

# A Primer on PEF's Priority Commodities: Industry Study on Coconut

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## LIST OF ABBREVIATIONS

AFMA	Agricultural and Fisheries Modernization Act
BAS	Bureau of Agricultural Statistics
CARP	Comprehensive Agrarian Reform Program
CCA	Climate Change Adaptation
CIIF	Coconut Industry Investment Fund
CNO	Coconut Oil
CSI	Coconut Scale Insect
DA	Department of Agriculture
DAR	Department of Agrarian Reform
DCN	Desiccated Coconut
DRR	Disaster Risk Management
GOCC	Government Owned and Controlled Corporation
HA	Hectare
KG	Kilogram
MT	Metric Ton
NAPC	National Anti-Poverty Commission
PCA	Philippine Coconut Authority
PDP	Philippine Development Plan
PEF	Peace and Equity Foundation
PHP	Philippine Peso
RAY	Reconstruction Assistance on Yolanda
SAGIP	Sama-samang Aksyonng Gobyerno, Industriya at Pamayanan sa Malawakang Pagsugpong Pesteng Cocolisap
SEC	Securities and Exchange Commission
UCAP	United Coconut Association of the Philippines
UNICOM	United Coconut Oil Mills, Inc.
VCO	Virgin Coconut Oil

## INTRODUCTION

The coconut palm, *Cocosnucifera*, a tree of the palm family *Arecaceae*, is one of the most important crops of the tropics.<sup>1</sup> It is dubbed the tree of life not only for the variety of products that can be made from it but also for the variety of livelihoods that it can support. Many seemingly ordinary items have by-products of coconut in them such as soap. The health benefits of the coconut are also highly regarded by health experts and practitioners around the world. Coconut water and coconut sugar have been highly touted for being good alternatives for people with diabetes.

The coconut, being an important crop for Filipinos, is one of the priority crops in the Peace and Equity Foundation's (PEF) focus on social enterprises. This primer seeks to give the PEF and its partners a wider understanding of the environment surrounding the coconut industry.

## WHAT IS THE POSITION OF THE COCONUT INDUSTRY IN THE WORLD ECONOMY?

Coconut is a source of various types of raw materials such as coconut oil (CNO), desiccated coconut (DCN), and copra meal aside from traditional food products such as coconut meat and coco water. Given the more traditional culinary uses of coconut, coconut raw materials are also used in various products such as soaps and textiles. Coconut products are hailed for their health benefits, thus gaining popularity among health consumers throughout the world. The coconut is also being utilized for biodiesel because it makes engines more efficient in combustion, thereby reducing emissions.

Philippine coconut faces tight competition with soybean, corn, and other crops used for vegetable oil in the world market. In fact, the American Soybean Association in the United States made a smear campaign against coconut oil in the past to bar it from the U.S. market. A number of scientific studies have since refuted this marketing ploy.<sup>2</sup>

Indonesia is the top producer of coconut products in the world, with the Philippines coming in second. In terms of exports, the Philippines is the top exporter of coconut products worldwide, especially in terms of CNO and DCN. This is due to Indonesia's preference for local consumption rather than export.<sup>3</sup> The top exporters of CNO can be found below.<sup>4</sup> The Netherlands is a re-exporter of CNO for most of Europe.

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<sup>1</sup>Encyclopedia Britannica."Coconut palm." February 11, 2014.

<sup>2</sup>Faustino, J. "Facing the Challenges of the Philippine Coconut Industry: The Lifeblood of 4.4 Million Coconut Farmers and Farm Workers," EPRA (2006).

<sup>3</sup> Ibid.

<sup>4</sup>Food and Agriculture Organization.(2013). "Trade." FAO STAT.

**Table 1. Top CNO Exporters in the world (Value \$ 1000)**

Country	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Philippines	352,625	504,860	577,790	657,217	578,769	733,813	1,039,612	594,506	1,265,716	1,425,446
Indonesia	157,847	153,608	264,944	413,762	270,674	570,410	769,134	387,360	566,068	937,756
Malaysia	41,296	78,381	104,990	119,011	95,990	124,800	173,708	111,000	143,167	260,782
Netherlands	56,508	90,802	131,062	128,099	111,638	111,845	268,310	150,217	216,059	365,456
Papua New Guinea	8,570	18,966	25,142	30,200	19,763	39,760	50,000	40,500	41,500	47,000

Source: FAO STAT. (2013). "Trade." <http://faostat.fao.org>

**Table 2. Top CNO Exporters in the world (tons)**

Country	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Philippines	944,661	1,186,355	959,400	1,152,316	1,066,829	889,802	850,076	832,938	1,345,703	826,721
Indonesia	446,319	364,820	447,113	752,072	519,973	739,923	649,362	571,157	567,497	569,801
Malaysia	92,961	179,539	247,800	193,824	165,557	168,081	129,553	128,614	131,501	143,614
Netherlands	107,354	150,023	169,000	170,614	155,519	118,273	196,584	144,014	192,482	189,726
Papua New Guinea	28,200	47,700	45,100	54,400	41,500	51,300	62,000	44,800	46,000	52,000

Source: FAO STAT. (2013). "Trade." <http://faostat.fao.org>

The top importers of coconut products in terms of CNO and DCN are the European Union (EU), China, Malaysia, the United States, and South Korea. The top importers of CNO can be found below<sup>5</sup>.

**Table 3. Top CNO Importers in the world (Value \$ 1000)**

Country	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
EU (Total)	388,296	495,972	661,497	721,017	681,666	794,385	1,099,361	728,787	977,021	1,528,689
United States of America	172,593	175,488	266,504	287,667	295,351	385,191	663,636	414,139	567,852	926,591
China, mainland	45,553	68,384	74,137	77,611	92,746	106,466	193,001	102,656	293,992	309,316
Malaysia	52,468	57,021	113,394	145,520	105,954	148,201	215,276	112,161	203,740	276,552
Republic of Korea	18,686	22,560	34,541	36,173	34,226	49,480	83,186	45,788	67,035	97,145

Source: FAO STAT. (2013). "Trade." <http://faostat.fao.org>

<sup>5</sup> Ibid.

