**Appendix 7**

**Levelling the Playing Field:**
**Fair Partnership for Local Development to Improve the Forest Sustainability in Southeast Asia**

DRAFT

# Report of Market Study

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# Market Chain Study of Selected Commodities in Palawan

## Introduction

People who live close to the forest are often the poorest in spite of the riches of the natural resources in their surroundings. Leveling the Playing Field (LPF) Project intends to promote fair benefit sharing among relevant stakeholders, particularly the local people, from renewable resource management. The final goal of the project is to help people in improving their livelihood while maintaining long-term perspectives in managing the resources. In addition, the project will provide accurate and relevant information to stakeholders so that they can make good decisions regarding their environment.

Market is an important element in management of renewable resources. Reality shows, however, that local people usually have a weak bargaining power even when conducive policies to support them exist. The project tries to help local people through several ways. One way is by providing local communities with access to information about the market. By having the overview about the market, its structure, etc., it is expected that local people could strengthen their bargaining power through improved marketing strategies. Other ways include helping local communities to be more efficient in achieving their own goals, and to add value to their product. Against this backdrop, the LPF Project conducts this market study in its Philippine site in Palawan.

## Objectives

The general objective of this study is to determine the market intervention measures that will improve the living condition of the project site beneficiaries. Specifically, the study has the following objectives:

1. To gather baseline information on the study sites;
2. To conduct a market exploratory survey to determine the marketable products in the study sites;
3. To describe the marketing chain for the identified agricultural products;
4. To assess the market potential of the identified agricultural products using primary and secondary data; and
5. To recommend an agenda for action for improving the beneficiaries' living condition via market intervention measures.

# Methodology

## Study Area

The study area covered the LPF project site in three barangays in Puerto Princesa City, namely: San Rafael, Tanabag and Concepcion. The locations of the villages represent the upland, lowland and coastal ecological settings. The site also includes the 5000-hectare community based forest management area in the three villages. Other areas included in the study are the DA-ATI Seaweeds Pilot Project in Narra, Palawan, Puerto Princesa City poblacion, and the market outlets in Manila.

## Data Collection

Primary and secondary data were used in the study. Primary data were used in the first phase of the study while secondary data were utilized in the second phase.

Phase 1 covered the exploratory appraisal of marketable products in the identified three barangays. The exploratory survey was conducted from October 17-28, 2004 on the products currently produced in the area. Information gathered focused on the local conditions of production such as harvest, labor, prices and trade systems in the marketing chain. Likewise, traders engaged in the marketing of the selected products were interviewed for this study.

Selection of the products was based on the information collected from personal interviews and observation of the respondents in the marketing chain. The following criteria were used to determine the products for further study:

- Importance as a source of income for the local people
- Demand (local, national or international market)
- Impact on environment
- Sustainability and volume
- Access and conditions of the market chain

Once the marketable products were identified, a review of literature was conducted to support the initial findings of Phase 1. The data for Phase 2 were obtained from published and unpublished reports from various private and government institutions (Bureau of Agricultural Statistics, PCAMRD, ERDB, PCARRD, Bureau of Foreign Trade and Export Promotions, Department of Agriculture, UPLB, University of Asia and the Pacific, etc.) and through the Internet. The data were analyzed and summarized to obtain the objectives of the study, i.e. to have an exhaustive review of literature for the identified agricultural products. Initially the study included cashew and seaweeds only but almaciga was later on added. There was reluctance to include almaciga given the dearth of literature on the product. Thus any output on almaciga are the only available literature on the subject.

Phase 2 analyzed the potential of the industry. It examined the uses of the products, the demand and supply situation, the products' marketing system, value chain analysis, the institutions, and the problems and prospects of the industry. The total available supply covers local production and importation while the domestic demand

for the commodity (per capita consumption, processing, seeds, etc) and foreign demand (via exportation) comprises the demand for the commodity. Through the industry analysis, the prospect of the industry in the market could be ascertained.

# Results of the Study

## Phase 1 - Exploration Study: Palawan Experience

There is no standard definition of market chain study. This is how the research team understood it. It is an appraisal about what is happening in a trade network observing the stakeholders at each level and see how they interact.

The study also looked at the structure and flows. The flows cover not only the exchange of goods but also the exchange of information. The first intervention is providing information to stakeholders who usually do not have access to it. Then capacitating tools for dealing or stronger bargaining position were given to the stakeholders. LPF does not wish to negotiate products on behalf of communities (some can misunderstand) but coach them (until they would not need the research team anymore).

The first phase of the study conducted an 'exploratory' appraisal of 'marketable' products available in the three barangays (San Rafael, Concepcion and Tanabag) of Puerto Princesa City. This study was used at the same time as a 'training tool' to transfer this "alternative" market study methodology to Ms. Devanadera.

An examination of the local conditions for production (harvest, labor, prices and trade systems was done for products found in the study area. In short, which product had the best market development potential for the local people? None of the products fulfills ideal conditions in the "real world". This is why the research team had to consider the strength/weakness balance and whether 'simple' interventions can be proposed or not.

The case of almaciga was not 'optimal' but more information should be collected before deciding to include it. Almaciga is too important for some poor people who do not have many choices.

The physico-ecological characteristic of the sites also supported the selection of commodities. Villages' lands cover a range of ecological floors from highland forest to seashore. Each of the products comes from one specific zone: almaciga from highland forest, cashew from agricultural lands and seaweed from the sea.

### A. Choice of Cashew, Seaweeds and Almaciga

The following criteria were used for the choice /selection of products for this study: importance as a source of income for local people, demand (local, national or international market), impact on environment, sustainability and volume, accessibility

and conditions of the market chain. The selection of the products was based on the information from interviews, observation and according to the set of criteria mentioned above. The 'outcome form" was used as a helping tool for final selection.

Thus seaweed was selected because it is a 'must', according to producers, government, and traders. On the other hand, rattan, looked as 'problematic" as expected. So it was postponed for later survey to be able to focus first on the most 'promising' products and use them as an engine to pull up the others. Cashew was chosen next and one 'pending' (almaciga). Cashew, seaweeds and almaciga were found to be the source of livelihood of the people in the study area.

Profiles for potential products: cashew, seaweeds and almaciga follows. Other products like honey, beeswax, bark cloth and charcoal were found to be among the livelihood source of the people in the sites.

## B. Profiles of Potential Products for the Study

### 1. Cashew

***" Savings for school days"***

Cashew nut is a product that has important demand for national and international markets. In Palawan, the cashew industry (planting, drying, processing and selling) has been a practice for at least fifty years.

There are several varieties. According to a regional trader, local varieties are smaller but contain more seed. Introduced varieties like Mitra are much bigger and there is increasing demand for them.

Antipolo cashew, mostly coming from Palawan is a main market competitor for the Palawan cashew at the national level. However, there is still enough room for different varieties and better quality nuts.

About 85% of the Cashew nut produced North of Palawan in the municipalities of El Nido, Taytay, Liminangcong and Roxas are sold in Puerto Princesa City and shipped to Manila by boat.

Cashew nuts from all over Palawan are shipped to Manila and sold, processed and repacked in Makati, Novaliches, Valenzuela, Antipolo and other provinces Pampanga and Laguna.

According to AMEX Trading Corporation world trade of Cashew nut amount to 486,670mt and the Philippine share is only about 7,200mt. or 1.4% of the world trade for this product.

In Puerto Princesa, a trader-respondent reported buying standard raw cashew (with shell) from P15 to 20/kg during peak season and P20 to 25 in lean season or when

supply is low. She sells standard quality cashew nut (without shell) at P170/kg (raw) and 220/kg (roasted). She also makes cashew snacks for local and visiting costumers

Prices in the village level vary from P15 during lean season to P10 during peak season (April, May).

This is why farmers try to store it until lean the season (December- February). But usually they have to sell the product in October to pay the children's school fees. So cashew became a traditional saving system for school expenses over the years. This social function is one of the reasons for the selection of cashew for the market study.

According to Barangay San Rafael's Kapitan, most households get some income from cashew. But some inhabitants have hundred trees when others have few. In Concepcion and Tanabag several farmers also own cashew trees.

Each tree can produce between 10 and 40 kilos a year. Small-scale cashew cultivation does not need big care and maintenance expenses but requires some capital for starting.

Actually, we suspect (but could not yet check our hypothesis) that some cashew farmers are a bit richer than almaciga gatherers or fishermen. According to the Socio Economic Survey (SES) conducted by the LPF project, most agricultural lands belong to big landowners while the rest own small size lands. This confirms Kapitan's comment about big differences among cashew growers.

**Case Study 1: "Nay Beating" Beatris Dacles**

***"It's really a savings system for school days"***

Nay Beating, a cashew farmer and entrepreneur by birth has been into cashew business for 10 years. She and her husband own 100 trees of cashew trees which are bearing fruit when they bought the lot 2 years ago. Harvest is every 2 days or every week from the cashew trees.

"Each tree can produce between ten and forty kilos a year", according to Nay Beating. She added that the Mitra variety has big sized nuts but have less fruits, unlike the native cashew which has smaller nuts but plenty of fruits. She also said that small-scale cashew cultivation does not need big care and maintenance expenses but requires some capital for starting.

According to her, supply is not a problem. It is more difficult to get enough capital for buying the product from the farmers. She started in the business with 20 sacks (20 x 50kg) but was later able to meet bigger orders (5 tons) until recently. She needs P60,000 to buy cashew during the peak season (April to May) and keeps it for at least 6 months to last her until the lean season (when supply is low) to finally sell at a good price.

"However, even if the price is too low during the peak seasons, there are times, we are forced to sell the nuts just to send our children to school. It is really "savings for school", according to Nay Beating.

She used to buy raw cashew nuts with the shell at P30 for *1 salop* (2 kilos). She pays the women P50 for opening one *balde* (12 kg) of cashew and with one *balde* you get 3 kilos of clean nuts. Usually it takes (one person) one day and half to open one *balde* of cashew nuts. If husband and wife, in the case of Nay Beating, 2 persons will take 1 day/*balde*. Thirteen kilos (13) kilos of cashew nuts after removing the shell become 3 kilos of cashew kernel. At least 9 kilos or the cashew nut shell is wasted if no longer used or processed.

If she has enough capital, (from her sari sari store and transport (jeepney) business, she buys cashew from the barangay and sells to local traders in the *poblacion* or market of Puerto Princesa City, Fig 1). In May 2004, she sold 2 tons of dried nuts to cashew trader in the market place at Puerto Princesa.

However, she makes sure she reserves dried cashew for processing. She has stocked 20 sacks of dried cashew nuts this harvest season, which she will be cooking from time to time and sell till next cashew season.

She sells fried split nuts in their area and delivers to the *poblacion* of Puerto Princesa which gives her 3 times the profit she gets from selling dried nuts. The price of dried nuts is P20 /kilo but if she sells it fried, she sells at P 170 during the peak season and P250-300/kilo during lean months.

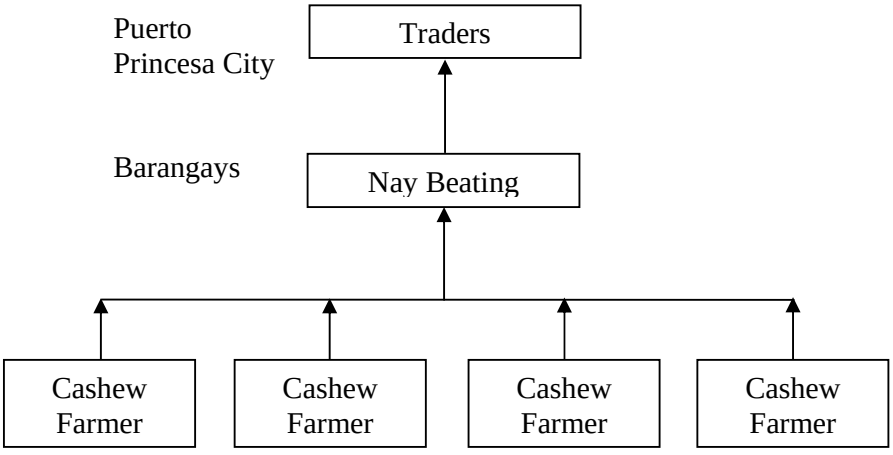



Figure 1. Cashew trading, Brgy Concepcion, Puerto Princesa City, Palawan, Philippines, 2005.

In the near future, she hopes to get bigger income if she can sell roasted whole nuts. But at the moment she has to make do with the split nut sheller, as she has to practice and master her whole nut sheller. With this sheller she intends to improve the quality of her cashew product.

From Nay Beating's experience, sales of fried split cashew nuts gave her bigger profit than selling unprocessed nut. She also knows that if she can master the tool that could give her whole nuts her profit from selling roasted whole nuts will triple. All she needs every peak season is the additional capital to buy more cashew seeds to expand her cashew business.

**Case Study 2: Maileen Millares**

Maileen is a local cashew trader in the market of Puerto Princesa City who had been in the business for 9 years. She took over the business from her parents who were in the cashew trading for 30 years. She has been selling cashew seeds and processed cashew nuts.

Just like Nay Beating, many cashew farmers and processors bring their produce to her and market is not a problem. Local and national (outside) traders had been approaching her asking for hundreds of tons of dried cashew for sale to the export market.

She gets her supply from barangays of North Palawan: Roxas,Dumaran, Taytay and El Nido (Fig 2). She either sells dried cashew nuts or processed: roasted, fried, and brittle in the market of Puerto Princesa City. She has buyers from Manila, Antipolo, Pampanga and Cebu. Her buyers from Pampanga usually deliver to Bulacan for cakes, ice cream, candies etc.

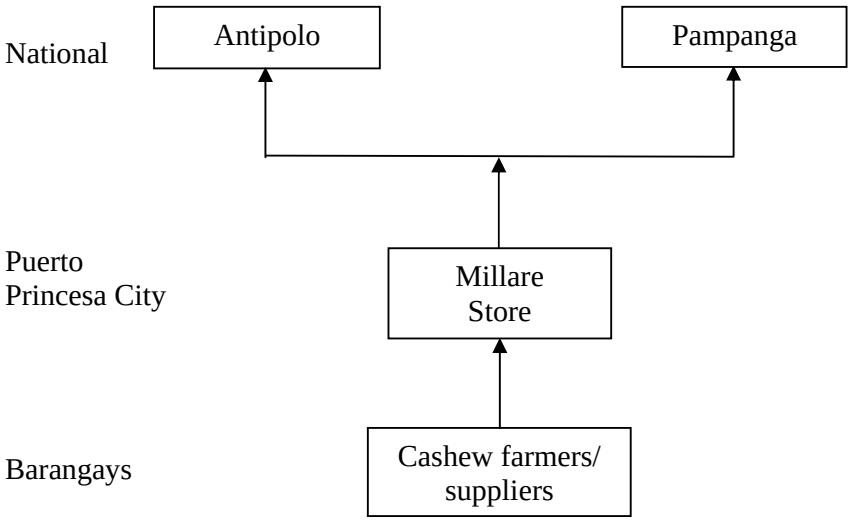



Figure 2. Market distribution of cashew from Barangay to national level, 2005.

According to Maileen, during the peak season (April to May) she sells 10 sacks/week and during the lean season (July-December until January) she sells 20 sacks/week at P200-300/kilo. She confirmed Nay Beatings's statement that cashew is "really a

savings for school". In the month of June, though prices are not high, the need for tuition forces them to sell their harvest.

From June to December, the nuts are sun dried, cleaned or dirt is removed. After removing the shell from the nuts, usually, 4 kilos of cashew seeds can produce 1 kilo kernel of cashew.

She has someone to process the nuts for her and sell them roasted whole at P220/kilo and half or split nuts at P170/kilo (lean months).

Both traders agree that exporters offer higher prices just to get the cashew nuts from the local farmers or traders but as Nay Beating experienced, there is more income or profit for them if they sell processed or fried nuts. However, there are not very many markets for processed nuts compared to plain dried nuts.

Actually, we suspect (but couldn't yet check our hypothesis) that some cashew farmers are a bit richer than almaciga gatherers or fishermen. According to SES, most agricultural lands belong to big land-owners while the rest get small size lands. This confirms Kapitan Kading's (Barangay Captain of San Rafael who owns 100 cashew trees) comment about big differences among cashew growers.

This is an opportunity for LPF to try to level the playing field among the cashew farmers and make them work together.

Based on the study's interview and these case studies, cashew is chosen as a potential product:

*Positive Points*
- Demand from national and international markets
- Experience in cashew plantation has been practiced for more than 50 years
- Sustainable and does not need fertilizers
- Provides seasonal jobs and income
- Acts as a savings account for school expenses

*Negative points*
- Not yet accessible for those who do not have lands
- Competition from other region
- Not very performing processing techniques

*Prices*
At village level 10 –15 pesos per kilo for raw cashew with shell

*But the following questions remain*
- How to level the playing field among cashew growers?
- How to deal with conservation of local varieties and demand for introduced varieties?

## 2. Seaweeds

***"The only crop that needs to be cradled like a baby is seaweeds"***
***(Visayan proverb)***

Seaweeds is booming all over Palawan. International market (especially China) is huge and in constant growth. Seaweed is a raw material for many industries such as food, cosmetic and pharmacy. Its potential use in new products is increasing too.

