GENDER-RESPONSIVE ECONOMIC ACTIONS
FOR THE TRANSFORMATION OF WOMEN
(GREAT WOMEN) PROJECT
Canadian International Development Agency (CIDA)
Department of Environment and Natural Resources –
Forest Management Bureau (DENR-FMB)
Philippine Commission on Women (PCW)

GREEn Kit

Gender-Responsive ENR Enterprises in the Philippines

LOWLAND–URBAN & COASTAL ECOSYSTEMS

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Quezon City, Philippines
April 2011

Message from the Chairperson of PCW

Women's roles and participation in managing our environment are often overlooked. They are at the forefront of livelihoods that turned into profitable entrepreneurial ventures in many communities. These enterprises make use of natural resources as raw materials—from non-timber forest products, agricultural products, and recyclable waste materials. Often, many other entrepreneurial (or livelihood) opportunities are lost and not maximized because women (and men) do not have knowledge, skills, and technology to develop products from these types of materials that are readily available in many communities.

Under the Gender Responsive Economic Actions for the Transformation of Women (GREAT) Project, the Philippine Commission on Women (PCW), partnered with the Forest Management Bureau of the Department of Environment and Natural Resources (DENR) and agreed to develop this Gender Responsive ENR Enterprises in the Philippines (GREEn) Kit, a "successor" of the sustainable livelihood kit of DENR in the past that have helped introduce income-generating technologies appropriate for upland, urban–lowland, and coastal resources context. The difference is that GREEn is now presenting mainly tried and tested and **gender-sensitive** technologies ready for adoption by the women and men in these communities. This kit is intended to help national and local agencies promote economic empowerment for women within the context of local economic development and good governance.

PCW commends the National Technical Working Group of the Forest Management Bureau for the effort and hard work they provided to complete this kit. Together with DENR-FMB, I would like to thank the Canadian International Development Agency (CIDA) for their untiring support to the GREAT Women Project.

As we work together as partners in the dissemination and implementation of the enterprise technologies from this kit, we look forward to seeing more women realize their dreams of becoming entrepreneurs, earning better incomes and enhancing their capacity to provide for their needs.

Remedios I. Rikken

REMEDIOS I. RIKKEN
Chairperson
Philippine Commission on Women

Message from the Secretary of DENR

No citizen is too poor so as to be disqualified from becoming an investor in the environment. From scavenging and recycling, to eco-tourism, people can earn decent livelihoods while helping reinvigorate our environment.

This kit on Gender Responsive Environment and Natural Resources Enterprises (GREEn) in the Philippines shows how to go about establishing various environmental enterprises, based on real-life models, as a guide to new investors. The kit features 63 ongoing micro- and small enterprises (MSEs) of women and men entrepreneurs. It walks the reader through step-by-step processes, material requirements, marketing considerations, legal bases, and economic analyses. The focus is on enterprise development in the upland, lowland–urban, and coastal ecosystems. These are the ecosystems that are in urgent need of protection and restoration to their former health and productivity. Through this GREEn Kit, we at the DENR hope to popularize the establishment of gender responsive, environmentally sustainable, and economically viable MSEs that will generate jobs, increase incomes, promote preference for green businesses, and enhance economic empowerment among women and men.

For this kit, we thank the Philippine Commission on Women, particularly the Gender Responsive Economic Actions for the Transformation of Women (GREAT Women) Project, which enjoys the support of the Canadian International Development Agency. This kit is in fact an updated version of the DENR's 1997 Sustainable Livelihood Options package.

With this kit, we hope to accelerate the attainment of our Millennium Development Goals, particularly those on poverty reduction, gender equality and women empowerment, and environmental sustainability. This GREEn Kit also supports the six-year National Greening Program (NGP) by featuring mature technologies for livelihood development. The NGP aims to mobilize the citizenry for reforestation, food security, and climate change mitigation. The NGP and the GREEn Kit are among the major activities that the DENR will present at the United Nations Forum on Forests, in connection with the declaration by the UN General Assembly of 2011 as the International Year of Forests with the theme "Forests for People."

To all those who contributed to the production of this GREEn Kit, including the National Technical Working Group of the Forest Management Bureau, my commendations and thanks.

Mabuhay!

RAMON J.P. PAJE
Secretary
Department of Environment and Natural Resources

Foreword

In 1997, in an effort to promote livelihood development in upland, lowland-urban, and coastal ecosystems, the Department of Environment and Natural Resources (DENR) packaged the kit, "Sustainable Livelihood Options for the Philippines." Consolidated mostly by the DENR Research Sector, the said kit promoted greater interests among local communities, women's groups, cooperatives, and associations to commercialize matured technologies and to establish income-generating activities. The kit contained 93 manuscripts on livelihood development, and provided systematic processes on how they could be properly implemented and managed. Expense–income forecasts, marketing considerations, legal bases, supporting agencies/institutions, and information on environmental sustainability were also included.

The technology kit helped encourage livelihood development; however, DENR realized that communities still needed direct financial assistance and technical support before they could engage in the livelihood options. Thus, in 2003, DENR established the Community Livelihood Assistance Program (CLASP) to provide financial support to 103 livelihood projects in the Philippines. Financial assistance ranging PhP20,000 to PhP400,000 was offered for agroforestry establishment, as well as for food processing, eco-tourism, and plantation development. Success stories on CLASP had been documented, including lessons and experiences, which then served as input to policy formulation and program development.

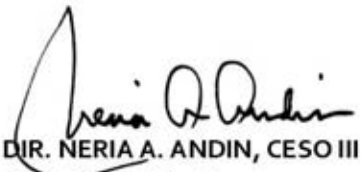
Consistent with the UN Millennium Development Goals (MDGs), DENR initiated programs and projects geared toward "eradication of extreme poverty and hunger" (Goal 1), "promotion of gender equality and empowerment of women" (Goal 3), and "ensuring environmental sustainability" (Goal 7). In 2008, DENR collaborated with the Philippine Commission on Women (PCW) for the Gender Responsive Economic Actions for the Transformation (GREAT) Women Project. One of the sub-projects, "Support to Micro and Small Enterprises: The Community Livelihood Assistance Project" was spearheaded by the Forest Management Bureau (FMB).

The "Gender Responsive Environment and Natural Resources Enterprises (GREEn) in the Philippines," which allowed DENR-FMB to update the technology–livelihood kit published in 1997, presently contains 63 manuscripts on environment and natural resources (ENR)-based enterprises for upland, lowland-urban, and coastal ecosystems. It discusses the actual experiences of women and men of micro- and small enterprises, subsequently offering an overview on how they started, implemented, and sustained their respective businesses. The GREEn Kit also provides information on supporting agencies/organizations, marketing considerations, legal bases, and technical measures to sustain the supply of raw materials required by the enterprise. The business endeavors featured in the GREEn Kit are managed by individual families, cooperatives, and federations; all are environmentally sustainable and gender responsive.

One highlight of the GREEn Kit is the section on Gender Analysis. It presents how the enterprises promote economic empowerment of men and women; it shows how both genders complement their roles at home and in the workplace. The

GREEn Kit also shares information on the time required by women and men to accomplish certain activities in the ENR-based businesses, a clear indication of the enterprises' capacity to continuously enhance the reproductive and productive roles of men and women. In fact, it is quite revealing how these businesses have opened the space for women to contribute to economic development while increasing their competency and confidence, thus promoting self-empowerment.

To the men and women behind the production of this kit, my heartfelt **congratulations**!



DIR. NERIA A. ANDIN, CESO III
OIC, Office of the Director
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Department of Environment and Natural Resources

Introduction

The development of the Gender Responsive Environment and Natural Resources Enterprises (GREEn) Kit has provided the Department of Environment and Natural Resources-Forest Management Bureau (DENR-FMB), through its National Technical Working Group (NTWG), the opportunity to interact with micro- and small entrepreneurs—both women and men owners/workers—engaged in environment and natural resource (ENR)-based enterprise development. The NTWG coordinated the various activities of the sub-project, "Support to Micro and Small Enterprises: The Community Livelihood Assistance Project," in collaboration with the Philippine Commission on Women (PCW).

KIT PRODUCTION

Producing the GREEn Kit involved the following: (1) inventory and short-listing of existing micro- and small enterprises in three major ecosystems (upland, lowland-urban, and coastal); (2) the conduct of two national workshops and follow-up discussion meetings; (3) field validation, and (4) review sessions. Through these participatory processes, a hefty amount of insights and ideas from the entrepreneurs, authors, and the NTWG were generated, thereby enriching the content of the kit.

Inventory of ENR-based enterprises: The start-up activity involved reviewing initial reports; enumerating ongoing enterprises in upland, lowland–urban, and coastal ecosystems owned or managed by cooperatives, community associations, women's groups, federations, and other individuals/families; and instructing DENR Regional Offices to submit their recommended list of enterprises for inclusion into the kit. Initially, about 90 livelihoods/enterprises were identified, most of which are projects funded through the Community Livelihood Assistance Program (CLASP). The inclusion criteria were as follows: the enterprise must have existed for at least two years, contributes to environmental management, and is ENR-based and gender responsive.

Short-listing the manuscripts: Based on the lists submitted by the different Regional Offices, the NTWG shortlisted the initial list in consideration of availability of authors. Ultimately, 63 of the initially targeted 90 ENR-based enterprises were identified, which is distributed accordingly as follows: 29 for upland, 27 for lowland–urban, and 7 coastal ecosystems. Most of the authors of the shortlisted manuscripts are DENR personnel of the Ecosystem Research and Development Sector or staff of the Community-based Forest Management Program in the field offices; a few of the authors belong to the academe. As for Region 9, the documentation and writing were initiated by FMB staff while the field staff served as resource persons.

National workshops: In 2010, the Chairperson of the DENR Gender and Development (GAD) Focal Point System issued a Special Order to conduct two national workshops—one in Lucban, Quezon and the other in Tagbilaran City, Bohol. The authors presented a brief profile of the product or services, materials and equipment, methods of production, economic analysis, ecological implications, laws and restrictions, and corresponding gender responsiveness of the ENR-based enterprise.

Some members of the NTWG and GAD focal persons of the Ecosystems Research and Development Bureau, Environmental Management Bureau, Mines and Geosciences Bureau, Land Management Bureau, and Protected Area and Wildlife Management Bureau served as resource persons. They provided suggestions and recommendations on how to improve the manuscripts. They also suggested the need to simplify terminologies, clarify some procedures, and provide pictures if the equipment used and processes are uncommon.

Field validation: Given the number of targeted manuscripts and location scope/coverage, the NTWG encountered some difficulty in consolidating the revised manuscripts in accordance with the agreed upon schedule/deadline. To address this concern, fieldwork activities were conducted not only to assist the authors rewrite the draft manuscripts, but also to ascertain the existence of the enterprise and to update some data, particularly on pricing. Of the 13 participating regional offices, four manuscripts each for Regions 9 and 13 were documented/revised by the NTWG.

Review workshops and meetings: Series of workshops and meetings were conducted to review and refine the draft manuscripts. These meetings likewise served as venues to present the edited manuscripts (e.g., content consistency), show the layout studies, and even to refine the titles of the enterprises. Editors and layout artists were sought for this purpose.

STRUCTURE OF THE KIT

The GREEn Kit is divided into two volumes, upland ecosystem and lowland–urban and coastal ecosystems. The manuscripts are arranged alphabetically and by region. Depending on the ecosystem that is of interest to the reader, the volume provides brief information about the enterprise, methods of production (including materials and equipment), cost and expected returns, economic benefits, ecological implications, laws and restrictions, and tips for consideration.

An important section of the GREEn Kit is the segment, Gender Analysis. It highlights the role complementation of men and women in every aspect of the business activity, including time spent (i.e., labor hours) for each. Under this segment, hefty reminders on health and safety requirements are also presented.

USERS OF THE KIT

The GREEn Kit can be used as a reference material on the implementation of ENR-based enterprises (i.e., micro- and small) for upland, lowland–urban, and coastal ecosystems. DENR-FMB hopes to generate greater interest on ENR-based enterprise development among the following: (1) men and women individuals who subsist primarily from natural resources; (2) cooperatives, associations, and local communities in upland, lowland–urban, and coastal ecosystems; (3) local government units (LGUs); (4) non-government organizations (NGOs); and (5) the private sector.

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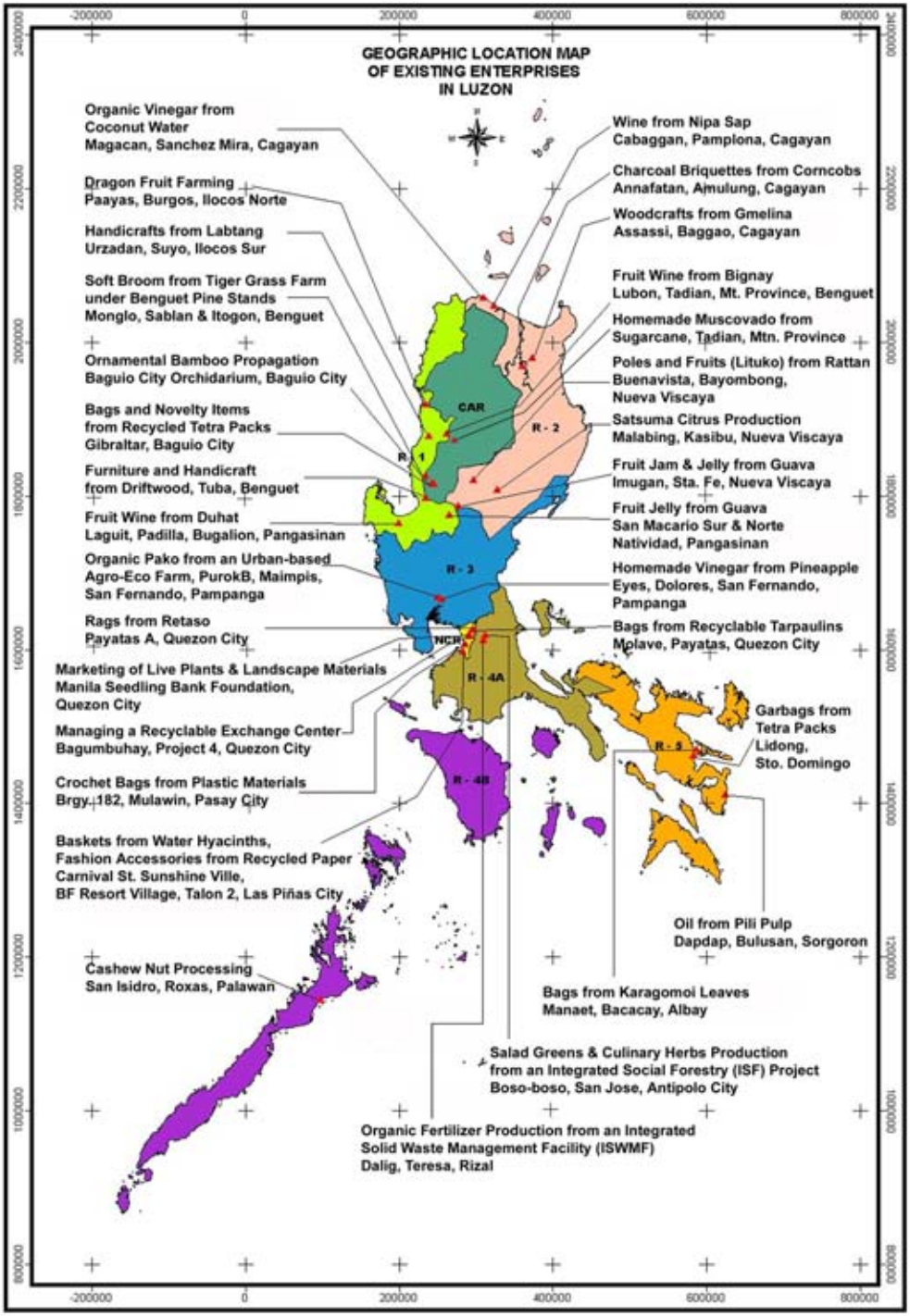
Acronyms & Abbreviations

AO – Administrative Order
BFAD – Bureau of Food and Drugs
BFAR – Bureau of Fisheries and Aquatic Resources
BIR – Bureau of Internal Revenue
BSWM – Bureau of Soils and Water Management
CADC – Certificate of Ancestral Domain Claim
CAR – Cordillera Administrative Region
CARP – Comprehensive Agrarian Reform Program
CBFMA – Community-Based Forest Management Agreement
CENRO – Community Environmental and Natural Resources Office
CEP – Coastal Environment Project
CHED – Commission on Higher Education
CLASP – Community Livelihood Assistance Special Program
CMMD – Coastal and Marine Management Division
CRMF – Community Resources Management Framework
CSC – Certificate of Stewardship Contract
CSD – comprehensive site development
DA – Department of Agriculture
DAO – Department Administrative Order
DAR – Department of Agrarian Reform
DARPO – Department of Agrarian Reform Provincial Office
DENR – Department of Environment and Natural Resources
DOH – Department of Health
DOLE – Department of Labor and Employment
DOST – Department of Science and Technology
DOT – Department of Tourism
DSWD – Department of Social Welfare and Development
DTI – Department of Trade and Industry
ECC – Environment Clearance Certificate
EO – Executive Order
EMB – Environmental Management Bureau
ERDB – Ecosystems Research and Development Bureau
ERDS – Ecosystem Research Development Services

FMS – Forest Management Service
FPIC – free prior and informed consent
FPRDI – Forest Products Research and Development Institute
GAD – gender and development
GHG – greenhouse gas
GMP – good manufacturing practice
IEC – information, education, and communication
ILARRDEC – Ilocos Agriculture and Resources Research and Development Consortium
IPM – integrated pest management
ISF – integrated social forestry
ISWMF – integrated solid waste management facility
LGU – local government unit
MMDA – Metro Manila Development Authority
MRF – material recovery facility
MSBFI – Manila Seedling Bank Foundation, Inc.
NCC – non-compliance coverage
NCR – National Capital Region
NIPAS – National Integrated and Protected Area System
NGO – non-governmental organization
NSWMC – National Solid Waste Management Commission
NZAP – New Zealand Aid Program
OTOP – One Town, One Product
PAMB – Protected Area Management Board
PCARRD – Philippine Council for Agriculture and Resources Research and Development
PD – Presidential Decree
PDDCP – Product Design and Development Center of the Philippines
PENRO – Provincial Environment and Natural Resources Office
PFA – Pesticide and Fertilizer Authority
PO – people's organization
ROI – return of investment
SEA – Self-Employment Assistance
SRA – Sugar Regulatory Administration
TESDA – Technical Education and Skills Development Authority
UDP – Upland Development Program


GEOGRAPHIC LOCATION MAP
OF EXISTING ENTERPRISES
IN LUZON
Organic Vinegar from
Coconut Water
Magacan, Sanchez Mira, Cagayan
Dragon Fruit Farming
Paayas, Burgos, Ilocos Norte
Handicrafts from Labtang
Urzadan, Suyo, Ilocos Sur
Soft Broom from Tiger Grass Farm
under Benguet Pine Stands
Monglo, Sablan & Itogon, Benguet
Ornamental Bamboo Propagation
Baguio City Orchidarium, Baguio City
Bags and Novelty Items
from Recycled Tetra Packs
Gibraltar, Baguio City
Furniture and Handicraft
from Driftwood, Tuba, Benguet
Fruit Wine from Duhat
Laguit, Padilla, Bugalion, Pangasinan
Organic Pako from an Urban-based
Agro-Eco Farm, PurokB, Maimpis,
San Fernando, Pampanga
Rags from Retaso
Payatas A, Quezon City
Marketing of Live Plants & Landscape Materials
Manila Seedling Bank Foundation,
Quezon City
Managing a Recyclable Exchange Center
Bagumbuhay, Project 4, Quezon City
Crochet Bags from Plastic Materials
Brgy. 182, Mulawin, Pasay City
Baskets from Water Hyacinths,
Fashion Accessories from Recycled Paper
Carnival St. Sunshine Ville,
BF Resort Village, Talon 2, Las Piñas City
Cashew Nut Processing
San Isidro, Roxas, Palawan
Wine from Nipa Sap
Cabaggan, Pamplona, Cagayan
Charcoal Briquettes from Corncobs
Annafatan, Amulung, Cagayan
Woodcrafts from Gmelina
Assassi, Baggao, Cagayan
Fruit Wine from Bignay
Lubon, Tadian, Mt. Province, Benguet
Homemade Muscovado from
Sugarcane, Tadian, Mtn. Province
Poles and Fruits (Lituko) from Rattan
Buenavista, Bayombong,
Nueva Viscaya
Satsuma Citrus Production
Malabing, Kasibu, Nueva Viscaya
Fruit Jam & Jelly from Guava
Imugan, Sta. Fe, Nueva Viscaya
Fruit Jelly from Guava
San Macario Sur & Norte
Natividad, Pangasinan
Homemade Vinegar from Pineapple
Eyes, Dolores, San Fernando,
Pampanga
Bags from Recyclable Tarpaulins
Molave, Payatas, Quezon City
Garbags from
Tetra Packs
Lidong,
Sto. Domingo
Oil from Pili Pulp
Dapdap, Bulusan, Sorgoron
Bags from Karagomoi Leaves
Manaet, Bacacay, Albay
Salad Greens & Culinary Herbs Production
from an Integrated Social Forestry (ISF) Project
Boso-boso, San Jose, Antipolo City
Organic Fertilizer Production from an Integrated
Solid Waste Management Facility (ISWMF)
Dalig, Teresa, Rizal
CAR
R - 1
R - 2
R - 3
NCR
R - 4A
R - 4B
R - 5
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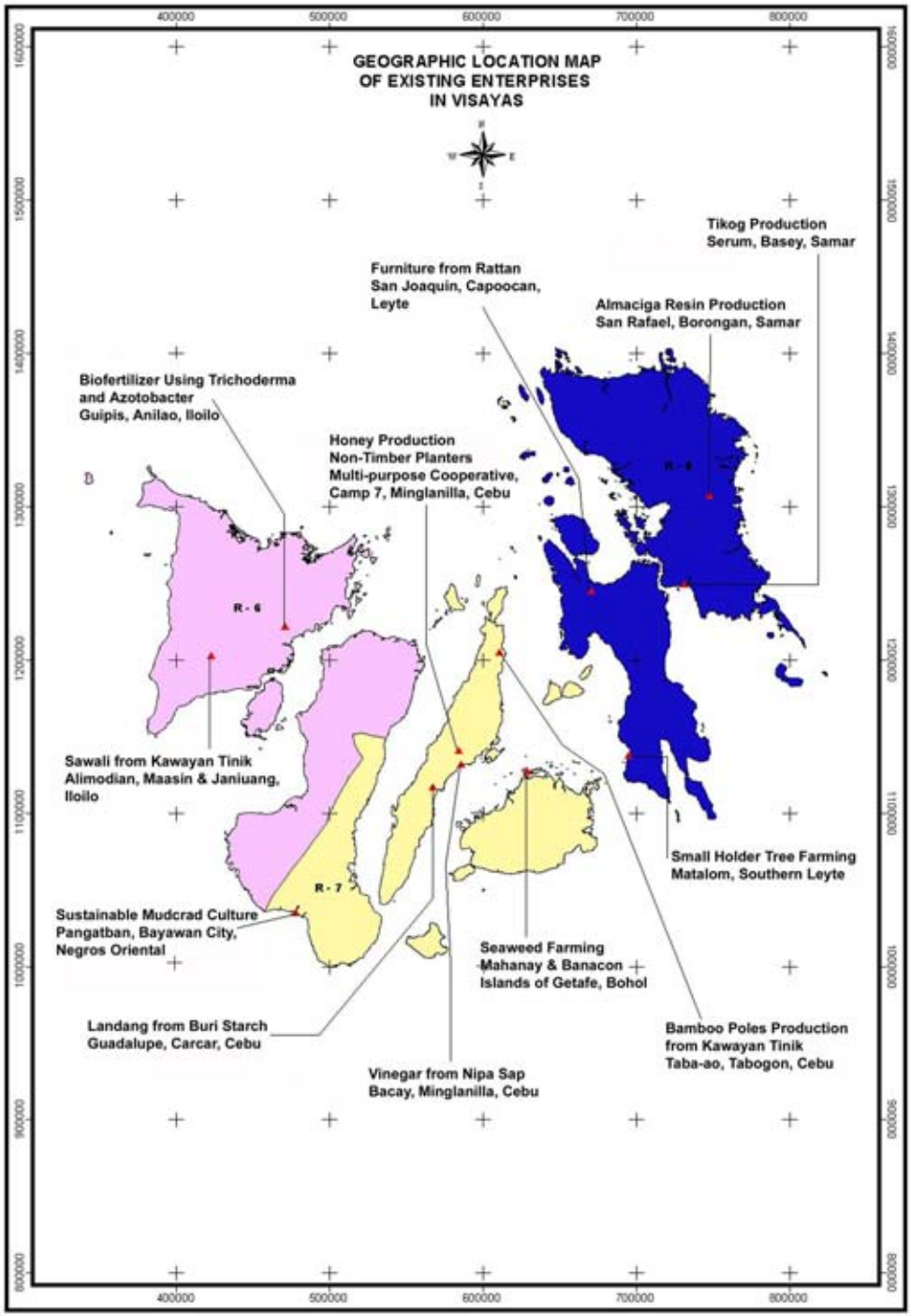
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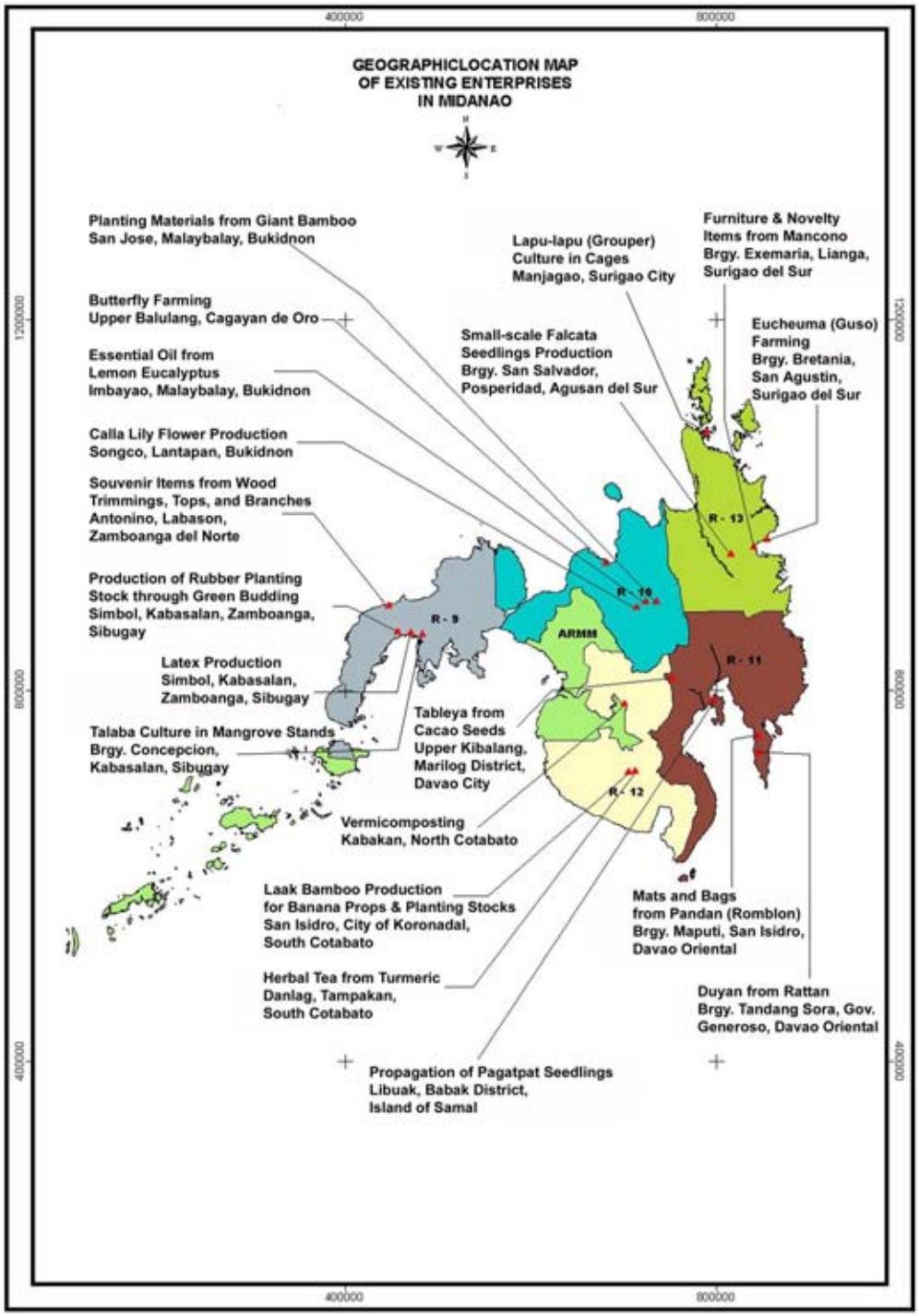
Bacay, Minglanilla, Cebu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GEOGRAPHICLOCATION MAP
OF EXISTING ENTERPRISES
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Butterfly Farming
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Trimmings, Tops, and Branches
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Production of Rubber Planting
Stock through Green Budding
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Sibugay
Latex Production
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Laak Bamboo Production
for Banana Props & Planting Stocks
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BAGS AND NOVELTY ITEMS FROM RECYCLED TETRA PACKS

Location: Bgy. Gibraltar, Baguio City
Entrepreneur: Gibraltar Sariling Sikap Organization
Author: Adelaida B. Costales

Segregation, a strategy for solid waste management, involves the recycling and reuse of non-biodegradable materials in order to reduce the volume of collected and disposed wastes. Through recycling, solid waste materials are transformed into new products.

Tetra packs, sachets, and plastic containers are some of the most common recyclable materials used in the manufacture of bags and other novelty items. Many tetra packs are thrown away as wastes. Fortunately, there are some responsible and concerned citizens, such as members of the Gibraltar Sariling Sikap Organization, who can transform these tetra packs into consumer goods through recycling, thereafter earning cash from this endeavor.

Gibraltar Sariling Sikap is a women-led and women-managed organization with membership from among residents of Bgy. Gibraltar, Baguio City. The organization, which is headed by Mrs. Juliet C. Flores, aims to address the solid waste disposal problem and unemployment concems in the barangay. The women members were organized through their own initiative. Later, they encouraged other residents, most especially women/housewives and the out-of-school youth, to partake in the enterprise.

METHODS OF PRODUCTION

Materials

Recyclable tetra packs
Sewing machine
Bias /cloth strap
Threads
Needle
Scissors
Zipper and snap-on
Detergent
Bleaching agent
Gloves

As an alternative to tetra packs, shampoo and coffee sachets and junk food packs may be used.

Procedure

Part A. Wallets and cell phone holders

Step 1. Collect recyclable tetra packs.
Step 2. Cut one side of the tetra pack to expose the whole film and to remove all its contents.
Step 3. Wash the tetra packs with detergent. Brush off the inside part of the exposed films.
Step 4. Pour 3–4 drops of bleaching agent in a basin full of water. Rinse thoroughly the washed materials.
Step 5. Dry the clean tetra packs by clipping them onto a clothesline.
Step 6. After drying, cut the materials into the desired size. The cuts depend if the product will be sewn or woven (i.e., wide or thin strips, respectively).
Step 7. Piece together the cut materials. Sew or weave the tetra packs into wallets and cell phone holders.
Step 8. If preferred, hand-sew a zipper or snap-on at the top opening.

Tetra packs should not be soaked too long in the bleaching agent to avoid color fading. Use gloves when washing the tetra packs, especially during bleaching, to protect the hands. Wastewater from washing should be disposed properly.

Part B. Aprons

Step 1. Follow the steps in collecting, cleaning, and drying of tetra packs when manufacturing wallets and cell phone holders.
Step 2. Join small-sized tetra packs using a sewing machine.
Step 3. After they are sewn together, cut the upper part of the mat-type tetra pack into the shape of an apron.
Step 4. Sew the edges and put a bias.
Step 5. Attach straps and a belt using the sewing machine.

Tetra pack mats must first be cut into the shape of an apron. One apron can consume 14 regular-sized tetra packs.

Part C. Bags

Step 1. Follow the steps in collecting, cleaning, and drying of tetra packs when manufacturing wallets and cel holders.
Step 2. Assemble the bag by sewing 3 ½ tetra packs for the bottom or base; 2 ½ tetra packs for the upper side or opening; 2 ½ tetra packs for each of the two sides; and 8 tetra packs for the front and backsides. Using this ratio, the bag will be about as tall as four regular-sized tetra packs when vertically joined together.
Step 3. Shape the bag by sewing the bottom and sides, as well as the top/opening.
Step 4. Lay the bias on each side and to the bottom part using a sewing machine.
Step 5. Put the zipper at the top/opening of the bag.
Step 6. If a bag handle is preferred, attach and sew the strap.

A medium bag consumes 25 pieces of regular-sized tetra packs.

GENDER ANALYSIS

The enterprise managed by Gibraltar Sariling Sikap Organization is an effective effort for housewives from the urban settings to conduct solid waste management while actively engaged in a business endeavor. Moreover, utilizing recyclable tetra packs for bags and novelty items can make men and women effective partners in barangay development. Unemployed mothers and fathers are provided the necessary sources of livelihood, resulting in additional income and food for the family. Both are also empowered through entrepreneurial skills buildup (e.g., through trainings), making them effective leaders in the process. In fact, in many occasions, members of the Gibraltar Sariling Sikap Organization lead barangay events and outreach programs.

The women members of Gibraltar Sariling Sikap are motivated to participate in the enterprise based on these specific reasons:
(a) Unemployed housewives generate additional cash to supplement their household income, enabling them to be productive during idle time.
(b) In their own way, members help address the solid waste problem in Baguio City.
(c) The Mayor of Baguio City sometimes sends the women members to trainings in various locations around the Philippines. Other forms of support include educational tours and in assistance in product promotion.
(d) An honorarium of PhP250/person/day is paid to association members if sought as trainers for other barangays.

Sometimes, however, women members do overtime work, especially from October to March, the peak months prior the Christmas season and the Panagbenga Festival. Homemakers may find it difficult to engage in the enterprise if they attend regularly to the affairs of the home.

ECONOMIC BENEFITS

For Bags

SALES		**P 15,400.00**
154 pcs of Bags @ P 100.00		
PRODUCTION COST		**7,783.33**
Fixed Investment		
Sewing Machine	10,000.00	
Depreciation Cost		83.33
Labor & Cost of Materials		7,700.00
NET INCOME		**7,616.67**

ROI = 0.97 or 97%

For Apron

SALES		**P 7,700.00**
154 pcs of Aprons @ P 50.00		
PRODUCTION COST		**5,473.33**
Fixed Investment		
Sewing Machine	10,000.00	
Depreciation Cost		83.33
Labor & Cost of Materials		5,390.00
NET INCOME		**2,226.67**

ROI = 0.4 or 40%

MARKETING CONSIDERATIONS

Marketing is not a problem since many government agencies like the Department of Environment and Natural Resources (DENR), Environmental Management Bureau (EMB), and local government units (LGUs) help in the promotion and sales of the products.

Gibraltar Sariling Sikap Organization also sets up its own product and promotional booth during the annual Panagbenga, other local festivals, and trade fairs, noting that there are plenty of local and foreign visitors in Baguio City. Apart from these, products are sold within the community and around the city. Products are also delivered personally to customers if they order in bulk.

ECOLOGICAL IMPLICATIONS

The enterprise has greatly helped the barangay and the city attain lesser wastes. Moreover, recycling solid wastes has created awareness among family and barangay members. The income generated from the tetra pack-based enterprise indeed lives by the mantra, "May pera sa basura" ("There's money in waste").

