THE WHOLE NUT

A TRUE COCONUT STORY

coconut knowledge center

IMPACT THROUGH INNOVATION

IMPACT THROUGH INNOVATION

PROJECT AND RESEARCH RESOURCE

PROJECT LOCATION
BALI, INDONESIA

TIMELINE
2019

TITLE
Coconut World
International GENEBANK and GERMPLASM Collection

Participants: Coconut Knowledge Center, Ministry of Agriculture, Indonesian Government, Ministry of Economic Development, Provcial Bali Government, Indonesian Palm Research Institute (Balit Palma), International Coconut Genetic Resources Network (GOGENT), Biodiversity International, Asia Pacific Coconut Community (APCC), The Crop Trust, Food and Agriculture Organisation (FAO) International Treaty on Plant Genetic Resources for Food and Agriculture, Australian Centre for International Agricultural Research (ACIAR)

PROJECT LOCATION
INDONESIA

TIMELINE
2018 / 2019

TITLE
Proof of Concept & SOP
Gender Inclusive Smallholder Seed Gardens impact investments for global transferability and scalability

Participants: Coconut Knowledge Center, Ministry of Agriculture, Indonesian Government, Ministry of Economic Development, Provincial Bali Government, Indonesian Palm Research Institute (Balit Palma), International Coconut Genetic Resources Network (GOGENT), Biodiversity International, Asia Pacific Coconut Community (APCC)

PROJECT LOCATION
INDONESIA

TIMELINE
2019 / 2020

TITLE
Creating a Coconut Plantation Investment Climate
CKC NES SOP (Nuclus Estate Smallholder System & SOP for Coconut. A broad based bio-diversity farming system)

Participants: Coconut Knowledge Center, Ministry of Agriculture, Indonesian Government, Ministry of Economic Development, Provincial Bali Government, Indonesian Palm Research Institute (Balit Palma), International Coconut Genetic Resources Network (GOGENT), Biodiversity International, Asia Pacific Coconut Community (APCC),
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CONTENT

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COCONUT WORLD

International GENEBANK and GERMPLASM Collection

PARTICIPANTS

Coconut Knowledge Center, Ministry of Agriculture, Indonesian Government, Ministry of Economic Development, Provcial Bali Government, Indonesian Palm Research Institute (Balit Palma), International Coconut Genetic Resources Network (GOGENT), Biodiversity International, Asia Pacific Coconut Community (APCC), The Crop Trust, Food and Agriculture Organisation (FAO) International Treaty on Plant Genetic Resources for Food and Agriculture, Australian Centre for International Agricultural Research (ACIAR)

To feed nine billion people by 2050, food availability needs to expand another 60% globally and up to 100% in developing countries. FAO

Investment is needed to build coconut stakeholders' capacity and resources across the value-chain, particularly for genetic resources conservation. The future of coconut production and associated livelihoods critically depends on growers having ready access to the broad genetic diversity of this crop. Most plantations' and smallholders' palms are senile, relatively unproductive and need replanting.

The trees may be older than the farmers with small holder farmers not knowing what variety they have, nor how to replace their old palms with elite planting material with the traits to resist climate change, droughts, pests and disease.

Coconut diversity is currently conserved in 1,500 accessions in 24 field Genebank germplasm collections around the world and which all face various serious threats.

THE GLOBAL FAIL SAFE GENEBANK CONTEXT :

The Svalbard Global Seed Vault is located deep inside a mountain under the permafrost on a remote island halfway between mainland Norway and the North Pole. It is the permanent global fail-safe repository of more than one million seeds from the world's critical food crops including maize, rice, wheat, barley, and beans.

But, there are many critical crops that cannot be conserved by seeds like coconut, banana, cacao, cassava, coffee, potato. These crops account for one billion tonnes of food a year and some are food security crops for the very poor and others are vitally important for global nutrition. *There is no equivalent to Svalbard Vault for these crops.*

The coconut crop genetic reserve currently curated or stored in 24 field collections that are at inherently high risk of neglect, disease, and natural disasters. *There is no global fail-safe for coconut.*

PROJECT INTRODUCTION :

CKC with the Indonesian Government *Balai Penelitian Tanaman Palma (Balit Palma)* Indonesian Palm Crops Research Institute (IPCRI) formally collaborate on technical advisory for; the supply of elite genetic material, planting and cultivation of elite genetic material, formal certification of coconut planting materials and exchanges with global coconut genetic collections. The coconut stakeholders also are partnering for the establishment of an innovative international coconut germplasm genebank collection situated in the Indonesian tourism island of Bali.

This globally relevant project framework is within the **COGENT 2017 Global Strategy for the Conservation and Use of Coconut Genetic Resources**.

COGENT strategy aims to invigorate the commercial coconut sector in a sustained manner, while protecting global food security. This is achieved by encouraging partnerships that increase the impact of research and adoption of technological innovations and developing for-profit commercial linkages between coconut research, conservation, tourism and ecotourism.tecting global food security. This is achieved by encouraging partnerships that increase the impact of research and adoption of technological innovations and developing for-profit commercial linkages between coconut research, conservation, tourism and ecotourism.

Education Tourism and Community-based Ecotourism is an emerging tool for biodiversity conservation and sustainably. Coconut palms are well suited to be integrated within such conservation and ecotourism initiatives.

PROJECT FOCUS :

1. Genetic resources conservation within a collection of around 50 varieties under the International Coconut Genebank (ICG).
2. Global Food Security.
3. Breeding highest productivity coconut with emphasis on smallholders to revitalise the coconut estate.
4. Smallholder and commercial farmer education in the modern coconut palm eco-system.
5. Developing leading edge secure Genetic Information Systems using Blockchain technology.
6. R&D activities including developing somatic embryogenesis in coconut.
7. Encouraging innovation through a coconut SME business incubator program.
8. Advocacy, education and promotion of coconut palm investment as a viable, sustainable, priority crop.

The project is orientated around expansion of existing CKC operations in Bali (micro factory virgin coconut oil processing, appropriate technology showcase, whole nut processing demonstration unit and eco-agro tourism visitor center).

The Bali international germplasm collection will be part of the COGENT (Coconut Genetics and Germplasm Network) International Coconut Genebank, FAO (Food and Agriculture Organisation of the United Nations), IPGRI (International Plant Genetic Resources) CGIAR (Consultative Group on International Agricultural Research), the program of international coconut germplasm collection model developed by Bioversity International under COGENT-FAO/IPGRI.

Bioversity International is a CGIAR Research Centre. CGIAR is a global research partnership for a food-secure future.

A Financial Commitment of SG$630,00,000 is sought to support development of this important project.

- Investing in global food security
- Protecting 80 million small holder people who depend on coconut
- Ensuring a sustainable coconut plantation and processing industry
- Enabling a coconut edible oils alternative to oil palm expansion

The project intends to seek financial contributions from private-sector, public- sector, non-bank FINTECH platforms, corporate agriculture and food businesses and including;

- Agri-business Stakeholders
- Global Climate Change Stakeholders
- Global Food Security Stakeholders
- Organisations interested in developing coconut small holders as an alternative to Oil Palm

PROJECT LOCATION

INDONESIA

TIMELINE

2018 / 2019

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PROOF OF CONCEPT & SOP

Gender Inclusive Smallholder Seed Gardens impact investments for global transferability and scalability

PARTICIPANTS

Coconut Knowledge Center, Ministry of Agriculture, Indonesian Government, Ministry of Economic Development, Provincial Bali Government, Indonesian Palm Research Institute (Balit Palma), International Coconut Genetic Resources Network (GOGENT), Biodiversity International, Asia Pacific Coconut Community (APCC)

FAO coconut experts estimate the urgent need to plant more than 900 million coconut palms worldwide to replace senile stocks, at a seedling value of USD$ 2.7 Billion.

Unconventional palm seedling systems such as somatic embryogenesis (tissue culture) while common in oil palm are presently unavailable to coconut palm. Oil palms increasing land area is made possible by its ability to produce tens of millions of viable seedlings.

Elite planting material for 20% of Indonesian coconut estate most in need of replanting would be around 120 million seedlings.

This project aims to provide a counter opportunity for Coconut Palm, as an alternative to Oil Palm, to supply the global edible oil markets expansion through facilitating re-planting, at scale, of the existing coconut estate.

PROJECT KEY POINTS :

- GENEBANK project eco-system delivers availability of seed garden genetic material.
- CKC & IPCRI collaborate on expert technical advisory, supply of certified planting materials and assistance in developing a modern Standard Operating Procedure (SOP) for Seed Gardens.
- CKC & Deejay Farms (India) JV provides knowledge access to patented genetic materials and seed garden technology.

THE SMALLHOLDER COCONUT SEED GARDENS ARE DEPLOYED TO IMPACT ON :

- Smallholder land use alternatives to oil palm cultivation
- Poverty alleviation
- Women empowerment
- Seedling bank capacity development

SEED GARDENS AS IMPACT INVESTMENTS

- Small holder farms deploying the SOP achieve an minimum 8x economic uplift on land/labour
- Av 700,000 high performing seedlings produced PA
- Av 5,000 hectares of coconut replanted PA
- Impact Investment JV model – Impact Investor, CKC & Smallholder @SG$30,000 per unit, fast yield and competitive ROI.