According to the Fishery Department, Palawan has suitable condition for seaweeds production. This is also the opinion of the private sector. Three companies based in other islands in the Philippines have opened regional offices or buying centers in Puerto Princesa. They consider there is still enough room for development. The Manager of Ocean Aquamarine in Manila even called for more investment in Palawan.

In Palawan, people mostly plant *Eucheuma* and especially *E. espinusum* which is still usually known among traders by its former name of *E. cotonii.* Other trade name is *agar-agar*. The buying price in Puerto Princesa for one kilo of dried seaweeds is from 36 to 38 pesos. Seven kilos of fresh seaweed make one kilo of dry product.

Local government also sees seaweed as a new source of employment, especially as an alternative option to fishery sector crisis. In fact, fish stocks have decreased dramatically and most fishermen cannot leave on it any more, unless using destructive and forbidden methods, like dynamite and cyanide.

According to the LPF SES, local fishermen put the blame on outsiders that use big boats and illegal methods. The Fishing department says that it is true that many outsiders come illegally to fish and the government does not have enough means to enforce the law.

The seaweeds industry could be a good solution to solve part of the problem. It gives some income to fishermen and, at the same time, has an 'accidental conservation' effect. As Yvette Lee, (vice president of Seaweeds Corporation in Manila) explains: '*If fishermen are involved in seaweeds, they will not use destructive fishing methods which could affect their plants. They will also be more active in fighting against those who still use them*".

The choice of seaweeds is based on the following points or criteria:

*Positive Points*
- Huge international demand
- Strong support from government institutions and NGOs
- Alternative to fishing crisis
- Accidental conservation effect
- Easy access to market with standard prices

*Negative points*
- Need of starting capital

- New activity in the region with little records from the past
- Lack of technical experience in the sites
- Dependence on an ecosystem (sea) very sensitive to changes (pollution)

*Questions*
- How to reduce risks from natural and human origin?
- Can fishermen take care of the seaweed without giving up other activities?

*Opinion*
Potential but needs careful monitoring

## 3. Almaciga

***"We are not active anymore, we just buy and sell…"* (Almaciga trader)**

Almaciga resin, known commercially as copal Manila, is a major non- timber forest Product (NTFP) from Palawan. It comes from the natural forest of Agathis Philippinensis, which grow in the highlands. According to SES, households get some income from almaciga. People from the community say that many families are into almaciga gathering. Kapitan Cading estimates them to be at least 50 families in San Rafael.

In San Rafael, Tanabag and Concepcion, tappers are both indigenous people (IPs) and migrants. Local communities have free access to the resource although there is the policy now coming from the PCSD regulating the permit to the IPs alone. It is an activity people can practice any time because unlike other NTFPs there is no seasonal cycle.

Tappers get credit on "*consumo*" or goods in local sari-sari stores (groceries) and pay back with almaciga resins. Often, traders give cash advance to harvesters who pay back with forest products or almaciga. This system is called "utang na loob" or "debt of gratitude". In many places in Palawan, in the municipality of Narra, almaciga tappers work in a team, under a "*kapatas"* leadership or foreman. (Lacuna 2004b and traders), The kapatas often gives to tappers cash advance for expenses. He gets a percent on each kilo. The *kapatases* are the middlemen, working for the concession owner/trader.

Nowadays the concessions or almaciga permits are granted only to Indigenous People (Palawan Council for Sustainable Development Resolution No 04-233), thus most of traders' permits are not renewed, according to the traders. This new policy tries to discourage almaciga gathering in CORE zones which is supposed to be "No touch" or "no activity" area, as a policy of PCSD. However, favor or the privilege is given to the IPs who have been living on almaciga and honey gathering since time immemorial.

In reality, the policy does not have the expected effect. IPs do not have the skills and financial capability to get into almaciga trade. They do not even have the capital they would need, to pay the tappers.

So they still depend on their traditional buyers for accessing market and paying harvesters. Though the IPs are granted the permit, the real boss is still the trader, they facilitate the processing of the permits and they use it to transport and market the almaciga of the IPs.

This leads to a confusing and conflicting situation with negative effect on the stakeholders and the resources; local tappers are still poor, indigenous people cannot make people respect their rights, traditional management systems (about tapping) are not followed anymore (almaciga stealing, unsustainable tapping methods), and traders have the choice between stopping and operating without permits.

Confusing situation also affects the market: companies cannot secure regular supply from clear origin and quality is affected.

At the village level, there are three classes or grade of almaciga resin: *tipak* (block) is the best quality. Resin comes in big blocks of glassy yellow color. The 2nd grade is called "white' and the color is clearer. The 3rd class is "assorted". It consists of pieces of different sizes and color. Prices for *tipak* are from 8 to 11 pesos/kg. For "white", price is 8 pesos/kg. Lower quality ('assorted') is between 6 to 8 pesos/kilo. According to informants, prices depend on the buyers. Some give better price than competitors.

In Puerto Princesa City, the classification is in terms of three qualities and named as A, B, C or 1, 2. 3. The researchers however are not absolutely sure that the different names are synonymous. Maybe it indicates some sorting operation previous to transport to Manila or Cebu. The following prices are followed: 14ps/kg for *tipak*, 10ps/kg for white and 9ps/kg for 'assorted".

In Manila, the traders clean and sort the resin. In the warehouse, about 12 women were cleaning almaciga. They were cutting off bark and sticky parts. These wastes are sent to incense factories in Cebu.

In the international market, there are six qualities for Copal Manila from Palawan (Only one is presently available. Gross price for 1st quality is US$ 980/m3 (1000 kg FOB).

No calculations could be done because more details on costs are needed. Likewise, comparison of quality/price at village level with Manila quality could not be done because of the processes in between (unless the full detail about sorting and costs could be obtained).

Considering the general situation, almaciga does not appear as a product with optimal market or development potential. However, it should not be dropped from the study, because it is vital for poor families who do not have alternative sources of income.

Almaciga profile based on the criteria/outcome forms:

*Positive Points*
- Source of income and "safety net' for the poorest
- Strong cultural value
- Demand for national market
- Provides jobs down stream (workshops, factories)
- No need of capital

*Negative points*
- No added value product at local level
- Archaic and not transparent market chain
- Misfunction or misuse of policies
- Conflicts

*Prices*
At village level: *tipak*: fetches 8 to 11 pesos. At regional level 14 pesos

*Questions*
- Is it sustainable? (yes and no)
- What are the trends in the international market?

Almaciga is a complicated case but a real challenge for LPF because it is still a vital income for the poorest but the situation is problematic. There is a need to document well all the studies and projects and learn from their experiences. Many researchers, institutions and NGOs have already worked on different aspects concerning almaciga but literature is not comprehensive.

As far as almaciga is concerned, market study should be done but it is not a priority. A systematic review of all literature available on almaciga both from the internet and printed files could be done in future studies.

## 4. Honey

Honey is an important cash income for many Indigenous People, especially for the Bataks. According to San Rafael's *Kapitan*, about 80 families still collect honey during the season. They sell it to several buyers in Puerto Princesa. Based on the Socio Economic Survey, honey is one of the major products, accessible to local communities. Palawan honey is famous for its taste and medicinal qualities. It is one of most popular souvenirs or *pasalubongs* that national tourists in Palawan bring home.

Honey from *Apis dorsata*, giant bee, is collected from the wild with traditional tools. It contains high moisture and many impurities. This is why it ferments very soon and loses quality. This is a major problem for marketing the product. NATRIPAL has been working on it for a long time. They introduced solar dryers and proposed to harvesters, cleaner harvesting and storing methods. But now they face another

problem: supply volume. Many IPs do not want to use new methods, which reduces the volume, even if they get better price for better quality honey. NATRIPAL is a bit confused about the IPs predilection. They could get the raw material from harvesters and process it. But in this case, they have to give cash advance to IPs, like in the 'colonial system', and miss part of their development goal. Anyway, they cannot afford it. Right now, NATRIPAL has the buyer, the technology for quality but cannot meet supply targets because of the IPs reluctance to adopt change in their harvesting and postharvest practices.

Recommendations:
It is recommended that small joint actions be undertaken with NATRIPAL:

- Try to present in San Rafael-Tanabag and Concepcion their method with participative approach. This can help NATRIPAL to understand what is the problem in this technology transfer. It is also an opportunity for local communities (if they like) to try new method and maybe supply NATRIPAL too.
- Look together for new markets for both honey and beeswax. In Concepcion, locals do not collect bee wax because they do not have market contact. NATRIPAL gets bee wax and can process it but does not have many buyers. The project can help them to find or to learn how to find new opportunities. There is a new potential buyer for beeswax. They could use this opportunity as a practical exercise.

## 5. Beeswax

In the barangays, a lot of beeswax can be found but are not being sold. The IPs have been earning from honey but leave the honeycomb behind. Though there is a market is for the product, they have not explored the business.

On the other hand, NATRIPAL buys the honeycomb to press honey using a very slow but clean technology (half beeswax=2.3 gallons; 1gallon=5 liters of honey)

At present, UPLB is buying the beeswax from NATRIPAL but if the quality can be improved according to Marina, a higher price can be paid.

Beeswax harvest during harvest season is150 kilos. Last year NATRIPAL harvested 100 kilos.

Recommendations:

- The upper layer that is yellow – commands a better price if the technology to separate this from the layer with impurities can be done (Maybe using filter)
- To improve the quality of beeswax, the gray part should be reduced/get the yellow portion. Grey part impurities=filter
- Must also find out how much proportion goes to waste waste? How much % impurities?
- Must weigh to get how much honey=wax
- How much volume can be produced?
- Minimum-maximum volume/year of yellow portion

- What is the price? FOB Manila price P250/kilo transport to Manila shouldered by the buyer

## 6. Charcoal

This product was included in the list of products that the researchers wanted to assess because of its importance for the local market. Now a ban was declared on this production because of its environmental impact. So it was decided not to work on it since it is not a "potential product to develop", given the present situation. However, it was observed that production is still on for very practical reasons: charcoal is still the cheapest domestic fuel. The Socio Economic Survey revealed that 41% of households in the project site use charcoal for cooking. Local authorities (some checkpoints along the road) tolerate local selling and allow 10 sacks per trip to Puerto Princesa.

Recommendation:
It could be useful to survey this industry later on. The researchers do not wish to encourage it but rather monitor it in order to reduce negative impacts (air pollution, fire, use of banned species) on the environment.

This survey could be part of a small study on local 'residual' timber industry. By 'residual' we mean small workshops, which get irregular and heteroclite supply from tolerated clearing or half illegal logging. This could be also linked to the sensitive issue of *kaingin* (slush and burn) practice. According to the local people, this prohibition is not realistic since there are not enough aims for law enforcement. There were also *kaingins* observed when the researchers went to the barangay.

Green charcoal production, which is now being promoted in UP Los Banos can be an alternative to charcoal.

## 7. Bark cloth

The Indigenous People from Palawan used to wear bark cloth. Now, most of them prefer industrial garment they can wash. But they still make bags and other items from this material. They remove the cambium of Artocarpus (bread tree) and crash the fiber with a batter. Bark cloth from the Bread tree is a very typical industry of Austro-Polynesian cultures (from Indonesia to Hawaii).

According to informants, harvest is not destructive. They just remove some part. It is probably true because people would not want to kill trees they value also for their fruits.

In Barangay Concepcion, some Batak families still collect bark for cloth. They sell it to resort and souvenir shops. It is a nice material but in its 'plain form", the market is very small. So maybe it is not a priority for now. However, the project can help in some actions that partners have already started.

***Budyong Rural Development Foundation Inc. (BRDFI)*** a non-government organization, in Palawan province, in association with ***Sabang Vendors Association***, a peoples organization in the vicinity of the St. Paul's Subterranean Park, Puerto Princesa City, created a set of items from bark cloth (bags, wallets, bag pack etc. (United Nations Development Program on Small Grants funded project).

The design is nice and looks practical. The initial project has ended in December 2004, just when items are picking up in the market as tourists' favorite souvenir items.

Recommendation:

- Help Budyong to make their product marketable (organize catalog, prices, stock)
- Linking with bark cloth producers from San Rafael, Tanabag, Concepcion.

## C. Conclusion

A lot of potential products were considered in the first phase of the study, but it is urgent that 2- 3 priority products (cashew and seaweed) be selected and later on continue with the others (given enough time) almaciga, bark cloth, beeswax etc.

Though almaciga is a major source of livelihood by the IPs, the industry will require much time as the technology of gathering the resin and tapping, the enterprise capability of the IPs, the capital needed, and the newly imposed policies by the government should be looked into.

As far as the bark cloth is concerned, the technology of making the bark cloth has been with the *Bataks*, for a long time but could still be improved. According to the former PENRO (Provincial Environment and Natural Resources Officer of the DENR, Palawan) Virgilio Tiongson, and some other foresters, producing the bark cloth will cause the extinction of the trees.

However, according to Margie Consuelo (community organizer) and Benny Postrado, (technical staff) of Budyong Rural Development Foundation Inc., the producers make use of the branches only and this method allows the growth of more branches. Thus, with the bark cloth industry in mind, the IPs producing the bark cloth will have to sustain the trees which are their source of the bark cloth, a part of their cultural heritage.

Demand and market for the cloth itself is not very much at present, but with a little creativity and marketing, souvenir products like bags, wallets, etc are now boosting eco tourism in the area.

Charcoal making has always been discouraged, but everywhere, there is charcoal because it is the cheapest fuelwood for cooking. Studies from UP Los Banos have come up with a technology on green charcoal making. The technology is not very expensive and has better efficiency than the local charcoal and there is demand for the product both local and abroad.

Based on the initial exploratory study, cashew and seaweeds are potential products that have high demand in the local and export market. But since these information are not yet enough, this will be supplemented by a review of literature on the industry.

## Phase 2 - Industry Studies

### A. The Cashew Industry

#### 1. Role of the Industry/Origin, History of Cultivation

The cashew is a hardy drought resistant tropical or subtropical tree. It is native to northeastern Brazil, in the area between the Atlantic rain forest and the Amazon rainforest. The vegetation type of the region is dry forest, savannah woodland or thorn scrub, and includes the almost desert-like Caatinga. Cashew is sometimes referred to a a rainforest species and the nuts are found in products that have a rainforest friendly label or connotation. Although the trees will grow in tropical wet forest, they rarely produce many nuts, and production is far greater in areas with a distinct wet and dry season, such as its native range in Brazil, India and east Africa.

Then the Portuguese introduced cashew to the west coast of India and east Africa in the 16$^{th}$ century, shortly after its discovery in 1578. It was planted in *India initially to reduce erosion, and uses for the nut and pseudofruit, the cashew apple, were developed much later.* The trees were well adapted to the region and became naturalized. Trees also became naturalized in Central America and the Caribbean Islands. Nut domestication predated the arrival of Europeans to Brazil; although international nut trade did not occur until the 1920s. Native South Americans discovered that roasting nuts in fire would remove the caustic effects. The roasting practice was either not known or not appreciated outside the native range, and as a result the cashew apple was the first product consumed, with the nut being discarded. Natives also knew of many medicinal uses for the apple juice, bark and caustic seed oil that were later exploited by Europeans.

Cashew is now planted in many tropical countries particularly in the coastal areas of East Africa, Tanzania, Kenya, Mozambique, Uganda, Ivory Coast, Nigeria, Angola, etc. Dispersal of the species to Southeast Asia appears to have been carried out by birds, bats, monkeys and human agents. In the Philippines, it is believed to have been brought in by Spanish missionaries. It is locally known as *kasuy or balubad.*

India developed more refined methods for removing the caustic shell oil and this country is given credit for developing the modern nut industry. India led the world in cashew production for many years until just recently when production in Vietnam surged about three-fold in a few years. In its native Brazil, cashew nut production ranks in the top 5 of the world and virtually all cashew apples and juice products come from this country. Preliminary data indicate the cashew nut industry surpassed almond in 2003, and thus cashew now claims the number1 nut crop in the world.

## 2. Uses of the Industry's Products

Cashew is a versatile plant and has various uses ranging from food, feed, medicines and industrial uses. The tree is a good species for reforestation, especially in areas with poor soil and low rainfall.

The cashew fruit is the most commercially important part of the plant. It is composed of the cashew apple (pseudocarp) and the seed (nut). The seed, which is botanically considered as the fruit, consists of the kernel and shell or pericarp.

The kernel is the main economic product. It comprises about 22-30% of the cashew nut by weight. White whole nuts or kernels are the prime market for cashew. The kernel can be roasted or fried and eaten primarily as table nut. The largest local market for dried or roasted cashew kernel, whether whole or broken, is Metro Manila wherein the kernel is consumed extensively as an ingredient in the preparation of ice cream, cakes, pastries, confectioneries and others for preparations as well as snack items.

Ground kernel is often mixed with cacao seeds to produce adulterated chocolate. The kernel oil is used to harden chocolates while the residual kernel cake can be mixed in fertilizer or in poultry feeds.

On the other hand, the shell which is about 70% of the cashew nut's weight produces a liquid substance commercially known as cashew nut shell liquid (CNSL). This substance is a good source of natural phenols, particularly the anacardic acid (90%) and cardol (10%).

