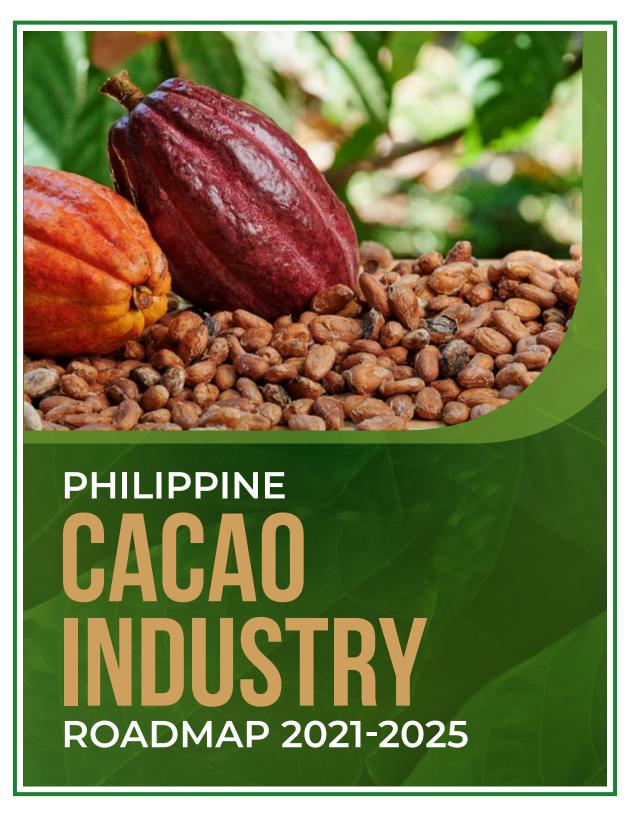


CACAO INDUSTRY ROADMAP 2021-2025











The Philippine Cacao Industry Roadmap (2021-2025)

Copyright 2022. All rights reserved.

No part of this publication may be reproduced, distributed, or transmitted in any form or by any means, including photocopying, recording, or other electronic or mechanical methods, without the prior written permission of the **Coordinating Office**, except in the case of brief quotations embodies in critical reviews and certain other noncommercial uses permitted by copyright law. Editorial correspondence and requests to publish, reproduce or translate this publication in part or in whole should be addressed to the authors and the publisher.

Published by:

Department of Agriculture - Bureau of Agricultural Research through the UPLB Foundation, Inc. in collaboration with the *Philippine Council for Agriculture and Fisheries*

Coordinating Office:

High Value Crops Development ProgramDepartment of Agriculture
Diliman, Quezon City, Philippines

Cover & Book Design:

Alphabet Communications Graphics & Print Quezon City, Philippines alphabetprinting@gmail.com

PHILIPPINE CACAO INDUSTRY ROADMAP DEVELOPMENT TEAM

Team Leader

Consul Armi Lopez Garcia, Philippine Cacao Industry Council

Co-Team Leader

Ms. Josephine Ramos, OPTIONS, Inc.

Technical and Industry Experts

Dr. Nelly Aggangan, UPLB
Prof. Juma Novie A. Alviola, UPMin
Dr. Nora Carambas, UPLB

Industry Experts

Ms. Sylvia Ordoñez, PCIC Vice-Chair, Luzon Island Representative
Mr. Buen Mondejar, PCIC Vice-Chair Visayas Island Representative
Mr. Christopher Lindo, PCIC Vice-Chair Mindanao Island Representative
Dr. Romulo Cena, USM

Mr. Dante R. Muyco Jr., Chokolate de San Isidro, Inc.

Ms. Magel Bacalso. KIDLAT MPC

Mr. Pedro Cruz, CIDAMI

Mr. Simon Bakker, Kennemer Foods International
Mr. Sherwin Paul Barrameda, Aurora Cacao Agricultural Cooperative
Chef Jill Sandique

Representatives from the Government Sector

Undersecretary Evelyn G. Laviña, DA HVCRC Ms. Judy Anne Placido, DA HVCDP Ms. Asther Paglinawan, DA BPI Mr. Noli Garcia, DA BPI Mr. Bernardo Pascua, DA BSWM Ms. Angelica L. Ecito, DA BSWM Ms. Jonalyn Villasis, DA ATI Mr. Manuel Dimalaluan, DA ATI Engr. Critsy Cecilia Polido, DA BAFE Engr. Denver Camania, DA BAFE Ms. Leonora Gabriel, DA AMAS Ms. Loredie De Jesus, DA AMAS Mr. Manuel Corinas, DA PCIC Ms. Joan Basay, DA ACPC Ms. Michelle Imperial, DA ACPC Mr. Joseph Manicad, DA PMS

Representatives from the other agencies

Mr. Alexander Estoesta II, DA PMS Ms. Faustina Baradas, DOST-PCAARRD

> Dir. Romeo Castañaga, DTI Mr. Blair Panong, DTI Ms. Gelyn Llana, DTI

Technical Writers

Ms. Mayla Viray-Blaskie Ms. Ethel Reynda Calivoso

TABLE OF CONTENTS

TABLE OF CONTENTS	V
LIST OF TABLES	vii
LIST OF FIGURES	vii
LIST OF APPENDICES	ix
ACRONYMS	x
MESSAGES	xii
FOREWORD	xiv
PREFACE	XV
EXECUTIVE SUMMARY	1
INTRODUCTION	5
Rationale	5
Objectives	6
Definition of Terms	7
INDUSTRY SITUATION AND OUTLOOK	9
Product	9
Product Forms	10
Cacao Production	13
Consumption	20
Trade (Import and Export)	22
Prices	26

ANALYSIS OF THE COMMODITY INDUSTRY	29
Value Chain Analysis	29
SWOT Analysis	41
Cost and Return Analysis	44
Benchmark Analysis	51
Competitive Analysis	54
MARKET TRENDS AND PROSPECTS	57
Local	57
International	58
PRIORITY CONCERNS & OPPORTUNITIES / CONSTRAINTS & OPPORTUNITIES	61
TARGET SETTING	64
RECOMMENDATIONS FOR POLICIES, STRATEGIES, AND PROGRAMS	67
Development Directions and Upscaling Strategies	67
Cacao Industry Action Plans	68
INDUSTRY CLUSTER GOVERNANCE NETWORK	77
REFERENCES	81
APPENDICES	83

LIST OF TABLES

Table 1.	Top Cacao Producing Provinces in the Philippines	15
Table 2.	Planting Materials Distributed per Government Program	16
Table 3.	Volume of Production and Area Planted/Harvested	17
Table 4.	Utilization of Cacao in the Philippines from 2010 to 2019	20
Table 5.	Volume and Value of Export and Import of Cocoa Products in Thousand Metric Tons, CY 2020	23
Table 6.	Value of Imports of the Top Cocoa-Importing countries, 2016-2020	24
Table 7.	Value of Philippine Cacao Imports by Country of Origin (US \$) 2016- 2020	25
Table 8.	Cacao Industry Value Chain Map	32
Table 9.	Agricultural Credit Programs	39
Table 10.	SWOT Analysis of the Philippine Cacao Industry	42
Table 11.	Costs and Returns per Hectare as Intercrop (600 trees per hectare)	45
Table 12.	Costs and Returns per Hectare as Monocrop (1,100 cacao trees per hectare)	48
Table 13.	Farmers' Assessment of the Effect of the Current Practices on Income and Environment with Proposed Solutions and Intervention Approach	52
Table 14.	Financial Requirement for Cacao Production	66
Table 15.	The Philippine Cacao and Chocolate Industry Action Plan	69
Table 16.	Industry Cluster Governance Network	79

LIST OF FIGURES

Figure 1.	Map Showing the Major Production Areas of Cacao in the World	13
Figure 2.	Top Producing Region in the Philippines	14
Figure 3.	Map Showing the Cacao Production of the Davao Region	15
Figure 4.	Performance of Cacao Industry, CY 2010-2020	18
Figure 5.	Graph Showing the Utilization of Cacao in the Philippines from 2010 to 2019	21
Figure 6.	Global Cocoa Bean Production by Country (in 1,000 metric tons)	22
Figure 7.	Wholesale Prices of Cocoa Beans from January 2016 to May 2021 (Philippine Peso per Kilogram)	26
Figure 8.	Farmgate Prices of Cacao Beans from January 2016 to May 2021 (Philippine Peso per Kilogram)	27
Figure 9.	Cacao Industry Road Mapping Process	63

LIST OF APPENDICES

Appendix 1.	Agro-Climatic Requirements for Growth and Development of Cacao	84
Appendix 2.	Climate Suitability Map	87
Appendix 3.	Land Suitability Maps	88
Appendix 4.	Philippine Cacao Industry Council Directory	135

ACRONYMS

ACPC Agricultural Credit Policy Council

ASEAN Association of Southeast Asian Nations

BAFS Bureau of Agriculture and Fisheries Standards

BIST Business Innovation through Science and Technology

BPI Bureau of Plant Industry

CIDAMI Cacao Industry Development Association of Mindanao

CPB Cocoa Pod Borer

CRADLE Collaborative Research and Development to Leverage Philippine Economy

DA Department of Agriculture

DA-HVCDP Department of Agriculture – High Value Crops Development Program

DA-RFOs Department of Agriculture – Regional Field Offices

DAR Department of Agrarian Reform

DENR Department of Environment and Natural Resources

DOST Department of Science and Technology

DTI Department of Trade and Industry

FFC Fine Flavoured Cocoa

GAP Good Agricultural Practices

ICT Information Communication Technology

KFI Kennemer Foods International

LGU Local Government Unit

MCDC Mars Cocoa Development Center

MinSAAD Mindanao Sustainable Agrarian and Agriculture Development

MPEX Manufacturing Productivity Extension Program

MRP Manufacturing Resurgence Program

NCITWG National Cacao Industry Technical Working Group

NGO Non-government Organization

NICER Niche Centers in the Regions for R&D Program

NSIC National Seeds Industry Council

NSO-FTS National Statistics Office – Foreign Trade Statistics

PAPs Programs, Activities, and Projects

PCA Philippine Coconut Authority

PCAARRD Philippine Council for Agriculture, Aquatic,

and Natural Resources Research and Development

PCIA Philippine Cacao Industry Association

PCIC Philippine Cacao Industry Council

PhilMECH Philippine Center for Postharvest Development and Mechanization

PSA Philippine Statistics Authority

RDLead Research and Development Leadership

SBC Small Business Corporation

SETUP Small Enterprise Technology Upgrading Program

UPLB University of the Philippines – Los Bańos

USM University of Southern Mindanao

VCA Value Chain Analysis

VSD Vascular Streak Dieback

MESSAGE

In the wake of unprecedented events and emerging crises, the Department of Agriculture (DA) launched the Plant, Plant, Plant Program to ensure that all Filipino families would have adequate supply of nutritious, healthy, accessible and affordable food to meet the demands of these challenging times.

As a testament of our firm resolve to triumph over this formidable foe, the DA was re-energized to act as one, but is committed at the same time to delivering results from various projects under the different major programs of the Department.



In light of this, I wish to congratulate all the principal actors who paved the way for the crafting and updating of High Value Crops Development Program (HVCDP) Roadmap. Through the completion and publication of this HVCDP Roadmap, we enshrine the spirit of excellence, collaboration, and resilience as inherent characteristics of our agricultural inheritance and legacy.

The progressive cross-cutting and continuing collaboration among all stakeholders in pursuit of attaining competitive advantage and relevant growth is an output designed into the pages of this roadmap.

I am proud and grateful that such a focused work on this commodity could be undertaken to ensure that a brighter future for the industry can reasonably be expected and attained because this blueprint already exists to assure it.

Marami pong salamat at Mabuhay!

WILLIAM D. DAR, Ph.D.

Secretary

Department of Agriculture

Cei G. Ca

MESSAGE

The Philippine coffee and cacao industries play a fundamental role in the socio-economic advancement of our country as they create employment opportunities and promote a culture of quality for local products that highlight the professionalism of our people and services. With coffee and cacao considered high-value crops and emerging agriculture products in the country, it is only imperative that we bridge the various gaps in our supply chain towards a more responsive and globally-competitive coffee and cacao industries.



The updated Philippine Coffee and Cacao Industry Roadmaps serve as guides in improving production while ensuring that the respective industries are cost-competitive, aligned with global quality standards, reliable and environment-friendly, and will provide sustainable benefits to farmers, processors, traders, and exporters. These, in turn, will accelerate the growth of the agriculture sector as we address issues on food security, economic prosperity, and social inclusion for micro, small, and medium enterprises (MSMEs).

As we strengthen and position the Philippine brand of coffee and cacao on the global stage, let us remain steadfast in charting realistic, responsive, and strategic actions in promoting our local produce so that we may be able to secure the sustainable and inclusive growth of our industries and provide a more comfortable life for all Filipinos.



FOREWORD

The Covid-19 pandemic that ravaged life and livelihood in the country for almost 2 years now proved to be an existential threat to our way of life. On the positive side, it elicited generosity and a sense of community in all of us, and became a catalyst of change in many areas of our lives.

It is in these multi-faceted circumstances that the High Value Crops & Rural Credit (HVCRC) of the Department of Agriculture (DA), working collaboratively with various



This roadmap is envisioned to serve as a guide to all industry stakeholders for the realization of the targets set in it for 2021 - 2025. It is an embodiment of how the industry will achieve its goals of transformative growth through the value chain approach, as well as increase in quality and sustained yields and incomes. It is with pride and pleasure that I express my heartfelt gratitude to everyone both in the private sector and government, who unselfishly lent their time and talent for this timely and necessary endeavor. More than the lofty legacy and memorable milestone we shall leave behind because of this worthwhile work, it is more the comfort in the knowledge that the entire industry would have a clear pathway to follow in the years ahead to realize its vision that is truly more meaningful to remember us all by. Thank you.

mel Cenis

Undersecretary for High Value Crops and Rural Credit Department of Agriculture

PREFACE

Big Congratulations are in order to all high value crops stakeholders in cacao, coffee,mango, banana, vegetables and onions who have successfully updated the commodity roadmaps of the country.

The updating of the high value crop roadmaps addresses the major challenges of our food and agricultural sustainability in the light of climate change and other natural calamities that hit most of our regions in recent memories. We have actively worked on a unified strategic initiative with the premise that

agriculture should be a positive contributor to food security, jobs creation and economic opportunities and environmental sustainability.



These agricultural roadmaps have carried key messages that the private sector which most of us are ably represented in these industry clusters are able and ready partners and driver of solutions for responsive and sustainable agriculture. Laying down the ground works with government and private sector partners and effective government leadership is an active ingredient for success.

We do hope and pray that these roadmaps will encourage many others to initiate action and strengthen collaborative engagements to achieve our shared goals for sustainable future.

CONSUL ARMI LOPEZ-GARCIA, Philippine Cacao Industry Council

Team Leader

Cacao Industry Roadmap Development Team





EXECUTIVE SUMMARY

The crafting of the revised Philippine Cacao and Chocolate Industry was necessitated to realign its vision, mission, goals, strategies and interventions with the Philippine Republic Act 8435 (Agriculture and Fisheries Modernization Act of 1997), the United Nation's Sustainable Development Goals (UN SDGs), the AmBisyon Natin 2040, the Philippine Development Plan (PDP) and the proposed Philippine Cacao Industry Development Act". This revised roadmap contains new strategies and interventions as well as retain some Action Plans in the 2017-2022 Philippine Cacao Industry roadmap that are deemed relevant and doable but need more push in its implementation. Two of the major revisions made in the existing roadmap are (1) the vision spells out the focus on building strong Philippine branding and (2) anchor the strategies and interventions on the principle of industry clustering, localization and market demands, as well as heightening a context of inclusivity in its scoping and application.

Where are we?

In recent years, the Cacao Industry has been gaining recognition in the domestic and export markets as the supply and demand gap of cocoa beans is increasing. One of the primary drivers of this increase is the growing middle class, increasing discretionary household income in developing countries, new and innovative uses of cocoa in the food, cosmetics and pharmaceutical industries, and the positioning of cacao as health food.

Based on PSA data, the Philippine cacao has a slow but increasing production trend with an average increase of 2,743 ha per year from 2013 to 2020. Such increase may be attributed to area expansion and the seed/seedling dispersal programs of DA, DENR and PCA. However, despite the increasing trend in production, supply still fall short to meet the increasing market demand domestically and globally. Low productivity is due to high mortality of planting materials and the lack of knowledge of cacao growers.

Like most countries that grow cacao, majority of the cacao farms in the country are small holdings and are being owned and managed by farmers. Thus, the need for localization and clustering.

Based on the Food and Agriculture Organization survey in 2017, the Philippines is placed 24th among the top countries producing cacao beans. However, the country placed 72nd in terms of exports with a global market share of less than 0.01%.

The Philippines is a net importer of cacao with an average of USD 168.3-M worth of import but with only USD 22.1-M export value. The large import of cocoa powder and export value of chocolate is being credited to major chocolate manufacturers in the country who seldom buy local cocoa beans. Instead, they use imported powder and cocoa butter for their raw materials.

Based on the recent Philippine Cacao Industry forum, the Philippines has an estimated global demand of about 4.7 million to 5 million metric tons (MT) by 2020. Nonetheless, a cocoa shortage is also predicted at 1 million metric tons (MT). The annual local consumption is at 50,000 metric tons (MT) but the local supply is only around 10,000 metric tons (MT).

With the Philippines' location conducive for cacao production and accessible to domestic and foreign trade, there is a heightened interest among local farmers and exporters to push for a more dynamic and competitive cacao industry that can compete with other major cacao-growing nations.

Moreover, the presence of players from all stages in the cacao value chain places the Philippines at a competitive edge. Another strength of the industry are the support services provided by the enablers in the form of technical and financial interventions, which facilitate the development and strengthening of the industry. Furthermore, the convergence of government support programs and projects touches various levels of the cacao industry value chain and is expected to transform and empower cacao farmers into thriving cocoa communities, which are the essential foundation for sustainable cocoa farming.

Where do we want to go?

To be globally competitive and sustainable cacao industry, efforts should be geared towards the following:

- Nationwide adoption of the upgraded harmonized cacao production and postharvest protocols to pursue poverty alleviation, job generation and environmental protection while advancing economic development and inclusive growth;
- b. Promotion of cacao production in areas highly suitable for cacao growing to improve farm efficiency and ensure increased farmers' income thereby raising their economic status;
- c. Promotion of continual applied research and development collaborations;
- d. Mobilization of all stakeholders and relevant government agencies to provide the needed extension support services for concerted industry-wide development efforts;
- e. Harmonized information gathering to establish a management information system; and
- f. Stronger participation in the global cacao and chocolate value chain by building/promoting Philippine Brand.

How do we get there?

One Sector-One Voice is one of the avenues that the cacao stakeholder wants to pursue. Through the leadership of the Philippine Cacao Industry Council (PCIC), in collaboration with the Department of Agriculture (DA), the Philippine Cacao Industry Association, Inc. (PCIA) will be organized and registered at the Securities and Exchange Commission (SEC) as a private organization composed of cacao industry stakeholders. It will serve as the Private sector partner and counterpart of the PCIC in the promotion of the Cacao Industry through the effective implementation of the Harmonized Production and Postharvest Protocols and Action Plans stipulated in the Cacao and Chocolate Industry Roadmap.

Implementation of the revised roadmap will be localized to ascertain timely and up-to-date execution of programs and plans. Yearly review of the roadmap and assessment of milestones will be performed to ensure that the interventions are properly implemented and to make revisions on the course of action, when deemed necessary. Moreover, active participation in local and international events to promote Philippine Brand of quality cacao will be continued as well as forging linkages with international stakeholders will be strengthened.

This revised roadmap is a product of the collective efforts of the cacao stakeholders. Series of meetings and consultations were conducted in crafting this roadmap. This revised roadmap will serve as a guide in the implementation of interventions and the close monitoring of Action Plans. All the stakeholders who participated in crafting this roadmap made a commitment to continue working together to ensure that the short-term goals will be achieved and the medium- and long-term goals be realized.

INTRODUCTION

Rationale

In the recent National Food Security Summit (NFSS), the importance of engaging a wide range of stakeholders in the agriculture value chain was realized as timely feedback can be obtained through them. The updating of the Philippine Cacao and Chocolate Industry Roadmap is aligned in such modality and complies with the Memorandum Order No. 37, Series of 2021 by the Office of the Secretary of the Department of Agriculture. This revised roadmap gives emphasis on the active participation of all stakeholders especially the private sector, and stresses the need for a Unified Action at the national and local level. The significance of harmonizing all efforts from production to marketing at the regional and local level was further elaborated in its strategies and Action Plans. Hence, this updated roadmap will serve as a guide in improving production as well as strengthening and positioning the Philippine brand of cacao and chocolate industry to be globally competitive.

But why invest in Cacao? Basically, cacao may significantly contribute to poverty alleviation and inclusive growth through livelihood and job generation. This is because cacao production only requires a small monetary investment or start-up capital. This explains why 90% of the growers are of small farm holdings. The suitability of cacao as an intercrop for coconut and banana, the two-week harvest interval, and an early gestation period of 18 months are some of the most valued advantages of this high value crop. The early return of investments and high profitability of the product also ensure good income augmentation potential. Moreover, cacao is considered one of the world's most valuable crops. It is a multi-million-dollar industry that has an increasing global and domestic market demands. Above all, the industry is market-driven considering that cacao has no product substitute. The gaining popularity of cacao products not only in the chocolate industry but also in cosmetics and pharmaceutical industries could not be over-emphasized. Hence, cacao's diversified usage as food and non-food warrants a sustainable market opportunity.

On the other hand, cacao industry also faces some hurdles and challenges that need to be addressed as shortage of supply due to low productivity has been observed. This is one of the reasons why an updated roadmap needs to be crafted.

Following the guidelines set in the Philippine Republic Act 8435 (Agriculture and Fisheries Modernization Act of 1997), the United Nation's Sustainable Development Goals (UN SDGs), the AmBisyon Natin 2040, the Philippine Development Plan (PDP), and the One DA Reform Agenda: Key Strategies along with addressing the issues and constraints raised by stakeholders, this updated roadmap will outline how the Philippines may address the following challenges:

- a. At the regional level, crafting harmonized production and postharvest protocols and strengthening technical support to ensure that Good Agricultural Practices (GAP) leading to excellent cacao bean quality is adopted;
- At the national level, improving farm productivity and efficiency to increase farmer's income;
- c. At the global level, expanding Philippine presence in cacao-chocolate industry by building and promoting Philippine Branding to be globally competitive.

Objectives

The general objectives of this roadmap are to harmonize the production and postharvest practices of cacao growers and to establish Philippine brand in the global market. To achieve these objectives, interventions will be focused on the following directions:

- Expansion of production areas in areas suitable for cacao growing based on the Climate and Soil Suitability Map
- Increase in fermented bean productivity level
- Moving Up of the Cacao Industry Value Chain
- Strengthening of Market Presence through Branding
- Focus on Fine Flavour Beans Market
- Apply the principle of clustering, localization and market demands

Moreover, the strategies and Action Plans are geared towards meeting the following specific objectives:

- Ensure availability and accessibility of quality cacao planting materials;
- Rehabilitate existing aging trees;
- Increase production areas;
- Raise crop yield to 2 kg/tree/year;
- Ensure availability of high-quality fermented cocoa beans to support and sustain value-adding activities;
- Contribute to the goal of attaining inclusive growth and poverty alleviation

Definition of Terms

- Agri-preneurship refers to the application of the principles of entrepreneurship to agriculture.
- Geo-tagging is the process of adding geographical information through the use of pictures, videos, websites, and other media channels in the form of metadata. This comprises latitude and longitude, altitude, bearing, and a range of other locationspecific data.
- Good Agricultural Practices (GAP) are practices that address environmental, economic and social sustainability for on-farm processes, and result in safe and quality food and non-food agricultural products.
- High-Value Crop refers to high-yielding crops that provide competitive returns on investment per hectare. These crops generate potential opportunities in the domestic and international markets and command high prices.
- **Intercropping** refers to growing two or more crops in the same field at the same time
- **LGU-recognized model farm** a recognition given by LGU to a cacao farm that showcases the advantages and benefits of adopting GAP in growing cacao and hopefully inspire other cacao growers to adopt GAP

- Monocropping refers to the practice of growing only one crop in the same land season after season.
- **Non-self-pollinating** is a feature of plants in which they do not have the ability to fertilize themselves. Vectors (insect or wind) are required to facilitate pollination. (Cross-pollination needs a pollinator or the wind to get the pollen to another flower of the same species.)
- One Sector-One Voice strengthening PCIC/PCIA to serve as the voice of the Cacao Industry
- **Pod-index** the number of pods needed to produce a kilogram of dried beans
- Quality planting materials grafted and scions coming from certified mother trees; planting materials asexually propagated using propagules/scions from NSIC registered cacao trees.
- **Single-origin chocolates** are made from cocoa beans produced in a specific country, region or even a specific plantation. Due to the climate and soil, together with the techniques of cacao farming and harvesting, origin chocolates have its own signature flavor profile.
- Supply chain refers to the network of individual and/or organizations from the delivery of raw materials from the supplier to the manufacturer until the product's delivery to the end user.
- **Value chain** characterizes the full range of activities necessary to create a product or service, which allows businesses to determine competitive opportunities.
- Varietal improvement refers to improving the characteristics of current varieties.

INDUSTRY SITUATION AND OUTLOOK

Product

Theobroma cacao, the scientific name of Cacao, literally translates as "food of the gods" in Greek. The name Theobroma cacao was first given to the cocoa tree by Carolus Linnaeus – the Father of Modern Day Taxonomic Plant Classification. Cacao is the Mayan root word to describe the tree and its product. It is grown mainly for its seeds known as the cocoa beans which are used to make cocoa mass, cocoa powder and chocolate.

In the Philippines, there are three major cultivar groups being grown by farmers. Each cultivar possesses its unique properties and qualities. These cultivars are:

The *Criollo* is considered as the most prized, rare and expensive variety. It is native to Central and South America. It is believed that the first cacao seed planted in the Philippines was the Criollo variety brought via the Acapulco-Manila Galleon Trade in 1670. Only 5% of the world's cacao production is Criollo because it is extremely susceptible to pests and diseases, thus difficult to grow. The beans are white to pale pink in colour and recognized as a superior quality, less bitter and more aromatic. Considered as the "Prince of Cocoas," Criollo is an ingredient in premium chocolates.

The *Forastero*, a native of the Amazon basin, is the most versatile variety and most commonly grown cocoa. It is mainly grown in Africa, Ecuador and Brazil and accounts for 80% of the world's cocoa supply. It is significantly harder, disease resistant and high yielding. Beans are purple-coloured and mainly used to give chocolate its full-bodied flavor. They have bitter taste, thus often blended with superior cocoas.

The **Trinitario**, a crossbreed variety of Criollo and Forastero, combines the best qualities of the two varieties: the hardiness and high yielding traits of Forastero and the refined taste of Criollo. It is the predominant fine flavour cocoa and is being used in about 10% of the world

cacao supply. Trinitario can be found in all the countries where Criollo cocoa was once grown including Southeast Asia and the Philippines. About 70% of Philippine production is Trinitario.

The soil and water composition differ in different locations, thus identical varieties of cacao may taste differently. Like wine sources, cacao bears the distinct flavor of the land where it originates.

Cacao is said to be a non-self-pollinating plant thus scientists and industry experts are recommending to have at least 3-5 clones in one farm site to facilitate pollination. In the Philippines, there are 13 approved varieties/clones registered in the National Seeds Industry Council, to wit: UF 18, BR 25, K 1, K 2, PBC 123, K 9, ICS 40, UIT 1, DR 1, P 7, S 5, USM Ch 1 and USM Ch 2. Of these major clones, six (6) are prevalently used, namely: UF18, PBC123, BR25, K1, K2 and K9. Among the six clones, UF18, BR25 and PBC123 are seen to have high performance and great potentials in the market. These clones possess the following traits: early maturing, early fruit-bearing, high-yielding, high fat content, tolerant to Vascular Streak Dieback (VSD) and have an average pod index of 20-34.

Product Forms

Cacao is the main ingredient that has no product substitute in chocolate production. There are six (6) intermediate products that can be derived from cacao beans: cocoa nibs, cocoa liquor (tablea), cocoa cake, cocoa butter, cocoa powder and chocolate confectionary blocks. These products gained popularity not only in the chocolate industry but also in cosmetics and pharmaceutical industries. Hence, cacao's diversified use for food and non-food industries provides broader market opportunities. As a health food, cacao is considered as a super food as it is packed with vitamins, antioxidants and essential minerals such as magnesium, calcium and iron.

Cacao products come in different forms, which can be differentiated as follows:

a. **Cacao Nibs** are made from fermented and dried cacao beans, which are de-hulled then broken into smaller pieces. They contain the whole cacao bean, thus possess the full flavor that cacao has to offer.

- b. Cacao Paste, known as cacao liquor, is made from milling whole cacao beans into a creamy, rich paste. The paste is allowed to solidify into a solid block, which can also be considered 100% chocolate as it contains only pure, whole cacao beans.
- c. Cacao Butter is the combined butter made from all of the fat-based components in whole cacao beans. This is made by pressing the milled cacao beans to separate the cacao butter from non-fat cacao mass or solid.
- d. Cacao powder is obtained from milling whole cacao beans and pressing them to remove the fat content. The milled cacao mass can then be grounded into a fine powder.
- e. Cacao beans are the raw form, which can be sold as wet or dry and fermented. It can be heat treated by roasting, to produce cocoa-based products.

Cocoa-based products traded in the local and international market include:

- Wet cacao beans
- Ready to sow cacao seeds (seedling purposes)
- Cocoa nibs (beans, whole/broken, raw/roast
- Tablea (Cocoa paste or liquor, not defatted)
- Cocoa powder (not containing added sugar/other sweetening matter)
- Cocoa butter, fat/oil
- Chocolates
- Chocolate Confectionery

On the other hand, some of the by-products that can be derived from cacao are as follows:

a. Cocoa Pulp Juice, also known as sweatings, is a whitish liquid extracted from wet cocoa beans. It contains predominant minerals such as potassium, sodium, calcium and magnesium. The pectin obtained from cocoa pulp juice is comparable with pectins that are derived from apples and lemons. Fermentation of the sugars in sweatings may lead to the production of alcoholic drinks, such as gin and brandy, as well as production of wine and vinegar.

- b. **Cocoa Pod Husk** (CPH) is the leftover pod material of matured cocoa fruit after the wet beans, sweatings and placenta have been removed. By-products that can be derived from CPH are as follows:
 - i. **Briquettes** dried cocoa pod husk is compressed to form a brick-shaped mass used for fuel. It is environment-friendly and has a high heating element.
 - ii. **Animal feed** CPH is incorporated into animal feeds for pigs, poultry and livestock, and is blended in tilapia feed.
 - iii. **Alkali** CPH ash can be used as a source of alkali for soap making.
 - iv. **Fertilizer** CPH ash can also be converted into a potassium-rich fertilizer by adding starch and pelletizing the mixture.
- c. **Cocoa Bean Shell** is the seed coat removed from the cocoa beans, which can be used as a mulch.
- d. **Cocoa butter extracted from discarded cocoa beans** may be used in the production of toilet soap, soft soap and body pomade.

The processing of cocoa waste into the above-mentioned by-products will not only help preserve the environment but also has the potential to augment cocoa farmers' income. Continual research and development are being undertaken to further assess the viability and profitability of the above-mentioned by-products. Likewise, new initiatives are being done to develop other by-products that can be derived from cocoa waste.

Cacao Production

Cacao is a perennial crop that grows in tropical environments, mostly concentrated in a region called the Cacao belt, which is anywhere within 20 degrees north or south of the Equator. It grows most notably in Central and South America, West Africa and Southeast Asia specifically Malaysia, Indonesia and the Philippines. The climate conditions in these areas are well suited for growing cacao trees. The tree is often grown under the shades of other trees and can be as tall as 40 feet. It typically bears fruits in 18 months but reaches full bearing capacity in 5 years producing 70 to 100 pods or more per tree per year. The suitability of cacao as an intercrop for coconut and banana and the two-week harvest interval are some of the most valued advantages of this high value crop.

The tree is cultivated in many countries. Africa contributes 77.3% of the world cacao production, followed by Latin America (17.2%) while Asia and Oceania at 5.5%. At present, the leading suppliers of cacao are Ivory Coast, Ghana, Indonesia, Nigeria, Cameroon, Brazil, Ecuador, Peru, Dominican Republic and Colombia.

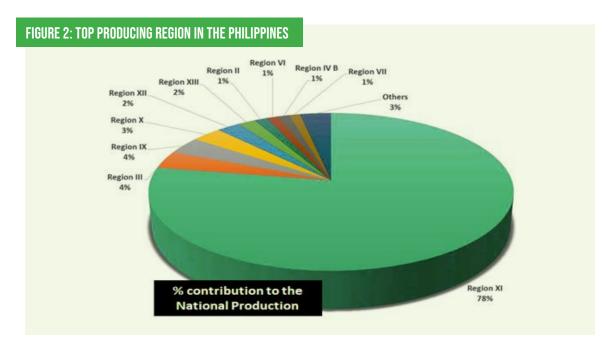


Ninety percent (90%) of existing cacao farms are small. This ownership profile holds true even in the global scenario where most cacao farms are also small, ranging from 1-3 hectares.

According to the Global Market Report for Cocoa (2019), global supply was able to keep up with the demand in the recent years, with a small excess in 2018. However, The Economist Intelligence Unit still forecasts insufficiency in supply in the long-term due to low yield and prices. Among the production constraints faced by the suppliers are wild weather pattern, pests and diseases, competition with other plantation crops, aging of cacao trees in major production areas, and low productivity level. Other factors involved are social unrest/civil war, low investments in postharvest and limited production inputs.

Local Production

In the Philippines, most cacao growing areas are located in the Mindanao island. As illustrated below, the Davao Region contributes 78% of the national cacao production having 7,257.85 metric tons (MT) planted in 19,975 hectares of land in 2020. The rest of Mindanao contributes almost 90% while the remaining 10% is being shared by Luzon and Visayas.



Nine of the top ten producing provinces are located in Mindanao island and one in the Luzon island. Though majority of the top producers are in the Mindanao island, it is noteworthy to recognize that Luzon and Visayas islands are continuously encouraging new growers and existing growers to expand its areas thereby predicting to increase its contribution in the overall cacao production in the future. Currently, the top producing

provinces in Luzon and Visayas are Aurora, Palawan, Iloilo and Bohol. The highest producers in Luzon and Visayas are Aurora province and Iloilo with 333.91 metric tons (MT) and 82.46 metric tons (MT) production, respectively.

TABLE 1: TOP CACAO-PRODUCING PROVINCES IN THE PHILIPPINES

Province	2020 Volume of Production (MT)	Area Planted (HA)
City of Davao	2,508.98	5,458
Davao del Norte	1,435.59	5,999
Davao del Sur	1,247.93	915
Davao Occidental	750.33	585
Davao de Oro (Compostela Valley)	741.68	5,580
Davao Oriental	573.34	1,438
Aurora	333.91	182
Zamboanga del Norte	282.02	1,502
Bukidnon	185.04	158
North Cotabato	138.31	1,800

Source: OpenStat, Philippine Statistics Authority (PSA), 2020

Figure 3 shows that in Davao region, the City of Davao has contributed the highest production in 2020 with a record of 2,508.98 metric tons (MT), which is equivalent to 27% of Davao region's contribution nationwide. It was followed by Davao del Norte and Davao del Sur with 15% and 13% contribution, respectively.



AREA PLANTED/HARVESTED

The first cacao in Asia was planted in the Philippines in 1670 while commercial farms were established in the 1950s. Production level reached 35,000 metric tons (MT) by 1990. However, production started to decline due to several factors such as typhoon, pests and diseases infestation, aging trees and possible genetic deterioration on commonly used varieties. The decline was further aggravated by decreasing world market price and competition with other plantation crops such as banana and palm oil, which led to a shift on planting preferences.

Despite its competitive advantage, the Philippine cacao production at present only stands at 9,340.73 metric tons (MT) from the 31,285.36 hectares of land planted with cacao based on the figures released by the 2020 Philippine Statistical Authority (PSA).

Around 77,648,326 pieces of seedlings were distributed and planted through the programs of Department of Agriculture-High Value Crops Development Program (DA-HVCDP), the Department of Agrarian Reform (DAR), the Department of Environment and Natural Resources—National Greening Program (DENR-NGP), and the Philippine Coconut Authority-Kaanib Program (PCA-Kaanib Program). About twenty million (20M) planting materials were distributed from 2016 to 2020 through the Department of Agriculture-High Value Crops Development Program (DA-HVCDP). However, monitoring was not regularly conducted, resulting in inaccurate and outdated data, which need to be addressed immediately. High mortality on the planting materials distributed and inefficient procurement and distribution system of planting materials were also identified as issues. Most of the materials distributed in the past did not thrive because of its untimely distribution and the seedlings were not yet mature when distributed.

TABLE 2: PLANTING MATERIALS DISTRIBUTED PER GOVERNMENT PROGRAM

Year	DA-HVCDP	DAR	DENR-NGP	PCA-Kaanib
2010-2020	24,940,910	1,628,556	39,571,832	11,507,028

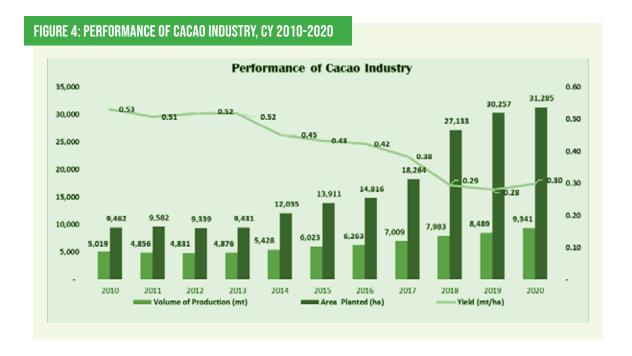
The seedling dispersal programs could have provided a big push for the industry if proper trainings were provided to beneficiaries and appropriate production protocols were observed. For this reason, the Harmonized Production and Postharvest Protocols for cacao is currently being crafted.

TABLE 3: VOLUME OF PRODUCTION AND AREA PLANTED/HARVESTED

Year	Volume of Production (MT)	Area Planted/Harvested (HA)
2010	5,019	9,462
2011	4,856	9,582
2012	4,831	9,339
2013	4,876	9,431
2014	5,428	12,035
2015	6,023	13,911
2016	6,263	14,815
2017	7,009	18,264
2018	7,983	27,133
2019	8,489	30,257
2020	9,341	31,285

Source: OpenStat, Philippine Statistics Authority (PSA), 2010-2020

Table 4 shows that there was a slight decrease in area planted for cacao from 9,582 to 9,339 ha in 2011-2012 due to high number of mortality rate. However, a gradual increase in area planted was observed in 2013 up to 2020 from 9,431 to 31,285 ha, which accounts for an average increase of 2,743 ha per year. Such increase could be associated with the DA, DENR and PCA seedling dispersal programs as well as the increasing interest of private sectors in cacao growing. Despite an increase in hectarage of cacao farm, the cacao production only increased slightly with an average volume of 563 metric tons (MT). As of the 2020 PSA release, there are 6 million cacao bearing trees planted nationwide. This may be attributed to the unclear data on how many trees have been planted in a hectare to match the computation for the expected production. It is therefore recommended that in conducting data gathering, the number of trees instead of hectarage should be collected in order to reflect a more realistic scenario of cacao production.



YIELD

Despite the availability of high-yielding varieties of cacao, the 2.0 kg per tree yield performance has not been achieved in most farms. This is due to the limited supply of quality planting materials and lack of trainings on good agricultural practices.

In spite of the availability of high-yielding varieties, area expansion and planting material distribution initiatives, the yield has declined from 0.53 metric tons (MT) per hectare (ha) to 0.30 metric tons (MT) per hectare (ha) during the period of 2010 to 2020. The volume of production at 0.5 kg to 1.0 kg per tree per year was observed, which is way below the targeted 2 kg per tree per year yield performance set by the industry to beat the 2022 Cacao Challenge. The genetic expression of the existing varieties is expected to produce 3.5 kg per tree per year.