**Table 4. Top CNO Importers in the world (tons)**

Country	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
EU (Total)	925,433	1,001,964	1,008,063	1,091,780	1,090,003	958,221	879,047	883,339	1,125,344	911,181
United States of America	484,986	352,334	416,178	432,003	493,913	458,532	499,148	484,353	576,855	498,278
China, mainland	118,960	152,167	116,407	125,649	166,170	125,254	146,171	140,079	307,155	170,194
Malaysia	137,267	281,887	196,575	251,408	184,290	165,343	147,451	151,715	194,313	162,595
Republic of Korea	47,014	47,117	52,207	53,696	56,101	58,150	60,058	57,678	64,970	58,393

Source: FAO STAT. (2013). "Trade." <http://faostat.fao.org>

## WHAT IS THE ORIGIN OF THE PHILIPPINE COCONUT INDUSTRY?

The Philippine coconut industry's roots can be traced back to the Spanish colonial period. Through a gubernatorial edict in 1642, the Spaniards forced our ancestors to plant coconut because they needed the fiber for their galleons.<sup>6</sup> They also traded copra for the manufacture of various products such as soap and margarine. In 1898, copra export comprised five percent (5%) of the total commodity export of the Philippines.<sup>7</sup>

The Americans introduced milling and commercial coconut oil production in the country.<sup>8</sup> It is estimated that the Philippines had 210,000 hectares of coconut area with 42 million coconut trees in 1905.<sup>9</sup> The Americans introduced economies of scale based on large-scale plantations that led to land monopoly. During the Commonwealth period, the American colonial administration imposed an excise tax on all coconut related imports. Part of the revenues was remitted back to the Philippines for the construction of roads and various other public works. During the Commonwealth period, an average of P21 million per month of excise money was the source of the annual national budget.<sup>10</sup> The coconut crop areas further expanded after World War II, brought about by rising demand for coconut products. In 1960, the area planted to coconuts expanded to 1.60 million hectares, increasing to 2.283 million or 42% in 1975. Copra production doubled from 1.60 MMT to 2.216 MMT.<sup>11</sup>

In the 1970s, several levies, including the controversial Coconut Levy (more popularly known as the 'coco levy'), were imposed purportedly to raise revenues for further development of the industry. The Philippine Coconut Authority or PCA, then also known as PHILCOA, was established to coordinate the functions of other government bodies relevant to the coconut industry. The "coco levy" was suspended in the 1980s due to the

<sup>6</sup>Dayrit, F. "A Brief History of the Philippine Coconut Industry as Reflected in the PJS, 1906 to 2005," Philippine Journal of Science.

<sup>7</sup>PCA. "History of Coconut Industry in the Philippines."

<sup>8</sup> Ibid.

<sup>9</sup> Ibid.

<sup>10</sup> Ibid.

<sup>11</sup> Ibid.

controversy it generated. It has since been a source of pain for the industry up to this day.

## WHAT IS THE CURRENT STATE OF THE PHILIPPINE COCONUT INDUSTRY?

The coconut is the country's top export commodity making it its top dollar earner among other agricultural exports. Earnings from the coconut industry ranked higher compared to other agricultural commodities averaging US \$ 1.58 billion from 2009 to 2011. <sup>12</sup>Coconut oil (CNO) tops the list of exports with around 1.3 million metric tons produced in 2010. Desiccated coconut and copra meal are the two other highest ranked export commodities.

**Table 5. Philippine Coconut Exports (Export Value \$ 1000)**

Item	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Oil, coconut (copra)	352,625	504,860	577,790	657,217	578,769	733,813	1,039,612	594,506	1,265,716	1,425,446
Coconuts, desiccated	94,798	95,749	99,743	127,136	138,548	159,362	240,356	145,757	152,608	286,766
Cake, copra	25,158	35,598	31,066	28,061	30,368	43,159	58,273	48,193	78,383	58,796
Copra	746	120	17	47	2	102	801	60	239	282
Coconuts	914	728	817	1,024	867	550	809	712	815	3,664

Source: FAO STAT. (2013). "Trade." <http://faostat.fao.org>

**Table 6. Philippine Coconut Exports (tons)**

Item	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Oil, coconut (copra)	944,661	1,186,355	959,400	1,152,316	1,066,829	889,802	850,076	832,938	1,345,703	826,721
Coconuts, desiccated	106,973	106,798	105,829	125,540	136,080	131,961	142,664	116,402	109,168	108,867
Cake, copra	385,454	507,648	364,241	430,241	429,876	425,409	437,051	402,705	723,081	314,338
Copra	2,744	300	38	65	6	104	104	84	304	274
Coconuts	4,140	1,188	3,116	3,130	2,306	1,086	1,892	1,925	2,578	7,605

Source: FAO STAT. (2013). "Trade." <http://faostat.fao.org>

Data from the Bureau of Agricultural Statistics (BAS; as of 2013) indicate that the extent of coconut cultivation is around 3.56 million hectares comprising around 25% of the total agricultural lands in the country. The number of coconut farms is estimated to be around 1.4 million.<sup>13</sup> The number of fruit bearing trees is estimated at 3.44 million.<sup>14</sup> Out of 79

<sup>12</sup>PCA. "2013 Outlook for the Coconut Industry," Presented at Bangko Sentral ng Pilipinas, March 6, 2013.

<sup>13</sup>Dy, R. "The Philippine Coconut Industry: Performance, Issues and Recommendations," EPRA (2006).

<sup>14</sup>Bureau of Agricultural Statistics. "Country Stat Philippines". retrieved May 5, 2013

provinces in the Philippines, 68 are coconut-producing areas.<sup>15</sup> The biggest producers are Quezon (326,025 has.), Zamboanga del Norte (172,900 has.), Davao Oriental (155,905 has.), Leyte (167,973 has.), Camarines Sur (119,045 has.), Zamboanga del Sur (127,280 has.), and Misamis Oriental (103,258 has.). Big islands like Samar, Leyte, and Masbate are predominantly coconut-based in agriculture production.

The extensive supply base feeds a group of large and medium-scale manufacturing sector comprising:

- 65 coconut oil mills with installed crushing capacity of 4.54 million MT per year;
- 45 oil refineries with installed capacity of 1.53 million MT of oil per year (either cochin and refined, bleached, and deodorized);
- 10 desiccated coconut plants with installed capacity 132,700 MT per year; and,
- 8 oleo-chemical plants that produce intermediate coco-based chemical products like fatty alcohol.

However, the manufacturing sector is currently in a state of overcapacity because of stagnation in the farm sector.<sup>16</sup> Most are operating below capacity for lack of raw material supply. Many coconut farms are in need of rehabilitation. The fruit-bearing trees are senile and need replanting. Coconut areas in the path of devastating typhoons (like Yolanda in 2013 and Pablo in 2012) have practically lost the standing trees. More recently, some provinces like Laguna have suffered setbacks due to massive infestation.

More significantly, despite the industry's contribution to the economy and its huge economic potential, coconut-producing provinces and coconut farmers are among the poorest of the poor in the country. This poverty can only be explained by the inability of producers to reinvigorate the production base to keep pace with the demand of the manufacturing sector and exports.

## **WHAT IS THE VALUE CHAIN SYSTEM IN THE COCONUT INDUSTRY?**

The versatility of the coconut and the variety of products that can be derived from it such as food, furniture, textiles, clothing, fuel, health and beauty products, among others, attract multiple actors that populate the supply chain. The value chain system is complex with a long chain from the supply base to end users, and with various horizontal and parallel channels.