CNSL is used in the manufacture of industrial products. It is used as a preservative and water proofing agent in insulating varnishes, in manufacture of typewriter rolls, in oil-and acid-proof cements and tiles, in brake linings, clutch facings, protective varnishes and paints, adhesives, laminating resins and baking enamels, as an excellent lubricant in magneto armatures in airplanes and for termite proofing of timbers. The tannin and resin produced are also utilized for waterproofing fiber-based materials, adhesives, inks and paints (Duke, 1983). After CNSL extraction, the shell is utilized as fuel.

Cashew apple is very nutritious and is used both as food and feed. It is an excellent source of vitamin C, where a 100-gram apple contains 167 mg of ascorbic acid. It contains up to 5 times the amount of vitamin C sas citrus and strawberries, and higher amounts of some minerals than other fruits. Ripe cashew apple has an exotic flavor and eaten fresh or processed into candy, syrup, vinegar, jam, chutney and *champoy*. Its juice is made into a refreshing drink (Brazil cajudo), may be fermented to make wine, and distilled too produce alcoholic beverage. After juice extraction, the pulp, which contains 9-10% protein and 65 pectin on dry basis, can be used as feeds for hogs. Unripe apple is prepared as pickles or cooked as curried vegetable.

Various parts of the cashew tree have medicinal and other uses. Timber is used in furniture making, boat building, packing cases and in the production of charcoal. Bark used in tanning. Stems exude a clear gum, Cashawa gum, used in pharmaceuticals and as substitute for gum arabic. Juice turns black on exposure to air and provides indelible ink (PCARRD Message Board; Duke, 1983). Along the coast of Orissa, shelter belts and wind breaks, planted to stabilize sand dunes and protect the adjacent fertile agricultural land from drifting sand, have yielded economic cashew crops 5 years after planting.

Medicinal uses of cashew bark, roots, leaves and apple juice are noted and are well known prior to recorded history in the native region of Brazil. Bark teas were used for diarrhea. Barks are also chewed to cure sore gums and toothache. Teas and fruit juices are known to have anti-microbial, anti-inflammatory, astringent, diuretic, and hypoglycemic and other medicinal properties (Duke, 1983). The young leaves alleviate diarrhea, dysentery and hemorrhoids while the mature leaves when crushed are used as poultices for burns and skin ailments. On the other hand, the roots contain purgative properties (Department of Agriculture).

The juice is used to treat stomach disorder, dysentery, vomiting and sore throat. It is also known as a cure for toothache, fever, muscular pain, irregular bowel movement, blood pressure and insomnia (Department of Agriculture). The active principles are thought to be tannins, anacardic acid and cardol (Duke, 1983). The red apples have higher tannin content than the yellow.

The kernel is an antidote for irritant poison or as a demulcent in the form of emulsion. It is also known for its aphrodisiac qualities, balances cholesterol level, an excellent nerve tonic and a steady stimulant and body builder.

The caustic shell oil was used to treat skin infections, warts, worms and botfly larvae beneath the skin. The shell may be used as rubefacient and vesicant in treating leprosy, elephantiasis, ringworm, warts, corns and cracks in the soles of the feet. Modern uses of shell oil and fruit juice include facial peels and scalp conditioners and shampoos. Clinical studies have documented the anti-inflammatory properties of tannins and the antimicrobial properties of anacardic acid against several species, including Escherichia coli and Helicobacter pylori. Leaf extracts show hypoglycemic activity in rodents and a reduction in artificially induced diabetes.

Young leaves may be eaten as vegetable salad. Leaves contain high amount of vitamin A (1025 IU) and 89 grams of ascorbic acid, which is more than enough to meet the adult daily requirement of 75 mg of vitamin C.

## 3. Supply

### a) World Production

Cashew is now the number one nut crop in the world since its production surpassed that of almond in 2003 (by over 300,000 mt). Cashew is produced commercially in 32 countries. World production in 2002 is at 1,870,284 mt or 4.1 billion lbs and has doubled since 1994 with most countries experiencing substantial increases particularly Vietnam. India pioneered the modern processing of nuts, and had been consistently the world's leading producer for decades prior to 2002. In 1999, the following countries were the top producing ones:

Table 1. World area and production of cashew nut, 1999.

| Country | Area (Ha) | Production (mt) | Productivity (kg/ha) | % Share Production |
|---|---|---|---|---|
| India | 704,709 | 388,474 | 545 | 54.0 |
| Indonesia | 302,000 | 32,000 | 300 | 4.4 |
| Brazil | 147,000 | 170,000 | 1156 | 23.6 |
| Vietnam | 85,000 | 37,000 | 435 | 5.1 |
| Tanzania | 59,000 | 25,000 | 423 | 3.5 |
| Mozambique | 44,000 | 40,000 | 909 | 5.6 |
| Kenya | 22,000 | 16,000 | 727 | 2.2 |
| Philippines | 27,801 | 11,129 | 400 | 1.5 |
| Total | 1,391,510 | 719,603 | | |

Source: http://www.ikisan.com

In 2003, the top ten countries were the following (Table 2).

Table 2. Top cashew producing countries in the world, 2003.

| Country | % of World Production |
|---|---|
| Vietnam | 28 |
| India | 25 |
| Nigeria | 10 |
| Brazil | 8 |
| Tanzania | 6 |
| Indonesia | 4 |
| Guinea-Bissau | 4 |
| Cote D'Ivoire | 4 |
| Mozambique | 3 |
| Benin | 2 |

Cashew occupies just over 7.5 million acres of land area in the world, which is extremely high given the level of production. This reflects the low intensity of production in most areas; many nuts are harvested from wild or naturalized stand of trees. Average yields worldwide are about 700 lbs/acre. In its native range in Brazil, yields are only 270 lbs/acre. In Vietnam, yields are the highest of the top 5.

**b) Local Production**

The Philippines has 3,446,542 bearing trees of cashew per year on the average. MiMaRoPa (Mindoro, Marinduque, Romblon and Palawan) is the leading producing region from 1990-2003 with an average of 2,963,469 bearing trees). Palawan is the number one producing province with an average of 2,979,919 bearing trees. Central Luzon follows next (225,323) with Nueva Ecija as the leading producing province in the region with 132,066 bearing trees. Both regions suffered a decline in their number of bearing trees from 2000-2003. ARMM produced 120 trees in 2003 while no cashews were planted in CAR and Eastern Visayas.

On the average, the Philippines produces 116,439 metric tons of cashew in a year. MiMaRoPa produces 106,798 metric tons followed by Central Luzon with an average of

5,499 per year. Northern Mindanao produces 1,350 metric tons while Western Visayas is at par with 1,076 metric tons of produce.

In 2003, total cashew production in the Philippines was at 111,291 tons in 27,801 hectares. The top-producing region is MiMaRoPa accounting for 90.39% of national production. Central Luzon is a far second with 7.10% share while Calabarzon has only 0.21%:

MiMaRoPa - 90.39%
Central Luzon - 7.10%
Northern Mindanao - 0.70%
Western Visayas - 0.58%
Calabarzon - 0.21%
Others - 1.02%

Palawan is still the leading producing province in the region in 2003. A total of 24,300 hectares are planted to cashew in the province posting 100,500 metric tons production. Palawan accounted for 99.9% of the total cashew produced in the region. Mindoro Occidental has only 46 hectares planted to cashew with production of 92 metric tons. There are only two cashew producing provinces in the region, i.e., Palawan and Mindoro Occidental.

Table 3. Volume of cashew production by municipality, Palawan, 1994.

| Municipality | Area (Ha.) | Production (Mt) |
|---|---|---|
| Abordo (Linapacan) | 3647.00 | 1641 |
| Aborlan | 2.20 | 1 |
| Agutaya | 298.00 | 134 |
| Araceli | 2.20 | 1 |
| Balabac | 2.20 | 1 |
| Bataraza | 27.00 | 12 |
| Brooke's Pt | 275.00 | 124 |
| Busuanga | 191.00 | 86 |
| Coron | 93.00 | 42 |
| Cuyo | 91.00 | 41 |
| Dumaran | 2539.00 | 1138 |
| El Nido | 1900.00 | 855 |
| Magsaysay | 8.88 | 4 |
| Narra | 307.00 | 138 |
| Puerto Princesa | 1222.00 | 550 |
| Quezon | 282.00 | 127 |
| Rizal | 18.00 | 8 |
| Roxas | 3184.00 | 1433 |
| San Vicente | 1307.00 | 588 |
| Taytay | 658.00 | 296 |
| TOTAL | 16054.48 | 7220 |

Based on average yield of 0.45 mt/ha; Source: Bureau of Agricultural Statistics

Available 1994 production data for the various cashew-producing municipalities of Palawan show that Abordo ranks first among the municipalities in terms of cashew planted (3647) and production of 1,641 mt (Table 3). Northern municipalities Roxas, Dumaran, El Nido and San Vicente rankled next in area planted to cashew and production. Puerto Princesa City has a bigger area planted to cashew (1222) and production yield of 550 mt as compared to southern municipalities in the province.

In the northern part of Palawan the following barangays have the highest nut production: Barangay Sibaltan in El Nido produces 20% of the nut production, 15% in Brgy. New Barbacan and San Miguel, Roxas, and 15% nut production in Brgys Sandoval and Bantulan in Taytay.

Sporadic cashew plantation in Palawan produced poor quality nuts in the market. According to the Bureau of Agriculture Statistics, as of CY2003 production was estimated to be 56 metric tons.

**c) Importation**

Inspite of the local production of cashew in the country, the Philippines still import cashew from other countries in the form of shelled cashew, cashew nuts (prepared/preserved), and nuts mixed with sugar or honey as confectionery.

*Shelled Cashew*. Shelled cashews are sourced from 11 different countries from 1989-2003. The top suppliers of shelled or peeled cashew for the last 15 years are Vietnam (293,654 mt), India (236,098 mt), and Hongkong (192,097 mt). But the consistent suppliers are India, Singapore, Hongkong, USA, Indonesia, Vietnam and Australia.

In 2003, 198,865 metric tons of shelled cashew were imported from nine countries, namely: Australia, Brazil, Germany, Indonesia, India, South Korea, Singapore, United Arab Emirates, USA and Vietnam. Vietnam, Germany and Brazil are the three major suppliers of shelled cashew in the country. The Philippines' major suppliers of peeled cashew were the following:

| | | |
|---|---|---|
| Vietnam | 83,010 mt | 41.74% |
| Germany | 52,800 mt | 26.55% |
| Brazil | 43,089 mt | 21.67% |
| USA | 13,501 mt | 6.79% |
| United Arab Emirates | 3,369 mt | 1.69% |
| Other countries | | 1.56% |

*Preserved Cashew Nuts.* The Philippines have been importing prepared/preserved cashew nuts since 1996, the year where production of cashew in the Philippines had dipped to a very low level. Except for years 1996 and 2001, the Philippines had consistently sourced preserved cashew nuts from Great Britain and Northern Ireland. The USA is also one of the major suppliers of the Philippines. Except in 2003, the Philippines had always obtained its cashew nut import from this country. In general, there are 11 countries selling cashew nuts to the Philippines. Vietnam and Spain had only started exporting their cashew nut to the Philippines in 2004.

For the past 9 years, India exported the highest amount to the Philippines amounting to 61,257 metric tons followed by USA at 35,743 metric tons and Indonesia, 24,728 metric

tons. The volume of imports was highest in 1999 with Indonesia being the top supplier of preserved cashew nuts.

In 2004, the country registered a total of 43,460 metric tons of preserved/prepared cashew nut imports from Great Britain and Northern Ireland, Indonesia, Spain, Taiwan, USA and Vietnam. The major suppliers are the following:

| | |
|---|---|
| Indonesia | 17,100 mt |
| Vietnam | 12,000 mt |
| USA | 11,454 mt |
| Spain | 2,023 mt |

Take note that Thailand had also exported to the country 2,496 metric tons in 1999 together with India (11,825 mt) and Indonesia (23,758 mt). This implies that the Philippines has competition when it comes to producing cashew nuts in Asia.

*Cashew nuts (mixed with sugar or honey*). The Philippines also imported cashew nuts with sugar or honey as confectionery only from one country, China. Records of importation were only in 1999 and 2004 with 592 and 1,425 metric tons, respectively.

**d) Total Supply**

The total supply of cashew in the country comes from domestic production and the various imports coming from different countries abroad as shown in Table 4. The highest production was in 1997 with 17,324 metric tons produced, a drastic increase from 6160 mt in 1996, and the lowest recorded production from 1989-2003. But for the last five years (1999-2003), production slightly stabilized, growing at a rate of 0.03% only. Meanwhile, total supply of cashew is only increasing at the rate of 0.3% for the same period which implies that the country has to import abroad to augment domestic production. In fact, imports are growing at a rate of 15.6% for the last 15 years.

Table 4. Supply account of cashew, Philippines, 1989-2003.

| Year | Production | Import | Gross Supply |
|---|---|---|---|
| 1989 | 9565 | 0 | 9565 |
| 1990 | 9767 | 0 | 9767 |
| 1991 | 9828 | 1 | 9829 |
| 1992 | 9911 | 18 | 9929 |
| 1993 | 9851 | 18 | 9869 |
| 1994 | 12375 | 8 | 12383 |
| 1995 | 15357 | 3 | 15360 |
| 1996 | 6160 | 55 | 6215 |
| 1997 | 17324 | 237 | 7561 |
| 1998 | 16856 | 92 | 16948 |
| 1999 | 11117 | 108 | 11225 |
| 2000 | 11102 | 45 | 11147 |
| 2001 | 11115 | 210 | 11325 |
| 2002 | 11122 | 148 | 11270 |
| 2003 | 11129 | 240 | 11369 |

Source: BAS

## 4. Demand

### a) Domestic Demand

Domestic demand for cashew comprises the amount that goes to food consumption, processing, seeds, and feeds and waste. As shown in the BAS Supply and Utilization Account of cashew in the Philippines in Table 5, per capita food consumption of cashew has been declining since 1998 at an average of 2% per year. Processed cashew exhibited an increasing trend from 1989 to 1997 at 4.13% but declined after that. Cashew that went to processing declined by 3.3% per year since 1998. The same trend is observed for cashew used as seeds. With the declining demand for food and processing, lesser quantity of cashew is set aside for seeds thus inhibiting the expansion of the industry.

Table 5. Utilization account of cashew, Philippines, 1989-2003.

| Year | Exports | Seeds | Feeds and Waste | Processing | Net Food Disposable | | |
|---|---|---|---|---|---|---|---|
| | | | | | Total | Per Capita | |
| | | | | | | Kg/Yr | Gm/Day |
| 1989 | 2329 | 103 | 35 | 16 | 6422 | 0.10 | 0.31 |
| 1990 | 2622 | 103 | 36 | 18 | 6989 | 0.11 | 0.31 |
| 1991 | 2645 | 103 | 31 | 15 | 6035 | 0.10 | 0.26 |
| 1992 | 3089 | 103 | 34 | 17 | 6677 | 0.10 | 0.28 |
| 1993 | 3119 | 103 | 34 | 17 | 6596 | 0.10 | 0.28 |
| 1994 | 1152 | 112 | 56 | 28 | 11035 | 0.16 | 0.44 |
| 1995 | 1122 | 113 | 71 | 36 | 14018 | 0.21 | 0.56 |
| 1996 | 298 | 115 | 30 | 15 | 5757 | 0.08 | 0.23 |
| 1997 | 555 | 116 | 85 | 43 | 16763 | 0.23 | 0.64 |
| 1998 | 3089 | 115 | 69 | 35 | 13631 | 0.19 | 0.51 |
| 1999 | 8 | 115 | 56 | 28 | 11018 | 0.15 | 0.40 |
| 2000 | 0 | 112 | 56 | 28 | 10951 | 0.14 | 0.39 |
| 2001 | 0 | 112 | 57 | 28 | 11128 | 0.14 | 0.39 |
| 2002 | 1220 | 111 | 50 | 25 | 9863 | 0.12 | 0.34 |
| 2003 | 2176 | 111 | 46 | 23 | 9013 | 0.11 | 0.30 |

Source: BAS

### b) Foreign Demand

The Philippines is exporting shelled/peeled cashew, prepared/preserved nuts and cashew nuts mixed with sugar or honey to countries in Asia, Middle East, Europe and the USA.

*Shelled/Peeled Cashew.* The top Philippine merchandise export market of cashew is China with a total exported volume of 8,214,664 metric tons in 16 years followed by India (5,067,539 mt) and Singapore (3,707,121 mt). The highest volume exported was in 1988 (3,335,328 mt) then in 1992 (3,098,328 mt).

The traditional markets for shelled cashew were China, Hongkong, India and Singapore. But the Philippines was not able to maintain these export markets. From 5 export markets (China, Hongkong, Indonesia, India and Singapore) in 1990 to 1991 this declined to 4 markets (China, Hongkong, India and Singapore) in 1992-1993, to 3

markets in 1994 (China, India and Singapore) and 1995 (China, Hongkong and Indonesia). The Philippines exported to China only up to 1995 and stopped thereafter. The Philippines also exported to Singapore from 1989-1994 but this was at a declining rate, from a high 1,618,232 metric tons in 1990 it declined to 198,000 metric tons in 1994. The Philippines stopped exporting its peeled cashew to Singapore from 1995 to 1997 and resumed exportation only in 1998. But it never again carried on its exportation the following years. In 1996 and 1999, the Philippines had only one export market, India and Hongkong respectively. There were no exportations made in 2000 and 2001.