OPERATIONAL FOCUS :

1. Develop small holder seed garden SOP model as an impact investment product.
2. Supply certified elite seed nuts and seedlings to public and private sector plantation customers and social impact FINTECH projects.
3. Small holder coconut seed gardens are accepted as a viable, scalable commercial small holder business model for rural; women currently excluded from coconut supply chain.

A commitment of SG$1,080,000 in the form of 36 x SG$30,000 impact investment packages is sought to facilitate development of the project alongside development of the leading technical seed garden SOP for global transferability and scaling.

This project works to resolve significant constraints in upstream barriers around securing global food security, the future of the 80 million small holder people who depend on coconut for poverty alleviation, alongside the present and future needs of the commercial coconut plantation and processing industry.

PROJECT LOCATION

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TIMELINE

2019 / 2020

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CREATING A COCONUT PLANTATION INVESTMENT CLIMATE

CKC NES SOP (Nuclus Estate Smallholder System & SOP for Coconut. A broad based bio-diversity farming system)

PARTICIPANTS

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Mapping, Feasibility and SOP development for Re-Planting the Indonesian coconut estate under propriety NES SOP for global transferability and scalability.

The NES model was confirmed as the most successful inclusive agri-business model by a study on large-scale agricultural investment projects over 50 years carried out by the World Bank.

PROJECT INTRODUCTION :

CKC is uniquely placed to develop and innovative solutions to coconut (Impact through Innovation) with in-house expert technical skills and executive level knowledge of oil palm management systems and processes, especially in regards to small holder engagement, seedling development and cultivation at scale, somatic embryogenesis, R&D, plantation management and processing.

CKC has engaged in research and field mapping of the coconut in Indonesia and around the world. In understanding the significant economic, social and cultural barriers to restoring upstream coconut sustainability, CKC researched the "younger sister palm" - oil palm – specifically, the "kebun inti-plasma" plantation system. This operating model is widely recognised as commercially effective in Indonesia and Malaysia, responsible for millions of hectares of oil palm development and billions of dollars in inward investment and external foreign exchange earnings.

Oil palm expansion has achieved an extraordinary negative impact relating to environment, wildlife, habitat, climate change and social justice. Change organisations such as the Roundtable for Sustainable Palm Oil work to mitigate oil palm expansion sustainably. CKC proposes the Indonesian and Malaysian Oil Palm model offers a useful reference for change in upstream coconut plantation investment at scale, its land use and its small-holders.

CKC NES MODEL development will yield a SOP consistent with the 17 Sustainable Development Goals of the United Nations, as a member of the Global Compact, and consistent with policies published via the CKC Code of Conduct.

The CKC SOP for coconut investment requires adaptation to the specific circumstances present in coconut and expertise and engagement at all stages of the value chain, including more research on small-scale coconut farmers, barriers and objections, intercropping models, seedling material supply chain and socio-economic assessments.

The initial scope of the project is formal development of the NES SOP, planting material supply chain, intercropping (GAP) and development of the investment climate model.

The project outcome will unlock coconut potential through a bankable model for domestic and foreign investment within the existing coconut palm estate.

OPERATIONAL FOCUS :

PHASE 1 :

- Mapping & Feasibility
- Standard Operating Procedure Development
- Plantation Investment Climate IM

A Financial commitment of SG$500,000 is now sought for Phase 1.

PHASE 2 :

- SPV "INDACOCO" Indian Ocean Plantation Company, investment capital raise and SOP operation.

Phase 2 will require deployment of a blended structured financial package of SG$17 Million.

This project will resolve the numerous agri-business and upstream barriers to small-scale coconut farmer engagement in the replanting and planting at scale a NES coconut investment model, and thereby support establishment of an investment climate in upstream coconut and downstream processing.

COCONUT IS THE MOST IMPORTANT SMALLHOLDER PALM OF THE TROPICS

PAPER I

THE IMPORTANCE OF COCONUT

IMPORTANCE OF COCONUT

- Coconut is the environment friendly small-holder palm of the tropical environment
- Covering 12.28 million hectares in 90 countries with an annual production of 64.3 billion nuts
- Coconut provides USD$ 7.73 Billion per annum to global coconut small holders

Global Coconut production yields 6 million tons in coconut oil equivalent annually and 70% is produced by Philippines, Indonesia and India

LOW IMPACT AGRICULTURE CROP

Coconut area as a % of viable arable and permanent cropland;
- Philippines below 30%
- Indonesia below 10%

ENVIRONMENTALLY FRIENDLY

- Coconut withstands conditions considered marginal for many food crops and is a stabilising factor in the farming systems of fragile environments.
- Coconut requires low to no inputs within an existing land use area unchanged in 100 years.
- Coconut plantations can provide wildlife and habitat conservation economic buffer zones.

SMALLHOLDER AGRICULTURE

98% of coconut is grown by more than 10 million resource-poor smallholder and sharecropper families, on smallholdings under 4 ha.

80 million poor people depend directly on coconut for their livelihood in 90 countries.

70% of the total coconut production is for domestic consumption in most producing countries making Coconut a critical global food security crop.

Coconut copra, used to make coconut oil, is prepared at the coconut farms, using very simple techniques and taken to large scale oil mills through a complex and speculative marketing system.

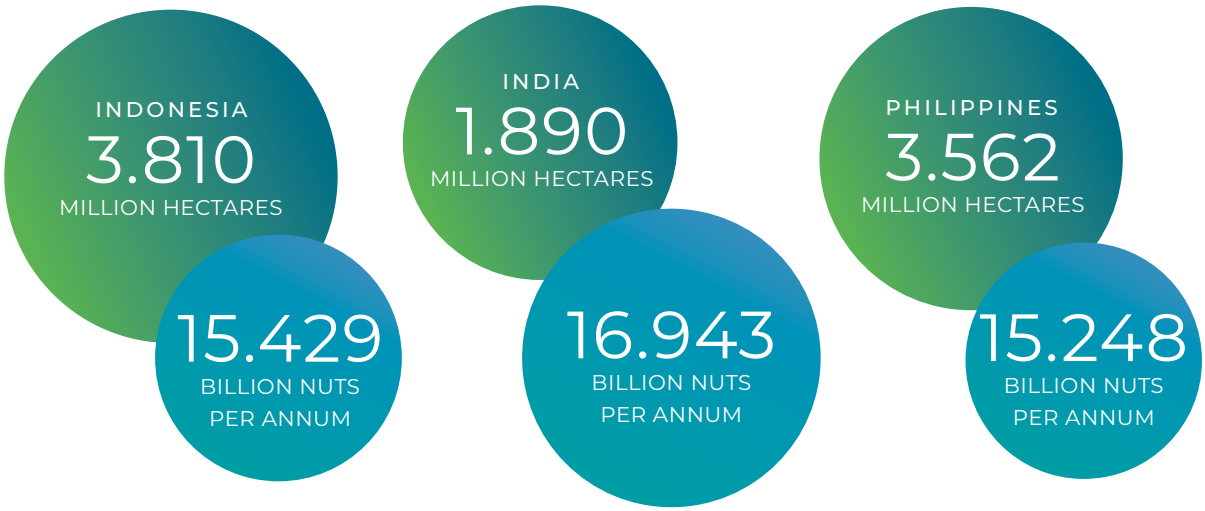
In addition to the traditional products of copra, coconut oil and copra meal, coconut has the unique advantage of producing a wide variety of food and environment friendly non-food products which are used both domestically and for a global export market.

In some coconut growing countries, the coconut is the main or only source of foreign exchange earnings.

50 % of existing coconut palms have passed their economic bearing age (60 years) and are due for replanting, around 900 million coconut seedlings are required at a value of USD$ 2.7 Billion to secure a sustainable future for the global coconut estate.

The biggest barrier to establishing an investment climate for coconut - and an economic alternative to oil palm land area expansion - is the critical lack of quality planting materials and coconut investment model.

GLOBAL COCONUT LEADERS



PAPER II

A WHOLE NUT APPROACH

As early as the 1960s, the United Nations Food and Agriculture Organization (FAO) observed that the coconut industry only benefited traders and processors.

- Ultimately this imbalance at small holder level has yielded a systemic failure in coconut sustainability.
- Coconut production has been falling since 1990.
- Over 50% of harvestable coconut is unproductive in a race to zero.

This high-volume-low-value system has rendered uneconomic 86% of the whole coconut for low-volume-high-value products.

With over 50% of global harvested coconut palms considered to be senile, and at the end of their life as viable sources of copra, the low prices of copra means that incentives to replant are very limited. While higher yielding varieties of coconut have been developed, they are typically more management and input intensive. Moreover, even with hybrids, smallholders are reluctant to face the loss of production of coconuts and of inter-cropped crops that replanting entails.

Any effort to liberate coconut farmers from their poverty cycle must; recover the whole coconut, close to the coconut farm site and include small holders in the value chain

THE EXISTING COCONUT SYSTEM ONLY ACCOUNTS FOR :

- 16% of the whole coconut
- 53% of the fresh coconut meat
- 84% of the whole coconut (shell, husks, and water) are wasted

FROM THIS WASTE RATIO OF 84% :

- A further 47% of the fresh coconut meat volume dries up and disappears.
- Only 10% of the coconut is utilised under the historic copra model.