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

- Benguet Electric Cooperative (BENECO): Training on marketing strategies; product packaging and labeling; provision of two sewing machines.
- City Welfare and Development: Provision of one sewing machine.
- Department of Social Welfare and Development–Cordillera Administrative Region (DSWD–CAR)'s "Self-Employment Assistance (SEA) Program": PhP100,000 seed capital under the socialized credit scheme
- EMB–CAR and the Local Government of Baguio City through the City Environment and Parks Management Office (CEPMO): Technical assistance and linkage support for educational tours ("Lakbay Aral") on solid waste management
- DENR– Ecosystem Research Development Services (ERDS): Product promotion
- Smart Telecom: Assistance in the creation of the Web page, www.gibraltar.baguio.com; linkage support with the Green Core Society of Saint Louis University in Baguio City for the supply of recyclables for use as raw materials (e.g., tetra packs and sachets).

LAWS AND RESTRICTIONS

- Republic Act No. 9003, "Ecological Solid Waste Management Act of 2000"
- Presidential Decree No. 1152, "Philippine Environment Code"
- Presidential Decree No. 1151, "Philippine Environmental Policy"

FURNITURE AND HANDICRAFT FROM DRIFTWOOD

Location: Bgys. Camp 7 and 8, Baguio City
Entrepreneurs: Mr. Larry Hacoco
Author: Mrs. Fatima T. Tangan

Commercial wood is very scarce at present, but unutilized or leftover indigenous forest materials like branches, stump roots, and other raw materials can be obtained and innovated. Moreover, designing and carving to make finished driftwood furniture and handicraft does not require meticulous activities compared with the processing of raw materials like lumber and logs.

Innately creative rural folks have started making furniture and handicrafts from tree stumps and driftwoods, and these have become their sources of livelihood. Driftwood-based furniture and handicrafts is an ongoing enterprise in Benguet, Ifugao, and Apayao in the Cordillera Administrative Region (CAR).

METHODS OF PRODUCTION

Step 1. Acquire permits and necessary supporting documents from Department of Environment and Natural Resources (DENR) and concerned local government units (LGUs).
Step 2. Conduct reconnaissance survey in a previously forested area where trees have been cut. Check for aged stumps and driftwoods. Alternatively, conduct survey in coastal areas after heavy rains and look for driftwoods washed away by currents.
Step 3. Collect stumps (including root system) with aesthetic and artistic appeal. Fill the spot where tree stump was collected with soil.
Step 4. For ease in transport, clean the stump of soil and cut the root system. Temporarily assemble the raw materials in areas accessible to heavy-duty vehicle. Then, transport these to the workplace.
Step 5. Examine the raw features of the raw materials and conceptualize the design. Assemble them into the desired craft and carve when necessary. Sand and apply finishing like varnish.
Step 6. Prepare promotional materials.
Step 7. Transport the finished products to market outlets, trade fairs, and exhibits.

Collect driftwoods right after a typhoon to assess easily the visual appeal, as well as to ensure the quality of the raw materials.

For first-time furniture- and handicraft-makers, training from individuals who have innate artistic characteristics is strongly advised in order for new artisans to develop suitable and marketable products.

GENDER ANALYSIS

This type of enterprise encourages the complementation of men and women in every part of the production process (i.e., reconnaissance survey, collection of stumps or driftwoods, cleaning, manual and final transport, material inspection and design conceptualization, end-product assembly, and marketing).

When in the company of others, the process is not laborious to women. In fact, production of furniture and handicrafts from driftwoods encourages men and women to work in groups, such as in stump collection for large and weighty raw materials. As a team, they take charge of the design and quality control of the driftwood while sharing and enhancing creativity and skills. Both men and women can join trainings on design conceptualization and finishing. Even young adults or the out-of-school youth can also help in this enterprise.

Due to the demand of eco-friendly products locally and abroad, furniture from stumps and handicrafts from driftwoods are developed all year round, although stump collection is only done seasonally. However, stump collection during summer entails less labor than gathering driftwoods after typhoons.

Good manufacturing practice must be observed. As a health precautionary measure, use masks in the application of varnish. Use available eco-friendly wood preservatives, as some buyers would prefer environment-friendly materials.

ECONOMIC BENEFITS

The cost of finished products and income of handicraft-makers depend on the natural shape of raw materials and their species. For instance, furniture made from narra (*Pterocarpus indicus*) stumps or other high premium species have higher prices compared with raintree (*Samanea saman*) furniture made from branches.

The prevailing price range is PhP2,500–3,000 for two-seater raintree furniture. A narra furniture of the same size costs PhP3,500–5,000. Driftwoods assembled into house accessories, corner stands, or night tables cost around PhP2,000–3,000. Raw materials and/or unprocessed driftwoods cost around PhP250–400 per cubic meter.

MARKETING STRATEGIES

Potential market outlets may include cultural festivals, agro-product exhibits, display areas along major highways, shops of manufacturers, or malls and garden shops. Made-to-order products are very uncommon because of the randomness in the shape and size of the raw materials; in parallel, finished products do not typically undergo quality control, especially on design. This implies that the finished products are purchased mainly based on the buyer's aesthetic requirements. Some entrepreneurs can advertise their products immediately in websites.

In marketing and promotions, entrepreneurs must provide the buyers some basic information on the type of woods used and some tips on how to care for them. High premium wood like narra and molave are more preferred compared with the

common species. The cost of finished products and income of handicraft-makers depend on the natural shape of raw materials and their species. For instance, furniture made from narra stumps or other high premium species have higher prices compared with raintree furniture made from branches. The prevailing price range is PhP2,500–3,000 for two-seater raintree furniture. A narra furniture of the same size costs PhP3,500–5,000. Driftwoods assembled into house accessories, corner stands, or night tables cost around PhP2,000–3,000. Raw materials and/or unprocessed driftwoods cost around PhP250–400 per cubic meter.

ECOLOGICAL IMPLICATIONS

This type of enterprise minimizes the harvesting of trees, especially high premium species. However, collection of stumps is ecologically unfriendly because the root system of a tree is dug out, which can cause erosion and landslide during rainy seasons. Thus, it is strongly recommended that dug spots be filled immediately with soil. Similarly, wildlings and saplings can be damaged during stump collection. Entrepreneurs should actively participate in reforestation of premium species to replace damaged seedlings.

In contrast, driftwood collection along coastlines supports coastal cleanup while providing source of income to coastal dwellers.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

- DENR: Assistance/regulation in stump collection and cutting; provision of necessary permits; and conduct of periodic monitoring of sources of raw materials.
- Department of Trade and Industry (DTI): Training on design enhancement and marketing; coordination on schedules of trade fairs; provision of free or discounted costs for display areas.
- Department of Science and Technology (DOST) through the Forest Products Research and Development Institute (FPRDI) based in Los Baños, Laguna: Technical assistance on wood preservation.
- Department of Health (DOH): Guidance on safety policies/regulations for workers.

LAWS AND RESTRICTIONS

- Under Presidential Decree No. 705, crafters and entrepreneurs should acquire the necessary permits from DENR and LGUs, especially in the collection of raw materials and transfer of crafts from factory to market.
- Periodic monitoring of factories on the source of materials, safety of workers, cleanliness of factories, and appropriate tax revenues are also mandated.

CHARCOAL BRIQUETTES FROM CORNCOBS

Location: Bgy. Annafatan, Western Amulung, Cagayan
Entrepreneur: Western Amulung Farmers Development Association (WAFDA)
Author: Abraham A. Aquino

Charcoal production is the process of converting plant materials into carbonized form through burning. In the past, charcoals are made from woody parts of plants.

The technology used by Western Amulung Farmers Development Association (WAFDA) utilizes wastes from corn, mainly to practice proper environmental management while generating extra income for the locals. By employing the briquetting technique, WAFDA produces fuel that is acceptable environmentally. WAFDA sources out their raw material from corn farms after harvest; notably, corn is widespread in the province. They also buy from neighboring farmers at PhPo.50/kg in preparation for the rainy season.

In the production of charcoal briquettes from corncobs, the following infrastructures are needed so that production would be systematic and efficient: storage, drying, carbonization, grinding, and processing of corncobs; drying of charcoal briquettes; and packaging of finished products.

Additionally, in setting up the enterprise production, these factors should be considered:

- the area should accommodate all facilities with provision of expansion;
- in terms of topography, the area should be level for easy transport of materials and other activities;
- general knowledge of the wind direction will help entrepreneurs determine the strategic location of the carbonization area (i.e., generated smoke will not be an inconvenience to nearby residence or establishments);
- the area should be strategically accessible to both raw material transport and management; and
- the production site must be supplied adequately with water for easy cleaning of equipment and to prevent fire risks.

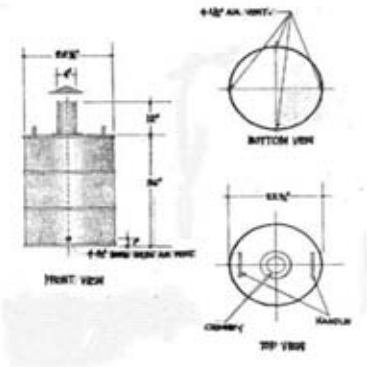


Diagram of the modified drum kiln

METHODS OF PRODUCTION

Materials and equipment

Corncobs	Portable grinder with generator
Modified drum kiln	Manual mixer
	Electrically driven briquettor/molder

Procedure

Step 1. COLLECTION: Gather corncobs after farmers have separated the corn grains from the cobs. Pile these in a storage area. Dry completely the collected corncobs under the sun.

Step 2. CARBONIZATION: Carbonize the dry corncobs using the drum kiln method.

- Set up the drum on a flat surface.
- Place a bamboo pole with diameter of 4–5 inches at the center of the drum before loading the corncobs. The pole must be taller than the drum.
- Pile the corncobs about half an inch below the brim of the drum.
- Pull the pole gently to create a center hole. Burn a piece of rag and drop it into the hole to ignite the dry corncobs.
- Plug the air vents with clay leaving only the bottom inlets open.
- Cover the drum during burning.
- Seal the bottom set of air inlets as soon as the corncobs at the base portion of the drum turn into glowing embers. Then, open the second set of vents. Repeat the same procedure until your reach the upper vents.
- Observe the smoke from the chimney. A thick white smoke means that burning of corncobs is still ongoing. When the smoke turns bluish and thin, the carbonization process is complete.
- Cover all inlets and other openings with clay for about 3 more hours. The recovery of carbonized corncobs will be about 24%–28%.

Drying of corncobs and carbonization using a drum kiln

Step 3. GRINDING: Put the carbonized corncobs in the grinder. To produce fine charcoal, install a fine mesh metal strainer.

- Before starting the engine, fasten tightly moistened flour sacks at the mouth of the receiver and the exhaust tube. Ensure that the moistened sacks are fastened in order to minimize dust leakage during grinding.
- Start the engine and set it to the "slower" switch speed of the machine.
- Open the grinder's feeding mouth and regulate the feeding of carbonized materials into the grinder.

The grinder consists of a metal frame, peg-teeth cylinder rod, hopper-type feeding tray, 13-hp gasoline or diesel engine, belt-guard, cylinder/engine pulley, funnel, and anti-pollution dust/carbon device.

Step 4. MIXING: Mix the ground corncobs with the binder.

- Prepare the binder by mixing 1 kg cassava flour with 1 Li. water. Simultaneously, boil 4 Li. water. Pour the flour-water mixture into the boiling water.
- Pour the ground corncobs into the mixing container. Then, pour the gelatinized cassava starch. Using a paddle, mix until every particle of the ground material is coated.
- Mix using the mechanical mixer. Mixing involves the process of coating every particle of the ground material with the binding film in order to enhance charcoal adhesion, as well as to produce uniform and good quality charcoal briquettes.

Mix the ground corncobs with the binder.

Cassava flour is used by WAFDA because it is readily available in the local market. Cassava is one of the main agricultural products of Cagayan.

Step 5. BRIQUETTING/MOLDING: This process converts the carbonized materials with the binder to form solid charcoals.

- Immediately after mixing, pour the mixture into the feeder. Slightly tilt the feeder back and forth to fill the molder completely. Fill the holes to the brim.
- Cover the feeder. Switch on the briquettor to compress the mixture. Switch off the briquettor after every filling.
- Pull the feeder to expose the compacted charcoal.

Step 6. DRYING: Carefully place the charcoal briquettes in drying trays and sundry these for 2–3 days during sunny days or place them in an in-house drier during rainy days.

Tip A briquettor, like any equipment, is normally equipped with instructional materials for user guide. The post-briquetting drying process is necessary to produce hard and easy-to-ignite charcoals.

Step 7. PACKING: When fully dried, put the charcoal briquettes in plastic bags and seal to prevent moisture absorption. Store the packaged briquettes in boxes for marketing.

GENDER ANALYSIS

The coal-to-charcoal enterprise encourages the complementation of men and women in every aspect of the production process. Men oversee the collection of corncobs, carbonization, grinding, and briquetting/molding whereas women handle the drying, packaging, and marketing aspects. The remaining tasks are shared equally by men and women.

As homemakers, women greatly gain from the enterprise by generating extra income. As member-sellers of WAFDA, they also receive shared benefits and control over the association resources. The enterprise fosters closeness of families.

However, one notable reason why some women do not engage in the livelihood is its seemingly "untidy" procedure and that it might cause respiratory illnesses. It is strongly recommended that workers use masks and gloves when producing charcoals. Men and women workers should wear protective clothing, gloves, and gas mask to protect themselves from charcoal dust and subsequent respiratory illnesses.

ECONOMIC BENEFITS

SALES ---------- **936,000.00**
300 packs of briquette/day x 26 days x 12 months/P10/pack

PRODUCTION COST ---------- **442,400.00**

Raw Materials	- 24,000.00
Packaging Materials	- 12,000.00
Labor (6 Laborers@P200/day)	- 374,000.00
Water & Light	- 12,000.00
Miscellaneous	- 20,000.00

FIXED INVESTMENT ---------- **102,000.00**

Charcoal Equipments

INCOME ---------- **493,600.00**

RETURN ON INVESTMENT

$$\frac{493,600.00}{544,400.00} = 0.90 \text{ or } 90\%$$

MARKETING CONSIDERATIONS

Production of charcoal briquettes assists rural folks in improving their entrepreneurial capability while providing better means of natural resource management. The enterprise can be transformed easily into small-, medium-, or large-scale businesses because of its relatively low capital requirements.

For WAFDA, corncobs are collected at a minimum price—if not for free—after farmers in the locality harvest their produce.

Some of WAFTA's regular buyers include (a) households from within and neighboring barangays, town centers, and nearby cities, (b) community-based bakeries, and (c) some city-based restaurants. Products are also sold directly to wholesalers, retailers, and intermediaries.

In promoting the product/enterprise, these advantages can be specified:

- Less smoke or smokeless
- Clean to use, compact, and uniform in size
- Even distribution of heat, solid, and easy to ignite

- Does not crack easily
- Can be used inside a nice room
- Can be used at a longer timeframe compared with traditional charcoal
- Has very high heating properties, even higher than low-grade coal.

HEATING VALUE COMPARISON

MATERIAL	HEATING VALUE (BTU/lb.)
1. Corncob	13,297.9
2. Peanut Shell	10, 997.9
3. Coco Shell	11, 180.9
4. Saw dust	10, 297.7
5. Rice Hull	5,714.7
6. Coco hush	11,934.1

SOURCE: ERDB (1999) and FPRDI (1996)

As a promotional strategy, WAFDA launched the product in TV and radio, and other information, education, and communication (IEC) activities.

ECOLOGICAL IMPLICATIONS

The production of charcoals from corncobs promotes the utilization of agricultural wastes while creating job for the community. It also reduces the pressure of cutting wood especially from the forest. Charcoal briquettes from corncobs also have the advantage of high heating value; it is also easy to ignite and environmentally friendly. These imply that the enterprise can lessen wood charcoal consumption, thereby minimize forest depletion.

In the production process, ecological mitigating measures can be as follows:

- Provide collection time of corncobs to include transportation to the processing plant.
- Collect wastes generated from packaging and put these in a storage area.
- The plant should install an ash/dust filtering structure to purify the air.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

- Department of Environment and Natural Resources (DENR): Training and technical assistance
- Department of Trade and Industry (DTI) and Department of Science and Technology (DOST): Product development, packaging, quality control, and marketing, as well as training
- DOST: Training on good manufacturing practices (GMP) and hazard control
- Municipal Agriculture Office (MAO): Technical assistance through skills training pertinent to charcoal briquetting
- Congress, local government units (LGUs), and Department of Labor and Employment (DOLE): Provision of information on sources of materials and funding assistance

LAWS AND RESTRICTIONS

- Gathering of corncobs from private farms after the cropping season is not prohibited provided there is an agreement between the collector and farm owner.
- LGUs require license/permit before business operation, including an Environment Clearance Certificate (ECC) from DENR because of the burning activities when producing molded charcoals from corncobs.

GLOSSARY

- Carbonization - The process of conversion of wood and other suitable biomass into charcoal or amorphous carbon through incomplete combustion with limited amount of air.
- Charcoal - The amorphous form of carbon obtained by the destructive distillation of animal or vegetable matter, wood, and other agricultural wastes.
- Charcoal briquette - The conversion of ground carbonized materials into solid hard pieces of finished products.
- Drum kiln - A set up for the carbonization or charcoaling of wood and other agricultural wastes, composed primarily of a drum.
- Heating value - The amount of heat involved per unit weight of charcoal burned.

REFERENCES

Technology Transfer Series, July–December 2000, Vol. II No. 2, Technical Services, DENR-Region 7, Banilad, Mandaue City.
Sustainable Livelihood Options for the Philippines: Info Kit for Urban-Farmland Ecosystem, DENR, 1997.
Interview with members of the Western Amulung Farmers Development Association (WAFDA), 2007.

FRUIT JAM AND JELLY FROM GUAVA

Location: Imugan, Sta. Fe, Nueva Vizcaya
Entrepreneur: Kalahan Educational Foundation (KEF)
Author: Mario C. Velasco

Guava (*Psidium guajava*) is a common ingredient in jam and jelly production. The native guava is small, naturally sweet, and with a pink fleshy pulp full of small seeds. Locally, the fruits are eaten raw. One mature guava can yield 10 kg of fruits during its peak season (May to August).

The enterprise managed by Kalahan Educational Foundation (KEF) was established through the assistance of Pastor Delbert Rice. Beneficiaries include members of the indigenous peoples within the Certificate of Ancestral Domain Claim (CADC) area at Imugan in Sta. Fe, Nueva Vizcaya. The production plants are built close to the fruit farms so that time between harvest and preparation is only between 12 and 24 hours.

METHODS OF PRODUCTION

Materials and equipment

2 kg. sugar
2 kg. guava
Small plastic pack of achuete
Casserole
Ladle
Knife
Chopping board
Strainer/cheesecloth
Measuring cup
Glass jars (470 mL) with lids
Labels
Burner stove

Sugar has two main roles: to set the preserve and to prevent microbial spoilage. The final concentration has to be high enough (>68%) to prevent fermentation by molds or yeasts, but low enough (<72%) to prevent crystallization.

Procedure

Part 1. Preparing guava jelly

Step 1. Wash thoroughly 2 kg of guava. Remove impurities like dirt and tiny stones.
Step 2. Mix a proportion of 50% ripe and 50% almost ripe guavas. Peel the top and

bottom parts. Cut them into quarters with skin.
Step 3. Remove the seeds from the fleshy pulp. Boil the cut fruits with just enough water until the fruits turn soft. Place the guava pulp into a cheesecloth and extract flavor and nutrients by squeezing. Keep the extract in a bowl.
Step 4. In a kettle, add 6 cups of water to barely cover the peeled fruits. Boil for 5 minutes to extract further the juice and pectin. Then, add the squeezed extract from the fleshy pulp. Stir continuously.

Longer boiling reduces the jellying strength of pectin and gives a cloudy juice, which is very difficult to filter. In addition, although a good preserve can be obtained naturally using pectin acquired from guava fruits, it is better to buy pectin powder or solution and add amount as prescribed in the package to the fruit juice or pulp. This will produce standardized gel at every cooking, which is necessary for quality control.

Step 5. Transfer the cooked pulp into a cheesecloth and allow the juice to drip and drain completely into a bowl underneath. Leave for 12 hours.
Step 6. Squeeze the bag to obtain greater juice yield.
Step 7. Re-strain through double-thick damp cheesecloth. Allow the juice to drip without squeezing.

The clearest jelly comes from fruits that have dripped through cheesecloth without pressing. However, this can be obtained by twisting the bag of juice while applying just enough pressure to squeeze the juice, but not the pulp.

Step 8. Measure the extracted guava juice.
Step 9. For a moderately sweet guava jelly, mix 3–4 cups of raw extracted juice with 1 cup of white sugar. Boil in slow fire with constant stirring. Add 1 tablespoon of lemon juice as soon as it has reached a jelly-like consistency. Add ¼ cup of sugar only after half of the free liquid of the fruit has evaporated. Check that the temperature is not beyond 44.5° C, the value at which the mixture has reached its jellying point.

Better jelly is obtained when the quantity cooked at one time is small. Do not attempt to cook more than 2 cups in a single cooking. Jelly cooked in big batches requires longer boiling, which may ruin the flavor and color of the jelly because of hydrolysis of pectin and volatilization of acid.

Step 10. Sterilize the jars and lids by submerging them in boiling water for about 6–8 minutes. Remove carefully and let dry on top of clean towels.
Step 11. Pour the jelly mixtures while hot in warm sterile jars. Remove scum and foam. Seal with lids and tighten, but not too tight.
Step 12. Submerge the sealed jelly bottles in boiling water for 8–10 minutes, depending on the size of the bottles. Carefully remove the bottled jellies and let cool. This will sterilize the jelly.
Step 13. Label and package the finished product.

Part 2. Preparing guava jam

Step 1. Wash 2 kg of guava and remove impurities like dirt and tiny stones. Peel the guavas and slice into halves. Remove the seeds. Cut the guava flesh into thin slices.
Step 2. For 4 kg of guava flesh, add 2 kg of sugar and 2.5 Li. of guava juice.
Step 3. Boil to 71 °C until sticky.
Step 4. To add color, add ¼ cup of achuete juice.
Step 5. Sterilize the jars and lids by submerging them in boiling water for about 6–8 minutes. Remove carefully and let dry on top of clean towels.
Step 6. Fill the jars up to ¼ inch from the top. Seal the lid and tighten.
Step 7. Put the bottled jellies into a boiling water bath filled up to 2 inches of water. Boil for about 5 minutes. Do not process too long or the jam will turn dark and get runny.
Step 8. Put labels and package the finished product.

Prior filling, the jars should be clean and sterilized. The ideal temperature for pouring is 82–85° C. Temperature hotter than this will result in condensation under the lid, which will dilute the jam and cause molding; if colder, the jam will be difficult to pour.

GENDER ANALYSIS

At KEF, both male and female participate in every aspect of the production. Women normally take charge of cooking. For every participating household, the enterprise promotes closer interaction between husband and wife.

In the production process, entrepreneurs should practice good manufacturing practices (GMP) by wearing masks, gloves, aprons, and hairnets. The production area should also be well ventilated to avoid too much heat during cooking.

Preserved guava generates additional business opportunities for KEF, much more than simply selling fresh guavas. A chain reaction of benefits is derived from the jam and jelly enterprise, may they be among fruit gatherers, processors, and sellers and secondary vendors. Overall, small-scale production of guava jam and jelly creates employment and increases the spending capability of upland families, and ultimately improves their socio-economic well-being.

MARKETING CONSIDERATIONS

Pre-production survey should be implemented to determine the potential market of guava jams and jellies. A successful business depends on reliable markets. Too often, small-scale processors decide to make jellies and jams because there is abundant supply of raw materials but with no evaluation of the demand for the product.

With the adoption of the technology, a small cottage industry is initiated. Upon passing quality control, finished products can be displayed initially in local sari-sari stores. At present, guava jams and jellies are sold in provincial markets and grocery stores, city markets, hotels, and big department stores. These are labeled with eye-catching designs; they show the distinctive taste expected from the product.

Usually, guava jelly products displayed in big department stores require a certain fee and specific number/volume. Hence, additional amount (i.e., marked-up price) should be incorporated into the pricing. In big groceries, 16 oz. of guava jellies command a price of PhP150/bottle.

Preferably, use glass jars with new metal lids for packaging. Bottle sizes of 8 and 12 oz. will serve this purpose; they cost about P10.00 and P13.00, respectively. Paper, polythene, or cloth lids can also be used, but they look less marketable and there is more risk of spoilage. Plastic containers with foil lids can also be used because they are cheaper than glass.

ECONOMIC BENEFITS

Assumptions:

a. There are no deliberately established guava plantations for commercial purposes, because these can be found naturally growing in clusters in different/suitable portions of forestlands and in the lowlands.
b. Guava fruits are freely gathered in forestlands except when there are claimants over the lands.
c. Cost of Ingredients

INGREDIENTS	UNIT COST	TOTAL COST
Sugar	P 60.00	P 120.00
Guava (2kg)	30.00	60.00
Achuete (small plastic pack)	30.00	30.00

PRODUCTION COST

Fixed Assets		
1-burner Stove	500.00	
Gas Tank	1000.00	
Gas	600.00	
Casserole	500.00	
Ladle	25.00	
Knife	30.00	
Chopping board	50.00	
Strainer/Katcha	25.00	
Hair Net	20.00	
Gloves	50.00	
Apron	150.00	
Measuring Cup	100.00	
		P 3,050.00
Materials		
Glass Jars (470 ml)	10.00/each	
Lids	5.00/each	
Label	2.50/each	

Product	Unit	Estimated # of trees / ha.	Total Production (kgs.)	Cost/kg.	Total cost of fruit collection (P)
Guava fruit	**kg**	**25**	**375**	**15**	**5,625**

PROJECTED INCOME GENERATED (Guava Jelly Production)

Product (a)	Total Volume collected (kgs.)/ha. (b)	2 kg of raw guava produces (c)	Total No. of jam/jelly cups produced (d) (d)= (b) ÷ 2 x 2.5	No. of 470 ml. jars produced (e) (e)= (d) ÷ 1.5 cup jam/jelly	Selling price/470 ml jar	Total Sales (P)
Raw Guava	**375**	**2.5 cups jam/jelly**	**468.75**	**312.5 or 312**	**100**	**31,200**

ECOLOGICAL IMPLICATIONS

Guava fruit is abundant during summer. Before the enterprise was formalized, a great percentage of ripened fruits were wasted. Annual wastage was reduced to a certain extent, and this was influenced by the demand for guava jam and jelly in predetermined markets, the volume that should be processed, and availability of local materials and equipment.

As a form of waste management after the production of guava jams and jellies, collect both the seeds and the unused guava tops/bottoms, and dump these in a pre-made decomposition pit. As a natural process, decomposing fruits enrich the soil, serve as bird and animal food, and act as medium for species regeneration enhanced by bird and animal activities.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

- Pastor Delbert Rice: Financial sourcing and establishing linkage
- Non-governmental organizations and Department of Trade and Industry (DTI): Training

LAWS AND RESTRICTIONS

The livelihood project must secure the following requirements: barangay permit; business and sanitation permits from the local government unit (LGU); business name registration from DTI; license to operate from Food and Drug Authority (FDA); and tax requirements from Bureau of Internal Revenue (BIR).

GLOSSARY

- Acid - Refers to the citrus juice or citric acid added in the fruit jam or jelly. The fruit must have high levels of acidity (pH 3.0–3.3) to enable the pectin to form gel. Citric acid, malic acid, or tartaric acid is added to adjust the pH of the fruit pulp to 3.0. Citric acid is usually used because it is widely available in the market.
- Jam – A solid gel made from the pulp of a single fruit or mixed fruits. The fruit content must be at least 40%. In mixed fruit jams, the first-named fruit must be at least 50% of the total fruit. The total sugar content must be no less than 68%. In tropical climates like the Philippines, 70% sugar is preferred.
- Jelly – A crystal-clear jam, made from filtered fruit juice rather than fruit pulp.

- Pectin – Naturally present in fruits especially guava. It is needed to set the fruit mixture into gel. Pectin can be bought as powder or liquid concentrate. It is usually supplied as "150 grade" (or 150 SAG), which indicates the ratio of the weight of sugar to pectin that will give a standard strength of gel when the preserve is boiled to 65% soluble solids. Pectin with 5 SAG is normally enough to produce good gel.

REFERENCES

Personal interview with Mrs. Minerva R. Galindez, retired elementary school principal and Home Economics teacher, Aritao, Nueva Vizcaya.

Personal interview with Pastor Delbert Rice and the president of Kalahan Educational Foundation (KEF), Imugan, Sta. Fe, Nueva Vizcaya

Personal interview with Dr. Perlita C. Tiburcio of the Food Processing Center of Nueva Vizcaya State University, Bayombong, Nueva Vizcaya.

SATSUMA CITRUS PRODUCTION

Location: Malabing, Kasibu, Nueva Vizcaya
Entrepreneur: Mr. Junior Dulnuan
Author: Herbert dela Cruz

Satsuma citrus (*Citrus unshiu*) is one of the major fruit crops grown in Nueva Vizcaya. The fruit is rich in vitamin C and calcium, and possesses refreshing qualities especially when consumed either as fresh or as juice. Apart from this, the fruit's skin can be used as food additives for flavoring, coloring, and perfume. The rind is also used in the preparation of candies and marmalades.

Citrus fruit production is a profitable enterprise and has raised the income of slopeland farmers of Malabing, Kasibu, Nueva Vizcaya. The economic benefit brought about by the enterprise has branched out to intermediaries, such as those involved in farm–market transport. Upland families have been into the citrus production over the years. The increase of citrus farmers in the province is indicative one of the popularity and profitability of the enterprise. Consequently, satsuma farming has also spread in the lowlands.

METHODS OF PRODUCTION

The most important aspect in satsuma citrus production is the propagation of seedling, which has to be grafted and/or budded in order to preserve the desired physical and fruiting characteristics. Then, the plantation area should be systematically prepared through brushing, staking, and hole digging. The prescribed depth of planting, soil requirement, elevation, and fertilizer application methodologies should also be considered. Following these will assure good results for the enterprise.

Step 1. Site requirements

- SOIL. Satsuma citrus can grow in a wide range of soil types, such as flat lands, sloping hillsides, and rolling terrain. The best yields can be obtained from soils with pH 5.5–6.5 with good drainage, preferably in sandy loam and or soils rich in organic matter.
- CLIMATE. Satsuma citrus is a tropical and subtropical fruit crop. It can grow almost anywhere, from sea level to 2,000 meters above sea level.
- TEMPERATURE. Warm temperature in tropical areas is conducive for the rapid growth and maturation of satsuma citrus. However, the absence of a cool temperature for maturing fruits can result in green rinds or poor orange color.
- RAINFALL. The best areas are those with well-distributed annual rainfall. Areas with distinct and long dry periods are also suitable, providing there is sufficient irrigation.

Step 2. Silvicultural requirements

- PROPAGATION. Propagate satsuma citrus by budding and grafting to obtain the true type of trees and for early bearing.
- LAND PREPARATION. Clear the land of grasses, weeds, and any obstruction. Stake out the site where each tree will be planted. Dig holes 50×50 cm wide and 60 cm deep. The holes should be bigger on compact or heavy soils. Fill the hole with compost or composted animal manure/vegetative plant parts mixed with excavated soil.
- SPACING. Set the planting distance to 4×5 m.
- PLANTING. Plant at the onset of the rainy season. However, if irrigation is available, plant anytime of the year. Plant the seedling into the prepared hole. Check for goosenecks. The bud union must not be covered with soil during planting. Cover the hole with top soil and press firmly. Water regularly.
- INTERCROPPING. For the first 3 years, plant quick maturing intercrops such as legumes for additional income. Do not plant intercrops close to the trees. Avoid soil erosion in any intercropping scheme.
- WEEDING AND MULCHING. Regularly weed the area equal to the tree canopy to avoid competition for moisture and nutrients. Mulch, especially during the dry season, to conserve moisture. Use dried grass or rice straw. The mulch should be at least 5 cm thick and 20 cm away from the base of the tree to prevent rotting of trunks. Mulch also prevents weed growth and provides organic matter when it rots.
- IRRIGATION. Irrigation is very important in areas with distinct dry seasons. This prevents water stress especially during the flowering stage. Irrigate by furrow, hose, or the sprinkler method.
- FERTILIZER APPLICATION. Fertilizer recommendations are numerous and varied. Each farmer seems to have his own special mixture and formulation to produce the best quality fruits. The following can be used as a fertilizer guide: A month after transplant, apply 200 g urea or 400 g of ammonium sulfate per tree every year for the first three years. Apply in split doses at the onset and before the end of the rainy season. Organic fertilizers (manure or compost) may also be used instead of inorganic fertilizers. Generally, 3 kg of chicken manure is equivalent to 200 g of urea. Chicken manure is also used as soil conditioner. Apply fertilizers also when the satsuma trees have started to bear fruits. For bearing trees, in addition to nitrogen, fertilizers containing phosphorus, potassium, and plenty of organic matter are very essential to enhance yield and fruit quality. On the fourth year, the recommended rate is 100-100-100 g NPK per tree, which is equivalent to 700 g of T-14. The rate is doubled in succeeding years, except the addition of phosphorus, which is only increased to half from the fifth year onwards. Single fertilizers may also be combined. The amount should be determined based on the recommended rate. Ultimately, fertilizers needs must be based on soil or tissue analysis.
- TRIMMING AND PRUNING. On the second year after transplant, trim the tree to a single trunk with 3 or 4 well-distributed branches. Remove all sprouts below 50 cm from the ground. Satsuma citrus tree is an evergreen and needs very little pruning except when removing diseased or dead twigs, unproductive branches, and those less exposed to sunlight. Start pruning at least 50 cm from the ground.
- SHADE AND COMPETITION. Excessive shading from other trees will affect the health and productivity of satsuma. In choosing a planting site, always allow for plenty of light and breathing space; that is, do not plant anything close to or under it.
- HARVESTING. Satsuma citrus can be harvested 5–9 months from flowering depending on environmental and cultural management practices. When harvesting, use pruning shears so as not to damage the fruits. Do not pull the fruit from the tree. Harvesting is done through manual picking from June to September.
- STORAGE. In ambient conditions, satsuma citrus can be stored only up to 2 weeks.

- PACKING. Put the harvested fruits under the shade and sort according to size, color, and rind qualities. Discard damaged, diseased, and misshapen fruits. If preferred, wax the fruits to minimize shriveling and to impart additional gloss. Pack them carefully in baskets or wooden crates lined with newspaper or other suitable materials.

INSECT PEST DAMAGE/SYMPTOMS CONTROL

INSECT PEST	DAMAGE/SYMPTOMS	CONTROL
Aphids (transmits the tristeza virus)	Leaves curl and yellow. Sooty molds are produced.	Spray with synthetic or organophosphate insecticides especially during the flushing.
Scale Insects	Leaves are yellow. Die-back occurs and sooty molds are produced.	Spray with suitable insecticides. Prune infested twigs or branches and burn,
Mealy Bugs	Leaves become discolored and malformed. Fruits drop and sooty molds are produced.	Spray with synthetic or organophosphate insecticides especially during flushing
Whiteflies	Leaves yellow and fall prematurely. Sooty molds are produced.	
Caterpillars	Feeding on young leaves and shoots occurs.	Spray biological insecticides ("Bacillus thurinaiensisl. Hand pick.
Leafminers	The tunneling on the underside of the leaves causes defoliation and curling of leaves and premature leaf fall.	Spray systemic insecticides (dimethoate).
Psylla (transmits the greening disease)	Leaves curl and turn yellow.	Use systemic insecticides such as spray or stem paint,
Snout beetles	Adult feeds on leaves by chewing. Larvae feed on roots.	Spray systemic pyrethroid insecticides such as Delthamethrin. Apply soil insecticides to kill grubs,
Mites	Scartch-like marks on leaves and fruit surface appear. Leaves or fruit turn yellow and brown.	Spray acaricides or asulfur-based fungicide or a flour and buttermilk solution. Botanicals like chili, sunflower and lantana are effective.
Rind borers	Gummosis results. Lumps on fruit rind appear.	Spray systemic insecticides.
Fruit fly	Maggots feed inside the fruit causing decay and fruit drop.	Bag fruits to control maggots. Trap adults. Collect and bury infested fruits.