Aging cacao trees, possible genetic deterioration on commonly used varieties, lack of good agricultural practices, and scarcity of high-yielding planting materials are among the factors affecting the yield and production volume of the industry. Thus, aside from expansion area and provision of inputs, massive rehabilitation/rejuvenation of old cacao trees is strongly recommended to increase yield. An estimate of 19 million trees also need to be fertilized with an expected yield of 39 metric tons (MT) by 2025.

The Philippine Coconut Farmers and Industry Development Plan (CFIDP) includes a collaborative effort in the implementation of the Coconut-Coffee/Cacao-Based Enterprise Development project under the Republic Act No. 11524 otherwise known as the Coconut Farmers and Industry Trust Fund Act. This targets to rehabilitate about three (3) million cacao trees over a five-year period, expand the priority cacao area to 7,300 hectares over five years, and establish cacao nurseries with production training to achieve a capacity of 10,000 seedlings per year. The goal of this project is to group farmers into clusters, create long-term jobs, and conserve natural resources. Farmers-owners will be the direct beneficiaries of this project, while tenants, laborers, and caretakers will benefit as skilled farm and processing service providers/workers.

A total of 2,982,676 cocoa trees to be rehabilitated/rejuvenated across all regions. There are 7,601 hectares accessible for intercropping growth across the country. In addition, 84 nurseries will be established to ensure the availability and accessibility of planting materials while also lowering seedling mortality rates. This will be done in collaboration with the High Value Crops Development Program (HVCDP) and the Bureau of Plant Industry (BPI) in conducting trainings for proper nursery operation and management. To serve its members and any interested clients, these nurseries must produce a minimum of 10,000 trees once they begin operations.

In addition, intercropping coconut and cacao might help meet the roadmap's targets of 3,792.98 metric tons by 2025 and 10,362.33 by 2028.

Consumption

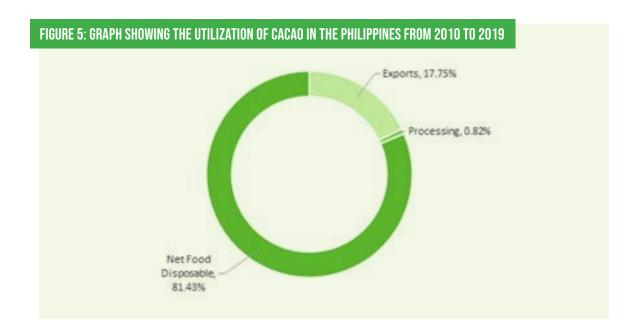
According to the recent Philippine Cacao Industry forum, the Philippines has an estimated global demand of between 4.7 million to 5 million metric tons (MT) by 2020, however, a cocoa shortage is also predicted at 1 million MT. The annual local consumption is at 50,000 metric tons (MT) while the local supply is around 10,000 metric tons (MT). In order to address the underutilization of the capacity of local grinders, it is evident that the expansion and strengthening of the production aspect of the industry be given emphasis.

The growing number of restaurants and coffee shops serving cocoa-based drinks and food items, and the growing industry of medium and small-scale chocolatiers requiring high quality cocoa beans contributed to the attractive price of cacao in the domestic market. Moreover, changes in consumer preferences such as increasing consumption of "Tsokolate" (Tablea) drinks and chocolates, and increasing purchasing power of middleaged working class pose opportunities for manufacturers of tablea and chocolates including cocoa beans producers.

TABLE 4: UTILIZATION OF CACAO IN THE PHILIPPINES FROM 2010 TO 2019

Year	Exports	Processing	Total Net Food Disposable	Per Capita Consumption (kg/year)
2010	181	76	7,485	0.08
2011	124	50	4,984	0.05
2012	298	47	4,634	0.05
2013	498	72	7,138	0.07
2014	1,770	65	6,431	0.06
2015	1,804	62	6,118	0.06
2016	2,233	60	5,911	0.06
2017	3,094	70	6,952	0.07
2018	2,733	75	7,412	0.07
2019	3,049	66	6,497	0.06

Source: OpenStat, Philippine Statistics Authority



Based on the Supply and Utilization Accounts data generated by the PSA, a Filipino consumed an average of 0.063 kg of cacao per year for the 10-year period (2010-2019). It can be observed that the per capita consumption dropped from 0.08 kg/year in 2010 to 0.06 kg/year in 2019. The average volume of imports during the period is 23% of the total supply of cacao in the country.

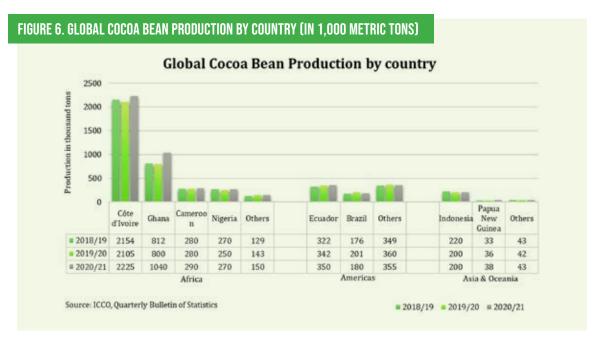
On the other hand, cacao intended for exports generally increased over the years, from 181 metric tons (MT) in 2010 to 3,049 metric tons (MT) in 2019. The drastic increase started in 2014 wherein eight (8) Filipino firms participated in the cocoa-chocolate global value chain. On the average, 17.75% of the cacao supply in the country was exported. Meanwhile, volume intended for processing exhibit volatility. The average volume allotted for the said activity is just 0.82% of the total available supply in the country.

Furthermore, total net disposable continuously takes up majority of the available supply with an average of 81.43% for the same period. Net Food Disposable pertains to the amount of food commodity available in its original or unprocessed form which is intended for human consumption.

Trade (Import and Export)

Cacao is an equatorial plant that grows only within 20 degrees from the equator. Thus, cacao production is commonly seen in tropical regions such as Africa, Latin America, and some parts of Asia. Hence, it is not surprising that the top producing countries of cocoa beans are found in these areas which include Côte d'Ivoire, Ghana, Ecuador, Cameroon, Nigeria, Indonesia, Brazil and Papua New Guinea. According to UNComtrade (2016), the majority of the global production of cocoa comes from only two countries: Cote D'Ivoire and Ghana. The combined supply from these countries constitutes 61% of global exports.

Figure 6 shows the production of cocoa beans by country from 2018/19 and 2019/20, with a forecast for 2020/21. In crop year 2020/21, the top producer is still Côte d'Ivoire with about 2.225 million metric tons (MT) of cocoa beans. All of the top eight (8) cacaoproducing nations exhibited increases in the production comparing the 2018/2019 and 2020/21 data, except for Indonesia. Only Indonesia is the Asian country among the said list with 0.200 million metric tons (MT) in 2020/21.



In 2017, the Philippines placed 24th in the cocoa beans production with 7,009 metric tons (MT). This is according to the survey conducted by the Food and Agriculture Organization (FAO). However, the country placed 72nd in terms of exports with a global market share of less than 0.01%.

Table 6 shows the volume and value of exported and imported cocoa products in 2020. Based on volume, the major cocoa product exported by the country in 2020 is still cocoa beans with 5,153 kg (equivalent to USD 13,657). The diversified use of cocoa beans in the manufacturing, pharmaceutical, and cosmetics industries generally pushes the global demand of cocoa beans on an upward trend. Other cocoa products exported by the Philippines include cocoa paste (48 kg), cocoa butter, fat and oil (381 kg), cocoa powder (241 kg), and chocolate and other food preparations containing cocoa (609 kg).

Meanwhile, the largest volume imported is still cocoa powder with 28,389 kg (equivalent to USD 59,511). This is being credited to major chocolate manufacturers in the country that use imported powder and cocoa butter for their raw materials. On the other hand, the biggest importation of cocoa products in terms of value is on Chocolate and other food preparations containing cocoa with USD 82,058 (equivalent to 19,886 kg).

The country also imported cocoa beans (175kg), cocoa shells, husks, skins and other cocoa waste (1841kg), cocoa paste (884kg), and cocoa butter, fat and oil (60kg). The total value of exported cocoa products is USD 22,130 while the imported cocoa products is USD 168,311. Clearly, there is a trade deficit in cocoa, which is equivalent to USD 146,181.

TABLE 5: VOLUME AND VALUE OF EXPORT AND IMPORT OF COCOA PRODUCTS IN THOUSAND METRIC TONS. CY 2020

COCOA PRODUCTS	EXP	ORT	IMP	ORT
COCOA PRODUCTS	Quantity (kg)	Value (US\$)	Quantity (kg)	Value (US\$)
Cocoa beans, whole or broken, raw or roasted	5,153	13,657	175	412
Cocoa shells, husks, skins and other cocoa waste	-	-	1,841	348
Cocoa paste, whether or not defatted	48	122	884	3,062
Cocoa butter, fat and oil	381	1,831	60	353
Cocoa powder, not containing added sugar or other sweetening matter	241	659	28,389	59,511
Chocolate and other food preparations containing cocoa	609	2,113	19,886	82,058
Others	1,334	3,749	10,947	22,566
Total	7,766	22,130	62,181	168,311

On import trade, countries engaged in cocoa-based products consistently top the world importers of cacao and its preparations. As shown in Table 7, USA has an imported value of almost USD 5,189,358 in 2020 followed by Germany (USD 5,167,840) and the Netherlands (USD 4,801,631). Most of the cacao beans exported by the cacao-producing regions are marketed to grinders in these countries, being the home of giant confectionery companies such as Mars Inc., Mondelez International Inc., and Hershey Foods Corporation, among others.

Other countries in the list include France, United Kingdom, Belgium, Canada, Poland, Italy and Russian Federation. It can be noted that the value of the cocoa imported by the top 10 cocoa-importing countries ranges from 57 to 59% of the total value imported from 2016 to 2020. The growing demand of cocoa beans is positively correlated with the demand for chocolates given that cocoa is the primary raw material that cannot be substituted by other commodities.

TABLE 6: VALUE OF IMPORTS OF THE TOP COCOA-IMPORTING COUNTRIES. 2016-2020

Country/Year	2016	2017	2018	2019	2020
World	47,934,704	47,891,387	49,313,420	49,935,825	49,534,209
United States of America	5,208,799	5,145,881	4,856,588	5,127,504	5,189,358
Germany	5,171,772	5,035,967	5,150,192	5,167,529	5,167,840
Netherlands	4,655,973	4,631,770	4,832,779	4,699,580	4,801,631
France	3,372,693	3,383,133	3,463,365	3,351,070	3,533,514
United Kingdom	2,517,449	2,628,473	2,781,130	2,767,815	2,968,990
Belgium	2,106,722	1,915,644	1,899,152	1,998,365	2,033,189
Canada	1,546,398	1,520,439	1,552,647	1,562,011	1,622,209
Poland	1,133,996	1,224,283	1,324,682	1,330,595	1,531,381
Italy	1,268,153	1,289,793	1,271,023	1,264,366	1,369,448
Russian Federation	971,057	1,048,556	1,179,825	1,248,863	1,221,288

Source: International Trade Center (ITC) Trade Map accessed through http://www.trademap.org

TABLE 7: VALUE OF PHILIPPINE CACAO IMPORTS BY COUNTRY OF ORIGIN (US \$), 2016-2020

Import Market	2016	2017	2018	2019	2020	Total	% Share
Malaysia	35,095	38,151	36,337	45,083	47,865	202,531	20%
Indonesia	31,046	27,544	32,494	32,416	35,442	158,942	16%
United States of America	44,541	37,303	22,796	17,552	14,041	136,233	14%
Switzerland	46,099	25,958	11,884	8,968	2,750	95,659	10%
Singapore	20,247	17,294	17,429	20,268	18,305	93,543	9%

Source: International Trade Center (ITC) Trade Map accessed through http://www.trademap.org

On the other hand, as shown in Table 8, most of the Philippine Cacao Imports are sourced from Malaysia with USD 202,531 from 2016 to 2020 followed by Indonesia with USD 158,942 and USA with USD 136,233. Bigger percentage of importations from Malaysia and Indonesia may be due to the proximity of these countries to the Philippines.

For the 2019/20 forecast, world cocoa grindings are expected to expand to 4.860 million tons, up by 157,000 tons, representing a 3.3% increase compared to the revised estimate of 4.703 million tons. It is anticipated that processing activities will grow by 5.1% to 1.164 million tons in Asia and Oceania, whereas a growth of 7.6% to 961,000 tons is projected for the Americas. In Africa, processing activities are forecast to expand by 0.5% to 1.001 million tons while a 1.6% increase to 1.734 million tons is envisaged in grinding activities for Europe compared to the level attained in the same period of the previous season (ICCO).

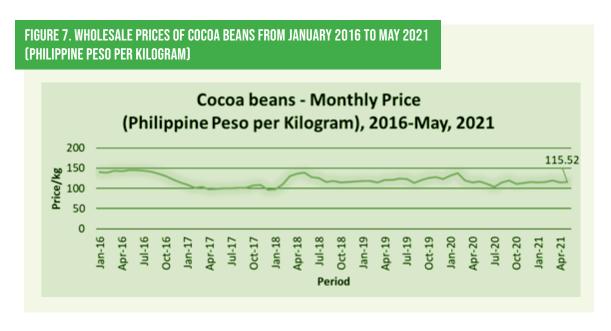
The high grinding capacity has already exceeded the bean production, thus, widening the gap of demand and supply. In the Philippines, current production is not even enough to supply local grinding requirements estimated to be at 40,000 metric tons (MT).

Among the primary drivers of this increase are: the big cocoa consumption demand of the United States and Europe, the increasing discretionary household income in developing countries, and the positioning of cocoa as health food, among others.

While demand is on an uptrend, supply gap continues to widen due to production constraints brought about by factors such as changing weather condition, pests and diseases, low productivity, aging trees, possible genetic deterioration on commonly used varieties, competing crops and unsustainable cacao farms. The one (1) million metric tons projected shortfall by 2020 is forecasted by experts to be felt earlier. The scarcity of bean supply also resulted in the closure of grinding facilities.

Prices

Normally, the local price of the country's cocoa beans is correlated with the international commodities pricing. However, when there is an increased volume in local cacao processing on a certain period (i.e. tablea processors) and the supply of raw materials is nil, it pushes the local price up considering that 'tablea' does not at all times conform to world market prices.



The wholesale price of cocoa beans in the Philippines ranged from Php 98.00-138.00/kg. As of May 2021, the wholesale price of dried cacao beans is at Php 115.52/kg.



From 2016 to July 2021, the farmgate price of dried cacao beans per month ranged from PhP 82.00 to 126.00/kg. As of July 2021, the farmgate price of dried cacao beans is at P96.01/kg.

Cacao is the only agricultural commodity that defies the law of Supply and Demand. Unlike other commodities, the price of cocoa beans is generally higher during peak season. Low production is between January to April with the price at its lowest. However, during the peak production period, i.e. October up to early January, the price is at its highest. Incidentally, this period is also the peak inventory month for cacao bean for occasions such as Halloween, Christmas and Valentine's Day.



ANALYSIS OF THE CACAO INDUSTRY

Value Chain Analysis

The Value Chain Analysis (VCA) is a concept from business management popularized by Michael Porter in 1985 with the objective of identifying the behavior of costs and the areas for differentiation. It is an approach for breaking down the sequence (chain) of business functions into strategically relevant activities through which value is added by the business. The industry value chain is composed of all the value-adding activities within the industry, beginning with raw materials and ending with the completed product delivered to the customer. In the Philippines, various government agencies complement the Industry Clustering Approach with VCA in order to diagnose industry performance and illustrate the interdependence and relationship among industry players.

As shown in Table 9, there are eight (8) segments in the Cacao industry chain, namely: input provision; cacao farm maintenance and beans production; fermentation, drying, and storage; local trading/marketing; beans processing; exporting; trading of finished products; and final sale in domestic and export markets.

Input Provision

Input suppliers, farmer cooperatives and nursery operators are the sources of raw materials used in cacao production. The most important raw material that these key players provide is the seedling. To provide these seedlings, the following activities are necessary: establishment/expansion and maintenance of budwood gardens/scion groves; propagation and distribution; and nursery accreditation. The destination of these inputs are farmer cooperatives and individual farmers. Moreover, organic fertilizer (such as biofertilizers and biopesticides) and inorganic farm inputs, pod sleeves, packaging materials and other input requirements of the upper level functions are made accessible by the input providers. Most importantly, they provide technical and extension services to producers.

Cacao Farm Maintenance and Beans Production

Producers may be farmer cooperatives or individual farmers. Their activities include planting/replanting/rehabilitation, farm maintenance, nutrient management, water management, pest and disease management and pod harvesting. These activities are necessary to produce cacao pods and wet beans.

Fermentation, Drying and Storage

There are farmer cooperatives which may be involved in processing activities. These cooperatives eventually coordinate with local processors, which sell to the local market and exporters, for the sale of their produce to the export market. Farmer cooperatives together with wet beans buyers are tasked to do the following activities to produce either dried or fermented beans and dried beans: pod breaking; fermentation; drying; packaging; storage; utilization of cacao waste and by-products; and other value-adding activities.

Local Marketing/Trading

In local marketing/trading of dried and fermented beans, farmer cooperatives and traders organize activities related to consolidation, cleaning, packaging and labelling, hauling, transporting, wholesaling, and retailing.

Beans Processing

Beans are further processed by farmer cooperatives and processors into nibs, tablea, butter and powder (set A) or chocolates and chocolate products (set B). For the first set of products, the tasks to be undertaken include cleaning, roasting, winnowing, grinding, pressing, pulverizing, packaging and storage. For chocolates and chocolate products, the activities are cleaning, roasting, winnowing, grinding, mixing/refining, conching, moulding and packaging.

Exporting

Products are then transported/shipped by exporters and processors to traders and other exporters. These products include tablea, cocoa beans, cocoa butter, cocoa powder, chocolates, and cocoa paste.

Trading of Finished Products and Final Sale in Domestic and Export Markets

The above-mentioned products are sold in retail by traders and exporters in the local and export markets. Supermarkets and retailers undertake the selling function. Final consumers include local households and consumers, OFWs, and tourists.

TABLE 8: CACAO INDUSTRY VALUE CHAIN MAP

Functions	Input Provision	Cacao Farm Maintenance and Beans Production	Fermentation, Drying and Storage	Local Mar- keting/Trad- ing	Beans Pro- cessing	Exporting	Trading of Finished Products	Final sale in Domestic and Export Markets
Tasks/roles	Provision of seedlings: a. establishemnt/ expansion, maintenance of budwood gardens/ scion groves b. propagation and distribution c. nursery accreditation o Make accessible fertilizer, pesticide, pod sleeves o Make accessible design and packaging materials and other input requirements of the upper level functions or Technical, extension services	Planting/ replanting/ rehabilita- tion Farm main- tenance Nutrient manage- ment Pest and disease manage- ment Pest and ing	Pod breaking Fermentation Drying Packaging Storage Utilization of cacao waste and by- products Other value- adding activities	• Consolidation • Cleaning • Packaging & labeling • Hauling • Transporting • Wholesaling • Retailing	Set A Cleaning Roasting Grinding Pressing Pulveriz- ing Packaging Set B Cleaning Roasting Winnow- ing Grindling Mixing/ Refining Conching Packaging	• Transport- ing/Shipping	Retailing	• Buying

Functions	Input Provision	Cacao Farm Maintenance and Beans Production	Fermentation, Drying and Storage	Local Mar- keting/Trad- ing	Beans Pro- cessing	Exporting	Trading of Finished Products	Final sale in Domestic and Export Markets
Role players/ Operators	Input Suppliers Farmer Cooperatives Nursery Operators	Farmer Coop- eratives Individual Farmers	Wet beans buyers Farmer Coops	Farmer Cooperatives Local Traders	Farmer Co- operatives Processors	Exporters Processors	Traders Exporters	Consump- tion
Product	- Seedlings - Organic ferilizers Technical services	Cacao pods, wet beans	Dried beans, fermented and dried beans	Dried beans, fermented and driend beans	Set A: Nibs, Tableam Butter, Powder Set B: chocolates and chocolate products	Tablea, Cocoa Benas, Cocoa Butter, Cocoa Powder, Choc- olates, Cocoa paste	Tablea, Co-coa Beans, Cocoa Butter, Cocoa Powder, Chocolates, Cocoa paste	Local Households and Con- sumers, OFWs, Tourists, Su- permarkets, Retailers, Export Mar- ket
Enablers	DA, DA-HVCDP, DA-BPI, DA-ATI, DA-BAFS, DA-BSWM, DA-BAR, PCA, DAR, DENR, DTI, DOST, PCIC/PCIA, LGL MinDA, Academe, Government, other private sector group, ACPC, LBP and other Funding Institutions	, DA-ATI, DA-BAF, NR, DTI, DOST, PC rnment, other priv sther Funding Insti	A-ATI, DA-BAFS, DA-BSWM, DTI, DOST, PCIC/PCIA, LGUs, lent, other private sector r Funding Institutions	DA, DA-HVC- DP, DA- AMAS, DTI, PCIC/PCIA LGUs	DA, DA-HVCDP, ATI, TESDA, PhilMech, DTI, DOST, PCIC/PCIA, LGUs	DA, DTI, PCIC/ PCIA, Attaches 	DA, DTI, PCIC/PCIA	Tablea, Co- coa Beans, Cocoa But- ter, Cocoa Powder, Chocolates, Cocoa paste

As shown in Table 9, the cacao industry is packed with industry enablers from the government sector, private sector, and non-government organizations. These enablers provide support services in the form of technical and financial interventions including the provision of postharvest facilities and support infrastructures as indicated in their respective mandates. These generally enable the development and strengthening of the industry.

One of the players that has a major role in the realization of the different interventions is the strengthened Philippine Cacao Industry Council (PCIC). The PCIC was created to spearhead the development of the industry. It is a private sector led council composed of public and private sector representatives. To provide co-leadership, the Department of Agriculture acts as a co-chair. Furthermore, at the Regional level, the Regional Cacao Industry Councils were established. These councils spearhead the development of the industry in their respective regions. The elected chairpersons represent their regions at the Philippine National Cacao Industry Council (Philippine Cacao). To date, sixteen (16) regional councils and five (5) provincial councils have already been created.

Enablers

The potential and significant contributions of the cacao industry to employment and income generation have led the various government agencies to initiate interventions that will support the development of the industry. Among the programs designed to provide support are as follows:

- High Value Crops Development Program of the Department of Agriculture (DA);
- Philippine Rural Development Program of DA;
- National Greening Program of the Department of Environment and Natural Resources;
- Coconut-Cacao Enterprise Development Project of Philippine Coconut Authority;
- Industry Clustering, Market Assistance, Trade Promotion and Shared Service Facility
 Programs of the Department of Trade and Industry (DTI);
- Market Resurgence Program (MRP) of DTI;
- Agrarian Production Credit Program of the Department of Agrarian Reform;

- Mindanao Sustainable Agrarian and Agriculture Development (MinSAAD) Project;
- Credit Program of the DA-Agricultural Credit Policy Council;
- SETUP, MPEX, and CAPE, NICER, RDLead, CRADLE and BIST Programs of DOST; and
- Research and Development Projects of the DA-Bureau of Plant Industry and academe.

The convergence of government support programs and projects touches various levels of the cacao industry value chain and is expected to transform and empower cacao farmers into thriving cocoa communities, which are the essential foundation for sustainable cocoa farming. To reach this goal of transformation and empowerment, there is a need for collaborative and harmonized interventions among government agencies, private and non-government organizations.

Infrastructure Support and Logistics

Postharvest Facilities

Availability of efficient postharvest facility in every region is necessary to produce quality cocoa. In line with the goal in positioning the Philippines as producer and exporter of Fine Flavour Beans, postharvest facilities for fermentation and drying need to be provided.

At present, majority of the cacao farmers ferment and dry the cacao beans at their farms or homes using makeshift equipment. Cacao beans are dried on the ground or makeshift platforms, which may expose the beans to surface contamination and infestation. The absence of appropriate solar dryers or mechanical dryers slows down the drying of cocoa beans during rainy season, allowing moulds to develop. On the other hand, rapid drying prevents the oxidation of acetic acid, which leads to excess acid trapped within the beans. Hence, this lack of appropriate machinery may cause serious problems for the industry as it affects the flavor and quality of the beans.

To attain these quality requirements, appropriate postharvest facilities must be available in all cacao-growing communities. These facilities include cacao bean grading kits, fermentary facility, solar dryer with UV cover, mechanical dryer, multipurpose dryer pavement, and warehouse.

Nursery and Budwood Garden

Given the competitive advantage and marketing potentials of cacao in the local and world market, many farmers have ventured in the industry in the recent years. However, the supply of quality planting materials was not enough to meet the demand of the increasing number of cacao growers as nursery and budwood gardens are limited.

There are over 150 nursery operators in Davao Region with combined production of more than five (5) million seedlings per year. These nursery operators are supplying the Davao Region and Mindanao areas as well as Luzon and Visayas areas. Ready to sow seeds and bud sticks, which are the primary inputs to nursery operation, are also sourced out from Davao. However, high mortality on planting materials was observed due to improper handling and transport.

The existing supply gap and the proliferation of non-accredited nurseries are major concerns that hamper the expansion and development of the industry. Hence, ensuring easy access and availability of quality planting materials should be given top priority. In order to address these concerns, there is a need to establish additional nurseries and budwood gardens at the provincial level. In addition, plant nursery accreditation and certification in the province should be strengthened at the same time more nurseries in the municipalities be accredited.

Farm-to-Market Road

Accessibility to farm-to-market road (FMR) plays a vital role in the production and marketing aspects of the industry.

In the production side, the lack of FMR affects the farmers' capacity to transport farm inputs and farm products, thus increasing their production costs. The delay of movement in the harvested cacao to postharvest facilities and/or marketing channels also affects the quality of beans, thus resulting in low farm gate prices.

As for the marketing aspect, poor road networks limit the farmers' opportunities to gain access to larger commercial channels and to choose buyers who can provide higher prices. Oftentimes, farmers rely on middlemen who often buy their beans at a much lower price.

Since most cacao farms are located in the rural areas, issues on product consolidation, delays in the movements of crops, farm inputs, and finished product, which affect production costs and farm gate prices, are very evident.

To help farmers gain better leverage on market and have better access to inputs, it is recommended that Farm-to-Market Road (FMR) initiatives put priority on the locations where cacao growing is suitable as presented in Appendices 2 and 3: Climate and Soil Suitability map.

Research for Development

Improvement and innovation across the different areas of the value chain (input provision to production and processing) are necessary in gaining competitive and comparative advantage. Accordingly, both the private and public sectors including the academe have been independently doing research and development on cacao production and management as well as product development and enhancement in order to attain its competitive advantage.

On cacao production and management, the agriculture-based academic institution such as the University of Southern Mindanao (USM) undertakes various researches that aim to develop new generation of superior clones that are high-yielding, high fat content, and resistant to Cocoa Pod Borer (CPB), Phytophthora pod rot, and Vascular Streak Dieback (VSD). Together with the DA-BPI, new cacao hybrids were developed, and studies on varietal appropriateness to local conditions were made.

To complement the research and development (R&D), the University of the Philippines Los Baños (UPLB), DA-BPI and the DOST in partnership with the private sector undertook research and development interventions to develop new technologies in nursery operation, farm production protocols and postharvest processing. These initiatives aim to increase farm efficiency and productivity as well as enhance product quality.

Although product development and enhancement are commonly initiated by the private sector engaged in processing/manufacturing, the government sector such as the DOST is also conducting researches for quality improvement of various cocoa-based products such as tablea, liquor, etc.

While there have been a number of researches conducted, the stakeholders believe that continual research and development across the value chain is necessary. However, research results should not be confined in R&D centers, therefore better and wider dissemination of research findings and transfer of technologies should also be prioritized. The establishment of a Cacao Research Center is being pushed by the industry players in order to have a focal center for R&D and depository of all cacao researches.

Human Resource Development

At present, the private sector and non-government organizations such as the Kennemer Foods International (KFI), CSI Trade Ventures., Cacao Industry Development Association of Mindanao (CIDAMI), and ACDI/VOCA provide technical support to cacao farmers across the country. Likewise, public sector initiatives led by DA, DAR, DENR, and DTI in partnership with Cacao Industry Development Association of Mindanao Inc. (CIDAMI) provide human resource trainings not only in the field of production but also on entrepreneurship.

It is evident that the importance of capacity building has been recognized and given priority by all sectors. However, most of the training centers are located in Region XI, thus making it less accessible to other regions such as Luzon and Visayas. To address this gap, PCIC in collaboration with TESDA will design and conduct trainings nationwide. Alongside with this initiative is the preparation of the Harmonized Cacao Production and Postharvest Protocols that will be published and made in digital format to reach more cacao growers.

Credit Support & Insurance

Credit is essential in the modernization and transformation of the country's cacao industry into a dynamic, high-growth sector. Access to timely and affordable credit is crucial to eliminate the cacao farmers' financial constraints to invest in farm activities, improve technologies, and increase productivity. The government has been implementing agricultural credit programs that cacao farmers and cacao-based micro and small enterprises (MSEs) and other players in the cacao value chain can access to finance the

capital requirements of their production, processing, marketing as well as farm rehabilitation and/or expansion undertaking, and other activities along the cacao value chain.

The Department of Agriculture (DA) including its attached agencies and the Department of Agrarian Reform are the government agencies responsible for the majority of the lending programs for the agricultural sector. The government credit programs administered by DA, DAR and other related agencies are designed to provide preferential (subsidized) loans to smallholder farmers, including those in cacao farming.

Majority of DA and DAR credit programs are implemented in partnership with the Land Bank of the Philippines (LBP). A number of the DA programs are also in partnership with cooperatives, farmers' associations and rural banks in delivering credit to smallholder farmers. Loans are granted for the purpose of purchasing inputs, as working capital, and/ or for the acquisition of farm equipment, machineries and post-harvest facilities. DA and DAR also make available financing support for immediate relief and recovery of small farmers affected by calamities and other disastrous and fortuitous events.

Cacao farmers and cacao-based MSEs may also avail financing through the lending windows provided by government-owned financing institutions such as the Land Bank of the Philippines (LBP) and the Small Business Corporation (SBC).

Shown below is the list of these programs.

TABLE 9. AGRICULTURAL CREDIT PROGRAMS

Agency	Program Name	Description
DA	Agricultural Competitive Enhancement Fund (ACEF)	Designed to increase productivity of farmers and fishers by providing credit for the purchase of farm inputs, machineries, equipment, and establishment and improvements of production and post-harvest facilities.
DA	Agrarian Production Credit Program (APCP)	Provides agri-production and enterprise credit, capacity building, and other support services to agrarian reform beneficiaries and their organizations.

Agency	Program Name	Description
ACPC	AgriNegosyo Program (ANYO) and its subprograms	Provides accessible and affordable credit to eligible borrowers to finance income-generating activities (production, processing, or marketing or agri-fishery income generating activity and non-farm micro-enterprise) and working capital and/or fixed asset acquisition (agricultural facilities construction/acquisition, machinery/ equipment acquisition) requirements of the micro and small agribusiness enterprise and farmers and fisherfolk cooperatives/ associations
ACPC	Kapital Access for Young Agripreneurs (KAYA)	Finance working capital and/or fixed asset acquisition requirement of start-up or existing agri-based projects of young entrepreneurs and agri-fishery graduates.
ACPC	Survival and Recovery Loan Assistance (SURE) Program	Provides immediate financing relief to small farmers and fishers affected by natural and other calamities, animal disease outbreak, and other disastrous events.
DAR	Expanded Assistance to Restore and Install Sustainable Enterprise for Agrarian Reform Beneficiaries and Small Farm Holders (E-ARISE-ARBs)	Financing support for disaster affected ARBOs and small farmer holders and their families to restore livelihoods and farming activities.
DAR	Credit Assistance Program for Program Beneficiaries Development (CAP-PBD)	Provides credit assistance to existing CAP-PBP Window III cooperative/farmers association borrowers to ensure their sustained economic development.
LBP	Credit Assistance for Cacao Agribusiness Entities and Other Organizations 100 (Cacao 100)	Finance cacao industry stakeholders and help them attain their mission of producing 100,000 metric tons of dried fermented beans by 2022
SBC	MSME Financing Programs	Direct lending to registered micro, small and medium enterprises (MSMEs), which aims to bridge the financing gap of "pre-bankable but viable" MSMEs that are at the moment "unserved" by the banking system.
		Through this program, MSMEs are provided with a conducive environment by financing their business needs, training them to get credit track record and experience, and building up business size necessary to access bank financing in the future.

Source: ACPC, DAR, LBP, DTI

While there are government-initiated interventions, it is imperative to increase the participation of the private sector in the provision of financing services to cacao farmers, in particular to the smallholders who lack capitalization, to advance their production activities and enable them to viably and sustainably contribute to the economy. Enhancing the enabling policy and regulatory environment is crucial to allow (1) adoption of market-based financial and credit policies, (2) focus on proper management and utilization of loan fund, (3) engagement and active participation of banks and government financial institutions, and (4) provision of critical support services in order to serve and provide accessible financing to more farmers including those engaged in cacao farming and cacao-based enterprises. Moreover, current programs only fund new farms that are operating for 0 to 3 years. Cacao growers with farms that need rehabilitation are having difficulty in raising funds for their farm activities.

In terms of insurance, the Philippine Crop Insurance Corporation (PCIC) has been offering insurance coverage to both commercial and non-commercial cacao growers/farmers under its tree and seedling mortality insurance products. These insurance products serve as a form of protection against losses due to natural calamities and pest and diseases infestation. The PCIC also provides free subsidized insurance coverage to subsistence cacao farmers that are listed in the Registry System for Basic Sector in Agriculture (RSBSA). Cacao farmers who are not in the list may go to their respective Municipal or Provincial Agriculturist to register and be included in the said list. Additionally, Crop Insurance may be bundled with certain agricultural credit programs, such as those offered by ACPC. These agricultural credit programs are in a form of loan and income security programs that are extended to the farmers.

SWOT Analysis

The series of consultative meetings and national convergence allowed the stakeholders to discuss strengths, weaknesses, opportunities and threats that are prevalent in the industry. These are as follows:

TABLE 10. SWOT ANALYSIS OF THE PHILIPPINE CACAO INDUSTRY

42

Value Chain Activities	Strengths	Weaknesses	Opportunities	Threats
Final sale in the Domestic	 Accessibility to domestic 	 Limited number of 	 Increasing discretionary 	 Decreasing world market
and Export Markets	and foreign trade	processors (Common	household income in	price
Trading of Finished Products	 Global recognition of 	Service Facilities)	developing countries	 Setback from pandemic
Exporting	Philippine cacao beans	 Underutilization of the 	 New and innovative 	
	and products	capacity of local grinders	uses of cocoa in the	
beans Processing	• Six (6) cacao products sold	 Insufficient/inappropriate/ 	food, cosmetics and	
Local Marketing/Trading	to local and international	Lack of knowledge on the	pharmaceutical industries	
	markets	use of PH facilities	 Increasing awareness of 	
	 No product substitutes 	 Lack of Philippine Cacao 	consumers to fair trade	
	 Presence of players from 	Brand	and health & wellness	
	all stages of the value	 Inefficient Market 	 Positioning of cacao as 	
	chain	Linkages	health food	
	 Cacao prices defies the 	 Trade-deficit in cacao 	 Growing number of 	
	law of supply and demand	 Weak technology 	restaurants and coffee	
	 Convergence of 	commercialization	shops serving cocoa-	
	government support		based drinks and	
	programs and projects		food items	
	 Continuous R&D 		 Growing industry of 	
	 Presence of enablers from 		medium and small-scale	
	the government sector,		chocolatiers requiring	
	private sector and NGOs		high quality cocoa beans	
	 Strengthened Philippine 		 Increasing purchasing 	
	Cacao Industry Council,		power of middle-aged	
	regional and provincial		working class	
Fermentation, Drying and	councils			
Storage				

Value Chain Activities	Strengths	Weaknesses	Opportunities	Threats
Cacao Farm Maintenance	 Suitability of location for 	 Low productivity level 	2M hectares of coconut	 Occurrence of pests and
and Beans Production	production	 Unstable yield from 	farms ideal for cacao	diseases
	 Suitability of cacao as 	2020-2014 despite area	cropping	 Wild weather pattern
	intercrop	expansion		 Competition with other
	 Early gestation period 	 Aging cacao trees in 		plantation crops
	 Two-week harvest interval 	major production areas		 Possible genetic
	 Early Return on 	 Dominance of small-scale 		deterioration on
	Investment and high	production		commonly used varieties
	profitability	 Inadequate R&D Centers 		
		 Inaccessibility to credit 		
Input provision	Massive distribution and	Non-self-pollinating		
	cultivation of planting	characteristic of cacao		
	materials	 Inefficient procurement 		
	 On-going crafting of 	and distribution system of		
	harmonized production	planting materials		
	and postharvest protocols	 Proliferation of non- 		
		accredited nurseries		

Cost and Return Analysis

Production

Consistent with the bright market opportunities of the industry is the promising return on investments (ROI) for those who are or will be engaged in cacao production. As illustrated in the table below, production cost of planting cacao (monocrop or intercrop) is relatively low. For monocrop production, initial production cost for the first year is at PhP89,628.00 per hectare (equivalent to 1,100 cacao trees) while intercrop planting is estimated to be at PhP61,148.00 per hectare (equivalent to 600 cacao trees).

Based on the data provided, material cost for cacao production is higher than the labor cost in intercrop planting from the first year until the third year of production. Material costs during these years comprise 65 to 75% of the total production, which went to the investment on seedlings, tools and other inputs. On the other hand, for monocrop production, material cost is higher than the labor cost during the first year of production only. This is due to the maintenance cost per year after the first year of production, which is equivalent to Php60,000.

Furthermore, production cost can even be lower when low-cost organic farm inputs such as biofertilizers and biopesticides are utilized. Biofertilizers like MYKOVAM is applied once only throughout the life time of the crop. It is composed of mycorrhizal fungi that proliferate in the roots and rhizosphere and aids in the absorption of more nutrients and water especially in marginal areas exposed to drought and high temperature. Only a very minimal amount of chemical fertilizer (from 25 to 50% of the recommended rate) is needed during the early establishment period of the field planted seedling.

Unlike other crops, ROI of cacao production can be gained within three (3) years both for monocrop and intercrop areas since harvest may be done within 18 months for well-managed farms. Profitability is higher on the third year as net income doubles relative with the production cost.

The promising income that the industry can offer accompanied with the numerous employment (being a labour-intensive industry) it can generate through cacao production will ultimately help in the government's goal for countryside development and poverty alleviation.