In 2002, the Philippines was able to export to India (385,000 mt) and Vietnam (834,500 mt). But in 2003, the Philippines was able to regain its former market, Hongkong, adding Australia, Guam, Japan, Palau and USA to its export markets. The volume however was small, 115,600 metric tons only, compared to its exports in the 1990s.

*Prepared/Preserved Cashew Nuts*. The Philippines is also exporting preserved cashew nuts to foreign markets but this is in an erratic fashion. There are 16 foreign markets for prepared cashew nuts. But the Philippines cannot keep its markets. In fact it exported only once in 7 out of 16 countries. The country had tapped the following countries only once from 1996 to 2003: Austria in 1996, Taiwan in 1998,Cyprus in 2001, Japan in 2003, and Turkey in 2002. Its main markets are USA and Guam markets where it had exported 5 times and Palau 4 times in 9 years 1996-2004). Starting in 2003, the country was able to export to 6 countries. In 2004 the country was able to increase its export markets to 9 countries.

From 1996 to 2004, the top Philippine merchandise export market of prepared/preserved cashew nuts is Singapore with a total export of 100,019 metric tons followed by USA (4,502 mt) and Guam (422 mt). The highest quantity exported was in 1998 (100,331 mt), 2004 (3,236 mt) and 2003 (2,057 mt).

*Cashew Nuts Mixed With Sugar or Honey*. The Philippines is also exporting cashew nuts mixed with sugar or honey to 19 different countries at times sporadically or consistently. In a year, the Philippines can have 4, 6 or 8 foreign markets. But in the years 2001 and 2004, the country was able to export its processed cashew nuts to 10 countries.

For the past 9 years, the Philippines had been consistently exporting to USA, Australia and Guam. Other important countries, which are supplied more or less regularly but not consistently by the Philippines, are Canada, Unites Arab Emirates and Hongkong. Other markets that were tapped in previous years were Finland (2001), Great Britain and Northern Ireland (1996-98), Hawaii (2000-01), Israel (2001), and Taiwan (1997). By 2004, however, the Philippines was able to tap new markets like Belgium, France, New Zealand, Samoa bringing to 10 its market outlets in foreign shores.

The top Philippine merchandise export markets of nuts mixed with sugar or honey as confectionery are UAE with a total export of 107,055 metric tons, followed by USA

(65,406 mt) and Hongkong (15,660 mt). The highest quantity exported was in 2000 (124,603 mt), 2001 (23,291 mt) and in 1998 (14,974 mt).

## 5. Marketing System

### a) Product Form

Cashews are marketed as raw nuts from farmers to local traders and processors outside of locality. There are also farmers/growers who process cashew nuts into splits and whole kernels and sell directly to consumers, wholesalers or retailers. Most of the raw nuts are shipped to Metro Manila and are processed in Antipolo City, Rizal. Processors in Antipolo City produced products called "blue seal" (split kernels which are opaque white with low moisture content) and marketed to food manufacturers/processors like Selecta, Magnolia, Goldilocks, etc. (Department of Agriculture, 2004).

A variety of cooking method also gives rise to plain, salted, roasted, or toasted and *adobo* flavored cashew nuts. Besides the retailers and peddlers who sell cashew on a per weight basis, there are also commercial centers (such as local market and grocery stores) that distribute the nuts in packs.

Food manufacturing companies buy wholesale amounts, de-shelled and ready to use. It is used in ice cream flavorings such as (Magnolia), chocolate bars (such as Hersheys), cakes and pastries (such as Joni's and Goldilocks), and other delicacies or confectioneries. Households use cashew as an ingredient for preparing certain dishes. Others consume it as dessert or *pulutan* in the form of salted, spiced and *adobo* flavors or in bottle (as in Tobi's). A few of the Filipino delicacies include cashew brittle, cashew cake, *turones de casuy*, cashew candy, *pastillas de casuy* (J & A of Cagayan de Oro City), and *bandi*. In Palawan, *bandi* is a native flat cake using cashew nuts instead of peanuts and is similar to *panucha* (Festin, 1991).

Other cashew products such as juice, wine and CSNL are still at the development stage in terms of marketing. Antipolo sells cashew shells to CNSL manufacturers in Metro Manila.

### b) Harvesting and Post-harvest Practices

Farmers plant and maintain the cashew trees/plantation. The fruits are harvested by hand picking or using a pole with a wire hook attached at the end. There is a shallow net or cloth bag to catch the fruit. The harvested fruits are then transferred to a basket lined with newspaper or any non-abrasive material so as not to injure the cashew.

The baskets are then brought to the packing sheds or bodega, where the nuts are separated from the apple and remove the peduncle. Farmers harvest and detach the nuts from matured apples. The nuts are sun dried while apples are fed to pigs or left to rot in the field. The cashew nuts or kernels are removed from the shell using a manual cashew sheller

The cashew nut shell, the source of CNSL, is not utilized and sometimes become a pollutant when not disposed properly after the kernels are extracted. If the shells can be collected and processed to get the CNSL oil or fluid, this could be an additional income for the processors.

After harvest, the nuts are dried under the sun for 2 days before storage. The nuts are spread out on clean ground to sun dry or in any suitable container in layers (not more than 10 cm thick) and raked constantly for uniform drying. Drying the nuts will ensure its good keeping/storage quality.

The nuts are gathered in heap while still warm and covered in the afternoon till drying is completed for 2-3 days to reach 7% moisture content. To dry 20 sacks it is done 3 sacks at a time.

When the nuts are properly dried, they are placed in sacks or bags and placed in storage or bodega in the house. Most farmers practice sorting and grading as matured dried nuts command better prices than unsorted and less quality nuts. Further sorting or removing of dirt or impurities is done before exposing/drying the cashew nuts under the sun before storage and before processing.

Well-dried nuts can be kept in storage for another cropping season with usually 85 % kernel recovery. By the use of the "*kalukati*" or cashew sheller, the kernels are extracted from the shell. The nuts should be kept in a tight container once extracted to keep insect pests, and ants away. Dirt, impurities and other debris such as stones, dried apples are removed and deformed or diseased nuts are sorted out before processing or cooking the nuts.

Though some men are involved in breaking the cashew nuts, majority are mostly women. Salary for men and women is equal or the same, though men work faster. It will take 12 persons to open or remove cashew shell of 100 sacks; or 8 persons for 20 sacks. Processing or shelling is easier if the cashew nuts are well dried. Sorting or classifying of the nuts is done before packing or before cooking. The nuts are processed as roasted or fried half or whole nut. Roasted and whole nuts command higher price.

In all these operations, many women are involved than the men.

| **Operation** | **Person Involved** |
|---|---|
| Gathering the cashew fruit | Man or woman & family |
| Removing the nut from the fruit | Woman/family |
| Sorting or classifying | Woman or man |
| Storage at home or in bodega | Woman or man |
| Spread the nuts under the sun for 2-3 days before storage | Woman or man |
| Place in sacks after drying | Man/woman |
| Store the sacks of nuts in the bodega or house | Man/woman |
| Exposing the nuts under the sun a day before storage | Woman /man |
| Extracting the kernel from the shell | Woman/man |
| Sorting out the nuts | Woman/man |
| Cooking the nuts | Woman/man |

**c) Distribution**

During harvest, all the produce are sold at once to the middlemen. The growers sell their produce immediately after harvest so they can recover the money they spent for their production. On the other hand, these middlemen buy the cashew at a low price, store them until the price increases and sell them during the off-season.

Cashew is sold mainly as raw nuts from the farmers to the local traders and processors within or outside the locality. Some growers or farmers process cashew nuts into roasted splits and whole kernels, which are then sold to consumers, wholesalers or retailers. A small quantity of the product is usually left for family consumption. Most of the raw nuts shipped to Manila are processed in Antipolo City, Rizal. Antipolo sells cashew shells to CNSL manufacturers in Metro Manila (Del Rosario, 1999).

Local processors can be classified into traditional and modern (Gervacio, 1985). The former usually operates near or within major cashew producing regions. These are cottage-level enterprises, which are involved, in de-shelling operations only. The kernels are then sold to provincial retailers and/or local agents of re-packers and food manufacturers located in Metro Manila.

Meanwhile, modern processors rely on provincial sources of raw nuts. Most modern plants are located in Metro Manila (Gervacio, 1985). They are not limited to processing operations. They have their own cooking, packaging, distribution facilities, therefore are able to sell directly to retailers and food manufacturers.

Figure 3 shows the distribution channels for cashew and raw and processed kernels and the prices they received at each market level (Department of Agriculture, 2004). The growers received P15 to P18.47 per kg of raw nut sold to local processors via retailer-agents. Local processors pay P143.55 to P150 per kg for split kernel and P250 to P350 per kg for whole nut. If exported, raw nut, either fresh or dried, fetched a price of P33.54 per kg or US $0.62 per kg. Meanwhile, processed or preserved cashew nut commanded a price of P248.40 per kg or US $4.6 per kg.

*Palawan (Devanadera, 2005).* Locally, farmers sell their cashew to traders and processors in the barangays and Puerto Princesa City. A lot of cashew buyers come from Manila, Antipolo, Pampanga and Laguna.

Antipolo vendors get their supply from Palawan but they have a better processing method which improves the taste and eating quality of their cashew.

The cashew farmer/retailers go to the different barangays and sitios to buy the nuts. Given enough capital to buy the cashew available in the barangays, the farmer/retailer buys the cashew in the neighborhood and sell them together with his produce to Puerto Princesa City trader/processor.

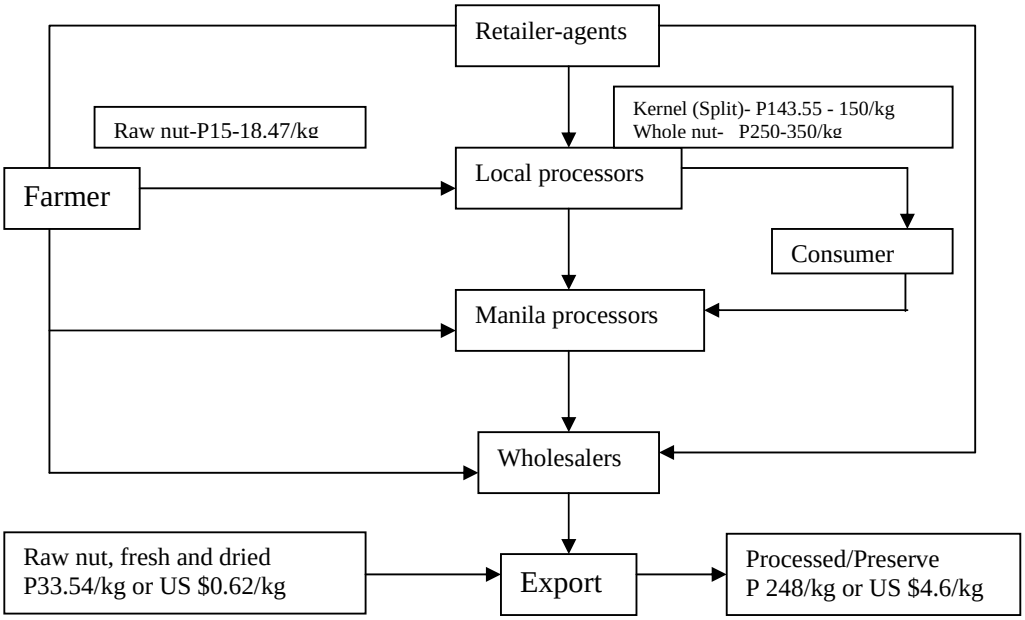
Some retailers or farmer traders process a portion of the cashew harvest and sell them locally as roasted or fried in splits/half or whole kernels and sell them in their locality or in Puerto Princesa City, other municipalities and tourist destination in the province.

Majority of the nuts are shipped to Manila, where they are processed. Municipal traders act as exporters in Taytay and El Nido. The traders bear the cost of handling and loading which are chargeable to the exporter.

A form of incentive is given to traders who purchase and accumulate a certain quota or quantity of nuts. If he exceeds his target or quota, additional fee or payment is given him. At present, there are three (3) big cashew exporters in Puerto Princesa City with their main office in Manila; UBICO, Ocean Aqua Marine and Marphil (Mr. Rene Lim).

Processors usually sell products to food companies/processors like Goldilocks, Magnolia, Selecta, Toby, Planters and others. In Antipolo, Rizal processors have this " blue seal" (split kernels which are opaque white with low moisture content).

From Palawan, the cashew nuts are placed in vans and shipped to Metro Manila going to the wholesalers and international market.




Source: Cashew…The Golden Nut of MiMaRoPa, Department of Agriculture, 2004

Figure 3: Distribution channel for raw and processed cashew and kernels, 2004.

## 6. SWOT Analysis

| SWOT ANALYSIS |
|---|
| STRENGTH<br>• Leading nut crop in the Philippines with high export potential<br>• Adapted in different soil types even on marginal soils<br>• Can be used for reforestation<br>• Availability of processing technologies<br>• Available expansion areas in Palawan, Occidental Mindoro and Romblon |
| WEAKNESS<br>• Lack of quality planting materials<br>• Erratic and low yield due to pests, diseases and heavy rains during flowering sand fruiting stage<br>• Abundance of unproductive old trees<br>• Lack of location specific culture and management technology on promising cultivators |
| OPPORTUNITIES<br>• Steadily growing demand for wholesale food items from the expanding world market for processed and industrially manufactured cashew based products<br>• Inclusion of Palawan in the BMP EACA Cooperation |
| THREAT<br>• Adverse agro climatic condition<br>• Low priced cashew nuts from competitor countries |

Source: DA

## 7. Problems and Constraints

For the cashew industry to realize its full economic potential, it has to address the following problems:

**a) Production**

There is low and erratic yield due to lack of quality planting materials, pests and diseases and heavy rains during flowering and fruiting stage. Abundant old unproductive trees still abound in the region. The lack of technical knowhow on how to eradicate pests and diseases afflicting cashew trees and the lack of location specific culture and management technologies for promising varieties contribute too to the low yield of cashew. The farmers' lack of awareness on the economic importance of cashew made them laggards in adopting new technologies and in replanting their cashew plantations.

**b) Post-production problems**

There are inadequate postharvest and processing facilities in major cashew producing areas. This is further exacerbated by the lack of training on improved processing technologies.

**c) Marketing**

Cashew prices are unstable in the market. Middlemen control the price thus growers are mere price takers. Moreover the cashew growers are largely unorganized thus they have a weak bargaining power when dealing with the traders.

The Philippines also faces competition from low priced foreign sourced cashew nuts. According to Falcatan, India had been exporting cashew nuts to the Philippines at a much lower price of P130-180 per kilo, way below the country's traded price of P230 per kilo. With the lower price, processors of course have no other choice but to buy from abroad

**d) Limited support services**

Cashew farmers decry the lack of financial support and poor farm to market roads.

But for the industry to become competitive in the domestic and world markets, the production and marketing constraints have to be addressed. Training on cashew production technologies for cashew nuts and apples should bed done. There is also a need to organize and strengthen cashew growers association and processors' cooperatives once profitable market outlets are identified. Market matching or contract marketing can be explored so farmers can be assured of higher prices for their produce. But there is a need to lower the cost of production so as to compete with low priced cashew coming from foreign markets.

## 8. Conclusion

The steadily growing demand for wholesale food products from the expanding world market for processed and industrially manufactured cashew based food products augurs well for the industry. Likewise, the continuous importation of cashew products in foreign markets only shows that there is demand gap that the cashew producing regions like Palawan can fill in the local market. Technically, cashew can be grown in the country and in the region due to the available expansion areas for production in Palawan. Aside from its economic potential as a crop, it ca also be used in reforestation as it can adapt in different types of soil even in marginal lands.

But for the industry to rise up from its doldrums existence, the production and marketing constraints have to be addressed. Training on cashew production technologies for cashew nuts and apples should bed done. There is also a need to organize and strengthen cashew growers association and processors' cooperatives once profitable market outlets are identified. Market matching or contract marketing can be explored so farmers can be assured of higher prices for their produce. But there is a need to lower the cost of production so as to compete with low priced cashew coming from foreign markets.

## B. The Seaweeds Industry

### 1. Background of the Industry

Seaweeds are marine algae which are grown in natural conditions of form pond culture. They have no true roots, stems and leaves, unlike other plants. These plants are widely distributed in the ocean, occurring from the tide level to considerable depths, floating tree or attached to substrates such as sand, mud, rocks, shells, corals and others. There are four main groups of marine seaweeds. These are red algae (*Rhodophycae*); brown algae (*Phaeophycae)*; green algae (*Chlorophycae*); and blue green algae (*Cyanophycae*). Of the four, the red and brown are commercially grown and used to manufacture seaweed products.

There are about 390 species of seaweed in the Philippines but only 60 are known to be edible. These are used to manufacture agar, alginate, carrageenan and furcellaran. The most important variety of seaweed is *Eucheuma,* of the red algae, which accounts for 98% of the total Philippine production of seaweed. *Eucheuma* is the source of carrageenan, one of the world's foremost food and industrial additives today. It is a valuable substance used in gelling, suspending or thickening with waterholding properties in various products. This red algae grows on sandy bottom of marine waters in intertidal or subtidal zones where the water is very salty, clear and fast moving. Its soft body is light brown to light green in color with erect or prostate branches.