DISEASE	DAMAGE	CONTROL
Scab	Small, raised light brown soots on leaves, twigs and fruits appear. Leaves crinkle and fruits become misshapen.	Spray copper-based fungicides as soon as growth starts until 2/3 petal fall or until fruits are 2 inches in diameter.
Powdery Mildew	White patches on leaves and twigs appear. Leaves shrivel and dry up.	Spray sulfur-based fungicides as soon as growth starts and prune heavily-attached shoots.
Greening/Leaf Mottling	Sectoral yellowing and dieback occurs. Off-season bloom appears. Fruits become lop-sided, acidic and bitter with aborted seeds.	Use disease-free budwoods/plant materials. Control the insect vector (Diaphorina citrH. Prune infected branches. Eradicate severly infected trees.
Bacterial Canker	Small, round translucent spots turn brown and corky with age. A yellow halo surrounds the spot.	Spray copper-based fungicides before growth starts and repeat until 2/3 petal fall.
Foot Rot	Cracks on trunk appear. Gummosis results and wood becomes discolored. Leaves turn yellow and then drop. Dieback occurs and eventually, death.	Use resistant rootstocks. Scrape off infected portion and paint with copper-based fungicide or Alliette. Provide drainage.
Pink Disease	Gum or crack on trunk and branches appear. Pink-colored mycelia of the fungus are seen on infected portions during the rainy season.	Prune the infect part. Paint the stem with copper-based fungicides,
Tristeza Virus	Stunting occurs. Twigs and trunks pit. Small fruits are produced.	Use disease-free budwoods/plant materials. Control the insect vectors (aphids).

GENDER ANALYSIS

Satsuma citrus production is a gender-sensitive livelihood project. From nursery activities to product marketing, women and men complement each other in terms of knowledge and skills. The primary motivation of women in participating in the enterprise is mainly to secure cash for their own household. They are only less likely to participate if they are adjusting to their routine as nursing mothers or if they are busy attending to daily activities like looking after children or sick family members.

During fertilizer and pesticide/fungicide application, workers must use long sleeve shirts and masks for protection. In waxing Satsuma citrus, gloves should be worn as part of good manufacturing practices (GMP).

ECONOMIC BENEFITS

For 1 ha. area

Sales Php 25.00/kilo	**Php 2,571,250.00**
Cost of Production	**Php 146,400.00**
Seedlings	62,500.00
Plantation establishment	3,500.00
Maintenance and protection	72,500.00
Harvesting	3,400.00
Transportation Cost/Harvest season	3,000.00
Miscellaneous/Harvest season	1,500.00
Net Income	**Php 2,424,850.00**
ROI	**16.56 or 1656%**

MARKETING CONSIDERATIONS

Many upland satsuma citrus farmers have already become socio-economically progressive because of their produce, which is very in demand in the market. Nueva Vizcaya is presently known as the citrus basket of the Philippines. Most of the citrus harvests are marketed in Manila and within the province, both at prevailing retail or sale prices. Primary and secondary dealers from the other provinces and cities visit Nueva Vizcaya for trading opportunities. Fruits are taken and hauled to market outlets in accordance with prevailing transportation and product costs.

ECOLOGICAL IMPLICATIONS

Establishing a satsuma citrus plantation greatly helps in rehabilitating degraded lands. It also transforms idle lands into productive areas. Moreover, it lessens pressure on the current forest cover. However, entrepreneurs should be cautious of the rapid conversion of lowland arable areas into industrial lands, as this might eventually push lowland agricultural production into the uplands where soil erosion may become a major problem. Existing food production and environment conservation programs in the Philippines tend to integrate fruit trees with existing cropping system.

REFERENCES

Prolonging the shelf life of citrus fruits with waxing, BAR Digest, Vol. 10 Issue No. 2, April–June 2008.
Crisanto R. Escano and Sonny P. Tababa. Fruit Production and the Management of Slopelands in the Philippines, PCARRD.
Personal interview with Mr. Junior Dulnuan in Kasibu, Nueva Vizcaya, September 15, 2010.
Personal interview with Forester Esthie Olli, MENRO, Kasibu, Nueva Vizcaya, September 16, 2010.
Personal interview with Mrs. Flordeliza C. Namuje of Namuje Farms, Kasibu, Nueva Vizcaya, September 21, 2010.

WINE FROM NIPA SAP

Location: Bgy. Cabaggan, Pamplona, Cagayan
Entrepreneur: A local women's organization
Author: Florencio G. Serra, Jr.

Ready for tapping nipa fruit

Nipa (*Nypa fruticans* Wurmb) is a common swamp species found along deltas, bays, coves, and tidal flats in Claveria, Sanchez Mira, Pamplona, and Abulug in northwest Cagayan and Aparri, Camalaniugan, Buguey, Sta. Teresita, Gonzaga, and Sta. Ana in north/northeast Cagayan. Nipa, with its multifarious uses, is a main source of sap for native wines, locally known in the region as "layaw." Contemporary nipa winemaking roots back to the practice of the old. However, this indigenous and traditional method produces low quality and burnt-smelled wine, which modern day science claim as health hazardous. The technology produced for the current winemaking enterprise has attempted to overcome these issues.

Producing nipa wine is profitable and as equally sustainable as fishing and nipa shingle production, which altogether contribute to the local economy. Presently, there are 23 and 8 distilling shacks in Pamplona and Abulug, respectively. About 10 sap collectors own and maintain a distillery within the said towns.

METHODS OF PRODUCTION

Materials and equipment

200-liter containers
Bolo
Bamboo
Distilling unit in a distilling shack
5 m PVC
3 m hose
Hand pump
Firewood
Boat to transport collected nipa to the distillery

Procedure

Part 1. Pre-tapping (activities prior sap collection)

Step 1. Select palms with healthy and matured fruits that have at least 10 cm diameter. Gather only one fruit for every nipa clump to avoid disturbance in plant growth.
Step 2. Remove the bracts attached to the peduncle, secondary fruits, and other vegetations around the fruit to give room for treatment, tapping, and sap collection.
Step 3. Apply regulated amount of downward pressure to the peduncle by kicking 60 times during the first visit and 4 times every 10 days thereafter.

Pre-tapping treatment: Regulated amount of pressure to the peduncle by kicking.

Part 2. Sap collection

Step 1. Cut the fruit from the peduncle using a clean sharp bolo. Immediately thereafter, set up the sap collection tube (i.e., precut bamboo) by inserting the tip of the peduncle to the hole created at the topmost part of the bamboo.
Step 2. Gather sap the following day and everyday thereafter for 50 days. Fill the 20-liter containers. A boat is used in collecting the saps because the nipas are located in swampy areas.
Step 3. After 50 days, transfer the gathered sap to the distillation shack.
Step 4. Stock the containers in the production area until sufficient saps can fill the distillation vats.

Collection to transport of gathered nipa sap.

Part 3. Distillation

Step 1. Clean the distillation vat, plastic tube, catch pan, and wood slat assembly.
Step 2. Pour nipa sap up to the brim of the distillation vat.
Step 3. Clean the sap by removing suds and other foreign objects.
Step 4. Cover the container with nipa fronds/leaves to prevent spilling during boiling.
Step 5. Put the wood slat assembly (with cross wood, catch pan, and plastic tube) on top of the distillation drum.
Step 6. Submerge the plastic tube into a water container to cool the distillate.
Step 7. Cover the outside bottom of the wood slat assembly with wet clean rags to seal and prevent escape of vapor during distillation.
Step 8. Set up the condenser vat on top of the wood slat assembly and pump water; this will then serve as the condenser. Replace the water at least thrice during distillation to maintain a cool temperature.
Step 9. Light the stove but regulate the fire at all times to prevent the distillate from smelling burnt.

Step 10. Position the container at the receiving end of the plastic tube. Then, stock empty containers with the distillate. Finally, seal and store.
Step 11. Transfer the collected distillates into wine-type bottles containers and store as finished product for marketing.

The distillation process

The establishment of a fuel wood plantation is a basic requirement in securing a permit-to-operate for wine distilleries to guarantee sustained source of energy while easing pressure against swamp forest and other forest ecosystems.

GENDER ANALYSIS

The enterprise strengthens the complementation of men and women work roles, especially during distillation. In terms of other activities, women mostly manage the fuel wood collection and marketing whereas men focus mainly on the pre-tapping activity and sap collection to transport.

One season of sap collection covers about 50 days. Meanwhile, a distiller can produce an average 240 Li./day of nipa wine during peak season. Given that distillation is done every other day, a distiller can then produce an average of 3,600 Li./month of nipa wine. Sap availability commands period for distillation. Normally, in Pamplona and Abulug, sap collection starts from late September and ends early April.

Workers should wear the proper working attire, such as long sleeve shirts and gloves, during sap collection. Masks, hairnets, gloves, and aprons should also be

worn during distillation as part of good manufacturing practices (GMP).

Women married to sap collectors and local distillers usually are knowledgeable on the processes involved in the production. They involve themselves in the pre-tapping to marketing but only after their activities at home have been completed. Notably, there has been an increased knowledge among women in terms of nipa winemaking. Men readily share the knowledge to women, especially between husband and wife, knowing that extra labor would increase the production rate and eventually, the family income.

The women's cooperative manifests the camaraderie, interest, knowledge, and good relationship between men and women in the community.

ECONOMIC BENEFITS

For 1 (one) season – 50 days		
Sales		**P 469,500.00**
1,080 containers (20 liter cap) nipa wine @ P400.00/container		
Cost of Production		**256,796.00**
Fixed Investment	35,560.00	
Depreciation Cost (4 seasons in a year)		889.00
Banca	*2,500.00*	
Containers		
5 20-liter capacity	*850.00*	
6 200-liter capacity	*4,200.00*	
Knife	*65.00*	
1 unit Distillation Unit	*20,250.00*	
1 unit Distillation Shack	*5,000.00*	
3 meters Plastic Hose	*45.00*	
5 meters PVC Pipe	*150.00*	
Hand Pump w/ installation cost	*2,500.00*	
Bamboo		612.00
Labor		
Treatment (4 days)		800.00
Sap collection (50 days)		10,000.00
Distillation (2 laborer @ P200.00)		20,000.00
Overhead cost		4,445.00
4,320 container of sap @ 50		216,000.00
Firewood		4,050.00
Net Income		**P 212,704.00**
ROI		**0.82 or 82%**

MARKETING CONSIDERATIONS

The uniqueness of nipa wine is its continuous supply and production throughout the year, as there is sustained availability of raw materials in Cagayan.

A well-managed nipa stand with spacing of 1x1 m (considering space for boat and collector passage) can yield 8,600 Li. of nipa sap per tapping season. On the third year of plantation establishment, a farmer can already gain from the different products, may they be shingles, vinegar, nipa wine, "salakot," or others.

Incidentally, farmers from Pamplona, Aparri, and Abulug depend solely on the natural stand; therefore, the volume of sap collected is limited. Cooperatives or proprietors with storage facilities, financial capability, and are located adjacent to Pamplona, Abulug, and Aparri buy nipa wine from community-based distillers in bulk at a cheap price. Then, they store them temporarily and market them to other areas in northern Luzon. Inasmuch as this setup increases the unit price of nipa wine, the price can be lowered during the peak season of distillation. Typically, a 20-liter wine bottle is priced PhP400 during the peak season and can go as high as PhP500 with limited supply.

ECOLOGICAL IMPLICATIONS

An essential prerequisite to producing nipa wine is the establishment of a sustainable fuel wood plantation that can be tapped readily for the burning requirements of distillation. Fuel woods are sourced usually from nearby public forests, kaingin areas, and private and public plantations; they contribute nearly 90% of the total energy requirement. The remaining 10% are driftwoods from uplands that have been deposited downstream due to flashfloods. As such, entrepreneurs should support efforts of concerned agencies to regulate the gathering, extraction, and transportation of fuel wood and other ordinary minor forest products.

In terms of procedure, producing nipa wine does not require toxic chemicals or materials in any of its processing stage. However, proper waste disposal should be observed in accordance with the ecological solid waste management protocols of local government units (LGUs).

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

Department of Science and Technology (DOST)-Tuguegarao and the LGU of Pamplona provide technical support to this women-led enterprise. DOST can also be sought to obtain the proper alcohol content of the wine.

LAWS AND RESTRICTIONS

Permits on the cutting, collection, gathering, processing, extraction, and transportation of ordinary minor forest products should be secured from Department of Environment and Natural Resources (DENR). The enterprise also abides by the ecological solid waste management of the LGU.

GLOSSARY

- Peduncle – Stem that holds the fruits
- Bracts – Sheaths that covers the peduncle
- Sap – Juice that surface from the peduncle

HOMEMADE VINEGAR FROM PINEAPPLE EYES

Location: Dolores Site, San Fernando City, Pampanga
Entrepreneur: Inocencio Magtoto Memorial Foundation, Inc. (IMMFI)
Author: Erminda Castaneda

Overripe fruits and eyes of Pineapple (*Ananas comosus* from Family Bromeliaceae) are made into vinegar via fermentation using brown sugar and fruit acids. Pineapple fruits are abundant every season and are widely cultivated in the Philippines. Pineapples are good source of manganese and vitamins C and B1, and can prevent blood clot formation.

Concurrently, overripe fruits—even the pineapple peelings and eyes (i.e., considered as wastes)—can be utilized and processed into vinegar. This technology is simple and non-laborious. Minimal time is involved in the production and these can be achieved using simple and improvised equipment.

On July 2008, the Inocencio Magtoto Memorial Foundation, Inc. (IMMFI) based in Dolores Site, San Fernando City, Pampanga, through its founder Ms. Claire Magtoto, sponsored a training on pineapple-based vinegar production. Among its beneficiaries were 10 women who are also persons with disabilities (PWDs).The trainees adapted the technology and thereafter sold pineapple vinegars in behalf of IMMFI, ultimately securing additional income for themselves. Then, as the volume of the production elevated with increased demand, more women workers were trained and hired by IMMFI.

METHODS OF PRODUCTION

Materials and equipment

Grated pineapple and pineapple eyes
Brown sugar
Tap water
2.5 gallon casserole
2.5 gallon earthen jar
5 gallon glass container
Cheesecloth
Recyclable bottles for packaging with plastic caps
Rolled plastic twine

Procedure

Step 1. Wash the pineapple fruit/eyes to remove dirt.

Step 2. Chop or cut the pineapple fruit/eyes into small pieces or by using a blender.

Step 3. For every 5-gallon earthen jars or glass containers, measure the following ingredients and place them equally (in ratio): 14 cups of chopped pineapple and pineapple eyes, 3.5 cups of brown sugar, and 56 cups of tap water. Fill the container with clean tap water to at least 3 inches from the rim.

Step 4. Cover the jar with cheesecloth and secure the cover with a plastic twine. Let the mixture stand for one week.

Step 5. After one week, stir the mixture using a clean ladle. Do this every week for 2–3 weeks, after which the vinegar should be ready for fermentation.

Step 6. After the fermentation period (i.e., about 2–3 weeks), boil the mixture for about 30 minutes.

Step 7. Strain the mixture using cheesecloth to remove the remaining sludge.

Step 8. Pack the vinegar in bottles while still hot then seal (process of pasteurization).

Step 9. Clean the used earthen jars in preparation for the next batch of fermentation.

GENDER ANALYSIS

Through the assistance of IMMFI, women PWDs manage and participate in the pineapple vinegar enterprise, hence allowing them to earn regular income despite their physical attributes. IMMFI also extends support to women PWDs by providing continuous training and education on product improvement, as well as in marketing and promotion. The women are also trained on simple recording and financial management, as well as on how to engage in other kinds of enterprise and projects. At IMMFI, although no male is involved at present, the enterprise can also be conducted by men, given the simple technology involved in this type of vinegar production.

According to the women workers of IMMFI, the enterprise has helped them gain self-confidence. Moreover, as they are also assisted by other agencies like the Local Government of San Fernando, Department of Trade and Industry (DTI), and Department of Environment and Natural Resources–Ecosystem Research Development Services (DENR–ERDS), they have learned to conduct proper waste segregation and good manufacturing practices. They are also taught to wear proper attires like hairnets, masks, and gloves during processing.

Pineapple vinegar production is conducted throughout the year. However, when produced in moderate volume, vinegar production may encounter idle periods (e.g., during fermentation). On these days, women workers can engage in other activities or household chores. Marketing can also be done easily, as products can be sold in display centers, public markets, and through direct orders from individual customers.

ECONOMIC BENEFITS

A. FIRST PROCESSING

INCOME

Long neck bottle/ 1 liter	P 25.00 x 25 pcs	P 750.00
Catsup bottle / 330 ml	P 15.00 x 100pcs	P 1500.00
Gin (bilog)/330 ml	P 20.00 x 100pcs	P 2000.00
Mother Vinegar/gal	P 150.00 x 5 gal	P 750.00
TOTAL		**P 5,000.00**

Cost of Production

Cheese cloth	5 pcs	P15.00	P75.00
Earthen jar	5 pcs	P 200.00	P 2000.00
Glass container	2 pcs	P 500.00	P 1000.00
Brown sugar	8 kilos	P 40.00	P 320.00
Gin bottles	100 pcs	P 1.0	P 1000.00
Catsup bottles	100 pcs	P 1.0	P 1000.00
Long neck bottles	50pcs	P 2.0	P 1000.00
Plastic twine	2 rolls	P100.00	P 200.00
Fuelwood	2 bundles	P 25.00	P 50.00
Total Cost		**P 6645.00**	

NET LOSS (first batch) **P1, 645.00**

B. SECOND PROCESSING

GROSS Income		P 5000.00
Less:		
Cost of production:		
Brown sugar 8 kilos	P 40.00	P 320.00
Plastic twine rolls	P 100.00	P 200.00
Fuelwood	P 25.00	P 50.00
Contingencies		P 100.00
TOTAL Cost		**P 670.00**
NET INCOME (2nd processing)		**P 4,330.00**

MARKETING CONSIDERATIONS

Pineapple vinegar has a unique sweet taste and light brown orange color compared with vinegars made from other raw materials. They can be packaged in bottles of various sizes and volume content (e.g., long neck, round gin, and catsup bottles).

For every 10 kg of pineapple fruit and eyes, the recovery is almost 95% for a 25-gallon volume per batch of production. In seasons where there are plenty of overripe pineapples, production can double. IMMFI ties up with pineapple vendors from public markets in San Fernando City and collect their pineapple eyes for free.

The vinegar products are displayed in the homecare site of women PWDs in Dolores Site, San Fernando, as well as in regular market places like public markets, sari-sari stores, and stalls. Some of the homemade vinegars are also bought directly from the production area; that is, some buyers consider it their social responsibility to help women PWDs increase their income through this vinegar enterprise.

ECOLOGICAL IMPLICATIONS

This enterprise uses waste products as raw materials, which are then converted into cash to help raise income for the women PWDs. Accordingly, this vinegar enterprise is coherent with the Solid Waste Management Act. Inasmuch as there is a big volume of unsold overripe pineapples in the locality, including eyes removed from peeled fruits, these waste-transformed-into-raw materials can be profitably processed into homemade vinegars.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

- DENR – Training on livelihood and solid waste management
- IMFFI – Provision of home for women PWDs; provision of display centers; and technical assistance
- Local Government of San Fernando – Issuance of business permits and provision of technical support related to laws and restrictions
- DTI – Support on product improvement and packaging
- Bureau of Food and Drug (BFAD) – Requirements on food manufacture and standards on product labeling

ORGANIC PAKO FROM AN URBAN-BASED AGRO-ECO FARM

Location: Purok 9, Bgy. Maimpis, San Fernando City, Pampanga
Entrepreneur: Ashanti Agro-Eco Farm
Authors/Managers: Foresters Reynaldo and Vilma Garcia

Ashanti Agro-Eco Farm is an agroforestry backyard venture in an urban setting where land is scarce and cost is very prohibitive. Located in a 3,500 sq. meter area, the agro-eco farm was envisioned as a forest resort and a "weekend work area" for the forester-owners. While practicing their forestry profession, the income generated from the agro-eco farm also contributes to the family income. Most especially, the farm has improved the environmental condition of the urban landscape. At present, Ashanti is home to at least 250 endemic forest and fruit trees. Planted in lines of 10 m distance, these are now 3- to 8-year-old, about 4–10 m in height.

However, the farm's current notable feature revolves around rows of edible Pako (*Athyrium esculentum*) planted alongside various trees and ornamentals. At present, pako production sustains the operational expense of the agro-eco farm. The shoots and young curled fronds of pako are generally edible and non-poisonous. A study conducted by the Philippine Nutrition Research Institute has revealed that pako is rich in phosphorus, potassium, and iron.

METHODS OF PRODUCTION

Materials and equipment

Germination seed box
10–12 sacks per 1,000 sq m of edible pako runners
Shovel
Rake
Pick mattock
1.5-inch diameter water hose
1 sack organic fertilizer per plantation plot (3 months)
Biodegradable plastic bags
Handheld planting tools
Water pump generator
Deep well

Procedure

Step 1. Land preparation

- Prior transplanting pako, prepare a work area composed of loose sandy loam, as this soil type is friable and workable.
- Create soil hills of 0.3 m distance along rows that are 1 m apart. Atop soil hills, create a hole 4 inches in diameter.

The pako species in Ashanti Farm were collected from the provinces of Bataan, Pangasinan, and Aurora.

Step 2. Collection and production of pako

- Gather the collected pako either through spores or alternatively through runners, and mulch these prior planting.
- Cut matured pako fronds. In a germination box, lay the back of the fronds (i.e., this where the spores are located) close to the soil medium.
- Water regularly in the morning and afternoon to reduce evapotranspiration.
- When baby sprouts of at least 3-inch length appear, transplant the pako plants.

Pako produces runners that can be collected as individual pako plants. In addition, there is no need to apply organic fertilizers regularly, as the trimmed fronds have been mulched in the plantation floors.

Step 3. Transplanting and harvesting

- Plant pako runners in groups of three at 0.3 m distance in the prepared 4-inch holes atop soil hills and cover with loose soil.
- Flood the plantation plot enough to saturate the soil with water.
- After planting, fully shade the pako plants for at least 1 week. Thereafter, do partial shading to simulate growth in natural habitat.
- As the pako grows new runners, trim plants to maintain a distance of 0.5 m between rows. Remove weeds that grow between the rows of pako plants.
- During dry season, water at least twice a week.
- Harvest on the fourth month when plants have already recovered and new shoots have grown. On the average, a plot should be harvested thrice a week to avoid over-maturing of edible parts. Harvest during sunrise (i.e., not later than 8 a.m.) to avoid excessive evapotranspiration. Should the pako plantation "overtop" its edible shoots, trim the plant up to the level of the edible portions.

Preferably, plant the pako every afternoon and during rainy season.

GENDER ANALYSIS

This enterprise promotes complementation of men and women, specifically between the husband and wife owners of Ashanti. As an alternative income generating project, labor is shared equally in terms of land preparation to planting and harvesting, and even in marketing. In terms of production, this kind of enterprise is non-laborious. After plantation establishment, both husband and wife have engaged with lesser time for plantation maintenance, hence allowing them to devote their time on other office and household chores. Concurrently, they continue to sell short-term crops (pako) while enjoying the ecological benefits/essence of the area. They also await the harvest of long-term crops from fruit and forest trees. In all aspects of the production, using protective gears like hats, boots, and gloves are often worn during actual work in the farm.

In Ashanti, the entrepreneurial activities have deviated away from the usual customs wherein men focus on the "inside-the-farm" labor while women oversee the marketing aspect. The wife-owner does equal physical work with her husband inside farm. Originally, marketing was done by the husband; he delivered the pako products to distant clients and restaurants. Later on, the wife realized that with increase in demand for pako, which equally translated into increased income, there was also the need to expand their pako production. With the advent of the cell phone technology, the husband-wife tandem maximized this access point, thereafter channeling their marketing activities through this new scheme. Eventually, the wife became greatly involved in marketing.

The distance of the farm is only a few kilometers from their residence, and the couple has employed three male youths (i.e., two contracted on an on-call basis during the establishment phase while the other is a relative who goes to school during daytime and stays to maintain and guard the farm at night).

ECONOMIC BENEFITS

For 1, 000 square meter area	
Sales 7 kls Paco @ P120.00 / day	**P 25,000.00**
Cost of Production	**13,600.00**
Collection of Planting materials	5,000.00
Land Preparation	3,300.00
Planting	2,300.00
Maintenance	3,000.00
Net Income	**P 11,400.00**
ROI	**0.83 or 83%**

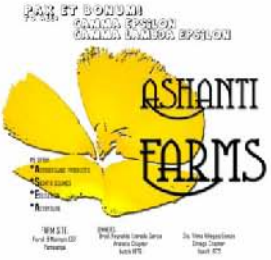
MARKETING CONSIDERATIONS

Income generation from producing and selling pako is tied closely with the promotion of Ashanti Agro-Eco Farm; that is, in promoting organic pako, the ecological and economic vision of the farm is highlighted. The Ashanti Agro-Eco Farm Resort has been registered with Department of Trade and Industry (DTI) and holds a permit from the local government. At this time, the resort mostly only caters to small meetings and parties.

In Ashanti, pako is farmed organically in plots and rows. As soon as they are harvested, pako are sold commercially in produce markets. Moreover, there are at least five restaurants being rationed with pako fronds by Ashanti Agro-Eco Farm on a daily basis; their total average daily requirement is the farm's minimum harvest. An average of 7 kg/day can be harvested from the farm.

ECOLOGICAL IMPLICATIONS

The project does not only respond to economic needs, but has also addressed issues on environmental protection, biodiversity conservation, and climate change mitigation and adaptation.



Agroforestry practices like the use of organic fertilizers do not destroy the soil, which incidentally has been degraded in the past due to overuse of inorganic fertilizers; the farm used to be an area for sugarcane production. Evapotranspiration was controlled because of the trees that now line the farm enclave. The trees also support the growth of pako.

Plant biodiversity was enhanced with the introduction of different endemic species, resulting further in the enhancement of animal biodiversity within the farm. For example, the tree frog, which according to Department of Environment and Natural Resources (DENR) is an indicator of good quality environment, still lives in the farm in abundance.

Land use practices encourage diversification and natural resource management. Moreover, the implemented agroforestry techniques on soil conservation, such as intercropping and area planning, mitigate the impact of climate change. These are enhanced further by the reduced and sequestered terrestrial greenhouse gas (GHG) emissions.

ORGANIC FERTILIZER PRODUCTION FROM AN INTEGRATED SOLID WASTE MANAGEMENT FACILITY (ISWMF)

Location: Bgy. Dalig, Municipality of Teresa, Rizal
Entrepreneur: Local government unit (LGU) of Teresa, Rizal
Author: Josephine Pudiquet; Co-author: Engr. Marlon F. Pielago

All barangays in Teresa, Rizal have their own Material Recovery Facility (MRF) in compliance with Republic Act (RA) No. 9003, also known as the Philippine Solid Waste Management Act. Thereafter, all solid wastes from local MRFs are brought to the 300-square-meter MRF operated by the LGU of Teresa, Rizal. Located in Bgy. Dalig, the MRF also conducts further processing and organic fertilizer production.

From an MRF, the waste plant eventually evolved into an Integrated Solid Waste Management Facility (ISWMF) with composting as its component. In turn, the produced compost is utilized as organic fertilizer for the vegetable garden maintained within the area, indeed a showcase of effective solid waste management.

Organic fertilizer production is the conversion of biodegradable wastes into compost to enrich, restore, and replenish the topsoil with valuable nutrients. In this enterprise, the production of organic fertilizer is two-pronged: (1) to reduce the amount of solid wastes generated in order to prolong the lifespan of the sanitary landfill facilities and (2) to generate livelihood for the locality through sales of the organic fertilizers.

METHODS OF PRODUCTION

Materials and equipment

- Biodegradable wastes, which include 50% of vegetables and fruits trimmings/peelings, grass cuttings, leaves, twigs, and branches; 30% of coconut husks; and 20% of dried poultry and piggery manure
- Sacks for packing and storage
- Compost screens
- 2 units shredders, each with 400 kg/hr capacity
- 1 unit of bioreactor with 500–1,200 kg input capacity
- Covered shed with several compartment (infrastructure)
- Shovels

Procedure

Step 1. Excluding the animal manure, shred the biodegradable wastes using a shredder.
Step 2. Mix all biodegradable wastes in the bioreactor for 72 hours to enhance and accelerate the decomposition process.
Step 3. Transfer the compost to compartments for air-drying.
Step 4. Turn the compost from time to time to even out its temperature.
Step 5. After three weeks, sieve the compost using a screen.
Step 6. Sundry the compost three days prior packing.
Step 7. Pack compost in 40 kg sacks.

Wet wastes are not accepted in the Teresa ISWMF. They are dried first in barangay MRFs before brought to the facility.

GENDER ANALYSIS

Mostly, males are employed to oversee the production process given the nature of the entrepreneurial activity (i.e., men tend to partake more in the preparation like shredding, mixing in the bioreactor, storing in separate compartments, screening, and packing). Albeit of lesser number, women help in the packaging and marketing of the products. At times, external support is outsourced; for this purpose, women are tapped regularly to segregate wastes; to conduct information, education, and communication (IEC) activities; and to tend the vegetable garden where the organic fertilizers are piloted for trial usage.

The vegetable gardening activity, having been a component of the ISWMF where the organic fertilizer product is tested, is documented regularly.

Women are motivated to participate in the enterprise to augment the family's financial needs and to enhance their knowledge/skills on appropriate solid waste management and vegetable gardening.

ECONOMIC BENEFITS

SALES		**P 75,000.00**
300 sacks of compost @ P 250.00		
PRODUCTION COST		**27,541.66**
Fixed Investment	665,000.00	
Composting Structure	350,000.00	
Bio-reactor (1 unit)	180,000.00	
Shredder (1 unit)	125,000.00	
Others	10,000.00	
Weighing scale		
Screening		
Depreciation Cost		5,541.66
Labor (2 x 22 days x 250/day)		11,000.00
Overhead cost (Fuel)		6,000.00
Other variable cost		5,000.00
(Supplies, maintenance)		
NET INCOME		**47,458.34**

ROI = 1.72 or 172%

MARKETING CONSIDERATIONS

The prevailing price of organic fertilizers is PhP250/bag. This price increases to include delivery charges when transported outside the municipality.

The immediate market includes farmers from Teresa, Rizal, mainly because the municipality is largely agricultural. The municipal government finds that local farmers patronize the use of organic fertilizers. Farmers from nearby towns who have also witnessed the success of small-scale and industrial farms using organic fertilizers are also being targeted as buyers.

One aspect that can be improved in marketing is the use of sacks designed solely for the compost products. At present, the sacks used by the Teresa ISWMF have no appropriate labels (e.g., the nutrient contents of the compost are not indicated).

ECOLOGICAL IMPLICATIONS

The enterprise is one way of reducing solid wastes, thereby complying with RA 9003. It also prolongs the lifespan of solid waste disposal facilities. Given that only dry segregated wastes are accepted, odor nuisance and proliferation of flies is not a big problem in the ISWMF.

As a commodity, safety practices are observed. Bureau of Soils and Water Management (BSWM) has classified the generated waste product as a non-toxic organic fertilizer. Mitigating measures are also installed for possible generation of leachate, especially during heavy rains.

Overall, the reputation of the Teresa ISWMF as an odor-free and a solid waste facility (e.g., "not infested with flies") is renowned locally and internationally; this is even recognized by the media. Correspondingly, the Teresa ISWMF has won various environmental and socio-civic awards because of these good practices.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

Several institutions have actively shown support the enterprise because it complies with RA 9003.

- Department of Environment and Natural Resources (DENR): Compliance to RA 9003
- Fertilizer industry: Product certification
- Commission on Higher Education (CHED) and the Department of Education (DepEd): Educational tours/exposure trips to the MRF
- Non-governmental organizations (NGOs) and the media: Product marketing

Moreover, various by-products have been generated for the livelihood program of the municipality. The municipal government has also sought the support of the Provincial LGU of Rizal and the Department of Agriculture (DA) in the conduct of cross-visits for prospective buyers.

LAWS AND RESTRICTIONS

The LGU program-driven enterprise complies with RA 9003, specifically in the reduction and conversion of solid wastes into organic fertilizer. The organic fertilizer is yet to be certified by the Pesticide and Fertilizer Authority (PFA) and Department of Trade and Industry (DTI).

SALAD GREENS AND CULINARY HERBS PRODUCTION FROM AN INTEGRATED SOCIAL FORESTRY (ISF) PROJECT

Location: Sitio Boso-Boso, Bgy. San Jose, Antipolo City
Entrepreneur: Dominador Bascara
Author: Aida R. Ceniza

Salad greens and culinary herbs are basic ingredients in making salads and pasta dishes. Lettuce is a common and well-known example of a salad green, while culinary herbs include tarragon, peppermint, basil, rosemary, oregano, and arugula. These leafy greens can vary in flavor, from mild to zesty, and they are favored because of their crispiness and crunchiness.

The growing market demand for salad mixes indicates the increasing consciousness of consumers on the benefits of green vegetables to human health and digestion. Salad mixes can be bought from large groceries and supermarkets. A packaged salad items may comprise lettuce or assortment of culinary herbs with varying blends of textures and flavors.

Growing lettuce and assorted herbs, which started out as a hobby and a source of vegetables for family consumption, has turned into a lucrative enterprise for the Bascara family. Mr. Dominador Bascara was able to maximize their 1.5-hectare land awarded through the Integrated Social Forestry (ISF) Program in 1998. Since then, the family enterprise became a regular supplier of fresh lettuce, tarragon, peppermint, basil, rosemary, oregano, and arugula in major grocery stores around Metro Manila.

METHODS OF PRODUCTION

Materials and equipment

Seeds for planting
4 units green house
25 plastic trays
6 sprinklers

Carbonized rice hull
Animal manure
Vermicast
Eggshells

Mushroom substrate
Coco coir

Procedure

Step 1. Germinating seeds in trays: For every 100 sq. m. of planting area, 5 g of lettuce seeds can be germinated in 25 plastic trays (8×10 in.), or an equivalent total population of 2,000 seedlings.

- To prepare the medium for germinating seeds, mix 10 kg of carbonized rice hull, two pails of vermicompost, a sack of mushroom substrate, and a pail of coco coir.
- Put the mixture in plastic trays and sow 1–2 seeds per hole.
- Cover the seeds lightly with soil and water them using a sprinkler with fine mist.
- Transplant seedlings as soon as 2–3 pairs of leaves appear or they have grown to 4–5 cm.

Germinating and transplanting seedlings

Step 2. Lettuce production in the greenhouse: One greenhouse covers 100 sq. m., which can be subdivided into 10 plots with area of 1×10 m. The ratio of mixture per 100 sq. m. is 36 sacks of carbonized hull, 18 sacks of animal manure, 30 kg of vermicompost, and 6 kg of eggshell powder.

- Plow and harrow the planting area. Pulverize the soil and mix thoroughly 36 sacks of carbonized rice hull with 18 sacks of animal manure (dried chicken dung).
- Make 10 plots measuring 1×10 m each. Then, spread 3 kg of vermicompost and 0.6 kg of eggshell powder on top of each plot; mix them lightly into the soil. This mixture will prevent the soil from becoming acidic.
- Transplant the seedlings at a distance of 15×15 cm between rows.
- Water immediately the plants to prevent wilting. To avoid evapotranspiration, the recommended time is 9 a.m. or 1 p.m., but either of the two should be done on a regular basis. Subsequently, water the plants every other day, still at regular time intervals.
- Cultivate plants regularly and remove weeds. For pest control, spray organic insecticide using crushed red hot pepper (25 pieces per gallon of water) over infected seedlings.
- Harvest the lettuce 20–25 days after transplant. Harvest either by removing the outer leaves or the entire head of matured plants.

The leaves of lettuce are highly perishable and prone to wilting. Do not harvest during the hottest part of the day.

Step 3. Culinary herbs production (from either seeds or cuttings)

PRODUCTION FROM SEEDS

- Follow the same procedure as with lettuce for germinating seeds, but transplant in the open field.
- As soon as abundant shoots appear, harvest by nipping young (about 3–4 weeks old) shoots. Avoid harvesting for one week to allow new leaves/shoots to develop.

PRODUCTION FROM CUTTINGS

- Plow and harrow the planting area/field.
- Plant 3–4 cuttings per hill at a distance of 20–30 cm between hills and 50–75 cm between rows.
- Cultivate plants using a hoe or animal-drawn plow.
- Remove weeds manually to prevent competition with soil nutrients.
- Water the plants when necessary. Spray organic pesticide. (See under lettuce production.)
- Harvest by nipping young shoots/leaves approximately 4–5 weeks from planting. After every harvest, leave the plants for a week to allow new shoots to grow.