IN TERMS OF SUSTAINABLE CLEAN ENERGY AND GEO TEXTILES; COCONUT UTILISATION IS EVEN WORSE :

- Only 8% of the shell from coconuts is recovered in the form of charcoal or activated carbon
- Only 1% of the husk from coconuts is converted into coir and peat

Non-utilization of 90% of the coconut not only puts the coconut farmers at a critical disadvantage it deprives [Indonesia] of revenues from high-value foods and clean industrial products.

PAPER III

OPTIMISING COCONUT LAND AREA

INTERCROPPING POTENTIAL;

- Of the total hectares planted to coconut less than 30% are estimated to be intercropped.
- In Indonesia a potential 2.6 million hectares of idle or underutilized agriculturally viable land is available to be planted to intercrops; a global food security opportunity and increased employment and incomes by at least 40%.
- Inefficient cropping of coconuts generates income of only c.USD$ 220 per hectare per year, compared with coconut/cocoa/banana/coffee systems which could yield incomes closer to USD$ 620 and USD$ 500 per hectare respectively.

HIGHER VALUE AGRICULTURE

The value chain for whole nut processing upstream must be focused on higher value coconut products arranged over three existing industrial sectors.

1. PLANT BASED FOOD AND NUTRITION

Water/sugar/oils and fats/fibre/flour/desiccated
(plant based healthy sustainable nutrition and intercropping opportunities for non-coconut foods, wellness and beauty)

2. RENEWABLE CLEAN ENERGY AND ENVIRONMENTAL PROTECTION

Activated Carbon/Charcoal/clean cook stoves/briquettes
(anti-pollution, clean-water, deforestation mitigation, renewable energy and rural electrification)

3. GEO TEXTILES AND ORGANIC GROWING MEDIUMS

Hydroponic substrates/container gardens/weed and erosion control (desertification mitigation, erosion control and organic planting mediums)

Value chain analysis points to a range of high value-added products that can be recovered from unused elements of the coconut under a whole nut zero waste model.

Emerging coconut products are deployed into functional foods, feeds, nutraceuticals, beauty, wellness, agricultural/environmental and industrial markets.

*Why in 2018 in a booming value added coconut market place should the upstream coconut continue to be deployed to only two wasteful high volume low value commodities?**

**coconut oil deployed mainly to oleo chemicals and desiccated coconut, with it's copra crushing by-product of copra meal.*

PAPER IV

THE COCONUT COPRA TRADE IS NOT SUSTAINABLE

The Impact of the Copra Trade on Small Holders is a disaster.

With an average production of 750 kg of copra per hectare per year and the logistics constraints such as transport cost from the farm to the processor, the smallholder supplier is forced to rely on the trader who can pay in advance, in most cases at a 30% discount to the farmer due to the poor quality of copra being produced because of the lack of drying facilities in the farm.

This current scenario has resulted in the uneconomical use of the rest of the coconut for other higher value products in the smallholders' areas of supply and as an economic barrier for small holder engagement in replanting.

Coconut farmers, the sole source of the raw materials suffer in abject poverty are at the mercy of middlemen traders who buy their produce at a discount due to a low quality of copra as a result of their lack of drying facilities.

It is easy to see why production increases when storms or cyclones bring down nuts and they can be simply collected and harvesting is more intensive around selling points where transport costs are lower.

Under the current coconut model the Oil Palm industry offers smallholders more economic opportunity at a low inputs return of USD$ 900 per hectare, resulting to-date in over 4 Million hectares of smallholder oil palm plantation in Indonesia alone.

Reality check: the coconut smallholder model is a Reward-to-Effort-to-Return Failure.

For the average smallholder, this return has to cover: The labour involved in collection off the ground or harvesting from tree bunches — which is dangerous; labour involved in de-husking the nut plus removing and sun-drying the coconut or the use of a drier; and transport of the copra to a selling point usually requiring payment for use or rent of a vehicle.

Therefore, this process involves labour and time that could be devoted to other income earning and household activities. The return per nut indicates the labour intensity of the process.

PAPER V

INDONESIAN COCONUT PROFILE

INDONESIA'S COCONUT PALM ESTATE PROFILE

- 3.81 Million hectares
- 5 Million household farmers
- 15.330 Billion coconuts per year
- 3.01 Million tonnes of copra production.
- Whole nut export (unprocessed) 25%
- Domestic Processing Industry supply shortfall 30%
- Aging palms up to 50% of plantation estate area
- Export value: USD$ 1.757 Billion or 0.94% of National Export Earnings
- Domestic value: USD$ 1.627 Billion

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

THE INDONESIAN COCONUT SECTOR IS CONFRONTED WITH TWO CORE CHALLENGES :

1. Continuing decline of coconut productivity due to senility of the palms
2. Coconut or copra production model alone yields a low replanting incentive

There is virtually no value-adding of coconut products in the villages and existing coconut processing enterprises at village level are too small in scale with their economic viability and sustainability at risk.

Coconut small holders (tenant farmers and landowners) are not organized as viable and bankable cooperatives or community-based organizations (CBO's), and have limited access to credit and capital.

Coconut processing ventures at village level must be scaled-up to take advantage of economics-of scale, promote efficiency and secure economic viability.

These small holder ventures need marketing assistance to enable them to gain market access both domestically and in the export market. In spite of the challenges, the coconut is an integral part of the way of life and food security of the majority of the tropical rural population.

To develop a sustainable coconut sector the whole nut value chain approach must be developed.

The total coconut plantation area is estimated at over 3.81 million hectares with 98.16% belong to smallholders, the private sector holds 1.69% and the government holds 0.14%.

PAPER VI

COCONUT IN CRISIS

GLOBAL REPLANTING CRISIS

Replanting of coconut trees on a massive scale is required if the coconut producing countries of Asia and the Pacific are to meet the world's rapidly growing demand for coconut products.

Potentially, around 900 million coconut seedlings are required at a value of USD$ 2.7 Billion to secure future of the global coconut estate.

The international experts and delegates, from the governments of 13 Asia-Pacific countries, including eight attending Ministers of Agriculture participated in the High-Level Regional Consultation on Coconut Sector Development in Asia and the Pacific in Thailand in 2013.

It was agreed that expert assistance would be needed urgently if their countries are to rehabilitate one of their most important agricultural products and help poor farmers.

All seven species of the region's coconut trees are aging and producing fewer raw materials. The lifespan of a coconut tree is 100 years, but in economic terms a coconut tree reaches its peak production (as many as 400 coconuts per year) between 10 and 30 years of age.

As many of the regions trees were planted shortly after the end of World War Two, their advanced age means they are producing far fewer coconuts and hence the livelihoods of millions are affected.

The vast majority, 95% of coconut trees are harvested by small-holders.The Asia-Pacific region produces 90% of the world's coconut products. Global demand for these products is growing at more than 12% a year, but the present rate of production growth is below 2% annually.

"Asia and the Pacific's aging coconut trees simply can't keep up with the growing demand,"

"This regional consultation has enhanced the understanding of governments that action will be needed, and soon, in order to respond to the challenge of replanting,"

"The group has also called for South-South cooperation and public-private sector investment."

"The scale of replanting is a real concern to the main producers such as India, Indonesia and the Philippines, whose combined production accounts for 70% of global coconut sector products".

Hiroyuki Konuma, Assistant Director-General and Regional Representative of the Food and Agriculture Organization (FAO) of the United Nations.

PAPER VII

PRO-POOR NUTRITION AND FOOD SECURITY

PRO-POOR COCONUT OIL NUTRITION (FOOD SECURITY)

During the last three decades, the availability of fat has increased steadily throughout the world, especially in developing countries. Nevertheless, fat consumption remains low in developing countries in comparison with developed nations.

In developing countries, rural families, who are often the poorest members of society, consume diets with a low fat content because of their low income and limited access to a diversified food supply.

Malnutrition is a crucial problem and increasing the amount of energy available must be a priority.

Fats and oils play a crucial role in bringing about this increase.

CKC Impact Micro factories make food grade edible oil at upstream village level, at competitive margins, without the need for large scale refining process and or a complex and speculative middleman system.

PAPER VIII

COCONUT VALUE CHAIN

ANALYSING THE CURRENT COCONUT VALUE CHAIN

In the export market, the average price to be paid for one whole coconut is approximately;

11 US cents if sold for coconut crude oil processing including copra meal,
33 US cents if sold for desiccated coconuts
55 US cents if sold for the processing of coconut milk and water

An analysis on the value of raw and mature coconuts for processing into virgin coconut oil (VCO) would reveal (FOB price of between US$4.00 – 5.00 per litre and if 12 coconuts will produce one litre of VCO) the additional value of one coconut would be around 42 US cents.

Assuming a production cost of 5 US cents per coconut, the value of one whole coconut should be 37 US cents.

IN INDONESIA THE PRICE OF A WHOLE COCONUT IN COPRA COMMUNITIES IS AROUND 10 US CENTS.