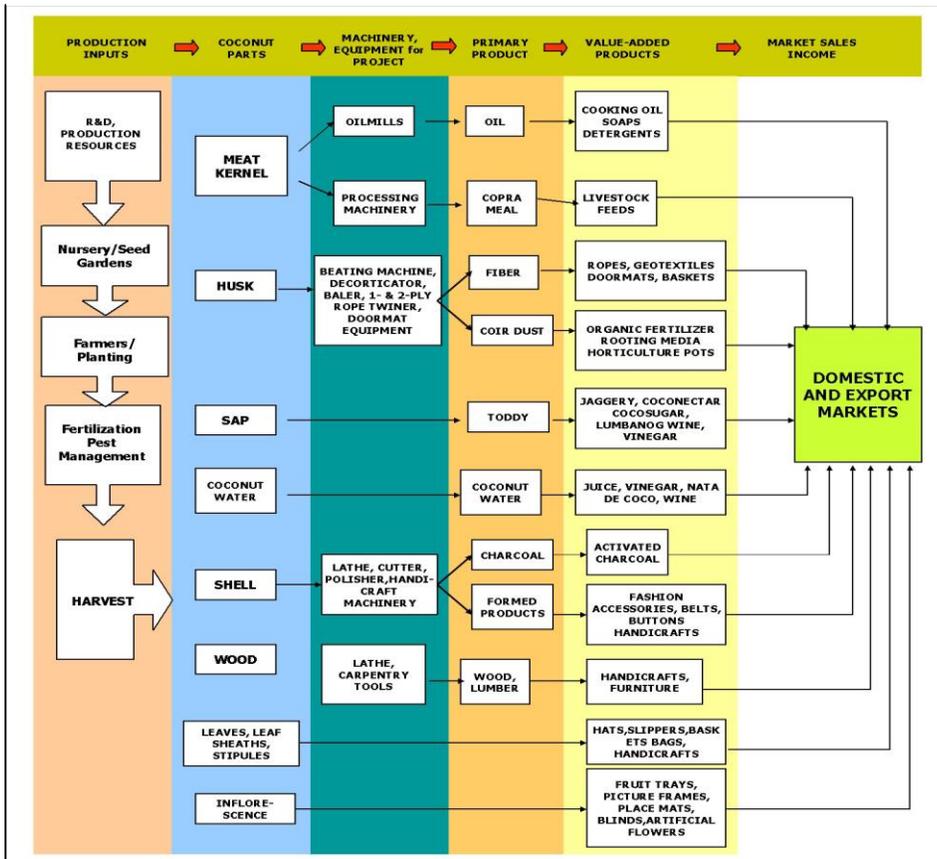
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<sup>15</sup> Ibid.

<sup>16</sup>Dy, R. "The Philippine Coconut Industry: Performance, Issues and Recommendations," EPRA (2006).

The Coconut Industry's Strategic Plan for Philippine Agriculture 2020 summarizes the coconut industry's supply value chain in six stages, as can be seen below:<sup>17</sup>

Figure 1. The Coconut Value Chain 1



The PCA estimates that there are around 3 million coconut farmers and farm workers and around 25 million more employed in various coconut based enterprises.<sup>18</sup> There are around 300 registered entities in the Securities and Exchange Commission (SEC)

<sup>17</sup>PCA. "Briefing Guide on the Subject: Coconut Industry Production Status, Growing Zones, Productivity and Potential to Increase Nut Supply in Coconut Farms through Practical and Efficient Farming Technologies."

<sup>18</sup>Pabuayon, et.al. "Key Actors, Prices and Value Shares in the Philippine Coconut Market Chains: Implications for Poverty Reduction," J. ISSAAS 15 (2009).

involved in the coconut industry ranging from farmer associations, civil society organizations, and small retail stores to private businesses. These organizations are into production, trade, and development. The discrepancy in the income levels of these groups varies, depending on the product.

Farmers are at the bottom of the value chain, not only terms of their location in the supply base but also in terms of access to economic benefits. A 2009 study by Pabuayon et. al., "Key Actors, Prices and Value Shares in the Philippine Coconut Market Chains: Implications for Poverty Reduction," gives us a glimpse of this discrepancy.

**Table 7. Estimated average income (before tax) of key participants in the coconut market chains, Quezon, 2006.**

Market Participant	Products Produced/Sold	PHP per Month
Farmer	Husked nuts	892 - 1,138
Farmer/processor	VCO	6,762
Trader	Husked nuts, copra, charcoal	84,960
Oil miller	Crude CNO, copra cake	0.80 - 2.55 million

Source: Pabuayon, et.al. (2009)

The United Coconut Association of the Philippines (UCAP), which has a multitude of members comprised of traders, manufacturers, federations, and other types of organizations is an important industry stakeholder. The DA, PCA, and the Presidential Assistant for Food Security and Agricultural Modernization, are among the government players.

### IS THERE INCOME FROM COCONUT PRODUCTION?

True to its being a tree of life, the coconut can be a raw material source for various products and correspondingly, livelihoods. Some products require significant investments in facilities and equipment, managerial capacity, and intricate business linkage. Others can be produced at the household and community levels. The most traditional products that are well entrenched in the market are the following:

- 1) **Coconut oil.** The oil is extracted from mature nuts through wet or dry (from dried nuts) process. The oil is used in a variety of ways, most commonly for soaps and food products. Compared to other oils, CNO has multiple health benefits such as increasing one's resistance to diseases. The current price of CNO (crude) in the domestic market is at 71.15 (P/Kg) and CNO (RBD is at 89.65 (P/Kg) as of June 20, 2014.<sup>19</sup>

<sup>19</sup>PCA."Daily Price Monitor." June 20, 2014.

- 2) **Desiccated coconut** (DCN) or shredded coconut meat is mainly used in pastries to add texture and flavor. The current price of DCN is at 6,124.00 (P/Kg) as of June 20, 2014.<sup>20</sup>
- 3) **Copra meal** or copra cake is dried meat from niyog where CNO is extracted from. It is also used as animal feed. The current price of copra meal is at 10.65 (P/Kg) as of June 20, 2014.<sup>21</sup>

There are also non-traditional processed products which are gaining acceptance in the market. Among the most popular ones are:

- 1) **Coco sap sugar** or coconut sugar is a sweetener derived from the sap of coconut trees. It is considered a healthy alternative to common table sugar and artificial sweeteners. It has gained popularity as a natural sweetener that's safe for diabetics for its low glycemic index. It also contains a selection of amino acids and vitamins which are beneficial to the human body.

**Table 8. Expected Initial Income from Coco Sugar Production**

<b>Expected Initial Income of Coco Sap Sugar (PHP) per 30 trees per month production</b>	
Particulars	Granulated Brown Sugar
Est. harvest (30 trees)	60 li
% Recovery	15
Production - 30 trees	270 kg
Suggested Selling Price	P30/kilo
Gross Income	8,100
Material Cost	455
Processing Cost	1,687.5
Total Cost	2,142.5
Net Income	5,957.5
Return on Invest.(%)	278

Source: PCA. Coconut sap at the village level, Techno Guide Sheet No. 8, 2003

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<sup>20</sup>Ibid.