*Gelidiella acerosa, Gracilaria, Sargassum, Codium edule, Hydroclathrus clathrus, Acanthopora spicifera, Laurencia, Caulerpa*, *Hypnea* and *Porphyra* are some of the other species that are commercially utilized in the country. All these species are sources of human food. The culture technology for *Gracilaria* and *Porphyra* is available, but has not been adopted for commercial production.

### 2. Uses of the Industry's Products

The economic importance of seaweeds lies in their composition. Seaweeds contain large amount of water, with dry matter compromising carbohydrates, proteins, fats, vitamins and minerals. They are usually consumed for their mineral and vitamin content. Seaweeds and their products are largely used as an additive or garnish to more bulky foods. Throughout the world, over 100 species of seaweeds are eaten.

*Seaweed for Food.* Seaweed as a staple form of diet has been used in Japan and China since prehistoric times. Some 21 species are used in every day cooking in Japan, six of them since the 8$^{th}$ century. Seaweed accounts for some 10% of the Japanese diet and seaweed consumption reached an average of 3.5 kg per household in 1973. In the west, seaweed is largely regarded as a health food and, although consumption there will ever be more than a fraction of the Japanese.

The most important species in Japan are Nori (*Porphyra* species), Kombu (*Laminaria* species) and Wakame (*Undaria pinnatifida*). The use of Kelps ('kombu" in Japan and "haidai" in China) dates back to at least the 5$^{th}$ century in China. The main species

used is *Laminaria japonica* (Laminariales), but 8-11 species are used also, mainly in Japan. Plants are dried after harvesting and either cut into strips or powdered. In Japan, kombu is used in the preparation of fish, meat dishes, soups and also as a vegetable with rice. Powdered kombu is employed either in sauces and soups or is added to rice in the same way as curry. Some kinds are used in making an infusion similar to tea.

Another kelp, *Undaria pinnatifida* (Laminariales), is widely used in Japan (where it is known as "*wakame"*) and China ('*qundai-cai*") as food. In Japan this is a more important crop than *Laminaria* both in value and production. The harvested algae are dried after washing in fresh water. After resoaking the plant material is used as an additive to soups (wakame soup is served with virtually every meal in Japan); toasted (Yaki-wakame); used half resoaked, with boiled rice; and coated in sugar and tinned (*Ito-wakame*). China, *Undaria pinnatifida* was collected from natural habitats for centuries, mainly on the East China Sea coast. Plants are grown now on ropes in the Quingdao and Dalian areas (Yellow Sea), to where the algae were transplanted from Korea and, perhaps, Japan (Tseng 1982). *Undaria* is not as popular as *Laminaria* in China as a foodstuff and the growers find the plants difficult to manage. The annual production in China is, therefore, very low, amounting to no more than a few hundred tonnes in dry weight each year.

Nori is a red algae, *Porphyra* spp. (Bangiophyceae). Nori is sold in sheets that may be toasted to give a green colour and then flaked and added to sauces, soups and broths. Sometimes it is just soaked and eaten. Small, dry nori sheets are used to wrap cold rice balls, which make a popular lunch-time snack for Japanese children. The food value of nori lies in its high protein content (25-35% of dry weight), vitamins and mineral salts, especially iodine. Its vitamin C content is about 1.5 times that of oranges and 75% of the protein and carbohydrates are digestible by humans, which is very high for seaweeds.

Laverbread (mainly *Porphyra dioica* and *P. purpurea*) is picked on the rugged coastline of Wales from rocks when the tide has gone out. Laverbread has an excellent nutritional content, mainly of protein, carbohydrate, vitamin B, B2, A and C and lots of trace elements and minerals, most prominent of these is iodine. Another plus is that they are low in calories and re suitable for the ever-increasing vegetarian market. In Wales, it is sold in health shops in tablet form and tinned. When the seaweed arrives at the welsh factories, it is inspected and goes through a series of washes. It is then cooked for several hours with only a little salt added; this produces a very dark, dense spinach-like pureÃ©.

Many chefs are discovering the culinary assets of laverbread, adding new dimensions to their repertoires. Traditionally, it has been enjoyed very simply spread on thin toast with oatmeal or malted vinegar and accompanied by fried or grilled welsh cured bacon. More recent it has been served with pasta dishes, in spicy batter with mushrooms, and seafood pizzas. Laverbread is also added to cheeses.

*Liquid Seaweed Extracts for Fertilizer.* Liquid extracts of marine brown algae are marketed for use in agriculture and horticulture. Most of these extracts are prepared from dried *Ascophyllum nodosum* meal (e.g. "Maxicrop", manufactured in the United

Kingdom), or from dried total drift, often referred to as "blackweed", but some utilize other species, such as *Fucus serratus* and *Laminaria* species (e.g. "SM3"; United Kingdom). One product currently being marketed is prepared from the stipes of *Ecklonia maxima* from South Africa ("Kelpak 66"). Other products prepared from seaweed include "Algifert" from Algea, a Norwegian company, "Seagro", manufactured in New Zealand; and "Seasol", an extract manufactured by a company in Tasmania. These are prepared from hot-water extracts of either the dried or wet seaweed, sometimes with the addition of sodium carbonate to aid extraction.

"Maxicrop" is primarily used for gardens and glasshouse crops and is exported to a wide range of countries (Chapman & Chapman, 1980). It has been used on citrus fruits in Guyana, on citrus and grapes in Greece, on orchids in Belgium, on garden crops in Thailand, and on glasshouse crops in Iceland. "Seagro" in New Zealand is largely used on pastures but it is also used on orchard crops.

A wide range of beneficial effects have been reported from the use of liquid seaweed extracts (Blunden 1977), including increased crop yields, resistance of plants to frost, increased uptake of inorganic constituents from the soil, more resistance to stress conditions, and reductions in storage losses of fruit.

Liquid seaweed extracts are used at very high dilution rates which results in only very small quantities of material being applied to a given area. The active substances in the seaweed extracts must therefore be capable of having an effect at a low concentration. Trace elements have been suggested as likely active constituents, but Blunden (1977) and Blunden & Gordon (1986) have concluded that the quantity of substances applied forms an insignificant proportion of the total requirements of the crops. The presence of plant hormones (substances naturally found in small quantities in plant tissues and involved in, amongst other things, the regulation of growth) has been suggested as being responsible for, at least some of the observed effects; it has been demonstrated that commercially-available seaweed extracts have high levels of cytokinin-like activity.

Close correlations between results achieved in field trials with the use of a synthetic cytokinin, kinetin, and seaweed extracts of equivalent cytokinin activities were found both on the yield of potatoes and in the crude protein of grasses. Similar results were obtained with the reduction in the rate of "degreening" of limes after post-harvest immersion of the fruit in seaweed extracts and kinetin solutions of equivalent cytokinin activity. Further circumstantial evidence supporting the possible involvement of cytokinins in seaweed extracts was the recent detection of cytokinin-like activity in a commercial seaweed concentrate prepared from *Ecklonia maxima* (Laminariales).

Studies of seaweed extracts have shown that although in some bioassay systems, for example the radish leaf expansion bioassay, high levels of cytokinin activity are recorded, in others, for example the *Amaranthus* seedling assay, low levels are found. These discrepancies are thought (Blunden & Gordon 1986) to be due to the extracts containing, in addition to true cytokinins, other compounds which behave like them in certain respects. Blunden & Gordon were further of the opinion that these substances may represent betaines - quaternary ammonium compounds which are derivatives of

either amino or imino acids containing a fully methylated pentavalent nitrogen moiety. Glycine betaine, one of the structurally simple betaines, was first extracted from sugar beet and was found to have chlorophyll-retention properties. In growth tests it was found to have an activity similar to that of cytokinins in several other growth tests and so it was considered that some of the cytokinin-like activity in sugar beet extracts was due to glycine betaine. It has been shown also to be a major osmoticum (controlling water movement in and out of plant cells) in certain higher plant families adapted to either salt or water stress and it has been suggested that other betaines and tertiary sulphonium compounds have a similar function in other species. Also it has been claimed that glycine betaine has a rÃ´le in frost resistance.

Betaines have been recorded for most of the species of marine algae used in the manufacture of seaweed extracts. *Ascophyllum nodosum* yields c-aminobutyric acid betaine, d-aminovaleric acid betaine and laminine whilst *Laminaria* species have a range of betaines including glycine betaine. Commercial seaweed extracts have been examined for their betaine content and the compounds detected were those reported for the algal species used in the manufacture of the extracts. Because of the reported effects from the application of commercial seaweed extracts and the known properties of compounds such as glycine betaine, the circumstantial evidence for at least part of the activity of the seaweed extracts being due to compounds of this type is strong (Blunden & Gordon 1986). Moreover, some of the discrepancies in the results obtained for the cytokinin contents when the extracts are bioassayed using different procedures may be explained by the presence of betaines in the extracts

*Drift seaweed for lazy beds.* Detached seaweeds or "total drift" have been used for many years in several European countries for the making of "lazy beds". Soil or sand is layered with seaweed for vegetable production, particularly potatoes. Such organic material has proved very useful in very barren areas, particularly the Aran Islands, off the mid-west coast of Ireland, and parts of Scotland. However, seaweed decomposes very slowly and it is probably uneconomical to transport such material more than few kilometer inland. In dry areas or in areas with soils of poor water-retention qualities, seaweed may be very useful as it retains water very well, but there may be problems with the high salt content. Some specialized uses are apparent, for example, Breton farmers transport large quantities of the brown alga *Himanthalia elongata* from the sea for artichoke crops; such uses may be more a matter of tradition than of any great benefit. More recent uses of seaweeds as fertilizers and soil stabilizers have been in the seeding of motorway embankments in Britain: grass seed is mixed with a crude extract of brown algae to make a paste-like mixture which is then sprayed onto disturbed areas. The paste keeps the seeds in place, retains moisture and binds the soil.

*Soil Additive/Conditioner*. A number of crustose, calcareous red algae (Corallinaceae) grow detached in shallow waters on the coasts of north western Europe and in the western Mediterranean and accumulate to form large beds of stone-like algae. These are collectively known as "maÃ«rl", "coral" or "coral sand" in northwestern France, Britain and Ireland (Blunden, Binns & Perks 1975). The two most common species in the north-eastern Atlantic are *Phymatolithon calcareum* and *Lithothamnion corallioides*, growing from 0-8(32) m in the sub tidal of quiet bays with clear Atlantic water off the coasts of Spain, France, Britain and Ireland. The

algal thallus is made up of successive layers of calcium and magnesium carbonates, which may account for up to 80% of the wet weight. MaÃ«rl is dredged off the coast of Brittany, at Falmouth in England, and in Bantry Bay, Ireland, dried, ground, and sold as a soil additive. Over 600,000 tons are harvested each year from live and dead deposits. Transport and drying costs are high and the main advantage over ordinary lime may be the relatively large amounts of trace elements present in the seaweed product. This product is much favored by organic farmers and horticulturists, as it is believed to provide many trace elements that might otherwise need to be added in "chemical" form. Ground maÃ«rl is particularly good for water filtration.

*As Feed.* The feeding of seaweed meal in the ration of hens was found to reduce the incidence of thin-shelled eggs had increased iodine content have also been observed in seaweed-fed poultry.

*Medicinal uses.* Certain species of seaweeds have been found to contain compounds with medicinal effects. Some were used to heal wounds, burns, and rashes. Others have been eaten for prevention of intenal disorders.

*Carageenan and Agar.* The major portion of seaweed harvest is used as raw material for the manufacture of agar and carageenan. Only 1 per cent is utilized for direct human consumption and a small percentage for raw material in animal feed and fertilizer production.

Carageenan is a natural marine colloidal gum that is extracted from some species of seaweeds. It is a yellowish or tan to white coarse to fine powder that is practically odorless and has a mucilage taste. It has the unique ability to form an almost infinite variety of gels at room temperature, rigid or compliant, tough or tender with high or low melting point. The gelation requires no refrigeration and the gels can be made stable through repeated freeze-thaw cycles. It is used to enhance a number of milk system and water system food products. Its functions include fat and foam stabilization, emulsion stabilization, gelation, thickening and binding. It is applied similarly in cosmetics, pharmaceuticals and other non-food products.

- In poultry, hams, sausages and other meat products- it is injected with carageenan to serve as binder, moisture holder and gelling agent. Sauces, salad dressing and dips require carageenan to impart body, provide thickness and stabilize emulsions.
- In the dairy items and desserts, carageenan is utilized as an enhancer. Whipped creams and toppings have stable foam due to carageenan. Acid milk products such as cream cheese and cottage cheese are given body and in the case of yogurt, improved fruit suspension of chocolate.
- Non-food use. Carageenan improves foam stability and creates thickness in shampoos. Carageenan is found in lotions and creams as it imparts body, provides slip, and improves rubout. It is also present in toothpastes, acting as a binder and improving foam stability. It is also found in gel-foam air-fresheners.
- As additive in instant food drinks, to keep food particles liquid in mixture.
- As medicinal ingredients in the preparation of surgical jellies, demulcents, and anti-acid tablets, in checking hepatitis, and in curing ulcer.
- As natural latex creaming and thickening for rubber.
- As adhesive for paper bags and gummed tapes.

- As coating for food packages and milk containers, ceramic glazes, leather finishes, broiler compounds, batter plate separators, beet sugar processing, wax and emulsions.
- As additive in the preparation of fertilizer and pesticides.

## 3. Supply

### a) World Production

As of 2003, China was the world's largest producer of seaweeds accounting for 63% of total world production followed by Japan with 21%. Meanwhile, the Philippines' share of seaweeds world production stands at 8%.

The Philippines is considered the world's largest producer of semi-refined carageenan also known as the Philippine National Grade (PNG) and the third largest manufacturer of refined carageenan, after the United States and Denmark. However, the country is also the biggest producer of red seaweed next to Japan (UA&P Food and Agribusiness Yearbook and Directory). The country is considered the largest supplier of *Euchema* accounting for 80% of total world supply.

During the period 1993-1997, the Philippines ranked 5th among the major producing countries of seaweed. The country contributed 6.56% to the total world production of 559,888,073 mt. China, on the other hand was the major seaweed producer with 292,441,630 mt that contributed 52.23% to the world production (Table 6). The second producing country was Korea with 57,221,136 mt followed by Korea Republic with 50,027,596 mt. They accounted for 10.22% and 8.94% of world production, respectively.

Table 6. Seaweed World Production, 1993-1997 (in Metric Tons).

| All Fishing Areas | 1993 | 1994 | 1995 | 1996 | 1997 | % Share | Growth Rate (93-97) |
|---|---|---|---|---|---|---|---|
| Total World Production | 36,566,591 | 71,624,400 | 141,389,256 | 280,902,907 | 559,888,073 | 100.00 | - |
| China | 18,511,176 | 36,821,085 | 73,346,026 | 146,377,635 | 292,441,630 | 52.23 | 99.37 |
| Korea D P Rp | 3,594,446 | 7,166,892 | 14,316,784 | 28,618,568 | 57,221,136 | 10.22 | 99.75 |
| Korea Rep | 3,352,172 | 6,464,342 | 12,650,014 | 25,098,883 | 50,027,596 | 8.94 | 99.57 |
| Japan | 3,411,847 | 6,453,944 | 12,418,978 | 24,426,747 | 48,476,658 | 8.66 | 94.18 |
| Philippines | 2,704,308 | 5,031,093 | 9,606,416 | 18,666,506 | 36,720,567 | 6.56 | 92.00 |
| Chile | 1,241,142 | 2,403,421 | 4,702,937 | 9,243,340 | 18,325,732 | 3.27 | 96.03 |
| Norway | 904,545 | 1,809,090 | 3,618,180 | 7,236,360 | 14,472,720 | 2.58 | 100.00 |
| Indonesia | 673,951 | 1,229,507 | 2,348,576 | 4,585,577 | 9,009,611 | 1.61 | 91.29 |
| USA | 405,972 | 811,944 | 1,623,888 | 3,247,572 | 6,494,882 | 1.16 | 99.99 |
| India | 437,800 | 831,500 | 1,617,900 | 3,190,700 | 6,334,700 | 1.13 | 95.06 |
| Others | 1,329,232 | 2,601,582 | 5,139,557 | 10,211,019 | 20,362,841 | 3.64 | 97.84 |

Source: DA

### b) Domestic Production

Seaweed production is very important to the country's marine ecosystem along with mangrove and coral reefs. In 2003 seaweed production accounted for 68% of the

country's aquaculture production leaving fish/shellfish with 32% share. Of the 988,888 mt produced in 2003, Mindanao contributed 54% or 535,484 mt and the rest 453,404 mt are shared by Luzon and Visayas.
The country's seaweed production over the past 23 years however showed a modest growth (Table 7). Production is increasing at a rate of 7.67% annually. Growth in production from 1995 onwards was only at 4% per year.

Tawi-tawi is the major producing area of seaweed contributing 30% or 189,192 mt to the total production of seaweed valued at P586,277,000 (Table 8). Sulu is the 2nd top producer with 168,265 mt and Palawan as the 3rd producing province at 103,386 mt. Other producing areas include Zamboanga City, Antique, Bohol among others.

