremely limited. The challenge therefore is to explore and produce more value-added coconut products rather than just copra. While there is really no data derived from actual survey, it is estimated that out of the total nuts produced, approximately 15 percent is utilized for household consumption; 50 percent for copra, 5 percent for VCO production, and around 30 percent are not harvested, gathered or collected in the field due to various reasons like low prices, difficulty in collecting the nuts in the bushes, remoteness of the farms, poor infrastructure and others. In other countries like Tonga, only mature and young coconuts are traded. The mature nuts are either sold in the local market or exported in New Zealand or Australia. There is no copra production or oil milling in the country. There is however, very little VCO production by an NGO involving the youth.

Given the very limited value-addition activities in the coconut sector in the Pacific region, the fundamental question should focus on how we can turn the whole coconut industry around from the current very limited value addition. Only under circumstances of more value addition can we expect that large quantities of the coconut materials in the region can be utilized more significantly to benefit the coconut farmers, including foreign exchange earnings for the country. However, investments in value addition should be market-led or demand-driven.

It is estimated that depending of the value of the end products in the export market, the average price to be paid for one whole coconut should be approximately 11 US cents if sold for coconut crude oil processing including copra meal, 33 US cents if sold for desiccated coconuts and 55 US cents if sold for the processing of coconut milk and water (Chand, V., 2012). An analysis on the value of raw and mature coconuts for processing into Virgin Coconut Oil (VCO) would reveal that at an FOB price of US\$ 5.00 per litre and on the assumption that 12 coconuts will produce one litre of VCO, the addition value of one coconut would be 42 US cents. Assuming a production cost of 5 US cents per coconut, the value of one whole coconut should be 37 US cents.

There is also economic potential to use the residue in the processing of VCO. This by-product can be further processed into coconut flour. A kilo of coconut flour can have an FOB price of US\$ 6 instead of just throwing it or using it as feed to livestock.



The husk can also be processed into coconut coir fiber for rubberized mattress, geotextiles for the control of soil erosion, and coconut pith for horticulture use as planting medium or as organic fertilizers. Coir fiber can fetch an average FOB price of US\$ 350 per metric ton, while coconut pith or cocopeat can fetch an average FOB price of US\$ 300 per metric ton.



Business Opportunities For The Value Chain of Coir Dust



Coco peat
Organic Fertilizers
Soil Conditioner
and ameliorant



The coconut shell can likewise be processed into charcoal and coconut shell charcoal-based activated carbon. Charcoal can fetch an average FOB price of US\$ 500 per metric ton while the average price of coconut shell based-activated carbon is US\$ 2 100 per metric ton. All these value-added products from the mature whole coconuts should increase the value of the raw material at the farm gate level.

Business Opportunities For The Value Chain of Coconut Shell



Granulated
Charcoal
Activated Carbon
Briquettes

In the current practice of traditional copra production, one ton of copra would require approximately 6 000 nuts or 6 nuts to a kilogramme of copra. Given an average price of US\$ 500 per metric ton, this will translate to only 8 US cents per nut, at the oil mill. In turn, the farm gate price will only be 5 or 4 US cents depending on the distance of the farms and the quality of the copra produced. At this price level, the farmers will not have much incentive to harvest or gather the coconuts, much less replant their senile coconut palms.

4. Cross Cutting Issues

The production of value-added coconut products and their exports using the value chain approach in coconut sector development in the Pacific region is influenced by several cross cutting issues. These include the availability of infrastructure and logistic services, appropriate technology and good management practices, market development, both at the domestic level and in niche markets outside the country.

As stated earlier, a great number of mature coconuts are not harvested, gathered or collected in the field due to the remoteness of the farms, lack of access roads, infrastructure like inter-island shipping, ports, trucking, warehouses and other logistic services. This is an area of great importance as we develop more access to both the domestic and niche markets.

Appropriate technology and good manufacturing practices must also be readily accessible to small and medium-scale processors and exporters. HACCP certifications including guidelines to avail of the opportunities and economic advantages of organic and trade fair certifications must also be readily accessible.

There is a growing awareness that coconuts are healthy with increasing demand and consumption of new and emerging products such as virgin coconut oil, coconut flour, coconut sap sugar, coconut milk and coconut water. While these products have already entered the mainstream market in the USA, Europe, Australia and others, very little volumes of these products are produced and used domestically in the Pacific region. There is therefore a need for more awareness raising on the health aspects of coconut products in the Pacific region and increase domestic utilization of coconut products. Both the domestic market as well as the niche markets abroad must be developed.

The price data reported by the countries for whole nuts and copra, or the raw materials for coconut processing indicate that the Pacific region remains relatively competitive when compared to other coconut growing countries in Asia. This is the main reason why the Pacific region has been a major supplier of raw materials to the Philippines, Singapore, Japan and other destinations.

While the raw materials in the Pacific region are comparatively low priced, attention must be given to ensure that the value-added products coming from the Pacific region must be competitive to those of other coconut producing countries. This analysis suggests that it seems unlikely that new opportunities are bright for crude coconut oil unless one has a special market like China, or unless the refined, bleached and deodorized (RBD) cooking oil to be produced

can compete with the much lower priced imports and competing products like palm oil, soybean oil and others.

The way forward may be in speciality virgin coconut oil and its derivative products for niche markets in New Zealand, Australia, USA and Europe including the domestic market. Women in Business in Samoa, Pure Fiji Ltd in Fiji, Tongai NGO called National Youth Congress are good examples of successful initiatives in value-added coconut products for niche markets.

Although there may be some opportunities to explore desiccated coconut, coconut milk, coconut shell charcoal briquettes and coconut shell charcoal- based activated carbon including coir products and coconut timber and wood processing, investments in these areas have to be thoroughly evaluated and location-specific project feasibility studies must be conducted to ensure competitiveness and sustainability. The need to scale up existing coconut processing ventures in the Pacific region should be given attention to ensure economies-of-scale, efficiency, better quality control, profitability and long-term sustainability.

VII. REGIONAL GAPS, COMMONALITIES AND RECOMMENDATIONS

The coconut sector in the Pacific region remains as an integral part of the way of life and food security to the majority of the rural population. As a crop, its natural habitat is mostly the coastal areas (2 to 5 kilometers from the sea) of the Pacific islands where it grows best and where other crops may not thrive as well as the coconuts do.

There is good potential for the rehabilitation and development of the coconut sector in the countries studied and in the Pacific region, in general. The conducive factors include the growing commitment and leadership in the Ministry of Agriculture and related government agencies, supported by strong advocacies by NGOs, international donors, investments from the private sector and increasing awareness by coconut farmers. These factors along with appropriate coconut development policies and programmes, institutional reforms and strengthening, private sector investments, linkage to the market and technical assistance throughout the value chain can certainly contribute to the development of the sector.

However, the coconut sector is faced with several challenges. Among them are the continuing decline of coconut productivity due to senility of the palms, poor management of the farms, natural calamities, labor shortage, remoteness of the farms, poor infrastructure, high transport cost, access to market, poor technical knowledge, among others. Coconut or copra production alone has become unprofitable due to low market prices. There is very little value-adding of coconut products in the villages. The existing coconut processing enterprises in the villages are rather too small in scale. Their economic viability and sustainability are at risk.

To develop a sustainable coconut sector in the Pacific countries, the value chain approach must be explored. Coconut replanting (including commercial coconut wood utilization), coconut-based cropping systems, coconut-based livestock integration including value-adding and coconut product diversification and marketing must be designed and implemented as profitable investments both by government and the private stakeholders.

Specifically it is recommended that:

1. Evidenced-based policies and coconut sector development programmes must be formulated to address the declining production and productivity of coconut farms and ensure maximum economic returns from investments in coconut replanting/planting, coconut based cropping systems including livestock integration and downstream value-added processing of coconut products. New agricultural surveys with focus on the coconut sector are recommended to provide essential inputs to policy formulation and programme planning.
2. To pursue the development policies in the coconut sector, proper institutional mandates and strengthening of the agricultural extension service and supporting agencies must be in place. A Coconut Sector Strategic Plan with verifiable targets and indicators of success supported with the appropriate government budget and private sector investment must also be in place.
3. While the relevant Coconut Productivity and Rehabilitation Programmes are in place and are on-going in some Pacific countries, it is recommended that technical assistance be provided on coconut varietal improvement through coconut genetic resource survey, coconut breeding research and proper selection methodology to ensure that only the best quality planting materials/seedlings are planted in the field. It was reported that there is an on-going Coconut Genetic Survey jointly conducted by the Ministry of Agriculture, Fisheries & Forest, and Provincial Development (MAFFPD) of Fiji and the Secretariat of the Pacific Community (SPC). This should be pursued. Similar Coconut Genetic Survey should also be conducted in other Pacific countries.
4. Rehabilitation of the coconut sector should involve coconut-based cropping system and livestock integration to ensure optimum productivity of the coconut farms and contribute to food security and the economic livelihood of the farming families. The coconut palms should therefore be inter-planted with cash crops or food security crops including fruit trees and industrial crops like cacao and coffee. Focus should be on coconut-cropping systems and coconut-livestock integration for which the respective countries have a comparative advantage. Investments in the Coconut Rehabilitation and Replanting Programmes including Coconut Based Cropping Systems and Livestock Integration must be a profitable venture.
5. While the coconut seedlings used in the on-going Coconut Replanting/Planting and Rehabilitation Programmes are the selected local varieties, coconut hybrids as well as selected dwarf varieties for young tender coconut drink may also be promoted. The Pacific countries may therefore need to pursue coconut hybridization with appropriate technical assistance. The other alternative is to teach progressive farmers how to produce coconut hybrids in their farms, as practiced in other countries like the Philippines and Sri Lanka.

6. Technical assistance on the production of Technical Manuals on the genetic qualities and production potential of various coconut varieties for specific use/purpose is recommended. The Technical Manuals should also include the guidelines on proper mother palm – seednut – seedling selection methodology. These manuals will be useful for the training of coconut extension workers and coconut farmers.
7. The production of Technical Guides, Posters, Leaflets on Coconut Based Cropping Systems, including Livestock Integration in Coconut Farms highlighting the Good Agricultural Practices in the management of the intercrops/cash crops with coconuts is recommended. Information materials on copra quality improvement techniques, hot-air copra dryers, the processing of value-added coconut products like virgin coconut oil, coconut flour, coconut water, coconut husk products and others should also be produced. These information materials will be useful in the training of farmers, housewives, entrepreneurs and should create greater awareness in the technologies and the economic opportunities for coconut product diversification.
8. Ministers of Agriculture and other stakeholders have recognized that there is a need to develop the coconut processing industry to stimulate better prices of coconut raw materials and provide the economic incentives for coconut replanting/planting and increase coconut production. Product diversification, value-addition, domestic utilization and export are therefore recognized as the way forward. In the case of Virgin Coconut Oil (VCO) industry, it is recognized that the Director Micro Expelling (DME) Process mostly used in the Pacific countries in the production of VCO needs to be scaled-up to promote efficiency, economies-of-scale, greater production to meet the supply requirements in the export market, while at the same time provide rural employment (especially among women and the youth) and ensure fair trade and better prices of whole coconuts as the raw material.

Thus, a scaled-up process technology for VCO production including access to appropriate machinery/equipment suppliers and may be an area for technical assistance to VCO processors in the Pacific. There is also a need for more technical assistance in Good Manufacturing Practices (GMP) among VCO producers. Training and capacity building in this area may be provided.

9. To help ensure strong backward linkages to the rural coconut farming communities, value-added coconut processing enterprises such as virgin coconut oil production, coconut flour processing and others must be developed and supported to meet domestic market demand and export opportunities. Technical assistance and support for market and cost-benefit analysis or project feasibility studies must be provided to potential groups of entrepreneurs prior to advocating new value-added coconut processing projects.
10. Discussions were also held with the respective Ministers of Agriculture of Samoa and Vanuatu, and the Ambassador of Samoa to the EU on the proposed ACP-EU funded Coconut Project following the “whole nut concept” where an integrated coconut

processing plant will be established. As whole nuts will be purchased and delivered to the processing plant, several products are expected to be processed, namely activated carbon from coconut shell charcoal, coconut milk/cream or desiccated coconut from the kernel, fiber and other coir-based products from the husk, and packaged coconut water. In the spirit of collaboration, other international donor agencies may provide technical assistance in the proposed project as needed.

11. To provide an economic incentive for replanting or cutting of senile and unproductive coconut palms, there must be a buyer of coconut logs. Commercial coconut wood utilization should therefore be encouraged and investment in this area must be promoted to provide lumber/coconut wood for housing and furniture making. This should also provide for a diversification strategy away from forest timber and avoid degradation of the forest and depletion of the forest resources in the Pacific.

A pilot project on coconut timber utilization in collaboration with appropriate stakeholders may be explored. Mobile saw mills equipped with tungsten carbide saws may be piloted with the appropriate techniques and technologies in coconut logging, saw milling (correct cutting patterns), drying and machining. A technical assistance project on this regard is desirable.

12. While copra is still the major coconut product being traded in the Pacific, copra quality improvement strategy must be implemented. This may include the provision of hot-air dryers, proper technical guidelines and appropriate training on copra drying, setting-up of national quality standards on copra following the APCC Code of Standards for Copra, and promotion of quality-based pricing among copra buyers and traders/exporters.
13. Given the very limited value-addition activities in the Pacific region, the fundamental question should focus on how to turn the whole coconut industry around from the current level to utilize the large quantities of raw materials to benefit the coconut farmers. Specific opportunities should therefore be explored around up-scaling VCO production and its product derivatives, desiccated coconut and or coconut milk processing as well as packaging of coconut water, processing of coconut fiber products including coconut shell charcoal and activated carbon. Location specific project feasibility studies should be undertaken to ensure success in these coconut processing business ventures.
14. To develop and expand the market for coconut products in the Pacific region, there is a need to raise the awareness among the Pacific people and other consumers on the health aspects of coconut products and the opportunity as well the intrinsic value of using locally produced coconut products like VCO, coconut cooking oil, coconut flour, coconut-based soap, young tender coconut water, and others. Domestic utilization of coconut products must be vigorously promoted and pursued.

15. To encourage investments in the coconut sector, the government financial sector through the banking system should provide support through reasonable credit schemes for coconut processing business ventures. These investments must be market-led or demand-driven, and the support for financing must include professional guidance on branding, packaging and market-matching assistance.
16. Capacity building and training programmes for coconut subject matter specialists/extensionists, coconut farmers and coconut processors must be provided with technical assistance from international development or donor agencies. This should include technologies in coconut replanting, varietal screening, seedling selection, coconut-based cropping systems, good agricultural practices and others. In the processing sector, technologies on Good Manufacturing Practices (GMP), HACCP and ISO Certification, Organic Certification, and product quality standards must be provided. The feasibility of establishing a centrally accredited product testing laboratory facility should be pursued.
17. To ensure efficiency and effectiveness in programme implementation, the Governments in the Pacific countries should strengthen the National Extension Service. The extension delivery services to coconut farmers and women folks in the coconut farming communities must be vigorously pursued.
18. The formation of coconut producers associations or cooperatives in the Pacific countries must also be facilitated/supported. This should ensure inclusive development among the rural coconut farming communities and at the same time promote greater efficiency and effectiveness in the delivery of extension services and capacity building activities.

Country Reports- Asian Region

EXECUTIVE SUMMARY

The Coconut Study Mission in the Asia was undertaken in five (5) countries (Indonesia, Philippines, Sri Lanka, Thailand and Viet Nam) to assess the coconut sector in the Asian region and identify gaps, commonalities and opportunities for sectoral development through the value chain approach.

Meetings with senior government officials, private sector stakeholders, NGOs, smallholder coconut farmers, officers and staff of coconut related organizations like the United Coconut Associations of the Philippines (UCAP) and various universities and research institutes, as well as visits to coconut farms and processing plants were undertaken.

The coconut sector in Asia, like those in the Pacific countries, is also confronted with several challenges. Among them are the continuing decline of coconut productivity due to senility of the palms, poor management of the farms, natural calamities, labor shortage, remoteness of the farms, poor infrastructure, high transport cost, access to market, poor technical knowledge, among others. Coconut or copra production alone has become unprofitable due to low market prices. There is very little value-adding of coconut products in the villages. The existing coconut processing enterprises in the villages are rather too small in scale. Their economic viability and sustainability are at risk.

Low coconut production and coconut farm productivity in the Asian region is due to several reasons and factors. About 15 to 30 percent of the existing palms have passed their economic bearing age (60 years) and are now senile and due for replanting. Due to lack of technical know-how, good agricultural practices are hardly practiced among small coconut farmers. There is also a lack of quality planting materials and lack of knowledge on coconut-based farming system models. New coconut pest infestations like *Brontispa*, rhinoceros beetle, black-headed caterpillars, and disease incidence like phytoplasma (wilt) diseases are also a challenge.