<sup>21</sup>Ibid.

- 2) **Virgin coconut oil (VCO)** is coconut oil extracted from fresh coconut meat or from fresh coconut milk and is considered to be the purest form of coconut oil. VCO has been praised for its health benefits. Some of its health benefits include lowered cholesterol levels and reduced risk of heart disease and diabetes. It also helps in weight loss, in healing wounds, and in boosting the immune system with its lauric acid content.

**Table 9 . Investment Cost in VCO Production**

<b>Estimated Investment Cost in VCO</b> (in PHP based on 2009 prices)	
a. Utensils and Equipments	Cost
Cheese cloth (katsa)	50.00
Measuring cup/spoon for liquid	40.00
Ladle	35.00
Funnel	30.00
Makeshift Grater (kudkuran)	1,000.00
2 pcs Cooking Pans (Makeshift Double Boiler)	700.00
Mechanical Coconut Grater (optional)	16,000.00
Coconut Milk Press (optional)	17,000.00
<i>Subtotal</i>	<i>34,855.00</i>
b. Cost of Raw Material and Packaging Material:	
Mature coconuts (big)	10.00
250 ml plastic bottle with cap	10.00
Bottle label	1.00
Cap seals (1000 pcs)	140.00
Cap seal blower or Heat Gun (optional)	2,000.00
<i>Subtotal</i>	<i>2,161.00</i>
<b>Total Cost</b>	<b>37,016.00</b>

Source: EntrePinoy's ATBP. "Virgin Coconut Oil Commercial Production," <http://bizfil.com/virgin-coconut-oil-commercial-production/>

- 3) **Coconut water** is the liquid found inside coconuts. It is extracted from young nuts. It is usually sold by small traders in the streets and by small eateries. Coconut water's composition is said to be near identical to that of plasma. It was used intravenously in the war and in emergency situations. Today, it is marketed as a natural alternative to sports drinks due to its high electrolyte content and exported with the use of tetra packs. It has grown in popularity partly through the recommendation of popular individuals and through the endorsement of various health, nutrition and lifestyle blogs and websites.

**Basic steps in processing coconut water.**

1. Select young coconut with no cracks, holes, or other defects.
2. Wash the nuts with tap water and later sanitize with chlorinated water (1 tsp commercial chlorine bleach per liter of water).
3. Cut nuts and collect coconut water in clean containers.
4. Scoop meat with spoon and wash with potable water to remove fibers, testa and other dirt particles.
5. Mix buko meat and coconut water (optional).
6. Add 20% potable water to the mixture and sweeten with sugar according to taste.
7. Pour in Polyethylene Terephthalate (PET) bottles and seal.
8. Store in coolers or refrigerate. This will last for 14 days or more at 4 degrees Celsius.

Source: PCA. Young Coconut Water, FPDD Guide No. 1 — Series of 2014

- 4) **Coconut flour** is used as a substitute for most common flours used in bread and cakes. It is obtained by drying coconut meat of all its juices. It has gained popularity because it is high in fiber, protein, and contains lauric acid. Health advocates and those suffering from 'coeliac disease' prefer it because it is gluten-free.

**Table 10. List of Equipment for the Production of Coconut Flour and VCO (500 Nuts per Day Capacity)**

Equipment	Unit	Cost
Grinder / Pulverizer	1	45,000.00
Spinner	1	45,000.00
Dryer	1	190,000.00
Expeller	1	120,000.00
Grater	1	7,000.00
<b>Building</b>		
Land 100 sq m	500 / sq m	50,000.00
Building 60 sq m	2,500 / sq m	150,000.00
<b>Total Cost</b>		<b>607,000.00</b>

Source: PCA. "Production of Coconut flour and virgin coconut oil."  
[www.pca.da.gov.ph/pdf/techno/flour\\_vco.pdf](http://www.pca.da.gov.ph/pdf/techno/flour_vco.pdf)

- 5) **Coco coir** is the natural fiber extracted from coconut husks. The fiber has many applications such as material for organic ropes, cushion for car seats, geotextile for road construction, coir logs to prevent river bank erosion, and other applications. In the process of coir extraction, coir dust, also known as peat, is

produced. The peat can be used as fertilizer for immediate application. Some entrepreneurs process the peat into peat blocks for export. The peat blocks are used for urban gardening.

#### **Coir Dust (Fertilizer) Application in Coconut Farms**

*Evenly distribute coir dust within 1.5 m radius of the coconut palm.*

*Incorporate within topsoil (0-6 in.) the following amount of coir dust/palm/year: 10 kg (in coastal areas); 15 kg (in inland areas).*

*Apply the recommended mineral fertilizer (ammonium sulfate) once a year at the start of rainy season following the broadcast and soil incorporation method within the 1.5 m radius of root zone of each palm.*

*Source: PCA. "Utilization of Coccopeat in Coconut Production," Techno Guide Sheet No. 10 Series of 2003*

### **WHAT DO FARMERS NEED TO KNOW ABOUT COCONUT PRODUCTION?**

On average, a coconut tree would yield around 35-36 nuts annually. A total of 100-110 trees can be planted on a one-hectare parcel of land which can produce 3,500 nuts. The coconut tree is best suited in sandy soil but can adapt to different types of soil. It is also best suited for warm and humid climates. Exposure to sunlight is also important and needs to be considered by farmers who plan to undertake intercropping.<sup>22</sup>

There are two main types of coconut trees: tall and dwarf. The dwarf variety grows faster but has a shorter life span. The PCA promotes tall and hybrid varieties of both dwarf and tall coconut trees contingent on the soil characteristics of the farm. The PCA also promotes the high-yielding 'Galas Green Dwarf' variety as an alternative for farmers. This variety yields 70 nuts per year compared to the 35-45 nuts per year of most common varieties. The other varieties promoted by the PCA are the 'Tacunan Green Dwarf' and the 'Genetically Multi-Ancestored Farmers' Composite Variety'.

Salt is the most common input. It is the cheapest and best source of chlorine to increase copra yield. This is important for the 40 coconut-producing provinces that are severely chlorine deficient.<sup>23</sup> Another type of input is the organic fertilizer, which is beneficial since it reduces the cost of inputs in areas where it's available.

Farmers have various options to enhance the productivity of coconut areas and increase incomes through diversification of crops within the same farm.