Table 7. Production of seaweeds (in metric tons) by region, Philippines, 1993-2001.

| Year | Philippines | Region I | Region II | Region III | Region IV | Region V | Region VI | NCR |
|---|---|---|---|---|---|---|---|---|
| 1980 | 229,957 | 19 | 2 | | 952 | 10 | 74 | |
| 1981 | 86,261 | | | | 3,025 | | 33 | 5 |
| 1982 | 109,239 | 13 | 4 | | 4,421 | 139 | 1,223 | 74 |
| 1983 | 133,650 | 21 | 4 | | 2,142 | 12 | 38 | |
| 1984 | 145,036 | 19 | | | 2,206 | 15 | 32 | |
| 1985 | 184,410 | 20 | | 7 | 2,130 | 20 | 68 | |
| 1986 | 170,483 | 16 | | 8 | 2,078 | 26 | 66 | |
| 1987 | 222,003 | 67 | 8 | 6 | 2,148 | 27 | 39 | |
| 1988 | 257,305 | 21 | 26 | 9 | 4,745 | 40 | 14 | |
| 1989 | 270,165 | 74 | 29 | 16 | 5,006 | 63 | 50 | |
| 1990 | 292,471 | 82 | 30 | 16 | 5,115 | 54 | 56 | |
| 1991 | 285,233 | 180 | 67 | 16 | 4,337 | 52 | 67 | |
| 1992 | 350,554 | 42 | 88 | | 5,504 | 52 | 45 | |
| 1993 | 381,154 | | | | 3,319 | 1,176 | 2,195 | |
| 1994 | 404,918 | 11 | 3 | | 3,054 | 3,366 | 1,703 | |
| 1995 | 579,922 | 2 | 4 | 4 | 104,122 | 10,837 | 1,306 | |
| 1996 | 658,998 | 2 | 4 | 3 | 180,612 | 8,871 | 1,336 | |
| 1997 | 657,786 | 4 | 2 | 2 | 164,998 | 3,246 | 2,102 | |
| 1998 | 685,753 | 2 | 1 | 1 | 143,042 | 7,325 | 12,724 | |
| 1999 | 696,545 | 2 | 1 | 1 | 125,685 | 8,470 | 17,889 | |
| 2000 | 707,452 | 1 | 1 | 1 | 168,758 | 10,753 | 19,187 | |
| 2001 | 786,242 | 1 | 1 | 1 | 171,635 | 21,086 | 30,768 | |

### c) Importation

The Philippines is also importing seaweeds. Indonesia is the major supplier contributing 51.17% or US$422,750 to the total import of US$826,126 (Table 9). Chile, on the other hand, is the 2nd major supplier with US$176,941 worth of seaweed export to the Philippines and USA with US$120,005. Other sources of seaweeds are Ireland, United Kingdom, China, Japan, among others.

Table 8. Seaweed production (in metric tons) by province, Philippines, 1995-1999.

| PROVINCE | 1995 | 1996 | 1997 | 1998 | 1999 |
|---|---|---|---|---|---|
| Tawitawi | 164,753 | 166,200 | 181,335 | 186,293 | 189,192 |
| Sulu | 178,996 | 168,860 | 173,729 | 173,223 | 168,265 |
| Palawan | 102,649 | 178,910 | 163,495 | 141,301 | 103,386 |
| Zamboanga City | 79,128 | 85,139 | 82,151 | 95,260 | 98,131 |
| Antique | 1,255 | 1,282 | 1,843 | 12,027 | 17,222 |
| Bohol | 9,563 | 10,383 | 9,451 | 8.728 | 9,693 |
| Zamboanga del Sur | 7,925 | 8,165 | 7,921 | 8,346 | 9,569 |
| Zamboanga del Norte | - | - | - | 5,850 | 8,010 |
| Camarines Norte | - | - | 715 | 3,558 | 5,018 |
| Sorsogon | 10,183 | 8,845 | 2,062 | 3,069 | 3,415 |
| Others | 3,188 | 3,603 | 4,403 | 4,924 | 8,719 |
| Philippines | 558,270 | 631,387 | 627,105 | 642,579 | 620,620 |

Table 9. Philippine imports of seaweeds (in kg and US$), 1995-1999.

| Country | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Qty (kg) | Value US $ | Qty (kg) | Value US $ | Qty (kg) | Value US $ | Qty (kg) | Value US $ | Qty (kg) | Value US $ |
| Indonesia | 333,739 | 218,781 | 498,762 | 294,433 | 525,060 | 380,715 | 358,945 | 243,247 | 858,992 | 422,750 |
| Chile | 75,800 | 96,000 | 175,000 | 204,650 | 482,322 | 554,676 | - | - | 163,468 | 176,941 |
| USA | - | - | 205,725 | 247,991 | 86,687 | 56,978 | 524 | 837 | 103,798 | 120,005 |
| Ireland | - | - | - | - | - | - | - | - | 9,636 | 58,780 |
| UK | - | - | - | - | - | - | - | - | 20,000 | 21,265 |
| China | - | - | - | - | 15,000 | 4,058 | 6,734 | 25,192 | 4,404 | 8,297 |
| Japan | 5,176 | 8,227 | 10,020 | 5,114 | 6,282 | 5,964 | 20,924 | 17,083 | 3,576 | 6,825 |
| Korea | 72 | 99 | 394 | 525 | 9,224 | 6,274 | 2,373 | 2,205 | 4,399 | 4,752 |
| Taiwan | - | - | - | - | 500 | 12,720 | 1,400 | 1,313 | 100 | 4,529 |
| Hongkong | 2,068 | 2,983 | 1,227 | 1,470 | 1,954 | 2,320 | 8,868 | 13,423 | 1,474 | 1,982 |
| Others | 14,810 | 7,590 | 125,532 | 50,336 | 183,898 | 70,370 | 47,736 | 30,073 | - | - |
| Total | 430,865 | 333,680 | 1,016,660 | 804,519 | 1,310,927 | 1,094,075 | 447,504 | 333,373 | 1,170,047 | 826,126 |

## 4. Demand

### a) Foreign Demand

The increasing global demand for carageenan encourages the Philippines to expand its production areas and produce quality seaweed to remain the preferred supplier in the world market. The country has been the number one supplier of *Euchema* seaweed and semi-refined carageenan and number four supplier of refined carageenan (Agriculture, October 2004).

For the past several years, demand for seaweeds in the foreign market had been growing. The number of importing countries likewise had increased from 42 to 45 countries for carageenan from 2002 to 2003 and 30 to 39 countries for seaweeds for the same period. Inspite of the barriers posed by the advanced countries like the USA and European countries, demand for carageenan continues to surge.

United Kingdom was the major market of Philippine seaweed contributing 14.10% (US$6,220,912) to the total export value of US$44,107,266 in 1999. This was followed by Denmark with US$5,758,868 and United States of America with

US$5,733,543. Other major markets are France, China, Spain, Hongkong, among others. In 2003, the Philippines major export markets for seaweeds were the USA, France, Denmark, South Korea and China. Of the total export value US$ 33,134,333 USA has 20.15% share, France with 17.31%, Denmark with 9.3%, South Korea 9% and China with 6.6%. The rest went to the remaining forty importing countries.

On the other hand, Denmark was the Philippines major market of carrageenan in 1999 (16.24%). This was followed by France with US$6,190,540, United Kingdom & Great Britain with US$5,803,796 (Table10) and USA with US$5,208,230. However, Philippine import of Carrageenan (Table 11) showed a tremendous increase in 1999 from US$235,241 in 1998 to US$1,564,804 in 1999. Denmark was our major importer having a share of 62.93% to total carrageenan imports. For 2003, Denmark, USA and France were the major export markets with exports of carageenan worth US$12.2M, US$5.97M and US$4.78M, respectively.

By product breakdown of Philippine exports of seaweeds in 1996, semi refined carageenan accounted for 55%, refined carageenan 24% and raw seaweeds 21%.

In the world market, carrageenan was mainly used for dairy needs. Other applications are for water gel, non-food uses and the least for other food items (FAO Fisheries Technical Paper, 1997)

Table 10. Philippine Exports of Seaweeds, 1995-1999.

| Country | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Qty (kg) | Value US $ | Qty (kg) | Value US $ | Qty (kg) | Value US $ | Qty (kg) | Value US $ | Qty (kg) | Value US $ |
| UK | 1,140,460 | 3,319,728 | 1,280,440 | 4,901,836 | 897,500 | 2,936,650 | 977,200 | 2,759,688 | 1,712,250 | 6,220,912 |
| Denmark | 4,894,368 | 5,712,339 | 3,114,640 | 4,713,454 | 3,376,852 | 5,622,267 | 1,544,809 | 3,247,087 | 4,306,568 | 5,758,868 |
| USA | 2,968,958 | 4,672,904 | 1,789,773 | 4,269,536 | 3,065,595 | 4,241,128 | 1,815,099 | 3,691,952 | 2,780,247 | 5,733,543 |
| France | 7,525,720 | 7,952,756 | 5,828,010 | 7,042,406 | 4,974,180 | 4,132,565 | 6,722,821 | 4,298,162 | 5,367,390 | 4,711,418 |
| China | - | - | - | - | - | - | 663,655 | 594,254 | 3,448,694 | 3,345,198 |
| Spain | 2,595,102 | 2,002,652 | 3,547,997 | 3,726,915 | - | - | 790,000 | 497,200 | 3,209,959 | 2,856,804 |
| Hongkong | 1,043,942 | 733,698 | 2,507,270 | 1,726,343 | 2,351,894 | 1,489,826 | 2,471,062 | 1,567,780 | 5,222,415 | 2,573,206 |
| Korea | 2,682,000 | 2,687,185 | 4,106,544 | 3,965,859 | 2,968,000 | 2,562,205 | 5,143,513 | 3,366,117 | 2,494,800 | 2,070,458 |
| Thailand | 520,670 | 1,315,488 | 552,960 | 1,723,413 | 399,900 | 1,274,495 | 673,010 | 2,175,560 | 488,350 | 1,575,867 |
| Brazil | - | - | - | - | 619,160 | 385,230 | 1,312,730 | 914,720 | 1,376,650 | 1,229,907 |
| Others | 5,549,597 | 10,708,893 | 3,680,758 | 9,903,772 | 9,009,465 | 10,748,966 | 4,608,333 | 7,564,225 | 2,048,394 | 8,031,085 |
| Total | 28,920,817 | 39,105,643 | 26,408,392 | 41,973,534 | 27,662,546 | 33,393,332 | 26,722,232 | 30,676,745 | 32,455,717 | 44,107,266 |

Source: DA

**b) Domestic Demand**

Seaweed processing in the Philippines was recognized as an industry in 1966 when the unprecedented commercial exploitation of the then widely-growing Eucheuma seaweed boosted the country's exports with a record volume of 800 metric tons. Initially, no attempts were made to cultivate Eucheuma. People gathered only wild varieties and this satisfied the needs of the foreign market for a few years. But the supply dropped alarmingly in the late 60's. This prompted Marine Colloid Philippines, Inc. (MCPI), a leading seaweed exporter, to study the feasibility of commercial Eucheuma farming. The company spent millions of pesos on research and development and, together with Filipino scientists, pioneered in this area. Seaweed culture proved successful after an experimental period from 1969 to 1973. By 1980,

several firms in the Philippines were manufacturing a new grade of carrageenan from seaweeds of the Eucheuma variety. This new grade of carrageenan had found markets all over the world and was known as Semi-Refined Carrageenan (SRC) or Philippine Natural Grade (PNG) carrageenan (Department of Agriculture Agribusiness Marketing Assistance Service).

Table 11. Philippine Exports of Seaweeds, 1995-1999.

| **Countries** | **1995** | **1996** | **1997** | **1998** | **1999** |
|---|---|---|---|---|---|
| United Kingdom | 3,319,728 | 4,901,836 | 2,936,650 | 2,759,688 | 6,220,912 |
| Denmark | 5,712,339 | 4,713,454 | 5,622,267 | 3,247,087 | 5,758,868 |
| USA | 4,672,904 | 4,269,536 | 4,241,128 | 3,691,952 | 5,733,543 |
| France | 7,952,756 | 7,042,406 | 4,132,565 | 4,298,162 | 4,711,418 |
| China | - | - | - | 594,254 | 3,345,198 |
| Spain | 2,002,652 | 3,726,915 | - | 497,200 | 2,856,804 |
| Hongkong | 733,698 | 1,726,343 | 1,489,826 | 1,567,780 | 2,573,206 |
| Korea | 2,687,185 | 3,965,859 | 2,562,205 | 3,366,117 | 2,070,458 |
| Thailand | 1,315,488 | 1,723,413 | 1,274,495 | 2,175,560 | 1,575,867 |
| Brazil | - | - | 385,230 | 914,720 | 1,229,907 |
| Others | 10,708,893 | 9,903,772 | 10,748,966 | 7,564,225 | 8,031,085 |
| Total | 39,105,643 | 41,973,534 | 33,393,332 | 30,676,745 | 44,107,266 |

Value in US$.

The following are the present markets for carageenan:

Food Markets

- Bread- retain fresh texture and taste on storage
- Noodles- improve resistance to overcooking
- Other Farinaceous Foods- improve the quality of high standard formulations

New Industrial Markets

- Industrial Suspension and Slurries- ideal stabilizing polymer for a wide range of solid-in-water dispersions
- Ceramic coatings and extrusion products-carrier for ceramic coating during manufacture of automotive spark plugs
- Anti-icers-fully soluble in the hot water/glycol mixes used for aviation machinery
- Humidity Control-can be used to control the humidity within a package
- Paper-Carageenans are excellent film formers and will reinforce cellulose fibers to give added wet and tear strength and to control ink bleed. Moisture lost by leakage is replaced at the expense of the gel which merely shrinks in size.
- Stabilizer- Carageenan outperformed xanthan and CMC when used as a stabilizer in liquid scouring cleansers for fiberglass, plastics and tiles.

Agriculture and Horticulture

- Hydraulic seeding-suspends the grass seed and fertilizer prior to pumping and help retain the seed on the soil
- Pesticide-film former which prevent misting and run off from plant foliage

- Used in pesticide preparation- as a natural ingredient, carageeann use has not been associated with toxilogical hazards

Biotechnology
- Cell immobilization-useful for trapping the seeds, cells and microorganisms with or without nutrients and other active materials.

Personal Care and Pharmaceutical
- Wound dressing-forms a water insoluble complex with an extract from the shell of crabs and other crustaceans called chitosan
- Cosmetics-control textual properties of any formulation or preparation containing plyols.

## 5. Marketing System

### a) Product Form

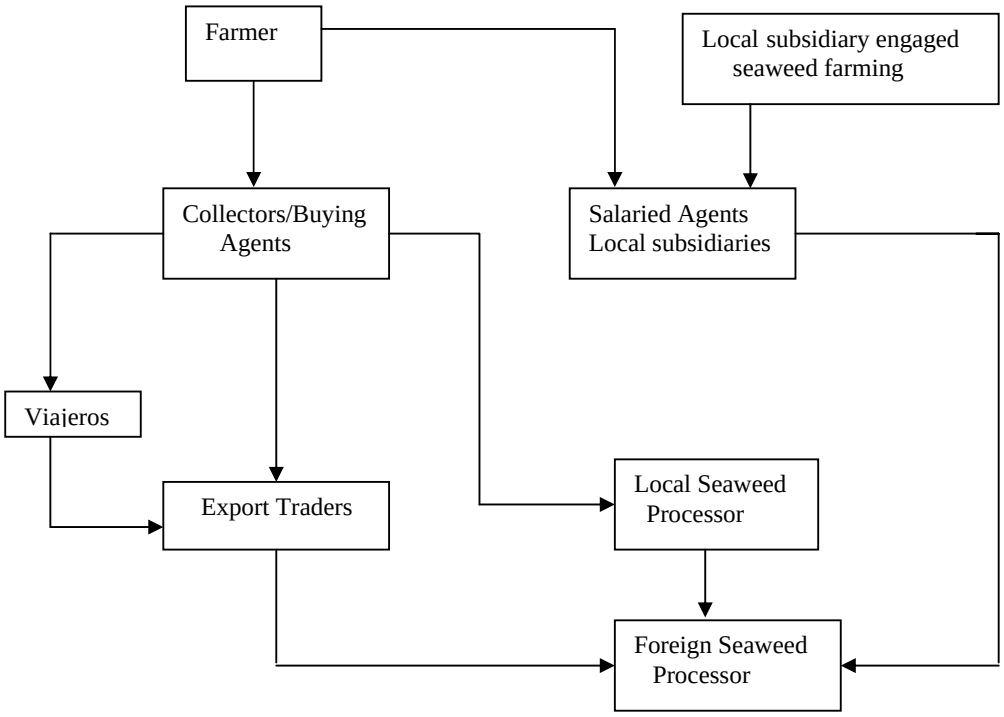
Seaweeds are marketed in the following product forms:
- Dried
- Carageenan (white powder)- a yellowish or tan to white, coarse to fine powder that is practically colorless and has mucilaginous taste. It is a valuable substance used mainly in products that need gelling, suspending, thickening or with water holding properties.
- Carageenan (gel)- a jelly-like substance obtained by extraction with alkaline of red seaweed which grow abundantly in warm waters.