- There is economic potential to use the residue in the processing of VCO.
- This valuable food by-product can be processed into coconut flour.
- A kilo of coconut flour can have an FOB price of US$ 6 instead of waste or as feed for livestock
- The husk can be processed into coconut coir fibre for rubberized mattress, geotextiles for the control of soil erosion, and coconut pith for horticulture use as planting medium or as organic fertilizers.
- High value coir products also include brushes, twines, tufted mats, carpets and other.
- Raw coir can fetch an average FOB price of US$ 350 per metric ton
- Coconut pith or cocopeat can fetch an average FOB price of US$ 300 per metric ton

The coconut shell can likewise be processed into charcoal and coconut shell charcoal-based activated carbon. Charcoal can fetch an average FOB price of US$ 500 per metric ton.

The average price of coconut shell based-activated carbon is US$ 2,100 per metric ton.

These value-added products from mature whole coconut are not available to the oil palm model.

A whole nut model can increase the value of the coconut at the farm gate level and impact directly on poverty alleviation for 80 million people.

In the current practice of copra production, one ton of copra would require approximately 6,000 nuts or 6 nuts to a kilogrammes of copra. Given an average copra price of US$ 500 per metric ton of copra at the farm gate, this translates to only 8 US cents per nut at the processor.

The current farm gate price can be as low as 5 US cents depending on the distance of the farms and the quality of the copra produced. At this price level, the farmers have low incentive to harvest or gather coconuts and process/dry the coconut kernel into copra and no incentive to replant their senile coconut palms.

Mono-cropping of low-productive coconuts generated an income of only US$220 per hectare per year, compared with various coconut/cocoa and coconut/coffee systems which would yield an additional US$620 and US$485 respectively. In comparison, low input oil palm profit is regarded to be around US$ 900 per hectare.

Coconut offers a tremendous potential to evolve a resilient, coconut-based holistic and secure food and income system that can adapt to climate change and other stress factors in the Asia-Pacific region.

PAPER IX

GLOBAL EDIBLE OILS MARKET

Q: What is the headroom market potential for coconut oil and virgin coconut oil?

Olive Oil and Coconut Oil track each other; both in growth and market share in global edible oils.

Coconut oil competes with other edible vegetable oils in a market valued at USD$ 83.4 Billion.
Coconut market share moved from 12 % in 1960 to below 3 % in 2017.

The loss of global edible oil market share for coconut and olive oil is due to huge continued expansion in the edible oils sector.

Both coconut oil and olive oil 1960's market share has declined by similar ratio's, despite a doubling of their respective production volumes over the same period.

A: The headroom opportunity for coconut oil market share growth and for coconut utilisation expansion within the healthy edible oils is absolutely enormous and including its virgin coconut oil subset.

Vast monocrop farming systems for oil palm and soybean account for 70% of global edible oils. These oils are so pervasive in food consumption they have gross negative human health effects in excess linoleic acid inflammation illness and oxidative organ-toxicity.

Palm Kernel Oil, different to Palm Fruit Oil, is a lauric oil like coconut oil with associated health benefits. From a very low base and due to marketing resources deployed by big oil palm managed to overtake both coconut's and olive oil's position in the edible oil market.

Global Edible Oils Market Value is set to Increase from US$ 83.4 Billon in 2015 to US$ 130.3 Billion by 2024 and expected to register a CAGR of 5.1%. *"Global Market Study on Edible Oils: Industry Analysis and Forecast 2016-2024."* The projected market trend can be attributed to rising health concerns across the globe and growing demand for healthy edible oils and Increasing consumption of fried food products globally.

COCONUT = huge growth potential downstream and a sustainable agri-business investment upstream.

Oil Palm & Soybean
The palm oil segment is projected to register the fastest growth rate through to 2024 accounting for over 32% share in the global market. Soybean oil is projected to register a slight negative growth owing to shifting consumer preferences toward healthier edible oil options. This shifting market trend is a result of increasing disposable income levels worldwide and growing awareness about the importance of healthy eating.

Asia Pacific is projected to dominate the global edible oils market, accounting for 41.2% share in 2015, and is expected to account for 42.4% at the end of 2024.

GLOBAL COCONUT COMMODITY ANNUAL TRADE VOLUMES

Coconut Oil	3.13 Million MT
Desiccated Coconut	331,387 MT
Activated Carbon	110,077 MT
Shell Charcoal	224,783 MT
Coir Products	629,788 MT

COCONUT WATER MARKET

Coconut water has led healthy coconut re-positioning and is the leading plant-based water available for sale worldwide.

In 2016, coconut water accounted for 96 percent of all plant-based water sold at over 700 million litres with a market value of USD$ 2.2 billion.

In the U.S., the industry for coconut water has experienced a continued growth in market size with a projected USD$ 1.98 billion in generated revenue forecasted for 2019, from USD$ 612.5 million in 2015. *Technavio's market research. 2016.*

VIRGIN COCONUT OIL MARKET

Philippines exports of VCO began in 2001 with 2 MT and grew to 6,002 MT by 2012.

Analyst predict the global virgin coconut oil market to grow steadily at a CAGR of around 10% by 2021.

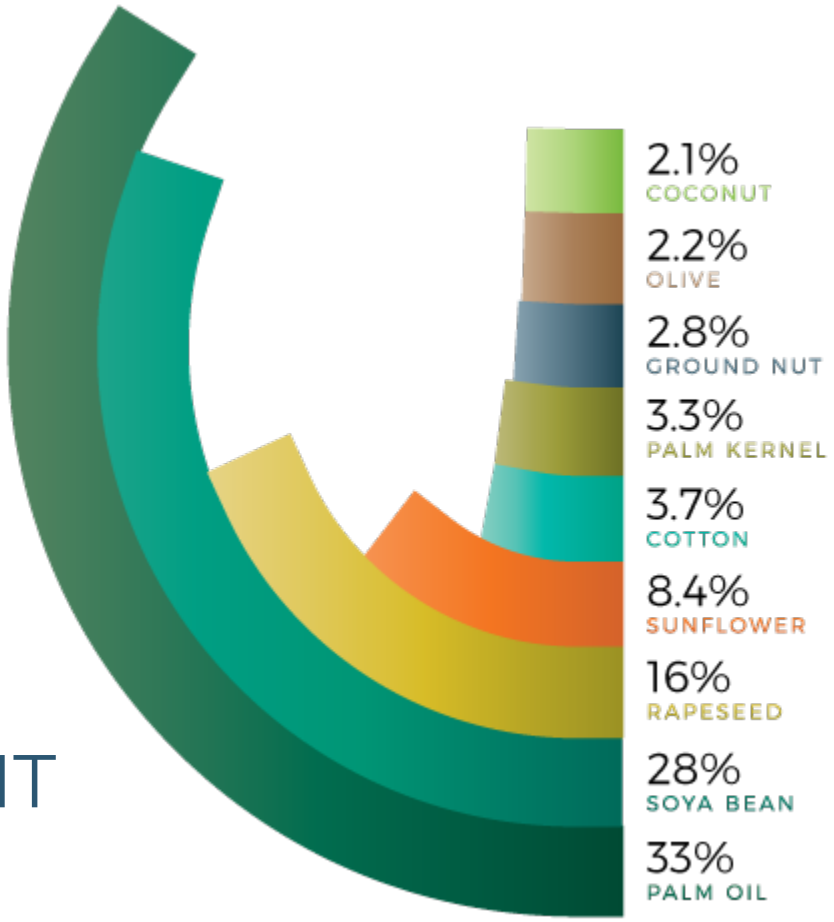
One of the key factors influencing growth is the increasing investments in the global virgin coconut oil market. This influx of investments has supported the players in the market to increase their production capabilities, to cater to the exponentially increasing demand from the consumers.

Increasing consumer spending on functional food and beverages as well as rising health consciousness of people in terms of proper nourishment of skin and hair is anticipated to strengthen the demand for virgin coconut oil over the period 2016-2023. The market is expected to intensify at a rapid pace over the next few years due to rising medical treatment and preventive healthcare which is anticipated to impel the demand for nutraceutical products.

The increasing interest in nourishing lifestyle and increasing intake of omega fatty acid will create more demand and more opportunities for coconut oil manufacturers to enter into this business.

Technavio's market research. 2016.

GLOBAL EDIBLE VEGETABLE OIL MARKET



150 MILLION MT PER ANNUM

PAPER X

CREATING AN OIL PALM TO COCONUT PALM INVESTMENT CLIMATE

Q & A

Big Oil Palm (Palm Oil) agri-industry is a commercially successful monoculture agri-business, with 34% of the global edible oils marketplace valued at billions of dollars per annum; Oil Palm manages many barriers to upstream palm agriculture, engaging successfully with government policy and with thousands of small holder farmers, operating at field and processing levels in coconut growing countries at an unimaginable scale, attracting huge levels of long term investment and operating financing.

Oil palms massive increasing land size is in its ability to produce hundreds of millions of seedlings on an annual basis using cutting edge tissue cloning science.

However, Big Oil Palm is also a social and environmental monoculture disaster on a global scale, coming under increasing strain in the form of domestic and international government and market pressures.

Between 2000 and 2012, Indonesia lost more than 6 million hectares of its forest, representing 6% of its total land area: An area half the size of England.