1. **Intercropping with Banana.** Bananas can be intercropped with one to three year old or older coconut trees. The basic climatic requirements are almost the

<sup>22</sup>PCA. "The Light Levels under Coconut Canopy and their Practical Applications in Intercropping"

<sup>23</sup>Magat, S. "Salt An Effective and Cheap Fertilizer for High Coconut Productivity," PCA, 2000.

same. In fact, banana needs less water than coconut, a fast-growing plant, and bears fruit in less than one year.<sup>24</sup>

#### Basic Information on Banana Intercropping

<i>Land Preparation:</i> After clearing the interspaces of coconut, mark the required distance: 3 x 3 m for Lakatan and Latundan; 5 x 5 m for Cardaba/Saba.
<i>Planting:</i> Dig a hole depending on the size of planting materials. Plant corms in slanting position with growing point on top. For suckers, plant in upright position and cover with soil up to the collar and press gently.
<i>Maintenance:</i> Fertilize banana with the following fertilizers and rates under two options: 100% inorganic fertilizer (IF) or 75% inorganic + 25% organic fertilizer (OF).
<i>Harvest:</i> Harvest 10 to 15 months after planting or when fruits are full, plum, round, and light green, and the angles of the fingers are rounded.
<small>Source: PCA Techno Guide Sheet No. 12 Series of 2003</small>

**Table 11. Simple Cost and Return Analysis of Lakatan Under Coconut Using Two Fertilizer Options**

Item	Option 1	Option 2
	100% inorganic	75% Inorganic +25% organic
Copra yield (t/ha)	9.71	11.94
Lacatan yield (t/ha)	17.39	15.08
Combined gross return(PHP)	218,830.00	224,960.00
Combined total cost (PHP)	133,800.00	134,950.00
Combined net return (PHP)	85,030.00	90,010.00
BCR (for 3 years)	1.70	1.60

Source: PCA-DRC, BagoOshiro, Davao City, 1995-1998).  
PCA Techno Guide Sheet No. 12 Series of 2003

**2. Intercropping with Cacao.** Cacao can be intercropped with coconut when the trees are 25 years old and above. Cacao and coconut do not compete with each other for soil resources except in dry areas.<sup>25</sup>

<sup>24</sup>PCA."Coconut-Banana Intercropping," Techno Guide Sheet No. 12 Series of 2003.  
<sup>25</sup>Magat, S., and Secretaria, M. "Coconut-Cacao Cropping Model" PCA 2007.

### Basic Information on Cacao Intercropping

<p><i>Cacao tree is best planted not closer than 2 meters from the base of coconut trees, at 3 m between hills, and 3 m between rows.</i></p> <p><i>Where there is limited land for cacao monocropping, the inter-spaces of coconut lands (with 8-15 meters of spacing of coconut palms) are suitable for several rows of cacao crop.</i></p>		
<i>Climatic Needs:</i>		
<i>Factor</i>	<i>Coconut</i>	<i>Cacao</i>
<i>Altitude (m above sea level)</i>	<i>Less than 600</i>	<i>Less than 300</i>
<i>Temperature (°C)</i>	<i>2 -P* 1 2</i>	<i>18-32</i>
<i>Light</i>	<i>&gt;2000 sunshine hours/year</i>	<i>Shade-tolerant crop</i>
<i>Total annual rainfall (mm)</i>	<i>1500- 2500 (well distributed)</i>	<i>1,250-2,800(w/o any drought exceeding 3 months)</i>
<i>Typhoon frequency (%)</i>	<i>&lt; 20</i>	<i>&lt; 20</i>
<i>Soil Requirements:</i>		
<i>Soil Condition</i>	<i>Coconut</i>	<i>Cacao</i>
<i>Soil Depth (cm)</i>	<i>&gt;75</i>	<i>&gt;1500</i>
<i>Drainage</i>	<i>Moderate to well-drained</i>	<i>Well-drained</i>
<i>Soil Acidity (pH)</i>	<i>5.5-7.5</i>	<i>4.5 - 7.0</i>
<i>Soil Texture</i>	<i>Sandy, loamy, clayey (with good structure)</i>	<i>Loamy, clayey (with good structure)</i>
<i>Organic matter content</i>	<i>Medium to High</i>	<i>Medium to High</i>
<i>Major nutrients</i>	<i>N, K, Cl, S, P, Ca, Mg, B</i>	<i>a C κ, CL N,</i>
<small>Source: Magat&amp;Secretaria. "Coconut-Cacao Cropping Model" PCA 2007</small>		

A study conducted by Magat and Secretaria (2007) suggests that a coconut-cacao farm with 135 coconut trees and 600 cacao trees can generate returns on Year 1 and a combined and gradual increase in income of PHP 36,232 on Year 2, PHP 69,030 on Year 3, PHP 93,541 on Year 4, and PHP 116,161 on Year 5.

3. **Intercropping with Corn.** Corn can be intercropped with coconut. The spaces between rows of coconut trees can accommodate about six to nine rows of corn depending on the planting distance.<sup>26</sup>

<sup>26</sup>PCA."Coconut-Corn Intercropping," Techno Guide Sheet No. 11 Series of 2003.

### Basic Information on Corn Intercropping

<p><b>Land Preparation:</b> Plow the field once when soil moisture permits and harrow twice. Make furrows at 0.75 m apart and 2 m away from the base of the coconut.</p>
<p><b>Planting:</b> Basal fertilizer application - Apply fertilizers in furrows in three bags 14-14-14 per ha and cover with a thin layer of soil before planting. Plant two seeds per hill on furrows at a distance of 20 cm between hills or 5.0 hills per linear meter (about 30,000-48,000 plts/ha). This should be thinned to one plant per hill two weeks after germination.</p>
<p><b>Maintenance:</b> Off-bar (plowshare away from furrows) on the 14th day after planting (DAP). Sidedress the remaining half of the fertilizer at two bags ammonium sulfate or one bag urea around 5-6 cm away from the corn plants just before hilling-up.</p>
<p><b>Harvest:</b> Harvest the ears at an appropriate time usually 95-100 DAP when husks are already dried.</p>
<p>Source: PCA Techno Guide Sheet No. 11 Series of 2003</p>

Commented [j1]: Is this really plowshare?

Commented [j2]: Is this really sidedress?

4. **Intercropping with Gmelina arborea.** Gmelina is a fast growing forest tree planted to produce wood for light construction and crafts. It can be grown alongside coconut trees with proper pruning.<sup>27</sup>

### Gmelina Intercropping procedure

<p>The bearing coconut trees are pruned from leaf 23 (with the oldest harvestable bunch and below, maintaining 22 living leaf fronds every nut harvest).</p>
<p>Plant two rows of gmelina seedlings at 3 x 3 m in between two rows of coconut trees. Fertilize gmelina plants with 14-14-14.</p>
<p>Prune the lateral branches of one to three year old gmelina trees below 3 m height to promote straight and bigger trunks.</p>
<p>Harvest 25% of the total gmelina planting on the third year for banana props, fuel. Harvest another 25% on the sixth year and the remaining 50% on the 10th year for lumber (wood) and fuel purposes.</p>
<p>Source: PCA. "Coconut-GMelina cropping System," Techno Guide Sheet No. 14 Series of 2004.</p>

Commented [j3]: Is this really props?