TABLE 11: COSTS AND RETURNS PER HECTARE AS INTERCROP (600 TREES PER HECTARE)

PARTICULARS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Yield					
Trees per Hectare	600	600	600	600	600
Pods per Tree		7	34	59	70
Total Pods per Hectare		4,200	20,400	35,400	42,000
Pod Index	20	20	20	20	20
Wet beans (kg/ha)		630	3,060	5,280	6,300
A. MATERIALS					
Tools					
Knapsack sprayer for insecticides	2,500				
Hand tools: spade, bolo, pruners, others	2,000				
Sub-total (PhP)	4,500				
Seedlings					
Total seedlings needed (Add: 10% for replacements of mortalities)	660				
Cost per seedling	20				
Sub-total (PhP)	13,200				
Dolomite (for soil pH correction)					
No. of kilos applied	1,000			1,000	
No. of bags required	20			20	
Cost per bag	180			180	
Sub-total (PhP)	3,600			3,600	
Fertilizer: 16-16-16					
Application rate (grams per tree)	340	560	600	600	600
Total kilos	240	336	360	360	360
Cost per bag	1,510	1,510	1,510	1,510	1,510
PARTICULARS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Cost per kilo	30	30	30	30	30
Sub-total (PhP)	7,248	10,080	10,800	10,800	10,800
Fertilizer: Organics					
Application rate (kilos per tree)	3		3		3
Total kilos	1,800		1,800		1,800
Cost per kilo	7.50		7.50		7.50

PARTICULARS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Sub-total (PhP)	13,500		13,500		13,500
Agri. chemicals (foliar; fungicide; insecticide)					
No. of application cycles	24	24	24	24	24
Cost/knapsack	29	29	29	29	29
No. of Knapsack	1.50	3	4	5	6
Sub-total (PhP)	1,100	2,088	2,784	3,480	4,176
Herbicide Spray					
No. of application cycles	4	4	3	2	1
Cost/knapsack	41	41	41	41	41
No. of Knapsack	12	12	12	12	12
Sub-total (PhP)	2,000	2,000	1,500	1,000	500
Plastic sleeves for CPB control					
Total sleeves needed		4,200	20,400	35,400	42,000
Cost per piece		0.06	0.06	0.06	0.06
Sub-total (PhP)		252	1,224	2,124	2,520
Provision for harvest sacks for pods		525	2,550	4,425	5,250
TOTAL MATERIALS COSTS (PhP)	45,148	14,945	32,358	25,429	36,746
B. LABOR					
Clearing					
Cost per man day	200				
No. of man days	5				
Sub-total (PhP)	1,000				
Layout / staking					
Cost per man day	200				
No. of man days	4				
Sub-total (PhP)	800				
Digging of holes					
Piece rate	5				
No. of holes	600				
Sub-total (PhP)	3,000				
Planting					

PARTICULARS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
No. of man days	12				
Sub-total (PhP)	2,400				
Round weeding & mulching					
Piece rate	2	2			
Total per cycle	1,200	1,200			
Number of cycles	4	4			
Sub-total (PhP)	4,800	4,800			
Foliar Spray					
Cost per man day	200	200	200	200	200
No. of knapsack	1.50	3	4	5	6
No. of man days	25	50	62.50	75	87.50
Number of cycles	24	24	24	24	24
Sub-total (PhP)	600	1,200	1,500	1,800	2,100
Herbicide Spray					
No. of application cycles	4	4	3	2	1
PARTICULARS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
No. of Knapsack	12	12	12	12	12
Sub-total (PhP)	800	800	600	400	800
Dolomite application/liming for soil pH Correction					
Cost per man day	200			200	
No. of kilos applied	1,000			1,000	
Application efficiency (i.e., kilos/man day)	150			150	
No. of man days required	1			1	
Sub-total (PhP)	200			200	
Fertilizer application					
Cost per man day	200	200	200	200	200
Total man days	2	2	2	2	2
No. of application cycles	4	4	2	2	2
Sub-total (PhP)	1,600	1,600	800	800	800
Tree pruning, chupon pruning, shaping					
Cost per man day	200	200	200	200	200
Total man days	1	4	3	3	3

PARTICULARS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
No. of cycles	4	3	3	2	2
Sub-total (PhP)	800	2,400	1,800	1,200	1,200
Pod sleeving					
No. of pods for sleeving	-	4,200	20,400	35,400	42,000
Piece rate	0.10	0.10	0.10	0.10	0.10
Sub-total (PhP)	-	420	2,040	3,540	4,200
Harvesting, pod breaking					
Kilos of wet beans harvested	-	630	3,060	5,280	6,300
Labor cost per kilo of wet bean harvested	3.50	3.50	3.50	3.50	3.50
Sub-total (PhP)	-	2,020	10,710	18,400	22,050
PARTICULARS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
TOTAL LABOR COSTS (PhP)	16,000	13,240	17,450	26,340	31,150
C. TOTAL MATERIALS AND LABOR COSTS (PhP)	61,148	28,185	49,808	51,769	67,896
REVENUES					
Wet beans (kg/ha)	-	630	3,060	5,280	6,300
Gross Value Wet beans (at PhP28/kg)		10,080	85,680	147,840	176,400
D. NET INCOME		(18,105)	35,872	96,071	108,504
E. RETURN OF INVESTMENT (%)		(64.24)	72.02	185.58	159.81

^{**600} trees per hectare (with 10% for replacement of mortalities)

TABLE 12: COSTS AND RETURNS PER HECTARE AS MONOCROP (1,100 CACAO TREES PER HECTARE)

	PARTICULARS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
1.	Cacao seedlings (1,100 pcs. @ PhP 25/seedling	27,500				
4.	Fertilization at Planting (PhP 1300/bag) Inorganic at 50 grams/hill Organic Fertilizer at 200 grams/hill (P300/bag)	2,750				

^{**50} kg per bag of Dolomite and Inorganic fertilizer

PARTICULARS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
 5. Maintenance Fertilization (PhP 1300/ Bag of 50 kg) - Vegetative Stage at 100-150g/ application/tree - Productive Stage at 200-250g/ application/tree 	8,580	17,160	22,800	28,599	28,600
4. Pesticides, Application as needed	1,850	2,775	3,700	3,700	3,700
5. Hand tools and Equipment	3,000	1,000	1,000	1,000	1,000
6. Sacks and Crates		1,000	2,000	3,000	3,000
7. Establishment Cost: (Labor Piece Rate PhP 350)					
Land Prep (Clearing, staking, liming)	8,000				
Holing & Planting at P15.00 X 1,100 holes	16,500				
Weeding Quarterly 12 MD	4,200				
Pruning quarterly at 10 MD	3,500				
Fertilizer application, quarterly at 4 MD	1,400				
Chemical Spraying, 12MD	4,200				
8. Farm Maintenance: PhP 10,000/ Month for 2 Ha		60,000	60,000	60,000	60,000
9. Pod Breaking at PhP 1.50/kg		1,350	4,500	6,750	9,000
TOTAL EXPENSES	81,480	83,285	94,000	103,050	105,300
10% Contingency	89,628	91,613	103,400	113,355	115,830
TOTAL PRODUCTION COST					
Yield at 90% productive trees or say 1000 trees productive. 100% good beans		15%	50%	75%	100%
Total Dried Bean Production at 2kg/Tree		300	1,000	1,500	2,000
Gross Value (Price index PhP 110/kg)		33,000	110,000	165,000	220,000
Net Income for Productivity Level of 2kg DFCB	(89,628)	(58,613)	(6,600)	65,065	112,090
Total Dried Bean Production at 3 kg/ Tree		450	1,500	2,250	3,000
Gross Value (Price Index PhP 110/kg)		49,500	165,000	247,500	330,000
Net Income for Productivity Level of 3kg DFCB	(89,628)	(42,113)	61,600	134,210	214,170

PARTICULARS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Total Dried Bean Production at 4 kg/ Tree		600	2,000	3,000	4,000
Gross Value (Price Index PhP 110/kg)		66,000	220,000	330,000	440,000
Net Income for Productivity Level of 4kg DFCB	(89,628)	(25,613)	116,600	216,645	324,170

Key to Higher Income: Higher Productivity. At least 3 kg/tree/year

Percentage of Productive Tree should be not less than 90% Beans rejection/damage beans should not be more than 10% Field Operation Efficiency, Good alignment & Branching at 1 meter

High Planting Density; Go for 1,450 trees per hectares

Proper fruit care.

High percentage of good pods and good beans

Convert fixed cost to variable cost

Value-added products

In the Philippines, there are seven cacao products sold to local and international markets. These are the wet beans, dried beans, dried fermented beans, cacao nibs, tablea, cocoa powder, and cocoa butter. Value of each product generally depends on the value-added inputs and demand in the market.

Products that have undergone value-adding processes are more valued. Per industry estimate, the value of beans increases four times when converted to tablea and increases eight times when converted to chocolate. This entails that in order to gain higher profitability, producers must value-add their products instead of settling into wet or dried beans alone.

In the previous roadmap, it was mentioned that among the most valued cacao product is the cocoa butter which is being sold at PhP750.00 per kilogram or higher. This product is a pale-yellow, edible fat extracted from the cocoa beans. It accounts 45-57% of the bean content and is the most expensive. It is a major ingredient in practically all types of chocolates and also being used in making ointments, toiletries, and pharmaceuticals.

In selling beans, the dried fermented ones are more valued compared to the wet and dried beans. Farmers may have an additional PhP10-15.00 per kilogram in selling dried fermented beans. However, in order to market this type of product, availability and accessibility to postharvest facilities are very important to farmers.

In terms of tablea product, the farmers get the highest profitability with 38% or equivalent to PhP130.00 based on the PhP 215.00 selling price of 1.5 kg of beans. Production cost is estimated at PhP45.00 - PhP50.00 per kilo of dried fermented beans. The minimal requirement for additional inputs and overhead costs, and the prevailing market price based on supply and demand, contribute to the bigger profitability of the farmers. On the other hand, tablea processors gain the next highest profit as compared to other levels of the value chain. A twenty-nine percent profit, equivalent to PhP99.00 per kilogram, is gained by the processors out of the PhP450.00 selling price per kilogram. Traders and wholesalers/retailers only acquire 4% and 14% profitability shares, respectively.

Under the value chain distribution in the international scenario, 6.6% profit goes to the farmer for every bar of chocolate, while the chocolate producer and retailer take 35% and 44% of the shares, respectively.

Farmers with value-adding activities gained more economically. Thus, the cocoa sector can contribute much in terms of inclusive economic growth. This is very important in spurring up rural economic development. This is on top of the jobs created and other related livelihood opportunities that can be created.

Benchmark Analysis

Majority of the cacao farms in the country are small holdings and are being owned and managed by farmers. These farmers are generally undergraduates who have gained knowledge in farming from their descendants or from experience. Consequently, majority of them have limited technical skills and knowledge on production, marketing, and entrepreneurship. Further, farmers have limited access to relevant and updated data, information, and technologies that they can use.

This human resource gap often becomes a hindrance in attaining the desired productivity and competitiveness of the industry. For instance, the lack of knowledge on Good Agricultural Practices (GAP) led to improper farm management resulting in low yield and vulnerability of cacao plant to pest and diseases. Likewise, the lack of knowledge on postharvest processing and the use of postharvest facilities also affects the quality of the cocoa beans. These inadequate skills and knowledge have greatly impacted the farmers' ability to maximize income potential from cacao growing. Addressing these gaps are relevant to the industry given that cacao production is labour-intensive rather than capital-intensive.

The table below shows the assessment of farmers on the effect of their current practices on income and the environment as well as their proposed solutions. This was adopted from the Value Chain Analysis and Competitive Strategy: Davao Del Norte Cocoa Bean.

TABLE 13: FARMERS' ASSESSMENT OF THE EFFECT OF THE CURRENT PRACTICES ON INCOME AND ENVIRONMENT WITH PROPOSED SOLUTIONS AND INTERVENTION APPROACH

Common Practices	Impact on Environment (IE)	Impact on Business (IB)	Solution	Intervention Approach	
Use of pesticides (Fungicide/ Herbicide) Decis, Dithane, Malathione, Alliete, Ader Round-up, Power Teeweed, Clear-up	Death of pollinator: tag-nok, bees, bat, butterfly Air contamination Health hazardous	Low production High cost of production	Practice integrated pest management Transition to organic farming practices	Encourage farmers group to supply organic pesticides & organic fertilizers Conduct training on organic farming Regular monitoring of organic farming practices	
Fertilizer/ synthetic Urea, complete, ammonium sulphate, potash, Viking	high phosphate/ nitrate acidic soil water contamination	High cost of production, low profit not sustainable			
Disposal of cacao pods -use as substrate of vermiculture -non-utilization of cacao pods scattered in the area	Recycling - organic fertilizer Spread of fungus infestation in the area; more mosquitoes - dengue	Low production cost Loss of income	Conversion of cacao pods to compost	Acquisition of pod shredder Training on equipment maintenance	
Transportation to procure inputs	Use of energy Carbon emission	Additional Cost	On-site nursery establishment	Capacity building	

Moreover, the characteristics of cocoa produced depends on the genotype, soil, climate and harvest conditions, and postharvest activities, particularly fermentation, drying and roasting. Fermentation and drying, when done appropriately, remove all unpleasant flavors and initiate chemical processes required to produce the true cocoa and chocolate flavours that occurs after roasting. According to Mikkelsen, the factors that affect the quality of the final beans in the fermenting step include degree of ripeness of pods; type of cocoa; climate and season; quantity of cocoa beans in a batch; and duration of fermentation.

Drying is a necessary step in the processing of cocoa. Through this process, the good condition of beans for storage and transport is obtained. It is also necessary to reduce the bitterness and astringency of the beans. Furthermore, it facilitates the development of the chocolate brown color characteristic of well-fermented beans as well as prevent the development of off-flavors within the beans.

In the country, facilities and systems used in drying and fermentation vary. This variation affects the quality of the beans. Agents of multinational companies have their own fermentary facilities, solar dryers, and bean grading kits, while farmers still do the fermentation and drying at their production areas or homes using makeshift equipment. Most likely, the beans are dried on the ground or makeshift platforms, which results in surface contamination that is a major source of fungi in fermented and dried cocoa beans.

Moreover, there is a high risk on mould development during rainy days wherein drying of cocoa beans is done on prolonged periods and on an intermittent basis. This results in off-flavours that is created when the moulds penetrate the testa, which can be a serious problem. On the other hand, when drying is too fast, the oxidation of acetic acid can be prevented. This results in too much acid trapped within the beans, which adversely affects the flavour of the nib.

Competitive Analysis

The cases of Ecuador and Indonesia provide examples of how countries are moving up in the value chain. One of the most important upgrading that the two countries are undertaking is process upgrading at the agricultural level. This is a response to the global trend as cocoa production has remained the same in the past 10 years while demand continues to increase.

Hence, the study conducted by the Duke University entitled "The Philippines in the Cocoa Value Chain" provided upgrading trajectory recommendations. If these will be achieved, the country is expected to move into higher value processing segment of the value chain. The following are the recommendations as stated in the said document:

- a. Short Term Process Upgrading (agriculture): Taking the lead from major cocoa bean producers, the Philippines needs to improve their agriculture production to be competitive and participate in the cocoa-chocolate GVC. The starting point for the country is to expand and improve the productivity. Aging trees, and inefficient agricultural operations have undermined productivity of the sector. Increasing the production should first satisfy the domestic market and later the international market. This should be the very first step that the country should follow. Efforts to boost processing at this stage will likely drive less expensive beans imports from other countries, and undermine production efforts at home.
- b. **Short Term Process Upgrading (certification):** Taking the lead from major cocoa bean producers, the Philippines needs to seek certification from the international certifying organizations, such as UTZ and Rainforest Alliance. While these certifications do not command a high price premium in the market, the commitment of several global cocoa processors and chocolate manufacturers to source only certified beans by 2020 represents a potential shift in the global demand market and new requirement for export. The Philippines needs to begin assisting farmers now to meet the requirements of these organizations to ensure competitiveness as production increases.

- c. **Short Term Product Upgrading:** Continue to encourage the diversification of cocoa bean variety in the nation. Since the geography of the Philippines allows for the cultivation of the three major types of beans: Trinitario, Criollo and Forastero, it is advisable that the country diversifies risks by growing all varieties that can cater to different end markets. However, more effort should be done towards diversifying into Forastero beans as demand for Criollo beans is a niche market with relatively small demand. Furthermore, it is advisable to explore high value hybrids to take advantage of new markets and new cocoa bean varieties.
- d. **Medium Term Functional Upgrading (manufacturing):** Once the country is able to meet the minimum requirements of cocoa production, manufacturing of the beans will be the next step. Other lead countries such as Ghana, Cote D'Ivoire, and Indonesia have attracted investment from big processors when they secured a good and stable production volume. Olam, Cargill and Barry Callebaut are present in these countries having state-of-the art factories and training specialists to run these cocoa plants that produce cocoa liquor and butter. Hence, this functional upgrading, moving to higher stages of the value chain, will provide additional export revenues as well as new jobs for the country.



MARKET TRENDS AND PROSPECTS

Local

The Philippines is said to be the first country in Asia that planted cacao. The conduciveness of the country's location for cacao production and accessibility to domestic and foreign trade heightened the interest of local farmers and exporters to push for a more dynamic and competitive cacao industry that can participate in the cacao global cacao and chocolate value chain. For this to materialize, there is a need to build and promote a Philippine Cacao Brand.

In 2017, the Cocoa of Excellence Program first recognized cacao-beans from the Philippines as part of the best 50 beans for the said year's edition. The Cocoa of Excellence Program is the first stage for cacao producers to join the International Cocoa Awards (ICA). The ICA is a global competition, coordinated by the Biodiversity International and Event International, that acknowledges the quality, flavor and diversity of cacao according to their origin. This year (2021), one entry from the Davao Region and one entry from Region VI were recognized as gold awardees. In addition, one entry from Davao Region received a silver award.

However, market linkages still remain inefficient which resulted in extensive market failures, high transaction costs and risks, and service gaps. Furthermore, the country is still an importer of cocoa products such as chocolate, cocoa powder, cocoa beans, cocoa paste, cocoa butter and cocoa husks. The large import of cocoa powder and export value of chocolate is being credited to major chocolate manufacturers in the country that seldom buy local cocoa beans. Instead, they use imported powder and cocoa butter for their raw materials. This in effect increases the importation of cocoa powder making it the leading cacao product import in 2014. Consequently, some of the finished by-products produced by local manufacturers are being exported to other countries.

While considered a snack food in developed countries, chocolate in the Philippines is mostly eaten during special occasion or given as gifts. Among the major chocolate manufacturers located in the country are Universal Robina Corporation, Commonwealth Foods, Inc., Goya, Inc., and Columbia International Food Products Inc. Most of these companies are situated in Luzon, with capacity ranging from 20,000 to 36,000 metric tons (MT) of processed cocoa annually. Universal Robina accounts 38% of the chocolate market, with Cloud Nine and Nips as top selling products.

Grinding requirement of local chocolate manufacturers is at 40,000 metric tons (MT) while national production is only at 10,000 metric tons (MT). A portion of this 10,000 metric tons (MT) is also being exported or processed at source, hence, not all local production is being consumed by the local grinders prompting them to import cocoa beans from other countries. It is reported that the Philippines imports 50,000 metric tons (MT) of cocoa and cocoa preparations to meet the local demand.

The presence of players from all stages in the cacao value chain places the Philippines at a competitive edge. Locally, the discrepancy between the grinding requirements of manufacturers and the existing national production entails more opportunities for production expansion to meet local demand. In addition, local processors offer higher buying price for cocoa beans compared to bean exporters.

For bean exporters, more opportunities are open due to the widening of supply and demand gap in the world market. A 10% market share in the world supply may provide a profitable income to the country and its producers.

International

The spread of the COVID-19 pandemic in the early part of 2020 had led to disruptions of supply chains, industries and markets across the globe. Just like the other sectors, the global cocoa and chocolate industry was affected by the changing demand and distribution channels in one way or another. Nevertheless, according to Fortune Business Insights (2020), the global cocoa and chocolate market size is still forecasted to grow exponentially with the increasing demand for specialty and premium chocolates in the

developed economies. The market may hit USD 67.22 billion by 2025 while presenting a compound annual growth rate of 5.7% between 2018 and 2025.

There is also an increasing consumer interest in single-origin chocolates. These are made from cocoa beans produced in a specific country, region or even a specific plantation. Due to the climate and soil, together with the techniques of cacao farming and harvesting, origin chocolates has its own signature flavor profile.

On the other hand, value-added cocoa-based products like chocolates are being made predominantly in non-cacao producing countries such as the United States and European countries. At present, Europe remains the main market for premium quality beans since majority of the grinders are based in the country. Of the 60% world grinding capacity, 39% are from grinders based in Europe, while the remaining 22% are based in America. This elucidates why main exporters of cacao and its preparations in 2015 were from countries in Europe such as Germany and Netherlands. Cacao producing countries such as Cote d'Ivoire and Ghana were the top exporters of cocoa beans in 2015.

With the increasing awareness and concerns on healthy eating, healthy alternatives within chocolate confectionery may be included to the current offerings. Major brands seek to affect the direction of new product development over the next five years. For example, there were reports that Nestlé has created a vegan version of its popular Kit Kat brand of lines (called Kit Kat V). This poses a challenge to cacao producing regions as most of the cacao farms are small holdings owned by farmers who have limited investment.

On the other hand, the growing demand for sustainably produced cocoa beans entails more profitability to farmers, which consequently demands higher prices for the premium quality beans they produce. This is observed over the last decade especially in Northern and Western Europe. In 2018, the World Cocoa Berlin Declaration was released, which recognizes that a sustainable cocoa sector can only be achieved through collaboration. In addition, the first international standard for sustainable and traceable cocoa was published in May 2019. Hence, it is increasingly necessary for producers to transform their current farming practices to more sustainable ones, such as the utilization of fewer synthetic fertilizers and conduct of good water management.

Moreover, supermarkets and sari-sari stores (other grocery retailers) still dominate the distribution of chocolate confectionery in the Philippines and this is expected to continue even with the effect of the COVID 19 pandemic. However, e-commerce is still seen to have some scope for development having made strong gains in chocolate confectionery during 2020 and 2021. In March 2020, the Fine Cacao and Chocolate Institute (FCCI) conducted a survey to better understand the impact of COVID-19 on small chocolate businesses. While several lockdowns were implemented, postage and delivery systems were still operating in different countries. With this, small chocolate businesses used this platform to improve their sales. Thirty percent of those who participated in the survey are planning to move sales entirely online while as much as 59% look forward to boosting digital marketing endeavors over the immediate future. Also, according to National Confectioners Association, online chocolate engagement grew, rising from 25 percent of shoppers in 2018 to 40 percent in 2021.

PRIORITY CONCERNS & OPPORTUNITIES/CONSTRAINTS & OPPORTUNITIES

The Philippine Cacao Industry Roadmap – Way Forward

This updated Cacao and Chocolate Industry roadmap is a revision of the 2016-2022 Harmonized Cacao Industry Roadmap. It is anchored on the principle of clustering and localization. The approach is scientific and dynamic as it will be backed-up by science and will be evaluated and revised, when deemed necessary, yearly. The aim to be globally competitive and sustainable is in line with the context in making the cacao industry environmentally sound, socially desirable, and economically viable.

One Sector-One Voice is one of the avenues that the cacao stakeholder wants to pursue. Through the leadership of the Philippine Cacao Industry Council (PCIC), in co-leadership with the Department of Agriculture (DA), the Philippine Cacao Industry Association, Inc. (PCIA) will be organized and registered at the Securities and Exchange Commission (SEC) as a private organization composed of cacao industry stakeholders. It will serve as the Private sector partner and counterpart of the PCIC in the promotion of the Cacao Industry through the effective implementation of the Harmonized production and postharvest protocols and Action Plans stipulated in the Cacao and Chocolate Industry Roadmap.

Implementation of the revised roadmap will be localized to ascertain timely and up-to-date execution of programs and plans. Yearly review of the roadmap and assessment of milestones will be performed to ensure that the interventions are properly implemented and to make revisions on the course of action, when deemed necessary. Moreover, active participation in local and international events to promote Philippine Brand of quality cacao will be continued as well as forging linkages with international stakeholders will be strengthened.

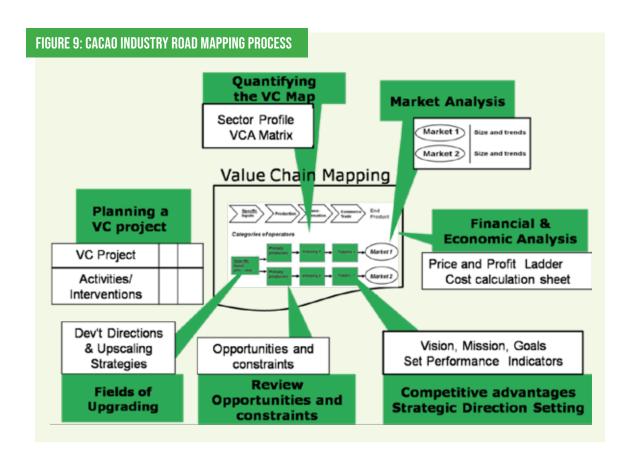
On the environmental context, this roadmap seeks to achieve production with special consideration for the environment. Thus Programs, Activities, and Projects (PAPs) that will be undertaken to spur development will be in consonance with environmental preservation and protection.

Socially desirable PAPs for the development of cocoa-growing communities are also laid down to ensure human resource development especially in cocoa-growing communities. This is being accompanied with economically viable practices that encourage fair and profitable supply chain with the goal of attaining inclusive business growth with much emphasis on the economic well-being of the cocoa farmers.

Philippine cocoa production is less than 0.1% of the global production. Philippines, Thailand and Vietnam share the 1% out of the 13% production of Asia, while Indonesia and Malaysia share the remaining 12%. The production and market position of the Philippine cocoa bean should be geared towards the Fine Flavour Bean (FFB) so as not to compete in the Bulk Bean (BB) market, which accounts for 95% of the world production. FFB accounts for only 5% of the world production but commands a much higher price.

In addition, production of FFB will provide the right quality of beans needed to support the development of the Philippine Chocolate Industry. This is also one way of decommoditizing the products so as not to be greatly affected by the price fluctuations in the global market, thus bringing more income to the farmers.

For the aforementioned plans and programs to materialize, it will require a concerted effort among the industry enablers and the private sectors to ensure an improved delivery of service particularly on postharvest facilities, among others. Given this aspiration, stakeholders have set their vision, mission, and goal, which will be the basis and direction of the industry.



TARGET SETTING

Vision, Mission, Goals and Objectives

The updated Philippine Cacao and Chocolate Industry Roadmap was formulated, drafted and finalized after a series of industry consultations, meetings, and regional convergence sessions. The following are the Vision, Mission, Goal and Objectives that were agreed upon by stakeholders:

VISION

A globally competitive and sustainable Philippine Cacao and Chocolate Industry built on a strong Philippine Brand of quality cacao.

MISSION

Anchored on the principle of strengthened marketing through industry clustering and localization, the Philippine Cacao and Chocolate Industry will be strengthened by 2025 through:

- Nationwide adoption of the upgraded harmonized cacao production and postharvest protocols to pursue poverty alleviation, job generation and environmental protection while advancing economic development and inclusive growth;
- Promotion of cacao production in areas highly suitable for cacao growing to improve farm efficiency and ensure increased farmers' income thereby raising their economic status
- Promotion of continual applied research and development collaborations;
- Mobilization of all stakeholders and relevant government agencies to provide the needed extension support services for concerted industry-wide development efforts;

- Harmonized information gathering to establish a management information system;
 and
- Stronger participation in the global cacao and chocolate value chain by building and promoting Philippine Brand.

GOAL AND OBJECTIVES

The goal is to produce 50,000 metric tons (MT) of quality fermented beans by 2025 to meet the demand of the export and domestic markets through a 40% annual increase in production.

In order to achieve the 2025 roadmap goal, the following objectives are deemed to be attained:

- To make available and accessible quality cacao planting materials as well as rehabilitate existing 31,000 hectares (600 trees/hectare);
- To increase 7,000 hectares of newly planted trees in 5 years;
- To raise yield to 2 kg/tree/year;
- To ensure availability of quality fermented cocoa beans to support and sustain valueadding activities;
- To contribute to the goal of attaining inclusive growth and poverty alleviation through:
 - ✓ Increase farmers' gross income to at least PhP 130,000 per hectare per year;
 - ✓ Increase export sales by at least USD 75-M by 2025;
 - ✓ Generate at least 17,000 jobs by 2025;
 - ✓ Encourage young people to go into cacao production.

TABLE 14: FINANCIAL REQUIREMENT FOR CACAO PRODUCTION

PROGRAM/ ACTIVITY/	/ FINANCIAL TARGETS				
PROJECT	2021	2022	2023	2024	2025
Expansion Area (ha)	35,520,000	53,280,000	79,920,000	127,872,000	204,595,200
Inorganic Fertilizer	750,000	1,125,000	1,687,500	2,700,000	4,320,000
Organic Fertilizer	400,000	600,000	900,000	1,440,000	2,304,000
Training and training-related activities	7,980,000	11,970,000	17,955,000	28,728,000	45,964,800
Technology Demonstration Establishment	16,110,000	24,165,000	36,247,500	57,996,000	92,793,600
Rehabilitation/Rejuvenation of Old trees	12,904,000	19,356,000	29,034,000	46,454,400	74,327,040
Research for Development	5,542,000	8,313,000	12,469,500	19,951,200	31,921,920
Agricultural Machinery, Equipment, Facilities and Infrastructures	21,707,000	32,560,500	48,840,750	78,145,200	125,032,320

^{*50}kg/sack of organic and inorganic fertilizer

^{*} Agricultural Machinery, Equipment, Facilities and Infrastructures (comprises farm production and postharvest-related machinery and equipment, postharvest facilities and irrigation)

RECOMMENDATIONS FOR POLICIES, STRATEGIES AND PROGRAMS

Development Directions and Upscaling Strategies

The constraints and opportunities identified by the stakeholders served as the basis in setting the development directions of this roadmap. This is also aligned to the One DA Reform Agenda: 18 Key Strategies, highlighting the four pillars of consolidation, modernization, industrialization and professionalization. The following development directions need to be noted in the implementation of this roadmap:

- Expansion of production areas in areas suitable for cacao growing based on the Climate and Soil Suitability Map
- Increase in fermented bean productivity level
- Moving Up of the Cacao Industry Value Chain
- Strengthening of Market Presence through Branding
- Focus on Fine Flavour Beans Market
- Apply the principle of clustering, localization and market demands

Aligned with the development directions to strengthen, expand and promote the industry are the seven (7) upscaling strategies, which are as follows:

- Increase production and access to quality planting materials based on the Climate and Soil Suitability Map
- Improve farm productivity by adopting the harmonized production and postharvest protocol
- Aggressive promotion of value-added products
- Strengthen market linkage and Philippine Branding of quality cacao
- Continual research and development across the value chain
- Continual provision of technical support on production, processing and marketing
- Resource generation and mobilization

Cacao Industry Action Plans

The Cacao and Chocolate Industry Action Plan is based on the seven (7) upscaling strategies identified by stakeholders where interventions from the government and the private sector were laid down. This Action Plan will facilitate the convergence and collaboration among stakeholders. Government interventions are distributed based on the agency's mandate.

Through this Action Plan, harmonization and integration of development initiatives from various sectors are made possible. This provides transparency in the programs and projects implementation as well as facilitates stricter and closer monitoring and evaluation of industry performance to achieve the target goals.

The timeframe on this Action Plan is set as follows:

- a. Short-term (2021-2025), which coincides with the National Agriculture and Fisheries
 Modernization and Industrialization Plan (NAFMIP) implementation
- b. Medium-term (2026-2030), which coincides with the UN's Sustainable Development Goals (SDG) 2030 deadline
- c. Long-term (2031-2040), which coincides with NEDA's AmBisyon 2040

The Roadmap Development Team believes that some activities and programs can be implemented in a year's period, thus a one-year timeframe was included in the Action Plan. These activities and programs falling under the one-year period will be evaluated and modified, when deemed necessary, after a year.

TABLE 15: THE PHILIPPINE CACAO AND CHOCOLATE INDUSTRY ACTION PLAN

TABLE 13. THE THILLIT INE GAGAG AND GHOUGHTE INDUST	III AUTIONT LAN	
Programs, Activities, and Projects	Implementing Agencies	Timeline
Strategy 1: Increase production and access to qua Suitability Map	ality planting materials based o	n the Climate and Soil
Establish additional Nurseries & Budwood Gardens at the provincial level	DA, BPI, DA-RFOs, DAR, Cacao stakeholders	Short term- 1st Year
Craft a Harmonized production and postharvest protocols	DA, Academe, Technical experts, Cacao stakeholders	Short term- 1st Year
Strengthen Plant Nursery Accreditation and Certification in the Province and accredit more nurseries in the municipalities	DA, DA BPI accredited nurseries, Farmers, Cacao stakeholders	Short term- 1st Year
Forge partnership between farmer/grower and those with bud wood garden	Cacao stakeholders	Short term- 1st Year
Facilitate national implementation of the Implementing Rules and Regulations (IRR) on genetic material procurement to improve procurement process and delivery system on planting materials	DA, DA BPI, DA RFOs	Short term
Improve planting material distribution (DA to strengthen the existing foundation groves/budwood gardens as source of propagules for propagation and the LGU to produce quality planting materials)	DA, PCA, DENR, LGU, DAR, Cacao stakeholders	Short term
Assist in the provision supplies and materials to expand the established nurseries	DA, DOST-PCAARRD, BPI, DA RFOs, LGUs	Short term
Facilitate the acquisition and supply of quality planting materials should only be sourced from accredited nursery operators in a particular region/province	DA, PCA, DAR, LGUs, Cacao stakeholders	Medium term
Provide farm infrastructures (Farm-to-Market Road, Irrigation system)	DA, DA RFOs, DPWH	Medium term

Programs, Activities, and Projects	Implementing Agencies	Timeline
Strategy 2: Improve farm productivity by adopting protocol	g the harmonized production a	nd post-harvest
Ensure Good Agricultural Practices (GAP) certification on Cacao in the provincial level	DA, BPI, Cacao stakeholders	Short term- 1st Year
Implement Integrated Pest and Disease Management Program, Plant Nutrition Program and Cultural Practices/Management Program	DA, PhilMech, BPI, DOST Academe, RCPC, Cacao stakeholders	Short term- 1st Year
Provide Postharvest Facilities (Fermentation, Dryers, etc.)	DA, PhilMech	Short term
Strengthen Science and Technology Community- Based Farming (STCBF) Program	DOST-PCAARRD	Short term
Conduct a comprehensive inventory of existing & potential/suitable cacao production areas	DAR, DA, LGU, PCA, DENR, Cacao stakeholders	Short term
Implement massive rehabilitation and maintenance program all-over the country	DA, PCIC Regional Councils	Short term
Establish LGU-recognized model farm in the municipalities or provinces	DA, LGU, Cacao stakeholders, DILG	Short term
Strengthen existing Common Service Facilities to be Linked to Expert Chocolatiers	DA, DOST, DTI, Cacao stakeholders	Short term
Strategy 3: Aggressive promotion of value-added	products	
Conduct of Product Development Clinics and Technology upgrading	DTI, DOST	Short term- 1st Year
Provide Cacao Processing Facilities (Common Service Facilities)	DA, DTI, DAR	Short term- 1st Year
Utilize cacao pod husk as fuel briquettes, cellulose acetate, feeds, and pectin as well as cacao dripping as wine, vinegar, ethanol and pectin	PhilMech, DOST	Short term- 1st Year
Build cacao waste village enterprise models in strategic growing areas	PhilMech, DOST, LGU, DA RFO	Short term- 1st Year
Product upgrading focused on high quality cacao mass (Tablea and Chocolate)	DTI, DA, DOST	Short term- 1st Year
Strategy 4: Strengthen market linkage and Philipp	oine Branding of quality cacao	
Establish/upgrade trading post facilities in the regional and provincial level	DA, AMAS, DTI, Cacao stakeholders	Short term- 1st Year

Programs, Activities, and Projects	Implementing Agencies	Timeline
Strongly recommend decentralization of testing hubs for Certificate of Product Registration (CPR) accreditation to simplify/shorten the processing time	DOH-FDA, DA, DTI, Cacao stakeholders, DOST	Short term- 1st Year
Conduct Quality standards & certification advocacy	DA, BAFS, DTI, DOST, PhilMech, Cacao stakeholders, FDA	Short term- 1st Year
Organize the Philippine Cacao Festival	DTI, DA, Cacao stakeholders	Short term- 1st Year
Conduct Annual Celebration of the World Chocolate Day	DTI, DA, Cacao stakeholders	Short term- 1st Year
Develop a local awarding system	DA, DTI, Cacao stakeholders	Short term- 1st Year
Participate in International, National & Regional Exhibits/Fairs	DTI, DA, Cacao stakeholders, DFA	Short term- 1st Year
Participate in the Annual Cocoa of Excellence Competition in Paris, France	DTI, DA, Cacao stakeholders	Short term- 1st Year
Conduct an Orientation on Single Origin, Traceability & Geographic Information System (GIS)	DA, BAFS, BPI, DTI	Short term- 1st Year
Encourage DA-AMAS to be more proactive in its Actions to support the development of the cacao industry	DA, DA AMAS	Short term- 1st Year
Improve Packaging and Labelling	DOST, DTI	Short term
Promote a Collective Trademark/Brand for Philippine Cacao Export Products	DTI, MinDA	Short term
Start the ground work for the International Cocoa Organization (ICCO) membership	DA, DTI, Cacao stakeholders, Philippine Government	Short term
Apply for Certification of Philippines as suppliers of Fine Flavour Cacao Beans	DA, Cacao stakeholders	Short to Medium term
Strengthen market linkages and referrals (local and foreign)	DTI, DA, BOI	Short to Medium term
Conduct of Asia Pacific Cacao Conference	DA, DTI, Cacao stakeholders	Short to Medium term
Define/Develop Standards for Philippine Cacao Products	DA, DTI-BPS, DOST, DA-BAFS	Short to Medium term
Promote the Philippine Brand Quality Cacao Beans and Chocolates Locally and Globally	AMAS, DTI, Cacao stakeholders, MinDA	Medium term

Programs, Activities, and Projects	Implementing Agencies	Timeline
Strategy 5: Continual research and development	across the value chain	
Support the Science for Change Programs i.e. Niche Centers in the Regions for R&D (NICER Program), R&D Leadership (RDLead), Collaborative Research and Development to Leverage Philippine Economy (CRADLE) for RDIs and Industry Program and Business Innovation through S&T (BIST) for Industry Program	BAR, DOST, Cacao stakeholders	Short term- 1st Year
Improve Postharvest Technologies and establish R&D Center including Cacao testing laboratory facilities	UPLB, DOST PHILMECH, Cacao stakeholders, Academe	Short term- 1st Year
Conduct Cacao Industry Profiling, Mapping and Geo-Tagging	DA, DA-RFOs, DAR, DENR, Cacao stakeholders	Short term- 1st Year
Continuously conduct studies on the local and global markets and its channels	DTI, AMAS	Short term- 1st Year
Continuously conduct feasibility and suitability studies based on the suitability map to identify best regions for selected high potential varieties	DA, BAR, DOST, Academe, Cacao stakeholders	Short term- 1st Year
Conduct researches based on the needs of the industry and how to level up the quality of cacao beans	DA, BAR, Academe, Cacao stakeholders, DOST, DTI	Short term- 1st Year
Continuously conduct dissemination, promotion and commercialization of developed technologies/R&D results	PCIC, DTI, DOST, Academe, Private sector, DA, BAR	Short term- 1st Year
Continuously conduct dissemination, promotion and commercialization of developed technologies/R&D results	PCIC, DTI, DOST, Academe, Private sector, DA, BAR	Short term- 1st Year
Disseminate information on the existence of R&D centers and its function and services	BAR, DOST, Academe	Short term- 1st Year
Utilize the research stations in the State, Universities and Colleges (SUCs)	DA, DA BAR, Academe, DOST	Short term- 1st Year
Implement Varietal Improvement Program	DA BAR, LGUs, Academe, Cacao stakeholders, DOST- PCAARRD, DA HVC	Short term
Establish additional research centers in different islands	DA, Cacao stakeholders, DOST, Academe	Short term