GENDER ANALYSIS

The family-led enterprise encourages gender complementation by hiring both husbands and wives. In the farm, male workers prepare the land for plowing, harrowing, and plotting. Other activities like sowing seeds in plastic trays, transplanting in plots, watering, weeding, and harvesting are shared by both men and women. If not caring for the family in their own homes, the wives participate in the enterprise to help their husband augment the family's financial needs. They are also motivated to join the business as this enhances their skills scientifically in terms of producing salad green and culinary herbs.

ECONOMIC BENEFITS

Sales	
Production	1,452,000
Product Cost	
Labor Cost	129,600
Material Cost	2,500
Total Product Cost	132,100
Fixed Investment	
Green House	350,000

Net Income= 1,319,900

$$ROI = \frac{1,319,900}{350,000 + 132,100} = \frac{1,312,900}{482,000} = 2.74 \text{ or } 274\ \%$$

MARKETING CONSIDERATIONS

There is high demand for lettuce and herbs, as people nowadays have become health conscious and they have started to value food items that are high in fiber. In retail stores, salad greens can be bought in individual packs and varying weights at affordable prices. Big supermarket chains are some of the regular buyers of these bulk-delivered green produce. Wholesale and retail selling can also be conducted directly from the farm site.

The medicinal benefits can also be added in the packaging. The following salad greens are known for their specific medicinal uses:

NAME	LOCAL NAME	SCIENTIFIC NAME	MEDICINAL USES
a. Lettuce	Letsugas (cebuano)	*Lactuca sativa*	It contains vitamin C to prevent scurvy and used especially in salads
b. Tarragon	Taragon (ilokano)	*Artemisia dracunculus L*	A culinary herb which is used for digestive disorders, toothache
c. Peppermint	Menta (cebuano)	*Mentha X Piperita*	It is use to soothe an upset stomach or to aid in digestion
d. Basil	Bidai (ilokano) Bouak (bikolano)	*Ocimum basilicum*	It is used in medicine for its digestive and anti gas properties
e. Rosemary	Romero (tagalog)	*Rosmarinus officinalis*	It is reported to help prevent liver toxicity, and had anti cancer and Anti-tumor properties
f. Oregano	Clavo (cebuano) Latay (subanon) Oregano (tagalog)	*Coleus aromaticus*	It is used for dyspepsia, asthma, chronic, coughs bronchitis, colic, flatulence, rheumatism
g. Arugula	Arugula (tagalog)	*Eruca vesicaria sativa*	It is rich in vitamin C and potassium

ECOLOGICAL IMPLICATIONS

Production of lettuce, herbs, and other green vegetables complements the food production program of the national government. It is a cheap source of vitamins, minerals, and fiber. The use of organic fertilizers and organic pesticides are encouraged because aside from being inexpensive, they are environmentally friendly and do not add harmful microorganisms to the soil.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

Department of Environment and Natural Resources (DENR): Issuance of Certificate of Stewardship Contracts (CSCs), technical assistance, and performance supervision of CSC holders.

LAWS AND RESTRICTIONS

DENR is the issuing agency of CSC in accordance with Proclamation No. 585 (June 05, 1990), which has segregated certain land parcels in Antipolo, Rizal as ISF program areas.

BAGS FROM RECYCLABLE TARPAULINS

Location: Bgy. Payatas-Area B, Quezon City
Entrepreneurs: Households from Bgy. Payatas-Area B, Quezon City
Author: Nery A. Alba

Nowadays, most advertisements are printed in tarpaulin. However, after some time, tarpaulins become waste materials. Nevertheless, tarpaulins can be recycled and turned into other usable products like bags, cell phone holder, and letter holder. In Bgy. Payatas-Area B, Quezon City, six households engage in the bag production enterprise using recyclable tarpaulins.

METHODS OF PRODUCTION

Materials and equipment

Sewing machine
2 scissors
60 kg recyclable tarpaulin
Lining material (optional)
Tape measure
Manila paper (for bag patterns)
3 bottles eco-friendly detergent (500 mL each)
180 pcs. zipper
1 small pack of candles
10 cones of thread
Working chair and table
Basin
Pail
Dipper (tabo)
Gloves

Procedure

Step 1. Collect recyclable tarpaulins from barangay-based material recovery facilities (MRFs) or other sources, such as the Metro Manila Development Authority (MMDA), and private and government offices.

Step 2. Hand-wash and clean the tarpaulins using eco-friendly detergent and water. Scrub-clean them using gloves. Rinse off the detergent and air-dry.

Step 3. Cut the patterns

- Prepare the pattern of the desired design. Use either the surface or back part of the tarpaulin.
- Using the pattern, hand-cut the bag dimensions based on their respective length, height, and width for each of the front, back, and side parts. Add 0.3-inch allowance for each part for sewing.
- To make bag handles, cut strips of desired length and width. Bags may have single or double straps.

Bags with advertisement/markings inside and outside

Step 4. Assemble the bag patterns.

- Sew together a sidepiece with the front part. If lining is preferred, sew each portion first with the lining material.
- To add handles, sew the strap ends about 5 inches from the top of the front part. Add zipper if preferred.
- Sew together the back and the other sidepiece.
- Complete the sewing process by affixing the front and back parts.

Straps may be bought directly from the market. Alternatively, recyclable materials like scrap cloth and old belt may be used. In addition, instead of using bag straps, holes with sewn straps can serve as handles and snap/magic tapes can be added.

Step 5. After sewing, use a lighted candle to smoothen excess threads.

Step 6. Package the products with labels/codes for easier identification in terms of size and price.

GENDER ANALYSIS

There is complementation in the work of men and women creating bags from recyclable tarpaulins. In Bgy. Payatas-Area B, women lead the production and marketing (i.e., looking for potential buyers and determining the pricing) whereas men oversee the transport and cleaning of recyclable materials. Sometimes, children help in placing lining trimmings and removing excess threads prior packaging. Wearing masks while cleaning is needed to protect the workers from inhaling any potential toxic substances from the tarpaulins.

One of the women entrepreneurs, Ms. Adelaida Nebres, has earned regular income from sewing 6 tarpaulin bags for about 4 hours a day. She also finds minimal conflict with time spent for the home.

ECONOMIC BENEFITS

Sales	
100 Ordinary shopping Bags can be made daily from 60 kg tarpaulin 30 kg, 30 manday at Php. 75	13,500
Cost of Materials	
Tarpaulin	900
Eco- friendly detergent	81
Zipper and zipper slider	1,260
Straps and including edging and handle	375
Thread	250
Candle, small	30
Depreciation cost of sewing machine	50
Total Cost of Materials	2,946
Fixed Investment	
Working Table	300
Chair	250
Pair of scissors	1,000
Pail, plastics, 5 liters	120
Basin, plastic	250
Dipper, plastic	15
Sewing machine, second hand	6,000
Pattern paper, Manila paper	6
Tape measure	15
Gloves	25
Total Fixed Investment	7, 981

Net Income = 10, 554

$$\text{ROI} = \frac{10{,}554}{7{,}981 + 2{,}948} = \frac{10,554}{10{,}927} = 0.96 \text{ or } 96\%$$

MARKETING CONSIDERATIONS

Tarpaulin bags are durable and are better substitutes for ordinary shopping and plastic bags. An effort to recycle tarpaulins into unique, stylish, and one-of-a-kind bags can help local communities generate household income. Finished products may take the form of shoulder bags, shopping bags, wallets, envelope bags, among others. Bag-makers anticipate that their products will be particularly appealing to customers with social and environmental consciousness.

At present, there is no permanent market outlet for bags made from recycled tarpaulin. Occasionally, entrepreneurs participate in trade fairs. In some instances, interested buyers go directly to individual sellers.

Forming a credit cooperative can help improve and strengthen this household-based enterprise. Initial assistance from local government units (LGUs) and Congress officials can be tapped for financing and in the procurement second-hand sewing machines.

ECOLOGICAL IMPLICATIONS

Through this enterprise, bag-makers become educated in methods of recycling wastes. By transforming recyclable tarpaulins into bags, local entrepreneurs eventually help preserve the environment. Sourcing recyclable tarpaulins can be undertaken with the cooperation of government and private offices. Moreover, except for some tarpaulin linings that serve as filling materials, waste products generated from this enterprise are minimal.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

- Office of the Mayor and Vice-Mayor of Quezon City: Funding and training assistance; provision of recyclable tarpaulins; enterprise promotion; and schedules for trade fairs
- Department of Environment and Natural Resources (DENR): Coordination with environmental organizations to help outsource recyclable tarpaulins

LAWS AND RESTRICTIONS

Republic Act No. 9003 (Ecological Solid Waste Management Act of 2003)

REFERENCES

Personal interview with Emerlita R. Balasbas, Livelihood Trainor of Bgy. Payatas, Quezon City (January and May 2010).
Personal interview with Adelaida Nebres of Bgy. Payatas, Quezon City (October 2010).

BASKETS FROM WATER HYACINTHS

Location: Carnival St., BF Resort Village, Bgy. Talon 2, Las Piñas City
Entrepreneurs: Sagip Ilog volunteers
Author: Teresa S. Salanguit

Creating baskets from water hyacinths (*Eichhornia crassipes*), commonly known as water lily, is an offshoot enterprise of the award-winning Las Piñas Sagip Ilog Rehabilitation Program. Sagip Ilog volunteers-turned-entrepreneurs were trained by the Product Design and Development Center of the Philippines (PDDCP) and in coordination with Order.Com Trading, Inc. in order for them to develop a good quality product line. This technology has been widely adopted in other areas in Metro Manila like Pasig, Taguig, and Muntinlupa, and in other provinces in the country.

METHODS OF PRODUCTION

Materials and equipment

20 pcs. of 3-feet-long dried water lily stalks
(for round grocery basket measuring 8×6×3 in.)
2.67 ft. galvanized iron (GI) wire (#10)
8 ft. rattan wicker
500 mL glue
1 bottle natural varnish
1 can lacquer paint
1 bottle anti-fungal and mold liquid
1 pc. graduated cylinder or any liquid measuring device
Iron cutter/scissors
1 unit bending machine with cutter
1 unit blowtorch
1 unit spot welding machine
1 unit oven dryer
1 LPG tank

Procedure

Step 1. Pre-treat the stalks

- Gather water lily stalks measuring at least 3 ft. long. Remove leaves and roots. Wash to remove silt or soil.
- Lay the stalks separately on a concrete floor or iron sheet and dry under the sun. If rainy, dry the stalks using gas-fed or electric oven (e.g., in a gas-fed oven, drying lasts 12 hours; in an electric oven, 2 hours). After 4 days, bind together 100 dried stalks.
- Mix 1 mL of the anti-fungal and anti-mold liquid using with 1 gallon of tap water to make a solution.
- Dip both ends of the stalks into the solution for 15 minutes.
- Air-dry the stalks for another day.

For product variation, dip the dried stalks into a dye solution to alter their natural color. Air-dry after dyeing.

Step 2. Assemble the basket frame.

- Cut GI wires (#10) into different lengths: one 8-inch wire for the upper rim, one 6-inch wire for the bottom rim, and six 3-inch wires for the connectors. Use a bending machine to straighten the cut wires and to ensure wire evenness.
- Bind the wires together and connect them using a spot welding machine.

Step 3. Create the woven baskets.

- Cut rattan wickers (32 pcs.), each measuring 3 inches. Using the stalks, weave by inserting the rattan wickers at even intervals.
- Cut the excess fibers.
- Subject the basket into a quick flame using a blowtorch to remove finer fibers and to enhance the basket's texture.
- Mix 500 mL of glue with 5 gallons of water. Dip the basket into the solution for 1 minute; this will increase stalk cohesiveness and make the product durable.
- Paint the woven basket with natural varnish mixed with an equal amount of lacquer.
- Air-dry the finished product before delivery or shipment.



GENDER ANALYSIS

The enterprise encourages the complementation of men and women. It also strengthens family ties. Men perform all activities in basket production (i.e., harvesting of water lily stalks, sun/oven-dying of stalks, air drying, wire cutting, wire frame bending/welding, weaving, trimming, blow torching, glue application, and varnishing) whereas women perform the other aspects of the production, except harvesting stalks, wire cutting, frame molding, and blowtorching. Men spend 8 hours a day doing the aforementioned activities; women spend 2 hours a day, thus giving them ample time to do their reproductive roles with their families. At least 12 families with average of 7 members earn PhP7,000/week from weaving baskets. For every piece of finished product, weavers (mostly women) are paid PhP15.00.

In the production process, protective gears like masks and gloves should be worn at all times.

ECONOMIC BENEFITS

SALES ----------	**55,000.00**
1,000 pcs. Of Baskets @ P55/pc.	
PRODUCTION COST ----------	**34,000.00**
Raw Materials - 30,000.00	
Salaries for technical person - 4,000.00	
INCOME ----------	**21,000.00**

RETURN ON INVESTMENT

$$\frac{21,000.00}{34,000.00} = 0.62 \text{ or } 62\%$$

MARKETING CONSIDERATIONS

Baskets made from stalks of water lilies are used locally to package groceries, fruits, and other gift items, especially during the Christmas season. Some clients who have set up stalls in major malls in Manila usually purchase woven baskets in bulk, but with specified designs and sizes.

For sustainability, the City Government has established the Las Piñas Basket Weaving Center to house the equipment and management team. The newly established Las Piñas City Arts and Crafts Center promotes and markets the basket products, which are then exported to U.S., Europe, and Asia. According to Mrs. Soledad So, owner of Order.Com Trading, Inc., the demand for the products in the U.S. has remained stable despite the recent economic crisis. The retail price of a basket in U.S. is US$50–100. The volume of a single shipment for one product line is usually worth around US$30,000 for a delivery period of 6 weeks to 1 month.

tip Design piracy is rampant in the woven basket industry. Hence, after one delivery/shipment, modify the basket's design to stay on top of the competition.

ECOLOGICAL IMPLICATIONS

Water lilies thrive along polluted rivers, similar to the river systems around Metro Manila. According to environmentalists, proliferation of water lilies reflects the poor ecological conditions of river tributaries. Water lilies correspond to over-abundance of nutrients in untreated wastewater from domestic and industrial sources. Moreover, their presence is an impediment to flood control managers.

Thus, harnessing the potential of water lilies can help local government unit (LGUs) rejuvenate and preserve river systems. Indirectly, the enterprise can reduce flooding while providing viable sources of income to local communities.

Along Zapote River, a river system under rehabilitation, basket weavers gather the leaves and roots of water lilies and compost them together with other biodegradable wastes.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

The enterprise is supported by PDDCP, Order.Com Trading, Inc., Villar Foundation, Department of Science and Technology (DOST), Department of Trade and Industry (DTI), and Department of Tourism (DOT).

CROCHET BAGS FROM PLASTIC MATERIALS

Location: Bgy. 182, Mulawin-Maricaban, Pasay City
Entrepreneurs: Households of Bgy. 182, Mulawin-Maricaban, Pasay City
Author: Nery A. Alba

Years ago, Bukas Kamay Foundation and the Invisible Institute, two non-governmental organizations (NGOs), provided technical support to homemakers of Mulawin-Maricaban, Pasay City, to produce crochet bags made out of ordinary plastic shopping materials.

Originally, the livelihood targeted parents of bright but poor students. However, realizing that most did not know how to crochet, a larger training session was sponsored to accommodate the other mothers. What followed was a regular session of about 10 women gathering in the barangay hall to crochet bags using plastic materials. The enterprise was later continued by Ann Wizer of Invisible Institute; as designer and mentor, she continuously introduces improvements in the product line and seeks buyers locally and abroad. Since then, the residents have formed a group now headed by Mrs. Teresa Tanierga.

METHODS OF PRODUCTION

Materials and equipment

2,400 pcs. of 12×15 inches (large) plastic bags
Crochet hook (No. 4/5)
Scissors
12 sachets eco-friendly detergents
Working table and chair
24 pcs. of 12-inch zippers
Cardboard to serve as a plastic roller
Crochet patterns/designs
12 sewing threads (small tubes)
13×4×16 inches old cloth for lining
Second-hand sewing machine

Procedure

Step 1. Collect plastic bags from homes, offices, or local material recovery facilities (MRFs).

Plastic materials from old video/cassette tapes and internal wiring of computers may also be used.

Step 2. Wash thoroughly and scrub-clean the plastic bags using eco-friendly detergents. Rinse off the detergent with clean water. Air-dry the plastic bags.

Step 3. Sort the plastic bags by color and size. A combination of varying colors may be used depending on one's taste.

Step 4. Cut the plastic materials to produce yarn-type plastics.

- Lay smoothly a piece of plastic bag in the working table.
- Trim the lower end and handle portions of the plastic bag.
- With the trimmed portions of the plastic material positioned on the left and right sides, fold horizontally the material into half, but set aside about 1.5 inches of the top unfolded. Continue folding horizontally until the plastic is about 1 inch.
- Cut the in 0.75-inch intervals, but leave the unfolded top portion uncut. Continue cutting up to the rightmost portion.
- Unfold the material and hold the uncut portion. Cut the leftmost part slant-ways to the left.
- Continue cutting in a slanted manner from the second leftmost lower portion to the first uppermost portion. Cut from the third left-most lower part then to the second uppermost portion and so on until you reach the rightmost portion. This will result in a single continuous plastic yarn.
- Twist and roll the plastic yarn on a cardboard so that it looks just like a commercial yarn.

Creating plastic yarns

Step 5. Design and assemble the crocheted bag.

- Prepare a pattern prior crocheting, as the bags may vary in size and design.
- Start crocheting using the plastic yarn.
- If lining is preferred, cut old clothing and sew this to the pre-woven crochet bag. Add accents like strap, zipper.
- Trim any excess threads.

Bag straps and other accents can also be crocheted.

Step 6. Pack the finished product and hang in the display area. Put labels/codes for easier identification (i.e., according to size and price).

GENDER ANALYSIS

Women oversee most of the production process. Both men and women perform the other activities, such as collection, cleaning, and sorting of plastic materials; they spend an hour a day doing these activities. Both the youth and adults partake in the finishing activities and quality control, which only entail 10 minutes a day. In terms of marketing, women oftentimes seek possible buyers and in determining the prices of the finished plastic products.

When aiming for closely crocheted designs (e.g., shells and flowers), 100 pieces of large plastic bags can produce one shoulder bag with lining in 12–14 days, and each bag can be sold at PhP800–1,000. With a simple design, two shoulder bags can be produced and these can be sold at PhP500–600 each if with lining or PhP400 without lining. The peak season of marketing is during Christmas and the summer break.

Given the use of much plastic, smoking should be banned in the production area. Workers should also wear masks to prevent untoward inhalation of toxic and the stingy smell of plastic materials.

A women-driven enterprise

ECONOMIC BENEFITS

Sales	**P 24,000.00**
Sale of 24 pcs shoulder bags with lining materials	
Product Cost	**62,370.00**
Raw materials	45,540.00
1/8 yard fabric scrap ½ kl of "retaso" Thread	
Labor	15,840.00
Tools/Equipment	990.00
Income	**16,830.00**
ROI = Net Income / Product cost	**.026 or 26 %**

MARKETING STRATEGIES

A number of items can be made from plastic materials, such as shoulder bag, wallet, shopping bag, portfolio, and cell phone holder.

During Christmas and the summer break, sales are obtained from bazaars, stalls in commercial areas, schools/offices, and locally sponsored trade exhibits. Customers, especially foreigners, are lured by the plastic-crocheted products because of their uniqueness, workmanship, style, and novelty. Understandably, entrepreneurs foresee that the bags will be of particular interest to customers who have strongly developed social and environmental consciousness.

The formation of a credit cooperative will help improve and strengthen this enterprise.

ECOLOGICAL IMPLICATIONS

One of the biggest campaigns on environmental awareness these recent years is the reduced use of plastic products. In the Philippines, supermarkets and department stores still use plastic bags in the purchase of consumer goods. It was only recently that big supermarket chains have begun selling reusable eco-bags, with added incentives to customers.

Moreover, if this enterprise is made popular nationwide, canal and river pollution can be minimized.

Except for some plastic linings, the waste produced is minimal because of the recycling component of the enterprise. Any waste material can be used as fillers for throw pillows and stuff toys, among others.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

Invisible Institute: Funding and training assistance
Department of Environment and Natural Resources (DENR): Enterprise promotion
Rural banks and cooperatives: Financial support

LAWS AND RESTRICTIONS

Republic Act No. 9003 (Ecological Solid Waste Management Act of 2000)

REFERENCES

Personal interview with Nellie Palevino of Bgy. 182, Marikaban, Pasay City, January 2010.
Personal interview with Corazon Tabios of Bgy. 182, Marikaban, Pasay City, May 2010.

FASHION ACCESSORIES FROM RECYCLED PAPER

Location: Carnival St., BF Resort Village, Bgy. Talon 2, Las Piñas City
Entrepreneurs: Sunshineville Sagip volunteers
Author: Teresa S. Salanguit

Old but colorful and glossy magazines, brochures, and flyers can be transformed into fashion accessories like earrings, bracelets, necklaces, anklets, and other fine paper crafts. In fact, Sunshine Sagip volunteers initially trained by the Coastal and Marine Management Division (CMMD) of the Department of Environment and Natural Resources-National Capital Region (DENR-NCR) now earn additional income from this recycled paper-based enterprise. Finished products are displayed at the Las Piñas City Arts and Crafts Center, which was established through the efforts of the City Government. Fisherfolks, barangay employees, and students from Navotas, Las Piñas, and Parañaque have also been trained on this business endeavor.

METHODS OF PRODUCTION

Materials and equipment

A. For the paper beads

Colored and glossy magazine
Aluminum ruler
Cutter
130 g glue
Scissors
1 bottle natural varnish
2 pcs. sewing needles
1 roll sewing thread

B. For the earrings

Carton or magazine cover
2–6 pcs. paper beads
Small long-nose pliers
Small pliers/cutter
2 pcs. fish hooks
2 pcs. head pins
2 pcs. eye pins
Few pieces of glass/plastic/wooden beads
Plastic cups
Re-sealable zipper storage bags (e.g., Ziploc)
1 wide-mouth container (for varnish)
Natural nail polish (optional)

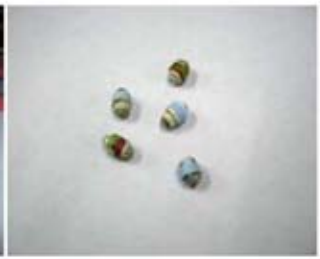
Plastic or wooden beads, hooks, and pins, can be bought at a cheap price in Divisoria and Quiapo, Manila.

Procedure

Part A. Create the paper beads.

Step 1. Select the most colorful pages of old magazines.
Step 2. Cut the pages into triangular strips of equal base and height. For smaller beads, the base of the triangular paper strips should measure about 2 cm. To increase bead length, widen the width of the base. To increase the diameter or thickness of the beads, increase the height of the triangular strips or use thicker paper.
Step 3. Roll a triangular strip from the base to the tip, but leave a pin-sized hole at the center. While rolling, hold the base of the paper strip between the thumb and the point finger and pull the other end to tighten the beads. Apply glue midway and at the tip of the paper strip.
Step 4. Sort the beads according to shape, color, and size. Then, arrange these into garlands using ordinary sewing thread and needle.
Step 5. In a well-ventilated or open area, dip the paper garlands in a wide-mouth jar containing natural varnish. Remove the garlands immediately and hang to air-dry.



Part B. Assemble the earrings.

Step 1. After drying, select beads of approximately the same size, color, and shape. To enhance earring design, add commercially bought plastic or wooden beads.
Step 2. Depending on the desired design, assemble the beads using eye pins, head pins, and fishhooks.
Step 3. Apply natural nail polish for product enhancement.
Step 4. For packaging, hook the earrings in pre-cut hard magazine covers, photographs, or mobile phone cards. Put the finished products in small Ziploc-type plastics.


Use more paper beads for uniqueness of products

GENDER ANALYSIS

Most of the trained volunteers, fisherfolks, and employees are women. However, the overall entrepreneurial activity manifests the complementation of both men and women. Masks should be worn when varnishing the products.

With pre-made paper garlands, an individual can produce 12 pairs of earrings in 4 hours day, which is about 20 minutes per pair. The entrepreneurs have become productive during their free time, even when watching telenovelas, sending babies to sleep, before and after the afternoon siesta, when chatting with friends and neighbors, or before going to bed at night.

ECONOMIC BENEFITS

With the assumptions that a housewife can produce 12 pairs within 4 hours/day at only 20 minutes per pair for 22 days/month, the following could be derived:

Total Annual Production Costs		**PhP 14,256.00**
Costs of materials per pair of earring:		
• 2 pcs. Fish hooks	: PhP 0.40	
• 2 pcs. Head pins	: 0.30	
• 2 pcs. Eye pins	: 0.30	
• 4 pcs. acrylic/plastic beads	: 0.20	
• 2 pcs. paper beads	: 0.10	
• 1 pc. zip lock,small	: 0.20	
	PhP 1.50	
Annual costs of materials	: PhP 4,752.00	
Labor Cost/pair/day/person	: PhP 3.00	
Annual labor costs	: PhP 9,504.00	
Total Annual Sales		**PhP 47,520.00**
❖ Sales per pair of Earring	: PhP 15.00	
Return of Investment		**PhP 33,264.00 (233%)**

Product pricing depends on the design and types of beads used.

MARKETING CONSIDERATIONS

Fashion accessories are normally sold in malls, bazaars, and even along busy streets. Entrepreneurs of paper-made accessories also sell directly their products to friends, relatives, schoolmates, or co-workers. Earrings in particular are very affordable and can be sold as low as PhP15.00/pair. By using recycled paper, each bead is virtually different from the other.

Accessories made by Sunshineville Sagip volunteers are sold at the Las Piñas City Arts and Crafts Center, which is open from Monday to Saturday and is often visited by foreign and local tourists. The center also initiates exhibits during local celebrations to highlight the various handicrafts produced by the locals.

ECOLOGICAL IMPLICATIONS

Old, colorful, and glossy magazines are type of wastes that are not traditionally sold to junkshops, although very few recyclers buy such at minimal cost. One reason is that reprocessing these items is too expensive for local paper mills. Hence, the tendency is to discard paper wastes into trash bins, if not altogether burned. However, burning of any form of garbage is prohibited by Republic Act (RA) No. 9003, also known as the Ecological Solid Waste Management Act of 2000. Hence, through this enterprise, the further emission of carbon dioxide can be minimized.

The activities involved in this recycled paper-to-accessory enterprise result in minimal solid wastes. Trimmings can be composted easily with other biodegradable wastes. In addition, rejected paper beads can be made into other crafts like mosaic, curtain blinds, rosaries, and other novelty items.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

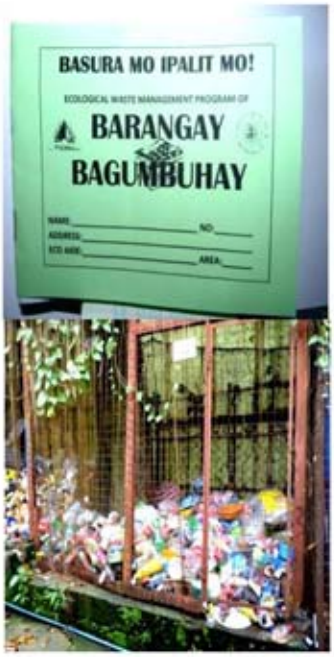
Technical support and training is provided by CMMD of DENR-NCR.

LAWS AND RESTRICTIONS

RA 9003 prohibits the open burning of any type of refuse. Penalties may include PhP300–1,000 fines or 1–15 days of community service in the locality where violations have been committed.

MANAGING A RECYCLABLE EXCHANGE CENTER

Location and Entrepreneur: Local government of Bgy. Bagumbuhay, Project 4, Quezon City
Author: Esmeralda P. Andres



Initiated by the local government, this enterprise helps address the role of barangays in implementing Republic Act (RA) No. 9003 (Ecological Solid Waste Management Act of 2000.) A material recovery facility (MRF) was set up for this purpose. Managing the MRF enterprise revolves around two systems: (a) collection of recyclables from households and designation of corresponding points for each item and (b) exchange of accumulated points with basic consumer items. With this scheme, households can avail assorted goods from the barangay using points from their turned-over recyclables, which translates into augmented daily expenses. The barangay also derives its own extra income from the MRF enterprise to finance its various projects.

About 1,600 households reside in Bgy. Bagumbuhay, one of the model barangays consistently recognized for its implementation of RA 9003. In 2002, Bgy. Bagumbuhay was a pilot area of the Community Livelihood Assistance Special Project (CLASP) of the Department of Environment and Natural Resources (DENR). Financial assistance of PhP150,000 was provided to jumpstart the composting project for home garden and nurseries; the aim was to provide additional income for the community and to impart management skills in segregating biodegradable waste in the area. Intensive information, education, and communication (IEC) campaign was done by the Barangay Council through three of its women members and with the assistance of senior citizens who also mostly comprise women.

METHODS OF PRODUCTION

Materials and equipment

100 plastic sacks
Plastic twines
400 passbook-type ledgers to be distributed to households
Calculator
Office supplies (e.g., bond paper, logbooks, marking pens, and cutter)
Exchange goods (e.g., food, soap, and basic medicines)
4 pushcarts

Procedure

Step 1. Site requisite (preparatory activity): For barangays with open spaces, implementers need about 15 sq. m. of compartmentalized facility to include a small receiving area for the enterprise management. For barangays with unavailable open spaces, a container van may be used.

Step 2. Develop the internal systems for the recyclable exchange center.

- Study the pricing of recyclables in bigger junkshops within the barangay or adjacent areas.
- Contact service providers who can give the best pricing in terms of subsequent purchase and pick-up of recyclables in order to save on transportation/trucking costs.

Step 3. Prepare a "price list" or exchange-for-points system for the recyclables.

SAMPLE POINT SYSTEM

TYPES OF RECYCLABLES	VOLUME	EQ. POINT/S
Glass bottles		
1. Gin	3 units	1
2. Catsup (big)	2 units	1
3. Catsup (small)	4 units	1
4. Beer	3 units	1
5. Lapad	2 units	1
6. Long neck	1 unit	1
7. Bubog	2 kg	1
Paper		
1. Newspaper	1 kg	3
2. Craft board	1 kg	1
3. Directory	1 kg	1
4. White paper	1 kg	3
5. Assorted waste paper	2 kg	1
Aluminum cans	1 kg	30
Aluminum or solid alloy	1 kg	35
Pet bottles	1 kg	10
Assorted plastic containers	1 kg	11
Steel (bakal)	1 kg	10
Stainless	1 kg	10
Tin cans	1 kg	2
Tapalodo/yero	1 kg	5
PVC	1 kg	1
Copper		
1. Class A	1 kg	200
2. Class B	1 kg	190
3. Class C	1 kg	180

POINTS-FOR-EXCHANGE

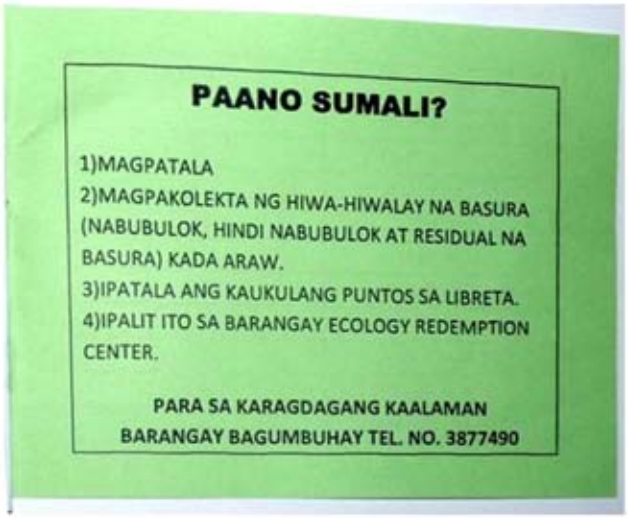
TYPE OF GOODS	EQ. POINTS
1. Laundry bar	30
2. Fabric conditioner	30
3. Dishwashing soap	25
4. Sardines (small)	20
5. Instant mami	10
6. Instant pancit canton	10
7. Amoxicillin, 500 mg	4
8. Ascorbic acid, 500 mg	5
9. Mefenamic acid, 250 mg	4
10. Paracetamol, 250 mg/60 mL	5
11. Others based on the needs of community	

Peg the points-for-exchange on the prevailing market price of specific recyclables.

Step 4. Stock the barter goods for your points-for-exchange system.

Step 5. Prepare and implement the IEC plan so you can disseminate your recyclable exchange center scheme to the residents. The IEC should serve to encourage family members to segregate solid wastes in their own homes. This can be done in partnership with different sector groups in the community.

Step 6. Prepare and distribute passbooks to each household in order to serve as ledger for accumulated points.



Step 7. Assign "eco-boys" who will collect recyclables from households. They will also take charge in filling up individual household passbooks. On a regular basis, the eco-boys should segregate, put in sacks, and label properly the materials collected from households. Store the recyclables in their corresponding compartments in the MRF.

Step 8. After accumulating the required volume, inform your pre-contacted bulk buyers to pick up the recyclables.

As an incentive to households, give additional points for recyclables that are cleaned and sorted properly.

GENDER ANALYSIS

Even if male-dominated by virtue of occupation, managing an MRF encourages men–women complementation, especially at the household level. The initial planning activities and conduct of IEC regarding the project can be done by either men and women over a period of 1 month. Households can lead the waste segregation activity in their own homes while the work of eco-boys can also be designated alternatively to women and the youth.

Collection is being done by eco-boys from 8:00-10:00 AM (Monday to Saturday), as well as the filling of individual booklets of households with corresponding points per accumulated recyclables. With this scheme, a household can avail assorted goods from the barangay using the points. This adds up to the daily sustenance of the family. The sale of recyclables, as soon as enough volume is accumulated, can be done once a month.

For occupational safety, the eco-boys should wear masks and gloves during the collecting, sorting, and packing activities.

ECONOMIC BENEFITS

SALES ----------		**652,800.00**
40 household/month x P1,600 x 0.85 x 12 months		
PRODUCTION COST ----------		**526,450.00**
4 eco-boys tocollect segregated wastes from Households @ Php2,800.00/month	134,400.00	
50% of sales of recyclables as additional Incentive/oncome for ecoboys	326,400.00	
Seed for buying recyclables and/or exchange goods	55,000.00	
Supplies and materials (Plastic sacks, plastic twines, ballpens, logbook, marking pens, cutter, Passbook, etc.)	5,000.00	
Calculator	500.00	
Depreciation cost	5,150.00	
FIXED INVESTMENT ----------		**51,500.00**
Compartmentalized recyclable Receptacle (20 yrs lifespan)	25,000.00	
Pushcarts, 4 sets @ 6,000.00/set (10 years lifespan)	24,000.00	
Weighing scale (hanging type, 50 kgs capacity, 10 years lifespan)	2,500.00	
Net Income ----------		**126,350.00**
Annual income		
Return on investment		**0.22**

$$\frac{126,350.00}{577,950.00} = 0.21 \text{ or } 21\%$$

MARKETING CONSIDERATIONS

With the passage of RA 9003, many junkshops and/or recyclers have sprouted around the country. A small barangay can initially avail the services of these types of junkshops. The services of bigger recyclers can be tapped for increased volumes of accumulated recyclables in the barangay. Accordingly, this translates to an increase in monetary gains of the MRF; that is, the higher the accumulated recyclables, the higher the price quote from recyclers. Moreover, some recyclers buy clean recyclables at a higher price.

ECOLOGICAL IMPLICATIONS

If implemented throughout the country, setting up properly managed recyclable exchange centers at the barangay level can strengthen the implementation of RA 9003. The participation of all communities will help the national government address problems on solid waste. Proper management of recyclables is not only a source of additional income for a family and the community from where it belongs. It also means protecting the environment.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

The activities of the MRF enterprise in Bgy. Bagumbuhay, Project 4, Quezon City is supported by the National Solid Waste Management Commission (NSWMC) and DENR.

LAWS AND RESTRICTIONS

RA 9003 (Ecological Solid Waste Management Act of 2000)

REFERENCES

Personal interview with Mr. Datiles, former chairman of Bgy. Bagumbuhay, Project 4, Quezon City.