A sample cash flow analysis of coconut-gmelina production suggests a 10-year net benefit of PHP 11,101 on Year 1, PHP 9,892 on Year 2, PHP 37,949 on Year 3, PHP 9,436 on Year 4, a PHP 2,975 loss on Year 5, PHP 80,132 on Year 6, PHP 5,978 on Year 7, PHP 10,232 on Year 8, PHP 11,548 on Year 9, and PHP 106,710 on Year 10 (PCA 2007). The income streams come from the sale of coconuts, coconut leaves, and gmelina wood.

<sup>27</sup>PCA. "Coconut-GMelina cropping System," Techno Guide Sheet No. 14 Series of 2004.

5. **Intercropping with Moringa or *malunggay*.** Dubbed as the “miracle tree”, moringa can be intercropped with coconut at the right developmental stage, usually when the coconut trees are seven years of age or older.<sup>28</sup> The moringa itself is a versatile crop that has emerging new uses ranging from health capsules and drinks to mixes with vegetable-enriched noodles.

## WHAT IS THE EXISTING POLICY ENVIRONMENT IN THE COCONUT INDUSTRY?

The Philippine Coconut Authority (PCA) is the designated governmental body tasked to look after the welfare of the coconut industry. It was created through Presidential Decree No. 232 in 1973 and absorbed its predecessors like the Coconut Coordinating Council, the Philippine Coconut Administration, and the Philippine Coconut Research Institute. It is essentially under the Department of Agriculture (DA) but was recently transferred to the Office of the President under the direct supervision of the Presidential Assistant for Food Security and Agricultural Modernization. The PCA functions as a government owned and controlled corporation (GOCC) which means that it has its own charter and budget separate from the DA.

*The **PHILIPPINE COCONUT AUTHORITY** is the sole government agency tasked to develop the industry to its full potential in line with the new vision of a united, globally competitive, and efficient coconut industry.*

**Mandate:** *To oversee the development of the coconut and other palm oil industry in all its aspects and ensure that the coconut farmers become direct participants in, and beneficiaries of, such development and growth. (PD 1468, Art. I, Sec. 2)*

**Mission:** *To promote the development of a globally competitive coconut and other palm oil industry that would contribute to food security, improved income, and enhanced participation of stakeholders.*

**Vision:** *PCA as an Entrepreneurial Development Authority.*

The PCA has four main programs:

- **Production Services**-- include projects on coconut planting and replanting, coconut rehabilitation, and maintenance of seed farms, institutional development, and farm diversification.
- **Market Development Services**--revolve around activities to promote the coconut industry.
- **Research and Development** --includes projects on varietal improvement, crop protection, and product development.

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<sup>28</sup> Magatet. al. "Mineral Macro-Nutrients, Micro-Nutrients and Other Elements in Leaves of Malunggay Plant (*MoringaOleifera*) Sampled in Some Locations in the Philippines," PCA, Technology-Advisory Notes, 2009.

- **Regulatory Services**--include the implementation of the coconut cutting act, the registration of key products and stakeholders, and upholding quality standards.

The Philippine Development Plan 2011-2016 (PDP) highlights the government priorities in the next five to six years. Under Chapter 4 on agriculture, Competitive & Sustainable Agriculture & Fisheries Sector, the government recognizes the need to promote long-term financing for long-gestating crops such as coconut similar to what the Philippines' Southeast Asian neighbors have done<sup>29</sup>. This chapter also highlights the need to strengthen agricultural exports such as coconut by funneling resources to it.

In Chapter 3 of the PDP termed as Competitive Industry & Services Sectors, the government recognizes the impact and importance of the coconut industry and the need to promote value-added products such as refined coco oil, coco biodiesel and oleo chemicals to double the export of coconut products by 2016.<sup>30</sup> The government will also promote the use of green products such as coconut among micro, small, and medium enterprises. This chapter also mentions a public-private-partnership (PPP) model in promoting green products with coconut and other commodities.

The government has yet to approve the Integrated Coconut Industry and Poverty Reduction Roadmap although it has been cited in the National Budget Memorandum No. 118 as part of the 2014 budget process.<sup>31</sup> The government plans to allocate around PHP 11.2 billion in annual spending for the coconut industry up to 2016.<sup>32</sup> The government also intends to use the coco levy fund as a source of financing for this roadmap, given the 2012 Supreme Court decision which declared the coco levy as a public fund.

For 2014, the government has appropriated the amount of PHP 2.3 billion, which is roughly 0.1% of the total PHP 2.2 trillion national budget. Historically, government appropriation for the PCA has been minimal and below one percent (1%) of the national budget. This is in contrast to the total DA budget for rice programs and projects amounting to PHP 7 billion for 2014.

The top three priority allocations of the PCA are for coconut planting and replanting, fertilization, and creation of agro-industrial hubs. The budget allocation leaves little room for disaster risks such as in the case of Davao Oriental in the aftermath of Typhoon Pablo in 2012, and Leyte and Samar in the aftermath of Typhoon Yolanda in 2013.

A number of laws and policies would have positively impacted on the coconut industry if only these were properly enforced:

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<sup>29</sup>Philippine Development Plan 2011-2016. "Chapter 4: Competitive & Sustainable Agriculture & Fisheries Sector" NEDA.

<sup>30</sup>Philippine Development Plan 2011-2016. "Chapter 3: Competitive Industry & Services Sectors" NEDA.

<sup>31</sup>The Coconut Industry Roadmap was prepared by the National Anti-Poverty Commission on behalf of a technical working group composed of other bodies of government: DA-PCA; DAR; DSWD; NCI; and Philhealth. It is part of the Aquino Administration's poverty reduction program.

<sup>32</sup>NAPC. "Poverty reduction roadmap of the Philippine Coconut Industry" 2011.