The coconut farmers and village coconut entrepreneurs also lack knowledge and skills on appropriate coconut processing technologies. Since they are not organized as viable and bankable cooperatives or community-based organizations (CBO's), they have limited access to credit and capital. The scale of coconut processing ventures in the villages are rather small and are not viable on the long term. Therefore, they need to be scaled-up to take advantage of the economic-of scale and promote efficiency and economic viability. The coconut processors also need more knowledge on good manufacturing practices (GMP) and other techniques to ensure good quality of their products.

They also need marketing assistance to enable them to gain market access both domestically and in the export market. Basic logistics and infrastructure like farm to market roads, electricity, transport and shipping facilities may also need to be developed.

In spite of the challenges, the coconut has remained as an integral part of the way of life and food security of the majority of the rural population. To develop a sustainable coconut sector in the Asian countries, the value chain approach must be explored. Coconut replanting including commercial coconut wood utilization, crop diversification and coconut-based cropping systems and coconut-based livestock integration must be implemented as profitable investments both by government and the coconut farmers.

Analysing the value chain in the coconut sector should enable us to improve the value of the end product, promote quality and efficiency as well as competitiveness and profitability. Value chain analysis should therefore concentrate more on value creation, innovation, product development and marketing while supply chain analysis should give primary focus on cost reduction and efficiencies of supply.

It is estimated that depending on the value of the end products in the export market, the average price to be paid for one whole coconut should be approximately 11 US cents if sold for coconut crude oil processing including copra meal, 33 US cents if sold for desiccated coconuts and 55 US cents if sold for the processing of coconut milk and water (Chand, V., 2012). An analysis on the value of raw and mature coconuts for processing into virgin coconut oil (VCO) would reveal that at an FOB price of US\$ 5.00 per litre and on the assumption that 12 coconuts will produce one litre of VCO, the additional value of one coconut would be 42 US cents. Assuming a production cost of 5 US cents per coconut, the value of one whole coconut should be 37 US cents.

There is also economic potential to use the residue in the processing of VCO. This by-product can be further processed into coconut flour. A kilo of coconut flour can have an FOB price of US\$ 6 instead of just throwing it or using it as feed to the livestock.

The husk can also be processed into coconut coir fiber for rubberized mattress, geotextiles for the control of soil erosion, and coconut pith for horticulture use as planting medium or as organic fertilizers. High value coir products also include brushes, twines, tufted mats, carpets and other. Raw coir can fetch an average FOB price of US\$ 350 per metric ton, while coconut pith or cocopeat can fetch an average FOB price of US\$ 300 per metric ton.

The coconut shell can likewise be processed into charcoal and coconut shell charcoal-based activated carbon. Charcoal can fetch an average FOB price of US\$ 500 per metric ton while the average price of coconut shell based-activated carbon is US\$ 2 100 per metric ton. All these value-added products from the mature whole coconuts should increase the value of the raw material at the farm gate level.

To further develop and sustain the coconut industry in the Asian region, the following recommendations may be considered:

1. There is a need to rehabilitate senile and unproductive palms in coconut growing countries in Asia.

This will require coconut replanting using selected elite local varieties and hybrids. Germplasm exchange and capacity building within the countries to develop capability on mass selection techniques, coconut breeding and hybridization should be pursued. Since coconuts can tolerate salinity and are highly adapted to the coastal zones, priority in replanting may be considered in these areas. This should contribute to the total carbon sink and prevent coastal erosion and massive sea water intrusion due to climate change. Breeding for drought tolerant varieties, high lauric oil content, precocity or earliness of bearing, and high nut production should also be pursued.

2. The lack of quality coconut planting materials must be addressed.

This will require more seedgardens to produce high yielding and early bearing coconut hybrids. The private sector may also be encouraged to establish commercial seedgardens to meet the required quantities of good quality planting materials for the replanting programme. Research on using somatic embryogenesis to mass propagate selected high yielding hybrids should also be vigorously pursued. The genetic based of coconut varieties should therefore be expanded and characterized for breeding and development of hybrids for specific purposes or uses.

One immediate and practical option is the use of selected local elite varieties. Thus, capabilities on mass selection techniques must be developed among extensionists and the coconut farmers to enable them to choose the best quality planting materials from the existing local varieties. An accreditation system of coconut farms with good local elite varieties should also be put in place.

Another option is to develop the capabilities of the farmers to produce coconut hybrids in their own farms, as practiced in Sri Lanka and the Philippines. This usually involves crossing a yellow or red dwarf variety with a selected local tall variety using the dwarf variety as the female progenitor, and selection of authentic hybrid seedlings is based mainly on the pigmentation (colour) of the germinating hybrid seednuts. The mass production of hybrids by coconut farmers in their own farms should contribute to the number of improved quality materials for the coconut replanting program.

3. Commercial coconut wood utilization should be promoted.

To provide an economic incentive for replanting or cutting of senile and unproductive coconut palms, there must be a buyer of coconut logs. Commercial coconut wood utilization should therefore be encouraged and investment in this area must be promoted to provide lumber/coconut wood for housing and furniture making. This should also provide for a diversification strategy away from forest timber and avoid degradation of the forest and depletion of the forest resources in the Asian region.

A pilot project on coconut timber utilization in collaboration with appropriate stakeholders in coconut growing countries may be explored. Mobile saw mills equipped with tungsten carbide saws may be piloted with the appropriate techniques and technologies in coconut logging, saw milling (correct cutting patterns), drying and machining. A technical assistance project on this regard is desirable.

4. There is a need to develop strategies against emerging coconut pests and diseases.

As pests and diseases cause low yields, research on environment friendly bio-control strategies using natural predators, pheromones and biopesticides must be pursued. Farm sanitation, group efforts through Farmer Field Schools must be widely promoted and practiced. Research on breeding for tolerant varieties especially against emerging/new coconut diseases must be pursued.

5. Coconut-Based Farming Systems models should be further developed, promoted and practiced.

To ensure food security, good nutrition and additional income in coconut communities, coconut-based farming system models involving intercropping of food crops, vegetables, fruit trees and industrial crops like coffee and cacao in between the coconut palms, as well as raising livestock like goats, cattle, chicken, etc. in the coconut farms must be vigorously promoted and practiced. Produce from intercrops and cash crops together with income from livestock should ensure food security and a sustainable source of livelihood. Technical assistance and guidance must be provided to enable the coconut farmers to adopt good agricultural practices (GAP) in coconut farming.

6. Value-added coconut processing must be promoted.

To be resilient in times of price volatilities, coconut farmers must not depend on copra alone. Value-added processing of various coconut products can also add income to the farming family. Coconut value-added products like virgin coconut oil, VCO-based soap and cosmetic products, coconut sugar, coconut vinegar, nata de coco, young tender coconuts, coconut shell charcoal and activated carbon, coir and coir-based products are some of the products that could add income to the coconut farmers. Technical assistance on coconut processing technologies, good manufacturing practices (GMP), promotion of quality standards and access to markets should therefore be provided to ensure viability and sustainability of value added processing ventures in coconut communities.

There is much potential to further develop the coconut husk industry (processing of coconut coir and coir-based products) especially in the Philippines and Indonesia, where so much raw material exists. The value added processing of coconut shell charcoal into activated carbon (AC) has so much potential as global demand for AC is increasing annually. The challenge is to focus on high value coconut products and by-products with health and environment-friendly applications.

7. Promote joint ventures among coconut growing countries.

To take advantage of the synergistic effects of sharing technologies (technical know-how and experience), raw materials, and access to niche markets, joint ventures within and among coconut growing countries should be encouraged. The government in collaboration with the private stakeholders can play a facilitating role in this regard.

8. Promote the health attributes of coconut products through an aggressive awareness campaign and through joint R & D efforts in the conduct of clinical trials.

Studies on coconut oil, and its main component which are known as medium chain fatty acids, have shown that it is beneficial as a dietary oil, as a food supplement or functional food and as a therapeutic agent. Because it can speed up the metabolism, it can readily provide energy and can even be beneficial for weight loss. Coconut oil has shown to enhance the immune system and has anti-microbial properties. Researchers assert that there is scientific basis for the many testimonial evidences on the health attributes of coconut oil. However, many of these require further research using adequate population sample size through the conduct of clinical trials/studies.

Greater awareness of the beneficial qualities of coconut products should increase domestic and export demand.

9. Enhance market promotion in traditional and niche markets.

Coconut products can be certified as organic, GMO-free, natural, healthy and environment-friendly. To improve market access of coconut products, the conduct of market promotional campaigns in the buying countries and niche markets through participation in high-impact trade exhibitions, technical seminars on the health and nutritional aspects of coconut products must be intensified. These efforts should contribute to the growth of the demand for coconut products.

10. Strengthen the national coconut extension service.

To ensure efficiency and effectiveness in programme implementation, the Governments in the Asian countries should strengthen the National Coconut Extension Service. The extension delivery services to coconut farmers and women folks in the coconut farming communities must be vigorously pursued.

Capacity building and training programmes for coconut subject matter specialists/extensionists, coconut farmers and coconut processors must be provided with technical assistance from international development or donor agencies. This should include technologies in coconut replanting, varietal screening, coconut breeding, seedling selection, coconut-based cropping systems, good agricultural practices and others. In the processing sector, technologies on Good Manufacturing Practices (GMP), HACCP and ISO Certification, Organic Certification, and product quality standards must be provided.

11. Facilitate and support the formation of economically viable CBO's / coconut farmers' cooperatives.

The formation of coconut producers associations or cooperatives in the Asian countries must also be facilitated/supported. This should ensure inclusive development among the rural coconut farming communities and at the same time promote greater efficiency and effectiveness in the delivery of extension services, financing and capacity building activities. The establishment of nucleus estates or the adoption of the cluster approach to coconut farming and marketing may also be pursued.

12. Coconut should be a priority crop in the national agricultural development agenda.

To encourage investments in the coconut sector, the government, as matter of policy, must consider coconut as a priority crop in its national agricultural development agenda. The government and private financial sector through the banking system should provide support through reasonable credit schemes for coconut processing business ventures. These investments must be market-led or demand-driven, and the support for financing must include professional guidance on branding, packaging and market-matching assistance.

Country: INDONESIA

I. Coconut Production

Coconut plantations in Indonesia can be found in almost all regions in the country with the largest area in Sumatera which occupies 32.43 percent of the total area and followed by Java (23 percent); Sulawesi (19.65 percent); Bali and Nusa Tenggara Barat (7.82 percent); Moluccas and Papua (9.7 percent); and Kalimantan (7.3 percent)¹.

The total coconut plantation area in 2011 was estimated at over 3.8 million hectares and 98.16% belong to smallholders and the rest owned by the private sector (1.69 percent) and the government (0.14 percent). Indonesian coconut plantation area is the largest in the world. However, with respect to production, it is still below its potential.

Indonesia has the biggest coconut land area in the world. The coconut area and production in 2006 – 2011 are shown in Table 1. Indonesia's coconut area increased from 2006 to 2010 although the increase was not significant. The total area in 2006 was about 3.78 million ha, and was estimated at 3.81 million ha in 2011. On the other hand, coconut production in 2006 was 3.13 million metric tons in copra equivalent and increased to 3.29 million MT in 2011.

Table 1.
Indonesia: Area and Production of Coconut
2006 – 2011

Year	Area	Production of Coconut	
		Million	Copra Equivalent
	(Ha)	Nuts	(MT)
2006	3 788 892	15 656	3 131 159
2007	3 787 989	15 966	3 193 266
2008	3 783 074	16 198	3 239 673
2009	3 799 124	16 290	3 257 970
2010	3 808 263	16 332	3 266 448
2011	3 813 780	16 450	3 290 000

Source: Directorate General of Estate Crops, Ministry of Agriculture

¹ *Source: Tree Crops Estate Statistics of Indonesia, DG of Estate Crops, Ministry of Agriculture*

There has been little increase in coconut production. The average production is around 0.90-1.10 tons copra ha/year. Many technologies have been developed to increase the productivity of coconut palms, not only good coconut varieties which have the potential to produce on 3 – 5 tons of copra/ha/year (high yielding tall or hybrids), but also good cultivation practices and pest management. To accelerate the replanting/planting coconut in the future, more efforts are still needed to help the coconut farmers.

The coconut area is distributed in 33 provinces in Indonesia mainly in Riau, East Java, North Sulawesi, Central Java, North Maluku, West Java, Central Sulawesi, East Nusa Tenggara, Lampung, Jambi, North Sumatera, South Sulawesi, and West Kalimantan Provinces.

Table 2. Area under Coconut by Region or Province or State (in Ha)

Name of Region or Province or State	2008	2009	2010
Sumatra	1 205,477	1 236 780	1 253 074
Jawa	843 697	873 879	873 997
Sulawesi	743 319	745 425	748 219
Total	2 792 493	2 856 064	2 875 290
Total Indonesian	3 783 074	3 799 124	3 808 263

Source: Directorate General of Estate Crops, Ministry of Agriculture

Constraints/Issues reported which are related to coconut production and farm productivity

Weaknesses

- o Approximately 98 percent of coconut plantation in Indonesia are smallholders, with limited cultivation technology, low productivity, and are less efficient;
- o Coconut farms are located in the rural areas, far from urban centers, with facilities and infrastructure that have not been developed to production efficiency, especially transportation;
- o Qualities of palms are low because the source of seed is unclear with traditional nursery;
- o Irregular spacing; the land used is not optimal; the population is below standard;
- o Education level of farmers is relatively low making it difficult to transfer technology in cultivation, processing and marketing;
- o Farmers have limited capital and are easily influenced by money lenders in the rural areas.

Opportunities

- a. The productivity of coconut crop around 1 ton copra/ha/year or about 50 percent of its potential production, while the market demand in both domestic and export markets is open wide enough;
- b. Land of coconut crop has the potential to be intercropped with food crops including livestock raising;
- c. Diversification of underdeveloped products.

Threats

- o The rapid use of palm oil as raw material for cooking oil in the country at a price that is cheaper with more efficient production technology, thus shifting the position of coconut oil;
- o Coconut areas have not been rehabilitated / rejuvenated enough to increase the level of crop productivity per hectare;
- o Coconut farmers' income is still relatively low compared with other commodities like oil palm and rubber.

II. Policies to Promote Coconut Farm Productivity and Increase Farmer's Income

In the National Long Term Coconut Development Programme (2025), coconut is projected to remain a potential commodity. At the micro level, coconut is a source of income, food and livelihood for small farmers. The policy objectives of the long term programme are as follows:

- o Increase the productivity of coconut to the equivalent of 2 tons copra/ha/year;
- o Replace traditional crop populations with high yielding varieties by more than 50 percent;
- o Increase the skills of farmers in the field of processing up to more than 50 percent;
- o Increase to more than 90 percent of coconut farmers who will practice intercropping, with food crops, plantation crops and livestock;
- o Improve farmer institutions, so that more than 80 percent of the farmers join in a group of independent farmers organization;
- o Increase farmers' income to US\$ 1 500/ha/year.

Coconut Research and Development Updates

The Indonesian Coconut and Palmae Research Institute (ICOPRI) is tasked to implement the coconut palm research on the aspects of genetics, breeding, seed production, and utilization of germplasm, agronomy, physiology, ecology, entomology and phytopathology, coconut based farming systems and agribusiness in coconut plantations.

ICOPRI has released as many as 24 varieties of coconut palm, consisting of 15 varieties of tall coconut, four (4) dwarfs and five (5) hybrids.

Four (4) varieties are preferred by the coconut farmers. They are Mapanget tall (MTT), Tenga tall (TAT), Palu tall (PUT), and Bali tall (BIT). Potential production of these varieties will vary between 2.8 - 3.3 tons of copra ha/yr, depending on the condition of the agro-ecosystem with 63-69 percent oil content. These varieties are resistant to bud rot disease. Farmers also prefer early maturing varieties like the Salak (GSK) dwarf variety released in 2006. This dwarf variety can bear fruits after 24 months with optimal production at 120 nuts/tree/year and is resistant to bud rot disease. This type is suitable for producing tender coconut. In the year 2010, Kopyor Dwarf coconut variety from Central Java province was also released to the farmers.

Coconut Development Programme by the Directorate General for Estate Crops aims to increase the productivity of coconut. The national proportion of old/senile palms which are more than 60 years of age has reached 15% of the total coconut area or approximately 583 500 ha.

Table 3 shows, the target area for replanting in 2009 and 2010. The actual area of replanting for 2009 is only 16 145 ha and 33 954 ha in 2010.