### b) Distribution and Prices

Seaweeds or seaweed products for export are produced in tremendous quantities by thousands of fishermen. The marketing channel consists of farmer-producer, small traders or middlemen, large traders or agents and exporters/processors.

There are two product flows. These are (1) farm to independent trader/buyer/middleman for export to a foreign processing company or its local subsidiary of a foreign-based parent company abroad; and (2) local subsidiary engaged in seaweed farming to a foreign-based parent company (Fig 4).

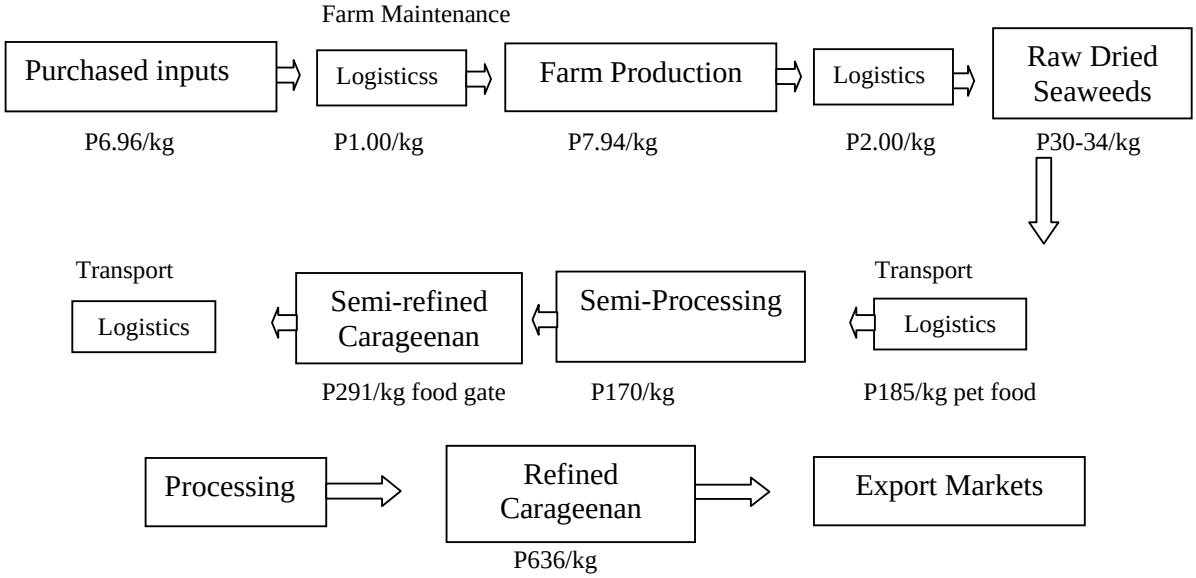
There are collection centers where seaweeds from various production areas are collected and sent to exporting centers. For example, seaweeds from Sitangkai and Sibutu in Tawitawi are collected in Bongao or Jolo before being shipped to Zamboanga City, Cebu City and Manila for export.




Source: DTI, The Seaweed Industry: Its Competitiveness in the World Market, June 1988 cited in Seaweed: An Investment Profile, Department of Agriculture.

Figure 4. Seaweeds commodity flow.

The following figure shows the supply/value chain for seaweeds in Mindanao:




Source: Mindanao Seaweeds Industry Road Map, Department of Agriculture.

Figure 5. Seaweeds supply/value chain.

Prices of seaweeds are heavily influenced by the buying policies of every buyer in the marketing chain. Generally, the middlemen rather than the producers dictate the prices of seaweeds. A Chinese middleman pays P7.50 to P8.00 per kg of dried seaweed.

Dried seaweeds are bought from the farms at a cost of P5 to P10 per kg. These are shipped to Zamboanga or Cebu where buying stations of the four local producers of seaweed products are located and sell for P10 to P12 of either semi-processed or exported dried seaweed.

**c) Key Players in the Industry**

There are 24 major players in the industry. These companies export either dried seaweeds only or both semi-refined carageenan and refined carageenan or combinations of the three product forms. The biggest players in the industry are Shemberg Marketing Corporation, Marcel Trading Corporation and Marine Colloids Phils. Inc. According to the Food and Agribusiness Yearbook, altogether these companies capture about 78% of the industry's export earnings.

The following are the companies engaged in exporting seaweeds:

1. Shemberg Marketing Corporation
   Pakna-an, Mandaue City
   Fax No. (63 32) 346-0863
   CP: Mr. Benson U. Dakay - CEO and SIAP President
2. Marcel Corporation
   Araneta Avenue, Quezon City
   Tel No. (632) 712-2631
   Fax No. (632) 712-5879 / 712-1989
   CP: Mr. Wee Lee Hiong - President
3. Philippine Bio-Industries Inc.
   Herrera St. Legaspi Village, Makati City
   Tel No. (632) 812-0377
   Fax No. (632) 840-0172
   Mr. Richard Radier - General Manager
4. King Marine Agro Corporation
   Juan Luna St. Binondo, Manila
   Fax No. (632) 242-2836 / 242-6905
   CP: Mr. Rene Pelagio - Export Coordinator
5. Asia Gel Corporation
   Escolta St., Manila
   Tel No. (632) 243-3951
   Fax No. (632) 243-6955
   CP: Mr. Christian Pile - General Manager
6. MCPI Corporation
   Tugbongan, Consolacion, Cebu City
   Tel No. (63 32) 346-0376 / 345-3751
   Celfone 0912-821-3346

Fax No. (63 32) 345-2740 / 346-0588
CP: Mr. Maximo Ricohermoso – President

7. Shemberg Biotech Corporation
   Carmen, Cebu
   Tel. No. (63 32) 254-9380
   Fax No. (63 32) 254-9388
   CP: Mr. Avelino Zambo - Executive Vice President
8. Quest International
   MEPZ, Lapu-Lapu City
   Tel No. (63 32) 340-0319 / 340-0322
   Fax No. (63 32) 340-0328
   CP: Ms. Ernestina Elizalde - Managing Director
9. FMC-Marine Colloids Phils. Inc.
   Quano Compound, Lo-oc, Mandaue
   Tel No. (63 32) 346-1811
   Fax No. (63 32) 346-1182
   CP: Mrs. Tita Tomayao - General Manager
10. Geltech Hayco Corporation
    Mabolo, Cebu City
    Tel No. (63 32) 231-0388
    Fax No. (63 32) 231-0103
    CP: Engr. Go Ching Hai – President
11. Genu Products Philippines Inc.
    Keppel Building, Cebu Business Center, Cebu City
    Tel No. (63 32) 233-1323 / 28
    Fax No. (63 32) 233-1373
    CP: Mr. Anastacio Cambonga - General Manager
12. Hercules Ultra Marine Inc.
    Sibonga, Cebu
    Celfone: 0918-7733735 / 7733735
    Tel No. (63 32) 257-3370
    CP: Mr. Ole Moegaard - General Manager
13. SKW Bio Industries
    V. Rama Avenue, Cebu City
    Tel No. (63 32) 255-2963
    Fax No. (63 32) 255-2963
    CP: Mr. Expedito Dublin - Philippine Representative
14. Delfin Internationa
    Cebu City
    Fax No. (63 32) 254-5497 / 261-0216 / 261-8837
    CP: Mrs. Luciana Delfin - General Manager
15. Marcel Trading Corporation
    Zamboanga City
    Fax No. (63 32) 911-1441
    CP: Mrs. Marina Tan - General Manager
16. Polyscaride Corporation
    Maasin, Zamboanga City
    Fax No. (63 62) 991-3032
    CP: Mr. Ben Avarado - General Manager

17. LM Zamboanga United Trading
    Sta. Catalina St. Zamboanga City
    Fax No. (63 62) 991-2607
    CP: Mr. Manuel Luy - General Manager
18. ZAMBOANGA FISH TRADING
    Veteran Avenue, Zamboanga City
    Tel. No. (63 62) 991-2350
    Fax No. (63 32) 991-2123
    CP: Mr. Vicente Wee - General Manager
19. Natum Corporation
    Buenavista St., Zamboanga City
    Fax No. (63 62) 991-3491
    CP: Mr. Jun Howon - General Manager
20. Ramon Chua Trading
    Sta. Catalina St. Zamboanga City
    Fax No. (63 62) 992-1435
    CP: Mr. Ramon Chua - General Manager
21. Omar Trading
    Sta. Catalina St. Zamboanga City
    Tel No. (63 62) 991-2504 / 992-0323
    Fax No. (63 32) 992-0322
    CP: Mr. Adam Omar - General Manager
22. IA Business Enterprises
    Zamboanga City
    Tel No. (63 62) 991-4711
    Fax No. (63 62) 991-1337
    CP: Mr. Ismael Abubakar - General Manager
23. Polenton Pacific Corporation
    Zamboanga City
    Tel No. (63 62) 991-5523
    Fax No. (63 62) 991-5523
    CP: Mr. George Alolor - Purchase
24. King Hoc Seaweed Enterprises
    Zamboanga City
    Tel No. (63 62) 991-6490
    Fax No. (63 62) 991-6490
    CP: Mr. John Cabanes - General Manager

## 6. Government Support and Incentives

There are a number of incentives that may be availed of by a seaweed producer or exporter:

- Executive Order 226 (As export producer)
  - For a Filipino corporation- export of at least 50% of local output
  - For foreign corporation (with more than 40% equity)- export of at least 70% of total output
  - Income tax holiday
  - Tax credit on taxes and duties for raw material/inputs used in export product

- Exemption from wharfage dues and any export tax, duty

- RA 8435
  - Duty free importation of capital equipment and inputs
- RA 8550
  - Tax and duty exemptions on the importation of fishing vessels not more than 5 years old
  - Long term loans to finance the building and acquisition and/or improvement of fishing vessels and equipment
  - Duty and tax rebates on fuel consumption for commercial operations

## 7. SWOT Analysis

The following is a SWOT analysis for the industry. The strength and weaknesses are inherent in the industry while the threats and opportunities come from the environment.

| SWOT ANALYSIS |
|---|
| STRENGTHS<br>• Ideal agro-climatic environment<br>• Presence of established production technology<br>• Farmers willing to farm and take risks<br>• Established marketing and distribution system<br>• Presence of many players in the processing and export sectors<br>• PNG Carageenan is competitive with refined carageenan from other species<br>• Globally competitive cost structures |
| WEAKNESSES<br>• High incidence of low farm productivity<br>• Poor quality of seaweed in some areas due to poor farming practices<br>• Lack of industry-wide quality standards on raw seweeds<br>• Inadequate thecnical services and training<br>• Lack of farm or village level postharvest and drying facilities<br>• Limited competition at the farm level<br>• Lack of organized growers cooperatives<br>• Inadequate production credit access<br>• Weak government support in international regulatory for a<br>• Limited access to global market intelligence by many stakeholders<br>• Inadequate R and D budget on processing and product application |
| OPPORTUNITIES<br>• High potential for farm expansion<br>• High potential for farm productivity enhancement and quality improvements<br>• Entry of new investors in the processing sector<br>• New markets for new application<br>• High demand for technical services<br>• Higher growth rate than the total hydrocolloid market<br>• Expanding new product applications |

| |
|---|
| • Acceptance of PNG as food additive and as casings for medicine capsules |
| THREATS<br>• Increasing unit costs due to slow (or unrealized) productive gains<br>• Rising cost of doing business<br>• Inadequate supply of raw seaweed for SRC plants leading to low capacity utilizations or closures<br>• Pollution of some farm production area<br>• Inadequate observance of quality standards for raw seaweed that impacts on carageenan recovery<br>• Peace and order concerns in parts of Western Mindanao<br>• Increasing competition inEuchema growing from Indonesia, Malaysia and Africa<br>• Establishment of carageenan palnts in competing countries<br>• New lobbying and disinformation tactics by competing firms over seas<br>• Country specific regulatory guidelines and their high rates of change in EU |

Source: DA

## 8. Problems and Constraints

The steady increase in production from 1997-2002 was attributed to high market demand, better prices received and good weather condition that encouraged farmers to expand areas for seaweed culture. Inspite of the continuous increase in seaweed production and share in the world market, the industry is beset with the following problems and constraints.

1. **Volume harvested by individual collectors is inadequate to meet the requirements of existing processors due to**
   a. Limited and uncoordinated system of collection
   a. Inadequate postharvest facilities and equipment
   b. Vast untapped potential sources
   c. Seedling inadequate and not readily available during culture period
   d. Ice-ice" disease
   e. Lack of quality seed stocks to deteriorating genetic condition of existing stocks in most seaweed farms
   f. Pollution in production areas
   g. Peace and order in seaweed producing areas
2. **Processing**
   a. Lack of additional refining plants to meet world demand of carageenan
   b. Inadequate technology to reduce acid insoluble (AIM) matter of the 8 to 18% cellulose fiber content to the new directive of 2% AIM although present AIM is fit for human consumption
3. **Marketing**
   a. Weak and inefficient marketing and pricing systems- subject to unstable buying and pricing policy of traders that is dictated upon by demand in the international market
   b. Stiff competition from FMC, Hercules and Sanofi whose financial clout can match or exceed a small LDC's GNP. They have taken the position of a long

term protracted marketing war against the Philippines in the hope that Philippine companies will grow weary in their bid to get accepted in the market and worst get bankrupt in the process.

c. Filipinos cannot sell directly in European countries market as they require an agent of foreign nationality. This means that there is a need for pre-selling (product demo and listing of product applications before any substantial sales can be made.
d. Increasing competition in *Euchema* production with other countries such as Malaysia, Indonesia and Africa

### 9. Conclusion

The Philippine seaweed industry has already penetrated the world market proving that it can be competitive vis-à-vis other producing countries. The country has the ideal agro-climatic conditions, wide natural grounds for expansion, established marketing and distribution systems and the presence of many players and processing and export sector. Cognizant of this fact, DA-BFAR will address some of these problems with the establishment of additional seaweed nurseries, promotion of seaweed health management, and provision of postharvest facilities and establishment of processing plant.

Mindanao has the largest potential area of seaweed farming and it accounts for 54% of the country's total seaweed production. However, their production is not enough to meet the demand of the local market. The peace and order condition especially in the ARMM, Sulu, etc. will give other areas like Palawan to fill in the gap. Palawan has also the ideal agro-climatic conditions to become a leading seaweed producer and exporter. With the identified constraints, Palawan can surge ahead by surmounting these challenges to production and marketing.

## C. The Almaciga Industry

### 1. Background of the Industry

The term copal applies to a large group of resins characterized by their hardness and relatively high melting point. They are soluble in alcohol. Up until the 1940s, or thereabouts, they were among the best of natural resins for use in varnish and paint manufacture and traded in large volumes. In the oil-soluble form they were also used in the manufacture of linoleum. Copal has been produced from a large number of different species from many parts of the world- Africa, Asia and South America. Today, most copal of commerce originates from Agathis Species of Southeast Asia: the Malay and Indonesian archipelago in particular and, to a lesser extent, the Philippines.

Historically, the copals have been classified according to their geographical origin:

- **Congo copal.** In the 1920s, 1930s and 1940s, the quality of copal produced from the former Belgian Congo (now Zaire) far exceeded that from any other region of the world. From 20 tons in 1900, production rose to 12,000 tons in 1923 and

23,000 tons in 1936. The resin was all of the fossilized type, having fallen to the ground from the tree where it was produced as a result of natural exudation or from accidental injury. In many cases the trees were no longer standing and the resin was recovered from below the surface of the earth, where it was located by exploratory prodding with the stick. The very hard, acidic materials were traditionally converted into oil-soluble forms for use in varnishes by a process known as "running" (subjecting them to high temperature heat treatment).

- **West African copals**. These were collected and exported in moderate amounts before Congo copal became so important. Again, most of the resin was fossilized and the copals were known in the trade by their country of origin, e.g., Sierra Leone, Cameron, Angola and Accra copals.
- **East African copals**. This was produced mainly in Tanzania and Kenya and was collected either in semi-fossilized form (from the soil below the tree where it fell), fossilized form (from the soil where the tree no longer existed), or by tapping the living tree.
- **South American copals.** Brazilian copal is the best known and is still produced to a very small extent today, where it is known as *jutaicica*. It is usually collected as a semi-fossilized resin.
- **East Indian and Manila copal**. These were copals produced from what is now Indonesia and nearby islands, and the Philippines. The term Manila copal arose from the time when Manila was the main port of export. Total production from this region in some years during the early part of the century reached 15,000 tons; then, the copal was collected both in the semi-fossilized form and by tapping. Today, this is the most important copal-producing region of the world and all of it is produced by tapping. Copal of mainly Indonesian origin and Manila copal ("*almaciga*") are produced from the *Agathis* species.

Until the decline in demand for copals brought about by the use of synthetic resins for varnish and paint manufacture, much of the copal was collected in the semi-fossilized or fossilized form. Nowadays, most of it is collected by tapping the living tree. Furthermore, many of the trees, which are now tapped, have been planted, and there is no longer dependence on the wild forest.

What the redwood is to California, the giant *almaciga* (*Agathis philippensis*) is to the Philippines. The *almaciga,* one of the few species of conifers that can grow in the humid tropics, is a relative of the New Zealand kauri pine (*Agathis australis*). Both *almaciga* and kauri belong to a family of evergreens found only in the Southern Hemisphere whose ancestors first appeared in the Jurassic Period, about 150 million years ago. Fossil records indicate that members of the genus *Agathis* made their way from the Australian region into Southeast Asia during the Ice Ages when sea levels were lower and the channels between islands were narra.