- a) The Agricultural and Fisheries Modernization Act (AFMA) or R.A. 8435 aims to transform the agriculture sector into "one that is dynamic technologically advanced and competitive, yet centered on human development, guided by sound practices of sustainability and the principles of social justice."<sup>33</sup> The law, however, has little impact on coconut farms since lands for coconut production are not regarded as prime agricultural lands since most of these lands are not irrigated. This has led to funding constraints and support for the coconut industry remains minimal.
- b) The Comprehensive Agrarian Reform Program (CARP) Law of 1988 aims for a more equitable distribution and ownership of land which recognizes the rights of farmers, farm workers, and landowners to empower and improve the quality of their lives. This law may have social justice in mind but it has had an adverse effect on the growth of the coconut industry. The stringent provisions of the law have distorted the rural land markets and have driven away possible investors. Because of this, there had been no replanting or intercropping in most commercial estates since 1988.<sup>34</sup> In the past, some resorted to cutting down coconut trees as an alternative source of income since investment in coconut farms wasn't a lucrative venture. Today the DAR has yet to distribute land under its Land Acquisition and Distribution (LAD) program. The Samar provinces, which have the largest portion of undistributed land, are predominantly coconut plantations (30% or 262,524 ha).<sup>35</sup>
- c) Republic Act No. 8048 or the Coconut Preservation Act of 1995 was passed into law as a response to the rampant cutting of coconut trees. This regulates the cutting of coconut trees through requirements and permits. It also stipulates that there should be a sustainable and efficient replanting program since the industry has significant impacts on the country's economy. The law has been criticized for being ineffective. The indiscriminate cutting of coconut trees continues although recommendations on how to improve the law's implementation have been made.<sup>36</sup> The Philippine National Police have also made successful arrests of illegal coconut loggers in the past decade. There are a number of provisions of this law which were updated in 2013 through R.A. 10593.
- d) The "Coco Levy Fund". In the 1970s, several levies were imposed through laws to fund government programs intended to support the coconut industry. These programs were carefully designed such that the coconut farmers would be the primary beneficiaries on paper. The benefits range from ownership of a bank that presently accumulates property, credit extensions, subsidized coconut products, scholarship and death benefits, free replanting of old coconut trees, and benefits control of the milling sector through UNICOM.<sup>37</sup>

<sup>33</sup>Agriculture and Fisheries Modernization Act of 1997. Republic Act No. 8435.

<sup>34</sup>Dy, R. "The Philippine Coconut Industry: Performance, Issues and Recommendations," EPRA (2006).

<sup>35</sup>Relief Web International. "Rebuilding Coconut Production After Typhoon Yolanda," 2014.

<sup>36</sup>Pabuayon I., et al. "The Philippines Regulatory Policy on Coconut Cutting: An Assessment Incorporating Environmental Consideration," Department of Agricultural Economics, College of Economics and Management University of the Philippines Los Banos (UPLB). J. ISSAAS Vol. 15, No. 2:93-106 (2009).

<sup>37</sup>Dy, R. "The Philippine Coconut Industry: Performance, Issues and Recommendations," EPRA (2006).

#### **Laws enabling the collection of coconut levies**

Republic Act (RA 6260) of 1971, known as the Coconut Investment Act;
Presidential Decree (PD No. 276) of 1973, established a Coconut Consumers Stabilization Fund (CCSF)
PD (582) of 1974, created the Coconut Industry Development Fund (CIDF)
PD (1841) created the Coconut Industry Stabilization Fund (CISF).

One may argue that the drafters of these laws and programs had reasonable intentions at the onset; history, however, has shown that the personalities involved during that time had questionable motives and objectives. Farmers were only able to partake of a small piece of the otherwise enormous coconut levy pie. During this time a monopoly was created since coconut mills and interlocking government directorates gained the lion's share of the profits and passed the burdens of the industry to the farmers.<sup>38</sup> The "coco levy" fund is considered public funds in nature but through legal and political maneuverings, it was converted to private funds.<sup>39</sup>

The levies were finally ended in 1982 but the "coco levy fund scam" has tainted the coconut industry for decades. The promise of help and support for the industry was instead channeled to fill the pockets of unscrupulous people linked closely with the former President. The legal tug of war on the coconut levy dragged on for at least two decades, bringing down the country's coconut industry with it.

In 2004 the Sandiganbayan made a decision that the funds were ill-gotten during the time of the late dictator. The Supreme Court in 2012 affirmed the decision of the Sandiganbayan and voted unanimously stating that the "coco levy" was imbued with public interest. The San Miguel Corporation shares and other Coconut Industry Investment Fund (CIIF) assets are estimated to be around PHP 100 B. Yet despite the SC decision, it's still not clear when and in what manner the funds will be spent for the benefit of the coconut farmers.

#### **WHAT ARE THE ISSUES AND CHALLENGES CONFRONTING THE COCONUT INDUSTRY?**

The Philippine coconut industry is facing serious challenges where the appropriateness, seriousness, and quality of the response will determine the industry's growth, survival and sustainability:

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<sup>38</sup>Faustino, J. "Facing the Challenges of the Philippine Coconut Industry: The Lifeblood of 4.4 Million Coconut Farmers and Farm Workers," EPRA (2006).

<sup>39</sup>Dy, R. "The Philippine Coconut Industry: Performance, Issues and Recommendations," EPRA (2006).

## Climate Change and Disasters

The 2013 Climate Change and Environmental Risk Atlas of Maplecroft, an international think tank, ranked the Philippines as second only to Bangladesh among the countries in Asia to be "most at risk from the changing temperatures and weather systems."<sup>40</sup> In the next decade, an overhaul will happen with the weather patterns of the country based on the climate scenarios developed by PAGASA: wet days will become wetter, hot days hotter, areas with usually dry weather will experience rain and vice versa.<sup>41</sup>

Because 68 out of the 79 provinces in the Philippines are coconut producing areas, the industry needs support. A PCA official has blamed the erratic weather conditions with the decline of production in Northern Mindanao as early as 2011 and the cause of the major decline in coconut production in the region.<sup>42</sup>

The country has been ravaged by numerous disasters, both by climatic and tectonic forces. The Philippines is exposed to various hazards because of its geographic location. Being situated in the Pacific rim of fire, the country is no stranger to earthquakes. This is further compounded by the fact that the Philippines is in the path of Pacific typhoons averaging 20 per year. The names Ondoy, Pepeng, Pablo, and recently Yolanda have been etched in the memories of Filipinos because of the destruction these typhoons have brought upon the country.

Yolanda-hit areas are coconut producing regions leaving many coconut farmers economically marginalized. The PCA confirms that around 33 million trees in seven provinces (Quezon, Guimaras, Iloilo, Negros Occidental, Cebu, Eastern Samar and Leyte) were damaged in varying degrees.<sup>43</sup> It will take three to five years to rehabilitate the coconut farms using fast-growing varieties. Leyte and Samar, provinces account for 15 percent of the 852,000 MT of coconut oil exported in 2012 but the full impact will be felt in 2014. It is hoped that the decline in exports would not exceed 10 percent of the US \$ 1 B dollar worth of exports in 2012.<sup>44</sup> Preliminary data from the United Coconut Association of the Philippines states that CNO exports fell 49 percent to 237,831 MT in the January to April 2014 period, compared to 466,111 MT during the same period in 2013.<sup>45</sup>

There is an urgency to cut and move felled trees to prevent the spread of pests and diseases and to hasten the rehabilitation process. *Cadang-cadang* disease, which is lethal to coconut trees and the *Brontispa* type of beetle are already spreading in the Eastern Visayas region. The PCA has provided chainsaws for farmers to help in clearing coconut areas in exchange for wages. The national government also promised to deliver a long-term solution in assisting coconut farmers through the Reconstruction Assistance on Yolanda (RAY) strategic plan. A total of PHP 361 billion has been promised for the

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<sup>40</sup>Maplecroft. "Climate Change and Environmental Risk Atlas for 2013," accessed February 25, 2014.