Table 3. Target Area and Actual Achievements in Replanting and New Planting in CY 2009 and 2010

	Target Area of Replanting (Ha)	Actual Area of Replanting (Ha)*	Target Area of New Planting (Ha)	Actual Area of New Planting (Ha)*
2009	100 000	16 145	10 000	425
2010	100 000	33 954	10 000	800

**Funded by National Budget*

III. Coconut Processing

The traditional coconut products in Indonesia are copra, coconut cooking oil, charcoal, coir pith, coconut fibre, desiccated coconut, activated carbon, coconut milk, coconut powder, nata de coco, young coconut water in can or packaged, coco timber, and handicrafts.

Table 4 shows the volume and value of various coconut products in Indonesia

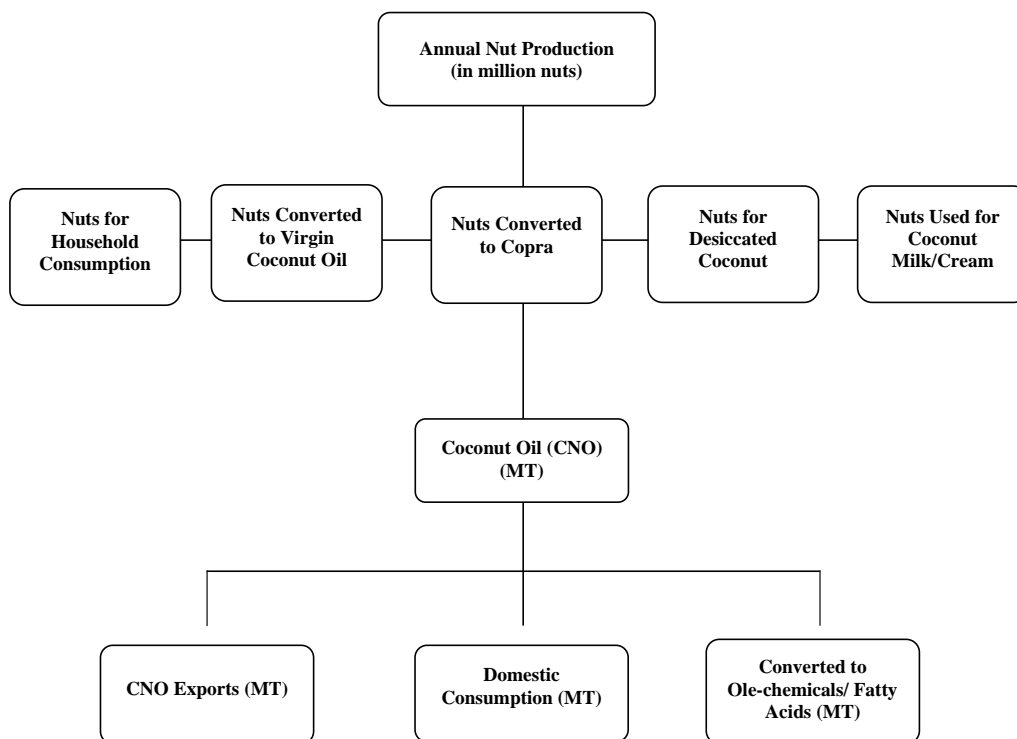
Table 4. Coconuts Product Export 2007 – 2011

	2007		2008		2009		2010		2011	
	Vol.	Value	Vol.	Value	Volume	Value	Volume	Value	Volume	Value
Fresh coconut	8 693	1 226	42 839	6 940	72 818	10 421	100 119	14 618	304 911	45 138*
Copra	46 920	8 821	26 110	5 149	39 517	7 733	38 043	11 451	34 565	21 863
Coconut Oil	739 923	570 410	649 255	769 134	570 311	387 360	556 826	566 068	540 050	941 061
Shell Charcoal	210 343	46 104	201 251	54 793	199 045	64 716	185 215	64 920	229 974	85 707
Activated Carbon	26 325	21 928	24 478	24 199	22 741	23 226	24 791	27 744	13 548	17 821
Desiccated Coconut	59 884	36 885	57 689	46 446	46 699	36 608	47 065	48 238	51 665	107 364
Coconut Milk	27 437	23 739	34 161	40 993	23 264	21 042	29 898	27 660	1 394	2 143
Coir Fibre (raw)	8 458	1 438	12 106	1 990	14 603	3 099	13 706	3 825	46 173	16 343
Total	1 128 983	710 551	1 047 889	944 644	988 998	554 205	995 663	764 524	1 222 280	1 192 302

Source: Coconut Statistical Yearbook, APCC

IV. Coconut Product Utilization and Marketing

Table 5. Coconut Utilization in Indonesia



Update of Recently adopted National Quality Standard of Coconut Products

The Indonesian National Body (BSN), through The Indonesian National Standard (SNI) of Coconut Commodity has adopted the National Quality Standards of various coconut products:

- a. Coconut Oil (SNI-01-2902-1992)
- b. Charcoal (SNI-01-1682-1989)
- c. Copra (SNI-01-3946-1995)
- d. Residue of Copra after Extracting Oil (SNI-01-2904-1996)
- e. Refined Bleached Deodorized Oil (SNI-01-0014-1987)
- f. Virgin Coconut Oil (SNI-7381-2008)

Major Market Destinations of Traditional Coconut Products

The major market destinations of traditional coconut products, such as copra, charcoal, coconut cooking oil, desiccated coconut, coconut milk, activated carbon and coconut fibre are the European and Asian countries.

Table 6. Major Market Destinations of Traditional Coconut Products

Commodity	
Copra	Bangladesh, Philippines, Malaysia, Netherlands, Taiwan
Crude Oil of Copra	China, Malaysia, Netherlands, United States
Coconut Oil, Refined	Netherlands
Coconut Oil, Refined, Bleached, Deodorized	China, India, Bangladesh, Russia
Desiccated Coconut	Singapore, Germany, United Arab Emirates, South Africa, Pakistan

Source: Bureau of Statistics of Indonesia, 20

Country : PHILIPPINES

I. Coconut Production 2009 – 2012

For the period 2009 – 2011, the average production was estimated at 14 743 Billion nuts or 2.813 Million MT copra equivalent. There is an increasing trend in coconut area due to massive planting and replanting.

Table1. Annual Coconut Production in Nut and Copra Equivalent

Year	Annual Nut Production	Annual Production in Copra Equivalent (MT)
2009	15 668 000	2.707
2010	15 510 000	2.894
2011	15 245 000	2.077
2012	15 862 000	2.630

Conversion is 1 MT Copra = 5,241 Nuts

Table 2. Area Under Coconut by Region, Philippines, Annual (In Hectares) 2009 – 2011

Region	2009	2010	2011
CAR	281	281	295
Ilocos Region	11 540	11 600	12 023
Cagayan Valley	13 611	13 661	17 578
Central Luzon	24 088	24 088	23 126
CALABARZON	343 580	438 673	335 777
MIMAROPA	179 321	181 784	146 522
Bicol Region	447 763	452 319	496 513
Western Visayas	119 663	119 922	135 928
Central Visayas	128 707	128 708	129 725
Eastern Visayas	383 546	434 881	479 266
Zamboanga Peninsula	369 013	372 971	425 186
Northern Mindanao	300 773	301 257	303 628
Davao Region	375 922	375 885	375 277
SOCCSKSARGEN	169 254	174 054	182 507
Caraga	219 107	219 121	391 312
ARMM	315 490	315 645	208 643
Philippines (Total)	3 401 709	3 564 850	3 663 307

The total coconut area is estimated at of 3.564 Million hectares with 1.122 Million hectares or 31.49 percent in Luzon; 683 511 hectares or 19.17 percent in Visayas and 1.759 Million hectares or 49.34 percent in Mindanao. There is also an increasing trend in coconut area due to massive planting and replanting.

There are 340 M bearing trees and the non-bearing trees below 6 years was estimated at 30 M.

Table 3. Number of Bearing Trees by Region

Region	2010
CAR	33 497
Ilocos Region	896 785
Cagayan Valley	1 372 790
Central Luzon	3 008 747
MIMAROPA	17 530 994
CALABARZON	41 746 328
Bicol Region	35 015 713
Western Visayas	9 542 000
Central Visayas	12 836 508
Eastern Visayas	46 209 603
Zamboanga Peninsula	31 032 824
Northern Mindanao	31 869 349
Davao Region	39 843 291
SOCCSKSARGEN	14 871 841
Caraga	20 846 275
ARMM	33 413 565
Philippines (Total)	340 070 110

Philippines 20110

II. Policies, Programmes and Activities to Promote Coconut Farm Productivity and Increase Farmer's Income

Some of the constraints/issues related to coconut production and farm productivity are:

- production of high-yielding hybrids now on limited scale due to high cost involved;
- limited production of seed nuts in Philippine Coconut Authority (PCA) seed gardens; and
- need to accredit private farms as source of good seed nuts.

Some of the policies to promote coconut farm productivity and increase farm income are:

- Soil conditioning – PCA is advocating for the use of coco dust as soil conditioner. Local government units are encouraged to provide funds for the hauling of coco dust from coco husk processing plants to coconut farms;
- Fertilization – PCA is now promoting the use of salt, animal manure and coco dust combined as cheap fertilizer for coconut farms;

- Through the Kasaganaan sa Niyugan ay Kaunlaran ng Bayan (KAANIB) Programme, PCA is now promoting entrepreneurship and mixed farming in coconut communities to augment income from coconut farming; and
- Cooperative development – coconut community cooperatives are being developed to engage in product diversification, e.g., coco husk processing to produce, coir, dust, coco mats, coco logs, etc.

Coconut Replanting/New Planting, Rehabilitation and Farm Productivity Programmes

1. Coconut Planting/New Planting Programme

- Participatory Coconut Planting Programme
 - Objective is to increase coconut hectareage nationwide.
 - Participants provide the seed nuts sourced from PCA, private farms or even from their own trees. Seed nuts are sown in seedbeds and once germinated to a height of about one foot, PCA gives an incentive of P14.00 or US\$ 0.35 per seedling. Once planted in the farm, PCA gives an additional P16.00 or US\$ 0.40 per seedling or a total of P 30.00 or US\$ 0.75 per seedling.
- 38 900 hectares were planted in 2010 while 34,300 hectares will be planted by end of 2011.
- Target for 2012 is 63 125 hectares.

Year	Target Area of Replanting (Ha)	Actual Area of Replanting (Ha)
2010	38 900	37 519
2011	34 300	
2012	63 125	

Table 4. Target Area and Actual Achievements in Replanting in CY 2010, 2011 and 2012

2. Coconut Rehabilitation by Intercropping and Livestock Integration

- The latest intercropping programme involves the provision of planting materials, e.g., corn seeds, banana, cacao, etc. In 2010, only 300 hectares were intercropped due to scarce funds.
- In 2012, some 71 750 hectares were targeted for intercropping due to the provision of bigger budget by the national government (Table 5). Aside from the free planting materials, technical assistance is likewise provided by the national government.

- With the provision of some P 60 M or US\$ 1.5 M by the national government for 2012, PCA has engaged in livestock dispersal to coconut farming communities.

Table 5. Intercropping in Coconut Farms: Target for CY 2011 and 2012

Year	Target Area for Intercropping (ha)
2011	300
2012	71 750

3. Coconut Rehabilitation by Fertilizer Application

- Salt Fertilization Programme – Salt (NaCl) is given free to selected farmer-participants nationwide, to be applied at 2 kgs per tree. A 25% increase in yield is expected through salt fertilization.

Table 6. Accomplishment & Target Area on Coconut Rehabilitation by Fertilization for CY 2009 to 2012

Year	Bags (salt)	Area (ha)
2009	314 000	78 500
2010	552 415	138 103
2011	268 886	67 221
2012	800 000	200 000

4. Other Coconut Rehabilitation and Productivity Programmes

- Part of the regular services of the PCA are:
 - Coconut pest and disease control
 - Extension services covering technical and non-technical assistance

III. Coconut Processing

Table 6 shows the export volume and value of traditional coconut products for the period 2008 -2010. In 2010, some 1.345 M MT of coconut oil was exported with a value of US\$ 1.257 Billion. The second highest export performer was copra meal, at 724 376 MT with a value of US\$ 78.233 M.

Table 7. Exports of Traditional Coconut Products
Volume in MT, Value in US\$ FOB

Commodity	2008		2009		2010	
	Volume	Value	Volume	Value	Volume	Value
Copra	No Export	No Export	84	59 795	303	239 027
Coconut Oil	847 626	1 033 662 599	826 237	588 016 626	1 207 076	1 073 949 732
Copra Meal	435 244	58 207 403	399 782	47 925 863	645 846	64 872 849
Desiccated Coconut	142 626	240 302 243	116 421	145 656 869	92 287	121 941 355
Coco Shell Charcoal	21 979	8 106 916	34 746	11 189 943	22 412	6 539 708
Activate Carbon	20 259	25 083 458	20 027	25 807 979	25 767	35 861 882

Table 7 shows the volume and value of exports of non-traditional coconut products. The highest performer in 2010 is oleochemical at 31 694 MT with a value of US\$ 17.416 M. The second highest performer was virgin coconut oil at 2 373 MT with a value of US\$ 8.34 M.

Table 8. Exports of Non-Traditional Coconut Products
Volume in MT, Value in US\$ FOB

Commodity	2008		2009		2010	
	Volume	Value	Volume	Value	Volume	Value
Coco Milk Powder	1 000	3 426 412	1 791	5 696 462	1 024	2 777 638
Liquid Coconut Milk	1 310	1 884 234	1 932	3 228 410	1 061	1 864 030
Baled Coir	5 825	922 386	4 561	739 142	3 830	847 694
VCO	1 639	5 342 046	1 801	5 587 572	2 281	6 696 500
Oleochemicals ¹⁾	68 318	64 148 776	23 375	12 678 993	26 091	13 942 337
Nata de Coco	5 095	5 446 915	6 017	6 025 625	4 487	5 040 925
Coco Water ²⁾	647 366	531 958	483 772	368 141	731 582	874 245
Coconut Flour	452	683 617	967	1 165 310	461	590 456

¹⁾ *Volume in Copra Terms*

²⁾ *Volume in Litre*

IV. Coconut Product Utilization and Marketing

The summary of coconut product utilization 2005-2010 is shown in Table 9.

**Table 9. Coconut Production and Utilization
Volume in '000 MT Commodity Terms 2005 – 2010**

Commodity	2005	2006	2007	2008	2009	2010
UTILIZATION						
Export						
Copra	0.04				0.08	0.30
Coconut Oil	1 151.64	1 070.27	886.56	847.63	826.24	1 342.51
Desiccated Coconut	125.72	136.2	130.67	142.63	116.42	109.17
Coco Chemicals*	122.11	124.32	98.6	68.32	23.38	31.69
TOTAL ¹⁾	2 144.48	2 033.73	1 707.87	1 634.27	1 514.94	2 331.75
Domestic Consumption*						
Manufactured Oil	360.00	380.00	500.00	700.00	827.00	790.00
Homemade Oil/Foodnuts	108.00	120.00	125.00	125.00	130.00	132.00
TOTAL	468.00	500.00	625.00	825.00	957.00	922.00
Total Utilization	2 612.48	2 533.73	2 332.87	2 459.27	2 471.94	3 253.75

Considering that only manufactured oil and homemade oil/food nuts domestic consumption against exports, 38 percent goes to domestic use and 62 percent to exports. If all domestic uses are accounted for, ratio becomes 25 percent domestic use and 75 percent exports. The exports are general broken down as 15 percent for the desiccated and coconut oil processing and 60 percent for copra, crude coconut oil and CNO-based products.

The average FOB price of major coconut products for CY 2008 – 2010 is shown in Table 10.

Table 10. Export Price of Selected Coconut Products US\$/MT FOB

Commodity	2008	2009	2010
Copra	No Export	690	756
Coconut Oil	1 204	714	934
Desiccated Coconut	1 644	1 247	1 398
Coco Milk Powder	3 407	3 149	2 715
Liquid Coco Milk	1 482	1 700	1 773
Coconut Shell Charcoal	359	324	317
Activated Carbon	1 261	1 302	1 376
Baled Coir	157	167	224
Virgin Coconut Oil	3 216	3 201	3 047

Among the export products, the highest priced was coconut milk powder within the range of US\$ 2 715 to US\$ 3 407 per MT. the next highly priced commodity was virgin coconut oil at the range of US\$ 3 047 to US\$ 3 216 per MT and the lowest priced was baled coir, at the range of US\$ 157 to US\$ 224 per MT.

The coconut processing plants and their capacities as of June 30, 2009 are shown in table 11.1.