Analyze high value bean varieties and hybrids available globally for potential production in the country as well as its market demand Encourage the academe to offer food technology course as part of their curriculum in their respective schools Explore R&D Collaborations with Cacao Industry DA, MinDA, DOST, Academe, DTI Conduct of Benchmarking Activities in Malaysia and Indonesia Strategy 6: Continual provision of technical support on production, processing and marketing Validate Regional Cacao Industry Baseline data and improve harmonized data collection with the help of the LGUs to accurately track production and planting in the country to establish Industry Databank Generate LGU cooperation and support (local generate LGU cooperation and support (local policy, resources, data generation) Strengthen capacity building/training of LGUs (MAOs and PAOs) on Cacao Conduct farmer's field day and industry forum DA, DOST-PCARRD, ATI, DTI, LGUs, Cacao stakeholders, LGUs, Short term stakeholders, LGUs, Cacao stakeholders, Conduct farmer's field day and industry forum Conduct farmer's field day and industry forum DA, DOST-PCARRD, ATI, DTI, Cacao Short term CMACS and CACAC	nedium nedium nedium nedium
course as part of their curriculum in their respective schools Explore R&D Collaborations with Cacao Industry DA, MinDA, DOST, Academe, DTI Conduct of Benchmarking Activities in Malaysia and Indonesia Strategy 6: Continual provision of technical support on production, processing and marketing Validate Regional Cacao Industry Baseline data and improve harmonized data collection with the PSA, Cacao stakeholders, help of the LGUs to accurately track production and planting in the country to establish Industry Databank Generate LGU cooperation and support (local Cacao stakeholders, LGUs, policy, resources, data generation) Strengthen capacity building/training of LGUs Conduct farmer's field day and industry forum DA, DOST-PCARRD, ATI, DTI, Short terms.	ng n- 1st Year n- 1st Year
Experts Conduct of Benchmarking Activities in Malaysia and Indonesia Strategy 6: Continual provision of technical support on production, processing and marketing Validate Regional Cacao Industry Baseline data and improve harmonized data collection with the pSA, Cacao stakeholders, help of the LGUs to accurately track production and planting in the country to establish Industry Databank Generate LGU cooperation and support (local policy, resources, data generation) Strengthen capacity building/training of LGUs Conduct farmer's field day and industry forum DA, DOST-PCARRD, ATI, DTI, Short term	ng n- 1st Year n- 1st Year
Strategy 6: Continual provision of technical support on production, processing and marketing Validate Regional Cacao Industry Baseline data and improve harmonized data collection with the PSA, Cacao stakeholders, help of the LGUs to accurately track production and planting in the country to establish Industry Databank Generate LGU cooperation and support (local Cacao stakeholders, LGUs, Short term policy, resources, data generation) Strengthen capacity building/training of LGUs DA, BPI, ATI, Cacao Short term (MAOs and PAOs) on Cacao Conduct farmer's field day and industry forum DA, DOST-PCARRD, ATI, DTI, Short term DA, DA, DOST-PCARRD, ATI, DTI, Shor	ng n- 1st Year n- 1st Year
Validate Regional Cacao Industry Baseline data and improve harmonized data collection with the help of the LGUs to accurately track production and planting in the country to establish Industry Databank Generate LGU cooperation and support (local policy, resources, data generation) Strengthen capacity building/training of LGUs Cacao stakeholders, LGUs, Short term DILG Strengthen capacity building/training of LGUs (MAOs and PAOs) on Cacao Conduct farmer's field day and industry forum DA, DOST-PCARRD, ATI, DTI, Short term	n- 1st Year
and improve harmonized data collection with the PSA, Cacao stakeholders, help of the LGUs to accurately track production and planting in the country to establish Industry Databank Generate LGU cooperation and support (local policy, resources, data generation) Strengthen capacity building/training of LGUs (MAOs and PAOs) on Cacao Conduct farmer's field day and industry forum PSA, Cacao stakeholders, LGUs Cacao stakeholders, LGUs, Short term DLLG DA, BPI, ATI, Cacao Short term Stakeholders Conduct farmer's field day and industry forum DA, DOST-PCARRD, ATI, DTI, Short term DA,	n- 1st Year
policy, resources, data generation) DILG Strengthen capacity building/training of LGUs (MAOs and PAOs) on Cacao Conduct farmer's field day and industry forum DA, DOST-PCARRD, ATI, DTI, Short term	
(MAOs and PAOs) on Cacao stakeholders Conduct farmer's field day and industry forum DA, DOST-PCARRD, ATI, DTI, Short term	ı- 1st Year
	ı- 1st Year
Collaborate with TESDA on the training plan DA, ATI, Cacao stakeholders, Short term DTI, TESDA,	ı- 1st Year
Provide support to Farmer Information Technology DA, ATI, TESDA, Farm Short term (FITS) Centers, School on the Air, Farmers' Field Schools, LGUs, NGOs, Cacao Schools, etc. stakeholders,	ı- 1st Year
Conduct Skills and Techno Transfer Training on ATI, CIDAMI, DTI, DOST, Short term Postharvest i.e., Cacao Fermentation and Drying Cacao stakeholders, TESDA, DA-PhilMech, Farm Schools	ı- 1st Year
Connect grower associations and processors DA, AMAS Short term through contract buying programs	ı- 1st Year
Promote agri-preneur and conduct Agri- preneurship Seminars to enable the farmers to be stakeholders, self-reliant	ı- 1st Year
Conduct of Productivity Enhancement Trainings DA, Cacao stakeholders, DTI Short term	

Programs, Activities, and Projects	Implementing Agencies	Timeline
Conduct capacity building for Resource Generation	DA, Cacao stakeholders, Landbank	Short term- 1st Year
Develop and implement specific technical training programs for capabilities gaps	DA, ATI, Cacao stakeholders, TESDA, Farm Schools, NGOs	Short term- 1st Year
Create an Inter-Agency Convergence Initiatives to support Capacity Building Activities for cacao processing	LGUs, DA, DTI, Academe, Cacao stakeholders,	Short term- 1st Year
Conduct Investment and Techno Forum	DTI, DA, CIDAMI, MinDA, Cacao stakeholders,	Short term- 1st Year
Continue the organization of the Philippine Cacao Quality Awards Competition Program (Cacao Beans Award)	DA, PCIC/PCIA	Short term- 1st Year
Encourage youth organizations to participate in the Cacao Industry as agri-preneurs	DA, TESDA, ATI, PCIC/PCIA	Short term- 1st Year
Programs, Activities, and Projects	Implementing Agencies	Timeline
Integrate Gender and Development (GAD) program in capacitating different stakeholders on gender equality and women's empowerment.	DA, GAD, PCIC/PCIA	Short term- 1st Year
Publish a compendium that will compile R&D results	DA, BAR, PCIC/PCIA, Academe, DOST	Short term- 1st Year
Digitalization of the Cacao Industry	DA, PCIC/PCIA, ATI, DTI, Academe	Short term- 1st Year
Conduct capacity building/training of BPI-NSQCS staff on molecular marking/tagging	BPI, DOST-PCAARRD funded project with USM	Short term
Develop and implement traceability training programs for small holders	DA, ATI, PCIC/PCIA	Short term
Strategy 7: Resource generation and mobilization		
Facilitate the involvement of Philippine Cacao Industry Council in the government cacao seedling procurement program	DA, Cacao stakeholders	Short term- 1st Year
Credit Access Facilitation Inventory of financing programs which can be accessed by cacao growers Land Bank of the Philippines Cacao 100 Small Business Corporation (SBC)	DA, DAR, DTI, LBP, PCIC/ PCIA, ACPC LBP, Cacao stakeholders SBC, DTI, Cacao stakeholders	Short term- 1st Year
Financing Program o DA, DAR, and ACPC-administered credit programs	DA, DAR, ACPC (through partner lending conduits)	

Programs, Activities, and Projects	Implementing Agencies	Timeline
 Design Special Programs on Credit Credit & Marketing Assistance Program for Agrarian Reform Beneficiaries Organizations (ARBOs) Credit facilitation through DA's Loan Facilitation Teams (LoFTs)2 	DA, ACPC, LBP, Cacao stakeholders DAR	Short term- 1st Year
Facilitate financing thru Agrarian Production Credit Program (APCP) & Land Bank of the Philippines	DAR, DA, Cacao stakeholders	Short term- 1st Year
Institutionalize a Convergence Mechanism at Regional Level for the preparation of Agency Budgets and Performance Targets Re: Cacao Industry Development	DA, Cacao stakeholders, DTI, other government agencies, DA RFOs, LGUs	Short term- 1st Year
Institutionalize the membership of the Regional Cacao Industry Councils to the Regional Development Councils (RDC)	DA, DTI, NEDA	Short term- 1st Year
Draft a one-year Action Plan to be drawn from the short-term five-year Action Plan complete with targets, timelines and Persons responsible	Cacao Industry Roadmap Development Team	Short term- 1st Year
Create a Cacao Roadmap Implementation Team to oversee the implementation of the first year Action PLAN. Composed of PCIC, PCIA, DA and DTI; recommended adjustments on the Roadmap as needed.	Cacao Industry Roadmap Development Team	Short term- 1st Year
 "Raise funds to re-visit the Cacao Roadmap: (1) to prepare a more in-depth study of the markets (local and international) and (2) conduct more comprehensive studies to identify sites suitable for cacao production based on the Climate and Soils Suitability map for cacao, which will form the basis for PCIC/PCIA strategic Actions following the principles of localization, clustering and market demands." 	DA, AMAS, DTI, Cacao stakeholders	Short term- 1st Year
Involve the participation of the different government agencies in the implementation of the Cacao Roadmap to ensure a unified Action at the national and local level	DA agencies, Bureaus and Attached Corporations, Cacao stakeholders, DENR	Short term- 1st Year

Programs, Activities, and Projects	Implementing Agencies	Timeline
Organize the Philippine Cacao Industry Association (PCIA) and register it with the Security and Exchange Commission (SEC) as a private organization	Cacao stakeholders	Short term- 1st Year
Strengthen the collaboration of Regional Councils with the Provincial councils, LGUs (MAOs and PAOs) in support of the implementation of the Mandanas Law	DA, LGUs, Cacao stakeholders	Short term- 1st Year
Achieve international certification for cocoa beans to add more value to the product	DA, DTI, Cacao stakeholders,	Short term- 1st Year
Implement the Credit & Marketing Assistance Program for Agrarian Reform Beneficiaries Organizations (ARBOs)	DAR	Short term

INDUSTRY CLUSTER GOVERNANCE FRAMEWORK

The industry stakeholders recognize the need to strengthen structural capability and control mechanism in the development and promotion of the cacao industry at the national level. Thus, initially, the National Cacao Industry Technical Working Committee (NCITWG) was created on August 2015 to spearhead the cacao industry development and paved the way for the organization of 15 Regional Cacao Industry Development Councils.

At the Regional level, Regional Cacao Industry Councils have been established. These councils spearhead the development of the industry in their respective regions. The elected chairpersons represent their regions at the Philippine National Cacao Industry Council (Philippine Cacao). To date, sixteen (16) regional councils and five (5) provincial councils have already been created.

The finalization of the 2016-2022 Philippine Cacao Industry Roadmap, necessitated the creation of a permanent national structure that will spearhead the cacao industry development thus, the creation of the Philippine Cacao. The Council is expected to attain the following organizational objectives:

- Provide leadership in the cacao industry development;
- Strengthen structural capability and control mechanism in the development and promotion of the cacao industry at the national level;
- Forge/strengthen public and private sector partnership for better coordination of development initiatives; and,
- Represent the industry to international cacao governing bodies;

To ensure a harmonized and synchronized industry development as well as instill a certain level of industry disciple, the following functions and responsibilities of the Philippine Cacao are further defined below:

- Support Passage of House Bill Nos. 1475, 1771, 3253, 4082, 5344, 5585 and 6429 known as the "Philippine Cacao Industry Development Act";
- Spearhead the development and promotion of the Philippine Cacao Industry;
- Assist in organizing the Philippine Cacao Industry Association (PCIA), which will be registered at the Securities and Exchange Commission (SEC) as a private organization;
- Formulate/advocate industry-related policies;
- Serve as the forum and coordinating body to discuss strategic issues affecting the cacao industry at the national level;
- Integrate and harmonize development efforts, programs and projects of the private and government sectors;
- Conceptualize, recommend, and monitor/evaluate project implementation;
- Promote transparency on project implementation; and
- Establish/harmonize cacao technical production and postharvest protocol.

The Council is composed of public and private sectors, with at least 60% of the members coming from the latter. Government representatives are from agencies involved in the development and promotion of the cacao industry. On the other hand, the private sector is composed of chairpersons of the Regional Cacao Industry Development Councils and representatives of cacao industry organizations that are national in scope.

The Council is a private sector led, thus representative from the private sector take the chairmanship and co-chaired by the DA being the lead government agency. There are two (2) vice chairpersons, one from the private and another from the government sector with the latter represented by the DTI. The DTI-XI, being the DTI National Cacao Industry Cluster Coordinator of the agency, serves as the Council's secretariat in close coordination with the DA-BPI. Tenure of office shall be two (2) years. (see Appendix 4)

Monitoring and Evaluation

The PCIC/PCIA together with the Cacao Roadmap Development Team (RDT) is committed in ensuring that the target goals will be achieved and the action plans be delivered. Close monitoring and yearly re-visitation of the roadmap will be done in order to make the necessary adjustments on programs and activities identified.

The PCIC/PCIA once established will come up with a harmonized data collection and monitoring and evaluation system to keep track of the development of the industry. This will involve the participation of all stakeholders particularly the participating government institutions as they will be required to submit periodic report.

Through the harmonized data collection, which will be facilitated with the help of LGUs, a more accurate tracking of production and planting are expected to be achieved thereby narrowing, if not eliminating, data gaps particularly on the production area, volume of production and productivity level.

Monitoring Report Forms will be developed and distributed to concerned agencies for periodic submission. This will be consolidated by the secretariat and presented to the council every semester for evaluation.

TABLE 16. INDUSTRY CLUSTER GOVERNANCE NETWORK

ROLES	ACTORS	RESPONSIBILITIES
Overall implementing and monitoring body	 Department of Agriculture National High Value Crops Development Program Department of Trade and Industry 	Spearhead the implementation of the strategies and programs in the Philippine Cacao Industry Roadmap Conduct an internal periodic review of the Roadmap Mediate planning and regular consultations between the public and provate sectors Establish partnership with private investors/ companies and tap foreign funding institutions

ROLES	ACTORS	RESPONSIBILITIES
Implementing Agency	Private Sector	Private counterpart support to scale-up investments
	 DA Regional Field Offices DA Services, Bureaus & Attached Agencies State Universities and Colleges (SUCs) Other National Government Agencies Local Government Units 	Implement the targets and strategies identified in the roadmap
Monitoring Agency	PCAF, DA-PMED, PSA	Conduct periodic assessment of the roadmap implementation

REFERENCES

Cacao Industry Development Association of Mindanao Inc., (2012). Cacao Industry Cluster Roadmap

Department of Agriculture-Bureau of Plant Industry. (2014). Cacao Industry Roadmap

Department of Agriculture-Bureau of Soils and Water Management. Land Resources Evaluation and Suitability Assessment of Strategic Production Areas: Land Suitability Map (Cacao)

Board of Investments. 2015. The Philippine Cocoa "Tablea" Industry Roadmap, 2015

International Cocoa Organization (ICCO), Quarterly Bulletin Forecasts and Estimates

Philippine Statistical Authority (PSA), OpenStat

Department of Trade and Industry (DTI). (2017). The Philippines in the Cocoa-Chocolate Global Value Chain

International Institute for Sustainable Development (IISD). (2019). Sustainable Commodities Marketplace Series 2019, Global Market Report: Cocoa

International Trade Center (ITC) Trade Map accessed through http://www.trademap.org

Climate Information for Agriculture, Department of Science and Technology-Philippine
Atmospheric, Geophysical and Astronomical Services Administration accessed thru https://www.pagasa.dost.gov.ph/



APPENDICES

APPENDIX 1: AGRO-CLIMATIC REQUIREMENTS FOR GROWTH AND DEVELOPMENT OF CACAO

FACTORS	CACAO
Elevation (MASL)	300 – 1,200
Temperature (oC)	Minimum of 18°C and maximum of 30-32°C
Soil pH	5.0 – 7.5
Soil Depth	150
Organic Matter (OM)	Rich in organic matter
Relative Humidity (%)	75-90
Rainfall (mm)	1,250 to 3,000 mm per annum

^{*}A suitable temperature is generally observed at an altitude up to 700 m.

Selecting a suitable cacao growing farm is vital in order to ensure maintaining cacao tree's vitality and productivity (refer to Annexes: Climate and Soil Suitability Map). An elevation of 300-1,200 meters above sea level (MASL) is recommended with soil depth of 150 cm and pH level from 5.0 to 7.5. The area needs to be rich in compounds that serves as reservoir of nutrients such as organic matter. Cacao thrives best under Type IV climate, which has an evenly distributed rainfall throughout the year as the ideal rainfall is about 1,250 to 3,000 mm. However, in areas where lesser rainfall occurs, an irrigation system is recommended. On the other hand, the temperature should be from 18oC to 32oC with 75-90% relative humidity.

The Philippines is among the countries in Asia seen to have a competitive advantage on cacao production given its strategic location and climatic condition. The three (3) million (M) hectares of coconut farms ideal for cacao intercropping supplement the industry's competitive advantage.

Climate of the Philippines

The Climate of the Philippines is tropical and maritime. It is characterized by relatively high temperature, high humidity and abundant rainfall. It is similar in many respects to the climate of the countries of Central America. Temperature, humidity, and rainfall, which are discussed hereunder, are the most important elements of the country's weather and climate.

^{*}Cacao thrives best under Type IV climate which has an evenly distributed rainfall throughout the year.

Temperature

Based on the average of all weather stations in the Philippines, excluding Baguio, the mean annual temperature is 26.60 C. The coolest months fall in January with a mean temperature of 25.50C while the warmest month occurs in May with a mean temperature of 28.30C. Latitude is an insignificant factor in the variation of temperature while altitude shows greater contrast in temperature. Thus, the mean annual temperature of Baguio with an elevation of 1,500 meters is 18.30C. This makes the temperature of Baguio comparable with those in the temperate climate and because of this, it is known as the summer capital of the Philippines.

The difference between the mean annual temperature of the southernmost station in Zamboanga and that of the northermost station in Laoag is insignificant. In other words, there is essentially no difference in the mean annual temperature of places in Luzon, Visayas or Mindanao measured at or near sea level.

Humidity

Humidity refers to the moisture content of the atmosphere. Due to high temperature and the surrounding bodies of water, the Philippines has a high relative humidity. The average monthly relative humidty varies between 71 percent in March and 85 percent in September. The combination of warm temperature and high relative and absolute humidities give rise to high sensible temperature throughout the archipelago. It is especially uncomfortable during March to May, when temperature and humidity attain their maximum levels.

Rainfall

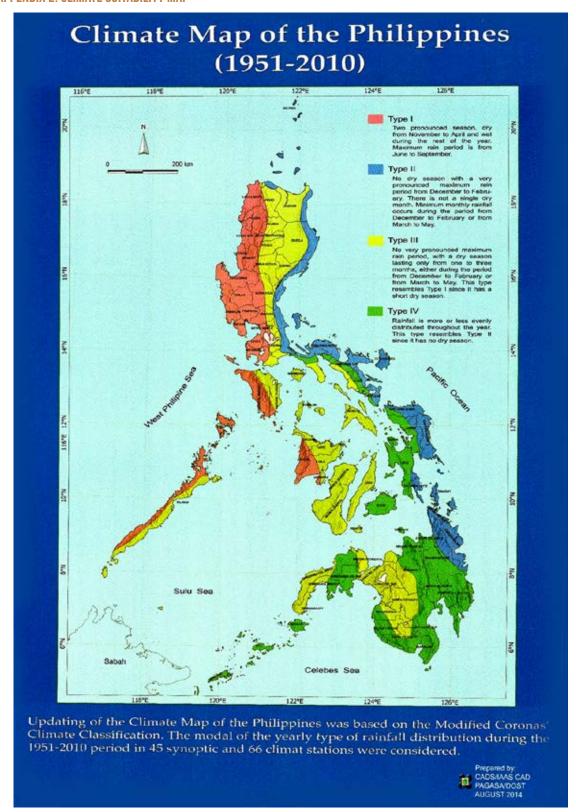
Rainfall is the most important climatic element in the Philippines. Rainfall distribution throughout the country varies from one region to another, depending upon the direction of the moisture-bearing winds and the location of the mountain systems.

The mean annual rainfall of the Philippines varies from 965 to 4,064 millimeters annually. Baguio City, eastern Samar, and eastern Surigao receive the greatest amount of rainfall

while the southern portion of Cotabato receives the least amount of rain. At General Santos City in Cotabato, the average annual rainfall is only 978 millimeters.

The Seasons

Using temperature and rainfall as bases, the climate of the country can be divided into two major seasons: (1) the rainy season, from June to November; and (2) the dry season, from December to May. The dry season may be subdivided further into (a) the cool dry season, from December to February; and (b) the hot dry season, from March to May.



LAND SUITABILITY MAP FOR CACA0

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

APAYAO, CAR

EXTENT OF SUITABILITY FOR CACAO PRODUCTION BY MUNICIPALITY

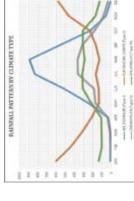
TOTAL	POTENTIAL EXPANSION	ANEA (ma)	818	18871	14,349	4,485	968'9	188331	3,857	0.00
	Other crops	2.5								
	Other	S1								
(Ha)	Mango	S1 S2								
CONFLICT RESOLUTION (Ha)	M			10	1					**
LICTRE	Rice paddy, 10n-irrigated	S1 S2	7	48	29		258	564	121	0000
CON	Rice non-ir	S1	108	612	1,467	137	1,520	≯ 66	1,066	0001 1002 002 000 0001 00011 000
	Ę	2.5	14	124	2	•	108	393	56	1004
	ٽ -	S2 S1 S2 S1 S2	147	2,362	1,170	884	1,470	1,163	2,148	6000
	Grassland, unmanaged*	2.5	4	1,601	22	38	48	15		Oak v
la)		1.5	172	4234	2,933	282	1,398	655'1	68	UM/ 11
AREA	Shrubland, ınmanaged*	25		332	113	99	278	102		600
XPANSION AREA (Ha)	Shrut	S1	366	1,720	7,572	3,072	1777	3,541	339	700.01
EX	Soconut	2.5		21						4.
	OO CO	S1	•	286						700
	TOTAL EXISTING AREA (Ha)		838	142		21	20	73	32	0111
	0 (Ha)	ES	833	99		12	14	25		070
	XISTING CACAO (Ha)	ZS	1	•			98			44
	EXIST	18	4	94				84	32	W/8
	MUNICIPALITY		CALANASAN	CONNER	FLORA	KABUGAO	LUNA	PUDTOL	SANTA MARCELA	1 V di O'di

SUITABILITY CLASSES:



	TYPE II : No dry season with a very pronounced maximum rain period from December to Pebruary. There is not a single dry month, Maximum monthy rainfall occurs during the period from March to May
CLIMATE TYPE	TYPE I : Two promouted season, dry from November to April and wet during the rest of the year. Maximum rain period is from June to September

TYPE III: No very promounced maximum rain period, with a dry season mating only from one to three months, either during the period from December to Rebrasy or from March to May. This type resembles Type I since it has



AGRONOMIC REQUIREMENT OF CACAO PRODUCTION

	22.9	(hd)	(hd)	(hd)	(hd)
high none-slight		VD,MVD 5.6-7.2	CL, SiCL, SC, WD,MWD 5.6-7.2 SiC, C, HC	WD,MWD	CL, SiCL, SCL, SC, WD,MWD SiC, C, HC
medium moderate	1.55	SPD,PD 5.1-5.5 7.3-7.8	FSL, L, SiL SPD, PD	SPD,PD	FSL, L, SiL SPD, PD
low	6.7<- (VPD,ED <5.0 > 7.9		VPD,ED	S, LS, CSL, SL VPD, ED
	EACTION (pH	SOIL REACTION (pH)		SOIL DRAINAGE SOIL REACTION (pH	
y acid	-extremely acid	< 4.5 extremel		< 4.5	< 4.5
ngly acid			45.50	45.50	45.50
acid				51.55	MWD moderately well drained 51-55
acid	- medium acid			56-60	56-60
pio	slightly acid	6.1 6.5 slightly a		61-65	61-65
	- neutral			6.6-7.2	very poorly drained 66-7.2
caline	- mildly alkaline	7.3 7.8 - mildty all	•	•	•
-moderately alkaline		7.9-84 -moderate	79-84		79-84
ilkaline	 strongly alkaline 	>8.5 strongly a	>85		>85
				<10% -none-few	
			- common	10-30% -common	10-30% -common
			- many	> 30% - many	> 30% - many

LAND LIMITATIONS DESCRIPTION AND COMBINATIONS ELEVATION SOIL DRAINAGE

AND LIMITATIONS DESCI	LAND LIMITATIONS DESCRIPTION AND COMBINATIONS	
ELEVATION	SOIL DRAINAGE	SOIL DEPTH
El2 -1000m-1500m	D2 Somewhat poorly drained to poorly drained	Sh2 - Moderately deep (50-100cm)
El3 -> 1500m	D3 - Very poorly drained or excessively drained	Sh3 - Very shallow to shallow (< 50cm)
SLOPE/TOPOGRAPHY	SOIL TEXTURE	ROCK OUTCROPS
T2 - Undulating to moderately steep	Tc -Coarse texture	Rc2 - Common
-Seep to very steep		Rc3 - Many

9	CODE LAND LIMITATION CODE LAND LIMITATION CODE LAND LIMITATION CODE LAND LIMITATION	900	NOTIFIED CAND	3000	MOLIVITATION OF	3	DOLLA LIMIT GALLON	3000	LAND LIMIT ALL LON
1	E2-Sh2-Rc2	11	E13-Sh2-Rc3	- 21	T2-E12-E3	31	T3-E3	14	T3-E12-E3-Sh3-Rc2
2	EIZ	12	F2-D2	22	T2-E12-E3-Rc2	32	T3-E3-Rc2	29	T3-E12-E3-Sh3-Rc3
3	E12-E2-Sh2-Rc3	13	Sh2	23	T2-E12-E3-Rc3	33	T3-E3-Rc3	43	T3-E13
*	E12-E3-Sh2-Rc3	14	Sh2-Rc2	54	T2 E12 E3 Sh2 Rc2	34	T3-E3-Sh3-Rc2	77	T3-E13-E3
25	E12-Rc2	15	172	25	T2-E12-E3-Sh2-Rc3	32	T3-E3-Sh3-Rc3	45	T3-El3-E3-Sh2-Rc3
9	E12-Sh2-Rc2	91	T2-E3	326	T2-E13-E3	38	T3-E12	9#	T3-E13-E3-Sh3-Rc3
2	E12-Sh2-Rc3	- 12	T2-E3-Rc2	22	T2-El3-E3-Rc3	- 32	T3-E12-E3		
8	El3	18	T2-E3-Sh2-Rc2	28	T2-El3-E3-Sh2-Rc3	38	T3-E12-E3-Rc2		
6	E13-E3-Sh2-Rc3	61	T2-E3-Sh2-Rc3	- 62	T2-F2-D2	39	T3-E12-E3-Rc3		
10	El3-Sh2-Rc2	20	T2-E12	30	T3	40	T3 E12 E3 Sh2 Rc3		

						pai	
Corn	Coffee	Cacao	Mango	Coconut	Grassland	Shrubs, unmanag	
4	18	82	82	116	126	134	

LAND SUITABILITY MAP FOR **CACAO**

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

BENGUET, CAR

EXTENT OF SUITABILITY FOR CACAO PRODUCTION BY MUNICIPALITY

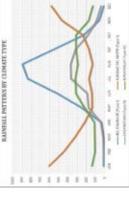
						EX	PANSION	EXPANSION AREA (Ha)	(a)			CONF	CONFLICT RESOLUTION (Ha)	OLUTION	(Ha)		
MUNICIPALITY	EXISTI	EXISTING CACAO (Ha)	(O (Ha)	TOTAL EXISTING AREA (Ha)	Coc	Coconut	Shrul	Shrubland, unmanaged	Grass	Grassland, unmanaged*	Vege	Vegetable	Rice paddy, non-irrigated	Rice paddy, on-irrigated	Other	Other Crops	POTENTIAL EXPANSION
	S1	2.5	S3		S1	2.5	IS.	22	S1	ZS	S1	S2	SI	25	S1	22	AREA (na)
ATOK	ľ	ľ				Ľ	ľ	•		30	•			•	•	٠	30
BAGUIO CITY					ľ												
BAKUN					Ĺ			22		22	•	11					143
BOKOD	ľ				ľ		ľ	7		52							31
BUGUIAS						•				•		4				•	-
TOGON							31	•	122	91			11				180
KABAYAN										52	•	4	•				30
KAPANGAN										61	•	14					33
IBUNGAN										13	•	18					31
LATRINIDAD						Ľ				1	•	171					172
MANKAYAN	•									3	•	1				•	4
SABLAN							\$6	2	20	1	13		09	5			145
TUBA							22	-	51	172	19	78	9				386
TUBLAY					•										•	•	
TOTAL.	•	•	•			•	6	99	193	382	73	301	77	S	•		1.193

SUITABILITY CLASSES:

CLIMATE TYPE

TYPE I : You promoted season, day from knowmber to Agail and
TYPE II : No dry season with a very pronounced maximum rimin
From Limit and Agail and Agail and
From Limit and September 1 - Person of Comp. Description in monthly rainfall secure during the
From Limit and Agail. TYPE IV : Rainfall is more or less evenly distributed throughout the year. This type resembles Type II since it has no dry TYPE III: No very pronounced maximum rain period, with a dry season lasting only from one to there months, other during the period from Beardon's robe from Natura or from Natura or from a short to May. This type resembles Type I since it has a short dry zeason,

vart of Benguet classified as climatic Type I.



AGRONOMIC REQUIREMENT OF CACAO PRODUCTION LAND LINITARILITY SOLDEPTH SOL

LAND UTILIZATION TYPE	LAND SUITABILITY RATING TYPE	SLOPE (%)	SOIL DEPTH (cm)	SOIL TEXTURE	SOIL	SOIL ' REACTION (pH)	INHERENT	FLOODING	EROSION	ROCK	· ELEVATION (masl)	ANNUAL RAINFALL (mm)	CLIMATIC
	S1	8	>100	CI, SICI, SCI, SC, SIC, C, HC	WD,MWD	5.6-7.2	high	none-slight	none-slight	none-few	<1000	2001-4500	UIIII
Cacao	\$22	8-30	50-100	FSI, L, SIL	da'das	5.1-5.5	medium	moderate	moderate	common	1000-1500	1000-2000	пл
	53	>30	<50	S, LS, CSL, SL	VPD,ED	<5.0->7.9	low	severe	severe	many	>1500	<1000	
£ .	- level to gently sloping - level to gently sloping - undalaring - undalaring to rolling - undalaring to rolling - receipt to rolling - receipt to receipt	liating steep	SOIL DRAINAGE ED -excessively d W/D -excessively d W/D -moderately w SPD -somewhat po PD -poorly draine VPD -very poorly d SURFACE IMPEDIMENT ROCK OUTTROPE 12.10% -none-few 11-30% -none-few	LINAGE - excessively drained - excessively drained - moderately well drained - senswhat proorly drained - very poorly drained - very poorly drained - very poorly drained - remained - excessively drained		SOIL REACTION (pt) 4-45. everwends and 4-5. S.O. very strongly and 51-55. estrongly and 61-65. estrongly and 66-66. estrongly and 66-72. estgriby and 66-72. resurta 73-78. embly alleiting 73-78. embly alleiting	TTON (pH) very strongly acid very strongly acid strongly acid medium acid medi		SOIL TEXTURE Coarse S sand LS - loamy ss CSL - coarse s SM - sandy lo Medium L - loam ESL - loam SSL - selthoan SSL - selthoan SSL - city loam SSL - city loam SSL - city loam SSL - city loam	rune seand - loamy seand - course seandy loam - seandy loam - fine seandy loam - loan - loan - sait loam - day loam - day loam - day loam - day loam - sait y day loam	S S S C S S C S S C S S C S S S C S	SC - sundy clay SIC - sulty clay C - clay HC - heavy clay	day ay clay
> 100 - dee	deep to very deep		> 30% - many	any					SCI - sanc	dy clay loam			

LAND LIMITATIONS DESCRIPTION AND COMBINATIONS

ELEVA EIZ EI3	ELEVATION 512 -1000m-1500m 513 ->1500m		SOIL DRAINAGE D2 - Somewhat D3 - Very poor	NGE what poor poorly dra	SOIL DRAINAGE 22 -Somewhat poorly drained to poorly drained 33 -Very poorly drained or excessively drained	p p	SOL DEPTH Sh2 - Moderately deep (50-100cm) Sh3 - Very shallow to shallow (< 50cm)	tely deep (50 allow to shall	0-100cm) low (<50cm)
SLOPE 72 73	SLOPE/TOPOGRAPHY T2 - Undulating to moderately steep T3 - Steep to very steep	deats	SOIL TEXTURE Tc - Coarse texture	RE e texture			ROCK OUTCROPS Rc2 - Common Rc3 - Many	NS w	
CODE	CODE LANDLIMITATION CODE LANDLIMITATION CODE LANDLIMITATION CODE LANDLIMITATION CODE LANDLIMITATION	CODE	LAND LIMITATION	CODE	LAND LIMITATION	CODE	LAND LIMITATION	T 3000	AND LIMITATION

			_		_	
Paddy rice, non-imigated	Vegetable	Coffee	Grassland	Bamboo	Shrubland, unmanaged	
2	47	81	126	133	134	

LAND SUITABILITY MAP FOR CACAO

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

KALINGA, CAR

EXTENT OF SUITABILITY FOR CACAO PRODUCTION BY MUNICIPALITY

PALITY P							EX	EXPANSION AREA (Ha)	AREA (H	(a)			CONF	LICT RES	CONFLICT RESOLUTION (Ha)	(H3)		1.000
St St St St St St St St	MUNICIPALITY	EXIST	ING CAC	(EH) O1	TOTAL EXISTING AREA (Ha)	Coco	nut	Shrub	land,	Grass	dand,	Rice	addy,	Co	Е	Other	rops	POTENTIAL EXPANSION
		\$1	2.5	83		\$1	\$2	S1		S1		SI	25	S1	25	S1	25	AKEA (Ha)
82 115	SALBALAN		ľ	11	11	•	•	108	15		8	4	•	7		•		152
1	TABUK	82	ľ	175				2,393	8	13,149	99			7,199				30,120
103 126 127	AN		·	83	83			24	•	23	8			46	11			162
105 - 832 - 846 71 - 442 72 545 64 1904 20 20 20 20 20 20 20			ľ	36		•		ľ		7				39				46
4 47 51 75 52 52 53 53 54 54 54 57 707 1 1 2 2 2 2 2 2 2 2	UK	103	Ľ	382	485	Ľ	ľ	493	22	5,051	09	_	28	3,482	141	1		11,252
TOTAL 189 - </td <td></td> <td>\$</td> <td>•</td> <td></td> <td></td> <td>75</td> <td>•</td> <td></td> <td></td> <td>3,713</td> <td></td> <td>4,040</td> <td></td> <td>1,783</td> <td></td> <td></td> <td></td> <td>9,645</td>		\$	•			75	•			3,713		4,040		1,783				9,645
TOTAL 189 - 744 933 146 - 3,745 100 23,081 199 13,444 35 13,351	N.		ľ	11	11	•		289	46		85		7	707	86			2,895
189 - 744 933 146 - 3,745 100 23,081 199 13,444 35 13,351	CAN			•				13	6	20	•			37	13			66
	TOTAL					146	•	3,745	100	23,081	661	13,444	35		263	1		54,364

Derivery of cacao planting materials must be started on the onset of rainty season." "establishment of shade trees prior to planting of cacao.

SUITABILITY CLASSES:



and having limition which in agregate are standards were by standards when the standards were for standard application of a standard will reduce productivity or to the core of the overall advantage to be agained from the overall advantage to be agained from the application of the overall advantage to be agained from the application of the applicatio

in time the twinket among the corrected with exist in intendiges at currently acteptable to cost, the immittations are so severe as to percularly accessing seasons as the control of the cost of the

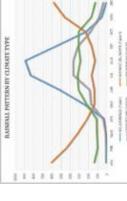
CLIMATE TYPE TYPE : Two pronouced s

222	from June to September	
period from December to Februa	wet during the rest of the year Maximum rain period is	
TYPE II : No dry season with a very prono	E 1 : Two pronouced season, dry from November to April and	Ψ

rain period, with a dry TY	three months, either	er to February or from	les Type I since it has	
TYPE III: No very pronounced maximum rain period, with a dry	season lasting only from one to three months, either	during the period from December to February or from	March to May. This type resembles Type I since it has	
TYPE III:				

TYPE IV : Rainfall is more or less evenly distributed throughout the year. This type resembles Type II since it has no dry season.

cheastern part of Kalinga mostly belongs to Type III climate classification and partly in the Western part belongs to Ty



E-PAGASA 2018 Climatalogical Normals (Rainfall), Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), accessed 27 chrise / Assural nasass does one sh index who iclimate harmonical enormals

AGRONOMIC REQUIREMENT OF CACAO PRODUCTION AAND

				ĺ												
CLIMATIC	U.III, IV	1171				clay	lay.		clay							
ANNUAL RAINFALL (mm)	2001-4500	1000-2000	<1000		2			-clay	heavy clay							
ELEVATION (masl)	<1000	1000-1500	>1500		Œ	S	SIC	O	Ξ							
ROCK	waj-auou	common	many			_	- loamy sand	se sandy loam	- sandy loam		sandy loam	-loam	-silt loam	loam	- silty clay loam	ly clay loam
EROSION	none-slight	moderate	severe	SOILTEXTURE	Coarse	sand	LS -loan	SI - coar	Jr - sand	Medium	PSL - fine	loan -	Stsilth	Tclay	sid silty	SCI sand
FLOODING	none-slight	moderate	auavas													
INHERENT	high	medium	low	(Hq	sely acid	trongly acid	-strongly acid	macid	-slightly acid	-	- mildly alkaline	 moderately alkaline 	- strongly alkaline			
SOIL REACTION (pH)	5.6-7.2	5.1-5.5	<5.0 -> 7.9	SOIL REACTION (pH)	< 4.5 extremely acid	45.50 verys	5.1 5.5 strong	56 60 medium acid	61-65 slight	66 7.2 neutra	7.3.7.8 mildly	79-84 - moder	-8.5 strong			
SOIL	WD,MWD	GPD,PD	VPD,ED		•	4	-			9	2	7	^			
SOIL TEXTURE	CI, SICI, SCI, SC, SIC, C, HC	FSL, L, SIL	S, LS, CSI., SI.	H	 excessively drained 	-well drained	 moderately well drained 	 somewhat poorly drained 	-poorly drained	-very poorly drained		DIMENT	S	ne-few	nomi	ny
SOIL DEPTH (cm)	>100	50-100	<50	SOIL DRAINAGE	ED -exc	WD -we	MWD - mc	SPD -sor	PD -po	VPD -ver		SURFACE IMPEDIMENT	ROCK OUTCROPS	<10% -none-few	10-30% -common	> 30% - many
SLOPE (%)	89	8-30	>30		_	dating		steep								
SUITABILITY RATING	IS	ZS	ES		- level to gently sloping	- gently sloping to undulating	-undulating to rolling	-rolling to moderately steep	£	-very steep		e	v shallow	llow	terately deep	-deep to very deep
LAND UTILIZATION TYPE		Cacao		SLOPE (%)	0-3 -leve	3-8 - gent	8-18 -und	18-30 -rolli	30-50 -steep	> 50 -very		SOIL DEPTH (cm)	0 - 30 - very shallow	30 - 50 shallow	50 - 100 - moderately deep	> 100 - deep

LAND LIMITATIONS DESCRIPTION AND COMBINATIONS ELEVATION

SOIL EROSION
E2 - Moderate erosion
E3 - Severe erosion

ELEVATION	NOL		SOIL DR	SOIL DRAINAGE			TIOS	SOIL DEPTH	
EIZ -	El2 - 1000m - 1500m		D2 - S	omewhat	D2 - Somewhat poorly drained to poorly drained	ly drained		Sh2 - Moderately deep (50-100cm)	100cm)
Ell3	El3 -> 1500m		D3 V	ery poorly	D3 - Very poorly drained or excessively drained	drained /	Sh3	Sh3 - Very shallow to shallow (<50cm)	w (< 50cm)
/adors	SLOPE/TOPOGRAPHY		SOIL TEXTURE	CTURE			ROCK	ROCK OUTCROPS	
T2 -1	- Undulating to moderately steep	do steep	Tc -C	Tc -Coarse texture	aus		Rc2	Rc2 - Common	
T3	- Steep to very steep						Rc3	Rc3 - Many	
CODE	CODE LAND LIMITATION CODE	CODE	LAND LIMITATION CODE LAND LIMITATION CODE LAND LIMITATION	CODE	LAND LIMITATION	CODE	LAND LIMITATION	CODE	VI
-	E2 Sh2 Rc2	12	Sh2-Rc2	23	T2 E13	*	T3-E12-E3-Re2	2	2 Non-irrigat
	613		Lab.	P.6	63 613 6ab 86	246	670 63 63 64 36	ŀ	ļ.