<sup>41</sup>PAGASA. "Climate Change in the Philippines," MDGF 1656, 2011.

<sup>42</sup>Fiel, T. "Climate change brought coconut harvest down, say execs," Philippine Daily Inquirer, July 28, 2011.

<sup>43</sup>Relief Web international. "Rebuilding Coconut Production After Typhoon Yolanda," 2014.

<sup>44</sup>Raghu, A., and dela Cruz, E. (2013). "Why Philippine coconut crop damage is causing supply worries," ABSCBN News.com, December 19, 2013.

<sup>45</sup>Diega, A. (2014). "Coco-oil export down by half as sector reels from 'Yolanda'," Business Mirror, January 4, 2014.

reconstruction of Yolanda-hit areas, PHP 18.7 billion of which is earmarked for the agriculture sector. The specific breakdown of the fund is still not detailed and funding will be sourced from donor communities.<sup>46</sup> The government also intends to disburse the fund in four years, with an annual release of PHP 100 million. It can be surmised that local disaster risk reduction and management plans for Yolanda-hit areas were either non-existent or inadequate to mitigate the impact of the typhoon.

## Infestation

Aside from climatic risks and threats, there is also a Coconut Scale Insect (CSI) invasion observed since 2010. The *Aspidiotus Destructor* is yellowish in color and injects a chemical on the leaves of coconut trees. This disintegrates the leaves' chlorophyll and interferes with the coconut's ability for photosynthesis.<sup>47</sup> The CSI is spreading in Region 4A CALABARZON and Basilan. This problem was largely ignored and previous measures implemented to eradicate the insect were futile.

The recent overhaul of political leadership in the agriculture sector indicates the gravity of the problem. The new food security and agricultural modernization chief, Secretary Francis Pangilinan has vowed to stop the spread of the bug and to eradicate it completely. Executive Order No. 169, mandates the activation of emergency measures to control and manage the infestation. Equipped with a PHP 750 M budget for a six month program, dubbed the "Sama-samang Aksyon ng Gobyerno, Industriya, at Pamayanan sa Malawakang Pagsugpo ng Pesteng Cocolisap" (SAGIP), Sec. Pangilinan intends to contain the spread of the insects.<sup>48</sup> Though the budget seems small for such a huge task, it's a step forward and substantial compared to the previous budget allocations promised by the PCA.

## Institutional fragmentation and policy bias

Despite being a major contributor to agricultural exports, the coconut industry is in the periphery of government policy and institutional support. The prioritization for rice and food self-sufficiency has overshadowed the coconut industry's need for years. The promise of great financial returns from the "coco levy" has also contributed to the virtual invisibility of the coconut industry in the annual budget. Coconut farmers are among the poorest in the country and there is a prevailing need to channel more funds for their source of livelihood. Rural poverty incidence is highest among coconut farmers at around 60%. Four of the top 10 provinces with the highest number of poor families are coconut-producing provinces.<sup>49</sup>

This bias has contributed to the other persisting issues within the coconut industry such as the increasing population of senile coconut trees. It is estimated that 30% of coconut-

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<sup>46</sup>Official Gazette. "P361 billion needed for Yolanda recovery, reconstruction" December 18, 2013.

<sup>47</sup>Larano, C. (2014). "Insect Attacks Philippine Coconuts: The *Aspidiotus Destructor* Thought to Come From Indonesia," *The Wall Street Journal*, June 9, 2014.

<sup>48</sup>Reganit, C. (2014). "KontraCocolisap: Fighting coconut scale insect infestation of 1.8 million trees," *InterAksyon.com*, June 22, 2014.

<sup>49</sup>National Anti-Poverty Commission. "Poverty reduction roadmap of the Philippine Coconut Industry" 2011.

bearing trees are senile or over 60 years old.<sup>50</sup> Further compounding this problem is the prevalence of low-yielding varieties of coconut trees around the country. Despite efforts by the PCA for replanting, it would take a nationwide effort to address this problem.

### **Inadequate provision for risks and losses**

The inadequacy of crop insurance has been a perennial constraint for coconut farmers. Related to this is the absence of a clear roadmap for the coconut industry's development, one that is sensitive to the risks of climate change, disasters, and infestation.

The PCA and Philippine Crop Insurance Corporation (PCIC) have a joint memorandum aiming to create funding mechanisms for micro-finance oriented towards small coconut farmers. To date 500,000 farmers are insured with PCIC out of the estimate 3 million farmers and farm workers. The current insurance policy is framed with consideration for coconut as a high value crop.

### **Reversing stagnation**

The Philippine coconut industry has been on a steady decline with 46.63 million of coconut trees (14% of total) considered to be senile.<sup>51</sup> Output production has been almost stagnant with an average growth rate of two percent (2%).<sup>52</sup> Even though the PCA has exerted efforts towards planting new trees, the scope of their ongoing program is just too small. This is also compounded by the fact that areas for coconut production are in decline. Land conversion and the rampant cutting of coconut trees despite the passage of the Coconut Preservation Act have led to the decline of coconut plantations.<sup>53</sup>

Land conversion has literally changed the landscape of coconut cultivation areas. Although accurate figures are not yet available, substantial portions of coconut areas have been transformed due to infrastructure development, real estate expansion, and sports and tourism.<sup>54</sup> There are also areas where coconut production has been switched for seemingly more lucrative crops, especially for disaster-hit regions.<sup>55</sup> It is more lucrative to grow rice, vegetables, and other crops since the gestation period for these are relatively shorter compared to the several years it takes for the coconut to yield nuts.

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<sup>50</sup>Faustino, J. "Facing the Challenges of the Philippine Coconut Industry: The Lifeblood of 4.4 Million Coconut Farmers and Farm Workers," EPRA (2006).

<sup>51</sup>National Anti-Poverty Commission. "Poverty reduction roadmap of the Philippine Coconut Industry" 2011.

<sup>52</sup>Ibid.

<sup>53</sup>Faustino, J. "Facing the Challenges of the Philippine Coconut Industry: The Lifeblood of 4.4 Million Coconut Farmers and Farm Workers," EPRA (2006).

<sup>54</sup> Ibid.

<sup>55</sup>Dy, R. "The Philippine Coconut Industry: Performance, Issues and Recommendations," EPRA (2006).

### **Improving value chain coordination**

There is a huge gap between the supply base and manufacturing chain. Oil mills, refineries, and other facilities are operating below capacity due to the lack of coconuts. A SWOT analysis prepared by Dr. Rolando Dy (2006) cites gaps in the marketing system. The gaps are mainly due to the following: poor infrastructure, low productivity due to senility of trees, low capacity of mills due to the shortage of raw materials, and weak institutional support from government due to frequent leadership changes in the PCA and the protracted debate over the coco levy funds.

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