Personal interview with support personnel of the City Government of Sta. Cruz, Laguna during the NSWMC exhibit at the SM North EDSA.

MARKETING OF LIVE PLANTS AND LANDSCAPE MATERIALS

Location: Manila Seedling Bank Foundation Inc. (MSBFI), Quezon City
Entrepreneur: Mrs. Delia Pionela
Author: Armando A. Combalicer

Live plants include trees, shrubs, bushes, cuttings, and slips used for indoor decoration or for outdoor landscaping. Some examples of high-value live ornamental plants used as potted or landscape materials are orchids, bromeliads, palms, ginger, *Mussaenda, Medinilla, Aglaonema, Heliconia,* and *Freycinetia*.

Mrs. Delia Pionela, the owner and manager of Del's Garden, is a seller of live plants and landscape materials. One of its stores is located at the Manila Seedling Bank Foundation Inc. (MSBFI) in Quezon City where it is on its second year of operation. Del's Garden commenced as a small backyard family business in Dolores, Quezon some 30 years ago. Mrs. Pionela is a member of various organizations like the Cactus and Succulent Society of the Philippines, Philippine Orchid Society, Inc., and Philippine Horticultural Society. She raises ornamental plants and sells them to neighbors and friends. For bulk orders, she sources out plants from large nursery owners and plant growers.

METHODS OF PRODUCTION

Materials and equipment

Water hose and sprinklers
Boxes/trays
Plastic bags
Pushcart
Pruning sheer, knives, trowels, and small shovel
Plant-tagging materials for labeling

Recycle grocery plastic bags and use these as receptacle for ornamentals.

Procedure

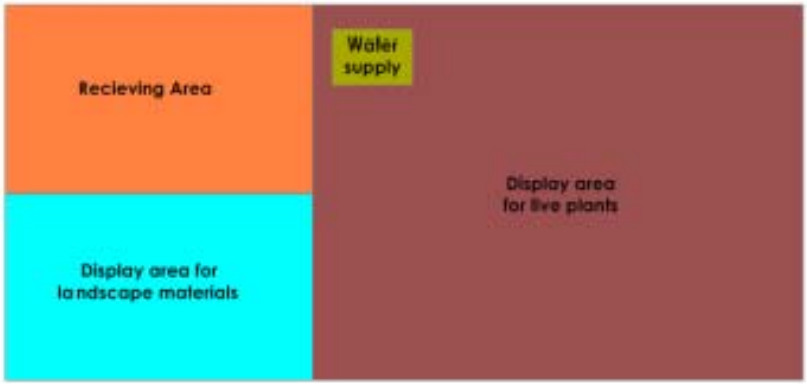
Step 1. Rent a garden shop. Based on these basic criteria below, select a shop that is ideal for marketing:

- The area should be large enough to accommodate the required number of live plants and landscape materials.
- It should be located near major roads or highways. In addition, it should be fairly near the population center.
- It should offer low rental rates.

MSBFI is of the places in Quezon City where live plants and landscape materials are sold in clusters of stalls. For new entrepreneurs, this is an ideal site to set up a garden shop/store.

Step 2. Manage the daily activities of the garden shop.

- Ensure the quality and health of plants by watering them regularly. Remove dead leaves and twigs.
- At the same time, maintain the cleanliness of the shop area. Arrange plants as if they are in a showcase area; this setup will enhance their aesthetic value to clients.
- Designate regular staff to receive orders from customers and to assist in the maintenance activities of the store.



Sample layout of a garden shop

Step 3. Manage your stock inventory. Conduct inventory at least once a week to determine sales, available plant stocks, and other supplies that need to be replenished.

Step 4. Source out other live plants and supplies from local growers, large nurseries, and garden shops. Alternatively, initiate trips to provinces known for their local plants and scout items with aesthetic value.

GENDER ANALYSIS

As a family-led enterprise, marketing of live plants and landscape materials is labor -intensive. In terms of complementation, men workers can supervise the trading and scouting of live plants, hauling of stocks, and maintenance. Meanwhile, women may engage in maintenance activities like watering, pest and disease monitoring, store supervision, and product marketing

and promotion. However, men and women can alternately supervise the store, which also enables them to perform their reproductive roles in the family.

ECONOMIC BENEFITS

Sales	
Live plants and Landscape	3,000,000
Product Cost	
Capital Outlay	
Delivery Truck	600,000
Materials and Supplies	35,000
Seed Money	600,000
Shop Rental	25,000
Fertilizer	12,000
Diesel	180,000
Wages	108,000
Maintenance Cost	
Shop Rental including Water and Electric Bill	316,800
Total Product Cost	1,876,800

Net Income = 3,000,000 – 1,876,800
= 1,123,200

ROI = $\frac{1,123,200}{1,876,800}$ = 0.59 or 59%

MARKETING CONSIDERATIONS

Recent physical developments in urban areas around the country has triggered keen interest in ornamentals and created great demand for indoor and landscaping using live plants. Bulacan, Cavite, Quezon, Laguna, Rizal, Cebu, Iloilo, Davao, and Cagayan de Oro already have their own thriving ornamental nurseries to supply the greening needs of their localities.

Plant-related implements like plant pots, plastic bags, potting media, and propagation trays can also be sold at the garden shop. The shop also derives additional income from landscape contracts and consignments.

ECOLOGICAL IMPLICATIONS

Marketing of live plants and landscape materials supports the greening program of the national government. Planting more trees and other plant species contribute significantly to the environment by moderating temperature, noise, and air pollution; they boost the capability of the ecosystem to overcome greenhouse gases. Plants also enhance the aesthetics, property value, and biodiversity of an area.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

Some of the partner organizations of Del's Garden are MSBFI, Cactus and Succulent Society of the Philippines, Philippine Orchid Society, Inc., and Philippine Horticultural Society.

LAWS AND RESTRICTIONS

- Secure business permits from concerned local government units (LGUs).
- The Department of Environment and Natural Resources (DENR) has promulgated Administrative Order No. 2008-08 in order to encourage and support the floriculture industry, as well as to adopt self-regulation in the conservation and sustainable utilization of Philippine wild flora.

RAGS FROM RETASO

Location: Bgy. Payatas A, Quezon City
Entrepreneur: Payatas A Multipurpose Cooperative
Author: Evangeline R. Marcelino

Creating rags is a process that not only involves the weaving of old cloth strips for cleaning purposes, but also making different patchworks like doormats, pot holders, table runners, and others. In the rag-making business, minimal capital is required, as strips from old cloth called "retaso" are used. In addition, because of the recycling nature of the enterprise, only minimal wastes are incurred.

METHODS OF PRODUCTION

Rags from retaso strips can be done two ways: (a) by hand weaving using a wooden frame and (b) by using a sewing machine.

Part A. By hand weaving using a wooden frame

Materials

1 kg retaso (for 4 rectangular rags)
12×16-inch wooden frame grid with 52×56 nails
Tape measure
Scissors

Procedure

Step 1. Cut retaso strips into 1-inch width.
Step 2. Tie the strips to form a thick thread. Roll them together to form a yarn-type ball.
Step 3. Loop the yarn using the wooden frame to create a pattern.
Step 4. Then, make the desired design of the rags/doormat.

Part B. By using a sewing machine

Materials and equipment

Retaso strips
Thread
Pattern paper
Scissors
Tape measure
Sewing machine

Procedure

Step 1. Prepare a paper pattern showing the design and shape of the rag.
Step 2. Cut the retaso into smaller sizes and shape that would correspond to the design of the rag.
Step 3. Sew together the pieces of retaso. Use excess cloth or trimmings (i.e., fillings) to patch gaps in the sewn rags.

Rags can be round, oblong, square, and rectangle. Then, 1 kg of thread can produce 200 doormats.

GENDER ANALYSIS

Making rags can be done by both men and women. However, for Payatas A Multipurpose Cooperative, most of the rag makers are women; they were organized purposively for the local women-led enterprise. The men in the community help the women sell the products in different areas in the city.

The women entrepreneurs consider this business endeavor as a "labor of love," given that rags can be done between household chores and while caring for the family. As per interview with Mrs. Estrella Fernandez, the head coordinator of Payatas A Multipurpose Cooperative, their members earn as much as PhP250/week by spending 6 hours/day in producing rags.

Creating rags from recyclable clothing has provided additional cash to cooperative members, as most are engaged in other forms of enterprise. In fact, majority of the women in Bgy. Payatas A earns extra income from making rags.

ECONOMIC BENEFITS

A. Using Washing Machine (*Annual Sales*)	
Sales	**P 79,200.00**
15 rags x 22 days x 12 months x P20/pc	
Product Cost	**62,370.00**
Raw materials	45,540.00
1/8 yard fabric scrap ½ kl of "retaso" Thread	
Labor	15,840.00
Tools/Equipment	990.00
Income	**16,830.00**
ROI = Net Income / Product cost	**.026 or 26 %**

B. Hand Weaving (*Annual Sales*)	
Sales	**P 39,600.00**
10 rags x 22 days x 12 months x P15/pc	
Product Cost	**15,366.00**
Raw materials	9,636.00
¼ kl of "retaso"	
Labor	5,280.00
Tools/Equipment *Wooden Frame* *Scissor*	450.00
Income	**24,234.00**
ROI = Net Income / Product cost	**1.57 or 157 %**

MARKETING CONSIDERATIONS

The identified markets for rags and doormats are the immediate neighborhood, marketplace, sidewalks, and along busy streets within and near Payatas. Bazaars and trade fairs are also venues for direct selling.

For greater marketability, use rubberized retaso to obtain good quality products.

ECOLOGICAL IMPLICATIONS

Making rags from retaso promotes recycling and is considered an environmentally friendly enterprise. Minimal wastes are generated during production. When fully utilized, no single piece of retaso is disposed. Moreover, excess scraps can be used as fillings for sewn rags.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

Payatas A Multipurpose Cooperative maintains regular customers, including the AFPSLAI Office and Bagbag Credit Cooperative in Novaliches, Quezon City.

LAWS AND RESTRICTIONS

Republic Act No. 9003 (Ecological Solid Waste Management of 2000)

REFERENCES

Actual interview with Mrs. Sonia Samonte, Everlasting-Payatas A, and Mrs. Estrella Fernandez of Payatas A Multipurpose Cooperative, Quezon City.

GARBAGS FROM TETRA PACKS

Location: Bgy. Lidong, Sto. Domingo, Albay
Entrepreneur: Lidong Women's Organization (LWO)
Author: Lida C. Borboran

"Garbags," as the name suggests, are bags made from garbage. It recovers and reuse waste materials, such as used juice packs, foils from junk foods and shampoo sachets, and other waste materials to produce useable items. The women-led enterprise is based in Bgy. Lidong, the largest among the 23 barangays in Sto. Domingo, Albay.

Plastic flowers made of straws may be included as design. Wooden handles may be used as alternate for bag straps. Crocheted pockets may likewise be included.

METHODS OF PRODUCTION

Materials and equipment

90 pcs. juice/tetra packs (enough for 5 pcs. of bags)
2 yards of cotton cloth
3 rolls of thread
3 reversible tapes
Scissors
5 bag straps
1–2 sewing machines (high-speed or ordinary)

Procedure

Step 1. Collection of juice packs

- Gather juice packs, shampoo sachet, or junk food foil packs from homes, parks, canteens of schools, and offices. LWO buys these items at PhP1.00 per 4–5 pieces.
- Wash and dry the collected recyclables.

Step 2. Bag assembly: Two types of bags can be produced from recyclable foils, non-woven and woven.

NON-WOVEN/ORDINARY BAGS

- Select similar foils and/or juice packs for uniformity.
- Using individual foils, sew the sides together to make the front, back, and side parts of the bag. The number of packs depends on the bag size.
- Using the connected foils, assemble and sew together the different parts.
- Line and pipe the edges with straps and cotton cloth.

- If preferred, attach handles by sewing bag straps or zippers/reversible tape for the lock.
- Inspect all parts of the bag and remove excess threads, protrusions, and other unclean parts before display.

WOVEN STYLE BAGS

- Cut foils into strips and fold the sides. The size of the strip varies depending on the size and design of the bag.
- Weave the strips to form the base and other parts of the bag.
- Assemble and sew together the different parts.
- Line and pipe the edges with straps and cotton cloth.
- If preferred, attach handles by sewing bag straps; zippers/reversible tape for the lock; or pockets by sewing another woven mat or cotton cloth inside or outside the bag.
- Inspect all parts of the bag and remove excess threads, protruding materials, and other unclean parts before display.

Cutting strips and assembling the woven bag

For woven bags, sew both sides of the strip to repair uneven cuts.

GENDER ANALYSIS

By the nature of the enterprise, women participate more in the production of garbags, although men are employed as well in the collection of recyclable foils. On the average, women spend 85 hours a week in producing garbags. By participating in the enterprise, both women and men can heighten their awareness on waste management, apart from earning extra income.

Women are motivated to participate in this enterprise because it can secure additional income for their family. It also enhances their productivity, minimizes idle time, and provides opportunity to provide their children tertiary education. However, some women opt not to participate if they would have to secure immediate sources of income (i.e., their labor is paid by the day) or if they have to attend to family concerns like health-related situations.

ECONOMIC BENEFITS

Equipment (fixed):

Sewing machine (High speed)	PhP 19,000.00
Sewing machine (ordinary)	PhP 11,000.00

Cost of materials per bag:

Bag 1 (1.5 ft. X 1 ft.)

Juice packs	PhP	4.50 (18 pcs at 0.25/pc)
Threads	PhP	5.00
Zipper	PhP	5.00
Cloth	PhP	20.00
Strap	PhP	10.00
TOTAL	PhP	44.50

Bag 2 (3 ft. X 3 ft.)

Juice packs	PhP	26.50 (106 pcs at 0.25/pc)
Threads	PhP	5.00
Zipper	PhP	10.00
Cloth	PhP	30.00
Strap	PhP	10.00
TOTAL	PhP	81.50

Bag 3 (woven; 1 ft. X 1 ft.)

Foils	PhP	7.50 (30 pcs at 0.25/pc)
Threads	PhP	5.00
Zipper	PhP	5.00
Cloth	PhP	20.00
Strap	PhP	10.00
TOTAL	PhP	47.50

BENEFIT COST ANALYSIS OF PRODUCING GARBAGS

ITEMS			COSTS
Revenue			8,435.00
Production Cost			5,590.00
Materials			1,740.00
Juice packs (1,000 pcs for 55 bags)	PhP	250.00	
Zipper	PhP	270.00	
Cloth	PhP	400.00	
Strap	PhP	550.00	
Thread	PhP	270.00	
Labor (PhP 70.00/woven bag)			3,850.00
Net income			**2,845.00**

ROI : P2, 845.00 / P5,590.00
or 0.508
or 50.8%

Note: Labor depends on the style of bag. PhP 70.00/woven bag, PhP 50.00/ordinary bag

MARKETING CONSIDERATIONS

Nowadays, bags from recyclables are becoming popular because of their value-added function. People have become greatly interested in eco-friendly products. Even supermarkets and some malls promote the use of environmentally sound items.

Office workers, fashionistas, students, and homemakers are the target clientele of this product. These types of buyers normally go for durable and reasonable, novel, and affordable items that they can use in any occasions. Being non-biodegradables, the bags are not easily worn out.

Fashionable and well-designed garbags can be sold in fair trades, market places, shopping malls, and display rooms. Labels and brochures can be used to promote the eco-friendly bags further.

ECOLOGICAL IMPLICATIONS

The garbags enterprise promotes proper waste segregation and management. It is responsive to the government's effort to sustain solid waste management, given that it primarily allows the segregation of wastes and minimizes the adverse impact of these to the environment. The enterprise also encourages households to segregate and dispose their wastes properly and use these for their own benefit. In effect, making garbags increase the entrepreneurs' awareness on the importance of waste segregation and management, and hence allowing them to participate in environment rehabilitation.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

Department of Trade and Industry (DTI): Training on design conceptualization
Local government unit (LGU): Product promotion (e.g., "One Town, One Product" program)

BIOFERTILIZER USING TRICHODERMA AND AZOTOBACTER

Location: Bgy. Guipis, Anilao, Iloilo
Entrepreneur: Guipis Primary Multi-Purpose Cooperative, Inc. (GPMCI)
Author: Erma D. Aguilar; Co-author: Rex A. Bajade

Guipis Primary Multipurpose Cooperative, Inc. (GPMCI) started its biofertilizer production in 2009 after it received a grant by the Agrarian Reform Fund to start up this livelihood project. GPMCI has continuously produced biofertilizers, thus allowing the cooperative to acquire sufficient profits. Aware of the potential of biofertilizers, especially among locally producing and low-cost organic farms, the cooperative eventually decided to expand its production. Accordingly, the Local Government of Anilao recognized the entrepreneurial efforts and finally invited the cooperative to display their biofertilizer products at the Municipal Agriculture Office.

METHODS OF PRODUCTION

Materials and equipment for composting (one-plot production cycle)

2 Li. trichoderma
2 Li. azotobacter
60 Li. water
Green leaves of kakawate or similar nitrogen-fixing species (e.g., ipil-ipil)
Animal manure
Biodegradable farm wastes
12 pcs. sacks or 15 mm plastic sheet covers
4 pcs. spading forks
4 pcs. spades
2 pcs. sprinklers
2 pcs. pails
1 pc. plastic container (60 Li. capacity)

Procedure

Step 1. Prepare a 1.5×7 m composting plot area. Ensure good drainage.
Step 2. Mix thoroughly 2 Li. of trichoderma with 60 Li. of water and set aside.

Step 3. Spread the farm waste (about 6-inch thick) in the prepared plot. Sprinkle the 6-inch-thick waste with trichoderma solution.
Step 4. Then, overlay kakawate leaves (about 6-inch thick), with twigs that were cut beforehand. Re-sprinkle with some trichoderma solution.
Step 5. Finally, overlay animal manure (6-inch thick). Re-sprinkle again with trichoderma solution.
Step 6. Repeat the overlaying and re-sprinkling procedures until the compost is 1.5-meter high.
Step 7. Cover the stockpile with thick plastic covers or sacks to avoid exposure to rain and sunlight.
Step 8. Water the pile daily to keep it moist.
Step 9. On the fifth day, turn and mix the pile then cover. Do this every 4 days up to the 45th day. The temperature of the pile will be hot at the earlier part of composting and will eventually cool down towards maturity. The compost is ready when it turns brown and smells like soil. On the 45th day (or even earlier), harvest the matured stockpile for composting.
Step 10. Spread the harvested compost in a shaded area and spray with a mix solution of 2 Li. azotobacter and 60 Li. water.
Step 11. Mix the compost material thoroughly and leave for 1 more day.
Step 12. Pack the compost in sacks and store in cool temperature until use.

ECOLOGICAL IMPLICATIONS

With green revolution technologies, modern agriculture has become increasingly dependent on the steady supply of synthetic inputs (i.e., chemical or inorganic fertilizers, pesticides, and additives), which are mainly oil-based and imported. The continuous, excessive, and imbalance use of these synthetic inputs have resulted in many adverse effects, such as soil microorganism depletion, low pH, and increased soil acidity. Consequently, plants, especially those that are edible, grow poorly and have low intake of essential trace minerals.

In the course of correcting these situations, the use of biofertilizer is deemed essential. Biofertilizers are natural organic fertilizers obtained from farm wastes, plant biomass, and other wastes. Fungus decomposers (e.g., trichoderma and azotobacter) are added to hasten the decomposition. Biofertilizers can supply the necessary nutrients for plants; they also help improve the natural microorganism environment, thus increasing soil quality. The use of biofertilizers in crop cultivation greatly helps in safeguarding soil health, resulting in high quality crop products.

The specific contribution of biofertilizers are as follows: (1) stimulated plant growth; (2) increased crop yield by 20%–30%; (3) replacement of chemical nitrogen and phosphorus by 25%; (4) soil activated biologically; (5) restored fertility of natural soil; (6) protection against drought and some soil-borne diseases; and (7) no adverse effects to the environment

GENDER ANALYSIS

The composting enterprise is a communal and voluntary project where access and participation, welfare and benefits, and control of resources are shared equitably among its members, thus making the business gender-friendly and self-sustaining.

In generating composts using the biofertilizer technology, different activities are jointly undertaken by both men and women members of GPMCI. The collection of animal manure, farm wastes, and green biomass are mainly overseen by women and children. Meanwhile, men do most of the hauling, mixing and maintenance, and harvesting of finished products. As a gender-friendly enterprise, both sexes are encouraged to participate to minimize the negative implications of the enterprise on women's household tasks or reproductive capacities. The participation of men, women, and children does not

hamper in their daily activities, either at home or at work/school, as the procedures do not require much time to accomplish. Continuous production is recommended since the product is saleable all year round, especially during the planting season.

In the process of doing the enterprise activities, handle sharp tools with care. In addition, use gloves and mask while doing the mixing process.

ECONOMIC BENEFITS

Item	Value (in Peso)	Total Value (in Pesos)
Sales 160 sacks (50 Kg) @ 300.00		**48,000.00**
Production Cost **Material:** Animal Manure - 100 sacks x 25.00 Trichoderma and azotobacter - 20 liters each @ 100.00/liter **Labor:** Setting of plots - 6 mandays x P150.00/d Mixing - 2 mandays x 8 mixing = 16 x 150.00 Harvesting - 4mandays x 150.00 Watering - 0.5mandays x 45 days x 150.00 Gathering of dried farm waste products/ materials & green leaves of nitrogen fixing plants	 2,500.00 4,000.00 900.00 2,400.00 600.00 3,375.00 2,400.00	**16,175.00**
Net Income		**31,825.00**
Return on Investment Net income/production cost		**1.97 or 197%**

MARKETING CONSIDERATIONS

The existing clients of GPMCI include project beneficiaries of Community-Based Forest Management (CBFM), Comprehensive Agrarian Reform Program (CARP), and Upland Development Program (UDP), the local government of Anilao, and residents in the municipality. Other target clients include owners of sugarcane plantations surrounding the production site.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

- Department of Agriculture – Soil analysis
- Sugar Regulatory Administration (Bacolod City, Negros Occidental) – Training and sourcing of fungus activators
- Local government units – Display center of products

BAMBOO POLE PRODUCTION FROM KAWAYAN TINIK

Location: Taba-ao, Tabogon, Cebu and Cansague Norte and Sur, San Isidro, Bohol
Entrepreneurs: Nagkahiusang Mag-uuma sa Taba-ao (NAGMATA) and
Cansague Norte and Sur Bamboo Planters Multipurpose Cooperative (CNSBAPMUCO)
Authors: Chona M. Tura and Lyndisa C. Quiachon

In Central Visayas Region, culms of Kawayan Tinik (*Bambusa blumeana*) bamboo species are commonly used for construction, furniture, parquet, concrete reinforcements, kitchen utensils, fish aggregating devices, handicraft industry, papermaking, farming implements, and other transport and household uses.

Bamboos are also planted along watercourses to prevent soil erosion; around farmhouses in villages to serve as windbreaks; and in fields for effective living fences or boundary marks between land properties.

METHODS OF PRODUCTION

Materials and equipment

Bamboo poles/culms, preferably 1- to 2-year-old to be used as cutting planting materials
10×12-inch plastic bags or black polyethylene bags
Sharp and blunt bolos
Hand saw
Digging bar
Sprinkler
Baskets for hauling the potted bamboo cuttings

Procedure

Step 1. Nursery operation

- Collect suitable culms for propagation from vigorous and healthy young mother clumps.
- Using a sharp bolo or handsaw, cut the whole culm into two-node culm cuttings. Each cutting should have one full internode (i.e., with two nodes intact) and an open internode above the second node, which will serve as receptacle or container during propagation.
- Pot the cuttings immediately in black polyethylene bags in vertical position, with the first node embedded into the soil while exposing the second node.
- Place the potted cuttings in a partially shaded area for about 1 month. Water

Bamboo culm vs. clumps

daily during the first 20 days.

- Fertilize the potted cuttings (preferably organic fertilizer) three weeks after potting. When chemical fertilizer is used, apply 15–20 g per cutting.
- Expose the rooted cuttings with sprouts to full sunlight after 1 month in the nursery for growth improvement.

The potting medium should constitute a garden soil or forest top soil that is loamy, containing high organic matter, and mixed with sand at 1:1 ratio. To ensure higher rate of survival, bamboo planting materials should be kept in a nursery for at least 6 months before they are planted in the field.

Cutting and potting bamboo culms

Step 2. Plantation establishment

- SITE SELECTION: Select a planting site at elevations from sea level to 3,200 m above sea level (asl) and with temperature range of 8.8–36.0° C.

Bamboo attains its optimum growth in well-drained and well-aerated sandy-loam and clay-loam type of soil and with a soil pH ranging from 5.0–6.0 while avoiding saline soils along salty or brackish water, as well as water-logged areas.

- SITE PREPARATION: Prepare the planting site following this step-by-step procedure: (a) remove or clear weeds vegetation at about 1 m wide through strip brushing; (b) conduct square/triangular and regular layout for riverbank and hillside rehabilitation, and vertical layout for reforestation and plantation development; (c) dig planting holes of about 60×60 cm, and (d) put stakes following a planting distance of 7×7 m.

To ensure high survival, conduct outplanting at the onset of the rainy season. Before planting bamboo, soils in the previously prepared holes should be removed. Holes are then filled with compost and top soil.

- HAULING OF PLANTING MATERIALS: Put potted planting materials in a suitable container, preferably in baskets (kaing) for easy handling and transport.

- PLANTING: Conduct planting in the morning or late afternoon to minimize evapotranspiration. When in sloping areas, plant along contours to maximize the water retention of growing bamboo plants. Cut and remove the plastic bag carefully to keep the ball of earth from breaking, as well as to prevent damaging the root system. Put the planting stock into holes in a slanting or horizontal position, with the root collar slightly deeper than ground level. Compress the surface soil firmly to release air around the newly planted bamboo. Mulch to reduce water loss and to make the top soil layer compact.

Step 3. Plantation maintenance and protection: Given that bamboo plantations are vulnerable to various destructions, such as fire, animal and human activities, pests, and diseases, the sustainable development of planted cuttings requires the following activities:

- Replanting or replacement of dead out planted cuttings;
- Removal of weeds and mulching; and
- Watering and fertilization (if needed).

Step 4. Harvesting

- Cut bamboo poles close to the base (about 15 cm above the first node) to maximize use of quality poles/posts.
- If butts (lower portion of the pole) are to be used for other purposes, cut the bamboo pole at 2-3 m aboveground.

GENDER ANALYSIS

The enterprise encourages the participation of both men and women in propagation and harvesting of kawayan tinik. In the propagation of planting materials, men and women devote 60 and 40 hours, respectively. In nursery activities like potting, care, and maintenance of potted seedlings, women and men spend 360 and 280 hours, respectively. In terms of hauling the materials from the nursery to the planting sites and subsequent planting activities, the ratio of works hours of men to women is 160:80. Protection activities take both of them 20 hours. In harvesting and marketing, men dedicate 8 while women allocate 4– 5 hours.

Women are motivated to participate in the enterprise because of the camaraderie and good leadership established by the officials of NAGMATA and CNSBAPMUCO. Moreover, beyond their traditional role as housewives, they can help their husbands earn additional cash income out of the sales of bamboo poles. However, women sometimes find it difficult to participate in the enterprise activities because they have to stay at home to take care of the children.

MARKETING CONSIDERATIONS

Bamboo pole production is a profitable venture for both rural and upland small farmers, thereby, augmenting their meager income. Generally, kawayan tinik is harvested as poles (average diameter of 10 cm and length of about 12 m). Each matured culm is sold at PhP100.00; this amount can already cover harvesting costs. For clumps from 6-year-old kawayan tinik, a maximum of 7–8 matured poles can be harvested every year if planted in a fertile soil. Nearby communities may serve as regular buyers.

ECONOMIC BENEFITS

One (1) hectare of Kawayan Tinik in 7 years

	YR. 1	YR. 2	YR. 3	YR. 4	YR. 5	YR. 6	YR. 7
SALES	--	--	--	--	--	70,000	70,000
700 poles @ P 100.00							
PRODUCTION COST	26,790	3,375	3,375	3,375	3,000	1,500	1,500
Nursery Operation							
Collection & Planting Stock Preparation	*1,250*						
Collection of Potting Soil	*2,500*						
Potting	*1,250*						
Maintenance	*5,760*						
Materials							
120 culms	*1,800*						
120 plastic bags	*480*						
Plantation Establishment							
Site Preparation	*4,375*						
Field Planting	*3,750*						
Maintenance							
Replanting	*625*	*1,875*	*1,875*	*1,875*			
Weeding/Brushing & Fertilizer application	*3,000*	*1,500*	*1,500*	*1,500*	*3,000*	*1,500*	*1,500*
Fertilizer Cost	2,000						
NET INCOME	-26,790	-3,375	-3,375	-3,375	-3,000	68,500	68,500
ROI	--	--	--	--	--	45.66	45.66

Assumptions:
- Labor cost = P 125.00/day based on the wage labor rate in the locality
- 20% allowance for mortality
- Spacing 7m x 7m; total no. of clumps = 204
- Farm gate price = P 100.00 per pole which already covers harvesting cost

ECOLOGICAL IMPLICATIONS

Bamboo is beneficial to environmental and land management. It offers fast-growing cover for deforested area, helps prevent soil erosion, and provides effective riverbank stabilization and watershed rehabilitation. In addition, some research has affirmed the role of bamboo in carbon sequestration.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

The enterprise has been supported by the Department of Environment and Natural Resources (DENR), having been one of its Community Livelihood Assistance Special Program (CLASP) beneficiaries.

LAWS AND RESTRICTIONS

The enterprise is supported by Executive Order No. 879 and "Creating the Philippine Bamboo Industry Development Council," with the primary aim of producing planting materials to attain DENR's mandate to plant bamboo in 20% of its reforestation projects. A permit is required in transporting bamboos from one province to the other.

SEAWEED FARMING

Location: Banacon Island, Getafe, Bohol
Entrepreneur: Banacon Fisherfolks and Mangrove Planters Association (BAFMAPA)
Authors: Chona M. Tura and Lyndisa C. Quiachon

Seaweed farming has been an alternative enterprise for coastal communities in Mahanay and Banacon Islands since the implementation of the Coastal Environment Project (CEP) in 2000. In these two islands, seaweed farmers commonly plant *Eucheuma spinosum*. Additional financial assistance was provided through the Community Livelihood Assistance Special Program (CLASP) Fund in 2004. Such livelihood option was introduced because of the small business enterprise's prospects of profitability; that is, many coastal inhabitants can start the business even with a small capital.

Many species of seaweeds are consumed as either cooked or raw food. Eucheuma and other seaweeds such as *Gracilaria, Gelidiella, Sargassum*, and *Turbinaria* are sources of important phycocolloids like agar, cargeenan, and alginates. They heavily utilized in many industries. Seaweed extracts are also used as raw materials in manufacturing commercial products.

In medicine, seaweeds are good therapeutic agents. They prevent many physiological and digestive disorders. Research (PCARRD) has also shown that some species of seaweeds have the potential for polyculture with shrimp and milkfish (PCARRD, 1986). Overall, this can increase production and provide additional income to fish farmers.

METHODS OF PRODUCTION

Materials and equipment

Plastic straw and soft-tie straw
Nylon rope
Goggles
Knife
Iron bar
Bolo
Scissors
Sledgehammer
Scoop net
Sacks
Baskets/basins and other containers
Stakes
Styrofoam as floating markers
Bamboo poles and wood post
Seaweed cuttings
Boat/Pump boat

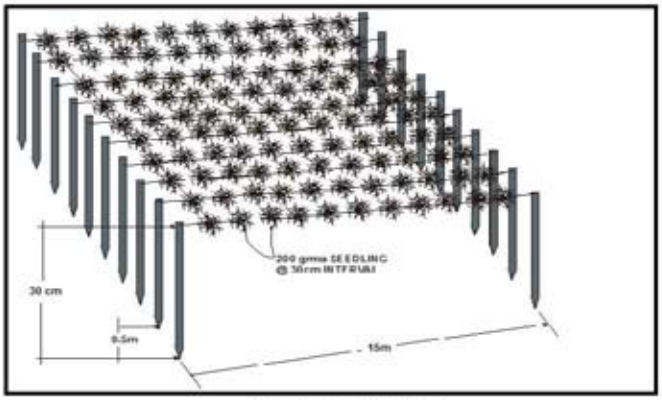
Procedure

Step 1. Select the site based on the following criteria:

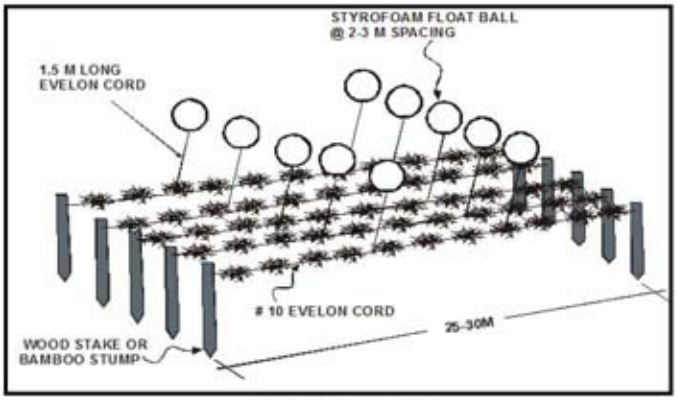
- Salinity ranging from 28–30 parts per thousand (ppt; salty water).
- Water temperature ranging from 27° to 30° C.

- Water depth of 0.5–4 m, either in low tide or in high tide.
- Bottom condition is firm, sandy, and rocky.
- Planting area is protected from large waves and strong winds.
- Area possesses good exchange of water.

Step 2. Culture the seaweeds by adopting either of the two: bottom monoline method or floating monoline method.



Bottom monoline



Floating monoline

Step 3. Seaweed propagation

- Tie the seaweed cuttings for use as planting materials to a 20 cm "soft-tie" straw.
- Weigh the cuttings to approximately 200 g per tie.
- Tie the cuttings to the monoline at 30 cm intervals. Accordingly, there will be 50 hanging seaweed cuttings for every 15-meter-length monoline.

Step 4. Maintenance and protection

- Conduct daily visitations.
- Remove debris and other foreign materials that are destructive to the seaweeds.
- Remove seaweed plantation grazers like sea urchins, starfishes, seahorses, or algae (locally known as lomot).

Step 5. Harvesting

- After 3 months from planting, harvest on a weekly basis.
- Harvest the entire plant and replant new cuttings. Alternatively, employ the pruning technique when harvesting the seaweeds.

Tip

Harvest by pruning branches and by leaving about 100–200 g of seaweed to grow again. Some seaweed farmers regularly harvest twice or thrice a week.

Step 6. Drying

- Lay the seaweeds in ground mats (e.g., fishnet, trapal, ramie sacks, and cellophane) or over a 2×10 m bamboo platform.
- Dry the seaweeds for 2–3 days during full sunny days or 7 days during alternating sunny and cloudy days.
- Regularly turn over the seaweeds to facilitate the drying process.

Tip

Protect sun-dried seaweeds from rain.

GENDER ANALYSIS

Seaweed farming is considered a gender-based activity and is non-discriminatory based on age. All family members can help performing the farming tasks. Both men and women participate in the propagation, maintenance and protection, harvesting, and drying activities. Harvesting covers 3 months after planting and is done on weekly basis at 2–3 times a week. Drying takes about 2–3 days in full sunny days; otherwise, it takes about 7 days. Moreover, children as young as 8 years old can help their parents, particularly in the preparation of straws for the hangings and monolines. They also help in planting, harvesting, and drying. These activities are done by children in their own homes after school hours, and during holidays and weekends.

Women are motivated to participate in this enterprise because they are provided the immediate cash to help augment the basic needs of the family. They also acquire new knowledge and develop their skills through hands-on experience, as well as from coaching by technical personnel.