Table 11.1. Philippines Coconut Oil Mills, Summary of Regional Dispersal (as of June 30, 2009)

Area/Region	No. of Mills	percent Share	Crushing Capacity (Copra Terms)		
			MT/Day	MT/Year	percent Share
Laguna-Quezon/ other S. Tagalog Area	19	30.16	2 097	629 100	13.98
Bicol	4	6.35	1 520	456 000	10.13
Visayas Area	15	23.81	3 043	912 900	20.28
Mindanao Area	25	39.68	8 345	2 503 500	55.61
Total (Philippines)	63	100	15 005	4 501 500	100
Luzon	23	36.51	3 617	1 085 100	24.11
Visayas	15	23.81	3 043	912 900	20.28
Mindanao	25	39.68	8 345	2 503 500	55.61

There are 63 coconut oil mills with a total capacity 4.5 MMT copra per year. There are 38 coconut oil refineries with a total capacity of 1.435 MMT oil per year. There are ten (10) desiccated coconut plants with a capacity of 159 609 MT desiccated coconut per year. There are eight (8) activated carbon plants with a capacity of 43 740 MT activated carbon per year. There are ten (10) oleochemical plants with a capacity of 457 600 MT per year. There are eleven (11) coco methyl ester manufacturers with capacity of 395 M liters per year. There are twelve (12) coco coir producers with capacity of 144 576 kgs/year. There are nineteen (19) virgin coconut oil manufacturers.

Table 11.2. Production Capacities of Coconut Oil Refineries, By Regional Distribution as of June 30, 2009

Region	No. of	Percent	Related Refining Capacity		
	Refineries	Share	MT/Day	MT/Year	Percent Share
NCR	5	13.16	245	73 500	5.12
IV	8	21.05	912	273 600	19.07
V	1	2.63	40	12 000	0.84
VI	1	2.63	50	15 000	1.05
VII	5	13.16	1 130	339 000	23.63
VIII	4	10.53	228	68 400	4.77
IX	3	7.89	630	189 000	13.17
X	4	10.53	280	84 000	5.85
XI	5	13.16	1 003	300 900	20.97
XII	1	2.63	240	72 000	5.02
XIII	1	2.63	25	7 500	0.52
Total Philippines	38	100	4 783	1 434 900	100
Luzon	14	36.84	1 197	359 100	25.03
Visayas	10	26.32	1 408	422 400	29.44
Mindanao	14	36.84	2 178	653 400	45.54

Table 11.3. Production Capacities of RP Desiccated Coconut Plants, By Regional Distribution as of June 30, 2009

Region	No. of	Percent	Related Refining Capacity			
	Refineries	Share	Bags/Day	MT/Day	MT/Year	Percent Share
IV	5	50.00	6 220	281.77	84 592.00	53.0
X	1	10.00	1 500	67.95	20 400.00	12.78
XI	3	30.00	3 380	153.11	45 968.00	28.80
XIII	1	10.00	636	28.81	8 649.60	5.42
Total Philippines	10	100	11 736	531.64	159 609.60	100
Luzon	5	50.00	6 220	281.77	84 592	53.00
Visayas						
Mindanao	5	50.00	5 516	249.87	75 018	47.00

Table 11.4. Production Capacities of RP Activated Carbon Plants, By Regional Distribution as of June 30, 2009

Region	No. of	Percent	Production Capacity	
	Plants	Share	MT/Year	Percent Share
IV	1	12.50	1 500	3.43
VII	1	12.50	9 900	22.63
VIII	1	12.50	800	1.83
IX	1	12.50	9 600	21.95
X	4	50.00	21 940	50.16
Total (Philippines)	8	100	43 740	100
Luzon	1	12.50	1 500	3.43
Visayas	2	25.00	10 700	24.46
Mindanao	5	62.50	31 540	72.11

Table 11.5. Production Capacities of RP Oleochemical Plants, By Regional Distribution as of June 30, 2009

Region	No. of	Percent	Production Capacity	
	Plants	Share	MT/Year	Percent Share
NCR	1	10.00	61 800	13.51
IV	6	60.00	215 315	47.05
V	1	10.00	30 000	6.56
IX	1	10.00	35 000	7.65
X	1	10.00	115 485	25.24
Total (Philippines)	10	100	457 600	100
Luzon	8	80.00	307 115	67.11
Visayas	0	-	-	-
Mindanao	2	20.00	150 485	32.89

Table 11.6. List of DOE-Accredited Coco Methyl Ester, Manufacturers and Production Capacities By Regional Distribution as of June 30, 2009

Region	No. of	Percent	Production Capacity	
	Plants	Share	Million Liters/Year	Percent Share
NCR	4	36.36	207	52.32
IV	5	45.45	143	36.15
X	2	18.18	46	11.53
Total Philippines	11	100	395.62	100
Luzon	9	81.82	350.02	88.47
Visayas	0	-	-	-
Mindanao	2	18.18	45.60	11.53

The major market destinations of traditional coconut products are shown on Table 12.

Table 12. Major Market Destinations of Traditional Coconut Products, 2010

Commodity	Destination
Copra	Korea
Coconut Oil	Netherlands, USA, Japan
Copra Meal	Korea, PROC, Viet Nam
Desiccated Coconut	USA, Belgium, Netherlands
Coco Shell Charcoal	Japan, PROC, Korea
Activated Carbon	Japan, USA, Germany

The major market destinations of non-traditional coconut products are shown on Table 13.

Table 13. Major Market Destinations of Non-Traditional Coconut Products, 2010

Commodity	Destination
Coco Milk Powder	Malaysia, Japan, France
Liquid Coco Milk	Brazil, USA, Japan
Baled Coir	PROC, Taiwan, Singapore
Virgin Coconut Oil	USA, Canada, Germany
Oleochemicals	PROC, Canada, Germany
Nata de Coco	Japan, USA, Canada
Coconut Water	USA, Brazil, Canada
Coconut Flour	U.K., USA, Japan

IV. Coconut Research and Development Update

- Latest in R & D is the search for predators to control *Brontispa* and coconut scale insects. Further study is being conducted on a type of insect predator indigenous to Palawan Island.
- Focus on development of coconut-based products, e.g., coco fiber glass, coco coir-dust board and coco dust charcoal briquettes.
- Clinical study on the effect of virgin coconut oil on cholesterol level has been concluded. Initial results show good effects of VCO on cholesterol level.
- Coconut water is fast becoming a popular energy drink. Vita Coco of Brazil has established a plant in Bicol Region with a capacity of 500 000 nuts a day.

- The Philippine Council of Agriculture and Aquatic Resources Research and Development (PCAARRD) has formulated a Coconut Industry Strategic Science and Technology (S and T) Plan (Figure 1). It has indicated the present status of the industry, the indicators, benchmark information, problems, S and T gaps, appropriate interventions, deliverables and potential impacts.

Figure 1. PCAARRD Coconut Industry Strategic S & T Plan

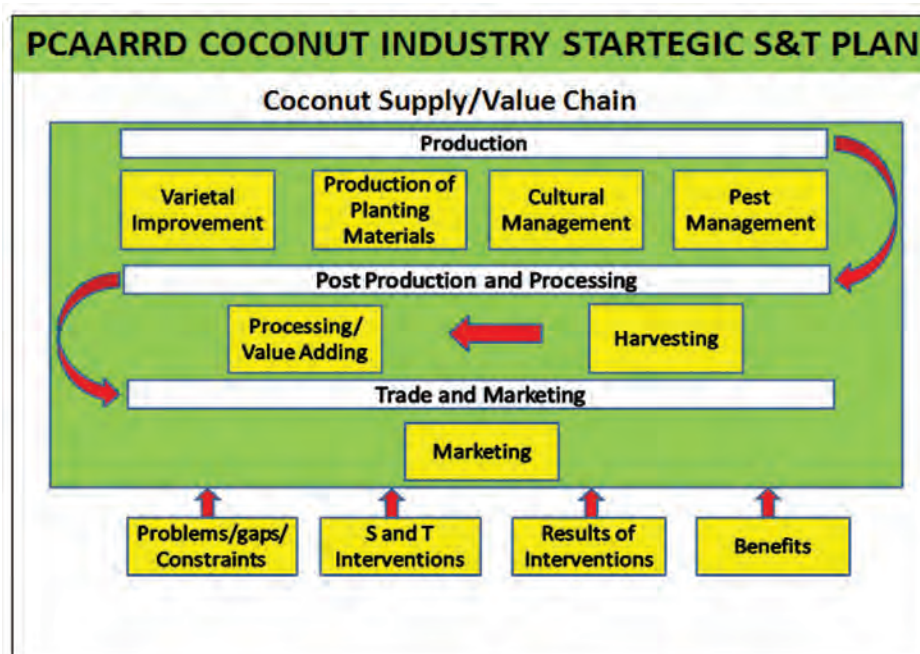


Figure 2. Coconut Industry Status

Indicator	Current	Benchmark (India)	With ISP Intervention	Assumptions
a. Nut Yield*	46 nuts/tree/year	77 nuts/tree/year	100 to 200 nuts/tree/year	Adoption of S & T interventions are more than 90%
b. Volume of nut production	15.54 B nuts/year			
c. Volume of exports (copra oil)	847 626 mt	6,817 mt		
d. Area planted	3.56 M ha	1.903 M ha	Additional 1 M ha in coastal areas	

*Represent average yield of coconut

Source: PCA and APCC, 2011

Figure 3. Varietal Improvement: S & T Interventions, Deliverables, and Potential Impacts

Industry Problem	S & T Gaps	S & T Interventions	Deliverables	Potential Impacts
Lack of quality planting materials	Need for HYVs and hybrids (using block seednut production system)	Using somatic embryogenesis to propagate selected high yielding palms of the highest yielding hybrids / varieties	150 M quality planting materials produced	Increased nut yield from 100 to 200 nuts/palm/year, increasing production value from Ph P 64.8B/yr to Ph P 129.6B/yr (Ph P 4.68B/yr) Somatic embryogenesis will reduce the cost of seedling from PhP 23 (seedling) to Ph P20 (somatic seedling)
Lack of quality Planting materials	Need to characterize and conserve coconut genetic resources	Characterization and <i>in situ</i> conservation coconut genetic resources	Selected 5 <i>in situ</i> on farm conservation site for coconut diversity Established working database & produce farmers' training material	Availability of quality coconut genetic resources in selected sites

Industry Problem	S & T Gaps	S & T Interventions	Deliverables	Potential Impacts
	Need to characterize coconut varieties for production of high-value products	Screening & characterization of coconut varieties for production of raw materials for high-value products	Selected 5 hybrids/cultivars for VCO and sugar production	Availability of quality hybrids/cultivars

Figure 4. Production of Planting Materials: S & T Interventions, Deliverables, and Potential Impacts

Industry Problem	S & T Gaps	S & T Interventions	Deliverables	Potential Impacts
Lack of quality planting materials	Need seedgarden to produce quality planting materials	Using somatic embryogenesis to propagate selected high yielding palms of the highest yielding hybrids / varieties	Established seedgardens	To plant 125M seedlings to replace senile palms & 156 seedlings to plant additional 1 M ha coastal areas (total of 281 M seedlings), we would need 5 248 ha of seedgarden. PCA only has 500 ha of seedgarden at present. Only somatic embryogenesis will enable us to plant large areas.

Industry Problem	S & T Gaps	S & T Interventions	Deliverables	Potential Impacts
				Using somatic embryogenesis only 1 054 ha of nursery is needed to plant 28 M seedlings/year

Figure 5. Cultural Management: S & T Interventions, Deliverables, and Potential Impacts

Industry Problem	S & T Gaps	S & T Interventions	Deliverables	Potential Impacts
Low yielding palms	About 25 – 30 percent of coconut palms are old/senile and have passed peak of production	Replant old/senile plams to increase number of productive palms by 25 – 30 percent	Replace old/senile palms	Increased total national coconut production by at least 25 percent (0.64M mt copra) valued at PhP 9.6 B/year
	Need to maximize the planting density	Increase from 100 palms to optimum density of 156 palms/ha, using 8 x 8 spacing	Increased number of palms/ha	Increased yield at least 50 percent or 1.28 M mt, valued at PhP 19.2 B/year
	Need to fertilize standing palms and irrigate dry areas	Application of fertilizers on standing palms and irrigation in dry areas	Improved nut yield of fertilized palms/ palms planted in irrigated areas	Increase nut yield from 46 to 100 nuts/palm/year (1 350 kg copra), or 4.32M mt copra in existing 3.2 M ha, valued at PhP 26.4 B/year

Industry Problem	S & T Gaps	S & T Interventions	Deliverables	Potential Impacts
Low yield palms (nuts & copra)	Need to determine the soil carbon levels for soil fertility management	Mapping of soil carbon levels in selected coconut based ecosystem	Map/database of soil carbon levels in selected coconut based ecosystem	Availability of map/database of soil carbon levels in selected coconut based ecosystem

Figure 6. Pest Management: S & T Interventions, Deliverables, and Potential Impacts

Industry Problem	S & T Gaps	S & T Interventions	Deliverables	Potential Impacts
Low yield due to pest infestation	Need for strategies against emerging pests	Research on environment friendly biological measures using natural predators	Developed a sustainable IPM for <i>Brontispa</i>	Prevent risk of 20 percent or more yield reduction due to <i>Brontispa</i> infestation
		Research on effective delivery registered systemic insecticides and predatory coccinellid	Pest monitoring and prediction models Effective registered systemic and predatory coccinellid	Prevent risk of 20 percent or more yield reduction due to CSI infestation in CALABARZON

Figure 7. Processing/Value Adding: S & T Interventions, Deliverables, and Potential Impacts

Industry Problem	S & T Gaps	S & T Interventions	Deliverables	Potential Impacts
Coconut farmers' depend solely on copra	Copra offers low and unstable prices	Develop new high-value coconut products needed for food, oleochemical, nutraceuticals uses	Produced 4 high value & non-traditional makapuno by-products	Increase farmers' income by 50 percent (PCDF data)
		Community-based STBF focused on improving productivity, capacity building (training / compliance to organic certification), product customization and promotion of coco sugar	Organically certified coco sugar with enhanced packaging	
Coconut farmers' depend solely on copra	Copra offers low and unstable prices	Intercropping with vegetables and fruit trees and raising livestock between coconut Increasing productivity by producing known high value products (coco sap sugar, VCO, coco soy sauce, coco candies, coco coir, BOF) Community managed nurseries	Established and implemented income generating activities in 7 coconut community-based organization (CCBO) in Mindoro and Bicol	Increase farmers' income by another 50 percent (FCDF and PCA data)

Country: SRI LANKA

I. Coconut Production

The Ministry of Coconut Development and Janatha Estate Development (MCDJED), Sri Lanka has indicated that the coconut production in 2012 was estimated at 2.9 billion nuts or 554 493 MT copra equivalent (Table 1).

Table 1. Annual Coconut Production in Nut and Copra Equivalent

	Annual Nut Production (in million nuts)	Annual Production in Copra Equivalent (MT)
2010	2 317	443 021
2011	2 808	536 902
2012	2 900*	554 493
2013	3 050*	583 174

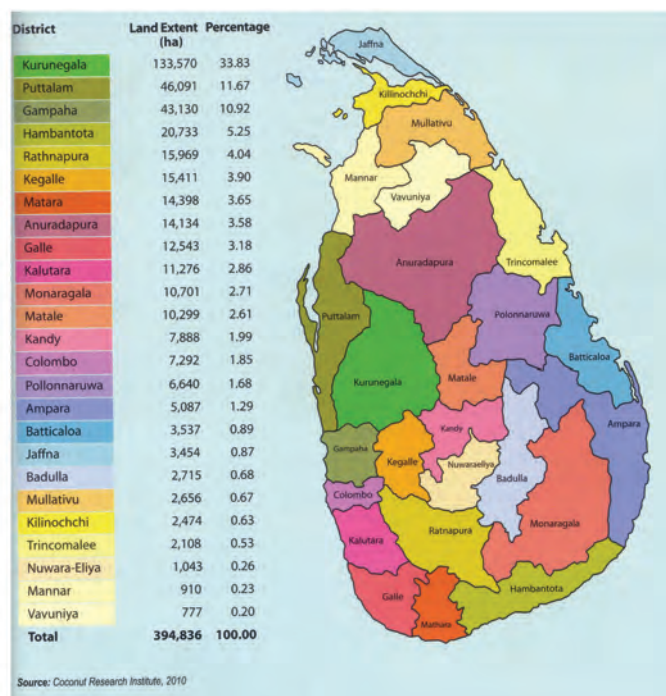
*2012 Provisional

Source: MCDJED

*2013 Forecast

*01 Kg. Copra = 5.23nuts

The area under coconut was estimated at 417 000 hectares or 20 percent of the total agricultural land in Sri Lanka. The major coconut growing areas are in the Coconut Triangle in parts of Western and North Western Provinces and in the Mini Coconut Triangle in Matara, Hambantota Districts in the south. The major coconut areas are shown in the map below.



The percentage estimate of young, bearing and senile coconut trees are shown in Table 2.