1	E2-Sh2-Rc2	- 77	Sh2-Rc2	23	T2-E13	*	T3-E12-E3-Rc2
2	EIZ	13	Z.L	77	T2-E13-E3	38	T3-E12-E3-R43
3	E12 E3 Sh2 Rc3	14	T2-E3	25	T2 El3 E3 Rc3	98	T3 E12 E3 Sh2 Rc3
*	E12-Rc2	15	T2-E3-Rc2	56	T2 E13 E3 Sh2 Rc2	37	T3 E12 E3 Sh3 Rc2
9	E12-Sh2-Rc2	97	T2 E3 Sh2 Rc2	22	T2 E13 E3 Sh2 Rc3	38	T3 E12 E3 Sh3 Rc3
9	EIZ ShZ Rc3	- 27	T2-E3-St2-R3	82	13	33	T3-E13
4	E13	118	T2-E12	53	T3-E3	90	T3-E13-E3
8	E13-E3-Sh2-Rc3	- 67	T2-E12-E3	30	T3-E3-Sh3-Rc2	41	T3-E13-E3-Sh2-Rc3
6	EI3-Sh2-Rc2	02	T2 El2 E3 Rc2	31	T3-E3-Sh3-Rc3	45	T3-El3-E3-Sh3-Rc2
10	E13-Sh2-Rc3	21	T2 E12 E3 Sh2 Rc2	32	T3-E12	43	T3 El3 E3 Sh3 Rc3
111	Sh2	22	T2 EI2 E3 Sh2 Rc3	33	T3-E12-E3		

	_		_	_			_	
3	Coffee	Cacao	Fruit trees, mixed	Mixed crops	Coconut	Grassland	Shrubland, unmanaged	
	81	82	105	115	116	126	134	

LAND SUITABILITY MAP FOR CACA0

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

MOUNTAIN PROVINCE, CAR

EXTENT OF SUITABILITY FOR CACAO PRODUCTION BY MUNICIPALITY

-	POTENTIAL EXPANSION	(E)	ľ	325	33	89	1,093	16,617	28	27	120	139	18,480
ì	POT EXP.	, ARE	L			L	L						L
	Other crops	25	ľ	Ì	ĺ	ľ	ĺ	Ì	ľ	Ì	Ì	ľ	ľ
(Ha)	Other	S1	ľ	•		ľ	ľ	•		•	•		ľ
CONFLICT RESOLUTION (Ha)	ddy,	25		1				49		3		13	99
CT RESC	Rice paddy, non-irrigated	S1		•			7	2,050		•		1	909 2,057
CONFL	_	SZ		212	11	43	279	66	52	21	119	101	606
	Corm	S1		•	٠	ŀ	139	260'9	٠	•	•	٠	6,237
	md, ged*	SZ		7.4	22	13	9	7.8	23	3	1	18	238
_	Grassland, unmanaged*	21		•	٠	٠	29	53 4,235	٠	٠		٠	314 4,295
REA (Ha	md,	25	·	36	٠	12	192	23	10		1	2	314
EXPANSION AREA (Ha)	Shrubland, unmanaged*	S1				·	411	3,284					3,695
EXP	n n	SZ			٠		٠	286					286
	Coconut	S1					٠	385					385
	TOTAL EXISTING AREA (Ha)							15				13	28
	(Ha)	S3			۰		٠	11		٠		13	24
	EXISTING CACAO (Ha)	25								٠			ľ
	EXISTIP	S1						+					*
	MUNICIPALITY						×	SIT	AN	V			TOTAL
	W		BARLIG	BAUKO	BESAO	BONTOC	NATONIN	PARACELIS	SABANGAN	SADANGA	SAGADA	TADIAN	

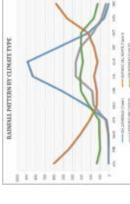
SUITABILITY CLASSES:



of a dty or extent the bly		J	
Moderately Suitable (See Statistics Parisher) and moderately Suitable (See Statistics See See for seasoning and see a moderately seeme for seasoning application of a given uses the limitation will reduce productivity to benefit and increase required inputs to the extent that the overful advantage to the given that the overful advantage to the season of the season	Moderately Suitable (S2) Land having limitation which in aggregate are moderately severe for sustained application of a	given use; the limitation will reduce productivity or benefits and increase required inputs to the extent	that the overall advantage to be gained from the use, although still attractive, will be appreciably inferior to that expected on class \$1 land.

CLIMATE TYPE		
TYPEI : Two pronouced season, dry from November to April and	TYPEII	TYPE II : No dry season w
wet during the rest of the year Maximum rain period is		period from Deo
from June to September		dry month. Maxi
		period from Mar

TYPE IV ; Rainfall is more or less evenly distributed throughout year. This type resembles Type II since it has no dry season. TYPE III: No very pronounced maximum rain period, with a dry season abstring only from one to here months, either during the period from December to February or from March to May This type resembles Type i since it has a short dry season.



AGRONOMIC REQUIREMENT OF CACAO PRODUCTION

LAND ILIZATION TYPE	LAND SUITABILITY TYPE TYPE	SLOPE (%)	SOIL DEPTH (ст)	SOIL TEXTURE	SOIL	SOIL REACTION (pH)	INHERENT	FLOODING	EROSION	ROCK	ELEVATION (mast)	ANNUAL RAINFALL (mm)	CLIMATIC	
	SI	8	>100	CL, SICL, SCL, SC, SIC, C, HC	WD,MWD	5.6.7.2	ųžių	none-slight	none-slight	none-few	<1000	2001-4500	LIII,IV	
Cacao	25	8-30	50-100	FSL, L, SIL	SPD,PD	5.1-5.5	unipəu	moderate	moderate	common	1000-1500	1000-2000	11.11	
	23	>30	05>	S, LS, CSI, SI.	VPD,ED	<5.0 -> 7.9	wol	severe	severe	many	>1500	<1000		
(%) JAC			SOIL DRAINAGE	28		SOIL REACTION (pH)	(Hd)		SOIL TEXTURE					
- P	level to gently sloping	pri	ED - ex	-excessively drained	,	<4.5 extremely acid	mely acid		Coarse		Ē	ine		
36-	- gently sloping to undulating	ulating	WD -wc	- well drained	4	15 5.0 very	very strongly acid		S sand		SC		lay	
m- 81	-undulating to rolling		MWD -mc	-moderately well drained			strongly acid		LS -loam	loamy sand	SIC	silty clay	*	
- oc-	-rolling to moderately steep	daats.		 somewhat poorly drained 		56-60 medii	- medium acid		CSL -coars	-coarse sandy loam	J	-clay		
- S0	-steep		PD -po	- poorly drained	9		slightly acid		St sand	sandy loam	H	- heavy c	lay	
)A-	very steep		VPD -vei	-very poorly drained	9		- Te		Medium					
					7	73-78 -mildl	- mildly alkaline		FSL -fine	fine sandy loam				
L DEPTH (cm)	(E)		SURFACE IMPEDIMENT	EDIMENT	7	79-84 - mode	 moderately alkaline 		L -loam					
30 -w	30 -very shallow		ROCK OUTCROPS	S	^	-8.5 stron	 strongly alkaline 		SIL - silt k	om				
- sp	-shallow		<10% -none-few	ne-few					CL clay	- clay loam				
m- 001	100 -moderately deep		10-30% -common	mmon					SiCL silty	silty clay loam				
30 - de	-deep to very deep		> 30% - many	my					SCI sand	sandy clay loam				

LAND LIMITATIONS DESCRIPTION AND COMBINATIONS SILLEMATION SOIL DEALMAGE DZ - - 5000m-1500m DZ - - 50mewhat poorly drained to poorly drain

ELEVATION	SOIL DRAINAGE	SOIL DEPTH
El2 -1000m-1500m	D2 - Somewhat poorly drained to poorly drained	Sh2 Moderately deep (50 - 100cm)
El3 -> 1500m	D3 - Very poorly drained or excessively drained	Sh3 - Very shallow to shallow (< 50cm)
SLOPE/TOPOGRAPHY	SOIL TEXTURE	ROCK OUTCROPS
T2 - Undulating to moderately steep	Tc - Coarse texture	Rc2 - Common
T3 -Steep to very steep		Rc3 - Many

	CODE	CODE PURE PRINTED IN	CODE	DANS ENTITATION CODE PART PRINTED IN	CODE	NOTIFIED DATE
Г	23	T2 E12 E3 Sh2 Rc2	31	T3-E3-Rc2	41	T3-E12-E3-Sh3-Rc3
Γ	22	T2-E12-E3-Sh2-Rc3	32	T3-E3-Rc3	42	T3-E13
Π	23	T2-El3	EE	T3-E3-Sh3-Rc2	-43	T3-E13-E3
Г	24	T2-E13-E3	34	T3-E3-Sh3-Rc3	44	T3-E13-E3-Rc2
Π	25	T2-E13-E3-Rc2	32	T3-E12	45	T3-E13-E3-Rc3
П	92	T2-E13-E3-Rc3	98	T3-E12-E3	94	T3-E13-E3-Sh2-Rc3
П	27	T2-El3-E3-Sh2-Rc2	37	T3-E12-E3-Rc2	- 45	T3-El3-E3-Sh3-Rc2
Г	28	T2 E13 E3 Sh2 Rc3	38	T3-E12-E3-Rc3	48	T3-El3-E3-Sh3-Rc3
Π	53	T3	68	T3-E12-E3-Sh2-Rc3		

	_		_			_	_
LAND USE	Rice paddy, non-irrigated	Com	Coffee	Cacao	Coconut	Grassland	Shrubland, unmanaged
CODE	2	9	81	82	116	126	134

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

NUEVA VIZCAYA, REGION II

EXTENT OF SUITABILITY FOR CACAO PRODUCTION BY MUNICIPALITY

						EX	EXPANSION AREA (Ha)	AREA (H	(a)			CONF	LICT RES	CONFLICT RESOLUTION (Ha)	(Ha)		
MUNICIPALITY	EXISTI	EXISTING CACAO (Ha)	to (Ha)	TOTAL EXISTING AREA (Ha)	Coconut		Shrubland, unmanaged*	Shrubland, inmanaged*	Grassland	Grassland, unmanaged*	కి	Corn	Rice p non-in	Rice paddy, non-irrigated	Other crops	sdo	POTENTIAL EXPANSION
	S1	2.5	S3		S1	25	21	25	S1	25	S1	2.5	S1	25	S1	25	AKEA (Ha)
ALPONSO CASTANEDA							27	,	577	*	205	•	169				086
AMBAGUIO								٠	6	56	•	11					47
ARITAO	41		•	41	52	•	118	٠	1,445	51	826	109	992	3	•		3,502
BAGABAG	•				158	•	3		3,120	91	2,870	•	1,620				7,788
BAMBANG	28		159	187	88	10			2,426	53	1,451	439	1,460	15			5,941
BAYOMBONG		1			42	45			1,084	743	1,081	271	995	3			4,266
			17	17	527	•	477	٠	2,739	34	2,713	2	829	•		٠	7,174
DUPAX DEL NORTE					121				879	2,355	473	684	332				4,845
DUPAX DEL SUR	•	7	142	149					1,076	1,787	202		166				3,232
KASIBU						96	8	112	84	341	7.3	1,305	11				2,030
KAYAPA		ľ	•		8	8			123	19	84	7	3	2			253
OUEZON									2,970	27	855	•	364				4,216
SANTAFE	•					•			35	3	•	122	4	2			168
ONTOS	•		•		13	•	•	•	809	241	1,044	33	1,636	8	۰		3,583
VILLAVERDE	•		•		91	13	•	15	324	545	996	214	1,234	18	•		3,345
TOTAL.	69	7	317	202	9601	123	623	127	47500		320001 3863	2004	0.427	63	l	l	51 270

AGRONOMIC REQUIREMENT OF CACAO PRODUCTION

CLIMATIC	UIIUN	0.7				thay	ı,		clay							
ANNUAL RAINFALL (mm)	2001-4500	1000-2000	<1000		Fine	•	: -silty clay	•	•							
ELEVATION (masl)	<1000	1000-1500	>1500		E	S	SIC	O	HC							
ROCK	none-few	common	many			_	loamy sand	se sandy loam	- sandy loam		fine sandy loam		-silt loam	loam	silty clay loam	sandy clay loam
EROSION	none-slight	moderate	severe	SOIL TEXTURE	Coarse	s - sand	LS -loan	CSL -coar	SL sand	Medium	FSL fine	L -loam	SIL siltle	CL -clay	SiCL - silty	SCI. sand
FLOODING	none-slight	moderate	alanas													
INHERENT	high	medium	low	(Hd	-extremely acid	very strongly acid	-strongly acid	-medium acid	-slightly acid	Tel	mildly alkaline	 moderately allcaline 	strongly alkaline			
SOIL REACTION (pH)	5.6-7.2	5,1-5,5	<5.0->7.9	SOIL REACTION (pH)	<45 extre					6 7.2 neutral	7.3.7.8 mildly		×85 stron			
SOIL DRAINAGE	WD,MWD	Gd'GdS	VPD,ED			•			9	,		15	^			
SOIL TEXTURE	CL, SICL, SCL, SC, SIC, C, HC	FSL, L, SIL	S, LS, CSI, SL		excessively drained	-well drained	 moderately well drained 	somewhat poorly drained	-poorly drained	 very poorly drained 		EDIMENT	82	pe-few	mmon	my
SOIL DEPTH (ст)	>100	50 - 100	<50	SOIL DRAINAGE	ED -ex	WD - we	MWD - mc	SPD - soi	PD -po	VPD -vei		SURFACE IMPEDIMENT	ROCK OUTCROPS	< 10% - none - few	10 - 30% - common	> 30% - many
SLOPE (%)	8	8-30	>30			dating		deets								
SUITABILITY RATING	IS	ZS	23		-level to gently sloping	- gently sloping to undulating	-undulating to rolling	 rolling to moderately steep 	da	-very steep		F	y shallow	-shallow	denately deep	-deep to very deep
LAND UTILIZATION TYPE		Cacao		SLOPE (%)	0-3 lev	3-8	8-18 -m	18-30 -rol	30-50 steep	> 50 - ve		SOIL DEPTH (cm)	0-30 -very shallow	30-50 sha	50-100 -moderately deep	> 100 - de

LAND LIMITATIONS DESCRIPTION AND COMBINATIONS ELFATION SOLL PRINAGE DESCRIPTION AND COMBINATIONS DESCRIPTION DESCRIPTION AND COMBINATIONS DESCRIPTION DESCRIPTION AND COMBINATIONS DESCRIPTION AND COMBINATIONS DESCRIPTIONS DESCR

	CONTRACTOR									
ELEV	ELEVATION		SOIL DRAINAGE	MINAGE			HTYGE SOIL DEPTH	Ŧ		
EIZ	312 - 1000m-1500m		D2 - Sc	mewhat p	- Somewhat poorly drained to poorly drained	drained	Sh2 - M	Sh2 - Moderately deep (50-100cm)	p (50	100cm)
El3	> 1500m		D3 -Ve	ery poorly	-Very poorly drained or excessively drained	drained	Sh3 - Ve	Sh3 - Very shallow to shallow (< 50cm)	shalle	w (< 50cm)
SLOPE	SLOPE/TOPOGRAPHY		SOIL TEXTURE	TURE			ROCK OUTCROPS	TCROPS		
17	T2 - Undulating to moderately steep	ly steep	Ω- ¬L	Tc - Coarse texture	ure		Rc2 - Common	manon		
13	- Steep to very steep						Rc3 - Many	any		
CODE	LAND LIMITATION	CODE	CODE LAND LIMITATION	CODE	CODE LAND LIMITATION	CODE	CODE LAND LIMITATION	5	CODE	LAND
1	E2-Sh2-Rc2	111	1.2	2.1	T2-E13-E3	31	T3-E12-E3-Sh2-Rc3	L	2	Rice paddy, non
8	El2	12	T2-E3	22	T2 EB E3 Sh2 Rc3	32	T3-E12-E3-Sh3-Rc2	_	4	Corn
m	E12 E2 Sh2 Rc3	13	T2-E3-Rc2	23	T3	33	T3-E12-E3-Sh3-Rc3		42	Vegetable
4	E12-E3-Rc3	14	T2-E3-Sh2-Rc2	24	T3-E3	34	T3-E13-E3		25	Coffee
5	E12-E3-Sh2-Rc3	15	T2-E3-Sh2-Rc3	52	T3-E3-Rc2	32	T3-E13-E3-Sh3-Rc3		28	Cacao
9	E12-Sh2-Rc2	97	T2-E12	97	T3-E3-Rc3				116	Coconut
2	E12-Sh2-Rc3	- 21	T2 El2 E3	22	T3-E3-S43-EC				126	Grassland
80	El3	18	T2 E12 E3 Rc3	28	T3-E3-Sh3-Rc3			_	134	134 Shrubland, unns
6/	E13-E3-Sh2-Rc3	67	T2 E12 E3 Sh2 Rc2	53	T3-EIZ			l		
l										

DCK OU	OCK OUTCROPS			FLOC	FLOODING	
2 - Common	nomm			Ľ	- Moderate seasonal flooding	
3 - Many	any			Œ	 Severe seasonal flooding 	
NOF	CODE	98	LAND USE	Г		
-Rc3	2	Г	Rice paddy, non-irrigated	Г		
Rc2	4	4	Corn	Г		
-Rc3	47		Vegetable	Г		
	_	18	Coffee	Г		
Rc3	85		Cacao	Г		
	11	116	Coconut	П		
	12	126	Grassland	Г		
	13	134	Shrubland, unmanaged	Г		
Г	l					

SUITABILITY CLASSES:

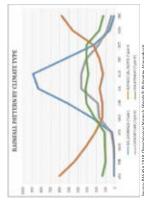
		_				
	to sustained	application of a given use, or only minor limitations	fuctivity or	vean		
	and having no significant limitation to sustained	se, or only mit	hat will not significantly reduce productivity or	senefits and will not raise inputs above an		
riginiy suntable (51)	ng no significa	n of a given u	ot significant	ad will not rai	level,	
ngmiy 3	Land havit	application	that will n	benefits ar	acceptable level	



	TYPE II : No dry season with a very pronounced maximum rain period from December to February. There is not a single dry month. Maximum monthly rainfall occurs during the period from Marth to May.
CLIMATE TYPE	TYPE: Two pronouced season, dry from November to April and wet during the vest of the year. Maximum rain period is from June to September

TYPE IV: Rainfall is more or less evenly distributed throughout the	year. This type resembles Type II since it has no dry	season,		
. No very pronounced maximum rain period, with a dry	season lasting only from one to three months, either	during the period from December to February or from	March to May, This type resembles Type I since it has	a short dry season.

TYPE III:



SOIL EROSION

E.2 - Moderate erosion

E.3 - Severe erosion

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

QUIRINO, REGION II

EXTENT OF SUITABILITY FOR CACAO PRODUCTION BY MUNICIPALITY

						EX	PANSION	EXPANSION AREA (Ha)	•			CONF	LICT RES	CONFLICT RESOLUTION (Ha)	(Ha)		
MUNICIPALITY	EXISTI	EXISTING CACAO (F	(O (Ha)	TOTAL EXISTING AREA (Ha)	Cocc	oconut	Shrubland, unmanaged	Shrubland, inmanaged*	Grassland, unmanaged*	and,	Col	orn	Rice paddy non-irrigate	Rice paddy, on-irrigated	Other crops	crops	POTENTIAL
	S1	25	S3		\$1	\$2	S1	25	S1	SZ	S1	SZ	SI	25	S1	S2	AREA (ma)
AGLIPAY	8		•	8	626	•	1,276	8	1,410	29	6,911	203	1,919	36	٠	•	12,448
CABARROGUIS	75	ľ	212	288	369		292	•	148	4	3,128	14	573		١	•	2002
DIFFUN	29	11	522	308	44	•	110	8	929	24	5,964	699	2,128	06			9,651
MADDELA	34	9	293	333	2,218	211	195	20	883	83	5,673	169	1,907	3			11,757
NAGTIPUNAN			1	1	88	9	171	74	675	548	1,531	176	276	4		•	3,546
SAGUDAY					6	3	32				1,711	313	1,131	248			3,447
TOTAL	621	17	242	938	3,351	220	2,915	140	3,750	721	721 24,917	1,524	7,933	380	٠	•	45,851

AGRONO	MIC REQU	IREMENT	OF CACAC	AGRONOMIC REQUIREMENT OF CACAO PRODUCTION	Z									
LAND UTILIZATION TYPE	LAND SUITABILITY UTILIZATION RATING	SLOPE (%)	SOIL DEPTH (Cm)	SOILTEXTURE	SOII. DRAINAGE	SOIL REACTION (pH)	INHERENT	FLOODING	EROSION	ROCK	ELEVATION (masl)	ANNUAL RAINFALL (mm)	CLIMATIC	
	S1	8>	>100	CL, SICL, SCL, SC, SIC, C, HC	WD,MWD	5.6-7.2	high	none-slight	none-slight	none-few	<1000	2001-4500	I, III, IV	
Cacao	25	8-30	50-100	FSL, L, SIL	GPD,PD	5.1-5.5	medium	moderate	moderate	common	1000-1500	1000-2000	11,11	
	SS	>30	<50	S, LS, CSL, SL	VPD,ED	<5.0 -> 7.9	wol	severe	severe	many	>1500	<1000		
SLOPE (%)			SOIL DRAINAGE	35	s	SOIL REACTION (pH)	(Hd		SOIL TEXTURE					
0-3 -lev	- level to gently sloping		ED -e	 excessively drained 		< 4.5 extremely acid	nely acid		Coarse		æ	Fine		
3-8 gen	- gently sloping to undulating	ulating	w- w	- well drained	4		trongly acid		s sand		8		lay	
8-18 -unc	- undulating to rolling		MWD - m	moderately well drained	II)	5.1.5.5 strongly acid	ty acid		LS -loan	-loamy sand	SIC			
18-30 roll	- rolling to moderately steep	daats	SPD -sc	somewhat poorly drained		5.6 6.0 mediumacid	macid		CSL -coar	coarse sandy loam	O	clay		
30 50 steep	da		PD -pc	poorly drained	9	6.1 6.5 slightly acid	y actd		St sand	sandy loam	H	- peavy	lay	
> 50 - ver	- very steep		VPD -vc	very poorly drained	9	6.6-7.2 neutral	-		Medium					
					7	73.78 mildly	-mildly alkaline		FSL fine	fine sandy loam				
SOIL DEPTH (cm)	(H		SURFACE IMPEDIMENT	EDIMENT	7	79-84 moder	- moderately alkaline		L -loam					
0-30 ver	- very shallow		ROCK OUTCROPS	PS	^	>8.5 strong	strongly alkaline		Silsilt loam	yam				
30 50 shallow	llow		< 10% -none-few	me-few					Clclay	-clay loam				
50 - 100 - moderately deep	derately deep		10-30% -common	поши						silty clay loam				
>100 - dee	- deep to very deep		> 30% many	any					SCL sand	sandy clay loam				

LAND LIMITATIONS DESCRIPTION AND COMBINATIONS SOLDANIAGE ELEVATION

ELEVATION El2 -1000m-1500m El3 ->1500m	SOIL DRAINAGE D2 - Somewhat poorly D3 - Very poorly drain	SOIL DRAINAGE D2 - Somewhat poorly drained to poorly drained D3 - Very poorly drained or excessively drained	SOIL DEPTH Sh2 - Moderately deep (50-100cm) Sh3 - Very shallow to shallow (< 50cm)
SLOPE/TOPOGRAPHY T2 -Undulating to moderately steep T3 -Steep to very steep	SOIL TEXTURE TC - Coarse texture		ROCK OUTCROPS Re.2 - Common Re.3 - Many
CODE I AND IMPERTING CODE I AND IMPERTURE CODE I AND IMPERTURE CODE	1 AND INSTITUTE OF	TAND IMITATION	MOLEVERMENTALION

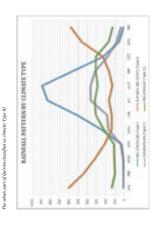
CODE	LAND LIMITATION	CODE	LAND LIMITATION	CODE	LAND LIMITATION	CODE	LAND LIMITATION	
1	EZ-ShZ-RcZ	111	Sh2-Rc2	7.7	T2-E12-E3-SH2-Rc2	31	T3-E12	
2	El2	12	172	22	T2 E12 E3 Sh2 Rc3	32	T3-E12-E3	
3	E12 E2 Sh2 Rc3	13	T2 E3	23	T2-E13	33	T3-E12-E3-Rc2	
8	E12-E3-Sh2-Rc3	1.4	TZ-E3-Rc2	24	T2-E13-E3-E42-Rc2	34	T3-E12-E3-Rc3	
2	E12-Rc2	15	T2-E3-Sh2-Rc2	52	T3	32	T3-E12-E3-Sh3-Rc2	
9	El2-Sh2-Rc2	16	T2-E3-Sh2-Rc3	92	T3-E3	36	T3 E12 E3 Sh3 Rc3	
2	E12 Sh2 Rc3	- 27	T2-E12	27	T3-E3-Rc2	37	T3-E13	
8	EI3	18	T2-E12-E3	28	T3-E3-R3	38	T3 El3 E3 Sh3 Rc2	
6	E13-Sh2-Rc2	- 57	T2-E12-E3-Rc2	29	T3-E3-Sh3-Rc2	39	T3-El3-E3-Sh3-Rc3	
94	650	90	T9 E9 E9 E9	30	T9 E9 G62 Dc2			

SUITABILITY CLASSES:



CLIMATE TYPE	
TYPE! : Two pronouced season, dry from November to April and wet during the rest of the year Maximum rain period is from June to September	TYPE II : No dry season with a very pronor period from December to Februa dry month Maximum monthly ra

TYPE IV: Rainfall is more or less evenly distributed throughout the near. Thic troe recombles Tone II shoot has no dry	Session of the common of the induce is the induce in the car.)
TYPE III: No very pronounced maximum rain period, with a dry coscon lasting only from one in throng manche other	during the period from December to February of from March to May. This type resembles Type I since it has a short dry season.



LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

BATANGAS, REGION IV-A

EXTENT OF SUITABILITY FOR CACAO PRODUCTION BY MUNICIPALITY

-						EX	EXPANSION AREA (Ha)	AREA (Ha	_				25	LIC KES	CONFLICT RESOLUTION (Ha)	ē			
MUNICIPALITY	EXIST	EXISTING CACAO (Ha)	VO (Ha)	TOTAL EXISTING AREA (Ha)	Coce	Coconut	Shrubland, unmanaged*	land,	Grassland, unmanaged*	land,	Corn	F	Rice paddy, non-trigated	addy.	Sugarcane	cane	Other Crops	rops	POTENTIAL EXPANSION
	S1	25	23		S1	25	SI	S2	S1	2.5	S1	SZ	S1	25	S1	25	81	25	AREA (na)
AGONCILLO											21	•	46	•	259		2,151	ľ	2,477
ALITAGTAG					236	186	٠	6			261	10	330						1,332
BALAYAN					292	20	31				1,854	629	3,579	7.1	501		۰	1	7,008
BALETE					301	1,035	•	1	19	2	52	19	99	1			25	2	1,598
BATANGAS CITY					9,548	292	105	144	54	22	879	196	425	10			33	•	11,983
BAUAN					2,207	22	151		31	٦	66	•	224			•	22	,	2,811
CALACA					43	120					2025	220	1,197	202	353	1,580	783	2.271	9,143
CALATAGAN					2,376	491	107	7.5	96	546	1.194	98	2,297	118	37	ľ	1	17	7,152
CITY OF TANAUAN					1,239	1,063					262	S	2,721	13	1,668	15	809	145	8473
CUENCA					732	311	1	22	1	ľ	126	•	7					٠	1,198
IBAAN					2,370	28	٠	١	•	ľ	3,085	40	349	1	•		٠	٠	5,904
LAUREL					370	9	3		1	2	188	•	15	•	33	•	1,766	۰	2,419
LEMERY					•	•	٠	۰	1	۲	524	•	997	26	102	412	1,522	1,677	4,595
TTYN					928	•	167	9	159	۰	2,266	43	1,807	8	66	•	117	٠	5,549
LIPACITY					7,750	462	20	۰	82	۰	3,125	3	829	•		•		٠	12,118
TOBO					1,410	949	929	315	480	۰	194	69	22	8					3,849
MABINI					824	•	56	•	18										898
MALVAR					529	385	٠	۰	1	•	1,557	19	293	•		•		٠	2,826
MATAASNAKAHOY					184	709					56		22					36	978
NASUGBU					2,549	1,244	390	69	170	۰	2,472	713	3,706	520	63				11,895
PADRE GARCIA					1,321						1,812	•	373						3,506
ROSARIO					6,671	99	206	٠	80	۰	7,433	136	2,089	2		•	·		16,983
SAN JOSE		•			3,558	145	٠		•		291	1	98	•		•	•	•	4,079
SAN IUAN					4,920	1,911	381	173	3	2	5,634	351	2,347	40		•	•		15,760
SANLUIS					343	120			•		1,762	407	114	•					2,746
SAN NICOLAS						•	7		635		14	1	237	1	491	1	169	1	1,553
SAN PASCUAL					1,721	20			1		63	1	569	6		•			2,082
SANTATERESITA					22	123			•		783	20	SS	1	179	1	30	1	1,297
SANTO TOMAS		ľ			3,514	46	7		175		1,508	7	589	8	•	1			5,854
TAAL			,	•	2	2	•		1		1,090	78	242	+	801	-	22	•	2,301
TALISAY			Ì		305	•	168	1	438	+	38	•	22	1	52	•	÷06	۰	1,944
TAYSAN					4,080	•	•		29	•	2,281	21	309	•	•	1	•		6,782
TINGLOY					276	•	2	۰	32	۰	104			•	•			٠	417
TUY					8	57	39	21		14	2,995	2,368	1,802	495	22	•			7,876
Tracks.					00000	0000													

AGRONOMIC REQUIREMENT OF CACAO PRODUCTION

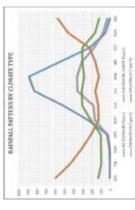
CLIMATIC	UII) IA	0.7				clay	sis.		clay							
ANNUAL RAINFALL (mm)	2001-4500	1000-2000	<1000		ine	sandy clay		- clay	- beavy							
ELEVATION (masl)	<1000	1000-1500	>1500		Ξ	SC	ŝ	O	Ħ							
ROCK	none-few	common	many				- loamy sand	se sandy loam	- sandy loam		- fine sandy loam		- silt loam	loam	clay loam	sandy clay loam
EROSION	none-slight	moderate	severe	SOIL TEXTURE	Coarse	pues - sand	neol - S.	N coar	It sand	Medium	-Nr - fine	-loam	M silth	J clay	sict - silty	SCL - sand
FLOODING	none-slight	moderate	severe					_					.,	_		
INHERENT	high	medium	low	H)	 extremely acid 	very strongly acid	fly acid	macid	-slightly acid	7	mildly alkaline	moderately alkaline	-strongly alkaline			
SOIL REACTION (pH)	5.6-7.2	51-55	<5.0 -> 7.9	SOIL REACTION (pH)	<4.5 extren	5-50 verys	5.1-5.5 strong	6 6.0 mediu	1 6.5 slight			79 84 modes	-8.5 strong			
SOIL	WD,MWD	GH, GPR	VPD,ED		*	•			9	9	7	7	^			
SOIL TEXTURE	CI, SICI, SCI, SC, SIC, C, HC	FSI, L, SIL	S, LS, CSL, SL	3	 excessively drained 	well drained	 moderately well drained 	 somewhat poorly drained 	- poorly drained	- very poorly drained		DIMENT	Sc	ne-few	nom	ń
SOIL DEPTH (cm)	>100	50-100	<50	SOIL DRAINAGE	ED -ex	WD - we	MW/D - mc	SPD - so	pp - po	VPD -ve		SURFACE IMPEDIMENT	ROCK OUTCROPS	< 10% none few	10-30% -common	> 30% - many
SLOPE (%)	8	8-30	>30			lating		daats								
UTILIZATION RATING TYPE	IS.	ZS	23		- level to gently sloping	- gently sloping to undulating	ulating to rolling	- rolling to moderately steep	d	- very steep		e	r shallow	low	lerately deep	o to very deep
LAND UTILIZATION TYPE		Cacao		SLOPE (%)	0-3 -leve	3-8 gent	8-18 -undi	18-30 - rolli	30-50 -steep	>50 - very		SOIL DEPTH (cm)	0 - 30 very shallow	30-50 -shallow	50-100 moderately deep	> 100 - deep to very deep

LAND LIMITATIONS DESCRIPTION AND COMBINATIONS

CHOILE CONTROL OF CONT	CHICAGO CONTRACTOR	
ELEVATION	SOIL DRAINAGE	SOIL DEPTH
El2 -1000m-1500m El3 ->1500m	D2 -Somewhat poorly drained to poorly drained D3 -Very poorly drained or excessively drained	Sh2 - Moderately deep (50-100cm) Sh3 - Very shallow to shallow (< 50cm)
SLOPE/TOPOGRAPHY T2 - Undulating to moderately steep T3 - Steep to very steep	SOIL TEXTURE TC -Coarse texture	ROCK OUTCROPS Rc2 - Common Rc3 - Many

Murginally Statishie (S3) in aggregate are teach from the inflamment with a regregate and sent and the regiment and sent	Not Sultable / Not Relevant to summarish in interest to substantial to the substantial country of such substantial country of such substantial country of such substantial such such such such such such such such	TYPE II. No dry season with a very pronounced maximum rain period from December to Referency There is not a single the round Norman monthly marked record along the period from Month of Song.	TYPE IV . Estimil is more or less evenly distributed throughout the your. This typer resembles Type II since it has no dry season.
		TYPE II	TYPEIV
SUITABLLITY CLASSES: Highly Suitable (St) Highly Suitable (St) Suitable (St) Highly Suitable (St) Suitable (St) Highly Suitable (St) Suitable (St) Benefits and will not stagisticately reduce productority or accopiable level.	Moderately Salitable (\$2) Noderately Salitable (\$2) Note: The control of the co	CLIMATE TYPE TYPE 1: Two promoted season, day from November to April and we defined the rest of the period for two floatment reint period is from june to September.	TYPE III: No very personaced maximum rala period, with a dry season lasting only from the control anoths, editor during the proted from becember to ferbrary or from Nard to May, This type resembles Type I since it has a short dry season.

Western part of Batangas belongs to Type I climate classification and the rest on Eastern part belongs to Type III.



_	CODE	EAST COL
_	2	Rice paddy, non-irrigated
	+	Com
_	34	Diversified crops
	8.1	Coffee
	112	Sugarcane
_	116	Coconut
_	126	Grassland
	134	Shrubs, unmanaged

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

CAVITE, REGION IV-A

EXTENT OF SUITABILITY FOR CACAO PRODUCTION BY MUNICIPALITY

						EX.	EXPANSION AREA (Ha)	AREA (H.	(6			CONFI	CONFLICT RESOLUTION (Ha)	LUTION (Ha)		
MUNICIPALITY	EXISTI	EXISTING CACAO (Ha)	O (Ha)	TOTAL EXISTING AREA (Ha)	Coci	Coconut	Shrubland, unmanaged*	land,	Grassland, unmanaged*	and,	Corn	E	Rice paddy, non-irrigated	ddy, gated	Other Crops	S.	POTENTIAL EXPANSION
	S1	S2	S3		S1	25	S1	SZ	S1	25	S1	25	S1	2.5	S1 .	ZS	AREA (Ha)
ALFONSO				ľ	2,953	839	252			137	1,116	514		3		·	5,814
AMADEO					2,043	404	25				376	193		٠			3,041
BACOORCITY				ľ	14	٠	2	٠	598	ľ	25		612				950
CARMONA				ľ			484	٠	134	1	138		139				895
CAVITE CITY							124	٠	89					٠			192
CITY OF DASMARIÑAS					486	•	117	٠	468	•	2,757	2	1,221	٠			5,054
CITY OF GENERAL TRIAS					54	٠	37	٠	150	•	116	•	1,683	٠			2,835
GEN, MARIANO ALVAREZ				•	124	•	22	٠	88	•	1		5.4	۰			259
GENERAL EMILIO AGUINALDO				ľ	2,724	46	573				360	2				·	3,704
IMUSCITY		•							28	•	883	٠	823	٠			1,734
NDANG		•		•	6,285	264	263	٠	80	•	1,056	37	14	۰			2,998
KAWIT		•									81	٠	922				357
MAGALLANES	91	•	122	138	3,222	106	40	٠	137		1,690	40	2	۰			5,241
MARAGONDON	52		23	89	1,361	•	1,260	٠	1,312	•	2,043	1	109	٠			6,578
MENDEZ		•			417	089					1	47		٠	٠	٠	1,145
VAIC		•	•		808		44	٠	544		2,060	•	1,719	۰			5,176
NOVELETA	•	•	•		•	•					2	•	*		•		9
ROSARIO		•	•		•						14		۰	۰			14
SILANG					2,615	201	950	1	291		5,342	188	456				10,012
TAGAYTAY CITY			•		98	935			6	9	12	422		٠			1,470
TANZA				•	75				288	•	206		2,858	ŀ			4,422
TERNATE							280	•	9	•	139	•	203				928
TRECE MARTIRES CITY		•	•		735	•	110		1,039		276	•	718	۰			2,877
TOTAL.	42		145	186	24,003	3,474	4,882	1	5,211	144	20,211	1,449	11,326	3			70,703

AGRONOMIC REQUIREMENT OF CACAO PRODUCTION

JMATIC	VI.	5														
CLIMATIC	CIII.IV	17				r clay	clay		r clay							
ANNUAL RAINFALL (mm)	2001-4500	1000-2000	<1000		Fine		SiC - silty clay		C - heav							
ELEVATION (masl)	<1000	1000-1500	>1500			ō	S	0	Ξ							
ROCK	none-few	сошшол	many				- loamy sand	se sandy Joann	y loam		fine sandy loam	_	-silt loam	loam	- silty clay loam	y clay loam
EROSION	none-slight	moderate	severe	SOIL TEXTURE	Coarse	S - sand	LS -loam	CSL -coan	Sl. sand	Medium	FSL fine:	L loam	St silt.lc	CL - clay	SiCL silty	SCL - sand
FLOODING	none-slight	moderate	severe			.,										•
INHERENT	high	medium	low	pH)	 extremely acid 	trongly acid	ly acid	macid	y acid	_	 mildly alkaline 	 moderately alkaline 	 strongly alkaline 			
SOIL REACTION (pH)	5.6.7.2	51-55	<5.0->7.9	SOIL REACTION (pH)	<45 extrem	L5 5.0 very strongly acid	51 55 strongly acid	56 60 medium acid	6.1 6.5 slightly acid	6 7.2 neutra	73.78 mildly	79-84 model	85 strong			
SOIL	WD,MWD	SPD,PD	VPD,ED	. 0,		_	-			9			•			
SOILTEXTURE	CL, SICL, SCL, SC, SIC, C, HC	FSL, L, SIL	S, LS, CSL, SL	В.	 excessively drained 	- well drained	 moderately well drained 	- somewhat poorly drained	 poorly drained 	 very poorly drained 		DIMENT	S	ne-few	nomi	á
(ст)	>100	50-100	<50	SOIL DRAINAGE	ED -exc	WD - we	MWD - mc	SPD - SON	PD - po	VPD - ver		SURFACE IMPEDIMENT	ROCK OUTCROPS	< 10% - none few	10 - 30% - common	> 30% - many
SLOPE (%)	89	8-30	>30		_	ilating		steep								
SUITABILITY	SI	25	S3		- level to gently sloping	 gently sloping to undulating 	 undulating to rolling 	-rolling to moderately steep	۵	-very steep		2	-very shallow	low	- moderately deep	-deep to very deep
UTILIZATION SUITABILITY TYPE RATING		Cacao		SLOPE (%)	0-3 -leve	3-8 -gent	8-18 -undt	18-30 -rolli	30 50 steep	> 50 - very		SOIL DEPTH (cm)	0-30 -very	30 - 50 shallow	50-100 mod	> 100 - deep

LAND LIMITATIONS DESCRIPTION AND COMBINATIONS RELAYING REPORT 10 Comments of the Comment of the

11	- Undulating to moderately steep - Steep to very steep	y steep	2	-Coarse texture	a a	
CODE	LAND LIMITATION	CODE	LAND LIMITATION	CODE	CODE LAND LIMITATION	
1	E2-Sh2-Rc2	11	T2-E3-Sh2-Rc2	21	T3-E12	
2	EIZ	12	T2-E3-Sh2-Rc3	22	T3-E12-E3-Sh3-Rc2	
3	El2-E2-Sh2-Rc3	13	T2-E12	23	T3-E12-E3-Sh3-Rc3	
9	E12-E3-Sh2-Rc3	9.7	T2-E12-E3-Sh2-Rc2			
2	E12-Rc2	1.5	T2-E12-E3-Sh2-Rc3			
9	E12-Sh2-Rc2	97	T2-F3-D2			
2	F2-D2	17	T3			
8	F3-D2	18	T3-E3			
6	12	19	T3-E3-Sh3-Rc2			

SOIL DEPTH

Sh.2 - Moderately deep (50 - 100cm)

Sh.3 - Very shallow to shallow (< 50cm) ROCK OUTCROPS Rc2 - Common Rc3 - Many

SUITABILITY CLASSES:

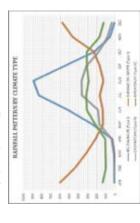
Highly Suitable (S1)
and having no gainfileart initation to sustained
application of a given use, or only minor limitations
that will not significantly reduce productivity or
accordible level.