Non-discriminatory in terms of gender and age

ECONOMIC BENEFITS

One (1) hectare farm of Eucheuma

	FRESH WEIGHT (P2.00/kg)	DRIED WEIGHT (P16.00/kg)
SALES	**P 177,760.00**	**P 203,154.24**
- 1 monoline can produce 40 kgs Eucheuma - 2,222 monolines in one hectare 88,880 kgs * for every 7 kgs fresh Eucheuma = 1 kg dried weight		
PRODUCTION COST	**119,386.20**	**127,386.20**
Fixed Investment	**74,922.00**	
Non-motorized boat	5,000	
Motorized boat	60,000	
Bamboo Platforms for drying (3 platforms)	2,500	
Goggles	600	
Scoop net	600	
Nylon Net	1,800	
Trapal	2,200	
Stakes (2 ft length)	2,222	
Depreciation Cost	7,492.20	7,492.20
Eucheuma cuttings 444 sacks	35,520	35,520
Empty sacks	15,554	15,554
Plastic Straw (black colored for monolines)	2,340	2,340
Plastic straw (soft tie for hangings)	1,960	1,960
Labor		
Planting	11,110	11,110
Maintenance	7,200	7,200
Harvesting / hauling	33,330	33,330
Drying & Sacking		8,000
Gasoline	4,880	4,880
NET INCOME	**58,373.80**	**75,768.04**
ROI	**0.48 or 48%**	**0.59 or 59%**

MARKETING CONSIDERATIONS

As of 2010, the farm gate price of E. *spinosum* is PhP16–P18.00/kg for dried *spinosum* and PhP2.00/kg for fresh weight. From an economic viewpoint, seaweed farmers are guided with the prevailing prices of the commodity. Thus, it is very important to identify and establish permanent and wider market outlets for the products.

ECOLOGICAL IMPLICATIONS

It has been observed that fishes feed on the seaweeds while some mollusks attach their eggs in monolines. The farm has provided food and habitat to fishes and mollusks. Moreover, seaweed farming has enhanced the farmers and islanders' awareness against illegal fishing, as this can directly affect the source of income.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

Strong linkage with concerned agencies, such as Bureau of Food and Drug (BFAD), Bureau of Fisheries and Aquatic Resources (BFAR), and Department of Environment and Natural Resources (DENR), is necessary for seaweed farmers to get support on technical and financial services.

LAWS AND RESTRICTIONS

National Integrated and Protected Area System (NIPAS) Act, as the area is within the protected area.

REFERENCES

Bureau of Fisheries and Aquatic Resources. Technology Guide on Aquaculture Production and Management, Cebu City, 2001, pp. 101–111.

Calumpong, H.P. and E.G. Meñez. Field guide to the common mangroves, seagrasses and algae of the Philippines, 1997, pp. 179–181.

Department of Environment and Natural Resources – Ecosystems Research and Development Services. Agal-agal (Eucheuma) Farming. DENR-6 Technology Transfer Series 6:1, January-March 1995.

Philippine Council for Agriculture and Resources Research and Development (PCARRD). State of the Art and Abstract Bibliography of Seaweed Research. Los Baños, Laguna, Philippines, 1995, Fisheries Research Series No. 7.

Trono, Gavino C. Field guide and ATLAS of the seaweed resources of the Philippines. Department of Agriculture, Bureau of Agricultural Research Fisheries Sector Program Marine Science Institute, College of Science, University of the Philippines, Diliman, Quezon City, 1997, pp. 227–232.

SUSTAINABLE MUDCRAB CULTURE

Location: Pagatban, Bayawan City, Negros Oriental
Entrepreneur: Roberto Sabillo
Authors: Joselito T. Sumabat and Lyndisa C. Quiachon

This mudcrab culture enterprise using King Crab (*Scylla serrata*) is a fisherfolk-designed technology that also contributes to the protection and conservation of mangrove sites. Mangrove serves as nursery grounds, shelter, and food source for fish and other sea creature apart from supporting fisheries production and aquaculture. One approach to this enterprise venture includes using a unit of floating nursery cage and three units of floating fattening frames, each with 30 empty plastic gallon containers. Covering 23 cropping periods (i.e., stocking of crablets/juveniles and subsequent fattening), the enterprise may reach 22 harvests a year.

METHODS OF PRODUCTION

Materials and equipment

2 pcs. crab trap for juvenile collection
Bamboo poles
Tie wire (#18)
Mononylon (#80)
Plastic gallon
Farmer's bolo
Plastic pail
Fish net
Jute sack
Scooping net (for crabs)
Scooping net (for debris/wastes)

Procedure

Step 1. Preparing the floating cage and fattening frame/compartments

- Construct a 6×2×1.5 ft. nursery cage using bamboo splits. Attach two bamboo poles at the bottom sides opposite each other to serve as floater. Make two openings (20 ×20 cm) at the top of the cage. Place a discarded fishnet on the cage floor to prevent crabs from fighting.
- Construct three units of 3×3.5×0.75 ft. fattening frames, each unit to accommodate 30 compartments. The size of each compartment should be big enough to fit the plastic gallon container. Then, attach two bamboo poles at the bottom sides opposite each other to serve as floater.
- Set up the crab-fattening compartments using an empty plastic gallon container. Discard the caps. Bore four holes (0.5 cm) around the lower side of the container and another four holes at the bottom. Make a 12×10 cm opening using a 10 cm tie wire for the hinge and lock. Fasten the gallons tightly in each compartment.
- Secure the nursery cage and fattening frames by tying them into a mangrove tree.

Floating cages and fattening frame/compartments

Tip Floating cage, fattening frames, and plastic gallon compartments can last up to 2–3 years.

Step 2. Selecting the site for mudcrab culture

- Select a good site, preferably with adequate mangrove vegetation and brackish water free from pollutants.

Tip Place the cages near the residence for protection and easy monitoring. The area to be selected should be partially shaded. To determine suitable water temperature and salinity, observe the mudcrabs; they usually try to climb unto the sides of the cage if the water is not tolerable.

Step 3. Collecting and stocking the crablets

- Purchase crablets or juveniles from certified sources; if not, collect them from the wild during early mornings or late afternoons using locally made crab traps. .
- Place the crablets (90 pieces plus 5% allowance for mortality) in a nursery cage.
- Rear the crablets for 2 weeks.

Collecting and stocking crablets

Crablets used in stocking usually have a carapace width of 3–5 cm; alternatively, their body weight should be about 80–100 g per piece. Crablets should be reared at least 2 weeks in a nursery cage.

Step 4. Feeding the crablets

- Feed crablets with trash fish, pounded soft seashells, kitchen leftovers, or kuhol twice a day (i.e., early in the morning or late in the afternoon). However, increase the feeds if crabs persistently search for food; this is to prevent fighting, which can cause crab deformity. The amount of feeding should be about at least 5% of the crab's body weight.

Aside from resource wastage, feeding crabs more than they can consume causes foul odor in the cage.

Step 5. Regular maintenance of crab storage

- Transfer crabs individually to fattening compartments after 10–15 days (from the nursery cage) using a scooping net. Tie each crab's pinchers using coconut or banana fiber.
- To clean the plastic gallon containing the fattened crabs, turn it upside down to release wastes and leftovers; this also avoids fouling. Then, clean each empty container by filling it with a handful of sand. Shake to remove algae.
- During low tide, if the area is without water, tow the nursery cage and fattening frames into mangrove areas where water is at least 0.5 m.
- Regularly remove debris, leaf litters, drifting seaweeds, and other wastes from the immediate area to ensure good water circulation and to prevent damage of cages and frames. Use a scooping net to remove floating wastes.
- For longer usage, lift and dry nursery cages and fattening frames if not in use.

If extremely needed, a small impoundment may be established under the mangrove trees to conserve water and to avoid the hassle of towing cage/frame into farther areas (especially during nighttime), which may expose the crabs to thieves. However, this intervention must be consistent with the Community-Based Forest Management Agreement-Community Resources Management Framework (CBFMA-CRMF).

Step 6. Harvesting and marketing of the crabs

- After 2 weeks in fattening compartments, harvest the mudcrabs by opening the slit of plastic gallon containers. Each mudcrab should weigh at least 200 g. Return lighter crabs into the compartment and fatten for another week.
- Leave gravid or "pregnant" female crabs, as evidenced by the orange mass on their belly, in the compartments. Preferably, release the gravid crabs into the wild for spawning.
- If orders are minimal, tie the crabs in bunch or place them in a basket (kaing) with banana leaves used for matting and covering. For bulk harvests and transport, place crabs in a wicker basket or crates; use wet jute sack for matting and covering.
- Occasionally sprinkle the crabs with water to maintain coolness if not immediately transported or disposed to buyer.

Even if the crabs' pinchers are already securely tied while in the compartment, wear globes during harvesting for safety measures.

GENDER ANALYSIS

Men and women contribute almost equally in every activity of the enterprise, except for the preparation of floating cages and fattening frame/compartments, which is men-dominated. Women lead the harvesting and marketing aspects.

In terms of welfare, the technology involved in the enterprise has increased the women's self-worth. It gives them the opportunity to share in the productive role while maintaining their reproductive role in the family. Activities are not time-consuming. In fact, floating cages can be stationed near the residence.

In terms of knowledge and awareness, as the ones left at home while the fishermen-husbands are out at sea, the women are able to develop their initiatives in finding ways to help augment the household income. Venturing into mudcrab culture/fattening was even the idea of the wife of the entrepreneur, Roberto Sabillo. She suggested the use of plastic gallons for use as fattening compartments. Both husband and wife, including children, actively work for the sustainability of the enterprise. Hence, both share the same knowledge and skills in the technology process.

Women are greatly motivated to partake in this kind of enterprise because of the following:

- Improved family bonding between husband and wife, including children, as they do the entrepreneurial tasks together. The family also spends time more fruitfully.
- The monthly family income acquired by the husband is augmented. In fact, the enterprise gives women the opportunity to send their children to school.
- The activities do not interfere much on the reproductive role of women in the household.
- Tasks are simple, do not require much manual strength, and are less time-consuming, unlike fishing and vending (i.e., fish catch) around the neighborhood.
- The children become more responsible by taking their share in the management of the enterprise during their free time. The activities do not interfere with their schooling. In fact, with enough school allowance, which is normally spent for school requirements, miscellaneous fees, and snacks, they are inspired further to go to school.

MARKETING CONSIDERATIONS

The local fisherfolk who pioneered this enterprise has revealed that the mudcrabs produced from their enterprise (i.e., using the aforementioned technology) are more appealing to and preferred by consumers. Accordingly, they are more delicious than the usual fattened mudcrabs. In addition, they are cleaner and less odorous. Their mudcrabs are harvested, stored, transported, and sold alive.

Market outlets include Dumaguete City and Cebu City. Mudcrabs that are sold to local markets in these areas can reach as high as PhP350/kg. Marketing in the neighborhood and local wet markets is also profitable even at the low price of PhP250/kg.

ECONOMIC BENEFITS

SALES	**123,750.00**
22.5 Kg mudcrab/harvest 22 harvest per year	
PRODUCTION COST	**80,485.10**
A. Cost of Materials	
Plastic gallon container	1,620.00
Plastic pail	200.00
Crab trap	250.00
Mononylon (No. 80)	750.00
Fish Net	150.00
Jute Sack	60.00
Bamboo poles	880.00
Tie wire (No. 18)	75.00
Trash fish, kuhol, etc.	5,000.00
Crablets	10,925.00
Farmer's bolo	350.00
B. Cost of Labor	47,306.00
C. Marketing Cost (5% of the Gross Revenue) (packing materials: ties, carton/basket, etc.)	6,187.50
D. Contingency Cost (10% of the Production Cost)	6,731.60
NET INCOME	**43,264.90**
RETURN ON INVESTMENT (ROI)	**0.54**

ECOLOGICAL IMPLICATIONS

- MANGROVE CONSERVATION: The enterprise complements efforts on mangrove rehabilitation and protection. The entrepreneurs are encouraged to plant and protect existing mangrove trees, as these help sustain their business operations. The technology does not destroy mangrove species. In fact, the enterprise can be a component of the mangrove development project for Community-Based Forest Management Agreement (CBFMA) holders.
- SOLID WASTE MANAGEMENT: Entrepreneurs are discouraged from dumping garbage in mangroves, as this would negatively affect their business operations. Entrepreneurs can also be tapped for mangrove and water pollution monitoring since they keep themselves abreast with water and mangrove conditions.

- BIODIVERSITY CONSERVATION: The technology can help ease pressure on mangroves, fish, seashells, and related resources. Efficiency in the utilization of coastal/marine resources is improved since trash fish are used as feeds.
- RICE PEST CONTROL: As the requirements for soft seashells are usually substituted by supply of kuhol, the enterprise can very well help in rice pest control.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

The enterprise seeks s assistance from Department of Agriculture- Bureau of Fisheries and Aquatic Resources (DA-BFAR), Department of Environment and Natural Resources (DENR), and Department of Trade and Industry (DTI) for technical and financial support on coastal resource management. Furthermore, have established linkages with local government units (LGUs) for assistance.

LAWS AND RESTRICTIONS

- Republic Act No. 7161 (Section 4; Banning of cutting of mangrove).
- Executive Order (EO) No. 263 (Community Based Forest Management) as the national strategy for sustainable forest management.
- Department Administrative Order No. 96-29 Implementing Rules and Regulations for EO 263 (CBFMP)

REFERENCES

Sumabat, J.T. Pagatban mudcrab culture: a fisherfolk design technology. Technology Transfer Series, 15(1). DENR-ERDS 7, Banilad, Mandaue City, 2004.

Bureau of Fisheries and Aquatic Resources, Region 7. In: Central Visayas Technology Guide on Aquaculture Production and Management. DA-BFAR 7, Arellano Blvd., Cebu City, 2001.

VINEGAR FROM NIPA SAP

Location: Bacay, Minglanilla, Cebu
Entrepreneurs: Diosdado Villala and Felix Barquirosa
Author: Nestor B. Molina

Nipa (*Nypa fruticans*) of the family Palmae is one of the species that predominates some mangrove areas in Central Visayas. Accordingly, workers tap female flower-bearing nipa palms to produce vinegar. The enterprise on sap extraction expands the income generation capacity of nipa farmers and mainly revolves around acquiring shingles from nipa leaves. Sap extraction does not interfere with leaf production as only matured leaves are harvested. Ultimately, this improves the quality of nipa shingles.

The enterprise's existence implies adequate supply of goods and cheaper local beverage (e.g., tuba) and vinegar for the community. In the event of surplus of nipa sap, this can be processed further into ethanol, hence increased income and employment in the locality.

METHODS OF PRODUCTION

Materials

Bolo	File	20-liter plastic container
Sickle	Nylon rope	4-gallon plastic containers

Procedure

Male flower *Female flower*

Step 1. Look for nipa palms that bear female flowers, as these are those that produce fruits.

Step 2. Prepare the female flower-bearing nipa palm for sap extraction by cutting some of its matured leaves. Retain the six youngest leaves using a sharp bolo. Remove the bracts that cover the fruit stalk.

Step 3. Hang a stone or any heavy object to pull the female flower/fruit stalk downward.

Tip The heavy stone will pull the flower/fruit stalk downward. However, this must not be too heavy to avoid breakage or injury to the stalk.

Step 4. Apply pressure onto the fruit stalk by kicking it 15 times every morning for at least 30 days. Kicking starts when fruits are newly developed; it ends when the fruit's color becomes whitish brown and the meat inside develops fully and has started to harden.

Tip Kicking should be light to moderately strong to avoid breakage or injury to the stalk.

Step 5. Clip the fruit stalk using a bamboo stick and tie it with a rope. Securely anchor the stick to the soil to maintain the stalk's downward position. Release the weight when the fruit bunch is ready for cutting. Cut either the tip of the fruit stalk or the base of the fruit bunch using a sharp sickle.

Tip Cover the cut portion of the stalk with mud to prevent exposure to excessive heat of the sun.

Step 6. Make two thin slices at the exposed cut of the stalk in the early morning or late afternoon to avoid evapotranspiration. Collect the flowing sap using a container. Ideally, slice and collect the sap daily.

Step 7. Package and sell the freshly gathered sap as tuba. Ferment the unsold tuba to produce vinegar.

GENDER ANALYSIS

This nipa-based enterprise can be done by both men and women. Men handle the preparatory activities of sap collection, including application of pressure through kicking, clipping, slicing, and gathering of sap or tuba. Meanwhile, women lead the nipa palm selection (i.e., for tapping), sap preparation, and bottling. In the event that the husband cannot do their activities due to illnesses or other reasons, the wife takes over temporarily. Wives also oversee the marketing activities, product promotion, and sales; in effect, they manage the allocation of income derived from the enterprise.

Overall, the self-worth of the women has increased. The enterprise has given them the opportunity to assist their husbands, if not altogether lead some of the production activities while doing their usual household chores.

MARKETING CONSIDERATIONS

Many prefer drinking tuba to other alcoholic beverages because of its low cost; when consumed in moderation, tuba does not cause any serious illnesses.

Selling vinegar command higher pricing compared with tuba. The demand for vinegar even increases when buyers vouch for its delicious taste. The price of both nipa-based vinegar and tuba can compete with similar products by virtue of easier entrepreneurial processes. In addition, nipa tapping for vinegar and tuba production does not interfere with leaf production, and hence entrepreneurs can still sell nipa shingles.

ECONOMIC BENEFITS

Sales	**P 183,600.00**
Sap produced	
Product Cost	**81,480.00**
Materials	7,650.00
Bolo	
Sickle	
File	
Nylon Rope	
Plastic container (liters)	
Plastic container (gallons)	
Labor	64,650.00
Marketing Cost	9,180.00
Income	**102,120.00**
ROI = Net Income / Product cost	**1.25 or 125 %**

ECOLOGICAL IMPLICATIONS

The extraction of nipa sap does not affect the present population of nipa stands. It even improves the growth and production of better-sized leaves. With higher income, nipa farmers are encouraged to plant more nipa, if not altogether protect and preserve existing nipa stands. Nipa sap extraction can save existing nipa stands from excessive and immature harvesting of leaves. Finally, in terms of waste generated, except for plastic containers, all of the materials required in the production are biodegradable. Moreover, plastic containers can be replaced by biodegradable bamboo containers.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

Department of Science and Technology (DOST) and Department of Trade and Industry (DTI) for product packaging, particularly on vinegar.

FURNITURE FROM RATTAN

Location: Bgy. Visares, Capoocan, Leyte
Entrepreneurs: Unyon sa mga Mag-uuma sa Capoocan (UMACAP)
Authors: RTD Felipe Calub, Leo Poculan, and Marcelina C. Espos

Rattan (*Calamus* spp.) is a non-timber forest species that have gained popularity specifically in the furniture industry due to its strength, lightness, versatility, and pliability.

Secondary to farming, the main livelihood, producing rattan furniture has become an alternative source of income for members of the Unyon sa mga Mag-uuma sa Capoocan (UMACAP). UMACAP has obtained a rattan cutting permit, thus allowing them to gather raw materials from 4,000 hectares of rattan natural stand and man-made plantation. Presently, UMACAP manages a 20-hectare rattan plantation. Aware of the existing natural rattan stand within the Community-Based Forest Management (CBFM) area, as well as the skills of some of its members, UMACAP ventured into this rattan furniture-making enterprise. The enterprise is also covered by a special project of the New Zealand Aid Program (NZAP) through the Department of Environment and Natural Resources (DENR)–Food and Agriculture Organization (FAO) Program.

METHODS OF PRODUCTION

Materials and equipment

Rattan poles and splits
Wood for framing
Sharp knife
Varnish
Sandpaper
Sanding sealer
Hammer
Nails

Procedure

Step 1. Peeling/scraping of rattan poles
Step 2. Sizing (bending) of rattan poles
Step 3. Weaving
Step 4. Framing

Sizing/bending, weaving, and framing

GENDER ANALYSIS

The enterprise overseen by UMACAP involves individual families. The products made by family members are displayed in their respective display areas, mostly in their own homes located along the national road.

Inasmuch as rattan-manufactured products are mostly displayed in their own house and since women usually stay at home, wives/daughters oversee the sales and marketing. Delivery of made-to-order products to Ormoc and Tacloban are initiated by the women; hence, money received from sales is usually kept by them. Accordingly, credit facilities are entrusted to the wives. In addition, wives have the final say on income allocation, such as which portion of the cash received should be re-allocated for the family enterprise. Nevertheless, any income and benefits derived from the sales is shared between the husband and wife.

The role of women in creating rattan furniture is fully recognized. Apart from sales and marketing, women partake in sanding, weaving, and scraping activities. After doing all the domestic chores at home, the wife joins her husband in the weaving, sanding, and spraying of varnish on finished products.

Residence/work area and display center along the national highway

In terms of hours spent per production, women participation is just about 50% compared with the men, as they still have to do domestic chores. Despite this, they still help augment the family income, noting that production tasks are shared between husbands and wives. Both allocate equal time in attending meetings, forums, or other skills enhancement activities. However, if the family engages in important activities that cannot be postponed, wives mostly attend the gathering and re-echo their discussion to their husbands.

Women are motivated to engage in this family enterprise because of the income derived from the sales of rattan furniture. They recognize that time spent at home can help strengthen their relationship with the rest of the family members. In addition, sharing the same passion for the enterprise also strengthens the family's moral and spiritual value.

MARKETING CONSIDERATION

Rattan furniture sets are displayed in the houses of individual families found along the national highway from Tacloban City en route to Ormoc City. Some are also displayed in Tacloban/Ormoc City and neighboring towns, but only upon specified orders by the proprietors. A single-sized bed is normally sold at PhP3,000, double beds at PhP3,500, and matrimonial beds at PhP4,000. Meanwhile, a sala set is typically sold at PhP4,000 and a lounging chair at PhP1,500.

ECONOMIC BENEFITS

For Beds

	SINGLE (in Pesos)	DOUBLE (in Pesos)	MATRIMONIAL (in Pesos)
SALES	**P 3,000.00**	**P 3,500.00**	**P 4,000.00**
1 Bed			
PRODUCTION COST	**2,727.00**	**3,237.00**	**3,561.00**
Wood from Framing			
2 x 3 x 6	120	120	240
1 x 2 x 6	20	20	20
Rattan			
Poles	960	960	960
Split	450	750	900
Nails			
Shoe tacks	75	150	150
CWN 4"	23	23	23
CWN 2"	92	92	92
Varnish	50	50	50
Sanding sealer	12.50	12.50	12.50
Sand paper	20	40	40
Labor			
Weaving	150	180	200
Framing, Sanding & Spraying	300	300	300
Overhead Cost	454.50	539.50	573.50
NET INCOME	**273.00**	**263.00**	**439.00**
ROI	**0.10**	**0.08**	**0.12**

For Sala Set

SALES	**P 4,000.00**
1 Sala Set	
PRODUCTION COST	**2,634.60**
Wood from Framing	
1 x 2 x 6	120
Rattan	
Poles	600
Split	750
Nails	
Shoe tacks	150
CWN	23
Varnish	50
Sanding sealer	12.50
Sand paper	40
Labor	
Weaving	150
Framing, Sanding & Spraying	300
Overhead Cost	439.10
NET INCOME	**1,365.40**
ROI	**0.51 or 51%**

ECOLOGICAL IMPLICATIONS

The UMACAP-led family-driven enterprise has developed a 20-hectare rattan plantation in their CBFM area. UMACAP also envisions developing another 100-hectare plantation not only to support the current needs of the enterprise, but also to address the environmental protection of the remaining natural rattan stands.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

UMACAP seeks the Department of Trade and Industry (DTI) for training support and product improvement so they can readily compete in the market. The barangay captain, through the Barangay Council, has also committed helping UMACAP members maintain peace and order in the area, a prerequisite for a fruitful entrepreneurial management.

LAWS AND RESTRICTIONS

Rattan cutting permits are secured from DENR.

TIKOG PRODUCTION

Location: Bgy. Serum, Basey, Samar
Entrepreneur: Tikog Workers Association (TWA)
Authors: Dr. Urbano B. Doydora, Dr. Eugenia N. Bautista, For. Emma C. Germano, and Christine Q. Buante

Tikog (*Filmbristylis globulosa*), also known as sea grass, is a sedge plant under the family Cyperaceae that usually grows in swampy areas in the Philippines, especially in Leyte, Samar, Bohol, and many parts of Mindanao. The plant grows and develops into clumps of several stalks that are 1–3 m long and 4 mm in diameter. These stalks are the sources of raw materials for the production of mats, handbags, placemats, baskets, tobacco cases, and other novelty handicraft products in Regions 8 and 10.

METHODS OF PRODUCTION

Materials and equipment

Plow
Harrow
Bolo
Pick mattock
Rake
Scythe/bolo
Nylon twine
Nylon rope
Digging bar
Spade
Grana dye
Cooking containers (e.g., cans, kettles, kawa, etc.)
Lag-ot (to flatten the tikog)
Empty sacks
Wheelbarrow
Thread

Procedure

Step 1. Production of planting stocks

- Collect tikog clumps with young tillers and suckers from both natural stand and man-made plantations.
- Cut stalks at about 15–20 cm from the base using a sharp bolo.
- Segregate the trimmed clump with mature stalks consisting of at least 2–3 young suckers or tillers.

Step 2. Site selection, preparation, and planting

- Select idle marshlands with clay loam or sandy loam soil with adequate moisture throughout the year.
- Brush and clean the area from any vegetation.
- Plow and harrow the area.
- Construct dikes (8x8 inches above the ground) and canals (6-inch wide and 10-inch deep) for efficient water management.
- Plant tikog seedlings following a planting distance of 12×12 inches



Step 3. Care and maintenance

- Conduct regular weeding and cleaning.
- Replant dead or missing seedlings two to three weeks after planting.
- Consult a technician from the Department of Environmental and Natural Resources (DENR) or Department of Agriculture (DA) regarding soil fertility status and use of fertilizers.
- Maintain good drainage, as stagnant water may affect the growth of tikog. In addition, do not allow stagnant water to permeate the tikog plantation as it triggers the incidence of pests and diseases
- Remove dead, deformed, damage, dried, and unused stalks to provide more space for young suckers or tillers to grow.
- Construct a compost pit where farm wastes and other debris from tikog can be stored.

Step 4. Harvesting

- Harvest tikog stalks once every three months.
- Select long and healthy stalks that are still green throughout their entire lengths.
- Immediately sundry the stalks after collection to achieve better color and quality.
- Grade the sundried stalks according to length and diameter.
- Bundle stalks with the same grade (e.g., 200 pieces long stalks and 220 pieces for shorter stalks)



Selective harvesting is applied because tikog plants continuously produce new stalks of different ages, height and classes. To achieve better stalk color and quality, harvest during sunny days; the harvested tikog should be sundried immediately.

ECONOMIC BENEFITS

One (1) hectare of Tikog in 3 years

	YR. 1	YR. 2	YR. 3
SALES	**P 241,540.00**	**P 422,690.00**	**P 845,390.00**
Production @ 5.00 per bundle	48,308 bundles	84,583 bundles	169,078 bundles
PRODUCTION COST	**85,860.00**	**86,625.00**	**115,581.00**
Establishment			
58 mandays @ P100.00 per day	5,800		
30 animaldays @ P150.00 per day	4,500		
Planting stalks	4,000		
Maintenance			
Weeding/Brushing	5,100	4,000	2,000
Pest/water	100	100	100
Fertilizer			
Labor	200	200	
Fertilizer application	1,000	1,000	
Replanting	60		
Harvesting	63,000	78,700	110,200
Bundling, Sorting, Hauling & Drying	2,100	2,625	3,281
NET INCOME	**155,680.00**	**336,065.00**	**729,809.00**
ROI	**1.81**	**3.87**	**6.31**

Assumptions:
- Harvesting is once every three months
- Ave. no. of clumps = 156, 048
- Yield every harvest = 2,520,000
- Average harvest in one year = 10,080,000
- Less 3.1% for wastage during harvest, including defective stalks = 31,996
- Net harvest (stalks) = 10,048,000
- Average length of stalks = 71.28 inches
- Average no. of stalks per bundle = 208

MARKETING CONSIDERATIONS

Tikog stalks are sold in bundles either dyed or uncolored. Stalks can also be sold either in the form of colored woven mats. Other processed products include wall decors, bags, hats, tobacco cases, and other colorful functional handicraft products.

Bundled dried stalks are usually sold to mat weavers in Samar and Tacloban City. The finished products are marketed in major cities like Tacloban, Cagayan de Oro, Davao, Cebu, and Manila while some are exported to foreign countries like Europe, Korea, China, and Hong Kong.

GENDER ANALYSIS

The enterprise is managed by the Tikog Workers Association (TWA) so majority of the members are women. Establishing the tikog plantation has become the priority activity of the association for sustainability of raw materials, as this supports their mat weaving production.

According to the women member of TWA, mats are sold for PhP350 each. Tikog stalks are sold only during mass production. An increasing number of women partake in harvesting, an activity done once every three months. They also oversee the air-drying process once tikog stalks are harvested. Moreover, planting is mostly performed by women. Replanting activities are done every 2–3 weeks after planting. Men on the other hand take over the site preparation, such as brushing, clearing, plowing, harrowing, drainage construction, and hauling of tikog.

Tikog production has been practiced ever since by locals of Bgy. Serum, Basey, Samar. Hence, it can be assumed that the entire community considers this economic practice as a regular family routine. Gender issues do not affect the sustainability of the enterprise. In fact, the enterprise helps reduces incidence of crime, as it generates new employment and increases revenue collection.

ECOLOGICAL IMPLICATIONS

- Occurrence of grass fire during dry spells is minimized, if not totally controlled, when abandoned marshlands and rice paddy areas are cultivated into tikog plantations.
- Proper land utilization for tikog plantation enhances ecological benefits within the adjacent areas.
- Effective maintenance and protection of existing natural tikog plantations also improves the area as wildlife habitats.
- Voluminous tikog stalks regularly harvested as raw materials for various handicrafts contributes to carbon sequestration.
- Proper plantation establishment and management, such as appropriate waste disposal, organic farming, species, and site watching, can directly address problems on climate change.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

- Department of Trade and Industry: Training and product promotion
- DENR-Ecosystem Research Development Services (ERDS): Training
- Development Bank of the Philippines: Financing
- Bureau of Food and Drugs (BFAD): Training on good manufacturing practices (GMP) and permit
- Department of Science and Technology (DOST): Training on GMP
- Fertilizer and Pesticides Authority

- Bureau of Plant Industry
- Bureau of Fisheries and Aquatic Resources

LAWS AND RESTRICTIONS

- Transport permit must first be secured from the concerned Community Environmental and Natural Resources Office (CENRO).
- Harvesting permit, environmental clearance certificate (ECC), non-compliance coverage (NCC), free prior and informed consent (FPIC), i.e., harvesting cannot proceed without NCC, ECC, or FPIC, among others.
- Republic Act No. 9003
- National wage rates

REFERENCES

Bautista, E. N. and U. B. Doydora. Studies on the Cultural Management and Growth Performance of Tikog in RRDP Sites. Terminal Research Report. ERDS- DENR Region 8, Tacloban City, 1990.

Doydora, U. B., E. N. Bautista, and E. M. Germano. Production and Management of Tikog. DENR-ERDS Region 8, Tacloban City. In Technoguide on Tikog, Fiber Development Authority, 1998.

Garcia, S.I. Cultural Management and Economics of Tikog Production, Development Forum, 1985, pp. 12–13.

Bautista, E. N. and C. Q. Buante, Terminal Report: Banner Program No. 5, "Determination of Appropriate Strategies for the Adoption of ANR Technologies."

SOUVENIR ITEMS FROM WOOD TRIMMINGS, TOPS, AND BRANCHES

Location: Pasil, Liloy, Zamboanga del Norte
Entrepreneur: Clara's Furniture and Handicraft
Authors: Ariel Barrientos and Dolores Wanasen

Clara's Furniture and Handicraft is an enterprise owned and managed by a husband and wife tandem—the husband is in charge of the production while the wife supervises the marketing. The business started with production of a few pieces of traditionally designed furniture, and which slowly increased into bulk-per-order cabinets, sala sets, beds, and doors. The production of souvenir items emerged when some customers started to order picture frames, woodcrafts, and décor. Given the abundance of raw materials in the form of the trimmings of logs/lumber excess from the furniture-making business, the couple complied accordingly. Moreover, due to their abundance, twigs and branches could be easily acquired at a cheaper price. When the demand for these small items increased, the owners eventually decided to reduce its furniture production and diversify their products to various wood souvenirs instead.

At present, Clara's Furniture and Handicraft make made-to-order mortar and pestles, frames, trophies, chopping board, pencil holder, flower vase, and other items depending on customer specifications. In addition, the technology used in making souvenir items requires simpler tools, hence lowering the cost of production.

METHODS OF PRODUCTION

Materials and equipment

- Wood trimmings, tops, and branches (e.g., gmelina or mahogany)
- Brush
- Calcomine (red and yellow)
- Sand paper
- Thinner
- Varnish
- Sealer
- Lacquer
- Pair of gloves, helmets, and masks
- Chisel, planer (katam), hammer, and knives of varied shapes and sizes
- Molder/torno
- Band saw
- Lathe machine

Molder/torno is used to shape the wood into the desired design and shape; band saw to cut the logs/lumber into the desired size; and lathe machine to slice logs into desired length and width.

Procedure

Step 1. Select fully matured wood materials, such as tops and branches, or trimmings. Discard damaged and diseased ones.
Step 2. Sort the materials according to size and stock them in a partially shaded area with good ventilation.

Step 3. Cut a wood block corresponding to the size of the item being produced.
Step 4. Using the lathe machine, slice the block into the desired thickness, width, and/or diameter.

Tip

Typically, mortar and pestle can be reproduced using one design and size (uniform length and diameter of 7 and 3 inches, respectively). Other products vary; their size and design depend on client specifications.

Step 5. Using a molder, craft the handicraft's final form.
Step 6. For easier sealing and coating, smoothen the surface of the wood by sanding.
Step 7. Apply coatings in layers: first coating – mixture of lacquer and thinner (1:2 ratio); second coating – mixture of lacquer and sealer (2:1 ratio); third coating – mixture of thinner and sealer (2:1 ratio); and fourth coating – calcomine (red or yellow) to hide stains or imperfections. Dry every after every coating.

Tip

Series of sanding: For the first coating, use sandpapers with large coarse (No. 100); for second coating, medium coarse (No. 120); and for the final coating, fine coarse (No. 150).

Step 8. Subject the newly coated items to low-heat sunrays (i.e., 8–10 a.m. or 3–5 p.m.) to maintain their lustrous appearance. If there is available vacant space, air-drying is preferred.

Tip

Avoid exposing the materials from the sun too much. Wood tends to wear out and become brittle, thus losing its fiber strength when exposed to excessive heat. In addition, avoid exposing the materials to moisture to avoid wood swelling and to prevent fungal attack.

Step 9. For the finishing, apply varnish and dry. Package the product for display.

GENDER ANALYSIS

As mentioned earlier, Clara's Furniture and Handicraft is an enterprise owned and managed by a husband and wife tandem. The husband manages the overall production whereas the wife takes charge of the marketing and promotion, and establishing linkages with sellers of raw material and design groups. Notably, this kind of enterprise requires dedication and full time involvement. Thus, women who rear young children may find it difficult to start and manage the enterprise.

More men are employed during the production because they are more familiar with the use of equipment. However, more women partake in the finishing work, albeit a much lower labor-per-hour wage (PhP100 for women compared with PhP300 for the actual production work of men). Wearing the proper attire and safety gadgets during production, especially among women handling the varnishing, is strongly recommended.

While men can work at nighttime and are paid more for overtime job, women spend most of their time during the day because they are involved in the finishing phase (i.e., they have to subject the products several times to sun drying). Additionally, women are only contracted as workers from October to November due to increased production for the Christmas season; in other days of the year, they are only sought on an on-call basis for made-to-order products. In effect, women can spend more time during the lean months and engage in household activities and other businesses. Correspondingly, most of the women employed by Clara's Furniture and Handicraft work in their farms during the planting season (June–August); thus, their participation in the wood-based enterprise does not affect their farming schedule.

ECONOMIC BENEFITS

ASSUMPTION: All equipment like molder and lathe machine are already present in their furniture business, hence not included in the cost of production.