"Say no to Oil Palm!", Greenpeace, Rainforest Action Network, SumOfUs, Rainforest Foundation Norway, Amnesty International, Aidenvironment, EU labelling requirements, EU import bans proposals, supermarket boycotts, and consumer driven push back, have amplified an extremely negative environmental image that may not be recoverable. Overlaid with the growing reality of an extraordinary negative impact on deforestation, environmental and human degradation at industrial scale.

In mitigation of deforestation publicity, oil palm industry wages a global PR campaign through global organisations like the Rainforest Alliance, the Roundtable on Sustainable Palm Oil, the Tropical Forest Alliance 2020, The Consumer Goods Forum and the French Alliance for Sustainable Palm Oil.

Sustainable Coconut Palm Plantation has significantly greater economic and environmental opportunities over Big Oil Palm; an existing land use estate, productivity uplift through inclusive small holder linkages and Higher Agri-Value Chain.

Oil palm investment attention is now turning to coconut from a land access opportunity as a coconut oil hedge within the oil palm plantation system.

However, the oil palm industry, seeking scale faces the decisive barrier of seedling material capacity constraints and the absence of a coconut plantation SOP.

"While certification of sustainable palm oil has the potential the improve practices on the ground, by far the biggest gains for biodiversity in an oil palm context are through avoiding further deforestation". IUCN Oil Palm Task Force in response to IUCN Resolution WCC- 2016-Res-061-EN

Oil Palm Cultivation in Malaysia and Indonesia

- 85% of global supply
- Employing 3.5m people mostly poor
- Combined export value of USD$ 50 Billion per annum

Q: How does the Indonesian Oil Palm estate compare in size to the Global Coconut Palm estate?

- Global Coconut palm estate is currently at 12.2 Million hectares and shrinking
- Indonesian Oil palm estate is 15 million hectares and expanding
- Indonesian Smallholder oil palm estate is (at minimum) 4 million hectares and expanding
- Indonesian Smallholder coconut palm estate is 3.4 million hectares and shrinking

The Oil Palm estate in Indonesia is greater in size than the global coconut palm estate.

Q: Are there smallholder barriers to converting to Oil Palm land use?

The barrier to smallholders engaging in oil palm is the 36 month loss of essential income from planting to FFB (fresh fruit bunch) production.

Q: How is oil palm attempting to resolve this smallholder barrier?

Consensus is that only intercropping systems may alleviate this oil palm smallholder objection barrier.

Q: What is the intercropping potential for oil palm compared to coconut?

- Intercropping in oil palm (monoculture) is potentially viable for the first 3 years and not part of SOP.
- Intercropping in coconut (biodiversity) is practiced and viable for the duration of the life of the coconut palm.

Q: What is the intercropping land use ratio for oil palm currently?

- Zero.

Q: What is the intercropping land use potential for coconut?

- Estimates are below 30% of coconut is utilised for intercropping systems, meaning in Indonesia around 2.6 Million viable hectares are available for new agriculture productivity and poverty alleviation.

Q: Can large agri-business capital be attracted into Indonesian coconut palm investment?

- Non-Indonesian (FDI) oil palm investment in Indonesia is c.USD$ 25 Billion over 5 million hectares.

Q: The Coconut palm landbank is existing but it is 98% in the hands of small holders; are these existing coconut small holder landbanks viable investment opportunities?

- Big Oil Palm companies are indicating development preference for brownfields (existing estate rehabilitation) over greenfields (new estates) due to the major changes in the global oil palm sustainability scene.

Q: Can the coconut palm smallholder landbank participate in a largeplantations.

- FELDA is the world's largest crude palm oil producer.
- FELDA settlements are representative of rural aid programs and poverty reduction efforts.
- Around 640,000 smallholder farmers in Malaysia account for 40% of global palm oil production.
- Of the 15 million hectares of land allocated to oil palm cultivation in Indonesia, 25 % is managed by smallholders in plasma schemes, and 17% by independent smallholders.

Q: Is Indonesia a viable landbank for foreign coconut agri-business investment?

- Large scale non-Indonesian oil palm businesses with more than 50% of landbank exposure to Indonesia.
    - IJM Plantations Bhd 52%
    - KLK 53.2%
    - Genting Plantations Bhd 72%
    - Sime Darby Bhd 58%
    - Felda Global Ventures Holdings Bhd 59%
    - 101 Corp Bhd 72%

Unconventional palm seedling systems like somatic embryogenesis (tissue culture) while common in oil palm, responsible for development of a massive cultivation land area, are unavailable to coconut palm which is requiring a conventional seed garden strategy.

Funding research into Coconut Tissue Culture will enable an effective scaleable coconut response to Oil Palm.

PAPER XI

UPSTREAM COCONUT BARRIERS VS OPPORTUNITIES

COMPLEX PROBLEMS HAVE CREATED SIGNIFICANT UPSTREAM ENTRY BARRIERS

- Low yield, ageing palms, unimproved planting materials, pests and diseases
- If not old then unproductive
- Low number of standing palms
- Poor small holder plantation management
- Very low smallholder income
- Little access to village processing technologies
- Lack of access to finance or investment
- Difficulty to establish new products with consistent quality at scale
- Poor marketing and promotional activities

CONSENSUS ON REPLANTING OBJECTIVES

- Replace old and/or unproductive coconut palms with high yielding legitimate planting materials
- Introduce Good Agriculture Practice and Optimal Land Use System
- Integrate upstream with downstream using zero waste concept
- Transform coconut from traditional crop to industry

THE CKC SOP :

- Apply cutting edge applied results of research on coconut and related crops
- Adapting elements of Nucleus Estate Smallholder (NES) business of oil palm
- Promoting private and institutional fund investment
- Optimizing coconut estate land use
- Addressing global sustainability and environmental issues
- Apply cutting edge palm plantation technologies
- SOP for cultivation of high yielding elite planting materials from seed garden and high yielding block
- SOP for Good Agriculture Practices: water and soil conservation, 4-stewardships of fertilizer application, integrated pest and diseases management
- SOP for Intercropping and/or mix farming to support the living of farmers particularly at immature planting stages and to diversify and increase small holder farmers' source of income and engage women into the decision making and operation of a new coconut agri-estate model.

CHARACTERISTICS THE NES (NUCLEUS ESTATE SYSTEM)

1. A minimum of 20% of land within a granted concession area is allocated for smallholders.
2. NES develops the plantation for the smallholders who borrow from commercial banks to fund the development and service this development cost as the palms start yielding.
3. The smallholder conversion is funded 100% by commercial bank loan against a land title certificate and contract with the NES operator.
4. The land cultivation stage is bankable and loans are generally re-paid in a 7 year term.
5. NES is the source of planting material, technologies and support to operate the smallholder plantations.
6. Smallholders farm their land area and send the fresh fruit bunch to the processing operated by NES.
7. NES provides technical assistant to smallholders in managing sustainability and the environment.
8. Many NES small holder farmers expand their plantation commitments as out-growers.
9. NES is a well-established agricultural model, implemented to many other crops.

The NES model is confirmed as the most successful inclusive smallholder model by a recent study on large-scale agricultural investment projects over 50 years carried out by the World Bank.

The official Indonesian representation of a smallholder farmer is one that does not require the acquisition of a business license (Izin Usaha Perkebunan untuk Budidaya or "IUPAB") There are now two main types of plasma-inti schemes in oil palm, the older Perkebunan Inti Rakyat (PIR) and the newer Pola Kemitraan Melalui Pemanfaatan Kredit Kepada Koperasi Primer untuk Anggotanya (KKPA).

PAPER XII

PROMOTING INCLUSIVE RESPONSIBLE AGRIBUSINESS INVESTMENT

AN UNPRECEDENTED INCREASE IN THE FLOW OF INVESTMENT TO AGRICULTURE IS OCCURRING WORLDWIDE.

Accelerators are:
(i) rising commodity prices (attracting foreign investment companies from Europe and North America)
(ii) implementation of food security strategies by investing countries such as the Gulf States, China and the Republic of Korea
(iii) search for alternative energy sources

Private-sector investments have resulted in large-scale acquisitions of farmland in low and middle-income developing countries with an associated debate about "land grabbing" with land considered critical to livelihoods and food security.

These investments and their impacts on "eroding land rights and the livelihoods of smallholders" have raised concerns worldwide demanding "responsible agri-business investments" that respect rights, livelihoods, gender and resources.

In coconut where the estate is owned and operated by small holders, attempts at land acquisitions by private investors constitute a threat to the land rights of poor farmers. At the same time small holder farmers' land rights limit investors' access to land and investment in commercial agriculture. Inclusive out-grower schemes with a nucleus plantation may provide to all stakeholders a better alternative to attempts at large-scale land acquisitions.

In evaluation, the following eleven (11) collaborative business models inclusive of smallholder farmers were considered;
1. Management contracts
2. Tenant farming
3. Sharecropping
4. Joint venture
5. Farmer-owned businesses
6. Contract farming
7. Centralized model
8. Nucleus Estate model
9. Multipartite model
10. Informal model
11. Intermediary model

PAPER XIII

CKC INDONESIAN COCONUT STRATEGY

Q & A

Q: CKC strategies are initially centric to Indonesia, with potential for global transferability and scalability, so are they consistent with Indonesian Government policy?