Table 2. Age Profile of Coconut Farms (CY 2012)

Percentage young palms (below 10 years)	Percentage bearing palms (above 10 – 60 years)	Percentage senile palms (above 60 years)
18	68	14

Source: MCDJED, CCB

The constraints/issues, problems and threats related to coconut production are identified as follows:

- Adverse weather conditions and anticipated impacts of climate change on production;
- Widely fluctuating farm gate prices, local market prices and global prices for coconut products;
- Increasing input costs (production costs);
- Susceptibility to pests and diseases. Emerging new pests and diseases (Black beetle, coconut mites, Asiatic palm weevil, slug caterpillar and the Weligama Coconut Wilt and Rot Disease);
- Ineffective utilization of advanced technologies for production;
- Insufficient use of fertilizer and other inputs;
- Fragmentation of coconut lands for industrial and urban development; and
- Trends towards converting coconut lands for other economic purposes.

II. Policies, Programmes and Activities to Promote Coconut Farm Productivity and Increase Farmers' Income

The Government of Sri Lanka through the Ministry of Coconut Development and Janatha Estate Development has paid special attention towards developing the coconut sector. The Mahinda Chintana Policy Framework, or the government's policy statement highlighted the following policies to promote coconut farm productivity and increase farmers' income.

- i. The Government of Sri Lanka has established a separate Cabinet Ministry for the development of the coconut industry portfolio through the Ministry of Coconut Development and Janatha Estate Development. The Ministry has already taken several initiatives to organize the coconut growers to reap maximum benefits from the "Mahinda Chinthana" Fertilizer Subsidy or Kapruka Diriya, introduced by His Excellency, the President. It is anticipated to plant 6 million coconut seedlings in CY 2013 by way of new plantings, under plantings and filling vacancies in the existing plantations through the ambitious programmes such as "Divi Neguma", "Kapruka Purawara" and "Kaprukai Sipnenai". At present, the number of coconut palms in an extent of one acre is around 40 whereas the optimum density should be 64 palms. A shortfall of 24 palms that reduces the potential yield. Therefore, the Ministry has endeavoured to correct this situation through its coconut planting intensification program.

The Ministry has also embarked on several programmes aimed at improving the coconut based industries. The programmes commenced by the Ministry has envisaged the upgrading of the socio-economic level of families dependent on coconut production and coconut based industries. Special attention of the Ministry is directed towards encouraging the growers to undertake intercropping with high value crops and animal husbandry in coconut lands to increase land use efficiency and productivity. The Ministry has identified the need for introducing new technologies and providing opportunities to win local as well as international markets as priority requirements in the coconut industry. With these initiatives the Ministry hopes to increase the annual coconut production to 3 650 million nuts by 2016.

- ii. The Ministry has also taken action to preserve prime coconut lands and increase productivity through introduction of new varieties and methods of cultivation. It has provided financial assistance to undertake coconut cultivation using drip irrigation and has vigorously promoted intercropping in coconut lands.
- iii. A Strategic Plan was presented by the new Ministry in 2011 with a view to developing the coconut industry. National priorities are set out in Mahinda Chintana and Mahinda Chintana Vision for the future and emphasizes that coconut is a major agricultural crop of the country. Statutory bodies relevant to the industry are mandated under the purview of the Ministry, viz. Coconut Development Authority (CDA), Coconut Cultivation Board (CCB), Coconut Research Institute (CRI), Chilaw Plantations OLC and Kurunegala Plantations PLC.

Coconut Replanting/New Planting Programs

The following Coconut Replanting/New Planting Programmes were launched by the Ministry:

(a) Kapruka Purawara Programme

Kapruka Purawara is one of the major programmes implemented to replant and rehabilitate existing coconut plantations covering 180 Divisional Secretariat Divisions in the country.

Major objectives of the programme are:

1. Improvement of land productivity in coconut cultivations;
2. Expansion of cultivation in lands with the potential for coconut;
3. Increasing the annual harvest of coconut to 100 nuts per palm;
4. Improvement of DS divisions selected under this programme as pilot units;
5. Transfer of research know-how related to coconut cultivation to the community; and
6. Create opportunities to those who are interested in taking up coconut cultivation and related industries.

(b) Divi Neguma Programme

Divi Neguma is the main livelihood development initiative of the Sri Lanka government. Under the agricultural sector of this initiative, the coconut industry is also given high priority. Under Divi Neguma initiative, an identified household will be provided with at least two seedlings free of charge for planting in their home gardens in order to ensure food security and improve household income.

(c) Kaprukai Sipnenai Programme

Under this programme, students in potential coconut growing areas will receive two potted coconut seedlings each free of charge which have to be planted in their home gardens and maintained as per instructions given. The observations with regard to the growth of the seedlings have to be recorded in the notebook provided together with the seedlings. The selected students who successfully study and pass their examinations while maintaining the growth records of the coconut seedlings up to the time of harvesting, will be awarded Kapruka Didiya Scholarships. This is a monthly cash grant to meet their educational requirements during the period they undergo studies in GCE Advanced Level.

Table 3 shows the target and achievements in replanting and new planting in 2011, 2012 and 2013.

Table 3. Target Area and Actual Achievements in Replanting and New Planting in CY 2011, 2012 and 2013

	Target Area of Replanting (Ha)	Actual Area of Replanting (Ha)	Target Area of New Planting (Ha)*	Actual Area of New Planting (Ha)
2011	2 025	1 063	5 000	11 242
2012	3 645	2 002	7 000	21 877
2013	4 048	-	12 000	

Source: MCDJED, CCB

* Targets are given according to the Kapruka Navodawa – National Coconut Sector Development Plan 2011

* It is assumed that area loss due to new constructions and other human activities would be replaced through replanting and new planting

** Achievements are according to the CCB statistics

Coconut Rehabilitation by Intercropping and Livestock Integration

Following actions have been undertaken since 2011 to increase productivity through intercropping.

- (a) Continue research studies and introduce them for different coconut growing areas;
- (b) Establish data bank as to the availability of planting materials and supporting credit facilities;
- (c) Link with Ministries of Livestock and Export Crops Development.

It is proposed to increase intercropping coconut lands to 40 000 ha by 2016. In addition, coconut land extent under livestock based integrated farming will be increased to 40 000 ha by 2016 by provision of animal breeds, and other related facilities through loan schemes.

Coconut Rehabilitation by Fertilizer Application

Through a nationwide subsidy scheme, chemical fertilizer has been made available to all coconut growers and under this scheme growers have to pay only 1/3 of the cost since 2011. Due to this subsidy, it is expected to increase annual coconut production by 10 percent.

Other Coconut Rehabilitation and Productivity Programmes

(a) Weligama Coconut Wilt Disease Control Project

Coconut leaf wilt disease was first identified in Weligama in Southern Sri Lanka. Following actions were taken to manage the disease:

- Establishment of 3 km wide barrier to prevent spread of the disease;
- Felling of severely diseased palms to reduce the density of pathogen;
- Growers were paid Rs. 2 000 per tree which is removed;
- Provision of 50 000 palms of green dwarf variety free of charge to the small holders which is found to be resistant to the wilt disease.

(b) Biological Control of Coconut Mite

In Sri Lanka, coconut mite was first found in Kalpitiya Peninsula in North West Sri Lanka and now it is present in all coconut growing areas in the country. After 10 years of research, the Coconut Research Institute (CRI) has now developed a biological control method to release laboratory bred predatory mites in the field to reduce damage caused by coconut mite.

III. Coconut Processing Industry and Marketing Production and Export of Traditional Coconut Products

Following are the traditional coconut export products in Sri Lanka:

1. Desiccated coconut;
2. Coconut oil;
3. Coconut milk and cream/milk powder;
4. Copra;
5. Variety of coir fibre products; and
6. Coconut shell based products (coconut shell charcoal and coconut shell charcoal-based activated carbon).

Although there are some improvements in the oil industry during 2012 due to the high demand in the local market, very little quantity was exported. As a result of raw material availability, the desiccated coconut industry and other value added coconut kernel based industries were largely affected and the activities of the DC industry remained at a lower profile during the past few years.

In 2010, there were some developments in the export of coir fibre raw products. There was a shift increase in value added fibre products. The coconut shell based industry is also one of the other important segments in the coconut sector and registered growth in both volume and value terms for both coconut shell charcoal and coconut shell charcoal-based activated carbon since 2008. Table 4 shows the production and export of tradition coconut products in Sri Lanka for CY 2010 – 2012.

Table 4. Production and Exports of Traditional Coconut Products in CY 2010, 2011 and 2012

	2010		2011		2012*	
Copra	101 040	1 036	77 098	2 185	122 965	780
Coconut Oil	65 133	2 262	53 093	1 931	81 000	2 500
Copra Meal	32 567	11 467	26 547	6 522	40 500	11 900
Desiccated Coconut	28 850	28 348	46 620	45 761	43 500	43 000
Coconut Milk/Cream	7 319	7 319	8 096	8 096	11 000	11 000
Coconut Milk Powder	4 580	3 817	5 335	4 446	4 600	4 600
Charcoal	3 016	2 873	5 205	4 957	7 980	7 600
Activated Carbon	28 782	28 782	31 359	31 359	30 000	30 000
Coir Fibre (Bristle Fibre, Mattress Fibre, Twisted Fibre)	149 751	126 908	135 030	114 432	136 390	115 585
<u>Other Coir Products</u>						
Twine	6 108	5 176	6 392	5 417	9 351	7 925
Yarn	1 245	1 055	905	767	1 345	1 140
Mats & Rugs	2 644	2 404	3 135	2 850	1 340	1 215
<u>Brushes (1,000 pieces)</u>						
Brooms & Brushes	27 903	23 647	28 909	24 499	24 106	20 429
Tawashi Brushes	29 511	25 009	28 075	23 792	30 924	26 207

*2012 – Provisional. Other coir products may be specified and volume may be expressed in MT or number of pieces

Source: MCDJED, CDA

Production and Export of Non-Traditional or Emerging Coconut Products

In Sri Lanka following are the non traditional export products:

1. Coconut water
2. Virgin coconut oil
3. Coconut flour

Export details are only available for virgin coconut oil (VCO) (Refer to Table 5 for details).

Table 5. Production and Export of Virgin Coconut Oil (VCO) in CY 2010, 2011 and 2012

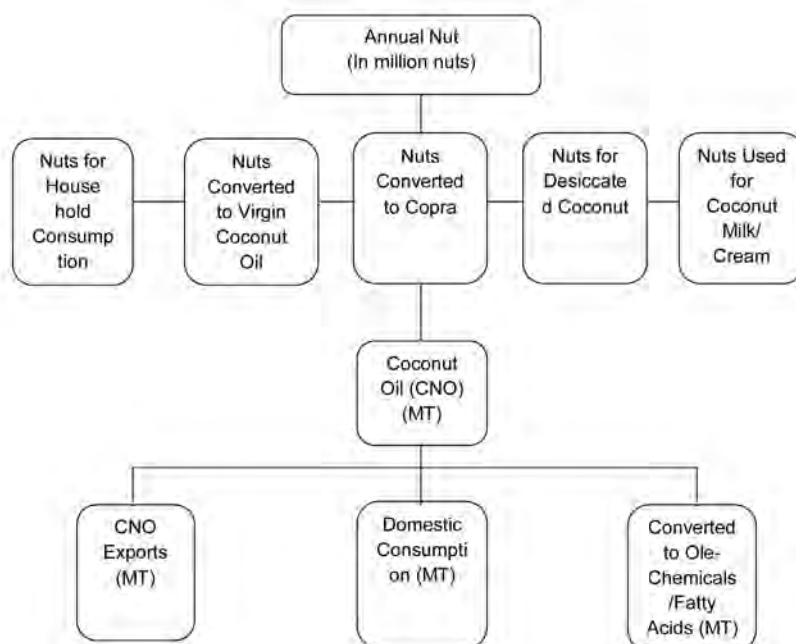
	2010		2011		2012	
	Production (MT)	Exports (MT)	Production (MT)	Exports (MT)	Production (MT)	Exports (MT)
VCO		1 817		910		1 660

Source: MCDJED, CDA

IV. Coconut Product Utilization and Marketing

Out of the total production of nuts, more than 70 percent is used for household consumption. Annually, some 2 000 million nuts are required for domestic consumption. The balance is divided among oil, copra and the DC industry depending on the demand in the world market for these products (Refer to Table 6 for details).

Table 6. Coconut Utilization in Sri Lanka



Source: MCDJED

Average FOB Price of Major Coconut Products in USD for 2010 – 2012

Except for activated carbon and to a lesser extent fibre products which have shown some increase, the FOB prices of kernel products are not very stable. Table 7 shows the average FOB price of major coconut products.

Table 7. Average FOB Price of Major Coconut Products per Metric Ton in USD for CY 2010, 2011 and 2012

	2010	2011	2012
Copra	1 181	1 166	1 050
Coconut Oil	3 233	4 000	3 992
Desiccated Coconut	1 655	2 760	1 687
Coconut Milk	1 275	1 788	1 470
Cream	2 013	3 458	2 675
Charcoal	391	508	530
Activated Carbon	1 665	2 131	2 310
Coir Fibre (Raw)	396	494	400
VCO	3 977	4 960	4 825

Source : MCDJED, CDA

Number of Coconut Processing Plants and Their Capacities

Table 8 shows the number of desiccated coconut mills and activated carbon factories.

Small scale cottage level oil processing units are not included in this Table. At present, the registration of fibre mills are not mandatory and only 121 mills are registered with the CDA.

Table 8. Number of Coconut Product Processing Plants and Their Capacities in CY 2012

** Coconut Oil Mills			Desiccated Coconut Mills			Activated Carbon Factories		
Units	IC	AU	Units	IC	AU	Units	IC	AU
1 265	335 706	81 000	51	77 904	42 000	08	50 640	39 810
	MT	MT		MT	MT		MT	MT

Note: Units – Number of units
 IC – Installed Capacity (Annual)
 AU – Actual Utilization (Annual)

Source : MCDJED, CDA

Major Market Destinations of Traditional Coconut Products

Sri Lanka exports at least 30 major categories of coconut products to over 125 countries in the world. In the area of kernel products, there was a reduction of export of fresh coconut in 2011 compared to the previous year which was mainly due to the increase of the levy or cess for Rs. 2 per nut to Rs. 30 per nut.

Sri Lanka is also well recognized in the world market for her coir products and demand for coir products has increased in 2011 due to the rapid growth of the emerging markets especially in China.

The coconut shell based industry is also an important sector which is having a major demand in the USA, France, Japan and Germany for a number of applications (Refer Table 10 for details).

Table 9. Major Market Destinations of Traditional Coconut Production CY 2012

	2012
Copra	Pakistan, UAE, UK, Iran
Coconut Oil	Pakistan, USA, Brazil, Oman, Myanmar
Desiccated Coconut	USA, Germany, Egypt, UAE, S. Arabia
Coconut Milk/Cream	UK, USA, Netherlands, Canada, Australia
Charcoal	Netherlands, Japan, Denmark, France
Activated Carbon	USA, Russia, Italy, Germany, Japan
Coir Fibre (Raw)	China, Germany, USA, Poland

Source : MCDJED, CDA

Major Market Destinations of Non Traditional Coconut Products

Only non traditional products where the export details available is for virgin coconut oil (VCO). At present major destinations are USA, Europe and Australia. During 2012 Sri Lankan company started export of coconut water under the brand name VITA COCO to the USA.

Government Policies Related to Coconut Trade and Market

In the Mahinda Chintana Policy of the government, high taxes are proposed on the importation of vegetable oil and other substitutes of coconut oil in order to protect the local coconut oil industry. At present (2013) all imported oil products are charged a special commodity levy of Rs. 110/- per kg.

In 2011, Rs. 30/- cess applied to export of fresh coconut was reduced to Rs. 7/- per nut. The existing export tariff rate of coconut products are given in Table 12.

Table 10. Export Tax (Cess) Rates of Coconut Products (Summary)

Product		Tax
Kernel Products	Per kg	50 cents – Rs. 1.00
Coconuts	Per nut	Rs. 7.00 – 10.00
Coconut Shell Products	Per kg	10 cents
Coconut Oil	Per kg	10 cents
Coconut Cream, Milk & Milk Powder	Per kg	10 cents – 35 cents
Coconut Base Arrack	Per litre	Rs. 3.00
De Fatted, Poonac, other	Per kg	25 cents – 50 cents
Activated Carbon	Per kg	10 cents per kg
Charcoal	Per kg	25 cents per kg
Raw Fibre	Per kg	10 cents – 25 cents
Finish Products		
Coir Yarn, Geotextile, Twine	Per unit	10 cents – Rs. 2.50
Rubberized Coir Products		
Broom and Brushes	Per unit	5 cents – 50 cents

Source : MCDJED, CDA

Country: THAILAND

I. Coconut Production

The Department of Agriculture of the Ministry of Agriculture and Cooperatives, Government of Thailand has indicated that coconut production in 2012 was estimated at 844 million nuts or 218 metric tons copra equivalent.