COST OF PRODUCTION (ex., MORTAR AND PESTLE) vs. INCOME
Mortar and Pestle at 30 pcs/units produced per day

COST OF MATERIALS

1. Secondary branches with10 - 20cm diameter at P12/FT — utilization per 1 mortar = 8'' (P8) x 30pcs = P240
2. Tertiary branches with 3-7cm.dia at P8 /FT) — utilization per pestle = 1ft (P8) x 30pcs = P240
3. Lacquer — Half gallon(P 175.0)
4. Sand Paper — 12 pcs (P125)
5. Thinner — Half gallon (P 175)
6. Calcomine — Red 1/4k (P50); Yellow 1/4k (P50)

Total Material Cost: P 1055

LABOR COST

1. Wage/day (Band saw, Lathe, Molder/ Torno operation) — P 300 at 3 Male workers (900)
2. Wage/day (Finishing : Sanding, Coating, Drying, Varnishing) — P100 at 3 Female workers (P300)

Total Labor Cost : P 1200.00
**Total number of male workers : 6 at 3 workers/day shift or alternate basis*
** Total number of female workers : 3 at full time basis*

ELECTRIC CONSUMPTION P 500/month — P16.50/day

TOTAL COST OF PRODUCTION/DAY **P 2541.50**

TOTAL Production/day = 30 pcs /units Mortar and Pestle/day
GROSS INCOME/DAY: Price/unit — P150 (Pick up price) x 30= P4500.00
NET INCOME/DAY: P 4500 – P 2541.50 = P 1958.50

MARKETING CONSIDERATIONS

Clara's Furniture and Handicraft is located along the main road such that traders and buyers can easily obtain the souvenir items. The display area is also adjacent to the production area, and hence, transportation cost is minimized to a great extent. The owners also deliver souvenir items and furniture sets in Marawi City, Cotabato, Zamboanga, and other nearby towns. A trader from Manila orders regularly (i.e., every 3 months) a maximum of 1,000 mortars and pestles. Moreover, the Department of Environment and Natural Resources (DENR) and other government agencies and organizations based in the province order the items and display them during important town events. The peak of production and sale is from October to December.

As for the limiting factors, the enterprise is affected greatly by the rainy seasons (June to August). At these months, it is difficult to dry raw materials and process the items. The stocked wood materials also become prone to swelling and fungal damage. During these months, quota-based orders are seldom met due to high costs in transportation and lack of capital. Accordingly, the owners also started a printing business near their production site and display shop so they can minimize additional costs for printing of logos, names, greetings of their souvenir items.

ECOLOGICAL IMPLICATIONS

Only the wood wastes from producing furniture sets are utilized. Similarly, utilization of secondary branches and tops of gmelina and mahogany are maximized. All parts (branches and twigs) of a tree, which are normally considered as wastes, are converted into cash products.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

The Department of Trade and Industry (DTI) assists in the design, packaging, and promotion of souvenir items and furniture.

LAWS AND RESTRICTIONS

- DENR regulates the sources and flow of wood material source, especially those utilized in furniture-making.
- Local government units (LGUs) issue business permits and oversees related regulations.
- The Bureau of Internal Revenue (BIR) issues receipts and invoice.
- The Philippine Occupational Safety and Health Center issues safeguard standards on workers social and public safety and health.
- PHILHEALTH oversees the insurance of workers and their health benefits
- The Bureau of Rural Workers (BRW) ensures that the rights of rural workers are protected.

TALABA CULTURE IN MANGROVE STANDS

Location: Bgy. Concepcion, Kabasalan, Zamboanga Sibugay
Entrepreneur: Kapunungan sa Gagmay'ng Mangingisda sa Concepcion (KAGAMACON)
Authors: Antonio Vega and Dolores D. Wanasen

The Kapunungan sa Gagmay'ng Mangingisda sa Concepcion (KAGAMACON) has started its talaba culture in 1999. Each household was awarded with 0.25 ha. to develop their "talabahan." Twenty-two households implement this type of business while responsibly maintaining and protecting their mangrove site.

The enterprise produces good quality talaba, which are grown in mangroves stands. The mangrove site and its surroundings are free from wastes given the regular cleaning of the involved family entrepreneurs. As support to the coastal management, the Bureau of Fisheries and Aquatic Resources (BFAR) and the Environment Management Sector of the Department of Environment and Natural Resources (DENR) conduct monthly inspection and water sampling within and along the vicinities of the area; they have certified the area as "red tide-free." KAGAMACON is also an adaptor of the "Kabasalan Mangrove Reforestation Project" in the region; hence, the activities involved in their talaba production meets cover both economic and environmental objectives.

METHODS OF PRODUCTION

Step 1. Site selection

- Select site free from pollution, flooding, and siltation. Talaba thrives best in brackish to marine water with salinity ranging from 15–26 ppt at 20–30° C water temperature.

Non-polluted water is green to blue green in color. Water depth should be at least 1.5–4 cm at the lowest tide. The bottom soil is neither hard nor shifting, but rather soft and muddy.

Step 2. Area establishment

- Clean the area of wastes, especially non-biodegradable materials.
- Prepare 2–3 m bamboo pole stakes according to water level depth. Place the stakes along the boundary of the culture area with approximately 1 ft. protruding above water level to serves as buffer, to attach filter nets against wastes, and to serve as fence against illegal intruders locally called as "hudhod."
- Conduct planting by submerging 50%–70% of the oyster spat body and by pressing them down into the mud/soil.

STAKING — For deeper portions, lesser stakes/poles are needed, but longer poles should be used; for shallower portions, use more but shorter ones.
PLANTING — Do this in May when the water level is low and siltation is less, as flooding seldom occurs during this season.

- Monitor the area daily from the onset of planting until harvesting. Keep records of mortality and development (e.g., size and color). Conduct daily cleaning, maintenance, and safeguarding from intruders.

Several days before harvesting, KAGAMACON increases the number of monitoring and patrolling using their non-motorized boat to safeguard the produce. Assignments are done per group and with specific schedules (e.g., round-roving or "toka-toka").

- Harvest 4–6 months after maturity. On the second and succeeding years, harvest only 30% of the produce in order to leave enough mother oysters to regenerate. The peak of the harvesting peak season is from September to December, mostly during low tides. This season is timely with the increase in the demand and price of talaba.

When the appearance of the shell is yellowish to reddish, there is contamination (i.e., red tide); when the color is greenish, the talaba are clean and safe to eat.
When the shell rim/opening is sharp and with algae/lumot, the produce is of low quality; when it is shiny and free of these, it is of good quality.

GENDER ANALYSIS

Both husband and wife, together with adult members of the family, participate in the enterprise, especially the maintenance and protection of individual mangrove stands. The males are involved in pole staking, roving, and patrolling (i.e., Bantay Dagat) while the females join their husbands in planting, cleaning, harvesting, marketing, and recording. Children help in harvesting, cleaning, and mending and repairing nets.

Some families can now afford sending their children to high school and even college due to the income derived from the talaba enterprise. With the assistance of various supporting agencies like BFAR and local government units (LGUs), the husband–wife team and their children have started to attend orientation meetings on the culture and production of lapu-lapu and grouper, a very promising coastal enterprise that they can also manage together with the existing talaba culture.

During high tide, only adult males go in the production site to conduct the various activities; women participation is limited during high tide in order to prevent any mishaps like drowning. Women also help their husbands during planting of talaba spats from May to June when the water level is low. Subsequently, after planting, only the men partake in the rest of the activities, such as maintenance and protection of talaba plantations. On these occasions, women focus on the household concerns and child rearing, attend seminars, and initiate other livelihood activities. It is only again during harvesting and marketing in November to January when women become busy, as they take the lead role in these activities. Children sometimes help their mothers clean the harvested talaba before they are marketed to adjacent towns and provinces.

It was also observed that the palms and soles of workers have lacerations/cuts and rough callus as a result of handling talaba shells and hence, they should wear proper protective gears. According to the fisher folks, as a rural practice, drinking tuba is an alternative medication for the injuries/cuts together with intake of pain relievers; accordingly, it is strongly recommended that concerned agencies should provide proper health assistance to the community.

However, KAGAMACON has not been spared from widespread news of the red tide phenomenon, even if their mangrove site is free from such. During news of red tide, their market dwindles. Even community consumers do not buy their product. At these times, family members become morally and financially insecure.

ECONOMIC BENEFITS

Sales

1,500 kilos at P20.00 — 30,000.00

Cost of Production per ¼ ha.

Materials

1. Bamboo poles 100pcs @ P10.00 — 1,000.00
2. Binder 3 rolls @ P100.00/roll — 300.00
3. Talaba Spats (Semilia) 1000K @ P6.00/K — 6,000.00

Labor Costs

3 Males (Planting/staking) @ one day x P250/day — P 750.00
3 females (from Harvesting to cleaning) @ P20.00/can (12k)
***1,500 kilos at 12k/can = 125 cans @ P 20.00/can = P2, 500.00

Bangka

Non motorized P 10,000 B/N or P 5000 Second hand

Average: P 7500.000

Total Cost: P 18,050.00

Income: P 11,950.00 (1st Harvest)

ASSUMPTIONS: In the succeeding years of harvest, the only incurred expenses are on labor (i.e., for harvesting and cleaning talaba), which amounts PhP2,50. Hence, the total net income is estimated at PhP27,500.00/year .

MARKETING CONSIDERATIONS

Through Barangay Ordinance No. 024 (2006), only KAGAMACON is authorized to buy and market the talaba harvested by households. The main reason for this is to ensure quality control and to protect the integrity of the talaba products, which has the reputation of being one of the freshest in the country.

The products are marketed through purchase orders or retail trade at PhP20.00/kg for cleaned raw produce. Each producer shares 30% of their income to KAGAMACON for marketing expenses. Then, a portion of the income is set aside for annual dues and for mangrove rehabilitation projects by the barangay.

ECOLOGICAL IMPLICATIONS

Bgy. Concepcion comprises eight puroks. Since the KAGAMACON adopts the "Kabasalan Reforestation Project" of DENR, enterprise management undertakes planting, rehabilitation, and protection of the whole mangrove site. KAGAMACON has also participated in the "Carbon Sink Program" through the Coalition for Mangrove Associations in the province. The Municipal LGU of Kabasalan in partnership with the DENR-Environment Sector and Ateneo de Zamboanga Medical Students has also implemented the solid waste management program, "May Pera sa Basura." With each 1 sack of garbage collected by every household, a raffle ticket is awarded and drawn quarterly; prizes include a sack of rice (first prize) and groceries worth PhP500 (second prize).

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

- DENR's Protected Areas and Wildlife Coastal Zone Management Sector (PAWCZM), Forest Management Sector for the Mangrove Reforestation Project, and Environment Management Sector: Waste management and pollution control
- Philippine Tropical Forest Foundation, Inc.: Technical assistance on mangrove development
- LGU of Kabasalan: Technical assistance and product promotion

LAWS AND RESTRICTIONS

BFAR undertakes water resources monitoring/testing and issues of Certificate of Non-Red Tide status.

BUTTERFLY FARMING

Location: Manresa Complex Xavier University, Upper Balulang, Cagayan De Oro City
Entrepreneur: Manresa Butterfly Garden
Author: Norma A. Palma; Co-authors: Lydia E. Tiongco, Judith T. Pit, and Myrna S. Decipulo

Butterfly farming is the culture of butterflies in captivity. Normally, the metamorphosis of a butterfly is completed within 32–35 days. On top of its ecological importance as source of genetic material for gene diversity, pollinators, and biomass convertors, the practice of releasing live butterflies during social occasions makes butterfly farming an economically profitable endeavor.

As a business venture, it is simple to do and requires minimal starting capital. A butterfly garden can be established in the backyard or anywhere for as long as there are sufficient food plants. Income can be generated from entrance fees and from selling eggs, larvae, pupae, and adult butterflies. Preserved butterflies, butterfly mounted frames, and souvenir items are value added products from butterfly farming.

Butterfly farming is being conducted by Manresa Complex Xavier University. There are also other existing butterfly farms in Bukidnon and Misamis Oriental managed by Intavas Women's Association and Holcim Rearing House (Holcim Philippines Manufacturing Corporation), respectively.

SOME BUTTERFLY SPECIES	LARVAL HOST/ FOOD PLANT	ADULT HOST PLANT
 *Papilio demoleus libanus*  *Papilio hispponeous*  *Papilio hystaspes*  *Papilio rumanzubia*	All *Rutaceae* species (e.g., pomelo, kalamansi, suha, lime, and ponkan)	All flowering plants like lantana, gumamela, marigold, cosmos, sweet honey, morning glory, kamantigue, asystasia (white/lavender), etc.

Tip Butterfly is host-specific. Larvae of *Papilions* will only eat young leaves of plants under *Rutaceae* (citrus) family. Others feed only on kamote and kangkong, etc.

METHODS OF PRODUCTION

Materials and equipment

- **LEPIARY (BUTTERFLY HOUSE) AND CEMENTED POND**

GI pipes
Steel bars
Fine-meshed garden net
Cement
Hollow blocks
Sand and gravel

Bamboo poles or round timber can be used as alternative construction materials for the lepiary while simple big basin or dug earthen can be used as pond.

- **BREEDING**

Adult male and female butterflies
Larval host/food plants
Flowering/nectar/adult host plants
Catching nets

Adult butterflies can be collected in the wild or from captive bred stock. Maximize the larval food plants and nectar host plants available in the locality/vicinity. Nectar is the butterfly's main source of food; butterflies need nectar throughout the adult phase of their life span. Accordingly, plant and raise sufficient larval food plants and nectar host plants before starting a butterfly farm.

- **REARING FOR COMMERCIAL PRODUCTION OF LIVE BUTTERFLIES**

Refrigerator set at 5–10° C (maximum 7 days) to prolong the dormancy of eggs
Plastic jars/containers
Laboratory supplies (cotton, alcohol, mineral water, floor wax, detergent powder, disinfectant, rugby, honey, and onionskin)

Adult butterflies are attracted to red, yellow, orange, pink, and purple blossoms that are flat-topped or clustered and have short flower tubes.

- **PRESERVING BUTTERFLIES**

Wooden frames
Wine glasses
Laminator
Killing jar
Pins
Wax paper
Cardboard
Butterfly Cage

Procedure

Butterfly farming has two major components: (1) propagating the appropriate larval host/food plants and flowering/nectar/adult host plants, and (2) breeding the butterflies.

Step 1. Propagating the appropriate larval food plants and flowering/nectar host plants

- Determine the appropriate food plants for the species of butterflies that you intend to raise. Plant these inside and outside the lepiary.
- Propagate sufficient amount of food plants in anticipation for large volume of larvae in their later stages.
- Propagate sufficient and various flowering/nectar host plants for the adult butterflies

Step 2. Breeding process

- Construct a lepiary with a flight area of about 25 sq m wide by 5 m high using materials.
- Construct a mini water pool or pond inside the lepiary as source of drinking water for the butterflies.
- Ensure regular supply of artificial nectar (mixture of 150 g water and 15 g brown sugar) as feed supplement.
- Collect female butterflies from the wild or buy captive bred stock and release in the lepiary.

Credits for some photos: the authors, Holcim Rearing House and Intavas Women's Association

- Remove the ova (eggs) daily from host plants in the flight area and secure by placing them in parasite- and predator-proof plastic containers (e.g., spiders, ants, wasps, lizards, etc).
- Check the collected eggs daily. The eggs will hatch in 4–5 days.
- Feed the newly hatched larvae inside the plastic containers with cuttings of young leaves from food/larval host plants.
- Clean the containers daily by removing the stems of devoured food plants.
- Collect the feces, as this can be used by larval and adult host plants as fertilizers.
- Replenish the food for continuous feeding until they become larvae pupates.
- On a daily basis, remove and measure pupae to determine their exact age. Glue them in strings/GI wires inside a hanger house to prevent damaging the wings of emerging adult butterflies. The hanger house can be placed inside the lepiary.
- Release adult butterflies in the lepiary then restart the breeding process.

Credits for some photos: the authors, Holcim Rearing House and Intavas Women's Association

A key element in butterfly breeding operations is cleanliness and attention to detail. Failure to clean the containers and to replace food plants will likely cause larval death due to disease and starvation. In the first 2 weeks of the larvae, caterpillars eat very little so small containers may be used to save on space. After the third instar, use big containers to accommodate bigger larvae and increased cuttings from food plants. Ensure that there is enough food up to the final instar or as soon as the larvae pupate is 28- to 29-day-old.

MARKETING CONSIDERATIONS

Butterfly farming is simple and requires minimal capital. Butterfly house can be established in the backyard and rearing can be done in a space inside the house as long as there sufficient food plants that can be collected to feed the larvae.

In butterfly farms, income can be generated readily from entrance fees, sale of eggs, larvae, pupae, adult butterflies, and sale of souvenir items. Moreover, live butterflies have become popular items for special occasions such as weddings, birthdays, funerals, and other special occasions. Value added products can be created in the form of preserved butterflies, butterfly mounted frames, butterfly souvenir items, and butterfly cages. Market outlet/buyers include the schools, offices, and interested individuals for field trips to the Butterfly Farm, events coordinators, and gardeners.

SUGGESTED PRICING OF BUTTERFLY PRODUCTS AND SERVICES (MANRESA COMPLEX XAVIER UNIVERSITY)

PRODUCTS/SERVICES	PREVAILING PRICE (PhP)
Entrance fee to the Butterfly Garden	20/individual
Egg	2–5/pc
Larvae	15–20/pc
Pupae	20–25/pc
Adult live butterfly	
Small size	20–25/pc
Medium size	30–35/pc
Dead butterfly for framing/mounting	15–25/pc
Butterfly cage rent	150–250/pc
Butterfly mounted frames (price vary according to size)	50–1,000/pc
Butterfly souvenir items/giveaways	50–100/pc
Propagated host plants (larvae and adult)	10–20/pot

ECONOMIC BENEFITS

	YEAR-1	YEAR-2
SALES	**P 108,300.00**	**P 108,300.00**
Matured butterflies (minimum of 75 pcs per Order x 2/monthly @ P27/pc	48,600	48,600
Egg, Larva & Pupa	12,000	12,000
Rent of butterfly cages	4,500	4,500
Income from preserved & Framed butterflies	24,000	24,000
Income from propagated Food plants	12,000	12,000
Entrance fee (average of 30 Visitor/month @ P20	7,200	7,200
PRODUCTION COST	**78,833.33**	**62,833.33**
Fixed Investment		
Refrigerator 5,000		
Depreciation Cost	500	500
Lepiary 25,000		
3 yrs. life span		
Depreciation Cost	8,333.33	8,333.33
Food plants, plastic containers & catching nets	10,000	
Permits & other operating Expenses	5,000	
Labor	54,000	54,000
NET INCOME	**29,466.67**	**45,466.67**
ROI	**0.37**	**0.72**

GENDER ANALYSIS

Butterfly farming can provide income to the women and then use this to augment the family income. The women's reproductive role is not hampered because tending the lepiary only requires a few hours a day of work, preferably in the morning and afternoon, when women are not busy with their domestic chores. Tending butterflies also provide a therapeutic effect to the women workers.

At the Manresa Butterfly Garden, males usually propagate and maintain the food plants, construct the butterfly house and butterfly cages, and collect cuttings of food plants. Women collect butterflies and eggs, rear the eggs until they become adult butterflies, and catch and package live butterflies in cages; they also handle sales, marketing, and record keeping. Men and women both participate in mounting preserved butterflies in frames or glasses as souvenir items.

During rainy seasons, more time is required in rearing the larvae, as this is the time when food plants become abundant and butterflies hatch eggs.

ECOLOGICAL IMPLICATIONS

Butterflies are important source of genetic material for gene diversity, pollinators, and biomass convertors. They are indicators of a healthy and unpolluted environment.

A butterfly house is one of the excellent examples in highlighting the timely theme of maintaining our fast dwindling sustainable resources (Cayabyab, 1989). Butterfly farming also promotes ecotourism. The aesthetic delight and meditative effects offered by natures' diversity inside a butterfly house is immeasurable.

Disposal of production and processing related wastes do not pose problems because most of the used materials are biodegradable. In fact, the feces of larvae can be a source of organic fertilizer.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

- Ecosystem Research Development Services (ERDS) of the Department of Environment and Natural Resources (DENR): Training
- Department of Science and Technology (DOST); Good manufacturing practices training
- Department of Trade and Industry (DTI): Product promotion
- Bureau of Plant Industry (BPI): Planting materials of larvae host plants and nectar host plants
- Fertilizer and Pesticides Authority (FPA)

LAWS AND RESTRICTIONS

DENR Administrative Order No. 2004-55 dated August 31, 2004 enumerates the implementing rules and regulations of Republic Act No. 9147, otherwise known as "Wildlife Resources Conservation and Protection Act."
Application permit, wildlife farm permit, wildlife collector's permit for breeding, and transport permit should be secured from DENR's Park and Wildlife Division.

REFERENCES

DENR-ERDS 10. Butterfly farming. Technology Transfer Series, Vol. VII (1). Technology Transfer and Information Division, Ecosystems Research and Development Service. Department of Environment and Natural Resources, Region 10, Cagayan de Oro City, 2004, p. 27.

Oposa, Jr. A. A Legal Arsenal for the Philippine Environment; the Philippine Islands; Batas Kalikasan, 2002, pp. 117 and 120.

Pit, Judith T. Manresa Butterfly Garden, Upper Balulang, Carmen, Cagayan de Oro City. Personal Interview, March 2010.

Academic American Encyclopedia, Vol. 3, De Luxe Home Edition, 1991, pp. 594–598.

CALLA LILY FLOWER PRODUCTION

Location: Sitio San Isidro, Bgy. Lunotan, Gingoog City, Misamis Oriental, a Community-Based Forest Management Agreement (CBFMA) holder
Entrepreneur: Civoleg, Haruhay and San Isidro (CIHARSAN) – Balatukan Cut Flower Women's Association
Author: Amelia C. Garciano; Co-author: Myrna S. Decipulo

Calla lily (*Zantedeschia ethiopica*) production is a promising enterprise for upland farmers, especially those living in areas with cold temperature and high elevation areas. It is considered a valuable and versatile cut flower product because of its many uses, such as for foliage or adornment during special occasions.

In the 1970s, Mr. Elias Diaz, an Igorot migrant from Baguio City, brought a piece of calla lily sucker in Bukidnon for trial planting purposes. In the years that followed, calla lily has multiplied; now, it is grown in the different barangays of Lantapan, Bukidnon, making the town the primary source of calla lilies in Region X.

CIHARSAN, which established a calla lily plantation in Sitio San Isidro, has 23 member entrepreneurs. Their calla lilies are planted within their residential lots. To facilitate marketing, the growers organized Balatukan Cut flower Women's Association to strengthen the women officers and member's leadership and management capability, as well as to enhance camaraderie among community members. The women members now enjoy additional income from the calla lily enterprise.

Calla lily flower production is a highly profitable enterprise. Establishing calla lily plantation is done only once and it requires minimal area and cash input. Income can be readily derived because calla lily has a short gestation period. Harvesting of flowers can be done after 6 months from planting and weekly thereafter. Production of flowers can be sustained because it continuously produces shoots.

METHODS OF PRODUCTION

Materials and equipment

Calla lily shoots and tubers for use as planting materials
Planting medium (top soil)
Scissors/cutter or sharp bolo
Backhoe and shovel
6×12-inch plastic or polyethylene bags
Banana leaves for wrapping
Fertilizer (e.g., organic and chicken dung)
Minimal agricultural chemicals (for pest and disease control)

Procedure

Step 1. Planting stock propagation: Two methods are recommended depending on the availability of planting materials.

- BY OFFSHOOTS: Plant directly the young calla lily shoots in a prepared plantation site early in the morning. Preferably, plant the shoots immediately to ensure high survival of the stocks. Alternatively, pot young (e.g., about 2–3 weeks old) calla lily shoots in 6×12-inch plastic or polyethylene bags. Arrange the potted shoots in pot beds or wooden boxes. Water daily and out-plant after 3 months.
- BY TUBER: Place the tubers upright in pot beds or trays under nursery sheds. Tubers will sprout within 3–4 weeks, which will then be ready for outplanting in prepared planting sites.

Stock propagation by offshoots and by tuber

Select good quality mother plants. In addition, observe proper handling of shoots and tubers during transport and hauling.

Step 2. Plantation establishment: Calla lily production entails only one-time plantation establishment. Thereafter, it requires only minimal care and maintenance.

- Choose a planting site, preferably with flowing water.
- Clear the area from weeds and debris using bolo.
- Pulverize the soil and dig holes at 50 cm to 1 m distance.
- Plant by using either offshoot or tuber techniques.

Alternatively, calla lilies can be planted near boarders of fruit tree plantations and as farm hedgerows.

Step 3. Maintenance and protection

- Conduct regular weeding beginning the early stage of plantation establishment until calla lilies are fully grown.
- Do not use any mechanical equipment during cultivation because calla lilies are shallow rooted.
- Protect the plants from stray animals.
- Apply organic fertilizer to enhance growth and flower production.
- Employ proper pest and disease control while in early stage of infestation by using a minimal amount of agricultural chemicals. Cutworms are the most common pests that attack the leaves of calla lilies.

Step 4. Harvesting

- Water the plants a day before harvesting to ensure fresh-looking flowers.

- Pull or cut flowers by gripping at the base of their stems (scape). Apart from faster harvesting, this approach guarantees extra stalk length.

Step 5. Packaging

- Cut calla lily stalks at the base using scissors or cutter, or a sharp bolo.
- Wrap the calla lily flowers in dozens using locally available materials like banana leaves.
- Pack the wrapped calla lilies in containers, either cartoons or plastic pails.

Harvesting, cutting, then wrapping using banana leaves.

Take extra care during harvesting to avoid removing the flower primordial from the auxiliary and for the young plants from being uprooted. Harvested calla lilies should be properly packed and delivered immediately.

GENDER ANALYSIS

Calla lily flower production is a business opportunity for upland farmers, especially women. Beyond the usual trend of growing ornamental and flowering plants in their yards for beautification, women members of CIHARSAN gain additional income from calla lily cut flower production. More importantly, the enterprise—being women-led—develops their sense of leadership, enhances camaraderie among members, and builds on their management skills. For example, centralized marketing is being observed within the organization. Mrs. Mamerta Duhaylungsod and Mrs. Rizza Gulay, both members of CIHARSAN, handle the orders. About 30–50 dozens is delivered regularly to Gingoog City once a week, but this normally depends on the availability of stocks. Calla lily flowers are produced by household member-entrepreneurs. CIHARSAN is now expanding by setting up a cut flower plantation for further commercialization.

As a family activity, husbands help in the propagation of planting stock, plantation establishment like site preparation, land cultivation, hole digging, and out-planting. Maintenance and protection, such as fertilizer and pesticide application, are also done by adult males. Meanwhile, women handle the weeding, harvesting, packaging, and marketing of calla lily flowers. These activities can be done early in the morning or late in the afternoon and thus, they can schedule properly their household chores within the day. As a safety measure, in activities where sharp bladed equipments are used, wearing of protective gears must be

Organizational meeting of the Balatukan Cut Flower Women's Association in 2006

observed. Masks should also be worn whenever chemical application is undertaken.

Growing calla lily also provides income to students to augment school allowance. They can sell the cut flowers in the jamboree site of Mt. Balatukan.

ECONOMIC BENEFITS

Income Statement for Calla lily Flower Production
(for an Initial of 300 Pieces Planting Stock Production – 1 Year)

ITEMS	Q1	Q2	Q3	Q4	Total Income
Gross Income					**31,000.00**
30 dozens per week sold thru regular order	4,800.00				
40 dozens per week sold thru regular order 100 pcs planting stock 20 dozens calla lily sold by young female students		6,400.00 1,000.00 800.00			
40 dozens per week sold thru regular order 100 pcs planting stocks 20 dozens calla lily sold by young female students			6,400.00 1,000.00 800.00		
50 dozens per week sold thru regular order (Peak season) 100 pcs planting stocks 20 dozens calla lily soldby young female students				8,000.00 1,000.00 800.00	
Production cost	**2,700.00**	**600.00**	**600.00**	**600.00**	**4,500.00**
I. Plantation Establishment Cost					
Preparation of planting site and planting stock propagation (3 persons @ Php100.00/person/ day)	*300.00*				*300.00*
300 pcs planting materials (offshoots @ Php5.00)	*1,500.00*				*1,500.00*
Out planting and replanting of mortalities (3 persons @ Php100.00/person/day)	*300.00*				*300.00*
II. Maintenance and protection					
Weeding (2 persons @ Php100/person every quarter)	*200.00*	*200.00*	*200.00*	*200.00*	*800.00*
Fertilizer (1 sack chicken dung every quarter)	*100.00*	*100.00*	*100.00*	*100.00*	*400.00*
III. Packaging & Marketing					
Supplies and materials (cartoons, straw, packaging tape)	*300.00*	*300.00*	*300.00*	*300.00*	*1,200.00*
Net Income					**26,500.00**
Return of Investment	= Net Income / Production Cost				**= 5.88 or 588 %**

MARKETING CONSIDERATIONS

Calla lilies are now being marketed around the Philippines. Orders normally come from wedding coordinators, cut flower shops, and retailers. Particularly, the calla lilies of Sitio San Isidro are bought by buyers from Gingoog; they are also delivered to Surigao, Iligan, Agusan, Cebu, Mandaue, Bohol, and Camiguin Island. In Cagayan de Oro City, the regular market outlets are the cut flower shops adjacent Gaston Park located near Carmen Bridge and the City Hall. They are also displayed and sold in the Cut Flower Section of Cogon Market.

Proper packaging should be done immediately after harvesting. Harvested calla lilies should also be delivered immediately to avoid damage and spoilage. White calla lilies are very sensitive and they easily rot. Other option that can be considered to minimize risk of damage and spoilage is for buyers to buy calla lilies directly from the farm. Farm gate price is pegged at PhP35.00–40.00 per dozen. Properly handled and delivered calla lilies may fetch higher price, apart from ensuring consistent buyers and customers.

For ease in marketing of calla lilies, accessibility and availability of transport facilities should be considered. Also, continue establishing market systems for sustainable income generation.

To complement calla lily production, communities can propagate other cut flowers such as baby's breath, Malaysian mums, anthurium, fish tails, and other ornamental plants. Calla lily shoots and tubers are also source of income, and they can be marketed to those interested in establishing calla lily plantations. This will attract more buyers and enhance market outlets.

ECOLOGICAL IMPLICATIONS

Women usually propagate ornamental and flowering plants in their own backyard, thereby enhancing the beauty of the immediate environment. Aside from this, given that calla lily flower production is a viable source of income, families are discouraged from engaging in destructive forest activities such as cutting of trees for fuel wood.

Calla lily production also serves as stream bank stabilizers, hedgerows, and cover crop in gardens and farm lots. It can sequester carbon, thereby contributing to climate change mitigation and adaptation, apart from improving microclimate in the area. No waste is generated from the enterprise since all parts of the plants have economic value in the community. Particularly, calla lily stalks and leaves can be use as feeds for hogs.

SUPPORTING INSTITUTIONS

The local government of Gingoog City through the Department of Agriculture (DA) continuously assists the member-entrepreneurs of CIHARSAN–Balatukan Cut Flower Women's Association by supplying organic fertilizers at minimum price. Trainings were also conducted by DA to enhance cut flower production in the area (i.e., to include different cut flower species and varieties). The Department of Environment and Natural Resources (DENR) provided land tenure and technical assistance in the initial establishment of the calla lily plantations.

HERBAL TEA FROM TURMERIC

Location: Bgy. Danlag, Tampakan, South Cotobato
Entrepreneur: Danlag Women's Association
Author: Marilyn D. Dicierto and Paterna G. Fernandez

Turmeric (*Curcuma longa*), locally known as "luyang dilaw," is a fairly common root crop. It is most popularly used as aromatic food seasoning in Asian cuisines. Its bright yellow color is also used in the textile and cosmetics industry. Extensive scientific research has also demonstrated turmeric's antioxidant properties.

In 2006, a non-governmental organization (NGO) taught 15 women from Bgy. Danlag, Tampakan, South Cotobato the process of making tea from turmeric. Ultimately, the trained women were organized into an association, which then oversees the turmeric tea enterprise. According to Mrs. Virgie Basan, president, the enterprise has helped local women, especially those who no longer have the capacity to engage in traditional work settings (e.g., senior citizens), to generate additional income for the family. As consumers, the local community has also benefitted from the medicinal properties turmeric tea.

METHODS OF PRODUCTION

Part A. Turmeric production

Step 1. Area selection: Luyang dilaw survives in all soil types, but sandy loams are mostly preferred. Ensure proper drainage to minimize roots decay and to avoid excessive exposure to stagnant water.
Step 2. Land preparation: For commercial purposes, plow the area in rows. The recommended spacing between rows is 25×35 cm; for planting within a row, it is 22.5×22.5 cm.

PLANT MANAGEMENT
(a) Germinate rhizomes in a germination bed away from the direct hit of the sun. After 3 weeks, when shoots have emerged, transplant. Maintain the germination beds by keeping them damp and warm.
(b) Plant luyang dilaw anytime of the year the same as way as ginger is planted. Mulch immediately after transplanting to regulate soil moisture and ensure survival
(c) Finally, water the soil constantly to keep it moist, as luyang dilaw cannot withstand drought.

Step 3. Maintenance and protection

- Weed regularly. The plantation areas must be free from weeds to avoid competition for soil nutrients and to eradicate habitat of harmful insects that may damage the crop.
- Maintain organic ways of production, as the intent is to produce turmeric for herbal tea.

- The products must be free from toxic chemicals. If desired, apply organic fertilizer (turmeric sap) or other organic fertilizers.

In Bgy. Danlag, a side-activity of the women's organization is involving their husbands to produce composts for organic fertilizers production.

Step 4. Harvest mature crops 6–10 months after planting. Ensure proper drying so that the turmeric is free of fungus.

Step 5. Preparation for mother rhizomes for the next planting cycle:
- Store the seed rhizomes 2–3 months after harvesting.
- Before planting, spread the rhizomes on a clean surface and cover with turmeric leaves.
- Select well developed and disease free rhizomes weighing 35–44 g.

Part B. Processing of turmeric granules

Ensure good manufacturing practice (GMP) by wearing the proper attire during tea production.

Step 1. Wash the turmeric in flowing water.
Step 2. Peel the washed turmeric with stainless knife.
Step 3. Grating/Grinding: Grate the peeled turmeric using electrical/manual grinder.
Step 4. Extract turmeric juice using the grated/ground turmeric through manual pressing or with the use of electrical juicer.

Grating/grinding, squeezing, and straining

Step 5. Mix the turmeric juice with brown sugar (1:1 ratio) then dilute.
Step 6. Cook the diluted turmeric juice in moderate fire until they become powdery. Use a wooden ladle during mixing.
Step 7. Pack the turmeric granules in clean sealed bottles or in clean, sealed cellophane using electric sealer.
Step 8. Store the packed turmeric granules, now in its tea form, in a dry area under normal room temperature.

Cooking to produce granules

GENDER ANALYSIS

The enterprise is women-led. Women workers do almost all of the entrepreneurial activities, such as planting, weeding, harvesting, processing, and marketing. These activities are done whole year round; nevertheless, because the production site is near their residences, mobilization is minimized. The enterprise also seeks the involvement of men, especially during land preparation. At times, the enterprise is considered a family activity, considering the involvement of every family member in the tea production.

For occupational health and safety, as well as for good manufacturing practice, the women workers use hairnets and gloves during turmeric tea production. The processing area is also designed with good ventilation and with a big space for more convenient place to work on.

The women group is highly motivated to sustain the enterprise given the increasing demand for turmeric tea. Add to this is the support by the mining corporation operating in the community and the local government units (LGUs).

MARKETING CONSIDERATIONS

Turmeric tea is marketed in two types: sweetened and unsweetened. The prevailing market price for 250 g and 1 kg packed teas is PhP50.00 and PhP200.00, respectively. Presently, turmeric tea is sold in the immediate locality, as well as in nearby cities and provinces. The women producers have also participated in trade fairs. Turmeric tea is also sold directly to referrals and walk-in clients. However, the product requires improved packaging with approved labeling from the Bureau of Food and Drugs (BFAD), and registration from the Department of Trade and Industry (DTI), especially prior mass production. In doing so, the market stance of the tea products can be strengthened. Establishing market contacts, accessing display centers, participation in trade fairs, and authorized promotion are important activities in marketing. It is also imperative that Danlag Women's Association be accredited by various institutions and LGUs in order to expand their entrepreneurial support.