INDONESIA NATIONAL COCONUT STRATEGY

- Establishment of coconut seed farms
- Rehabilitation, revitalization, expansion
- Farmers-Industry partnership
- Pest management
- Supporting facilities (post-harvest tools, credit)

INDONESIA NATIONAL COCONUT POLICY

- Rehabilitation for monoculture plantation (old/damage/ unproductive) with supreme variety, through Integrated Coconut-based Smallholder Plantation (Supra - Din), by arranging planting space (into 16 m X 6 m) integrated with cattle
- Revitalization coconut in urban area with special high value variety (aromatic, kopyor, sugar, etc.)
- Expansion of coconut plantations according to suitable region

INDONESIA NATIONAL COCONUT OPPORTUNITY

- Vast existing area for replanting and utilized for diversification of other value crops from inter-cropping
- Increasing varieties of coconut products and derivatives, especially for health benefit
- Coconut can grow in various area (dry land or tidal zone)
- Market opportunity for product development and vast market segmentation
- Technology availability from downstream to upstream industries (high quality seeds, integrated coconut processed system) to increase efficiency and farmer's income
- To support coconut as national strategic industry

INDONESIA NATIONAL COCONUT PROBLEMS

- Supply discontinuity, high logistic cost
- Inequality of product quality
- Low productivity due to highly un-productive plants
- Limited upstream industry
- No price incentives
- Ineffective and inefficient supply chain
- No new investment (company) on coconut plantation
- Crop conversion to more economic and or incentivized cash-crops
- Limited access to commercial or government funding
- In 2015, damaged coconut tree accounts for 12.98% of the total plantation (including old and un-productive plants)
- Utilization for by-products and coconut waste still minimum
- Limited partnership between farmers and industry
- Market-driven industry (international standards to be fulfilled)

A: Yes, the strategy is consistent with policy and secures engagement at all levels.

PAPER XIV

CKC GLOBAL COCONUT STRATEGY

Q & A

Q: Is CKC and Indonesian coconut policy consistent with global coconut stakeholders and development aid institutions for the purposes of transferability and scalability?

The FAO coconut program aims to raise farmers' incomes by improving productivity and coconut oil quality and to introduce sustainable practices based on the Sustainable Agricultural Network (SAN) standards as a basis for Rainforest Alliance Certification.

Delegates from the governments of 13 Asia-Pacific countries, including eight Ministers of Agriculture, participating in the FAO High-Level Regional Expert Consultation on Coconut Sector Development in Asia and the Pacific in 2013 noted that assistance would be needed, and soon, if their countries are to rehabilitate one of their most important agricultural products and help poor farmers.

The FAO High-Level Regional Expert Consultation on Coconut Sector Development in Asia and the Pacific in 2013 agreed that to develop and sustain the coconut industry in the Asian region, the following 12 step recommendations may be considered:

1. There is a need to rehabilitate senile and unproductive palms in coconut growing countries in Asia.
2. The lack of quality coconut planting materials must be addressed.
3. Commercial coconut wood utilization should be promoted.
4. There is a need to develop strategies against emerging coconut pests and diseases.
5. Coconut-Based Farming Systems models should be further developed, promoted and practiced.
6. Value-added coconut processing must be promoted.
7. Promote joint ventures among coconut growing countries.
8. Promote the health attributes of coconut products through an aggressive awareness campaign and through joint R & D efforts in the conduct of clinical trials.
9. Enhance market promotion in traditional and niche markets.
10. Strengthen the national coconut extension service.
11. Facilitate and support the formation of economically viable coconut farmer cooperatives.
12. Coconut should be a priority crop in the national agricultural development agenda.

'Increasing the value of sales that smallholder farmers receive for their coconuts has long been recognised as the most significant and fastest way of bringing lasting benefits to the rural economy of the islands' (Asia Development Bank 1983)

Indonesia's program of Public Sector Nucleus Estates and Smallholder (NES) development was designed to create productive employment at relatively low cost and raise the farm incomes of landless and near-landless families while increasing output and exports from important tree crops. The World Bank supported the program through seven projects approved in quick succession in 1977-83. Of an expected cost of USD$1.3 billion for the seven, the Bank commitment was USD$655 million. The NES program took advantage of Indonesia's increased oil revenues. Later, however, as these revenues dried up, the Government was to face serious problems in providing the counterpart funds. WORLD BANK REPORT

A: Yes, consistent with all formal policy and objectives of coconut stakeholders, public and private sector, development aid institutions and SDG's

PAPER XV

CRITICAL NEED FOR MAPPING OF SMALLHOLDER COCONUT

In a paper delivered to the 1993 ACIAR funded workshop on coconut improvement in the Pacific, Foale and Ashburner argued that while the attraction of coconut as a financial investment had disappeared almost completely, its place in household, local and regional economies remained secure because of its role as a stable perennial component of multi-culture cropping systems (Foale and Ashburner, 1994).

RESEARCH FOR MAPPING OF SMALLHOLDER COCONUT

PAST RESEARCH FOR THE COCONUT SECTOR HAS BEEN FOCUSSED ON ISSUES SUCH AS:

- the potential for increase in yields and better pest resistance through genetic selection;
- better control of pests and diseases;
- understanding the emerging coconut value chain;
- development of appropriate techniques in upstream coconut processing;
- improving the technical efficiency of coconut processing;

LESS ATTENTION WAS GIVEN TO RESEARCH THAT FOCUSED ON:

- positively influencing the institutional and policy environment facing small holder coconut growers;
- adoption strategies increasing the likelihood of uptake of technical research;
- development and distribution of appropriate technologies consistent with the issues that smallholders face and understanding smallholder risk mitigation options;
- understanding alternative uses of land planted to coconut palms;
- developing R&D to support change in the context of the increasing age of coconut palms;

CKC RESEARCH STRATEGY FOR COCONUTS:

- understanding the importance of coconuts to livelihoods of small holders and barrier extensions;
- projecting consequences for smallholder production systems of the ultimate demise of coconut palms;
- alternative uses of land devoted to coconut palms, alternatives to growing other cash and food crops under coconut palms, and the scope for retrieving some salvage value from coconut timber;
- understanding the costs of converting coconut land to alternative uses
- understanding the potential to deploy coconut productivity into two distinct value chain pathways of Food and Clean Energy.
- undertaking field-based small holder mapping and R&D to address impediments or other issues that are limiting profitability of coconut production and its investment climate;
- gain small holder workings knowledge to be an effective agent of change and disseminate the R&D to growers, processors (other agents of change), including governments and their extension agencies with respect to coconuts;
- engage with the markets and processors for coconut products, and develop R&D for promotion of linkages and the associated incentives that smallholders require to invest in adoption of research outputs;
- develop the SOP model for coconut sustainability using R&D outputs;

A sizeable proportion of the Indonesian population not only in coastal communities is dependent on coconut palm as a direct and indirect avenue for cash and subsistence production. Given this dependence it would be important to understand the dimensions — in real terms of households, localities and production — that is at risk from the increasing age of coconut stands.

Large areas planted during and after the colonial era will die off and require effective strategies at small holder level to stimulate and support, at scale, the systemic replanting of coconut and or adaptation by smallholders to a different system of farming. Research must be targeted directly at coconut growers and therefore has the potential to bear directly on poverty alleviation.

The current status quo does not provide a viable eco-system to engage with small scale landholders to achieve replanting and or is currently model whereby sufficient planting materials can be made available;

There is little doubt there will be a significant impact on coconut smallholders and mapping and understanding the status of the resource will indicate the, severity, timing and scale of this impact. Knowledge of how much the economic activity of poor smallholders is vulnerable to the loss of coconut stands through senility die off, and or pest and disease, would support an investment context for 'insurance policy' activities such as germplasm conservation.

PAPER XVI

SMALLHOLDER AGRI-LINKAGES & POTENTIAL FOR UPSTREAM PROCESSING

KEY INCENTIVES EXIST FOR COMPANIES AND SMALLHOLDERS TO DEVELOP AGRI-LINKAGES.

COMPANY

- Access to land
- Expansion of produce supply
- Financial opportunity
- Exposure reduction
- Reputational risk and Corporate Social Responsibility
- Reduction of production risks
- Import substitution

SMALLHOLDER

- Access to markets
- Access to financial services
- Stable (and in some cases higher) prices
- Technical assistance/extension
- High quality inputs
- Fast and reliable payment

ACCESS TO CREDIT

Access to credit is a major issue for the development of the agriculture sector. Currently, the access to financial services by farmers is limited, and in particular medium-and long-term financing.

LAND-USE MAPPING AND BEST USE OF LAND

Invariably any land acquisition, be it for a large- scale plantation or for an inclusive out-grower scheme, would have an impact on local farming systems, and local livelihoods and income. Clarity is needed about the costs and benefits as well as socio- economic impacts of the various uses of land for other than agriculture Also, government should ensure that new plantations operating under nucleus estate or out-grower schemes are carefully assessed against socio-economic and environmental impacts (e.g. increased food insecurity in communities and biodiversity loss).