Table 1. Annual Coconut Production in Nut and Copra Equivalent ('000 MT)

Year	Annual Nut Production (in million Nuts)	Annual Production in Copra Equivalent (‘000 MT)
2010	997	299
2011	845	218
2012	844	218
2013* Forecast	845	220

Source: Department of Agriculture

The area planted to coconuts was estimated at 213 000 hectares. Coconuts are predominantly planted in the Southern Region of Thailand mainly in the provinces of Prachab Kirikhan, Chumphon, Surat Thani and Nakorn Si Thammarat. Table 2 shows the extent of area under coconut region. Table 3 shows the extent of area planted to coconut by province.

Table 2. Area Under Coconut by Region (in 1 000 Ha)

Name of Region / Province	2010	2011	2012
Southern Region	121	115	114
Central Region	103	97	96
North & Northeastern Region	7	4	3
Total	231	216	213

Source: Department of Agriculture

Table 3. Province Growing Coconut (in percentage of total area)

Name of Province	Year 2011		Year 2012	
	(Ha)	Percent	(Ha)	Percent
Prachab Kirikhan	67 775	31.4	68 018	31.6
Chumphon	33 625	15.6	33 442	15.7
Surat Thani	32 260	14.9	32 194	15.1
Nakorn Si Thammarat	15 874	7.4	15 823	7.4

Source: Department of Agriculture

The age profile of coconuts in Thailand is shown on Table 4.

Table 4. Profile of Coconut Farms (CY 2012)

Percentage Young Palms (Below 10 Years)	Percentage Bearing Palms (Above 10 – 60 Years)	Percentage of Senile Palms (Above 60 Years)
0.44	79.56	20

Source: Department of Agriculture

Constraints related to Coconut Production and Productivity include: a) senility of palms; b) pest and disease damage (mainly by coconut hispine beetle-brontispa, coconut black-headed caterpillar, oryctes rhinoceros, rhynochophorus, ferrugenus or the Asiatic palm weevil); and c) competition with more economically profitable crops like oil palm and rubber.

Research and development programmes in the coconut industry include:

- a) improvement of coconut varieties/development of new hybrid variety including the coconut aromatic makapuno;
- b) production of high yielding hybrids and aromatic coconut seedlings;
- c) production and promotion of edible and non-edible high value products from coconut like Virgin Coconut Oil (VCO) and VCO-based products, young tender coconuts as fresh fruits or processed and packaged coconut water, coconut milk, desiccated coconut, coir fiber products, coconut sap sugar, coconut sap cider vinegar, nata-de-coco, coconut shell charcoal and coconut shell charcoal-based activated carbon and others;
- d) transfer of new technologies in collaboration with the Department of Extension through the GAP system in order to improve yields and promote quality products to meet SPS standards and regulations of importing countries;
- e) product development research and promotion of the health aspects of coconut and VCO as functional food.

II. Policies, Programmes and Activities to Promote Coconut Farm Productivity and Increase Farmer's Income

The Government of Thailand through the Ministry of Agriculture and Cooperatives and its statutory bodies like the Department of Agriculture, Department of Extension and the Bureau of Agricultural Economic Research has drafted a Coconut Strategic Plan for CY 2013 – 2016. The production policy is to increase coconut production by replanting using hybrids and good coconut varieties to improve the quality of coconut, increase yield and income of coconut farmers. The production policy also stipulates the need to improve efficiency in the prevention and integrated management of coconut pests, and strengthening of the capacity of coconut farmers groups, organizations or cooperatives. The marketing policy shall involve the production and promotion of value added products from coconut.

The production target is to increase coconut yield by at least 20 percent in the potential areas and to maintain coconut harvest of not less than 900 kg/rai.

The first strategic objective is to improve coconut production efficiency and the strategic plan is to adopt production system management (by zoning, farmer's registration database, etc), improve production efficiency and revenue, and improve product quality and safety.

The second strategic objective is to develop a prevention and an integrated pest management (IPM) system of major coconut pests. This includes capacity development on IPM; improve early warning system on coconut pest infestation, develop the coconut farmers' and the community's capacity to manage pest infestations and promote self-reliance.

The third strategic objective is market development for coconut products. The strategic plan involves campaign for value-addition and consumption/utilization of coconut products and develop the capacity for the coconut industry's competitive advantage.

Coconut Replanting/New Planting

Table 5 shows the target area and actual area achievement in coconut replanting and new planting in CY 2010 – 2012.

Table 5. Target Area and Actual Area Achievement in Coconut Replanting and New Planting in CY 2010 – 2012

Year	Actual Area of Replanting (Ha)	Target Area of New Replanting (Ha)	Actual Area of New Planting (Ha)
2010	1 019	213	305
2011	1 061	392	288
2012	781	478	320

Source: Department of Agriculture

The varieties used for coconut replanting and new planting are the Department of Agriculture (DOA) hybrid varieties namely, Sawi Hybrid No. 1, Chumphon Hybrid No. 60, and Chumphon Hybrid No. 2 including selected Thai tall varieties and the sweet aromatic dwarf variety for young tender coconut and fresh fruits and for processed or packaged coconut water.

III. Coconut Processing Industry and Marketing

The traditional export coconut products of Thailand are copra, coconut oil, copra meal, desiccated coconut, coconut milk, coconut shell charcoal-based activated carbon, coir fiber, virgin coconut oil and coconut sugar.

Table 6. Production and Exports of Traditional Coconut Products in 2010–2012 (MT)

Commodity	2010		2011		2012 (Jan – Aug)	
	Production	Export	Production	Export	Production	Export
Copra	62 232	463	66 878	67	NS	NS
Coconut Oil	42 500	876	66 096	1 217	NS	405
Copra Meal	42 500	1 427	NS	2 035	NS	1 284
DC	NS	1 519	NS	4 008	NS	2 456
Coconut Milk	186 230	NS	176 543	NS	438 460	NS
Activated Carbon	NS	7 746	NS	9 096		
Coir Fiber	NS	53 078	NS	41 578		
Coconut Sugar	NS	1 778	NS	1 998		

Source: Department of Agriculture

Coconut utilization in the country would reveal that 60% is used for domestic household consumption and the rest are for various uses in the processing industry. Table 7, 8 and 9 shows the number of manufacturers and their production capacity for coconut milk, canned coconut water and low-fat desiccated coconut, respectively.

Table 7. Coconut Milk Processing Unit

• Manufacturers	≈ 10 factories
• Capacity	≈ 600 MT (white meat/month) ≈ 180 000 MT/year ≈ 1 200 000 Nuts/days
• Products	≈ 270 000 MT (Coconut Milk) / year

Source: Department of Agriculture

Table 8. Coconut Water (Canned) Processing Unit

• Manufacturers	≈ 15 factories
• Capacity	≈ 300 MT (water/day) ≈ 90 000 MT/year ≈ 800 000 Nuts/days
• Products	≈ 150 000 MT (Coconut Water) / year

Source: Department of Agriculture

Table 9. Low-Fat DC Processing Unit

• Manufacturers	≈ 2 factories
• Capacity	≈ 60 MT (Coconut Meat/day) ≈ 18 000 MT/year
• Products	≈ 6 000 MT/year

Source: Department of Agriculture

The FOB prices of major coconut products per metric ton in US\$ for CY 2010 – 2011 are shown on Table 10.

Table 10. Average FOB Price of Major Coconut Products per Metric Ton in US\$ for CY 2010 – 2011

	2010	2011
Copra	733	590
Coconut Oil	1 436	1 957
DC	843	2 113
Activated Carbon	2 028	1 714
Coir Fiber	301	369

Source: Department of Agriculture

The major market destinations of coconut export products of Thailand in CY 2012 are shown on table 11.

Table 11. Major Market Destinations of Traditional Coconut Products in 2012

	2012
Copra	Vietnam, Laos, Germany
Coconut Oil	Malaysia, China, Germany
DC	Brazil, Pakistan, South Korea, Turkey, Laos
Activated Carbon	Japan, USA, Australia, South Africa, South Korea
Coir Fiber	China, South Korea, Malaysia, Taiwan, USA
Coconut Sugar	Australia, USA, UK, Malaysia, Canada
Coconut Water	USA, Malaysia, China
VCO	EU, USA, China
Coconut Milk	EU, USA, China, Middle East

Source: Department of Agriculture

Country: VIET NAM

I. Coconut Production

Coconuts in Viet Nam are mainly grown in the Mekong Delta region of the South and in the Central region with extent of about 147 210 hectares. Production of about 818 000 000 nuts / year (equivalent to 181 800 metric tons of copra). The Mekong Delta region contributes more than 75 percent of Vietnam coconut production. This also is the centre of the coconut industry in Vietnam. The total production area in the Mekong Delta is approximately 110 000 hectares and Ben Tre has the greatest concentration of coconuts with 50 000 hectares of production land, almost 40 percent of the area of the Mekong Delta.

- **The major coconut regions or provinces**

The two main regions which produce coconut have different agro-ecological conditions. The Mekong Delta is characterized by water logging, fertile soil but often flooded and pre-disposed to salt-water intrusion while the Central region is characterized by poor sandy soil and at times affected by severe drought or typhoon. In general, the Mekong Delta is more suitable for coconut cultivation in Viet Nam and many coconut processing facilities are located in this region.

The land under coconut cultivation is 156 876 hectares, or roughly 4.1 percent of the total agricultural land of the country.

- **Number of people employed or dependent on the coconut industry**

There are about 4 000 000 Vietnamese people involved in coconut business (production, harvesting, processing, marketing and distribution) or 4.6 percent of the population. The economic, social and ecological value by the coconut makes it an important crop in the country.

II. Coconut Production in CY 2010, 2011, 2012 and Forecast for CY 2013

The annual coconut production in nuts and copra equivalent is shown on Table 1.

Table 1. Annual Coconut Production in Nut and Copra Equivalent

	Annual Nut Production (in million nuts)	Annual Production in Copra Equivalent (MT)
2010	818.200	181.822
2011	940.381	235.095
2012	1 015.141	253.785
2013 (estimate)	1 111.000	279.163

Source: VOCARIMEX

The trend of production is increasing since the coconut bearing palms are relatively young. However, the average coconut productivity is low, about 39 nuts/tree/year due to poor agriculture management.

The area under coconut by province is shown on Table 2.

Table 2. Area Under Coconut by Region (in Ha)

Name of Province	2010	2011	2012	2013 (*)
Ben Tre	50 000	50 814	67 710	67 910
Tra Vinh	14 100	14 301	15 731	16 300
Tien Giang	8 100	10 823	11 905	12 105
Kien Giang	8 110	8 110	6 110	6 110
Bac Lieu	6 200	6 200	3 000	3 000
Ca Mau	11 900	11 900	11 900	11 900
Binh Dinh	6 800	10 520	10 520	10 520
Others	42 000	42 000	30 000	30 000
Total	147 210	154 668	156 876	157 845

(*): estimate

Source: VOCARIMEX

Coconut planting areas in Vietnam are increasing steadily due to high demand in the local and international markets. Coconuts have higher adaptability to climate changes than other crops. Vietnam is one of the top five countries severely affected by climate change. Accordingly, the coconut is the first choice in affected areas.

The age profile of coconut trees is shown on Table 3.

Table 3. Age Profile of Coconut Farms

Percentage Young Palms (below 10 years)	Percentage Bearing Palms (above 10-60 years)	Percentage Senile Palms (above 60 years)
Ben Tre : 33	Ben Tre : 65	Ben Tre : 2
Binh Dinh : 5	Binh Dinh : 35	Binh Dinh : 60
Others : n.a	Others : n.a	Others : n.a

Source: VOCARIMEX

Constraints/Issues Related to Coconut Production and Farm Productivity

- Adoption of modern agriculture management system and technology is still limited; farmers do not invest in their coconut farms because of financial problem;
- There is a trend to plant dwarf coconut variety for drinking (price of tender nuts is also higher than that of tall mature nuts in the market), this affects raw material for industrial processing;
- Low coconut yield and production in the Central region due to poor farm management: higher percent of senile palms, poor soil, drought and infestation of Brontispa;
- Bad effects of climate change (sea water intrusion, drought, flood and typhoon) in both Mekong Delta and Central regions.

III. Policies to Promote Coconut Farm Productivity and Increase Farmer's Income

- Increase of coconut planting as small holding programme;
- Increase national production and farm yield by providing quality coconut seedlings with high-yielding and high-value varieties;
- Acceleration of coconut extension and poverty reduction programmes;
- Pest control (Brontispa);
- Recommendation for organic fertilizers application and intercropping with other crops such as cocoa, citrus, banana;
- Land use rights (especially for the Central region);
- Aromatic varieties were admitted to national varieties;
- Promotion of value-added coconut processing for all parts of the coconut;
- Link coconut farmers to the market (processors, traders, investors);
- Capital/loan without interest for coconut new planting/replanting;
- No export tax for coconut products.

Coconut Replanting/New Planting, Rehabilitation and Farm Productivity Programmes

Coconut Replanting/New Planting Programme

At the national level, there have been 3 projects: “Development and Production of Coconut Seedlings” funded by The Ministry of Industry and Trade (phase 1 from 2006-2008, phase 2 from 2009-2010, and phase 3 from 2011 – 2015). In addition, there are some R&D projects on coconut farming technologies and coconut processing. In these projects, coconut growers got benefit from technical trainings, good seedlings, fertilizers for demonstration sites. These have resulted in increasing coconut production and farm productivity significantly.

The Governments of coconut growing provinces have plans to develop the coconut sector, for example:

In Ben Tre province:

- “Improving production in coconut farms phase 2012 – 2016” which will cover 5 000 hectares.
- Funding for fertilizer and labor which is about 1 500 000 VND/ha to help farmers maintain their coconut farms.

In the Central region, coconut projects were funded by the Ministry of Agriculture and Rural Development (MARD) on “Researching on Coconut Varieties and Suitable Techniques in Planting in order to Increase Yield Phase 2012 - 2014”.

Table 4 shows the target area and actual achievements in replanting and new planting in CY 2010, 2011 and 2012.

Table 4. Target Area and Actual Achievements in Replanting and New Planting in CY 2010, 2011 and 2012

	Target Area of Replanting (Ha)	Actual Area of Replanting (Ha)	Target Area of New Planting (Ha)*	Actual Area of New Planting (Ha)
2010	700	100	600	4 059
2011	200	200	1 000	7 000
2012	300	300	3 000	2 000

* New planting areas

Coconut Rehabilitation by Intercropping and Livestock Integration

The coconut holdings in Viet Nam is small, so that intercropping and livestock integration is very necessary. Models/kinds of intercropping are dependent on the demand of the market. Some models have been introduced such as: coconut with cocoa, citrus, banana, mangosteen, rice, sugarcanes, fish, shrimps in drainage canals, cassava, grass for feeding cows, pigs and chickens.

Intercropping and livestock integration under coconut could increase the farmers income by 2 - 3 times. These models are multiplied nationwide in coconut growing communities.

Table 5. Intercropping and Livestock Integration in Coconut Farms: Actual Accomplishments in CY 2010, 2011 and Target for CY 2012

	Intercropping *		Livestock *	
	Intercrop 1 (Ha) <i>Fruit crops</i>	Intercrop 2 (Ha) <i>Cocoa</i>	No. of animals (1) dispersed <i>Shrimps (Ha)</i>	No. of animals (2) dispersed
2010	15 400	6 333	2 000	n.a
2011	15 600	10 000	2 100	n.a
2012	16 700	14 000	2 300	n.a

Source: VOCARIMEX and IOOP

The above data are from Ben Tre, where the coconut farmers have the most experience in intercropping and livestock production under coconut farms.

Coconut Rehabilitation by Fertilizer Application

- Thru annual R&D projects, the government has recommended to the farmers to apply fertilizers to their coconut to increase yield. In general, there are fertilizer recommendations (with emphasis on using organic matter) suitable for each stage of coconut development as well as for each ecological region of the country. Also through these projects, coconut farmers receive technical assistance and fertilizers for demonstration. Results of these projects showed that fertilizer application helped increase the yield of coconut up to 50-60 percent compared with the control.
- National coconut project (phase 3) 2011 – 2015 conducted by the Research Institute on Oils and Oil Plants with some demonstrations in organic fertilizer.
- An R&D project is being conducted in the Central region for organic fertilizer from coir dust of coconut or coco peat.
- Ben Tre province has a policy for funding fertilizer to help coconut farmers
- Binh Dinh province is building up a project to increase coconut yield within the next year by using fertilizers (KCl and coconut coirdust).

Table 6. Target Area and Actual Accomplishments on Coconut Rehabilitation by Fertilization in CY 2010, 2011 and 2012

(Data from Ben Tre Province, the main coconut producing area)

	Target Area of Fertilization (Ha)	Actual Area Fertilized (Ha)
2010	40 000	41 000
2011	42 000	44 000
2012	45 000	55 000

Source: VOCARIMEX and IOOP

IV. Coconut Processing

Table 7 shows the production and export of traditional coconut products in CY 2010 and 2012.