ECONOMIC BENEFITS

Items	Value (in pesos)	Total value (in pesos)
Sales 1 cropping cycle turmeric tea processing	 146,350.00 1,346,993.75	1,493,343.75
Production cost ½ ha. Turmeric production crop, rhizomes, labor & travel expenses **Processing cost** labor, equipments, processing area (building), marketing supplies and raw materials		**1134430** 55,380.00 1,079,050.00
Net income		358,913.75
Return on Investment Net income/production cost		0.32 or 32%

ECOLOGICAL IMPLICATIONS

Planting luyang dilaw ensures maximization of idle lands. As a root crop, luyang dilaw functions as a good soil cover, hence preventing soil erosion. By using the organic production technology, the areas planted with luyang dilaw can be rehabilitated and later used to produce other crops.

As a form of waste management, the waste products from turmeric processing can be maximized by converting them into organic fertilizers to be used eventually in the plantation areas.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

Sagittarius Mines Inc. (SMI), a partner of the enterprise, has provided seed fund capital in the form of grant, which was then used as revolving fund for the association. The Municipal and Barangay LGUs have also contributed funds for the construction of the production and processing building. In addition, Danlag Women's Association is supported by the Municipal Social Welfare and Development Office (MSWDO) through its self-employment and Rural Improvement Club (RIC) programs.

In the long run, DTI and the Department of Science and Technology (DOST) shall be tapped for product quality control, packaging, labeling, patenting, and marketing.

LAWS AND RESTRICTIONS

Danlag Women's Association is presently processing its registration with the Department of Labor and Employment (DOLE). It will also process its registration with Bureau of Internal Revenue (BIR) and concerned LGUs, and permit-to-produce and license-to-operate from BFAD and DTI.

This association recognizes the rights of women for equal access to business opportunities as mandated by Republic Act No. 7882, "An Act Providing Assistance to Women Engaging in Micro and Cottage Business Enterprises, and for Other Purposes." The LGUs also promote gender and development (GAD) programs, which promotes women's rights and privileges to avail government services, including support to livelihood projects for women.

LAAK BAMBOO FOR BANANA PROPS AND PLANTING STOCKS PRODUCTION

Location: Sitio Upper Acub, Bgy. San Isidro, Koronadal City, South Cotabato
Entrepreneur: Assumption, Barrio 8, San Isidro, Carpenter Hills Cooperative (ABESCO)
Author: Mr. Bighani M. Manipula

Laak bamboo (*Bambusa sp.2*) is considered one of the most versatile plants due to its multifarious uses, both from economic and ecological perspectives. One of its important uses that are fully recognized in Mindanao region is its suitability for props using its poles in the banana industry.

The enterprise managed by Assumption, Barrio 8, San Isidro, Carpenter Hills Cooperative (ABESCO), which started in 1994, is an offshoot of the project, "Transfer of Bamboo Production Technology to Integrated Social Forestry (ISF) Farmers." The beneficiaries were provided trainings and planting materials for the establishment of laak bamboo plantation in their respective areas.

The enterprise involves the growing of laak bamboo in plantation areas in the upland, particularly in Community-Based Forest Management (CBFM) areas. In the enterprise site (i.e., nursery), culm cutlings/propagules (young bamboo plants raised through cuttings) are grown as planting materials. The culms or poles are the main stems individually grown in a clump attached in the rhizome system. These culms or poles are harvested from clumps after 4 years and every 2 years thereafter. Then, they are sold to buyers in various sizes ranging from a minimum of 3 and 5 cm for top and base diameters, respectively, and in 12, 14, 16, and 18 ft lengths. Harvesting of culms or poles provide good nourishment to incoming shoots and help attain sustainability of raw materials. At the same time, they maintain the good quality of the environment.

The other use of laak bamboo is for the production of bamboo cuttings for use as planting raw materials to individuals or companies engaged in bamboo plantation establishment. Cuttings are harvested from one-year-old bamboo clumps. Then, they are cut into one-node sections measuring 28–30 cm (length) with at least a 10–15 cm single branch attach to it.

METHODS OF PRODUCTION

Materials and equipment

Garden soil
6×8-inch black plastic bags
Spade
Sharp bolo
Water sprinkler
Coconut fronds or leaves
Wooden poles
Hand gloves

Procedure

Part A. Nursery establishment and bamboo propagule/cutling production

Step 1. Select an area for the nursery site covering at least 15 sq m.

Step 2. Make a nursery shed using coconut leaves for roofing materials.

Step 3. Gather and pulverize ordinary garden soil that is free of fungal infestation.

Step 4. Put the soil in plastic bags containing at least pair of holes at both sides.

Step 5. Prepare the one-node culm cuttings and pot them vertically in plastic bags. The nodes should be covered with soil that is pressed around the cutting.

Step 6. Water the potted cuttings daily or when necessary.

Step 7. Inspect root system after 1 month by gently pulling or tugging the bamboo cuttings.

Step 8. Harden the bamboo cutlings/propagules by gradually removing the cover of the shed and by reducing the water activities.

Step 9. Plant the bamboo cutlings/propagules after 3 months.

Part B. Plantation establishment and maintenance

Step 1. Select, delineate, and clear the area of the bamboo plantation.

Step 2. Dig 25x30 cm (width x depth) holes in 5x5 m intervals.

Step 3. Plant the cutlings/propagules during the rainy season. Remove the plastic bags before planting.

Step 4. Apply urea (46-0-0) fertilizers around the plants at 50 kg/ha or 125 g/plant once a year for two successive years; on the fifth year, apply 100 kg/ha or 250 g/plant.

Step 5. Replant dead plants and conduct strip brushing once a year for three consecutive years.

Step 6. Establish and maintain at least a 5-meter fire line along the plantation area.

Part C. Harvesting bamboos for pole production

Step 1. Cut matured culms/poles 30 cm above the ground in pole lengths of 12, 14, 16, and 18 ft.

Step 2. Haul the culms/poles from the plantation site to the roadside or loading area if this is to be sold immediately, or to stocking sites for drying and proper stockpiling before disposal.

Part D. Harvesting bamboos for planting stock (cuttings) production

Step 1. Select and cut one-year-old culms from the clump just above the second node from the ground level.

Step 2. Remove the leaves and small branches, leaving only the main branch for every node.

Step 3. Cut the culms into one-node sections 8 cm below and 15–20 cm above the node. Cut part of the attached branch leaving about 10–15 cm (length) or 2–3 nodes per branch.

Step 4. Haul and stockpile the cuttings in shaded loading areas for immediate disposal to buyers.

Cutting the culm into one-node sections

GENDER ANALYSIS

Both men and women work together in the establishment of the laak bamboo plantation, placing the planting stocks in the nursery, and in the production of one-node culm cuttings for commercial purposes. Male workers usually do the more labor-intensive part of the process like the clearing, and protection and maintenance of the plantations, which are usually done during summer seasons. Meanwhile, female workers handle the remaining activities like application of fertilizers in the plantation and nursery maintenance; these are done throughout the year. Nursery workers should use rubber shoes, long sleeve clothes, and head gears when carrying out these activities, especially when in the plantation, for body protection and safety.

The involvement of women in this enterprise is beneficial because

- They can make use of their idle time (e.g., after doing household chores/family roles) into productive use by engaging in the entrepreneurial activities.
- They contribute to the family income, which is then used for family expenses or in buying personal items.
- They have increased awareness on enterprise management.
- They have access to land and crop resources
- They can access credit facilities and ultimately control any resources and benefits derived therein.
- They are encouraged to participate in community activities.
- They continue to earn the respect of their husbands and children, even community members, for being industrious (e.g., they avoid the temptation of gossiping, thereby shying away from troubles).

MARKETING CONSIDERATIONS

ABESCO is assured of available market due to the banana plantation expansion in Region 12. Presently, a hectare of banana spaced at 2×2 m requires about 10,000 culms of bamboo per year. As of 2009, the estimated banana plantation in the region is 12,000 ha, which require about 120 million culms/poles per year, assuming that all banana plantations use bamboo as banana props.

Initially, the bamboo products have been sold for use as banana props only. In the years that followed, when banana industry players expanded their plantations in South Cotabato, planting materials were sought from ABESCO. Over the past five years, the number of one-node culm cuttings and 16/18-feet poles sold by ABESCO to two of its major clients is 5,000 and 16,200 pcs., respectively.

Both one-node culm cuttings and bamboo poles are sold at the farm gate price of PhP5.00 per cutting/pole. Transactions are conducted through purchase orders. Other potential markets include individual banana contract growers in Region 12.

ECONOMIC BENEFITS

*One Hectare Laak (Bambusa Sp.2) Bamboo Plantation for **Pole Production** in Six Years*

Description	YR-1	YR-2	YR-3	YR-4	YR-5	YR-6
SALES	-	-	-	75,000	-	78,750
Annual Production of 15,000 poles per hectare @ P 5 per pole farm gate price						
PRODUCTION COST	14,280	1,500	450	37,500	3,600	39,375
Cost of 440 ready to plant propagules including 10% allowance for mortality @ P15.00 each farm gate price	6,600					
Cost of one bag (50 kg) fertilizer(urea 46-0-0) @ P1,500 per bag	1,500				3,000	
Labor						
Hauling of propagules /planting stock from source to project site @ P5.00 each for 440 propagules/planting stock	2,000					
Hauling of propagules/planting stock from roadside to planting site @ P2.00 each for 440 propagules/planting stocks	880					
Site preparation-brushing @ P150 per day for 5 man-days	750					
Staking @ P150 per day for 2 man-days	300					
Hole-digging @ P 150 per day for 2 man-days	300					
Planting @ P150 per day for 2 man-days	300					
Maintenance						
Fertilizer application @ P150 per day for 2 man-days	300	300			600	
Strip-brushing @ P150 per day for 3-man-days (5x100m)	450	450	450			
Fire line construction and maintenance@ P150 per day for 5 man-days	750	750				
Replanting @ P150 per day for1 man-day	150					
Harvesting						
Cutting of poles @ P1.50 each for 15,000 poles				22,500		23,625
Hauling of poles from site to road- side @ P1.00 each for 15,000 poles (Loading and Transport of poles are borne by the buyer)				15,000		15,750
NET INCOME	-	-	-	37,500	-	39,375
ROI	-	-	-	1.00	-	1.00

Note: No harvesting on the 5th year because selective-cutting of all matured culms is applied.

Cost & Return Analysis of one hectare Laak (Bambusa sp. 2)
Bamboo Plantation for Planting Stock (one-node culm cutting) Production
as Experienced by People's Organization (ABESCO)

Description	Y1	Y2	Y3	Y4	Y5	Y6
SALES	-	25,000	25,000	25,000	25,000	25,000
Annual sale of 5,000 one-node culm cutting planting stock @ P5 each farm gate price						
Production Cost	-	15,000	15,000	15,000	15,000	15,000
Planting materials and fertilizers were provided by the project						
Cost of Labor for Establishment and Maintenance	-	-	-	-	-	-
The beneficiaries provided the labor free of charge as their counterpart to the project	-	-	-	-	-	-
Harvesting Cost						
Harvesting/cutting into one-node section and hauling @ P3 per node section	-	15,000	15,000	15,000	15,000	15,000
NET INCOME	-	10,000	10,000	10,000	10,000	10,000
ROI	-	0.66	0.66	0.66	0.66	0.66

ECOLOGICAL IMPLICATIONS

The enterprise addresses problems on environmental degradation, considering that bamboos—once planted—can regenerate without the need of replanting. Bamboo is also good for stream bank stabilization. Add to these, a good amount of litter is produced, which can improve soil condition, thereafter producing profuse root systems that can properly bind the soil. This is one way of mitigating the adverse effect of climate change. Moreover, the amount of carbon dioxide from the atmosphere is absorbed and converted into free atmospheric oxygen.

In terms of waste management by the enterprise, the trimmings generated from the production processes are left in the site. As soon as they are decomposed, they become part of the nutritional requirement of the plantation.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

- Technical assistance from Ecosystem Research Development Services (ERDS) and Forest Management Services (FMS) of Department of Environment and Natural Resources (DENR), Department of Agriculture (DA), and Department of Trade and Industry (DTI)
- Financial assistance from the Technology Livelihood Resource Center, DTI, national and rural banks, Department of Science and Technology (DOST), and local government units (LGUs)

LAWS AND RESTRICTIONS

- Certificate of verification and permit to transport must be sought from the Community Environmental and Natural Resources Office (CENRO) of DENR
- DENR Administrative Order No. 31 dated 24 June 1991 (i.e., revised guidelines for contract reforestation wherein bamboo has been included as a reforestation species)

REFERENCES

Virtucio FD and CA Roxas. Growing Bamboo for Livelihood and Environmental Protection. DENR-ERDS. Techno-Transfer Bulletin, 1988.

Bamboo Production in the Philippines, 2004.

VERMICOMPOSTING

Location: University of Southern Mindanao (USM) Vermi Center, Kabacan, North Cotabato
Entrepreneurs: Regional Vermicomposting and Vermimeal Production Center (RVVPC12)–USM
Authors: SSRS Helen Escote-Villame and Elizabeth E. Atok

Vermicomposts are organic fertilizers or soil enhancers produced by decomposing farm, yard, and kitchen wastes through the action of earthworms. In the Philippines, for commercial vermicomposting, the recommended earthworm species used is the African Night Crawlers (*Eudrilus eugeniae*). They can breed as often as once a week, producing an egg capsule containing 1–3 young worms, which then mature in less than 30 days from hatching. Not harmful to man or domestic animals, these worms can live up to 2 years and grow to a length of 6 inches. They thrive best at temperatures of 24–28° C with moisture content of 60%–80%.

Vermicomposting can be produced in only 4–6 weeks compared with ordinary composts that are produced in 8–12 weeks. A vermicompost has purely organic, plant growth promoting, and disease-preventing properties, apart from containing major and minor plant nutrients. Production is all year round as long as raw materials (i.e., wastes) are abundant and the use of organic fertilizers for food and ornamental plant production is encouraged.

METHODS OF PRODUCTION

Materials and equipment

A. Compost

Earthworms (i.e., African night crawlers or "ANC")
Crop residues
Livestock wastes
Grasses/grass clippings
Market wastes (vegetables or fruits)
Leaves of leguminous trees (e.g., kakawate or ipil-ipil)
Sawdust
Shredder

The entrepreneur, RVVPC12–USM, uses the 50:50 (C:N) ratio, wherein 50% are made of manure/leguminous leaves and the other 50% is made of biodegradable materials, such as grass clippings, leaves, and rice straw.

B. Vermibeds

GI sheets or wood
136 pcs. hollow blocks
10 kg vermibreeders
6 bags animal manure
1 bamboo pole
10 m nylon net

C. Composting

Weighing scale
Shovel
Rake
2 pcs. bolo
1 m fine wire screen mesh
Nylon nets

Procedure

Step 1. Select the site according to these criteria: near the source of raw materials; water can be accessed easily; flood-free; shaded (preferably with trees) and aerated; and accessible so that it can be easily monitored and managed.
Step 2. Design the vermibeds. To accommodate 50 kg per sq m composts, the standard design by RVVPC12-USM is 5×2×2 m. This size provides ease in doing activities like filing substrates and stocking ANCs into in the vermibeds. Use hollow blocks as sidings. Alternatively, a low-cost design with plain GI sheets and plastic canvass may be used.
Step 3. Collect the materials as substrate or food for ANC/earthworms. Chop/shred the collected materials for faster decomposition (e.g., 1–2 weeks), as ANC earthworms hate fresh food.
Step 4. After 1–2 weeks of decomposition, load the mixed materials into the vermibeds (e.g., 50 kg/sq m).

Do not use chicken manure for vermicomposting because of its high temperature, which can greatly slow down the decomposition process.

Step 5. Stocking/piling, care, and maintenance of ANC earthworms in the vermibeds:

- Purchase the initial stock of ANC earthworms from reliable sources.
- Ensure that the temperature of the vermibeds is within 16–300° C
- Water the bedding materials to lower their temperature. Stock the ANC earthworms per 1 kg/sq m. Immediately, mulch the vermibeds with rice straw.
- Water the beds to maintain the moisture level, particularly during dry season. Do this regularly at 7–8 a.m. and 4–5 p.m. to avoid evapotranspiration.
- Place a nylon net over the vermibeds for protection from birds, toads, lizards. Eliminate centipedes and beetle grubs.

Earthworms die when they come in contact with insecticides/pesticides.

Step 6. Harvesting the vermicompost

- Stop watering the beds 5–7 days before harvest. The height of the bedding will be about 50%.
- Harvest and then separate the ANC earthworms from the vermicompost 30–45 days from stocking/piling either manually (handpicking) or by using a strainer/sifter. Timely harvest is important.

Step 7. Air-dry the vermicompost on a concrete floor or laminated matting in a covered shed for 1–2 days.

Harvesting and air-drying

Step 8. Sieve/filter manually or mechanically the vermicompost to separate coarse and fine materials.
Step 9. Pack the fine vermicompost in plastic bags and place in sacks for storage; this can be sold at a much higher price than the coarse one. Then, pack the coarse vermicompost into 50 kg sacks and sell as soil amendment or for potting mix.

Sieving and packing/bagging

GENDER ANALYSIS

Both men and women work together in this vermicomposting enterprise, and the activities of each are conducted all year round. Female workers manage the planning/networking (initial phase), care/watering/maintenance, packaging, and marketing, each activity for 2 hours per vermicomposting cycle; they also manage harvesting/processing (10 hours per cycle). These imply that women allocate greater time spent for the family except the harvesting season. Meanwhile, male workers usually handle the more labor-intensive and time-consuming part of the process, such as construction of vermibeds, stocking/piling, and hauling of materials.

The complementation of gender roles motivates both men and women to sustain continuously the enterprise, given that all benefit in terms of the following:

- Increased income to support the family's basic needs and children's education;
- Increase knowledge, skills, and awareness in enterprise implementation;
- Access and utilization of resources (i.e., land, and raw materials, products produced, and funding support);
- Increased control over solid wastes at the household and farm levels;
- Assured supply of organic food for the family and the larger markets, indicating better health and food safety; and
- Increased and enhanced participation among those involved in the enterprise, especially at the community level, which do no conflict with responsibilities at the household level.

Workers should use the appropriate working apparel and gears when handling the vermicompost.

ECONOMIC BENEFITS

ITEMS	Value (in pesos)	Total Value (in pesos)
ANNUAL REVENUE		132,000.00
10 cycles/year with 200 kg vermi- breeders production @P500.00/kg		100, 000.00
10 cycles/year with 4000 kg vermi- compost production @P8.00/kg		32, 000.00
ANNUAL PRODUCTION COST		15, 609.93
Animal manure 60 sacks for 10 cycles @P50.00/sack	3,000.00	
Labor on stocking and maintenance	6,000.00	
Labor on harvesting @200.00/cycle for 10 cycles	2,000.00	
Transport cost @P200.00/cycle	2,000.00	
10 kg vermi breeders @P250.00/kg	2, 500.00	
Depreciation Cost	109.93	
NET INCOME		116, 390.07
Annual revenue	132, 000.00	
Less: Annual production cost	15, 609.93	
FIXED INVESTMENT		3, 298.00
2 Vermibeds (5m x2mx0.2m)		
And other materials		
RETURN ON FIXED INVESTMENT		35.29
Net income	116, 390.07	
Fixed investment	3, 298.00	
RETURN ON TOTAL INVESTMENT		6.16
Net income	116, 390.07	
Fixed investment + production cost	18, 907.93	

MARKETING CONSIDERATIONS

Vermicomposts are sold directly to households, farmers, garden clubs, organizations, and individuals involved in organic farming/gardening at PhP400/50 kg. Meanwhile, the harvested ANC earthworm breeders are sold at PhP250–1,000/kg. Breeders are also sold at a retail price of PhP1/pc. to vermicomposters; one (1) kilogram comprises approximately 1,000 vermibreeders.

ECOLOGICAL IMPLICATIONS

The use of vermicompost significantly reduces cost of inputs for chemical fertilizers by farmers while enhancing soil fertility and providing efficient use of farm wastes, which otherwise can pollute the environment. It greatly helps in reducing and recycling wastes on-site, which consequently reduces greenhouse gas emissions (GHG).

One (1) kilogram of ANC earthworms can consume 1 kg of waste at a daily basis. In terms of plant germination, plant growth, and crop yield, vermicompost can improve soil physical structure by attracting deep-burrowing earthworms already present in the soil, thereby improving soil water holding capacity. An analysis of the substrate/ANC food materials from the Department of Science and Technology–Philippine Council for Aquatic and Marine Research and Development (DOST-PCAMRD) revealed a significant increase in nutrient content in soil as follows:

SUBSTRATE ANALYSIS

Determination	Before Vermicomposting	After Vermicomposting
Total Nitrogen	0.53	2.74
Total Phosphorus (P_2O_5)	0.29	1.33
Total Potassium (K_2O)	0.65	3.54
Total Calcium (Ca)	0.02	0.29
Total Magnesium (Mg)	0.08	0.52
Total Iron (Fe)	0.12	0.43
Total Copper (Cu)	0.001	0.005
Total Zinc (Zn)	0.004	0.01
Total Manganese (Mn)	0.006	0.03
Ph	8.6	7.20
Moisture (%)		10.20

The need to increase the source of nitrogen-rich materials from leaves/stems of leguminous trees encourages farmers/households to plant these trees within farms/home lots.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

The USM Vermi Center, Department of Environment and Natural Resources– Ecosystem Research Development Services (ERDS, Region XII), and Department of Science and Technology (DOST)-Region XII can provide services on technical assistance and training. Other institutions, households, and individuals engaged in vermicomposting can also provide technical/information sharing. Department of Trade and Industry (DTI)-Region XII also provides micro-financing to small and medium enterprises (SMEs).

LAWS AND RESTRICTIONS

The business name of the enterprise should be registered with DTI, although households engaged in vermicomposting need not apply for this. Local government units (LGUs) issue the Mayor's Permit, a prerequisite for SMEs. Certification on standards for organic soil should also be secured from the Department of Agriculture (DA), particularly from the Bureau of Soils and Water Management (BSWM) and Bureau of Plant Industry (BPI), in order to guarantee the quality of produced composts from vermicomposting.

EUCHEUMA (GUSO) FARMING

Location: Bgy. Bretania, San Agustin, Surigao Del Sur
Entrepreneur: Bretania Pebbles Cooperative (BPC), holder of CBFM No. 73009
Author: For. Marites C. Orcullo; Co-author: Ms. Maria R. Miranda

Eucheuma, popularly known as guso, is a cultured seaweed that is grown in most parts of Mindanao. As an export product, it is considered a dollar-earner for the Philippines. Guso, with its characteristic shape and green or brown color, can be harvested from 45 to 60 days after planting, and can be sold immediately after drying. Thereafter, through industrial processing, its flour- or gel-type form can be used to produce many other edible and non-edible items.

Guso farming is one of the entrepreneurial activities of Bretania Pebbles Cooperative (BPC) through the Gender and Development (GAD) funding in 2003 amounting to PhP69,000. Due to its short cropping cycle, guso farming has helped increase the income of coastal families, which used to be way below the subsistence level. Beyond the economic benefits, the community has become conscious of the benefits derived from protecting the sea and marine resources. In fact, community members now prohibit illegal fishing.

During warm months, guso grows thick with few branches; during cold months, it grows very fast with plenty of shoots. BPC does not conduct guso farming during June and July, as the survival of planted seedlings is very low and infestation is very common.

METHODS OF PRODUCTION

Materials and equipment

Guso seedlings
Plastic twine
Ropes (size no. 8, 10, or 12)
Plastic bottles (for floaters)
Sand bag, big stone, or bamboo poles (for the anchor lines)
Scissors

Procedure

Step 1. Clear the chosen site of debris, undesirable organisms or weeds.
Step 2. Stake the anchors (e.g., bamboo poles) onto the four corners of the substratum. If there are no wooden anchors, use big rocks or sandbags.
Step 3. Fasten one end of the nylon rope on one of the anchor lines/stakes and the other end to the other line. Fasten the other nylon rope onto the other anchor lines. Parallel to each other, these two ropes will serve as mother lines.

Step 4. Cut 6-inch-long plastic twines. Tie the plastic twines to the cultivation lines at 6 in. apart. Then, tie the guso seedlings, which are more or less 3 g in weight, onto the plastic twines. Do the same until all of the cultivation lines are tied with guso seedlings. Another technique is to tie first the seedlings to the cultivation lines before they are attached to the mother lines. The distance between the cultivation lines should be 1 ½ m. In addition, the mother lines should use larger rope sizes compared with the cultivation lines. The length of ropes (mother and cultivation lines) may vary depending on the farmer's preference.
Step 5. Tie the ropes with floaters.

Guso seedlings tied to plastic twines

Guso seedlings for propagation should be healthy; that is, they should be taken from the young, healthy portion of the plant. Also, seedlings have to be hung near the water surface to receive sufficient sunlight.

Step 6. Seedling and farm maintenance: One week after planting, replace lost and poor growing seedlings. Remove "ice-ice," dead sea grass, barnacles, and grazers growing on the seaweeds, as these compete for nutrients, light, and space.

To achieve greater yield, the seaweed farm should be well attended to. This means that entrepreneurs should constantly check their farms for any infestations. Seaweeds also need to be kept clean. To do this, one can shake or raise the seaweed lines to remove any unwanted seaweeds and rubbish. Seaweeds should also be harvested as soon as it reaches its harvesting size (6–8 weeks) and replanted immediately for a continuous harvesting and re-planting cycle. Plants should not be left to overgrow, as these will break and easily drift away. In addition, over-matured plants are difficult to dry because of their thicker branches.

Step 7. Harvest after 2 months from planting by taking the whole plant. Set aside healthy planting materials for the next planting cycle.
Step 8. Drying: Spread out the harvested seaweeds evenly on a clean cemented surface, drying mat, or drying platform. Turnover the seedlings every 2 hours so that every surface will be dried evenly. Dry the seaweeds for 2–3 days or depending on the amount of sunlight. Guso has a rubbery touch when properly dried.

During drying, do not spread the seaweeds directly over the sand to avoid contamination.

Step 9. Pack the dried guso in plastics or sacks and store in a dry and well-ventilated place.

ECONOMIC BENEFITS

Items	Value (in pesos)	Total value (in pesos)
Sales 125kls. @ P40/kl. / month		5,000.00
Production cost Materials 1roll rope for 3,500 seedlings @ P700/roll 10 kls.Seedlings @ P10/roll Straw thread 20 pcs Empty galloons @ 30/pc.	 700.00 1,000.00 70.00 600.00	2,370.00
Net income		2,630.00
Return on Investment Net income/production cost		1.11 or 111%

MARKETING CONSIDERATIONS

Fresh seaweeds are sold at PhP10.00/kg while dried seaweeds can be bought at PhP40.00/kg (i.e., local pricing scheme). BPC members bring the dried seaweeds to a resort lodge in Barobo, Surigao del Sur. The peak season of product sales is during the rainy or cold season.

GENDER ANALYSIS

As one of the marginalized sectors of our society, women sea-farmers are encouraged by BPC to participate in eucheuma farming because they are those who usually do not have any fixed income. Incidentally, catching fish and other aquatic resources (the main livelihood of BPC members), are now almost depleted and their catch cannot sustain their family's daily needs.

Guso farming, as a family enterprise, allows women and other family members to gain access to the different activities of the enterprise. The enterprise empowers women to contribute to and increase the family income in order to meet daily subsistence. Moreover, it allows them access credit facilities; they can request for cash advance from their buyers to meet the emergency needs of the family, especially for the children's schooling or to buy medicines.

Women participate in almost all of the activities in guso farming. The respective hours spent for every activity is as follows: tying plastic twines to cultivation lines, 2 hours; tying guso seedlings to plastic twines, 8 hours; tying the floaters, 4 hours; farm maintenance, 2 hours/day for 2 months; harvesting, 8 hours/day for 3 days; and drying, 8 hours/day for 3–7 days.

Nevertheless, there is also complementation in the workload of both men and women sea-farmers. For example, both husband and wife work together in tying the plastic twines to the cultivation lines and in tying the guso seedlings to the plastic twines. Both also work together in the harvesting and drying of seaweeds, which makes the workload easier and faster to achieve.

It is suggested that proper apparel like long sleeve shirt, wide brimmed hat, gloves, and boots be worn during the whole operation of the enterprise. Should children be involved in the operation, it is suggested that this should not be at the expense of their education.

ECOLOGICAL IMPLICATIONS

Community members are now aware of the benefits derived from protecting the sea such that they themselves prohibit any illegal fishing or blasting in the area.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

Department of Environment and Natural Resources (DENR)
Department of Trade and Industry (DTI)
Local Government Units (LGUs)

LAWS AND RESTRICTIONS

BPC was issued with a Community Based Forest Agreement (CBFM No. 73009) on December 28, 1998 covering 367.00 ha.

LAPU-LAPU (GROUPER) CULTURE IN CAGES

Location: Manjagao, Surigao City
Entrepreneur: Manjagao Mangrove Developers Multipurpose Cooperative (MAMDEMULCO)
Author: For. Godofredo C. Logroño; Co-author: For. Emelito Mausisa

Grouper (*Epinephelus spp.*), locally known as lapu-lapu, is a high-value fish product with great potential in aquaculture because of its excellent texture and flavor. Lapu-lapu has a body color of light yellow to brown, with uneven spots scattered on the head, body, and fins. The demand for lapu-lapu in the international market is fast growing, particularly in Hong Kong, Japan, and Singapore. Among many species of groupers, the local "baghak" fish raised in Manjagao fetches a high market price.

Members of Manjagao Mangrove Developers Multi-purpose Cooperative (MAMDEMULCO) started the lapu-lapu culture in mangrove areas within the locality in the 1990s. Fingerlings abound Surigao throughout the year, and fishermen acquire them through fish catch or direct purchase. Thereafter, entrepreneurs can raise fingerlings with sizes of 2.5–7.5 cm to the desired weight of 500–700 g within 6–8 months.

METHODS OF PRODUCTION

Materials and equipment

Bamboo Poles
Fish net (polyethylene) No. 0.5
Nylon No. 120
Nylon rope No. 16
Nails of varying size
Round timber
Split rattan
Nipa shingles
Sawali

Some of the materials used by local entrepreneurs are sourced from the community by MAMDEMULCO.

Procedure

Step 1. Choose the site by identifying areas with good water quality and adequate water exchange (i.e., minimal pollution), away from sea grasses and coral beds, without any predators, and protected from strong winds and waves. The area should also be accessible but secured from poachers. The ideal site area is at least 3 m deep at the lowest low tide.

Step 2. Construct the cage using a double layer polyethylene net with eye of 1–2 in. so that fingerlings cannot escape due to tearing and mechanical damage. Fasten the four corners of the cage to the bamboo posts using a nylon rope; alternatively, round timber may be used. The cage frame should be durable enough to withstand stress caused by wave action or increased weight from culture operation. The ideal cage dimension is 1.5×1.5×3 m. A hut may be constructed near the cage to serve as rest area for the fishermen and feeding post for the fishes. Use light materials like sawali for the walls, nipa shingles for roofing, split bamboos for flooring, and round timber for posts.

Nets are placed like an inverted mosquito net or hapa. Each cage is supported with polyethylene rope inserted along the sewed borders of the net and held using a clove hitch with overhand knot.

Step 3. Procure or collect the fingerlings.

Members of MAMDEMULCO procure fingerlings, which are available all year round, from a supplier in Surigao City. Some members simply catch the fingerlings near or within the vicinity of the constructed fish cages.

Step 4. Feed daily the fingerlings with fresh or frozen chopped fish at 5 kg for the first 4 months, with half of the ration given early in the morning and the other late in late afternoon. Increase feeding to 6 kg when the lapu-lapu reaches 5 months.

A hut near a cage for ease in feeding

Constantly monitor the water depth; ideally, this should be 1–1.3 m. Then, as a form of health management, ensure that the fishes do not encounter too much stress, as this can result in disease outbreaks. Observe the unusual swimming behavior of fishes, especially during dawn or late afternoon. Fish gasping for air usually indicates low levels of dissolved oxygen; should this happen, thin out stocks by transferring some into other compartments. Meanwhile, fishes that refuse to swim with other fishes and those losing balance while swimming are unhealthy stocks (e.g., those with sudden loss of appetite and red spot-like wounds on the skin and fins, which are likely to have bacterial infection) and should be separated immediately.

Step 5. Selective harvesting of 500–700 g fishes: Place a drag net at the farthest end of the pond and drag it slowly towards the other end; do this in the early morning. Then, transfer the fishes to a holding net where grading is done. Return undersized fishes into cage.

Step 6. Post-harvest: Place 3 to 5 fishes inside an oxygenated double-sheet plastic bag with water at about 3–5 cm or at least covering the nostrils of the fishes.

Step 7. Put the plastic bags inside styrofoam containers and label them as "live fish." Place crushed ice on top of the plastic bags to maintain water coolness during transport.

Hold grouper temporarily inside a conditioning tank and provide aeration for about 1–2 hours. Adjust water temperature gradually to 18° C by adding packed ice. Before transport, conduct a "freshwater dip" or short bath in freshwater for 2–10 minutes. The dip will decrease parasite infection and lessen incidence of disease and mortality during transport.

ECONOMICS BENEFITS

Item	Value (in Peso)	Total Value (in Pesos)
Sales 72.8 kg of Lapu-lapu at P1,700.00/kilo		**123,760.00**
Production Cost Fixed Cost (includes materials & labor cost) Variable Cost (Fry, Feeds, Labor of caretaker, repair & maintenance)	 2,916.00 94,139.00	**97,055.00**
Net Income		**26,705.00**
Return on Investment Net income/production cost		**0.28 or 28%**

MARKETING CONSIDERATIONS

Lapu-lapu culture generates higher profits compared with the culture of other aquatic animals. The market demand for lapu-lapu is highest from November to February, but production is insufficient due to shortage of fries. In effect, local entrepreneurs may find it difficult to plan the business, such that they can increase production to meet market demands. This issue can be addressed by improving hatchery techniques and switching the lapu-lapu culture to artificial diet.

GENDER ANALYSIS

The people in the rural areas, especially women, are one of the marginalized sectors of the society. Women usually have no fixed income. However, with this lapu-lapu enterprise, women earn extra cash from working as caretaker of sea farms. They also earn from catching fishes for feeds.

Nevertheless, MAMDEMULCO stresses that the enterprise hones complementation of both men and women workers. The men construct the cages in February; they devote about 16 working hours spread over 2 days. Procurement of fry, stocking of the fry in the net, and the procurement of feeds for the fry are done by both men and women in March; they devote 9 working hours each per month. Feeding of the fry is also undertaken by both men and women for 1 hour daily from March to October. The peak of selling adult grouper takes place in November and December; both men and women participate in this activity and they each devote a total of 8 hours daily.

It is suggested that proper clothing like long sleeve shirt, wide brimmed hat, gloves, and boots be worn during the whole operation. Should children be involved in any of the entrepreneurial activities, this should not be at the expense of their education.

ECOLOGICAL IMPLICATIONS

Lapu-lapu culture increases fish production and helps lessen the occurrence of illegal activities in communities, such as mangrove cutting and illegal fishing. With increased environmental awareness and its direct impact to their businesses, MAMDEMULCO officials and members have actively protected the remaining natural resources in the vicinity.

SUPPORTING INSTITUTIONS/PARTNER AGENCIES

- Department of Environment and Natural Resources (DENR)
- Surigao del Norte College of Agricultural Technology (SNCAT)
- Bureau of Fisheries and Aquatic Resources (BFAR)
- Local government units (LGUs)
- Department of Trade and Industry (DTI)

LAWS AND RESTRICTIONS

- MAMDEMULCO is a Community-Based Forest Management Agreement (CBFMA) holder.
- Executive Order No. 23: Moratorium on the cutting and harvesting of timber in natural and residual forests. Lapu-lapu culture can therefore be an alternative means of livelihood for communities affected by the said law.

GREEn Kit

Gender-Responsive ENR Enterprises in the Philippines

For more information on this kit, contact
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GENDER-RESPONSIVE ECONOMIC ACTIONS
FOR THE TRANSFORMATION OF WOMEN
(GREAT WOMEN) PROJECT
Canadian International Development Agency (CIDA)
Department of Environment and Natural Resources –
Forest Management Bureau (DENR-FMB)
Philippine Commission on Women (PCW)

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