FACTORS WHICH PROMOTE SUCCESSFUL AGRIBUSINESS LINKAGES

- The strength and sustainability of the business models are attributable to the success factors listed below:
- genuine interest of companies in working with smallholders
- understanding of the contract conditions by the actors
- important role of farmers' organizations
- transparent price setting mechanism and price agreement
- knowledge transfer
- commitment of company management staff and farmers
- assured market outlet
- prompt and reliable payment to farmers
- no side-selling

UPSTREAM PROCESSING POTENTIAL

A 5000-nuts-inputs-per day whole nut micro-hub coconut village-community zero-waste model should be considered viable and as proof-of-concept CKC is developing a whole nut showcase demonstration unit in Bali.

The common view is that a supply chain of a minimum of 200,000 nuts per day is necessary for the economic operation of a multi-line coconut processing investment. In the Philippines, US food giant Kraft – through its subsidiary Franklin Baker operate ten (10) coconut product line processing factories that each consume 2 Million coconuts per day.

The total direct potential contributions of the SME model, in terms of income, employment, taxes, and alternative products from coconut can be estimated by multiplying the number of investments achieved.

The indirect potential contributions involve the disposable income made available in the rural areas as derived from employment in the enterprise, the ancillary household industries resulting from the ancillary products after core products (VCO/Charcoal/Husk) in the model such as soap and aromatherapy oils from VCO for the beauty market, plant-based drinks, and the geotextiles and organic plant media from coconut coir and peat production.

The model also provides renewable energy for drying its activated carbon production, and or village power for rural electricity requirements as heat to turn steam turbines for power generation.

AN INTEGRATED VILLAGE-LEVEL PROCESSING FACILITY PRODUCES 7 PRODUCTS:

FROM COCONUT MEAT

500 Lt VCO
300 Kg Coconut Flour
500 Kg Cattle Feedstock

FROM COCONUT WATER

1,000 Lt water

FROM COCONUT SHELL

200 Kgs activated carbon

FROM COCONUT HUSKS

1,000 SQM geo-textiles
200 Kgs organic planting medium

PAPER XVII

A RENEWABLE ENERGY SOURCE

THE COCONUT CROP IS AS MUCH AN ENERGY CROP AS IT IS AS A FOOD CROP.

Not only a sustainable supply of plant-based nutrition and beverages the Coconut Tree is a renewable energy source of huge scale.

The energy contained in the Indonesian coconut harvest is equal to 31 x 1012 kilocalories (from husk and shell which are deemed waste) and equivalent to 3.8 billion Lt of gasoline).

One of the largest leaves of the plant world is that of the coconut. It averages 6.1m (20 ft) long and weighs 2.65 kg air-dried (Zuniga et al. 1965). Energy from these petioles is calculated to be 39 x 1012 kilocalories, a value even larger than that from husk and shell because of so many non-bearing or senile trees existing due to a systemic failure of replanting.

For a coconut plantation bearing 10,000 nuts/year the calculated energy from the shell, husk and petiole amounts to 54.5 million kilocalories.

Shell, husk and petiole may be converted to clean burning charcoal with energy losses partly recoverable from non-condensable gases evolved during charcoaling.

Sugar cane, cassava, forest trees and oil-bearing plants are all considered as sources of energy calories.

IN ALL RESPECTS THE COCONUT REMAINS OVERLOOKED DUE TO THE HIGHLY INEFFICIENT EXISTING COPRA INDUSTRY.

- The energy value of coconut oil @9,000 kcal/kg (Child 1974)
- The energy value of coconut shell @5,500 kcal/kg (Paddon and Parker 1979)
- The combustion heat of coconut husk @3,515 kcal/kg (Festin 1976)

EVALUATING THE ANNUAL INDONESIAN COCONUT HARVEST AT A CONSERVATIVE VALUE OF 12 BILLION NUTS, THE ENERGY POTENTIAL FROM WASTE BY-PRODUCTS FROM THE OIL HARVEST IS:

- From coconut shell: 990 kcal/nut x 1.2 x 1010 nuts = 11.88 x 1012 kcal
- From coconut husk: 1,600 kcal/nut x 1.2 x 1010 nuts = 19.20 x 1012 kcal.

The amount of energy available from shell and husk is so large as to merit further studies of these energy sources, especially when aligned with global climate change and poverty alleviation projects such as the Global Alliance for Clean Cookstoves. http://cleancookstoves.org

Coconuts charcoal has highly desirable characteristics as a clean cook stoves fuel source. It is clean burning (non-smoky) when burned, is not subject to organic decay, and is a highly concentrated form of energy. Coconut shell in raw form has a heating value of 5,535 kcal/kg, however, charcoal made from Coconut shell has a heating value of 7,200 kcal/kg (Paddon & Parker, 1979).

Other charcoals produced from coconut materials are also promising; coir dust charcoal, coconut husk charcoal (Lozada 1978).

The energy inventory of the coconut shows that the husk, not only constitutes the largest component of the nut (33.3%) but also the greatest contributor of energy which is over 40% of the total energy value of the coconut.

Carbonization of coconut shell, (Wells 1917) obtained a yield of 32.5% charcoal. The non- condensable gases may be used as gaseous fuel and amounted to 16.2% of the weight of the shell.

Carbonization of the shell in a retort at 3150 C produced charcoal with a heating value of 7,860 kcal/kg and fixed carbon of 83.9%. Kiln produced charcoal at 3240 C gave fixed carbon of 69.5% and kcal/kg of 6,784. (Tamolang 1976) (Lozada 1978) which constituted 28% of the shell or 4.2% of the whole nut and amounts to 0.0504 kg charcoal/nut.

Coconut husk charcoal and Coir dust charcoal have a comparable heating value of 5,965 kcal/kg (Festin, 1976). For comparison, the heat of combustion of cellulose is 4,179 kcal/kg (Hougen et al., 1954) while for coir dust itself, a waste product, it is 3,515 kcal/kg (Festin, 1976). The process of charcoaling concentrates the energy by removing extraneous materials leaving fixed carbon as the final product. During the process of charcoaling, non-condensable gases and liquid distillates are removed and solid charcoal with very little volatile matter is left.

The average number of fallen leaves/hectare of coconut trees is around 2,500/year. Ninety-one percent of the leaf is the petiole which is often used as fuel for cooking in the villages. The leaf blade constitutes 7%, and the midribs, 2% of the leaf. In one leaf, the petiole will weigh 0.91 x 2.65 kg x 0.90 (10% moisture) or 2.17 kg dry. At approximately 400 million trees in Indonesia each producing at least 12 leaves a year or a total of 45 x 108 leaves with a total weight of 4,000 kcal/kg the energy available from the coconut petiole is equal to 39 x 1012 kcal.

THE COCONUT PLANTATION IS AN ENERGY PLANTATION:

1. The tree is not harvested for biomass until the end of its productive life (between 35 and 100 years old).
2. The perennial energy harvest is husk, shell and leaf-petioles (waste products)
3. The energy harvest (shell, husk and petioles) is regular throughout the year; the supply of energy is uniform, month by month.
4. The plantation is permanent and sustainable with re-planting at minimum 35 year intervals.
5. The energy-rich material is low cost yet has potential for high-value green products such as coconut shell charcoal briquettes and activated carbon.
6. The leaves with petioles are harvestable for commercial fuel purposes. The production of these leaves by the tree is regular, the formation is certain and independent of nut production.

- *In the copra model only the meat of the coconut @30% of the nut is utilized commercially.*
- *The oil (considered the most valuable component) comprises 10% of the nut.*
- *The sustainable and renewable nature of the plantation must be utilized for the shell, the husk and the leaves as valuable green energy sources.*
- *Coconut is an existing energy plantation.*
- *Research must be directed towards realization of this energy potential.*
- *Coconut shell, husk and leaves have exciting prospects as energy sources and align with global sustainability and climate change aspirations and projects.*