Table 7. Production and Exports of Traditional Coconut Products in CY 2010 and 2012

	2010		2012	
	Production (MT)	Production (MT)	Production (MT)	Exports (MT)
Coconut Candy	Ben Tre: 19 000	Ben Tre: 19 000	Ben Tre: 4 345	Ben Tre: 4 345
Coconut Oil	BT+Tra Vinh: 1 445	BT+Tra Vinh: 1 445	Ben Tre: 2 236	Ben Tre: 2 236
Copra Meal	BT: n.a TV: 115	BT: n.a TV: 115		
Desiccated Coconut	BT+TV: 43 500	BT+TV: 43 500	Ben Tre: 19 959	Ben Tre: 19 959
Coconut Milk & Powder	BT: 800	BT: 800	Ben Tre: 5 822	Ben Tre: 5 822
Charcoal TV: n.a	BT: 28 000	BT: 28 000	Ben Tre: 6 070	Ben Tre: 6 070
Activated Charcoal BT: n.a	TV: 3 820	TV: 3 820	Ben Tre: 5 025	Ben Tre: 5 025
- Coconut Fiber	BT+TV: 80.000	BT+TV: 80.000		

Source data of 2012: Ben Tre and Tra Vinh provinces only, VOCARIMEX and IOOP

V. Coconut Product Utilization and Marketing

It is estimated that about 15 percent of nuts are used by households (culinary purpose, tender coconut for drinking, worship purpose, etc.), 12.4 percent for export as material, 72.6 percent are produced into high value products such as coconut candy, DC, coconut milk and coconut fiber.

Table 8 shows the average FOB price of major coconut products for CY 2010, 2011 and 2012 in US\$.

Table 8. Average FOB. Price of Major Coconut Products per Metric Ton in US\$ for CY 2010 and 2012

	2010	2012
Coconut Candy	838.89	1 075
Coconut Oil	1 090	942
DC	1 129.52	1 385
Coconut Milk Powder	2 562.45	2 930
Charcoal	144.88	227
Activated Carbon	1 250	2 149

Source: Ben Tre Province, VOCARIMEX and IOOP

Number of Coconut Processing Plants and their Capacities for CY 2010, 2011 and 2012

Canned coconut milk and low fatty of desiccated coconut mills in Ben Tre province which are partly funded by the Government.

Table 9. Number of Coconut Product Processing Plants and their Capacities in CY 2011

	Number	Total Capacity (Ton/year)
Coconut Oil Mills	4	19 800
DC Mills	7	76 600
Coconut Milk Powder Mills	2	20 400
Activated Carbon Mills	2	4 720
Fiber Processing Units	25	115 000
Coconut Candy Units	50	30 000

List of Coconut Oil Mills

	Name	Capacity (MT/year)
1.	Tien Phat Limited Company	-
2.	Luong Quoi Coconut Processing One Member Limited Company	7 200
3.	Pha Le Coconut Oil Joint Stock Company	5 400
4	Tra Vinh Coconut Processing Company	7 200
Total		19 800

List of Desiccated Coconut Mills

	Name	Capacity (MT/year)
1.	Tan Phuoc Hung Desiccated Coconut Mill	9 000
2.	Pham Hong Son Enterprise	10 800
3.	Tan Cuong Enterprise	10 800
4.	Dinh Phu My Limited Company	21 600
5.	Ben Tre Im-export Joint Stock Company	14 400
6.	Tra Bac Joint Stock Corporation	4 000
7.	BTCO Co. Ltd.	6 000
Total		76 600

List of Coconut Milk Mills

	Name	Capacity (MT/year)
1.	Luong Quoi Coconut Processing One Member Limited Company	14 400
2.	Viet world company	6 000
Total		20 400

List of Activated Charcoal Mills

	Name	Capacity (MT/year)
1.	Tra Bac Joint Stock Corporation	4 000
2.	Bac Giai joint stock company	720
Total		4 720

Update of Recently Adopted National Quality Standards of Coconut Products

- VCO product standard as national standard was published in 2010;
- Desiccated coconut standard as national standard was published in 2012;

- The Ministry of Agriculture and Rural Development of the Socialist Republic of Viet Nam has promulgated Circular No. 13/2011/TT-BNNPTNT on 16th March 2011 guiding the food safety control for imported foodstuffs of plant origin, including coconut.

Table 10 shows the major market destinations of traditional coconut products

Table 10. Major Market Destinations of Traditional Coconut Products in CY 2012

	2012
Coconut Candy	China
DC	Egypt, Sri Lanka, UAE, South Africa, UK, France, Germany, Jordan, China
Coconut Milk Powder	Thailand, Malaysia, China, New Zealand
Activated Carbon	UK, Germany, Singapore, Ukraine, Russia
Coir Fiber	China, Taiwan, South Korea, France

Source: VOCARIMEX

Table 11. Major Market Destinations of Non-Traditional Coconut Products in CY 2012

	2012
Nata de Coco	China, Taiwan
Coconut coirdust	China, South Korea, Taiwan, Japan

Government Policies and Support Related to Coconut Trade and Market

- Tariff for the export of raw nuts is 0 percent.
- Coconut is one of the many crops which contribute to foreign income for the country. Since 2009, coconut festival has been organized bi-annually with funding from government.
- Trade Promotion Department (Ministry of Industry and Trade) also helped coconut processors link with foreign markets.
- Government's support for coconut industry market promotion, e.g. conduct of domestic trade fairs, coco week and/or world coconut day celebration, conduct and/or participation in international trade fairs/exhibitions.
- Government funding for new product research and development, coconut festival (recognized as national festival), joining international fairs/exhibitions.

VALUE CHAIN ANALYSIS OF THE COCONUT SECTOR IN THE ASIAN REGION

1. Coconut Resource Base in the Asian Region

It is estimated that the Asian Region has a coconut resource base of about 53.5 billion nuts per year (APCC Statistical Yearbook, 2011). The top six countries are India with 16.9 billion nuts, Indonesia with 15.3 billion nuts, Philippines with 15.25 billion nuts, Sri Lanka with 2.71 billion nuts, Viet Nam with 940 million nuts, and Thailand with 845 million nuts.

In terms of area, the top six countries in Asia are Indonesia with 3.808 million hectares, Philippines with 3.562 million hectares, India with 1.896 million hectares, Sri Lanka with 395 000 hectares, Thailand with 216 000 hectares and Viet Nam with 155 000 hectares.

Coconuts remain valuable as a source of food and for other uses. The coconut as a crop is also valuable to the island communities especially in the coastal areas as a natural resource adaptable to climate change and as a protection to sudden sea water intrusion, flooding, erosion and other stresses.

About 15 to 30 percent of the coconut palms in the Asian region have passed their economic bearing age of 60 years and are therefore senile and are less productive. However, farmers have shown very little motivation in replanting their ageing or senile coconut palms. With low commercial value of their coconut harvest, there is not much reason for them to undertake coconut replanting. It is argued that it is only when the coconuts will have greater value that the farmers will find every possibility to maximize their yields and productivity.

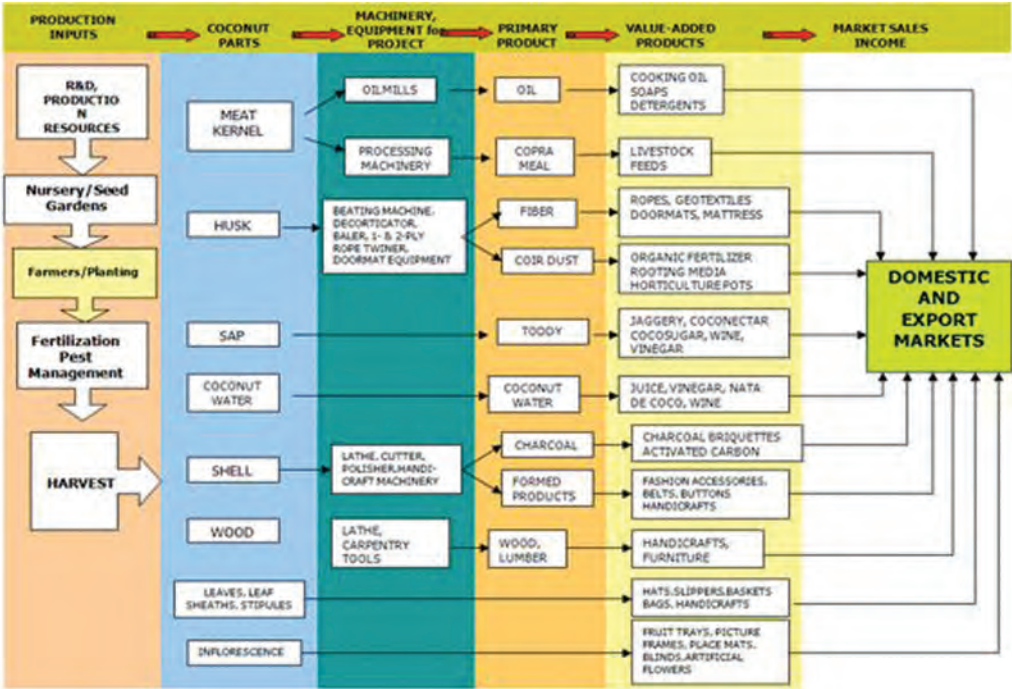
Most governments in the Asian region have put up and implemented coconut replanting and rehabilitation programmes to assist the coconut farmers in replacing their senile palms and increase farm productivity but the availability of good varieties or quality planting materials or hybrids is limited. The coconut development road map of the government should therefore ensure the availability of quality materials to accelerate the replanting programme. To provide more incentives for replanting, adequate economic incentives to add value to coconut as a natural resource base must be pursued. It should be recognized that there are tremendous possibilities to exploit the potential value-added products of coconut in the value chain. The big volume of coconut timber from felled coconut logs during replanting must be also put to commercial use.

2. Value Chain Concept and Value Chain in the Coconut Industry

The value chain as a set of interlinked value-adding activities should provide the opportunities to convert inputs into outputs which in turn add more worth of the product and help create competitive advantage. Identifying and analysing the value chain in the coconut industry should enable us to improve the value of the end product, promote quality and efficiency as well as competitiveness and profitability. Value chain analysis should therefore concentrate more on value creation, innovation, product development and marketing while supply chain analysis gives primary focus on cost reduction and efficiencies of supply.

Below is a graphical presentation of the supply and value chain of the coconut.

Coconut Industry: Supply-Value Chain



Source: APCC and PCA

3. Value-Added Coconut Products in the Value Chain of the Coconut Sector in the Asian Region

The graphical presentation of the value chain of coconut shown in 2 shows the magnitude and potential for commercial coconut processing and value addition in the coconut industry. The challenge is to explore and produce more value-added coconut products rather than just copra. While there is really no data derived from actual survey, it is estimated that out of the total nuts produced, approximately 30 percent to 70 percent is utilized for household consumption; 30 percent to 75 percent for copra, 10 percent to 15 percent for desiccated coconut, coconut cream/milk and coconut water.

The Philippines is the biggest exporter of coconut products, mainly crude coconut oil (CNO) and CNO-based products (approximately 60 percent) and desiccated coconut, coconut cream/milk and coconut water (approximately 15 percent of total production). Domestic consumption of coconut products in the Philippines is only approximately 25 percent of total production. Indonesia on the other hand consumes approximately 70 percent to 80 percent of its total production for cooking and household consumption. Only about 20 percent - 30 percent is exported as crude coconut oil, desiccated coconut, coconut milk/cream, coconut water and other CNO-based products.

Sri Lanka has the highest per capita consumption of coconut at 116 nuts per person per year. Thus, Sri Lanka also domestically consumes 70% of its total production. Sri Lanka and India are the biggest exporters of coconut coir and coir-based products while the Philippines, Indonesia and Sri Lanka are three biggest exporters of desiccated coconut.

The Philippines is currently exporting about 38 coconut-based primary and downstream products and by-products from the coconut. The average foreign exchange earnings from coconut products for 10 years (2002 – 2011) amount to US\$ 1.113 Billion. The high value coconut products from the Philippines include a) virgin coconut oil, b) coconut milk powder, c) coconut flour, d) desiccated coconut, e) coconut milk/cream, and f) coconut shell charcoal-based activated carbon.

COMPARATIVE EXPORT PERFORMANCE OF HIGH VALUE COCONUT PRODUCTS				
PRODUCT	Ave. (2002 – 2011)		2012	
	Volume MT	Unit Price US \$/MT	Volume MT	Unit Price US \$/MT
Desiccated Coconut (DC)	118,963	1,292.48	98,876	2,020.09
Activated Carbon (AC)	28,764	1,173.30	41,449	1,733.82
Liquid Coconut Milk (LCM)	1,902	1,413.05	3,104	1,814.26
Coconut Milk Powder (CMP)	1,563	2,868.28	1,599	3,610.99
Virgin Coconut Oil (VCO)	1,422	3,490.89	6,002	4,082.43
Coconut Flour (CF)	790	1,059.28	564	2,384.95

Source of Basic Data: PCA and UCAP

Desiccated coconut is used as an ingredient in five major industries. These are in confectionary products, bakery goods, frozen food, consumer food processing and general food processing.

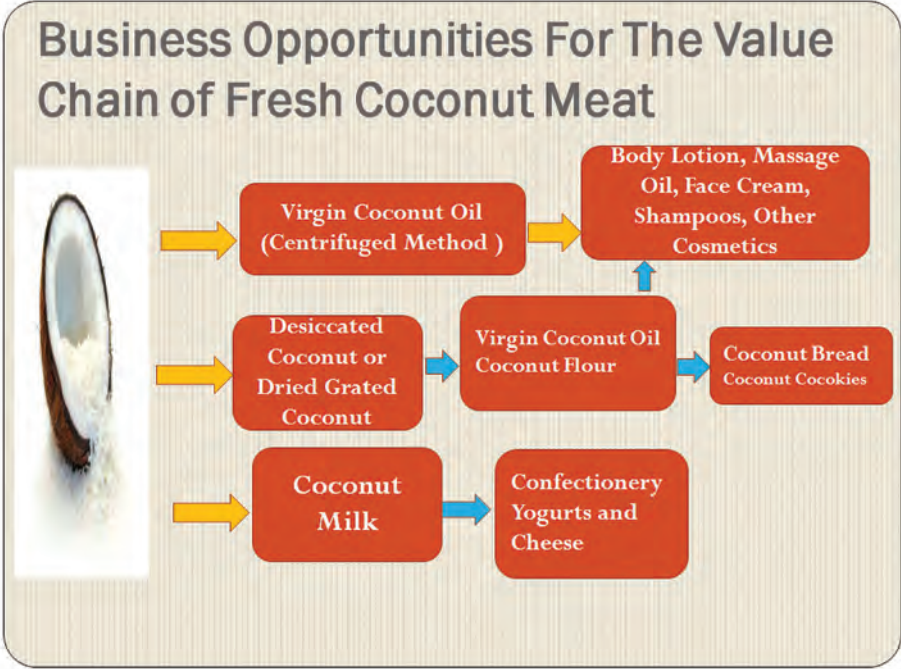
Coconut shell charcoal-based activated carbon is used in big quantities in water treatment/purification, mineral processing, oil and fats, food and beverage, pharmaceutical, electroplating industries and others.

Coconut milk products are used as ingredients in the preparation of various dishes like exotic curries and other dish mixes. It is also used in the preparation of refreshing drinks and smoothening diluted with ice and mixed with nata de coco. It is likewise used in confectionaries, bakery products and native delicacies.

Virgin coconut oil (VCO) has multi-functional uses thereby providing flexibility in marketing. VCO can be utilized in all edible and non-edible applications. A lot of people all over the world are now ingesting VCO as a food supplement to boost their immune system, assist in mitigating symptoms of several diseases and other health benefits. If it is used as a base for hypoallergenic cosmetics, soaps, and skin care products. It is also used as a base for aromatherapy and massage oil including as body lotion, body scrub and as hair and skin conditioner.

It is estimated that depending of the value of the end products in the export market, the average price to be paid for one whole coconut should be approximately 11 US cents if sold for coconut crude oil processing including copra meal, 33 US cents if sold for desiccated coconuts and 55 US cents if sold for the processing of coconut milk and water (Chand, V., 2012). An analysis on the value of raw and mature coconuts for processing into Virgin Coconut Oil (VCO) would reveal that at an FOB price of US\$ 5.00 per litre and on the assumption that 12 coconuts will produce one litre of VCO, the additional value of one coconut would be 42 US cents. Assuming a production cost of 5 US cents per coconut, the value of one whole coconut should be 37 US cents.