Marginally Suitable (53)
And having littletion which in aggregate are severe for sustained application of a given use and will so reduce productivity or benefits, or increase equived inputs, that this expenditure will be only marginally justified. Not Suitable / Not Relevant
Land having limitations which may be

CLIMATE TYPE
TYPE 1: You promoted season, day from November to April and TYPE 11: Not ground on the avery promotine damagness in the state and a range from that the avery promotine to the formary. There is not a range from that the avery promotine to the formary. There is not a range from that the avery promotine of the average pr

TYPE III: No very pronounced maximum rain period, with a dry session lasting only from one to three months, either dirting the period from December to February or from March to May This type resembles Type I since it has a short dry session.

The whole part of Cavite classified as climatic Type I.



LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

LAGUNA, REGION IV-A

					EX	PANSION	EXPANSION AREA (Ha)	2				CONFL	CONFLICT RESOLUTION (Ha)	LUTION	(Ha)			
EXIST	EXISTING CACAO (HA)	(Ha)	EXISTING	Coc	Coconut	Shrubland, unmanaged*	land,	Grassland, unmanaged*	and,	Corn	_	Rice paddy, non-irrigated	ddy,	Sugarcane	cane	Other crops	sdou	TOTAL POTENTIAL EXPANSION
25	25	83	WKEA (Ba)	15	2.5	1.5	25	81	25	81	25	18	2.5	15	25	15	25	AREA (Ha)
l.	Ĺ			801	ľ	2.364	22	476	ŀ	33	ŀ	12	ŀ					3.714
ľ	Ľ	Ľ		346	2	286		148	ľ	669		242	ŀ			ŀ		1.723
ľ	Ľ	ľ		355	6	8	-	223	ľ	389	ŀ	438	ŀ			ŀ	ľ	1.418
ľ	Ĺ			1,866		276	1	623		1,218	١	246						4,230
104		7	110	1,227		060'9	20	168	S	335	٠	135	٠					7,980
ľ	Ĺ	ľ				35	٠	222		356	٠	253	٠			ŀ		986
ľ	Ĺ	Ĺ		724	ľ	814	7	1,076	ľ	1,856	2	1,511	11	217	15	ŀ	·	6,231
ľ	Ĺ	ľ		15	•	26	٠	89		•		m	٠					111
ľ	Ĺ	ľ						499		215	٠	734				٠		1,449
ľ	Ĺ	ľ		235	•	536	٠	49	·	219	٠	27						1,067
15	Ĺ		15	1,038	•	1,916	•	205	•	378	•	232	٠					3,769
ľ	Ĺ			433		1,767	104	27		385	٠	31						2,748
ľ	Ĺ	ľ		184	ľ	423	•	\$	٠	468	٠	25	١					1,191
ľ	Ĺ			107	•	4,514	•	190	•	0.03	•	163	·					4,974
ľ	Ĺ			1,068	•	2,073	•	973	•	248	•	309	ŀ			۰		4,972
ľ	ľ			311	•	248	•	157	•	349		302						1,367
ľ		ľ		350	•	262	٠	282	•	1,546	٠	183						2,659
ľ	ľ			842	43	1,174	201	20	20	099	180	45	6				ľ	3,224
ľ	ľ			824	•	2,845	82	12	•	348	24	38						4,175
ľ		ľ		586		1,515	99	83		23	•	49	٠					2,023
ľ	Ĺ	ľ		290		201	•	41		735	•	121	ŀ					1,388
ľ	ľ			99	•	164	•	419		424	٠	131	٠			٠		1,204
S			5	58		301	•	561	11	113	۰	121	۰					1,165
ľ	Ĺ			7.1						436	•	82	•					591
ľ	ľ	ľ		2	•	1,051	09	91	12	129	28	13	·		•		·	1,312
ľ	Ĺ			1,160	4	9,798	447	182	33	872	•	367	2					12,865
ľ	Ĺ			82				2.4		718	•	241	٠					1,069
ľ	Ĺ			472		1,089	•	828	2	369	•	130						2,943
ľ	Ĺ			352	•	634	•	215	•	151	•	89	٠					1,420
ľ	Ĺ									200	•	125	Ī					326
124		ľ			İ													

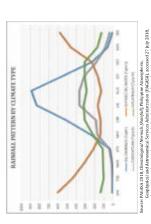
AGRONOMIC REQUIREMENT OF CACAO PRODUCTION

	_	_		r												
CLIMATIC	ATTILL)	11.1				clay	ay		clay							
ANNUAL RAINFALL (mm)	2001-4500	1000-2000	<1000		Fine		silty clay		- heavy							
ELEVATION (masl)	<1000	1000-1500	>1500		Ē	SS	SiC	O	H							
ROCK	none-few	common	many				loamy sand	-coarse sandy loam	-sandy loam		fine sandy loam		nem	clay loam	-silty clay loam	sandy clay loam
EROSION	none-slight	moderate	severe	SOIL TEXTURE	Coarse	sand	.s -loam	Ncoar	M sand	Medium	SI fine:	-loam	ilsilt loam	31clay	sict silty	SCL sand
FLOODING	none-slight	moderate	ananas		-	•			•							*/
INHERENT	high	medium	low	(Ho	nely acid	- very strongly acid	ly acid	macid	/ acid	_	- mildly alkaline	ately alkaline	 strongly alkaline 			
SOIL REACTION (pH)	5.6-7.2	5.1-5.5	<5.0->7.9	SOIL REACTION (pH)	< 4.5 extremely acid	15 50 very s	5.1.5.5 strongly acid	56 6.0 mediumacid	6.1 6.5 slightly acid	5.6 7.2 neutral	73-78 mildly	7.9 - 8.4 - moderately alkaline	8.5 strong			
SOIL DRAINAGE	WD,MWD	ad'ads	VPD,ED	s	٧	4	ıs		٥	9	_	_	^			
SOIL TEXTURE	CL, SICL, SCL, SC, SIC, C, HC	FSL, L, SIL	S, LS, CSL, SL		excessively drained	well drained	- moderately well drained	somewhat poorly drained	-poorly drained	-very poorly drained		EDIMENT	Sd	ne - few	nomin	uy
SOIL DEPTH (cm)	>100	50-100	<50	SOIL DRAINAGE	ED -ex	WD -wc	MWD - m	SPD -so	PD -po	VPD -ve		SURFACE IMPEDIMENT	ROCK OUTCROPS	<10% none few	10 30% common	> 30% - many
SLOPE (%)	8	8-30	>30			lating		teep								
SUITABILITY RATING	\$1	SZ	83		- level to gently sloping	- gently sloping to undulating	- undulating to rolling	 rolling to moderately steep 		-very steep		(ii	r shallow	low	lerately deep	o to very deep
LAND UTILIZATION TYPE		Cacao		SLOPE (%)	0-3 level	3-8 gent	8-18 -unds	18-30 rollii	30-50 -steep	>50 -very		SOIL DEPTH (cm)	0 - 30 - very shallow	30 - 50 shallow	50-100 -moderately deep	> 100 - deep to very deep

LAND LIMITATIONS DESCRIPTION AND COMBINATIONS

ELEVATION E12 -1000m-1500m E13 ->1500m	SOIL DRAINAGE D2 - Somewhat poorly drained to poorly drained D3 - Very poorly drained or excessively drained	SOIL DEPTH Sh2 - Moderately deep (50-100cm) Sh3 - Very shallow to shallow (<50cm)
SLOPE, TOPOGRAPHY TZ - Undulating to moderately steep T3 - Steep to very steep	SOIL TEXTURE TC -Coarse texture	ROCK OUTCROPS Re2 - Common Re3 - Many

	Available Statistics of the control of the contro	Not Statistical Volt Meet Contributed by the statistical statistics of the statistic of the		TYPE II : No day season with a very pronounced maximum min provid from December to Netranay. There is note a single day month. Naturum monthly canfail occurs during the period from Natrit to Nayo.	TYPE IV ; Rainfall is more or less evenly distributed throughout the year. This type resembles Type II since it has no dry season.
SUITABILITY CLASSES:	Highly Matthele (ST) Land having so significant finitions to sustained and having so significant finitions to sustained tophysicant of grows use or ordy functor finitiations benefits and we dill not riske impris abeny an exceptable level, not siese impris abeny an	Moderate/Suitable (2) Land having limitions which in aggregate are moderately seven for suatured application of a greet user, the suatured application of a greet user, the limitions will reduce productively or that the area contact alternates personal reduction use, although mild interface, will be appreciably interface to that expected on dates 51 land,	CLIMATE TYPE	TPPR1: 1 'You promote actoos, day from Newember to Apol and TYP weeding the vest of the your Nextmen min partied is from lane to September.	TYPE III. (No very promoted maximum interfect, while a very represented maximum interfect, while a very representation group from one to three months, where the during the spread from Recentates to Relutary or from Martin to dong. This type recentibles type) since it has a short day season.



The state of the s	Source PGGSA 2018 Climonological Normics (Brainfully Jupipan Autosopheric, Coophysical and Astronomical Services Administration (PGGSA), accessed 77 July 2018 chttps://www1.papasa.dost.gov.ph/index.php/climato/climatological-cormals>-	
--	--	--

CODE	LAND LIMITATION	CODE	CODE LAND LIMITATION	CODE	CODE LAND LIMITATION		CODE
1	E2-Sh2-Rc2	11	T2-E3-Sh2-Rc3	2.1	T3-E13-E3-Sh3-Rc2	_	2
2	BIZ	12	T2-612	22	T3-E13-E3-Sh3-Rc3	Ш	4
8	El2-Rc2	13	T2-E12-E3-Sh2-Rc2			Ш	18
+	E12-Sh2-Rc2	11	T2-E12-E3-Sh2-Rc3				82
S	E12-Sh2-Rc3	57	T3			_	112
9	F2-D2	97	T3-E3			Ш	116
- 2	Sh2-Rc2	- 21	T3-E3-Sh3-Rc2			Ш	126
8	772	81	T3 E3 Sh3 Rc3				134
6	12-63	19	T3-E12-E3-Sh3-Rc2				
01	T2-E3-Sh2-Rc2	07	T3-E12-E3-Sh2-Bc3				

	CODE	LAND USE
	2	Non-tirrigated rice
	+	Corm
	18	Coffee
	82	Cacao
	112	Sugarcane
	116	Coconut
	126	purpseug
	134	posterium proprings

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

QUEZON, REGION IV-A

						EXP.	EXPANSION AREA (Ha	CEN (Ma)				CONF	CONFLICT RESOLUTION (Ha)	JEU ION	На		*******
MUNICIPALITY	EXISTI	EXISTING CACAO (Ha)	A0 (Ha)	TOTAL EXISTING	ривооо	#	Shrubland, unmanaged*	land,	Grassland, unmanaged*	and,	Corn	Е	Rice paddy, non-irrigated	addy,	Other crops	sdou	POTENTIAL EXPANSION
	51	25	53	ĺ	S1	25	S1	ZS	S1	SZ	S1	2.5	SI	ZS	S1	SZ	AREA (Ha)
	ľ	ĺ.	Ē		2,922	ľ	ŀ		99	ľ	99	ľ	2		ŀ	ŀ	3.060
	Ī	ľ	Ī		5,699	32	250	40	424	ľ	424	7	44		ŀ		4,021
	ľ	ľ	Ī		116'9	202	349	262	340	ľ	340	16	149	·	ŀ	ŀ	8,572
	2	ľ	58	09	1-68'9	559	31	ŀ	1,337	243	1,580	425	117	10	ŀ	Ī	11.197
	ľ	ľ	Ī		3,384	ľ	10,404	ľ	281	ľ	281	4	372		ŀ		14,726
					866'81		2306	•	1,263	ľ	1,263	9	101		٠		23.933
	ľ	ľ	ľ		4,294	16	9/	18	3,222	32	3,222	82	1,789	ľ	ŀ	ŀ	12,818
	ľ	ĺ.	Ē		13,463	ľ	213	ľ	3,753	ľ	3,753	62	276		ŀ	ŀ	21.521
CITY OF TAYABAS	22	,	26	117	13,448	202	524	112	1,608	217	1,608	286	928		ŀ	ľ	19,185
	Į.		Ī		1,696	ľ	2,420	212	754	13	754	29	107		·		6.012
GENERAL LUNA	·				6,174	•	82	ľ	686	ľ	686	13					8.251
GENERAL NAKAR	Ĺ	l.	Ī		1,041	10	240	7	81	*	81	9	224	2	١	ŀ	1.696
GUINAYANGAN	ľ				12,762	ľ	2,963	12	147	ľ	147	9	101		ŀ	ŀ	16,139
	Į.	ľ	Ī		11,829	10			397	ľ	397	24			١		12.657
	Ī				1.577	34	80	ľ	1.213	ľ	1.213	ľ	204			ŀ	4 321
	ľ	ľ	Ī		21	ľ	3.384	ľ	338	ľ	338				ŀ		4,081
	ľ				22.832		1502	ľ	432	ľ	432	75	433	ŀ	ŀ	ľ	25 707
	Ī	ľ	Ī		5,142	702	1,330	158	743	171	743	193	249		ŀ	ľ	9,430
	ľ	ľ			2,189	56			2,543	2	2,545	ľ	918	2			8228
					5,542	06	772	ľ	379	ľ	379	41					7.203
	ľ	ĺ.	ľ		686'9	18	3,460	226	448	ľ	448	36	207	ľ	ŀ	ŀ	12,160
					15,099	311	1,398	r.	870	•	820	202	284		ŀ		19,044
PADRE BURGOS					2117		80	•	160	•	160	3	14		٠		4,529
	1	ŧ	36	41	6,734	1	481	214	894	•	894	÷	749				9,972
					1929		2,423	•	360	۰	360	31	34		٠		7,949
PATNANUNGAN					3,140	•	4,395	•	82	•	82	•	89		i		7,767
	28	•	39	29	2,970	•	20	•	91	•	91	7	•	•	•	٠	3,205
					97175				339	•	339	3					6,807
					989	12			47	•	42	2	9				108
	61	S		86	10,521	915	6,358	174	298	•	298		352		٠		18917
	21	2	93	119	3,511	64	19	•	419	ľ	419	10		•	ŀ	ľ	4,473
	2		46	48	1°23		611	•	22	•	22	•	8		٠		406
			Ī		1,108	ľ	2,909	83	82	ŀ	82	20	13		ŀ	ŀ	4301
	·				742	223	304	178	5,646	2,164	7,810	1,914	573	15			19,569
SANANTONIO	Į.		Ī		5,458	30	22		ŀ	ŀ					ŀ	ŀ	5.510
SAN FRANCISCO					9,115	-1	915	610	4,793	2,621	7,414	816	453	28	ŀ	·	28,016
	37	ľ	18	55	991'9	297	1,942	52	3,941	26	4,000	925	325	11	ŀ	ľ	17,691
			-		9,644	141	24	43	4,742	411	4,742	995	2.551		21	ŀ	22.886
TAGKAWAYAN	ľ	ĺ.	Ī		10,086	19	15,046	249	204	ľ	504	22	414		ŀ	ŀ	26,846
	ľ		Ĺ		4,436	ľ	1,571	4	1,170	ľ	1,170	ľ	296		ŀ	ŀ	9,319
					1000	ſ	ĺ	İ		İ	İ	,		İ	t	t	
		•			8,204	•	•	•	260	•	298	7	23	•	-	•	9,455

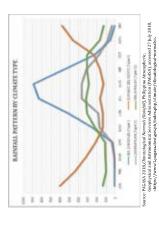
AGRONOMIC REQUIREMENT OF CACAO PRODUCTION

UTIL	LIZATION	UTILIZATION SUITABILITY TYPE TYPE	SLOPE (%)	SOIL DEPTH (%) (cm)	SOILTEXTURE	SOIL	REACTION (pH)	INHERENT	FLOODING	EROSION	ROCK	ELEVATION (masl)	RAINFALL (mm)	CLIMATIC	
		SI	8>	>100	CL, SICL, SCL, SC, SIC, C, HC	WD,MWD	5.6-7.2	ųžių	augijs-auou	none-slight	waj-auou	<1000	2001-4500	t,m,rv	
	Cacao	25	8-30	50-100	FSL, L, SIL	GP,PD	5.1-5.5	medium	moderate	moderate	сошшои	1000-1500	1000-2000	1,11	
		SS	>30	<50	S, LS, CSL, SL	VPD,ED	<5.0 -> 7.9	low	auanas	severe	many	>1500	<1000		
SLOPI	SLOPE (%)			SOIL DRAINAGE	35	,	SOIL REACTION (pH)	(Hd		SOIL TEXTURE					
0-3		- level to gently sloping		ED -ex	excessively drained	•	< 4.5 - extremely acid	nely acid		Coarse		Ξ	ne		
3-8	- gent	gently sloping to undulating	ilating	WD -w	-well drained	•	15-50 very strongly acid	strongly acid		S -sand	_	8		lay	
8-18		- undulating to rolling		MWD - m	- moderately well drained		1 5.5 strongly acid	gly acid		LS -loan	- loamy sand	ŝ	SiC - silty clay	.6	
18-30		 rolling to moderately steep 	steep	SPD -so	 somewhat poorly drained 		5.6 6.0 mediumacid	ım acid		CSL -coar	 coarse sandy loam 	O	- clay		
30-50	daats 0	ф		PD - pc	- poorty drained		6.1 6.5 slightly acid	ly acid		SL sand	sandy loam	Ħ	: - heavy o	day	
> 20		- very steep		VPD -vc	-very poorly drained	•	66-72 neutral	76		Medium					
							7.3 7.8 mildly alkaline	/ alkaline		FSL - fine	- fine sandy loam				
SOIL	SOIL DEPTH (cm)	8		SURFACE IMPEDIMENT	EDIMENT		7.9 - 8.4 - moderately alkaline	rately alkaline		L -loan					
0-30	0-30 -very shallow	y shallow		ROCK OUTCROPS	PS S		> 8.5 - strong	 strongly alkaline 		Sil silt loam	meo				
30-20	30-50 shallow	llow		<10% -none-few	me-few					CL -clay	- clay loam				E
50-10	70m - 00	50 - 100 - moderately deep		10 30% common	mmon					SiCL silty	- silty clay loam				3
> 100	- deep	> 100 deep to very deep		> 30% - many	any					SCI. sand	ly clay loam				1
															1

ABINATION	
g	a
AND AND	ALTERIA
ΙOΝ	0.000
DESCRIPT	
IITATIONS	
Ī	i
LAND	TAL PARTY AND

ELEVATION 312 - 1000m - 1500m 313 - > 1500m	SOIL DRAINAGE D2 - Somewhat poorly drained to poorly drained D3 - Very poorly drained or excessively drained	SOIL DEPTH Sh2 - Moderately deep (50 - 100cm) Sh3 - Very shallow to shallow (< 50cm)
SIOPE/TOPOGRAPHY TZ - Unclusting to moderately steep T3 - Steep to very steep	SOIL TEXTURE Te -Coarse texture	ROCK OUTCROPS Rc2 - Common Rc3 - Many

	Marquing Statistics of a group of	Most Statuble / Not feet and the surprised by the surpromutable in the feet of the surprised by the surpromutable in the feet of the surprised by the surprised by the surprised by the surprised by the surprised by the surprised by the surprised by the surprised by the surprised by the surprised by the surprised by the surfree by the surprised b		TYPE II : No dry reason with a very pronounced maximum rain period from breamler to belveracy. There is not a single dry mount, Maximum nonthity antibil occurs during the period from March to May.	TYPE IV: Takindi is nore or less evenly distributed it roupbout the year. This type resembles Type II since it has no dry essenti.
SUITABILITY CLASSES:	Highly Statistics (S). In this Statistics of the state o	Noticently Statistics of the aggregate are land having interaction which is aggregate are motorities been been assumed application of a motorities and armone and and additional or and that the overall advantage required inspire to the form that the overall advantage in page 100 for the time although statistics with the proposed on the statistic of this expected on class \$1 limit.	CLIMATE TYPE	TYPE 1: Two promoted season, dry from November to April and very dimension and the rest of the year Rasimum rain period is from June to Suptember	TYPE III: No very promoted maximum and predict which dry reseased besting sold from one to three months, either drinking the predict from the besting the either months, either drinking the predict from the bestine to Rebraury or from March to May. This type resembles Type I since it has a abort dry season.



ION CODE LAN	Rc3 2 Rice raddy	Rc2 4 Corn	Rc3 24 C-00	8 8	10 10	87 Coconit	112 Grassland	116 Coconut	126 Grassland
LAND LIMITATION	T3-E12-E3-Sh2-Rc3	T3-E12-E3-Sh3-Rc2	T3 E12 E3 Sh3 Rc	T3-E13-E3-Sh3-Rc2	T3-E13-E3-Sh3-Rc3	T3-F2-D2	T34734D2	Te	
CODE	31	32	33	S,	38	36	32	8	
LAND LIMITATION	T2-F2-D2	72 F3 D2	T3	T3-E3	T3-E3-Rc2	T3-E3-Rc3	T3-E3-Ch2-Br-3	The Fit Shit Br 2	T3-E3-Sh3-Rc3
CODE	23	22	23	24	52	56	22	36	56
LAND LIMITATION	T2	23-21	T2 E3 Rc2	T2-E3-Rc3	T2-E3-Sh2-Rc2	T2-E3-S12-Rc3	72-P2	T2-FI2-F3-Sh2-Br2	T2 FIZ F3 Sh2 Rr3
CODE	11	21	13	72	15	91	44	18	6,1
LAND LIMITATION	E2-Sh2-Rc2	EIZ	E12 Rc2	E12-Sh2-Rc2	E12-Sh2-Rc3	E13-Sh2-Rc2	52-52	F3-D2	Sh2
CODE	ī	- 2	3	*	25	9			0

CODE	LAND LIMITATION	CODE	LAND LIMITATION	CODE	LAND LIMITATION	CODE	LAND LIMITATION	CODE	SU GNAL
-	E2-Sh2-Rc2	111	172	23	T2 F2 D2	31	T3-E12-E3-Sh2-Rc3	2	Rice naddy non-in
2	EIZ	27	12-63	22	T2 F3 D2	28	T3 E12 E3 Sh3 Rc2	4	Corn
3	E12-Rc2	13	T2-E3-Rc2	23	T3	33	T3 E12 E3 Sh3 Rc3		C-00-0
*	BIZ-ShZ-RcZ	ž	T2-E3-Rc3	24	T3-E3	×	T3-E13-E3-Sh3-Rc2	ā ā	contec
S	E12 Sh2 Rc3	15	T2-E3-Sh2-Rc2	52	T3-E3-Rc2	32	T3-E13-E3-Sh3-Rc3	10	CENT
9	El3-Sh2-Rc2	91	T2-E3-Sh2-Rc3	92	T3-E3-Rc3	36	T3-F2-D2	78	Coconut
7	F2-D2	4	T2-812	22	T3 E3 Sh2 Rc3	37	T3-F3-D2	112	Grassland
8	F3-D2	18	T2-E12-E3-Sh2-Rc2	28	T3-E3-Sh3-Rc2	38	Tc	116	Coconit
6	Sh2	67	T2 El2 E3 Sh2 Rc3	53	T3-E3-Sh3-Rc3			126	Grassland
07	Sh2-Rc2	20	T2 El3 E3 Sh2 Rc2	30	T3 E12			134	Shrubland, unman

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

ILOILO, REGION VI

EXTENT OF SUITABILITY FOR CACAO PRODUCTION BY MUNICIPALITY

POTENTIAL EXPANSION	AKEA (III)	7,280	3,818	5,806	5,429	2,244	3,070	3,531	8,183	2,164	2,006	7,972	9,081	4,304	19,048	3,862	6,277	8,013	2,862	1,886	3,403	4,015	1,007	7,794	13,649	795	8,141	4,629	4,398	5,756	2,141	2,863	3,291	818	4,676	5,349	6,911	5,921	1,694	3,392	5,027	8,188	6,390	2,027	1,641
Other crops	25	,												۰					•	ĺ	1						1			1				1			٠			•	1			1	•
Other	S1	69				55								69					•								158	•					1	1		250	25			403	•	832		•	•
ane	25	,				•						,		•			•	•		1		1	1		•		1	•	•	1	1	•	1	1	1		٠	•		•	1	٠	٠	•	•
Sugarcane	S1	64				27				٠		۰		405	12	1	٠	٠	*	1	•	•	1	•	•	•	220	•	*	1	1	•	1	1	1	16	25	•		222	Ť	141	٠	1	1
	S2	7		322	1,232	٠	99		202	5	٠			•	616	•	096	2,400		1		1	1	719	2,256	•	1			1	6		1	1	92		194		٠	٠	•		٠	1	-
Corn	S1	685	208	1,186	1,199	487	714	1,491	626	1,084	2,988	640	6,257	933	8,548	248			1,367	222	1,072	752	263		4	300	601	1	520	637	1,072	348	928	316	2,518	306	1,783	233	969	271	909'1	224	861	241	878
ted.	25	ŀ	ŀ	153	325		06	•	287		•		ŀ		72			440	•	1	•	1	4	_	292	1	1		•	_	12		1	1	9		33				i			-	7
Rice paddy, non-irrigated	S1	1,071	420	2,590	543	1,312	1,514	1,839	2,608	812	350	4,795	1,229	1,045	3,715	454	1,215	1,817	1,494	848	222	288	299	753	,304	999	2,579	313	548	979	834	2,253	2,161	431	2,018	2,060	755	1,431	674	1,280	3,167	2,488	1,527	46	604
	S2 S	13		352 2		- 1	320 1	- 1	1,104 2	-		- 4	- 1	-	720 3	19	-	-	-	-		+	+	1	241 1	•	2	+	-	8	1	- 2	- 2	1	- 2	- 2	1 99	6 1		-	Ш	22 2	- 1		-
Grassland, unmanaged*	Н	1,271		232			82		,366 1,	36	21	29	533	509	3,771	524				18	10	+	2	98	723	•	1,735	9	226	2,092	1			1	-	1,313	2,700	2,957		292		3,144	14		
-	S1	49 1,2	8	401 2	14		Ļ		2 1,3				- 5	- 2	479 3,7		702	409				-			209	-		00	- 2	_	118		,			- 1,3	127 2,7	1 2,9		- 2		4 3,1		91	
Shrubland, unmanaged*	SZ		1		496 1,574	3	14	200	2.0	45	9	23	2	1		856		112 4		80	9	10					9	6	7		16		44	-	43	622	.1	2	308	258		504	7	+	
-Rs all	S1	1,065	2,651	- 48		_		- 20		4	1,646	1,753	1,062	- 221	1,116	- 82	. 20	- 11		8	1,716	2,975			- 1,872		998	4,197	1,077	2,025	°		*			- 62	6	- 1,282	30	3 25		9 20	3,827	1,724	
Coconut	25		L		28		26		974															84															L						
Š	S1	3,096	37	89	2	360	245	ľ	638	181		721	Ľ	1,422	ĺ	1,738	İ	·		299	53	Ì	99	783	Ì	30	2,144	106	1,026	15		262	108	72		707	108	12	18	137	254	823	161	ĺ	69
TOTAL EXISTING AREA (Ha)				3				2		3			10		1	17	2					-			1			29	1			•					3	7							
(Ha)	S3			3				2		3			10		1	17	2			1		-	1		1		1	8	1	1	1	•	1	1	1		m	7			•		٠	1	
cacao	SZ						٠					ī		•				•		1		•	1		•	•	1	1		1	•		1		1		•		٠		Ī			1	
EXISTING CACAO (Ha)	SI				۰	٠	٠		۰			١				•				1		•	1			•	1	21		1	1		1	1	1		•				Ħ		٠	1	-
MUNICIPALITY	L	AJUY	ALIMODIAN	ANILAO	BADIANGAN	BALASAN	BANATE	BAROTACNUEVO	BAROTACVIEJO	BATAD	BINGAWAN	CABATUAN	CALINOG	CARLES	CITY OF PASSI	CONCEPCION	DINGLE	DUEÑAS	DUMANGAS	ESTANCIA	GUIMBAL	IGBARAS	ILOILO CITY	JANIUAY	LAMBUNAO	LEGANES	LEMERY	LEON	MAASIN	MIAGAO	MINA	NEWLUCENA	OTON	PAVIA	POTOTAN	SAN DIONISIO	SAN ENRIQUE	SAN JOAQUIN	SAN MIGUEL	SAN RAFAEL	SANTA BARBARA	SARA	TIGBAUAN	TUBUNGAN	ZARRAGA

AGRONOMIC REQUIREMENT OF CACAO PRODUCTION

CLIMATIC	U.III, IV	1,11				clay	ay		clay														
RAINFALL (mm)	2001-4500	1000-2000	<1000		Fine	sandy clay		-clay															
ELEVATION (masl)	<1000	1000-1500	>1500		E	SC	SiC	O	H										nosion	sion		seasonal flooding sonal flooding	
ROCK OUTCROPS	waj-auou	сошшоп	many			_	- loamy sand	- coarse sandy loam	sandy loam		- fine sandy loam		-sittloam	- clay loam	silty clay loam	sandy clay loam		SOIL EROSION	E2 - Moderate erosion	E3 -Severe erosion	FLOODING	F2 - Moderate seasonal flooding F3 - Severe seasonal flooding	
EROSION	none-slight	moderate	severe	SOIL TEXTURE	Coarse	S - sand	LS - loar	CSI coal	SL sanc	Medium	FSL - fine	L - loam	SIL salt:	CL - clay	SICL silty	SCL - same		•	_		-		
FLOODING	none-slight	moderate	severe																eep (50 - 100cm)	to shallow (< 50c			
INHERENT	high	modium	low	(Ind.	mely acid	strongly acid	glyacid	- medium acid	-slightly acid	al	- mildly alkaline	rately alkaline	 strongly alkaline 					SOIL DEPTH	Sh2 - Moderately deep (50 - 100cm)	Sh3 - Very shallow to shallow (< 50cm)	ROCK OUTCROPS	Rc2 - Common Rc3 - Many	
SOIL REACTION (pH)	5,6-7,2	51.55	<5.0->7.9	SOIL REACTION (pH)	< 4.5 extremely acid	45-50 very strongly acid	5.1 5.5 strongly acid	5.6 6.0 medit	51 65 slight	56 7.2 neutral	73.78 mildly	7.9-84 -moderately alkaline	-8.5 -stron					SOI	Sh2	Sh3	RO	Rc3 Rc3	
SOIL	WD,MWD	GH, GPB	VPD,ED	,	•	-			•	•			•				IONS		poorly drained	ssively drained			
SOIL TEXTURE	CL, SICL, SCL, SC, SIC, C, HC	FSL, L, SIL	S, LS, CSL, SL	32	- excessively drained	-well drained	- moderately well drained	 somewhat poorly drained 	poorly drained	 very poorly drained 		EDIMENT	S	ne-few	mmon	my	LAND LIMITATIONS DESCRIPTION AND COMBINATIONS	GE	D2 - Somewhat poorly drained to poorly drained	- Very poorly drained or excessively drained	æ	e texture	
SOIL DEPTH (cm)	>100	50-100	<50	SOIL DRAINAGE	ED -cox	WD -w	m- GWM	os - and a	od - DO	VPD -ve		SURFACE IMPEDIMENT	ROCK OUTCROPS	<10% - none few	10 30% common	> 30% - many	TION AND	SOIL DRAINAGE	D2 - Some	D3 -Very I	SOIL TEXTURE	Tc - Coarse texture	
SLOPE (%)	8>	8-30	>30			dating		steep									DESCRIP					daos	
UTILIZATION SUITABILITY TYPE RATING	IS	25	S3		-level to gently sloping	-gently sloping to undulating	-undulating to rolling	-rolling to moderately steep	œ.	-very steep		T	very shallow	-shallow	-moderately deep	-deep to very deep	IITATIONS		1500m		RAPHY	T2 - Undulating to moderately steep T3 - Steep to very steep	
UTILIZATION		Cacao		SLOPE (%)	0-3 -leve	3-8 -gent	8-18 -und	18-30 -rolli	30 50 steep	> 50 very		SOIL DEPTH (cm)	0-30 -very	30 - 50 shall	50 100 moc	> 100 - doe	LAND LIN	ELEVATION	El2 1000m 1500m	El3 -> 1500m	SLOPE/TOPOGRAPHY	T2 - Undulating to mod T3 - Steep to very steep	

SUITABILITY CLASSES:

Marginally Suitable (S3)
Land having limitations which in aggregate are
severe for sustained application of a given use and
will so reduce productivity or benefits, or increase
energied inputs, that this expenditure will be only
mannialto inertical.

Not Suitable / Not Relevant Land having limitations which may I are time but which amond the corrections which are some source and initiations are so severe as no precident initiations are so severe as no precident sustained use of the land in the given Existing forest, shrubland greater thirrigated padds for eard miscellanes such as built up areas, roads, set are such as built up areas, roads, set are

Moderate Systituble (25).
Land having limitation which in aggregate are moderately every for sustained application of a green use the limitation will reduce productingly or benefits and increase required inputs to the account that the overall advantage to be gained from the use, although still strateface, well lie appreciably inferior to that expected on class \$1 land.

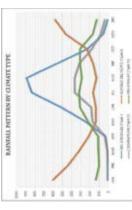
TYPE II : No dry season with a very pronounced maximum rain period from Decenter to Rebrary. There is not a single dry month, Maximum monthly rainfall occurs during the period from March to May.

TYPE.III: No very pronounced maximum rain period, with a dry season faining only from one to larse months, either during the period from the teacher to Répurary or from Marito May Fresenber to Répurary or from that to May Tris type resembles Type I since it has a short dry season.

CLIMATE TYPE

TYPE IV ; Rainfall is more or less evenly distributed throughout the year. This type resembles Type II since it has no dry season.

climatic Type I and Northern part belongs to Type III.



urce: PAGASA 2018, Climatological Normals (Rainfall), Philippine Atmospheric, Geophystal: and Actronomical Services Administration (VMGASA), accessed 27 July 2018, chttps://www1.pagassdost.gov.ph/ndex.php/climate/climatological-normals--

 CODE
 LAND LIMITATION
 CODE
 LAND LIMITATION
 CODE
 LAND LIMITATION

 1
 62-802-802
 31
 72-83
 21
 72-82-02

	2	EIZ	12	T2-E3-Rc2	22	T2-F3-D2	
	3	E12-E2-Rc3	13	T2-E3-Rc3	23	T3	
_	4	EL2-E3-Rc3	74	T2-E3-Sh2-Rc2	22	T3-E3	
	5	E12-Rc2	32	T2-E3-Sh2-Rc3	52	T3-E3-Rc2	
	9	E12-Sh2-Rc3	97	T2-E12	97	T3-E3-Rc3	
	- 2	F2-D2	- 21	T2-E12-E3-Rc2	22	T3 E3 Sh2 Rc3	
_	8	F3-D2	- 81	T2-E12-E3-Rc3	82	T3-E3-Sh3-Rc2	
_	6	Sh2-Rc2	67	T2-E12-E3-Sh2-Rc2	62	T3-E3-Sh3-Rc3	
_	10	172	20	T2-E12-E3-Sh2-Rc3	30	T3-E12	Ш
1							
ш	CODE	LAND USE					
ш	2	Non-irrigated rice					
ш	4	Corn					
_	34	Diversified crops					

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

PALAWAN, REGION IV-B

EXTENT OF SUITABILITY FOR CACAO PRODUCTION BY MUNICIPALITY

						8	CPANSION	EXPANSION AREA (Ha	_			CONF	CONFLICT RESOLUTION (Ha	LUTION	Haj		
MUNICIPALITY	EXISTI	EXISTING CACAO (Ha)) (Ha)	TOTAL EXISTING ABEA (Ha)	Coconut		Shrubland, unmanaged*	Shrubland, nmanaged*	Grassland, unmanaged*	land,	Rice paddy, non-irrigated	addy,	Corn	_	Other	Other crops	TOTAL POTENTIAL EXPANSION
	S1	SS	S3		S1	ZS	SI	SZ	S1	SZ	S1	ZS	S1	25	S1	SZ	AREA (Ha)
ABORLAN					14,186	1,202	2,897	2,444	338	46	4,372	283	2				25,772
AGUTAYA	٠	•	•		96	7.4	•	·	1,656	66	ŀ	•	ŀ	٠			1,924
ARACELI		•	•		+	129	300	3,399	99	584	721	1,154	•	14			6,402
BALABAC					16,565	٠	1,877	43	292	7	56						19,283
BATARAZA	46	9	2	116	20,127	999	8,454	481	1,652	16	5,487	16			•		36,900
BROOKE'S POINT	22	10	53	19	19,256	835	2,051	474	•	•	8,041	22	ŀ	۰			30,684
BUSUANGA					14	52	2,353	2,604	3,808	5,999	729	514	4	2			13,054
CORON					37	66	1,793	3,693	5,501	4,962	464	767					16,869
CULION	٠	•			ın	6	517	2,373	2,090	5,448	1,538	27.2	41	21	•	•	12,818
CUYO					3,014	195	368	•	95	34	38	۰	9	•			3,711
DUMARAN					83	66	929	2,905	1,715	4,637	3,079	1,710	•	1			14,789
LNIDO					1,085	189	2,425	2,853	1,866	1,770	3,455	166	34	4			14,672
JINAPACAN		•	•		•	129	18	220	7.2	292	7	301	2	37			1,902
MAGSAYSAY					3,302	155	3	•	231	132	44	17	2	8			3,898
MARRA					6,317	501	987'9	3,045	1,484	102	16,330	195	8				34,267
PUERTO PRINCESA CITY	٠	•	•		8,142	4,574	8,780	5,587	1,836	955	9,190	1,332	20	3	•	•	40,469
OUEZON	4	8	13	25	12,133	4,584	9,262	8,094	842	11	3,823	202	11	۰			38,962
RIZAL	62	5	15	48	11,208	1,166	24,961	3,055	11	2	5,154	129				3	45,689
ROXAS		•			1,365	1,122	1,049	2,878	6,180	11,622	2,208	1,344					27,767
SAN VICENTE		•	•		130	418	87	741	1,600	3,604	2,063	1,135	7.5	31			9,884
SOFRONIO ESPAÑOLA	12	17	21	51	7,023	6,151	2,899	8,158	7	15	1,799	365	•	•	•		26,416
TAYTAY					089	226	3,247	4,381	5,136	5,649	260'6	1,424	99	33			29,939
TOTOT																	

Note: Delivery of cacao planting materials must be started on the onset of rainy season.