*Almaciga* is a huge tree, up to 60 meters tall and with a trunk three meters wide. Its bark is grayish brown and forms large, flat, angular scales resembling a jigsaw puzzle pieces. Its massive trunk is cylindrical, straight and clear, not branching until it reaches the narrowly conical crown where it radiates into slender whorls of stiffly projecting branches. Both male and female cones are produced on these branches; The female cones are much larger than male cones and take two years to mature. Seeds can be fertilized with pollen from the same tree or from another nearby. The seeds

have wings that allow them to float away from the parent tree when the cone breaks into pieces.

*Almaciga* yields a valuable resin known on the world market as Manila copal, used in the manufacture of varnishes and linoleum. Tapping the resin has been an important source of income for many rural people in the Philippines. *Almaciga* is now listed as a potentially threatened species because excessive tapping coupled with destructive methods (such as application of sulfuric acid to stimulate resin production) has killed many trees. With other sources of hardwood timber diminishing, the industry is turning its eyes on *almaciga*, which is highly prized and carries a premium on the market. We can only hope the *almaciga* does not meet the fate of the kauri pine, which was exploited to exhaustion in New Zealand during the first half of this century..

*Almaciga* is a very large tree reaching 300 cm in diameter at breast height and 60 m in height. The trunk is straight, cylindrical or may taper and sometimes with markedly spiral grain. It has no buttress but with big swollen superficial roots. Sometimes the butt swells to a varying degree.

The crown is monopodial and narrowly conical. The branches are radial and may droop or turn at the ends, and may vary in thickness. It self prunes to leave a clear bole. The bark is smooth, gray, 1-1.5 cm thick and peels or shed off in large irregular plates. It is a rich source of resin. Young leaves are about 3-4 cm wide and at least 10 cm long. Leaves from fully exposed branches are rounded at the apex, 4-5 cm long and 1.5-2 cm wide.

Cones are globular, about 8 cm in diameter. Male cones are borne In or slightly above the leaf axils and cylindrical. Cone scales are peltate, numerous, with 10-12 pollen sacs. Female cones are terminal, ovoid to globose, with numerous woody cone scales, each bearing a single large ovule. The cones become massive and woody at maturity; viable seeds form only in the flattened-ovoid with 1 large wing. Sometimes the wings are smaller than usual. Ripe cones shatter on the tree.

*Almaciga* is endemic in the Philippines and exists on mountain slopes throughput the archipelago. Reports show that the species grow in the following provinces: Cagayan, Rizal, Isabela, Benguet, Abra, Zambales, Nueva Ecija, Bataan, Tayabas, Quezon, Polilio, Aurora, Mindoro, Camarines, Albay, Sorsogon, Calayan Island, Sibuyan, Negros, Samar, Palawan, Misamis, Davao and Zamboanga. It has a geographic range from 19˚30 N to 38˚S and is commonly found in countries like New Zealand, Australia, New Caledonia, Melenesia, Papua New Guinea, Moluccas, Sumatra, Java and Brunei. The tree is distributed at medium and high altitudes ranging from 400 to 3000 m above sea level.

## 2. Uses of the Industry's Products

*Almaciga* yields high quality resin. A good type will produce 20 kg of gum per year. The resin is commonly known as Manila copal in the international market. It is utilized in various products such as varnish, paint, linoleum, plastic and others.

Today the major use of copal is as varnish for wood and paper. It is also used in road-marking paints, where the capacity of the resin to prevent bleed-through of road-making materials is beneficial.

It was an early export product of the Philippines, hence the identification Manila copal. Locally, this is used as incenses in religious ceremonies, for torches, starting fire, caulking boats and smudge for mosquitoes. It is also used in other processes as in making patent leather and sealing wax. *Almaciga* is suitable for the manufacture of cheap soaps and paper size. Aqueous solutions of the alkaline resonates are precipitated by solutions of all other metallic salts, e.g. aluminum sulphate, in the form of an insoluble resinate which could be used in paper manufacturing to render the paper non-bibulous.

Resins and gums are products obtained from exudations of plants. The products may exude spontaneously, but are more often secured by making incisions in the bark or trunk. It is somewhat difficult to draw a sharp distinction between gums and resins, as there are a number of plant exudations known as oleoresins, balsams and gum resins which have properties intermediate between those of true gums and resins. In general, plant products of this nature contain resins, gums, volatile oils and aromatic acids.

Resins are solid or semi-solid and are insoluble in water, but soluble in alcohol, ether and volatile oils. They are formed usually by the spontaneous evaporation of resinous juices which exude naturally from the trunk of trees or when the trunks are cut. Frequently resin may be extracted from various parts of plants by solvents such as alcohol and ether. They are also found as minerals (mineral resin) which are no doubt, products of extinct vegetation. Resins from different sources frequently show great differences in their chemical composition and properties. Commercially, manila copal, which is used in making varnishes, is the most important Philippine resin.

Oleoresins are the plant exudations consisting of resins dissolved in volatile essential oils. Manila elemi, employed in varnish making, and turpentine are examples of this class of substances accruing in the Philippines.

Gum resins are plant exudations, like gamboges, which consist of a mixture of resin gum. Gamboges of the inferior quality can be obtained in the Philippines from *Garcinia venulosa* and probably from other species of *Garcinia.*

Some of the dipterocarp resins can be collected in large quantities and appear to offer commercial possibilities as material for the manufacture of varnishes.

## 3. Supply

### a) World Production

Indonesia is the biggest producer and exporter of copal followed by the Philippines. Indonesia's exports averages 1,850 tons per year.

In 1982, Sarawak exported just over 50 tons of copal; Malaysian exports since then record only very small quantities of copal. Papua New Guinea has been a small producer and exporter in the past but the present scale of production from this source and other islands of the Pacific, is not known.

Total exports from Indonesia and the Philippines averaged about 2,300 tons per year from 1988-1993. Most Indonesian copal (and some Filipino) is shipped via Singapore but Germany, which also imports directly from Indonesia, is a major market outlet and the most important in Europe. India and Japan import modest quantities directly from Indonesia. Taiwan is the biggest importer of copal from the Philippines.

Imports of copal and damar into Japan from 1985-1987 averaged 400 tons per year.

**b) Local Production**

The yield of resins produced from the copal depends on a large number of factors namely: genetic, environmental and practical (i.e., method of tapping used) factors, and it is very variable. It had been reported that annual yield of 16-20 kg came from a good tree. The average annual yield of 1.2 kg, 3.7 kg and 5.6 kg/tree were the result of recent tapping trials at three sites in the Philippines.

*Agathis* with thick bark yields significantly more resin than those thin-barked trees, and that tapping in the morning and at the side of the tree, which maximizes the length of time, that sunlight falls on it is beneficial to resin yields.

Aside from resin, the *Agathis* produces a high class, much valued, utility timber and it is grown widely as a timber tree. These resin yielding Agathis are planted for timber and tapping of plantation trees is therefore a secondary activity to that of timber production. The proportion of planted trees, which are tapped commercially, is not known but it is probable that it is a relatively small proportion and that copal production from such sources could be increased significantly if demand and the economics of production are favorable.

Production data from 1990-1998 show a declining trend in resin production in the country at a rate of 5.93% per year (Table 11). Except in 1994 and 1995 where copal production was at its peak, production was very low in 1997-1998.

Table 11. *Almaciga* resin production, Philippines, 1990-1998.

| Year | Volume (000 Kgs) |
|---|---|
| 1990 | 943 |
| 1991 | 780 |
| 1992 | 634 |
| 1993 | 576 |
| 1994 | 1231 |
| 1995 | 1059 |
| 1996 | 890 |
| 1997 | 310 |
| 1998 | 261 |

Varnishes and lacquers are produced from *almaciga* resins. A conglomeration of both large and small firms manufactures these varnishes and lacquers. Official industry figures on production capacity of the coatings industry are not available. However, the Philippine Association of Paint Manufacturers (PAPM) lists 25 regular members engaged in the manufacture of paints, lacquers, varnishes and other related protective coatings. All are based in Metro Manila. Of these, only one was known to regularly use *almaciga* resin for its paint and varnish manufacture. A maximum of four container vans, each averaging 9,400 kgs of resin are delivered each month to this manufacturer.

Another large multinational company produced varnish from almaciga resin in 1985. About 10,000 liters were produced in that year and this was marketed to Cebu's basketware industry. After this initial production, the company stopped producing this type of varnish due to problems in production arising from the quality of the resin. Another reason given was that most basketware producers in Cebu produce their own varnish from *almaciga* resin.

## 4. Demand

### a) Foreign Demand

According to a study, no less than 46% of the total multipurpose tree products, including the non-wood forest products, go to home consumption while 10% is given away to neighbors and relatives. The remaining 44% are sold. This implies that small farmers supply more to family consumption on a subsistence level than to markets. In the national market, products that are traded include resin from *almaciga* among other product forms and other non-wood forest species. Import and export of non-wood forest products in the international market are largely at different stages of processing. Some of these unprocessed forest products are traded in small quantities compared to other commodities.

The Philippines has an average total export of about 2,800 tons annually from 1988 to 1993 wherein Taiwan was the biggest importer (Table 12. The major countries of destination were Taiwan, Hongkong, Singapore, USA, France and Germany. Exports during this period reached an average of about 350 tons per year with no clear trend.

Table 12. Exports of Manila copal by year and country of destination, 1988-1993.

| **Destination** | **1988** | **1989** | **1990** | **1991** | **1992** | **1993** |
|---|---|---|---|---|---|---|
| Taiwan | 184 | 196 | 139 | 224 | 171 | 286 |
| Hongkong | 91 | 72 | 78 | 84 | 60 | 52 |
| Singapore | 70 | 57 | 60 | 44 | 30 | |
| USA | 56 | 20 | | 5 | | 14 |
| France | 6 | | 11 | 6 | | |
| Germany | | | | | 11 | 30 |
| Total | 407 | 345 | 288 | 363 | 272 | 382 |

Resins and gums (especially Manila copal and Manila elemi) are the main non-wood forest products (NWFP exported) in raw form. Almost all resins that are produced are exported. In 1998, 355,000 kg of *Almaciga* resin with an FOB value of US$254,000 and 221,000 kg of Manila elemi with an FOB value of US$448,000 were exported (Table 13). There are insufficient processing factories in the country.

Table 13. Exports of Manila copal and Manila elemi, 1990-1998.

| Year | Manila Copal | | Manila Elemi | |
|---|---|---|---|---|
| | Quantity (000 kgs) | Value (US fob 000) | Quantity (000 kgs) | Value (US fob 000) |
| 1990 | 288 | 211 | 611 | 1 064 |
| 1991 | 363 | 242 | 146 | 251 |
| 1992 | 273 | 164 | 176 | 295 |
| 1993 | 382 | 243 | 330 | 686 |
| 1994 | 387 | 249 | 269 | 464 |
| 1995 | 328 | 252 | 259 | 621 |
| 1996 | 326 | 258 | 353 | 947 |
| 1997 | 281 | 365 | 162 | 436 |
| 1998 | 355 | 254 | 221 | 448 |

The Manila copal which is exported from the Philippines directly to the United States is cleaned, sorted and graded in Manila. Particular attention is paid to cleanliness, color and size. Manila copal is sometimes adulterated with other resins, particularly dipterocarp resins: the latter however, are readily distinguished from Manila copal. As the resin is collected largely by non-Christian tribes, the sorters in Manila frequently encounter considerable admixtures of other resins. As the consumers have to depend largely on the Philippine sorters, it is not surprising a uniform quality of resin is difficult to attain.

The quality of copal is very variable depending inherently on the species from which it was obtained (which may affect its solubility properties) and the manner in which it is collected: whether by tapping or by picking from the ground in fossilized form. After cleaning (removing pieces of bark and other foreign matter), copals are graded by their hardness, color and size of the pieces as well as the state of cleanliness. Pale, clean pieces, with good solubility in alcohol, are the best quality.

An example of how copals are priced in the international market can be seen in the 1995 prices for some Indonesian copal grades from Singapore (CIF London):

| | |
|---|---|
| “Clean scraped chips” | US$ 1,500/ton |
| “Medium scraped chips” | US$ 1,000/ton |
| “Small chips” | US$ 900/ton |

**b) Domestic Demand**

There are no available data to assess the domestic demand for manila copal. But a pre feasibility study of producing varnish from *almaciga* resin conducted by Garcia can give an indication on the amount of *almaciga* resin demanded by the furniture and basketware industries.

Long before commercial varnishes were introduced, small furniture producers were already using almaciga resin. The resin is dissolved in thinner or denatured alcohol and the varnish is applied directly to the furniture piece. This practice is still prevalent today, especially in areas where *almaciga* resin is readily available. However, the Forest Products Research and Development Institute (FPRDI) had developed a more scientific process. This process has resulted in a varnish with fat superior finishing properties that what is produced traditionally.

Varnishes and lacquers are the common finishing materials used by the furniture and basketware industries. Lacquers give a more durable and longer-lasting finish than varnish. Because of this, they are used for the higher end furniture pieces which cater to more discerning markets. Varnishes, on the other hand, are used as ordinary "low quality" finish for low end furniture, interior walls, partitions, sash doors and louvers. It is also extensively used as finishing for "disposable" handicraft items such as baskets.

Most basket producers are found in several provinces in Northern, Central and Southern Luzon, specifically Quezon, Ilocos, Bicol, Pangasinan, Pampanga, Cagayan and Metro Manila. In Visayas, Cebu. Biohol and Negros are major centers for basket weaving. The basketware industry is composed of about 5,000 firms, 150 firms considered as large scale and about 4,800 firms considered as cottage type or small to medium scale enterprises. In the industry, subcontracting to micro-manufacturers is a production norm. Often financially strapped, these micro-manufacturers resort to cost-cutting measures at the expense of product quality (Garcia).

The basketware industry uses varnish, paints, and dyes as finishing. The consumption of varnish by this sector is derived and estimated by Garcia by assuming that 50% of basket produced use varnish and that 3 liters of varnish are consumed for every 50 pieces of baskets. Based on this estimate, an average of 1.6 million liters of varnish per year was projected to have been consumed from 1985-1994 (Table 14).

Basketware exporters require a large volume of varnish. Most of these producers employ a regular chemist to oversee varnish production. The color of the varnish does not seem to be an important quality consideration. Class C resin which produces dark varnish is widely used by these basketware exporters. A medium sized basket exporter uses an average of 10 drums of varnish per month during peak months or season.

Table 14. Estimated consumption of varnish, 1985-1994.

| Year | Volume (Liters) |
|---|---|
| 1985 | 1,147,459 |
| 1986 | 1,439016 |
| 1987 | 1,621,248 |
| 1988 | 1,769,091 |
| 1989 | 1,910,741 |
| 1990 | 1,972,746 |
| 1991 | 1,777,102 |
| 1992 | 1,942,573 |
| 1993 | 1,730,409 |
| 1994 | 1,223,581 |

Source: C.M.C.Garcia Pre-Feasibility of Producing Varnish from Almaciga Resin.

## 5. Problems and Constraints/Conclusion

The dearth of literature on almaciga is a deterrent in assessing the market potential of the commodity. Although this is a source of income for the indigenous people, there is no clear-cut market for it in the domestic market except for varnish and lacquers. Most of local production though is exported abroad. But how to aggressively export the product in the international market requires an efficient marketing system where quality of the product and sustainability of supply are required. Given the present situation, this is a tall order to meet.

# Agenda for Action

Specific course of action to be taken regarding the 2 products selected for this market study:

**Cashew**

1. **Deeper study on cashew farmers in the villages**
   During the first short site visit, interviews were done but an estimation on cashew farming in the sites could not be done in such short time. There is a need to have precise figure about the number of cashew farmers and their socio-economic profile if we want to undertake collective actions.

2. **Follow on with the market chain among traders**
   We need to know more about market trends and main competitors at national and international level. We must understand better the problems of quality and varieties.

3. **Secondary data collection (internet/institutions)**
   We need comparative information on same issues (trends, qualities, competition). So we can learn from others experience.

4. **Improve cashew processing techniques (opening shells)**
   The tools that farmers use are not very 'ergonomic'. One can damage hands and the other can be dangerous for the back, if used during long hours. BALITRO in Bogor has several cashew nut opening tools. Comparison should be done in terms of performance and costs.

5. **Bio-technology for pests**
   In SES, farmers say that pest control is one of their major problems. Researchers from BALITRO did many studies on cashew pests and they have bio-technical solutions.

6. **Enterprise training**
   Help the farmers to organize and give them training about how to market their cashew. We can start first with the raw cashew and later on think about more products with added value.

**Seaweeeds**

1. **Training on production, care and management of seaweeds**
   Training on seaweed cultivation. Collaboration with the Regional Fishery Training Center or the Provincial Agriculture Office to assist the communities in the site selection, training on planting, care, management and monitoring of seaweeds project.

2. **Capacity building on enterprise**
   Training on enterprise should be organized in two phases. First with an existing organization, e.g., NATRIPAL and then the community members who are interested or involved with business or marketing products of the community. The training will give general information on basic enterprise building and management and will give them the actual application to their existing business/enterprise.

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