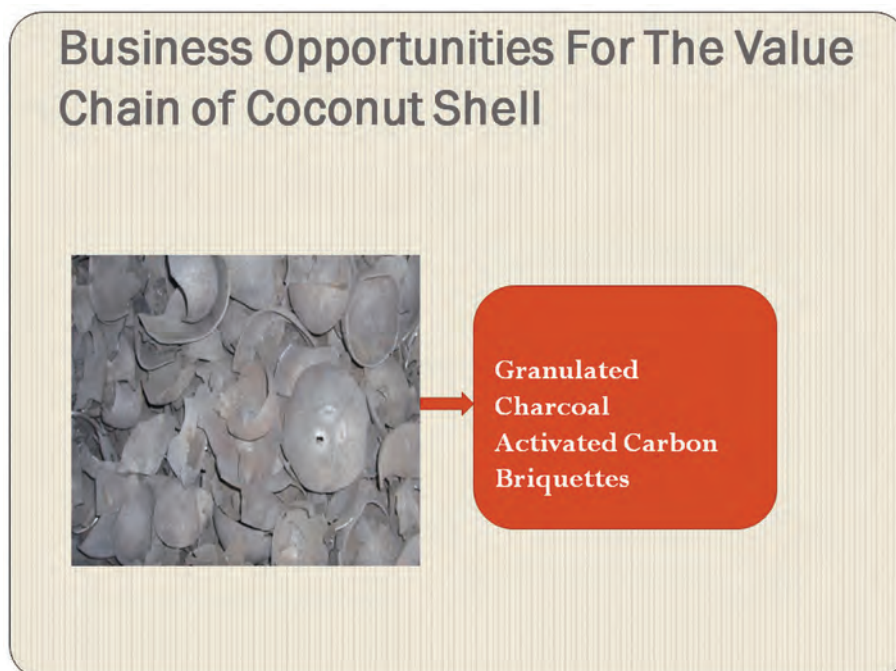
There is also economic potential to use the residue in the processing of VCO. This by-product can be further processed into coconut flour. A kilo of coconut flour can have an FOB price of US\$ 6 instead of just throwing it or using it as feed to livestock.



The husk can also be processed into coconut coir fiber for rubberized mattress, geotextiles for the control of soil erosion, and coconut pith for horticulture use as planting medium or as organic fertilizers. Coir fiber can fetch an average FOB price of US\$ 350 per metric ton, while coconut pith or cocopeat can fetch an average FOB price of US\$ 300 per metric ton.



The coconut shell can likewise be processed into charcoal and coconut shell charcoal-based activated carbon. Charcoal can fetch an average FOB price of US\$ 500 per metric ton while the average price of coconut shell based-activated carbon is US\$ 2,100 per metric ton. All these value-added products from the mature whole coconuts should increase the value of the raw material at the farm gate level.



The business opportunities discussed above illustrates that value addition and more income can be derived from various products in the value chain. In the current practice of traditional copra production, one ton of copra would require approximately 6 000 nuts or 6 nuts to a kilogramme of copra. Given an average copra price of US\$ 500 per metric ton of copra, this will translate to only 8 US cents per nut, at the oil mill. In turn, the farm gate price will only be 5 or 4 US cents depending on the distance of the farms and the quality of the copra produced. At this price level, the farmers will not have much incentive to harvest or gather the coconuts and process/dry the meat into copra much less replant their senile coconut palms.

REGIONAL GAPS, ISSUES AND COMMON PROBLEMS

Particulars	Regional Gaps, Issues and Common Problems	Reasons and Contributing Factors
Production	<ul style="list-style-type: none"> - Low Coconut Production and Low Farm Productivity 	<ul style="list-style-type: none"> - Senile palms - Poor farm management - Lack of Coconut-Based Farming Systems Models - Lack of Quality planting materials - Pest and diseases - High cost of inputs - Natural calamities: drought, typhoons, flooding due to climate change - Indiscriminate cutting of coconut trees - Conversion to more profitable crops like oil palms, rubber, etc. or other commercial use of land - Land Tenure Problems
Processing	<ul style="list-style-type: none"> - Lack of Capital and Financing - Limited knowledge and skills in appropriate coconut processing technologies 	<ul style="list-style-type: none"> - Limited access to credit - Not bankable farmers (smallholders) - Not organized as viable CBO's/coops - Lack of knowledge on GMP, HACCP and Quality Standards
Processing	<ul style="list-style-type: none"> - High cost of machineries; Lack of access to appropriate machineries 	

Particulars	Regional Gaps, Issues and Common Problems	Reasons and Contributing Factors
	<p>Economic</p> <ul style="list-style-type: none"> - Viability and Sustainability of Small-scale Processing Ventures - Logistics and Infrastructure - 	<ul style="list-style-type: none"> - Too small in size (needs to be scaled up to be economically viable) - Availability of electricity, transport facilities and cost of shipping
Marketing	<ul style="list-style-type: none"> - Low prices/widely fluctuating farm gate prices - Poor marketing system - Low domestic utilization / Low domestic market demand - Lack of access to markets 	<ul style="list-style-type: none"> - Competition from other vegetable oils, products - Multi-layered copra trading (chain of middlemen) - Smallholders not organized as marketing coop for bulk trading - Lack of knowledge on health benefits of coconut products - Lack of knowledge on environment-friendly products from coconut - Remoteness of farms, poor infrastructure, high transport / shipping costs - Lack of market information - Limited market promotion
Others	<ul style="list-style-type: none"> - Policies and Government Support - Focused and Aggressive Coconut Development Programs - Economic Incentives - Infrastructure Development - Development of Economically Viable Coconut Farmers Coops/CBO's 	<ul style="list-style-type: none"> -

The table above summarizes the regional gaps, issues, common problems and the probable issues of problems. To further develop the coconut sector in the Asian region, meaningful interventions must be implemented along the value chain of the coconut industry, including policy issues and focused coconut development programmes.

RECOMMENDATIONS

1. There is a need to rehabilitate senile and unproductive palms in coconut growing countries in Asia.

This will require coconut replanting using selected elite local varieties and hybrids. Germplasm exchange and capacity building within the countries to develop capability on mass selection techniques, coconut breeding and hybridization should be pursued. Since coconuts can tolerate salinity and are highly adapted to the coastal zones, priority in replanting may be considered in these areas. This should contribute to the total carbon sink and prevent coastal erosion and massive sea water intrusion due to climate change. Breeding for drought tolerant varieties, high lauric oil content, precocity or earliness of bearing, and high nut production should also be pursued.

2. The lack of quality coconut planting materials must be addressed.

This will require more seedgardens to produce high yielding and early bearing coconut hybrids. The private sector may also be encouraged to establish commercial seedgardens to meet the required quantities of good quality planting materials for the replanting program. Research on using somatic embryogenesis to mass propagate selected high yielding hybrids should also be vigorously pursued. The genetic based of coconut varieties should therefore be expanded and characterized for breeding and development of hybrids for specific purposes or uses.

One immediate and practical option is the use of selected local elite varieties. Thus, capabilities on mass selection techniques must be developed among extensionists and the coconut farmers to enable them to choose the best quality planting materials from the existing local varieties. An accreditation system of coconut farms with good local elite varieties should also be put in place.

Another option is to develop the capabilities of the farmers to produce coconut hybrids in their own farms, as practiced in Sri Lanka and the Philippines. This usually involves crossing a yellow or red dwarf variety with a selected local tall variety using the dwarf variety as the female progenitor, and selection of authentic hybrid seedlings is based mainly on the pigmentation (colour) of the germinating hybrid seednuts. The mass production of hybrids by coconut farmers in their own farms should contribute to the number of improved quality materials for the coconut replanting program.

3. Commercial coconut wood utilization should be promoted.

To provide an economic incentive for replanting or cutting of senile and unproductive coconut palms, there must be a buyer of coconut logs. Commercial coconut wood utilization should therefore be encouraged and investment in this area must be promoted to provide lumber/coconut wood for housing and furniture making. This should also provide for a diversification strategy away from forest timber and avoid degradation of the forest and depletion of the forest resources in the Asian region.

A pilot project on coconut timber utilization in collaboration with appropriate stakeholders in coconut growing countries may be explored. Mobile sawmills equipped with tungsten carbide saws may be piloted with the appropriate techniques and technologies in coconut logging, saw milling (correct cutting patterns), drying and machining. A technical assistance project on this regard is desirable.

4. There is a need to develop strategies against emerging coconut pests and diseases.

As pests and diseases cause low yields, research on environment friendly biocontrol strategies using natural predators, pheromones and biopesticides must be pursued. Farm sanitation, group efforts through Farmer Field Schools must be widely promoted and practiced. Research on breeding for tolerant varieties especially against emerging/new coconut diseases must be pursued.

5. Coconut-Based Farming Systems models should be further developed, promoted and practiced.

To ensure food security, good nutrition and additional income in coconut communities, coconut-based farming system models involving intercropping of food crops, vegetables, fruit trees and industrial crops like coffee and cacao in between the coconut palms, as well as raising livestock like goats, cattle, chicken, etc. in the coconut farms must be vigorously promoted and practiced. Produce from intercrops and cash crops together with income from livestock should ensure food security and a sustainable source of livelihood. Technical assistance and guidance must be provided to enable the coconut farmers to adopt good agricultural practices (GAP) in coconut farming.

6. Value-added coconut processing must be promoted.

To be resilient in times of price volatilities, coconut farmers must not depend on copra alone. Value-added processing of various coconut products can also add income to the farming family. Coconut value-added products like virgin coconut oil, VCO-based soap and cosmetic products, coconut sugar, coconut vinegar, nata de coco, young tender coconuts, coconut shell charcoal and activated carbon, coir and coir-based products are some of the products that could add income to the coconut farmers. Technical assistance on coconut processing technologies, good manufacturing practices (GMP), promotion of quality standards and access to markets should therefore be provided to

ensure viability and sustainability of value added processing ventures in coconut communities.

There is much potential to further develop the coconut husk industry (processing of coconut coir and coir-based products) especially in the Philippines and Indonesia, where so much raw material exists. The value added processing of coconut shell charcoal into activated carbon (AC) has so much potential as global demand for AC is increasing annually. The challenge is to focus on high value coconut products and by-products with health and environment-friendly applications.

7. Promote joint ventures among coconut growing countries.

To take advantage of the synergistic effects of sharing technologies (technical know-how and experience), raw materials, and access to niche markets, joint ventures within and among coconut growing countries should be encouraged. The government in collaboration with the private stakeholders can play a facilitating role in this regard.

8. Promote the health attributes of coconut products through an aggressive awareness campaign and through joint R & D efforts in the conduct of clinical trials.

Studies on coconut oil, and its main component which are known as medium chain fatty acids, have shown that it is beneficial as a dietary oil, as a food supplement or functional food and as a therapeutic agent. Because it can speed up the metabolism, it can readily provide energy and can even be beneficial for weight loss. Coconut oil has shown to enhance the immune system and has anti-microbial properties. Researchers assert that there is scientific basis for the many testimonial evidences on the health attributes of coconut oil. However, many of these require further research using adequate population sample size through the conduct of clinical trials/studies.

Greater awareness of the beneficial qualities of coconut products should increase domestic and export demand.

9. Enhance market promotion in traditional and niche markets.

Coconut products can be certified as organic, GMO-free, natural, healthy and environment-friendly. To improve market access of coconut products, the conduct of market promotional campaigns in the buying countries and niche markets through participation in high-impact trade exhibitions, technical seminars on the health and nutritional aspects of coconut products must be intensified. These efforts should contribute to the growth of the demand for coconut products.

10. Strengthen the national coconut extension service.

To ensure efficiency and effectiveness in program implementation, the Governments in the Asian countries should strengthen the National Coconut Extension Service. The

extension delivery services to coconut farmers and women folks in the coconut farming communities must be vigorously pursued.

Capacity building and training programs for coconut subject matter specialists/ extensionists, coconut farmers and coconut processors must be provided with technical assistance from international development or donor agencies. This should include technologies in coconut replanting, varietal screening, coconut breeding, seedling selection, coconut-based cropping systems, good agricultural practices and others. In the processing sector, technologies on Good Manufacturing Practices (GMP), HACCP and ISO Certification, Organic Certification, and product quality standards must be provided.

11. Facilitate and support the formation of economically viable CBO's / coconut farmers' coope ratives.

The formation of coconut producers associations or cooperatives in the Asian countries must also be facilitated/supported. This should ensure inclusive development among the rural coconut farming communities and at the same time promote greater efficiency an effectiveness in the delivery of extension services, financing and capacity building activities. The establishment of nucleus estates or the adoption of the cluster approach to coconut farming and marketing may also be pursued.

12. Coconut should be a priority crop in the national agricultural development agenda.

To encourage investments in the coconut sector, the government, as matter of policy, must consider coconut as a priority crop in its national agricultural development agenda. The government and private financial sector through the banking system should provide support through reasonable credit schemes for coconut processing business ventures. These investments must be market-led or demand-driven, and the support for financing must be include professional guidance on branding, packaging and market-matching assistance.

BIBLIOGRAPHY

Agustin, Yvonne, TV., et. al. (2012). Annual Coconut Statistics Vol. VII, No. 15. United Coconut Associations of the Philippines (UCAP), Pasig City, Manila, Philippines.

Amrizal, Idroes. (2011). APCC Annual Coconut Statistical Yearbook. Asian and Pacific Coconut Community (APCC), Jakarta, Indonesia.

Arancon, Romulo Jr., N. (2013). Prospects of Value-Added Coconut Products in the Domestic and Export Market. The APCC-DOA International Training on the Processing of Value-Added Coconut Products, Bangkok, Thailand.

Arancon, Romulo Jr., N. (2012). Proceedings of the APCC XLV International COCOTECH Meeting: Inclusive Growth and Sustainable Development of the Coconut Industry, Kochi, India.

Bureau of Agriculture Economics and Planning, Ministry of Agriculture and Cooperatives, Thailand. (2013). Briefer on the Strategic Plan for Coconut Industry Development (Draft) of Thailand, Bangkok, Thailand.

Bawalan, Divina, D. (2013). Processing of High Value Coconut Products: Lessons from the Philippines. Paper presented at the Gorontalo International Coconut Conference, Gorontalo, Indonesia.

Coconut Cultivation Board, Sri Lanka. (2013). Role of Coconut Cultivation Board in the Present Scenario of Coconut Sector Development, Colombo, Sri Lanka.

Department of Agrarian Reform, Quezon II Provincial Office, Philippines. (2013). Briefer on the Program Beneficiaries Development (PBD) Plans and Activities for Quezon II, Philippines.

Department of Agriculture, Philippines. (2013). Investment Areas: Coconut Products and By-Products, Quezon City, Philippines.

Department of Agriculture, Quezon Provincial Agriculture Office, Philippines. (2013). Briefer on Coconut Development Programs in Quezon Province, Philippines.

Dy, Roland, et. al. (2011). The Business of Agribusiness. From the Roots to the Fruits. University of Asia and the Pacific (UAP), Manila, Philippines.

Gunathilake, H.A.J. (2013). R&D Overview of the Coconut Research Institute, Lunuwila, Sri Lanka.

Manohar, Erlene, et. al. (2011). Coconut Industry Development Roadmap. Philippine Coconut Authority (PCA), Department of Agriculture, Quezon City, Philippines.

Naka, Peyanoot. (2013). Country Paper on the Status of the Coconut Industry in Thailand. In Proceedings of the XLIX APCC Session/Ministerial Meeting, Nadi, Fiji.

Nghia, Trong, Nguyen. (2013). Country Paper on the Status of the Coconut Industry in Vietnam. In Proceedings of the XLIX APCC Session/Ministerial Meeting, Nadi, Fiji.

Pangahas, Bonifacio. (2011). Country Paper on the Status of the Philippine Coconut Industry. In Proceedings of the XLVIII APCC Session/Ministerial Meeting, Honiara, Solomon Islands.

Philippine Council of Agriculture and Aquatic Resources Research and Development. (2013). Coconut Industry Strategic Science and Technology (S&T) Plan of the Philippine Council of Agriculture and Aquatic Resources Research and Development (PCAARRD), Los Banos, Philippines.

Salim, Aidil Chandra. (2013). Country Paper on the Status of the Coconut Industry in Indonesia. In Proceedings of the XLIX APCC Session/Ministerial Meeting, Nadi, Fiji.

Setiawan, Yang Yang, et. al. (2013). Briefer on the R&D Status and Accomplishments of the Institute for Research and Development for Agroc-Based Industry, Bogor, Indonesia.

Somaweera, Nihal. (2013). Country Paper on the Status of the Coconut Industry in Sri Lanka. In Proceedings of the XLIX APCC Session/Ministerial Meeting, Nadi, Fiji.

Tuan, Duong Anh. (2013). Briefer on the Status of the Coconut Sector in Vietnam. Vietnam Vegetable Oils Industry Corporation (Vocarimex), Hochiminh City, Vietnam