AGRONOMIC REQUIREMENT OF CACAO PRODUCTION

LAND UTILIZATION TYPE	N SUITABILITY RATING	SLOPE (%)	SLOPE (%) SOIL DEPTH (cm)	SOIL TEXTURE	SOIL DRAINAGE	SOIL REACTION (pH)	INHERENT	FLOODING	CLASS	ROCK	ELEVATION (masl)	ANNUAL RAINFALL (mm)	CLIMATIC	
	SI	8>	>100	CL, SiCL, SCL, SC, SIC, C, HC	WD,MWD	5.6-7.2	high	aųžijs-auou	none-slight	none-few	<1000	2001-4500	t,m,m	
Cacao	ZS	8-30	50-100	FSL, L, SIL	SPD,PD	5.1-5.5	medium	moderate	moderate	сошшоп	1000-1500	1000-2000	11.11	
	SI	>30	<50	S, LS, CSL, SL	VPD,ED	<5.0 -> 7.9	low	auanas	severe	many	>1500	<1000		
SLOPE (%)			SOIL DRAINAGE			SOIL REACTION (pH)	(Hd		SOIL TEXTURE					
0-3	level to gently slopin,	nit out	ED -ex	 excessively drained 		< 4.5 extremely acid	nely acid		Coarse		E	ne		
3-8	-gently sloping to undulating	ulating	WD -we	well drained		45 50 very:	very strongly acid		S - sand		S	sandy :	day	
8-18 -1	-undulating to rolling		MWD - mx	 moderately well drained 	_	51 55 strong	- strongly acid		LS -loan	y sand	Š	SiC - silty clay	ı,	
18-30	-rolling to moderately steep	deats	os- dds	somewhat poorly drained		5.6 6.0 medit	- medium acid		CSL coar	se sandy loam	D	-clay		
30-50	-steep		PD -po	poorly drained		61 65 slight	- slightly acid		SI - sand	-sandy loam	H	: heavy	clay	
> 50	-very steep		VPD -ve	-very poorly drained		6.6 7.2 neutral	al		Medium					
						73.78 mildly	mildly alkaline		FSL - fine	- fine sandy loam				
SOIL DEPTH (cm)	[(cm)		SURFACE IMPEDIMENT	EDIMENT		79 8.4 mode	moderately alkaline		L -loan	_				
0-30	-very shallow		ROCK OUTCROPS	SA		-85 stron	strongly alkaline		Sil silt.l	-silt loam				
30-50	-shallow		<10% -none-few	ne-few					CL -clay	loam				
50-100 -r	-moderately deep		10 - 30% - common	mmon					SICL - silty	clay loam				
> 100	-deep to very deep		> 30% - many	my					SCIsand	y clay loam				

SLOP	SLOPE/TOPOGRAPHY			SOILTE	SOIL TEXTURE			
22	- Undulating to moderately steep - Steep to very steep	erately s	teeb	- 2L	Tc - Coarse texture			
CODE	LAND LIMITATION	CODE	CODE LAND LIMITATION	CODE	LAND LIMITATION	GODE	LAND LIMITATION	_
~	23	13	21.	52	T2 E13 E3 Rc3	37	T3 ER2 E3 Rc2	
~	E2 Sh2 Re2	14	TZ-E3	92	T2 F2 D2	38	T3 EIZ E3 Re3	_
9	EIZ	15	T2 E3 Rc2	22	T2-F3-D2	30	T3 ET2 E3 Sh2 Rc3	_
*	E12 E3 Rc3	9[T2 E3 Rc3	28	T3	40	T3 EI2 E3 Sh3 Rc3	
165	E12 Rc2	27	T2 E3 Sh2 Rc2	62	T3-E3	41	T3-EI3	
9	E12 Sh2 Re2	81	T2 E3 St2 Rc3	30	T3-E3-Rc2	42	T3 613 E3	
2	EI3	61	TZ-612	31	T3-E3-Rc3	83	T3 EI3 E3 Sh2 Rc3	_
80	E13 E3 Rc3	20	T2 E12 E3	32	T3 E3 Sh2 Rc3	44	T3 EI3 E3 Sh3 Rc3	_
6	E2-D1	21	T2 E12 E3 Rc2	33	T3 E3 Sh3 Rc2	45	T3-F3-D2	
			the same party and the		THE RESERVED AND THE	**		

SOII Description SOII ERRORIN 30.2. Abstractive description 7.2. Londonsementaries 30.3. Frequential of Strengers of the Common Strength 7.3. Severe recolor ROCK OUTGOPS 14.000NG RG 2. Common Strength 7. Nobrate sessoral files RG 3. Mary 7. Nobrate sessoral files RG 3. Mary 7. Nobrate sessoral files



SUITABILITY CLASSES:

Highly Suitable (S1)
Land barking obligation thinking to exterined
Land brangen obligation thinking to the
application of a given use or only more instactors
that will not significantly reduce productivity or
brandle and will ont raise inputs above an
acceptable level.

| August | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security | Security |

Moderately Suitable (\$23) and abut having intuition which in agmoderately sewer for sustained a given use; the limitation while reduce the new first and increase required ing that the overall advantage to be use, although still attractive, will I inferior to that expected on class?

CLIMATE TYPE

wet during the rest of the year Maximum rain period is from June to September

and TYPE, II. Note you would be very promoted materianism rish period from Becnetier to Relensy, Three so sus a single dry month, Marinum monthly randful occurs during the period from Marin to Moy.

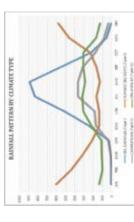
TYPER. V. Shidalli s more or less evenly distributed fromthout the

y pronounced maximum rain period, with a dry
TYPE IV: 1
besting only from one to three months either
y
it the period from December to February or from
s
to May. This type resembles Type I since it has

TYPE III:

YPE IV : Rainfall is more or less evenly distributed througho year. This type resembles Type II since it has no dry season.

western part of Palawan belongs to climatic Type I and southeast part of the island is Type III.



ce: PAGASA 2018, Climatological Normals (Rainfoll), Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), assessed 27 July 2018, Highest (Awaya), naspassades recovery fridescubin chimate chimatological anormals.

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

BOHOL, REGION VII

Marginally Suitable (53)

Land having limitations which in aggregate arre
severe for sustained application of a given use and
will so reduce productivity or benefits, or increase
will so reduce productivity or benefits, or increase
equived inputs, dath this expenditure will be only
marginally instified.

SUITABILITY CLASSES:

Moderately Suitable (S2)
and having intuition which in an indicately severe for sustained given use, the limitation will reduce properlike and one of the several advantage to be use, although still attractive, will see although still attractive, will have the or the second s

EXTENT OF SUITABILITY FOR CACAO PRODUCTION BY MUNICIPALITY

Maintenanty Maintenanty						_	-	EXPANSION AREA (Ha								CONFLICT RESOLUTION IN		
Mathematical Registration Mathematical Registration	MUNICIPALITY	EXISTI	NG CACA	AO (Ha)	TOTAL EXISTING	ő	conut	Shrubl	and, iged*	Grassl	and,	Cor	F	Rice p.	addy, igated	Other c	rops	POTENTIAL EXPANSION
1 1 1 1 1 1 1 1 1 1		S1	SZ	83	AREA (DB)	S	25	81	SZ	\$1	25	S1	SZ	51	SZ	S1	22	AREA (Ha)
1	URQUERQUE	•				1,906		18	40	106	٠	245			١	۰	٠	2,355
1	IIA					2,368		119	93	1,380	45	298		722		·		5,660
1	lA.	•		•	•	726	Π	200	875	•	•	32	2	48	-	•	•	3,084
1	BOUERA		1			2,725		2,011	61	-	1	69	1	18	1	1	1	4,917
1	LAYON		1	•		1,013		•		1,334	1	317	1	32		•	1	2,700
1	ILIHAN	-	1	•		828		1,550	267	4,814	13	•	•	30	П	•	•	7,504
1	UAN	10	1	-	11	963		2,314	46	•	1	821	1	245	•	•	•	4,422
1	UNIDO			-		189				•		456	٠	493	1			1,137
1	JR.			5	5	1,512		1,180	227	6	205	741	44	311	16			4,341
1	NAVISTA	19		7	26	4,016	•	160	•	3,494		80		388				8,138
1	APE.					2,927						174	•	279				3,381
1 1 1 1 1 1 1 1 1 1	DIJAY					2,462		198	173	15	8	168	•	325	50			4,283
1	MEN					9,505		174	25	718	256	2,196	87	2,259	309	۰		16,943
1	CBIAN	4		2		3,182		1,694	206			145	989	203	236			8,524
1	SIN					2,049						150	536	112	65			3,180
1	ELLA	•	ľ	•		293	*	130	37	2,242	·	•	٠	4	•	•	•	2,980
1	TES					754	•	26	۰	1,994				2		٠		2,778
1	ЭНОУ	2	13		15	829		514	276	7	•	1,898	33	2,242	4		•	5,987
Column C	40	11		1	12	3,628		36	151	926	88	206	7.1	381	99	Ī		7,043
March Marc	S					280		2,376	•	537	•	26	•	92				3,309
1	AO.					895		90	45	173	212	926	259	7.8	45	•		3,212
1	03	•		2	2	541		٠	1		ŀ	125	17	34	9	Ī	•	1,185
1	1A HERNANDEZ			-		674		30	464	175	200	220	109	96	14	•	•	2,906
1	FE	•		•	•	3,269	•		1	1,532	•	6	1	753	1			5,564
Milkovi	DULMAN	-	1	-		1,989		107	9	25	10	46	23	164	33	1	1	4,044
1	ANGA	•		•	•	5,878		27	٠	432	٠	69	124	260	36	•	•	7,430
MINO. Mino. Mi	A			1	1	853	1		12	•	170	147	99	45	23	•		2,707
1		•		•		900				19	40			36		•		1,001
MATCH 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		•		•	•	1,684		2	•	32	2	31	•	22	•	•	•	1,779
1	NC.	•		-		1,464		88	25	20	258	454	81	47	+	•	•	2,625
WEAT		•	1	•		3,980		657	203	1		791	27	357	1	•	1	6,446
Mary Mary	N	•	1	•	•	1,326		30	53	1,862	43	878	٠	1,063	1	•		5,260
March Marc	BOJOC	•	1	•	•	2,601		482	62	1		11	1	16	1	1		3,187
Milkovi	3LA0	•		•	•	630		2,280	1	202	1	•	1	450		•	•	3,562
MOTO 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2	1	1	5	LÓ.	1,226		89	43	26	•	3,061	89	2,155	30	1	1	6,926
3 100 11 12 12 13 14 14 15 14 15 15 15 15	CARLOS P. GARCIA	•	1	•	•	2,103	•	•	1	160	٠	127	٠	474	1	•	1	2,865
1	AYAN	3	10	•	13	572		337	89			129	1,160	81	613	•		6,803
S S S S S S S S S S	SIDRO					2,348		619	21		٠	83	•	14	1			3,232
1	MIGUEL	5		3		2,815		94	10	799	22	3,543	7	2,334	48	۰	٠	79267
1	LLA	•	ľ			1,200		170	32	185	١	1,981	10	14	•	۰	•	3,614
1	RA BULLONES		ľ			2,495	Ĺ	171	132			555	285	749	19			5,168
1 2002 2004 200	TUNA	•	3	5		1,806		244	29	140	11	4	٠	3				2,282
N. N. 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1	BILARAN CITY	•	ľ		•	325	Í	•		1,355	ľ	•	1	3	•	•	•	1,683
March Marc	BON	-1	ľ	Ī	1	4,802	•	246	١	2,092	۰	860	1	2,296	•	۰	•	10,295
ON	IDAD	4			4	1,590	•	21		1,646	۰	4,975	6	3,447				11,687
COA 5 5 5 10 2.479	CON	•		•		2,706		•	•	•	•	274	248	295	30	•	•	3,884
	,	2		5	0	2,479	Ī			1,957	۰	5,263	•	6,791		·		16,490
	SNCIA					1131	L	100	l	ľ	ŀ	ŀ	Ì	Ì	I	ŀ	I	

AGRONOMIC REQUIREMENT OF CACAO PRODUCTION

UTILIZATION TYPE	UTILIZATION SUITABILITY TYPE RATING	SLOPE (%)	SOIL DEPTH (cm)	SOIL DEPTH SOIL TEXTURE (cm)	SOIL	SOIL REACTION (pH)	INHERENT	FLOODING	EROSION	ROCK OUTCROPS	ELEVATION (masl)	ANNUAL RAINFALL (mm)	CLIMATIC
	15	8	>100	CI, SICI, SCI, SC, SIC, C, HC	WD,MWD	5.6-7.2	high	none-slight	none-slight	none-few	<1000	2001-4500	I, III, IV
Cacao	22	8-30	50-100	FSL, L, SIL	SPD,PD	5.1-5.5	medium	moderate	moderate	common	1000-1500	1000-2000	1,11
	SS	>30	<50	'IS' 'CSF' 'SF	VPD,ED	<5.0 -> 7.9	low	aaaas	aaaas	many	>1500	<1000	
SLOPE (%)			SOIL DRAINAGE			SOIL REACTION (pH)	(hd)		SOIL TEXTURE				
0-3 -levi	- level to gently sloping		ED -ex	 excessively drained 		<45 extre	-extremely acid		Coarse		Œ	ы	
3-8 -gen	atly sloping to undu	lating	WD - W	well drained			very strongly acid		S - sand	_	8		lay
8-18 -unc	- undulating to rolling		MWD - mc	- moderately well drained		•	strongly acid		LS loan	- loamy sand	Š	SiC silty clay	
18-30 -roll	 rolling to moderately steep 	deap	SPD -soi	 somewhat poorly drained 		5.6-6.0 medi	medium acid		CSI coar	 coarse sandy loam 	U		
30-50 -steep	da		PD - po	- poorly drained		•	slightly acid		SI. sand	sandy loam	HC		lay
>50 ver	- very steep		VPD -ve	 very poorly drained 		6.6 7.2 neutral	Ę		Medium				
						73.78 mildly	mildly alkaline		FSL fine	- fine sandy loam			
SOIL DEPTH (cm)	(F		SURFACE IMPEDIMENT	EDIMENT		79 8.4 mode	-moderately alkaline		L -loam				
0-30 -ver	very shallow		ROCK OUTCROPS	PS .		-8.5 stron	 strongly alkaline 		SIL silt1	-slt loam			
30 - 50 shallow	llow		< 10% none few	ne-few					CL - clay	loam			
50-100 - moderately deep	derately deep		10-30% - соптоп	mmon					SiCl. salty	clay loam			
>100 - dee	deep to very deep		> 30% - many	my					SCT - sand	- sandy clay loam			

SOIL DEFITH
Sh2 - Moderately deep (50-100cm)
Sh3 - Very shallow to shallow (< 50cm)

LAND LIMITATIONS DESCRIPTION AND COMBINATIONS
BEZ - 1000m - 1500m DE - 200ewhat peorly defined to poorly defined to 2 - 1000m DE - 31500m

ROCK OUTCROPS Rc2 - Common Rc3 - Many

SOIL TEXTURE
To - Course texture

SLOPE/TOPOGRAPHY
TZ - Undulating to moderately st
T3 - Steep to very steep

TYPE II : No dry season with a wery pronounced maximum rain produce from the most a single dry month Assimum monthly rainfall occurs during the	period from March to May. TYPE IV : Rainfall is more or Test eemly distributed throughout the season. The type recentlike Type I linke that so dry season.				
: No dry season v period from Ded dry month, Max	period from March to May, 7. Bainfall is more or less ever year. This type resembles T season.		1	11	H S
TYPEII	TYPE II	×		ĐX -	1
CLIMATE TYPE TYPE: Two pronounces eason, dry from November to April and we defining the read their year the years hasdimum rain period is from line to September.	TYPE III 5 No. vvc. y processored markin ma the provist, with a dry and marked markin man benefit to the Apple and the provision which makes the processor to better the benefit of the and when the host processor the property of the and show they assore to a second to the processor to the processor that the processor	Province of Bohol is classified as climatic Type IV. RAINFAIL PATTERS IN CLIMATE TYPE	/	A	165 152 155 art 417 5,5 35, 465 30
0 1	F	å L			

CODE LAND LIMITATION		ATTON	CODE	LAND LIMITATION	8	CODE
11 TZ-E3-Rc2			21	T3-E3-Rc3	Ľ	2
12 T2-E3-Rc3			22	T3-E3-Sh2-Rc3	Ľ	
13 T2 E3 Sh2 Rc3		Rc3	23	T3 E3 Sh3 Rc3	L	Coffe
72-E12			24	T3-E12-E3-Rc2	Ľ	8
15 T2-E12-E3-Rc3		kc3	25	T3-E12-E3-Sh2-Rc3	=	116 Coco
16 T2-E12-E3-Sh2-Rc3		h2-Rc3	56	T3-E12-E3-Sh3-Rc3	12	126
17 T2-F3-D2			22	T3-F3-D1	1-	134 Shru
18 T3]	1
19 T3-E3						
C 0 C 3 C 3 C 5 C 5 C 5 C 5 C 5 C 5 C 5 C 5	١,					

CODE	LAND LIMITATION	CODE	LAND LIMITATION	CODE	M
11	TZ-E3-Rc2	21	T3-E3-Rc3	٠	Pice naddy
12	T2-E3-Rc3	22	T3-E3-Sh2-Rc3	4	Corn
13	T2-E3-Sh2-Rc3	23	T3-E3-Sh3-Rc3	=	Coffee
14	T2-E12	24	T3-E12-E3-Rc2	8	Caran
15	T2-E12-E3-Rc3	25	T3-E12-E3-Sh2-Rc3	116	45
91	T2-E12-E3-Sh2-Rc3	56	T3-E12-E3-Sh3-Rc3	126	Gracoland
17	T2-F3-D2	27	T3-F3-D1	134	Shribland
18	T3				and an order
61	T3-E3				

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

NEGROS ORIENTAL, REGION VII

The particle The		L				L	EX	EXPANSION AREA (Ha)	AREA (Ha.		Ī				CONFL	CONFLICT RESOLUTION (Ha)	JULION CH	(8)			h	
1	PALITY	EXIST	ING CACA	(Ha)	TOTAL EXISTING AREA (Ha)	Cocom	l	Shrubli	and,		land,	Cor		Rice pa non-irri	ddy, şated	Sugarc	a Hile		2	Other cr	84.0	TOTAL POTENTIAL EXPANSION
1 1 2 6 1 2 6 1 2 7 2 7 2 7 2 7 2 7 2 7 2 7 2 2		S1	ZS	S3		S1	25	15	25	SI	ZS.	SI	ZS	SI	2.5	S1	25	SI	25	S1	ZS	AKEA (Ha)
No. 1		Ľ	ľ			778	23	Ī	Ī	6	8	1.146	52	306	2	176	ľ	ŀ	t	t	ŀ	2,653
1		-	3			436	ŀ	74	124	307	1,034	716	233	439	123	44				52	ŀ	3,558
No. No. No.		ľ				ın	ŀ	176				781	62	32	۰	1,705	13			723	ŀ	2,965
March Marc		Ľ				31	18	584	51	1.422	101	3,914	177	85072	23	252	ŀ		ŀ	32	ŀ	8,663
1		Ľ	ľ		Ĺ	432	192	1,905	331	2,236	672	1,322	530	831	303		ľ			ŀ	ı	8,753
1		Ľ	•			192	28	16	12	265	557	69	۰	255	73	98	۰	۰	٠	17.	ŀ	2,533
17. 17.	CANLAON CITY	ľ	٠							329	•	1,646	1,736	1,235	292	29	151				٠	5,959
1	AIVAN	Ľ				971	32	6,851	573	7,834	570	11,416	347	10,056	490	9826	474		ŀ	97	ŀ	49,425
1	HULNGAN	Ľ		20		220	446	183	448	1,821	3,167	731	1.465	589	357	62	45		۰	20	2	9,624
1 1 1 1 1 1 1 1 1 1	TAY.	ľ				1,051	118	28	512	7.5	546	1,986	783	2,596	643	524	18		٠	40	12	9,351
7 7 8 7 10		ľ	٠	٠		961	45	4	٠	٠		672	566	240	ŀ	898	٠	٠	٠	2,867	ŀ	5,488
1	SGITY	Ľ								40		19	١	38	١	169				358	H	947
1		Ľ	ľ	1	1	419	114	36	t	240	09	523	18	157	92	8	ľ			16	ŀ	1,682
1		Ľ				254	216	17	42	460	424	1.018	368	253	34	41	ŀ			ŀ	ŀ	3,161
1		Ľ				325	ŀ	1,319	22	6,702	212	9,643	18	2,980	11	5,622	18		٠	2	ŀ	26,972
1		Ľ		20		338	103	7.3	16	840	140	414	۰	513	۰	707	8		ŀ	45	ŀ	3,198
1		Ľ	ľ			1,494	228	524	350	548	219	3,387	458	1,282	21	092	l		ŀ	H	t	8,894
1 1 1 1 1 1 1 1 1 1		Ľ	ľ			934	26	214	91	8	ľ	588	40	09	ı		ŀ	15	-	H	t	1,603
1	LINA		•			270	38	1,812	184	1,734	441	4,742	186	1,428	202	275						12,611
1 1 1 1 1 1 1 1 1 1						1,192	32	190'1	22	2,106	467	6,610	638	3,722	78	80Z	16			135	2	16,321
3 - 1,2 16 2 15 18 18 18 18 18 18 18 18 18 18 19 6 6 72 22 1 20 18 18 20 96 6 72 22 2 1 20 2 21 2 20 2 2 20 2		1			1	216	9	423	188	1,172	74	160	304	158	15	222	ŀ	·	ŀ	٠	ŀ	3,158
- - - - - - - - - -		3		12	15	168	3	129	3	846	129	1,095	å	099	73	82			۰	8	f	3,259
58 28 - - 238 609 336 414 267 90 19 9 - 2 5 58 68 16 31 - 11 2655 315 208 7 659 - - 1,727 -		ľ	-	•		21	٠	375	63	61	184	386	96	9	·	321	2		·	306	ŀ	1,823
538 68 18 31 11 2,635 315 2,018 7 689 - 1,727	000	ľ				28	28			233	609	308	414	267	90	19	6			2	ın	2,044
	JITA I		7			538	68	18	31		11	2,635	315	2,018	7	629				1,727	1	8,027

AGRONOMIC REQUIREMENT OF CACAO PRODUCTION

TILIZATION	UTILIZATION SUITABILITY TYPE RATING	SLOPE (%)	SOIL DEPTH (cm)	SOILTEXTURE	SOIL DRAINAGE	REACTION (pH)	INHERENT	FLOODING	EROSION	ROCK OUTCROPS	ELEVATION (masl)	ANNUAL RAINFALL (mm)	CLIMATIC
	ıs	89	>100	CL, SICL, SCL, SC, SIC, C, HC	WD,MWD	5.6-7.2	high	none-slight	none-slight	none-few	<1000	2001-4500	I, III, IV
Cacao	ZX	8-30	50-100	FSL, L, SIL	GPD,PD	51-55	medium	moderate	moderate	common	1000-1500	1000-2000	11.11
	N	>30	<50	S, LS, CSL, SL	VPD,ED	<5.0->7.9	low	severe	auanas	many	0051<	<1000	
SLOPE (%)			SOIL DRAINAGE	35		SOIL REACTION (pH)	(pH)		SOIL TEXTURE				
0-3 lev	level to gently sloping		ED -cox	excessively drained		< 4.5 extremely acid	mely acid		Coarse		E.	Fine	
:aff 8	gently sloping to undulating	lating	WD - we	well drained		45 50 very strongly acid	strongly acid		S sand	-	×		day
8-18 -unc	-undulating to rolling		MWD - mx	- moderately well drained		5.1.5.5 strongly acid	gly acid		LS -loar	my sand	S.	SiC - silty clay	39
18-30 -roll	rolling to moderately steep	deep	cos - GdS	 somewhat poorly drained 	_	5.6 6.0 medit	um acid		CSL -coar	rse sandy loam	U		
30 50 steep	dax		PD -po	- poorly drained	-	61 65 slightly acid	dy acid		SI. san	- sandy loam	Ξ	: heavy	clay
> 50 -ver	-very steep		VPD -ve	- very poorly drained	-	6.6 7.2 neutr	Tel.		Medium				
						7.3.7.8 mildt	- mildly alkaline		FSL - fine	fine sandy loam			
SOIL DEPTH (cm)	Œ		SURFACE IMPEDIMENT	EDIMENT		7.9 - 8.4 moderately alkaline	erately alkaline		L -loar	=			
0-30 -very shallow	ry shallow		ROCK OUTCROPS	PS.		>85 stron	strongly alkaline		StL -stlt:	neam			
30-50 sha	-shallow		<10% -none-few	way - agu					CL - clay	-clay loam			
0-100 -mc	50-100 -moderately deep		10-30% - common	иошио					SiCL -silty	- silty clay loam			
> 100 - dec	-deep to very deep		> 30% - many	Aune					SCL - same	ty clay loam			

LAND LIMITATIONS DESCRIPTION AND COMBINATIONS SOIL DRAINGE SOIL DRAINGE

LAIND LIMIT ATTOURS DESC	LAIND LIMITATIONS DESCRIPTION AND COMBINATIONS	
ELEVATION	SOIL DRAINAGE	SOIL DEPTH
El2 -1000m-1500m	D2 - Somewhat poorly drained to poorly drained	Sh2 - Moderately deep (50 - 100cm)
El3 -> 1500m	D3 - Very poorly drained or excessively drained	Sh3 - Very shallow to shallow (< 50cm)
SLOPE/TOPOGRAPHY	SOIL TEXTURE	ROCK OUTCROPS
T2 - Undulating to moderately steep	Tc - Coarse texture	Rc2 - Common
T3 - Steep to very steep		Rc3 - Many

FLOODING
F2 - Moderate seasonal flooding
F3 - Severe seasonal flooding

2	CODE DAME DESTRUCTION CODE DAME DESTRUCTION CODE DAME DESTRUCTION CODE	3	NOTIFIED THE PARTY OF THE PARTY	3	NOTIFIED ONCE	3	NOT THE PARTY OF THE	3	CALL CAPACITY
7	E2 Sh2 Rc2	11	F2-02	21	T2 E3 Sh2 Rc3	31	T3-E3	41	T3-E12-E3-Shi
2	EIZ	12	F3-D2	22	ZI3-Z.L	35	T3-E3-Rc2	- 42	T3-E13
3	E12-E2-Sh2-Rc3	13	Rc2	23	T2-E12-E3	33	T3-E3-Sh2-Rc3	43	T3-E13-E3-Sh:
*	E12-E3-Rc3	77	Sh2	*	T2 E12 E3 Rc2	85	T3-E3-Sh3-Rc2	4	T3-E13-E3-Sh
50	E12-E3-Sh2-Rc3	15	Sh2-Rc2	52	T2 E12 E3 Sh2 Rc2	32	T3-E3-Sh3-Rc3		
9	E12-Rc2	97	T2	97	T2-E12-E3-Sh2-Rc3	36	T3-E12		
4	E12 Sh2 Rc2	- 27	T2-E3	- 22	T2-E13	32	T3-E12-E3		
8	E12 Sh2 Rc3	87	T2-E3-Rc2	87	T2 E13 E3 Sh2 Rc2	38	T3-E12-E3-Rc2		
6	El3	67	T2-E3-Rc3	62	T2-F3-D2	68	T3-E12-E3-Rc3		
10	El3-Sh2-Rc2	20	T2-E3-Sh2-Rc2	30	T3	04	T3-E12-E3-Sh3-Rc2		

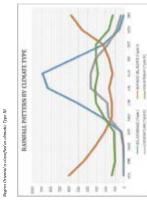
SUITABILITY CLASSES: Highly Situable (1) Individual Langue or south (1) Land Langue or south (1) Land Langue or south (1) Land Langue or south (1) Land Langue or south (1) Landul Langue (1) Landul Langue (1) Landul Langue (1) Landul Langue (1) Landul Langue (1) Langue (

Moderately Suitable (S2) Land having limitation which in a moderately severe for sustained given use; the limitation will redu penefits and increase required in that the overall advantage to be

CLIMATE TYPE TYPEI : Two pronouced

. The promotest across the promotest care a	wet during the rest of the year. Maximum rain period is	from June to September	
٥			

TYPE III : I



LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

SOUTHERN LEYTE, REGION VIII

						EX	ANSION	EXPANSION AREA (Ha)						CONFL	ICT RESC	CONFLICT RESOLUTION (Ha)	Œ				11000
MUNICIPALITY	EXISTD	EXISTING CACAO (Ha)	(Ha)	TOTAL EXISTING AREA (Ha)	Coconut	nut	Shrubland, unmanaged*	land,	Grassland, unmanaged	and,	Corm	F	Rice paddy, non-irrigated	iddy,	Sugarcane	ane	Banana	ma	Other crops	crops	POTENTIAL
	S1	S.S	æ		S1	ZS	S1	25	S1	ZS	1S	25	SI	25	S1	ZS	SI	25	S1	ZS	(eu) vayv
ANAHAWAN	ľ	Ī	·		1,457	ľ	Ī	20	1,457	ľ	122	Ī	ŀ	ŀ	ŀ	Ī	Ī	ŀ	ľ		3,055
COLNOS	14	ľ	3	17	339	ľ	615	178	336	ľ	155	ľ	103	9	ŀ	·	16	ľ	9	S	1,761
CITY OF MAASIN			•		298	965	624	432	867	965	859	422	118	13	٠	٠			6	•	2,202
HINDNANGAN					1,063		222	45	1,063		393	٠	689		٠				•	•	826'8
IINUNDAYAN	ľ	ľ			1,855	ľ	#	ľ	1,855	ľ	248	ľ	523	ŀ	ŀ	Ī	Ī	ŀ	183	ľ	47474
IBAGON	36	1	86	134	357	2	82	18	357	2	30	1	63	۰	ŀ	·	2	ŀ	ľ	•	826
ULOAN			65	29	451	105	2	2	451	105	134	1	22								1,278
LIMASAWA					35		Ī	ŀ	35	·			6	·	·	·	Ī				78
MACROHON	ľ	ľ			698	147	43	179	869	147	156	39	22	e	ŀ	ľ	Ī	ľ	ľ		2,474
MALITBOG	18	3	23	74	212	67	398	300	215	49	66	1	63	43	·		1	3	2	•	1,304
PADRE BURGOS	4	20	34	58	414	16	22	22	414	16	11	22	2	9						•	1,134
PINTUYAN	ŀ				281	•	135	ľ	281						1				44	•	741
SAINT BERNARD	·				1,019	37	569	16	1,019	37	306	ľ	8	·	ŀ	ŀ	Ī	ŀ	ľ		2,794
SAN FRANCISCO	ľ	1	32	36	678	32	99	ľ	678	32	18	ľ	89	٠	ŀ	ŀ	·	ŀ	ľ		£89T
SAN JUAN (CABALIAN)					803			۰	802	١	56	•	22	•	81	٠			11	•	1,848
SAN RICARDO			7	7	327	•	3	•	327						9				2	•	599
SILAGO	1		17	19	1,550	•	1,939	562	1,550	•	989	٠	292		٠				•	•	6,241
SOGOD	•		•		914	•	389	174	914	•	382	•	69	•	•	•	•	•	•	•	2,841
TOMAS OPPUS			22	22	165	•	101	6	165	١	179	9	2	٠	٠	٠			•		189
TOTAL	7.3	25	328	425	13,655	1.063	5.387	1,733	13,655	1.063	3,683	490	1.826	7.1	88	•	21	3	257	2	13,001

SUITABILITY CLASSES:

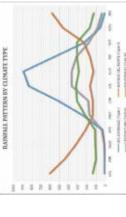


AGRONOMIC REQUIREMENT OF CACAO PRODUCTION

LAND UTILIZATI TYPE	LAND SUITABILITY UTILIZATION RATING TYPE	SLOPE (%)	SOIL DEPTH (ст)	SOIL TEXTURE	SOIL	SOIL REACTION (pH)	INHERENT	FLOODING	EROSION	ROCK OUTCROPS	ELEVATION (mast)	ANNUAL RAINFALL (mm)	CLIMATIC
	S1	8>	>100	CL, SICL, SCL, SC, SIC, C, HC	WD,MWD	5.6-7.2	high	none-slight	none-slight	waj-auou	<1000	2001-4500	t, m, IV
Carcao	SZ	8-30	50-100	FSI, L, Sil.	GA'GAS	51.55	medium	moderate	moderate	сошшоэ	1000-1500	1000-2000	11'11
	S3	>30	05>	S, LS, CSL, SL	VPD,ED	<5.0->7.9	low	severe	severe	mamy	>1500	<1000	
SLOPE (%)			SOIL DRAINAGE		. •	SOIL REACTION (pH)	(Hd		SOIL TEXTURE				
	- level to gently sloping	6/	ED -exc	excessively drained		<4.5 extrer	- extremely acid		Coarse		Œ	Fine	
3-8	- gently sloping to undulating	ulating	WD -we	well drained	4	15 5.0 very s	- very strongly acid		s -sand	_	8		lay
8-18	- undulating to rolling		MWD -mc	moderately well drained	0)	51 55 strong	strongly acid		LS -loan	loamy sand	SIC	silty clay	8
	 rolling to moderately strep 	doots.	SPD -son	somewhat poorly drained			macid		CSL -coar	coarse sandy loam	U	-clay	
30-50	stresp		od- Od	orly drained	9	6.1 6.5 slight	- slightly acid		SI sanc	sandy loam	H	- heavy	day
> 50	- very steep		VPD -vei	- very poorly drained	9	66 72 neutral	æ		Medium				
					7	7.3-7.8 mildly	 mildly alkaline 		FSL -fine	- fine sandy loam			
SOIL DEPTH (cm)	H (cm)		SURFACE IMPEDIMENT	EDIMENT	7	79-84 model	moderately alkaline		L -loan				
0-30	- very shallow		ROCK OUTCROPS	Sc	n	8.5 strong	strongly alkaline		Silsilt1	oatn			
30-50	- shallow		<10% none few	ne - few					CL -clay	-clay loam			
50 100	- moderately deep		10 - 30% - common	nomin					SICL sllty	- silty clay loam			
>100	- deep to very deep		> 30% - many	ny					SCL sanc	sandy clay loam			

CLIMATE TYPE TYPEI : Two pronouced

	wet during the rest of the year Maximum rain period is from June to September	we during the rest of the year, Maximum min period is proof than becambe the Noteury. There is not a single from line to September . The second many mind in course during the period from March in May.
TYPEIII	TYPE III: No very pronounced maximum rain period, with a dry season lasting only from one to three mothls, either during the period from December of behaving or from March to May. This type resembles Type! since it has	TYPE IV : Rainfall is more or less evenly distributed throughout the year. This type resembles Type II since it has no dry season.



LAND LIMITATIONS DESCRIPTION AND COMBINATIONS RELYATION EEG - 1000n-1500n D2 - Samerkis pooly dained to proxyly dained to 32 - 5500n TO 52 - 5500n D3 - 4507 pooly dained or excessively damaged. SOIL TEXTURE To - Course textu SLOPE/TOPOGRAPHY T2 - Undulating to modera T3 - Steep to very steep

CODE

7	race panay, non-impated	711	Sugarcane
4	Corm	116	Coconut
34	Diversified crops	126	Grassland
18	Coffee	134	Shrubland, unmanaged
82	Cacao		
88	Mango		
87	Jackfruit		
16	Barana		
105	Fruit trees, mixed		
107	Abaca		

SOIL DEPTH
Sh2 - Moderately deep (50-100cm)
Sh3 - Very shallow to shallow (<50cm)

ROCK OUTCROPS Rc2 - Common Rc3 - Many

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

CITY OF ISABELA, REGION IX

EXTENT OF SUITABILITY FOR CACAO PRODUCTION BY MUNICIPALITY

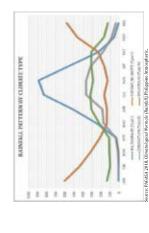
						EXI	NOISNA	AREA (H	0)	ONFLICT	. RESOLU	TION ARE	(Ha)		
MUNICIPALITY	EXISTI	NG CACA	0 (Ha)	TOTAL EXISTING AREA (Ha)	Cocc	oconut	Shrubland unmanaged	land, aged*	Grassland	and, ged*	Corn		Paddy rice, non-irrigated	ice, gated	Other crop	sdo	POTENTIAL EXPANSION
	S1	25	S3		15	25	S1	25	S1	S2	S1	25	51	25	S1	25	AREA (Da)
CITY OF ISABELA	•		•		11,428	926	195	24	•						•		12,604
			•								•		•		•		•
TOTAL	•			•	11,428	926	195	24							ŀ		12,604

SUITABILITY CLASSES:

CLIMATE TYPE
TYPE 1: Von personned steamen, day from November to Ageil and
TYPE 1: No day season with a recyp personned maximum rind
from 1 leave to September to Ageil and
from 1 leave to September to Ageil and
from 1 leave to September to Ageil and
from 1 leave to September to Ageil and
from 1 leave to September to Ageil and
from 1 leave to September to Ageil and
from 1 leave to September to Ageil and
from 1 leave to September to Ageil and
from 1 leave to September to Ageil and
from 1 leave to September to Ageil and
from 1 leave to September to Ageil and
from 1 leave to September to Ageil and
from 1 leave to September to Ageil and
from 1 leave to September to Ageil and
from 1 leave to September to Ageil and
from 1 leave to September to Ageil and
from 1 leave to September to Ageil and
from 1 leave to September to Ageil and
from 1 leave to September to Ageil and
from 1 leave to September to Ageil
from 1 leave to September to Ageil
from 1 leave to September to Ageil
from 1 leave to September to Ageil
from 1 leave to September to Ageil
from 1 leave to September to Ageil
from 1 leave to September to Ageil
from 1 leave to September to Ageil
from 1 leave to September to Ageil
from 1 leave to September to Ageil
from 1 leave to September to Ageil
from 1 leave to September to Ageil
from 1 leave to September to Ageil
from 1 leave to September to Ageil
from 1 leave to Ageil
from 1 leave to Ageil
from 1 leave to Ageil
from 1 leave to Ageil
from 1 leave to Ageil
from 1 leave to Ageil
from 1 leave to Ageil
from 1 leave to Ageil
from 1 leave to Ageil
from 1 leave to Ageil
from 1 leave to Ageil
from 1 leave to Ageil
from 1 leave to Ageil
from 1 leave to Ageil
from 1 leave to Ageil
from 1 leave to Ageil
from 1 leave to Ageil
from 1 leave to Ageil
from 1 leave to Ageil
from 1 leave to Ageil
from 1 leave to Ageil
from 1 leave to Ageil
from 1 leave to Ageil
from 1 leave to Ageil
from 1 leave to Ageil
from 1 leave to Ageil
from 1 leave to Ageil
from 1 leave to Ageil
from 1 leave to Ageil
from 1 leave to Ageil
from 1 leave to Ageil

TYPE III:

Whole part of City of Isabela is classified as climatic Type IV.