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NEW YORK, September 7, 2016 /PRNewswire/ Innovative Approaches for Oil Palm Smallholder Finance in Malaysia and Indonesia, Edoardo Cavallo October 25th, 2017. Coconut mass propagation attained through somatic embryogenesis. Published: Wednesday, 17 February 2016" Written by Sharie Al-Faiha A. Abustan, Edna A. Anit, DOST-PCAARRD S&T Media Service Official Recommendation Letter n°2017-1 Interim coordination of COGENT New era for the coconut sector. What prospects for research? Alexia Prades1,2,□, Uron N. Salum3 and Daniel Pioch4 Agustin TVY. 2016. Market Performance of High Value Products of Coconut, The Philippine Experience. Proceedings of the 47th APCC COCOTECH Conference, 26–30 Sept 2016, Bali, Indonesia. Batugal PA, Ramanatha Rao V, Bong C. 1998. Promoting multi- purpose uses and competitiveness of the coconut. Proceedings of a workshop, Chumphon, Thailand, IPGRI. Dayrit F. 2015. The properties of lauric acid and their significance in coconut oil. 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(University of Oxford), Gaveau, D., Delabre, I. (Zoological Society of London), van den Hombergh, H. (IUCN-Dutch National Committee), Hance, J. and Meijaard, E. Wich, S.A., Delabre, I., Koh, L.P. (University of Adelaide), Ancrenaz, M., Meunier, Q. (Olam International Ltd. in Gabon), Gaveau, D., Carlson, K.M., and Meijaard, E. Meijaard, E., Sheil, D., Garcia-Ulloa, J., Wich, S.A., Carlson, K.M., Juffe-Bignoli, D., and Brooks, T.M. TRADITIONAL VERSUS INTENSIVE COCONUT PRODUCTION IN NORTH SULAWESI by Nordy F.L. Waney Jon Tujuwale Sam Ratulangi University Faculty of Agriculture. Smallholder*Palm*Oil*Financing*in*Indonesia:* Needs, Opportunities for Sustainable, Finance Intervention! By Hélène Roy, Senior Associate Sustainable Finance with the Rainforest Alliance, and Jessica Guo, 2015 Summer Analyst, Undergraduate at NYU Stern School of Business, with support from Stephen G. Krecik, Senior Manager, Southeast Asia, of the Rainforest Alliance. AidEnvironment. (2008). Palm Oil: Inventory of the Major Bottlenecks and Sustainability Initiatives in the Palm Oil Chain, Obidzinski, K., Lee, J., Ghazoul, J.,& Koh,L. (2013). World Wildlife Fund for Nature SUSTAINABLE FINANCE IN SINGAPORE, INDONESIA AND MALAYSIA: A REVIEW OF FINANCIERS' ESG PRACTICES, DISCLOSURE STANDARDS AND REGULATIONS Co-Author and Project Leader: Jeanne Stampe, WWF jstampe@wwf.sg Co-Author: Benjamin McCarron, Asia Research and Engagement, www.asiareengage.com Contributors: Adam Harrison, Angel Llavero, Emmaneulle Neyroumande With additional input from : Maria Boulos, Sue Charman, Nicholas Fong, David Gregory, Irwan Gunawan, Han Kwai Hin, Richard Holland, Rizkiasari Joedawinata, Karen Mo, Thiagarajan Nadeson, Paolo Revellino, Katharina Serafimova, Ben Ridley (Credit Suisse), Christian Leusder CONNECTING TO THE WORLD THROUGH REGIONAL VALUE CHAINS: Partnership Opportunities in Coconut Value Chain for the Small Caribbean Economies Ajmal Abdulsamad is a Senior Research Analyst at Duke University, Center on Globalization, Governance & Competitiveness (CGGC). Abdulsamad, Ajmal, Stacey Frederick, Andrew Guinn, and Gary Gereffi. (2015). Pro-Poor Development and Power Asymmetries in Global Value Chains. Abdulsamad, Ajmal, Shawn Stokes and Gary Gereffi. (2015). Public-Private Partnerships in Global Value Chains: Can They Actually Benefit the Poor? Leveraging Economic Opportunities. United States Agency for International Development. Abreu, Enrique E. Gonzalez. (2015). Field Research Dominican Republic. Conjunto Productivo del Coco del la Republica Dominicana. Personal communication with Ajmal Abdulsamad. July 2015. Agostini. (2015). Coconut Growers Association Ltd. Trinidad. Personal communication with Personal Communication with Bree Romuld. August 2015. Ali, Shahab. (2015). Field Research. Guyana. Veljaon Specialized Trading - Coconut Exporter. Personal communication with Personal Communication with Ajmal Abdulsamad. August 2015. Alphonso, Andron and Ashraf Narine. (2015). Field Research. Guyana. Alfro Alphonso & Sons Enterprises Personal communication with Personal Communication with Ajmal Abdulsamad. August 2015. Alvarado, Agron Juan. (2015). Field Research Dominican Republic. Ministrio de Agricultura, Director del Departamento de DEFRUT. Personal communication with AJmal Abdulsamad. July 2015. Anderson, Winston. (2010). "Caribbean Agricultural Health and Food Safety Agency: Implications for Regional and International Trade, The." Vt. J. Envtl. L., 12: 255. Aowmathi, Iamie. (2015). Field Research. Guyana. Hope Coconut Industries Ltd. Personal communication with Personal Communication with Ajmal Abdulsamad. August 2015. Flow-specific physical properties of coconut flours Musuvadi R. Manikantan1*, Rose P. Kingsly Ambrose2, and Sajid Alavi3 1Central Plantation Crops Research Institute, Kasaragod-671124, Kerala, India 2Department of Agricultural and Biological Engineering, Purdue University, West Lafayette, IN, USA 3Department of Grain Science and Industry, Kansas State University, Manhattan, KS, USA Principles for developing productive upland agriculture in the humid tropics www.udpmindanao.org Project ALA – 97/68 A GUIDE TO INTERCROPPING COCONUTS Prepared for the Upland Development Programme in Southern Mindanao (UDP) by Kenneth R S Proud Upland Farming/ Soil & Water Conservation Consultant April 2005 A partnership programme sponsored by the European Commission (EC) and the Government of the Philippines (GoP) and executed by the Department of Agriculture (DA) Prepared for the Upland Development Programme by: K R S Proud, Upland Farming / Soil & Water Conservation Specialist. April 2005, Cocowood processing manual. From coconut wood to quality flooring An outcome of ACIAR project FST/2004/054: Improving value and marketability of coconut wood. Contributors: Henri Bailleres, Gary Hopewell, Adam Redman, Lesley Francis, Johannes Fehrmann, Susan House Cite this publication as:
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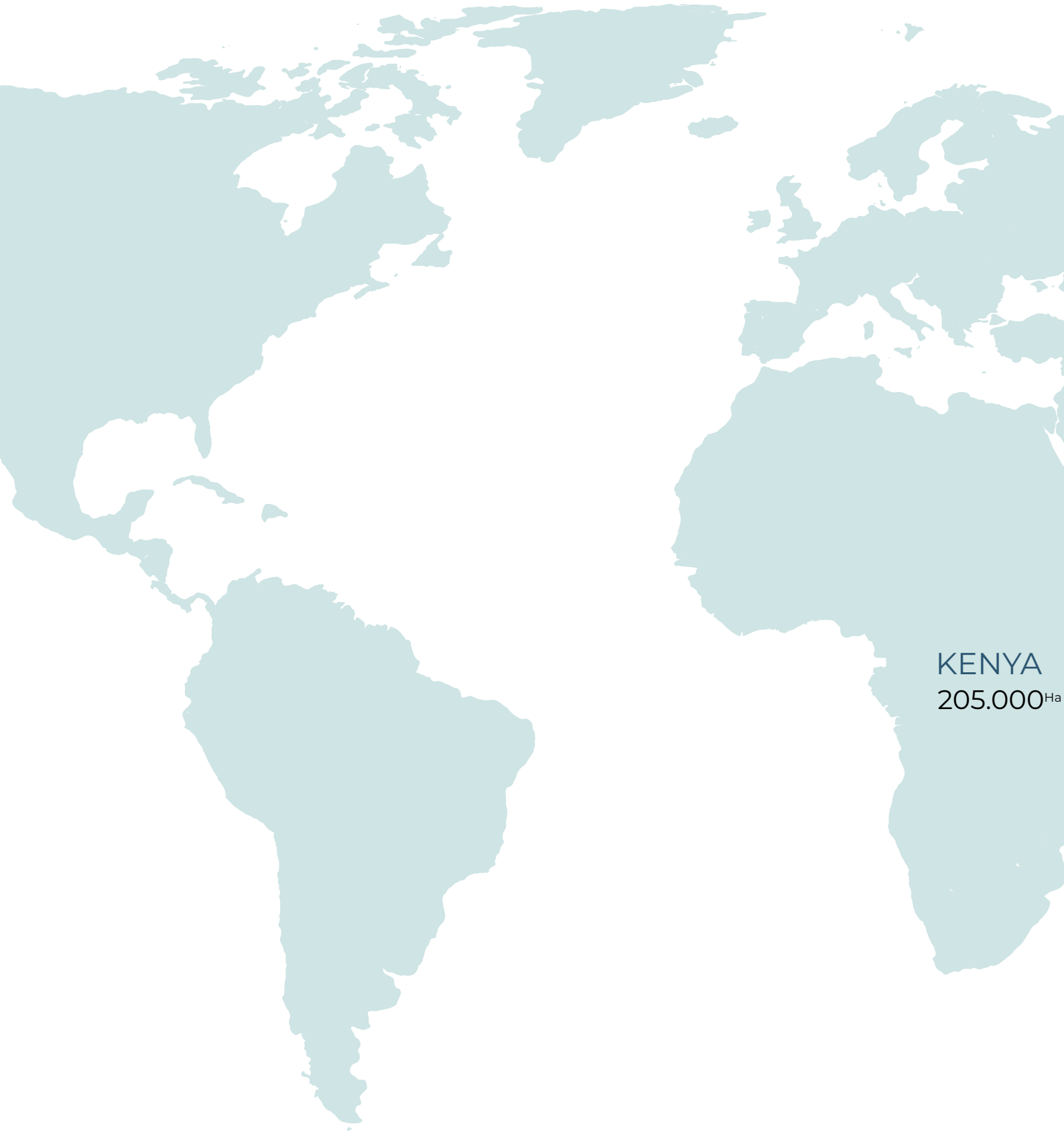
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