AGRONOMIC REQUIREMENT OF CACAO PRODUCTION

LAND UTILIZATION TYPE	SULTABILITY RATING	SLOPE (%)	SOIL DEPTH (cm)	SOIL TEXTURE	SOIL DRAINAGE	SOIL REACTION (pH)	INHERENT	FLOODING	EROSION	ROCK OUTCROPS	ELEVATION (masl)	ANNUAL RAINFALL (mm)	CLIMATIC
	SI	8>	>100	CL, SICL, SCL, SC, SIC, C, HC	WD,MWD	5,6-7,2	high	none-slight	none-slight	waj-auou	<1000	2001-4500	LIII, IV
Cacao	25	8-30	50 - 100	FSL, L, SiL	SPD,PD	5.1-5.5	medium	moderate	moderate	common	1000-1500	1000-2000	1,11
	83	>30	<50	S, LS, CSL, SL	VPD,ED	<5.0 -> 7.9	low	severe	severe	many	>1500	<1000	
SLOPE (%)			SOIL DRAINAGE		. , 0,	SOIL REACTION (pH)	(hd)		SOIL TEXTURE				
0-3 -leve	level to gently sloping		ED -exc	excessively drained	•	c4.5 extre	- extremely acid		Coarse		Ξ	Fine	
3-8 -gen	-gently stoping to undulating	alating	w- we	well drained	٦	L5 5.0 very	very strongly acid		s - sand	-	S		ilay
8-18 -md	undulating to rolling		MWD - mo	moderately well drained	-	51-55 stron	strongly acid		LS -loss	-loamy sand	ŝ	SiC - silty clay	ı.
18-30 noll	 rolling to moderately steep 	steep	SPD - sor	somewhat poorly drained		56 6.0 medi	- medium acid		CSL coa	-coarse sandy loam	U		
30 50 steep	e		od- dd	poorly drained		61-65 slight	- slightly acid		SI san	-sandy loam	H	: heavy clay	lay
> 50 -ver	very steep		VPD -vet	- very poorly drained		5.6 7.2 neutral	Je.		Medium				
						.3-78 mildl	- mildly alkaline		FSL -fine	fine sandy loam			
SOIL DEPTH (cm)	æ		SURFACE IMPEDIMENT	EDIMENT		9 8.4 mode	 moderately alkaline 		L -loam				
0-30 -ver	-very shallow		ROCK OUTCROPS	S	^	.85 stron	 strongly alkaline 		Sit silt	-silt loam			
30 - 50 - shal	-shallow		<10% - nor	-none-few					CL -clay	-clay loam			
50 - 100 moderately deep	derately deep		10 30% common	nom					SiCt silty	silty clay loam			
> 100 - dee	-deep to very deep		> 30% - many	ny.					SCT -san	sandy clay loam			
LAND LIN	IITATIONS	DESCRIP	TIONAND	LAND LIMITATIONS DESCRIPTION AND COMBINATIONS	IONS								
ELEVATION			SOIL DRAINAGE	æ		os	SOIL DEPTH			SOIL EROSION			
El2 -1000m-1500m	1500m		D2 Somev	D2 - Somewhat poorly drained to poorly drained	poorly drained	Sh2	- Moderately o	Sh2 - Moderately deep (50-100cm)			nosion		
El3 -> 1500m			D3 - Very p	-Very poorly drained or excessively drained	ssively drained	Š	- Very shallow	Sh3 - Very shallow to shallow (< 50cm)		E3 -Severe erosion	eion		
SLOPE/TOPOGRAPHY	RAPHY		SOIL TEXTURE	8		RO	ROCK OUTCROPS			FLOODING			
T2 - Undulati	T2 - Undulating to moderately steep	daats	Tc - Coarse texture	texture		Red	Rc2 - Common			72 - Moderate	F2 - Moderate seasonal flooding		
T3 - Steep to	- Steep to very steep					Rei	Rc3 - Many			F3 - Sevene sea	- Severe seasonal flooding		

LIMITATION CODE LANDUSE	T2-E3-Sh2-Rc3 85 Mango	TZ-EIZ-E3-Sh2-Rc2 116 Coconut	T2-E12-E3-Sh2-Rc3 134 Shrubs, unmanaged	T3-E3 137 Rubber	T3-E3-Sh3-Rc3	T3-E12-E3-Sh3-Rc2	T3-E12-E3-Sh3-Rc3	T3-E3-Sh3-Rc3	T3-E12-E3-Sh3-Rc3	
CODE	11 T2-E	12 TZ-E	13 T2-E	14 T3-E	15 T3-E	16 T3-E	17 T3-E	18 T3-E	19 T3-E	
LIMITATION	E2-Sh2-Rc2	EIZ	E12-E3-Sh2-Rc3	E12-Sh2-Rc2	F2-D2	F2-Tc	F3-D2	Sh2-Rc2	T2	49 63
CODE	1	2	3	*	S	9	- 2	8	6	0.1

0.0	nut	ubs, unmanaged	er				
85 Mango	116 Cocos	134 Shruk	137 Rubber				
				_	Ш	_	L
	-Rc2	-Rc3		-Rc2	Rc3	-Re3	

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

ZAMBOANGA CITY, REGION IX

EXTENT OF SUITABILITY FOR CACAO PRODUCTION BY MUNICIPALITY

						EX	EXPANSION AREA (Ha)	AREA (HE	0		O	ONFLICT	RESOLU	TION ARE	A (Ha)		
MUNICIPALITY	EXISTII	NG CACA	0 (Ha)	TOTAL EXISTING AREA (Ha)	Coc	oconut	Shrubland, unmanaged	and,	Grassland, unmanaged*	and,	Corn	_	Paddy rice, non-irrigated	ice, şated	Other crops	sdou	POTENTIAL EXPANSION
	5.1	25	S3		S1	ZS	S1	2.5	S1	25	S1	2.5	S1	25	S1	25	ANEA(Da)
AMBOANGACITY					17,783	2,221	3,742	702	10,589	1,677	3,208	20		۰	•	8	39,949
TOTAL					17,783	2,221	3,742	202	10.589	1,677	3.208	20	ŀ	•	ŀ	8	39,949

SUITABILITY CLASSES:
Highly Suitable (SI), Suitable

Marginally Suitable (53)
And having limitations which in aggregate are
seeve for sustained application of a given use and
will so reduce productivity or benefits, or increase
will so reduce productivity or benefits, or increase
required inputs. But this expenditure will be only
marginally instified. Not Suitable / Not Relevant
Land having limitations which may be surm
in time but which cannot be corrected with
knowledge at currently acceptable cost, the
limitations are so severe as in new-cut-

CLIMATE TYPE

TYPE1 : 1'' repronented session, day from Rovember to dayed and represent own with a representation of the session which session with a representation of the year. Maximum rain period is from just to September to February. There is not a single from just to September to February. There is not a single from just to September to February. There is not a single from just to September to September to Application of Septemb

CLIMATIC LIII, IV Ξ

ROCK ELEVATION ANNUAL OUTCROPS (mast) (mm)

AGRONOMIC REQUIREMENT OF CACAO PRODUCTION

WD,MWD GP, PD

CL, SICL, SCL, SC, SIC, C, HC S, LS, CSL, SL FSL, L, SiL

50-100 <50

8-30 ×30

S æ

Cacao

2001-4500 1000-2000 <1000 >4500

1000-1500 <1000 >1500

common

moderate

medium high

low

<5.0 -> 7.9

VPD,ED

severe

SOIL TEXTURE Coarse

SOIL REACTION (pH)
44.5 certemely acid
45.5.0 very strongly acid
55.4.55 certongly acid
56.4.0 medium acid
61.4.5 cellightly acid
61.4.5 cellightly acid
72.7.2 medium acid
72.7.3 medium acid
72.7.8 medium acid
85.4.0 medium acid
85.5 cellightly acid
85.4.0 medium acid
85.5 cellightly acid
85.8 cellightly acid
85.8 cellightly acid
85.8 cellightly all acid
85.8 cellightly all acid

- excessively drained
- well drained
- moderately well drained
- sonewhat poorly drained
- poorly drained
- very poorly drained

SOIL DRAINAGE
ED -excessiv
WD -well dra
MWD -moderat
SPD -somew!
PD -poorty of

-level to gently sloping
-gently sloping to undulating
-undulating to rolling
-rolling to moderately steep
-steep
-very steep

SLOPE (%) 0-3 -lea 3-8 -ge 8-18 -un 18-30 -ro >50 -ve

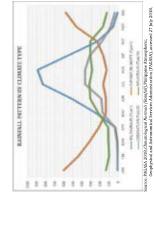
SOIL DEPTH (cm)

0-30 -very shallow
30-50 -shallow
50-100 -moderately deep
> 100 - deep to very deep

TYPE III: No very pronounced maximum rain period, with a dry season in Saing only from one to turne nonths, either during the period from Decomber to February or from March to May. This type resembles Type I since it has

TYPE IV : Rainfall is more or loss evenly distributed throughout the year. This type resembles Type II since it has no dry soason.

sandy clay silty clay clay heavy clay



SOIL DEPTH Sh2 - Moderately deep (50 - 100cm) Sh3 - Very shallow to shallow (< 50cm) Rock outcrops Rc2 - Common Rc3 - Many

LAND LIMITATIONS DESCRIPTION AND COMBINATIONS ROLIBRANGE EET-1000m-1500m DESCRIPTION AND COMPUTATION CONTROL STORM DESCRIPTION TO STORM THE PROPERTY OF THE PR SOIL TEXTURE To Coarse texture SLOPE/TOPOGRAPHY TZ - Undulating to moderately steep T3 - Steep to very steep

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

ZAMBOANGA DEL NORTE, REGION IX

EXTENT OF SUITABILITY FOR CACAO PRODUCTION BY MUNICIPALITY	31LITY	FOR	CACA	O PRODUC	TION B	Y MU	NICIP,	ALITY									
	L					EXP	EXPANSION AREA (Ha)	REA (H:	-			CONFLIC	r resoli	CONFLICT RESOLUTION AREA (Ha)	EA (Ha)		
MUNICIPALITY	EXISTI	EXISTING CACAO (Ha)	O (Ha)	TOTAL EXISTING AREA (Ha)	Coconut	ıı	Shrubland, unmanaged*	and,	Grassland, unmanaged*	and,	Corn	E	Paddy rice, non-irrigated	rice, Igated	Other crops	cops	POTENTIAL EXPANSION
	SI	25	S3		S1	25	S1	25	S1	2.5	S1	SS	S1	SZ	S1	25	акса (на)
BACUNGAN	10	1	33	44	2,518	31	25	9	006	28	160			•		•	3,699
BALIGUIAN	17	18	48	122	1,612	296	278	13	175	465	119	ľ		ľ		ľ	3,257
DAPITAN CITY	ľ				6,398	1,583	649	14	20	83	45	25					8,846
DIPOLOG CITY		٠			5,695	11	144		83		921						6,853
dodos	34	1	22	57	3,042	1,758	3,273	9	768	65	329	32					9,492
GUTALAC	14	18	21	53	3,319	8,181	87	ĽS.	305	1,769	30	19		ľ		ľ	13,813
JOSE DALMAN	ľ	2	33	5	2,815	436	99	98	563	209	557			ľ		٠	4,725
KALAWIT	68	19	10	89	842	10,183		31	99	1,182	128	2,607		•			15,039
KATIPUNAN			11	11	5,156	2	1,357		369		389				۰		7,275
LA LIBERTAD	ľ				1,367	2,600			2	96	133	S		ľ			4,242
LABASON	14	6	4	30	631	4,630		02	17	1,729	47	132				,	7,162
пгол					2,382	2,660	۰	١	106	205	2,738	2,164					10,254
MANUKAN	1		11	17	3,047	16	82	۰	759	78	357						4,414
MUTIA	•	3	1	4	1,297	2,723		194	281	871	43	6					5,417
PIÑAN	ľ		1	1	6,876	2,159	154	30	654	93	155					٠	10,121
POLANCO	3	•	4	7	8,457	321	257	3	733	64	1,751	1			3		11,589
PRES. MANUEL A. ROXAS			12	12	209	,	8		526	,	3,659					,	4,499
RIZAL	•	٠	1	1	2,869	1,237	٠	•	88	,	83	Ī	٠	•	٠	•	4,277
SALUG	14	1	2	17	5,832	1,476	69	198	1,032	96	969	101	•				9,503
SERGIO OSMEÑA SR.	11	٠	17	28	3,345	872	168	156	1,118	142	118	124	,				6,042
SIAYAN	10		40	50	1,097	369	150	354	4,775	991	376	19				,	8,131
SIBUCO			4	4	2,645	260	783	14	3,659	529	125		,		۰		8,315
SIBUTAD		•			2,910	,	141		122	,	94	·	,				3,267
SINDANGAN	9		40	46	4,619	926	286	578	2,314	1,550	2,353	45					12,671
SIOCON	92	•	30	56	5,048	8	495		1,402	85	823	Ì	,			·	7,887
SIRAWAI		•			4,223	303	378	4	610	101	353		,				5,972
TAMPILISAN	13	5	1	19	278	5,941	۲	38	63	386	414	2,881				,	10,001
TOTAL	211	26	365	652	88,927	49,685	698'8	1,862	21,368	10,810	16,983	8,257			3	1	206,764

Delivery of cacao planting materials must be storted on the onset of rainy sec sotablishment of stade trace prior to planting of cacao

AGRONOMIC REQUIREMENT OF CACAO PRODUCTION

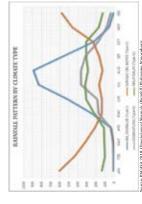
	_			,																	
CLIMATIC	U.III,IV	1,11				clay	ay		clay												
ANNUAL RAINFALL (mm)	2001-4500	1000-2000	<1000		Fine	- sandy clay			- heavy clay												
ELEVATION (mast)	<1000	1000-1500	>1500	-	Œ	SC	SIC	0	HC										rosion		- Moderate seasonal flooding - Severe seasonal flooding
ROCK	none-few	common	many				loamy sand	-coarse sandy loam	- sandy loam		fine sandy loam	_	meo	-clay loam	-silty clay loam	sandy clay loam		SOIL EROSION	E2 - Moderate erosion E3 - Severe erosion	FLOODING	F2 - Moderate seasonal flooding F3 - Severe seasonal flooding
EROSION	none-slight	moderate	severe	SOIL TEXTURE	Coarse	s - sand	LS -loan	CSL -coar	St. sand	Medium	FSL -fine	L -loam	SiL silt loam	CL -clay	SiCL -silty	SCI sand		5		_	
FLOODING	none-slight	moderate	severe																Sh2 - Moderately deep (50 - 100cm) Sh3 - Very shallow to shallow (< 50cm)		
INHERENT	high	medium	low	Ed	- extremely acid	 very strongly acid 	strongly acid	- medium acid	y acid	72	mildly alkaline	moderately alkaline	strongly alkaline					SOIL DEPTH	Sh2 - Moderately deep (50-100cm) Sh3 - Very shallow to shallow (<50c	ROCK OUTCROPS	Rc2 - Common Rc3 - Many
SOIL REACTION (pH)	5.6-7.2	51-55	<5.0->7.9	SOIL REACTION (pH)	<45 extrer	45-50 verys			5.1 6.5 slightly acid	6.6 7.2 neutral	7.3 7.8 mildly	79-84 mode	>8.5 strong					soi	Sh2 Sh3	ROC	Rc2 Rc3
SOIL	WD,MWD	GPD,PD	VPD,ED		•	•	-		,	•			A				IONS		poorly drained ssively drained		
SOIL TEXTURE	CL, SICL, SCL, SC, SIC, C, HC	FSI, L, SIL	S, LS, CSL, SL		 excessively drained 	-well drained	moderately well drained	somewhat poorly drained	- poorly drained	- very poorly drained		EDIMENT	PS PS	me-few	enthon	- many	LAND LIMITATIONS DESCRIPTION AND COMBINATIONS	NGE	D2 - Somewhat poorly drained to poorly drained D3 - Very poorly drained or excessively drained	32	e texture
SOIL DEPTH (cm)	>100	50-100	<50	SOIL DRAINAGE	ED -es	w- um		SPD -sc	DD - Dd	VPD -ve		SURFACE IMPEDIMENT	ROCKOUTCROPS	<10% none few	10 30% - common	>30% -m	TION ANI	SOIL DRAINAGE	DZ Some D3 Very	SOIL TEXTURE	Tc - Coarse texture
SLOPE (%)	8	8-30	>30			lating		steep									DESCRIP				daas
SUITABILITY RATING	IS	25	×		 level to gently sloping 	 gently sloping to undulating 	-undulating to rolling	-rolling to moderately steep	4	-very steep		e	- very shallow	low	-moderately deep	-deep to very deep	IITATIONS		1500m	RAPHY	- Undulating to moderately steep - Steep to very steep
LAND UTILIZATION TYPE		Cacao		SLOPE (%)	0-3 -leve	3-8 -gent			30-50 steep	> 50 -ver		SOIL DEPTH (cm)	0-30 -ver	30 - 50 shallow	50-100 moc	> 100 - deel	LAND LIN	ELEVATION	El2 -1000m-1500m El3 ->1500m	SLOPE/TOPOGRAPHY	T2 - Undulating to mod T3 - Steep to very steep

Marginally Stituble (SS) Land-kovid limitations which aggregate are severe for statistical application of a given use and request for statistical application of a given use and request girtler and the state of the	Net Suitable / Net beforem Lusal break delimination harpet paramountable Lusal break diministra solution part barriera for solution for the break diministra solution for terrorida volution solution for morning control for control for solution for morning minimistra ser so soprer as to preduce automatic solution for break diministration for the solution for the	
SULABILITY CLASSES: [Highly samble (S)] Land home to sufferent intensive to surfamed [John Farger of sufferent meeting to present minimizens [John Farger of Specimen of S	Moderatedy Suitable (S2) ingregate or consequence of consequence o	

CLIMATE TYPE

TYPEII : Me dy season with very prosonanced maximum rain profed from Docomber to February Three is nea a single dry month. Maximum monthly rainfull occurs during the period from March to May.	TVDE IV . Rainfall femore or lace assents dierributed throughout the
TYPE II : Two promotes aceased of your knowmeter in spiral and TYPE II : Not promotes accessed out you want to me period is a period from Jerowine to demand you will have been a set a single from June to September 2.	PURE 11 - No come reconnected maximum retain received width a dear
TYPE	1 302

ern part of Zamboaga Del Norte is classified as climatic Type IV and Northwestern part is Type III.



ource PAGASA 2018 Cimanological Normols (Rainfall), Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), accessed 27 lay 2018, ehttps://www1.pagasadost.govqpl/index.php/climate/climatological-normals--

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

ZAMBOANGA DEL SUR, REGION IX

SUITABILITY CLASSES:
Highly Suttable (S1)
Land laving no significant laphication of a given use, o that will not significantly re-

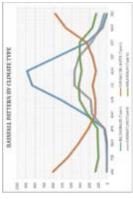
	L					EXP	EXPANSION AREA (Ha)	REA (Ha)				CONF	CONFLICT RESOLUTION AREA (Ha)	UTIONA	REA (Ha)			
MUNICIPALITY	EXIST	EXISTING CACAO (Ha)	(O (Ha)	TOTAL EXISTING AREA (Ha)	Coconut	nut	Shrubland, unmanaged*	nd,	Grassland, unmanaged*	g* 5	Corn		Mango	Bar	Banana	Other crops	crops	TOTAL POTENTIAL EXPANSION
	51	25	23		S1	SZ	S1	25	S1 S	S2 Si	S1 S2	. S1	SZ	21	25	21	22	AREA (Ha)
AURORA	1	Ľ		ī	6,887	1,118	100	7	287	26	1,119	29	Ļ	Ľ	,	ľ		9,676
BAYOG	Ĺ	Ĺ	80	8	199		234	15	3,430	260 1	1,070	,						5,675
DIMATALING	¥	_	9	10	5,214	320	288	2			441			Ĺ				6,303
DINAS	Ľ	Ľ	Ľ		8,515		241		144		382		9	Ľ		5	ľ	10,296
DUMALINAO		37	Ĺ	38	3,594	m	ō	ŀ	403	-	2,856	103	Ļ	Ľ		ľ	ľ	696'9
DUMINGAG	1	Ĺ	19	61	282		133		7,764	85 1	1,228						•	9,491
SUIPOS	Ľ	Ľ	Ĺ		953	19	80	ī	430	- 2	380		L	Ĺ			ľ	3,791
DSEFINA	Ĺ	Ĺ		-	989	702	7	162		135	630 1,	1,167		Ĺ				3,488
UMALARANG	Ľ	Ĺ			1,994	103	10		128	134	886			ľ			•	3,359
ABANGAN	S			8	204		18	H	1,640	. 2	029	L.	L	Ĺ		1		4,483
AKEWOOD	Ĺ	Ľ			2,208	15	126	2	818	65	541	,				æ		3,771
APUYAN	Ľ	Ĺ			7,241	120	413		190	. 1	,155			ľ			•	9,120
MAHAYAG	Ľ	Ľ			2,461		127	ŀ	929	16 2	2,649		L			2		5,920
MARGOSATUBIG	Ĺ	Ľ			4,285	1	191		24		514							5,015
MDSAUP	Ľ	Ľ			69	20	154	H	3,967	182	058	46	L					5,268
TOLAVE	Ľ	Ľ	Ľ		1,877	43	272	ŀ	ī		3,964	88	Ļ	Ľ			ľ	6,243
AGADIAN CITY					4,290	29	205	3	926	17 4	4,245	410						10,174
T0G0				-	3,432	2,292	-	H			241	37						6,001
JAMON MAGSAYSAY		ľ			4,093		49	-	445		.351							5,938
SAN MIGUEL	1	ľ	2	3	4,052	9	113		136	. 1	.186							5,494
SAN PABLO					4,523		-	H	28		166		2					5,545
SOMINOT		ľ		,	1,594	128	89	-	2,569	70	209	32						5,070
ABINA	ľ	ľ			1,111	4,581					00	65			2	55		5,771
AMBULIG	ĺ	ľ	1	1	2,690		1		98	- 2	382,			ĺ	•	٠		5,046
TIGBAO		ĺ			1,659	8	22	19	157	16	1,170	9	1			m		3,162
IUKURAN		·		7	447	•	107		3,617	29 1	1,043	,			•		•	5,245
IINCENZO A. SAGUN	9		7	12	4,285				25	H	149		1		1	Ť		4,460
4044																		

AGRONOMIC REQUIREMENT OF CACAO PRODUCTION

			_																				
CLIMATIC	VI, III, IV	11.11				clay	, fe		clay														
ANNUAL RAINFALL (mm)	2001-4500	1000-2000	<1000		Fine		•																
ELEVATION (mast)	<1000	1000-1500	>1500		Ē	8	Sic	U	HC										rosion	nois		 Moderate seasonal flooding Severe seasonal flooding 	
ROCK OUTCROPS	waj-auou	common	many				-loamy sand	coarse sandy loam	sandy loam		fine sandy loam	_	yam	- clay loam	silty clay loam	sandy clay loam		SOIL EROSION	E2 - Moderate erosion	E3 - Sevene erosion	FLOODING	F2 - Moderate seasonal flooding F3 - Severe seasonal flooding	
EROSION	none-slight	moderate	severe	SOIL TEXTURE	Coarse	S - sand	LS -loam	CSIcoars	St sand	Medium	FSL -fines	L -loam	SiL silt loam	CL -clay	SiCL - silty	SCI sand		o,			ъ.	EE	
FLOODING	none-slight	moderate	severe																sep (50 - 100cm)	Sh3 - Very shallow to shallow (< 50cm)			
INHERENT	high	medium	how	(Hd	- extremely acid	very strongly acid	ty acid	m acid	y acid	2	 mildly alkaline 	moderately alkaline	strongly alkaline					SOIL DEPTH	Sh2 - Moderately deep (50-100cm)	- Very shallow	ROCK OUTCROPS	Rc2 - Common Rc3 - Many	
SOIL REACTION (pH)	5.6-7.2	5.1-5.5	<5.0->7.9	SOIL REACTION (pH)	<4.5 extrem	45 50 verys		56 60 mediumacid	6.1 6.5 slightly acid		7.3.7.8 mildly	79 84 modes	strong					ios	Sh2	Sh3	ROC	Rc2 Rc3	
SOIL	WD,MWD	GA'GAS	VPD,ED	·	٧	4	r.			4	7	7.	۸				ONS		poorly drained	sively drained			
SOIL TEXTURE	CL, SICL, SCL, SC, SIC, C. HC	FSL, L, SIL	S, LS, CSL, SL		excessively drained	well drained	moderately well drained	somewhat poorly drained	poorly drained	very poorly drained		EDIMENT	Sc	ne -few	nount	ny	LAND LIMITATIONS DESCRIPTION AND COMBINATIONS	GE	D2 - Somewhat poorly drained to poorly drained	D3 -Very poorly drained or excessively drained	9	texture	
SOIL DEPTH (cm)	>100	50-100	<50	SOIL DRAINAGE	ED -ex	WD - We	MWD - mc	SPD - so	PD - po	VPD -ve		SURFACE IMPEDIMENT	ROCKOUTCROPS	< 10% - none - few	10-30% - common	> 30% - many	TION AND	SOIL DRAINAGE	D2 -Somes	D3 -Very p	SOIL TEXTURE	Tc -Coarse texture	
SLOPE (%)	8	8-30	>30			lating		steep									DESCRIP					toeb	
SUITABILITY RATING	SI	SI	S3		- level to gently sloping	gently sloping to undulating	-undulating to rolling	-rolling to moderately steep	a	very steep		îi	r shallow	low	denately deep	deep to very deep	IITATIONS		1500m		зарну	T2 - Undulating to moderately steep T3 - Steep to very steep	
LAND UTILIZATION TYPE		Cacao		SLOPE (%)	0-3 -leve	3-8 gent	8-18 unds	18-30 -rolli	30 - 50 steep	> 50 very		SOIL DEPTH (cm)	0-30 -very shallow	30-50 shallow	50 - 100 - moderately deep	>100 - deep	LAND LIM	ELEVATION	El2 - 1000m - 1500m	El3 -> 1500m	SLOPE/TOPOGRAPHY	T2 Undulating to mode T3 Steep to very steep	

Challallon	CODE	LIMIT AT TON	2000	FIMILATION	1000	CIMITATION.	2000	MULATION	5	3000	LANDO
Sh2-Rc2	11	T2	21	T2 B12 B3 Sh2 Rc3	3.1	T3-E12-E3-Rc2	41	T3-E12-E3		4	Corn
	12	T2-E3	22	T2-F2-D2	32	T3-E12-E3-Sh3-Re2	45	T3-E12-E3-Sh3-Rc3		47	Vegetable
E3-Sh2-Re3	13	T2-E3-Rc2	23	T2-F3-D2	33	T3-E12-E3-Sh3-Re3	43	T3-E14		2	Coffee
Rc2	3.6	T2-E3-Rc3	24	T3	34	T3-E13-E3-Sh3-Rc3				82	Cacao
Sh2-Rc2	15	T2 E3 Sh2 Rc2	22	T3-E3	35	T3-F2-D2				85	Wango
Sh2 Rc3	97	T2-E3-Sh2-Rc3	58	T3-E3-Sh2-Rc3	36	T3-F3-D2				87	ackfruit
02	17	T2-E12	27	T3-E3-Sh3-Rc2	32	T3				5	Banana
Tc	81	T2-E12-E3	28	T3-E3-Sh3-Rc3	38	T3-E3				501	105 Fruit trees, mixe
02	16	T2-E12-E3-Rc2	53	T3-812	39	T3-E3-Sh3-Rc3				911	Coconut
-Rc2	20	T2-E12-E3-Sh2-Re2	30	T3-E12-E3	40	T3-E12	L		_	971	126 Grassland
										ĺ	

Modernely Stituble (S2) Modernely Stituble (S2) I and hong innerson which in aggregate are of a manufactured in the through which the statement of a permitted of a manufactured in the statement of the statement of a manufactured in the statement of the statem		that win to significantly reduce productivity or benefits and will not raise inputs above an acceptable level.		win so returns potatativity or netrens, or increase required inputs, that this expenditure will be only marginally justified.
ATE TYPE 1. Two promoted search, dry from Neventher to April and from June 16 Spreader. 1. Two promoted search of your Mazzon into period is from June 16 Spreader. 1. We try, proximated and the first of the fir		Modernely Stiliable (S2) Land having limitation which in aggragate are a medicarriesty were for teamined applications of a genericary were for teamined applications of a genericary teamined the state of the state		Not Salitable / Not Relevant Land hong limitations which may be summontable in time but which entable corrected with extering minimate but which entable corrected with execution minimates at the second as suppressed to execute minimates and execute an opposite of the execution minimates and execution in the given manner minimates used the half of the given manner from the proper and miscellaneous half types and he shall up areas, roads, etc are connidered as not tolerant.
is 1 way consense to a day from November to April and from June to September from June to September from June to September from June to September from June to September from June to September from June to September from June to September from June from Jun	CLIM	ATE TYPE		
ficatio	TYPE1	: Two pronouced season, dry from November to April and wet during the rest of the year. Maximum rain perrod is from June to September		: No dry season with a very pronounced maximum rain period from December to February. There is not a single dry month, Maximum monthly rainfall occurs during the period from March to May.
Entern part of Zumbounga Del Strikelongs in Type III climite chasefactions and the rest on Western part belongs to Type IV.	TYPEIII	1: No very pronounced maximum rain period, with a dry season stating only from one to three months, either ending the specied from December to February or from March do May This type resembles Type I since it has a short dry season.	TYPEIV	; Painfall is more or less evenly distributed throughout the year. This type resembles Type II since it has no dry season.
	Eastern J	pert of Zamboungo Del Sur belongs to Type III climate chassificat	ion and the r	rat on Wessern part belongs to Dyne IV.
	1	RAINDALL PATTERN BY CLINATE Y	344	



LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

ZAMBOANGA SIBUGAY, REGION IX

EXTENT OF SUITABILITY FOR CACAO PRODUCTION BY MUNICIPALITY

						EXI	EXPANSION AREA (Ha	AREA (h	(a)		L	CONFLIC	CONFLICT RESOLUTION AREA (Ha)	UTION AR	(EA (Ha)		
MUNICIPALITY	EXISTI	EXISTING CACAO (Ha)	.0 (Ha)	TOTAL EXISTING AREA (Ha)	Coconut	nut	Shrubland, unmanaged*	land, aged*	Grassland, unmanaged*	land, aged*	3	Corn	Paddy rice, non-irrigated	Paddy rice, on-irrigated	Other	Other crops	POTENTIAL EXPANSION
	S1	SZ	S3		S1	SZ	S1	25	S1	25	S1	SZ	S1	25	S1	25	AREA (na)
AUCIA	8		2	14	3,644	1,029	422	ľ	402	19	1,691	271					7,479
suuc	13	4	19	36	4,028	18	670	20	103	2	1,001	12			2	•	2,856
DIPLAHAN	1	,	2	3	849		436		214		1,849				3		3,351
MELDA	16		13	50	3,008		73	•	322	٠	069				1	٠	4,128
IPIL (Capital)		•			4,673	725	337		178	37	2,688	16			+		8,657
KABASALAN			1	1	3,742	31	352		381	15	839				•		2,360
MABUHAY					1,237	200	•	52			675	184					2,348
MALANGAS	20	3	6	32	5,542	292	110		489		1,510	129			3		8,074
NAGA		•			4,648	1,662	28	12	130	13	832	48	•				7,412
OLUTANGA					139	99	۰	23			6	22	•				256
PAYAO	14	1	4	18	4,942	238	578		33		2,071	148			57		8,066
ROSELLER LIM	3	•	3	7	2,668	63	128		1,016	12	2,174						9,061
SIAY	7	1	4	111	3,265	•	265		1,016		2,594						7,464
FALUSAN					151	477	18	113			132	424					1,344
IITAY	2	1	2	5	6,574	5,183	106	21	170	126	1,480	899					14,328
UNGAWAN	S	1	3	8	9,547	١	371	1	5,652	٠	2,831	·			٠	•	18,402
TOTAL	16	8	99	163	61.658	9 981	4218	240	10.138	225	23.065	1 001			7.1	•	111 586

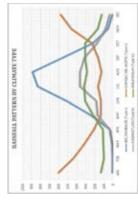
AGRONOMIC REQUIREMENT OF CACAO PRODUCTION

		_	_																			
CLIMATIC	UIIII	11.11				clay	lay		clay													
ANNUAL RAINFALL (mm)	2001-4500	1000-2000	<1000		Fine	- sandy clay																
ELEVATION (masl)	<1000	1000-1500	>1500		Œ	28	Š	U	Ĭ										rosion		- Moderate seasonal flooding - Severe seasonal flooding	
ROCK	none-few	common	many				-loamy sand	coarse sandy loam	sandy loam		fine sandy loam	_	nam	clay loam	silty clay loam	sandy clay loam		SOIL EROSION	E2 - Moderate erosion E3 - Severe erosion	FLOODING	F2 - Moderate seasonal flooding F3 - Severe seasonal flooding	
EROSION	none-slight	moderate	severe	SOIL TEXTURE	Coarse	purs-	S -loan	SL -coar	T -sand	Medium	-Stfine	-loam	Sil silt loam	CL - clay	ict. silty	SCI sand		s		24	E E	
FLOODING	none-slight	moderate	severe		•	0.	-	•	vi	~	_	_	0.	_	0.	0.			- Moderately deep (50 - 100cm) - Very shallow to shallow (<50cm)			
INHERENT	high	medium	low	EE.	- extremely acid	-very strongly acid	- strongly acid	- medium acid	y acid	74	- mildly alkaline	- moderately alkaline	strongly alkaline					SOIL DEPTH	Sh2 - Moderately deep (50 - 100cm) Sh3 - Very shallow to shallow (<50c	ROCK OUTCROPS	Rc2 Common Rc3 Many	
SOIL REACTION (pH)	5.6-7.2	5.1-5.5	<5.0->7.9	SOIL REACTION (pH)	<4.5 - extrer	45-50 verys	5.1-5.5 strong	5.6 6.0 mediu	6.1-6.5 slightly acid	66-7.2 neutral	7.3.7.8 mildly	7.9-8.4 model	> 8.5 strong					SOI	Sh2 Sh3	ROC	RG RG	
SOIL DRAINAGE	WD,MWD	dd'dds	VPD,ED		,	*	r.		9	9	7	7	٨				ONS		poorly drained sively drained			
SOIL TEXTURE	CL, SICL, SCL, SC, SIC, C, HC	FSL, L, SIL	S, LS, CSI, SL	H	 excessively drained 	well drained	moderately well drained	somewhat poorly drained	poorly drained	 very poorly drained 		EDIMENT	SA SA	ne-few	moon	uny	LAND LIMITATIONS DESCRIPTION AND COMBINATIONS	GE	D2 - Somewhat poorly drained to poorly drained D3 - Very poorly drained or excessively drained	æ	e texture	
SOIL DEPTH (cm)	>100	50-100	<50	SOIL DRAINAGE	ED -ex	WD - W	m- DWM	SPD - so		VPD -ve		SURFACE IMPEDIMENT	ROCK OUTCROPS	<10% - none - few	10 30% common	> 30% - many	TION AND	SOIL DRAINAGE	D2 - Some D3 - Very	SOIL TEXTURE	Tc - Coarse texture	
SLOPE (%)	8	8-30	>30			fating		deeps									DESCRIP				toob	
SUITABILITY RATING	IS	25	83		- level to gently sloping	- gently sloping to undulating	- undulating to rolling	- rolling to moderately steep	d-	- very steep		e	- very shallow	low	- moderately deep	deep to very deep	IITATIONS		1500m	RAPHY	- Undulating to moderately steep - Steep to very steep	
LAND UTILIZATION TYPE		Cacao		SLOPE (%)	0-3 -leve	3-8 -gent	8-18 -und		30 50 steep	> 50 - very		SOIL DEPTH (cm)	0-30 very	30 50 shallow	50-100 -mod	> 100 - deep	LAND LIN	ELEVATION	El2 -1000m-1500m El3 ->1500m		T2 - Undulating to mode T3 - Steep to very steep	

CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION
-	E2-Sh2-Rc2	11	T2-E3-Rc3	21	T3-E3-Rc2	31	T3-E3-Rc3
2	El2	12	TZ-E3-Sh2-Rc2	22	T3-E3-Sh2-Rc3	325	T3-E3-Sh3-Rc3
3	E12-Sh2-Rc2	13	T2 E3 Sh2 Rc3	23	T3-E3-Sh3-Rc2	EE	T3-E12-E3
4	E12-Sh2-Rc3	34	T2-E12	54	T3-E3-Sh3-Rc3	34	T3-E12-E3-Sh3-Rc3
S	F2-D2	15	T2-E12-E3	22	T3-E12	32	T3-E13
9	F3-D2	97	T2 E12 E3 Sh2 Rc2	97	T3-E12-E3		
2	Sh2-Rc2	- 22	T2 E12 E3 Sh2 Rc3	- 22	T3-E12-E3-Sh3-Rc2		
8	T2	18	T2-F2-D2	28	T3-E12-E3-Sh3-Rc3		
6	T2-E3	- 67	73	53	T3		
2.0	T2 E2 E03	02	63 64	UE	T2 E2		

	Nurginally Statistics of the control	Next Statuble / Not Resident / Not Statuble / Not Resident / Land brough limitations which may be summountable and the brought limitations with a corrected with exerting immensions as a control or supplied to the resident sustained as of the limitation of the sub-resident of the limitation of the li
SUITABILITY CLASSES:	Highly variable (S.) Land knotte per significant function to sustrained the first per significant function to mandous the results of all green the scalenty request mandous the first of all green the scalenty request mandous the first of all first or first per significant function and exceptable level.	Moderates Statishie (SS). Land having limitation which in aggregate are moderately expert for standard application of a great process. The standard application of a great use; the immediate will reduce producity or given use; the immediate will reduce producity or that the exact and administing to the imperiated from the use, although stall attractive, will be applicated from the inferrior to that expected on class SI land.

CLIMA	CLIMATE TYPE		
TYPEI	TYPEI : Two protouced seesand day from November to April and work during the rest of the year Maximum rain period is from June to September	TYPEII	TYPEII: S for season with every promonented maximum rain period from December to Feleramy. There is not a single dry month, Maximum monthly rainfall occurs during the period from March to May.
TYPE III :	No very pronounced maximum rain period, with a dry season lasting only from one to three months, other draining the period from December 10 february or from March to May This type resembles Type I since it has	TYPEIV	Paniall is more or less evenly distributed throughout the year. This type resembles Type II since it has no dry season.



LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

BUKIDNON, REGION X

EXTENT OF SUITABILITY FOR CACAO PRODUCTION BY MUNICIPALITY

						EXE	EXPANSION AREA (Ha)	AREA (Ha	ءِ					CONFLIC	T RESOL	CONFLICT RESOLUTION AREA (Ha)	REA (Ha)				
MUNICIPALITY	EXIST	EXISTING CACAO (Ha)	O (Ha)	TOTAL EXISTING AREA (Ha)	Coconut	nut	Shrubland, unmanaged*	land,	Grassland, unmanaged*	land, aged*	Corm	F	Sugarcane	cane	Banana	ana	Veget	Vegetables	Other	Other crops	POTENTIAL EXPANSION
	S1	22	S3		S1	S2	S1	25	S1	S2	S1	25	S1	SZ	S1	S2	S1	25	S1	25	AKEA (Ha)
BAUNGON	49	16	18	83	1,392	30	ŀ	1	1,992	2,047	4,740	2,591		ŀ	41	10			88	34	12,966
VBANGLASAN	2	•		10	•	٠	217	198	6	290	2,280	4,453	1						66	40	7,586
CITY OF MALAYBALAY					79	96	83	84	1,135	2,985	1,895	8,139			1,871	14,286					30,653
CITY OF VALENCIA		•			6	٠	331	1,416	376	778	2,371	6,134	2,201	183	1,988	2,922			7.5	•	18,781
DAMULOG	12	•	9	18	798	4	4		84	•	202	28					7,675	158			8,954
DANGCAGAN			·		163	253	ŀ			٠	4,441	165	×t*		·			92	ľ		5,052
DON CARLOS	9			9	95	١	199	9	19	41	2,216	84	10,201	802			22		510	•	14,245
IMPASUG-ONG			28	28	,	572	3	366	134	1,142	19	5,032				581				1,779	679'6
KADINGILAN	13	1	2	17	28	1	6	3	3,268	579	5,614	137	7.2	19			1				6,503
KALILANGAN	•	8	4	15	ľ	23	3	212	۰	-	806'2	269'6	386	811	•	1					14,008
KIBAWE					1,207	237	42	2	46	ľ	3,596	734	1,415	511	43	•	1,829	31	1	2	669'6
KITAOTAO	6	1	14	24	433	4	•	167	121	1,174	2,580	256	\$69'9	267	•		28	4		•	11,758
LANTAPAN	•		ŀ		ľ	١	١	376	٠	146	1,615	12,264	263	45	272	73			ľ		15,054
JBONA		-	2	*	200	529	101	288	32	1,532	312	420	•	•	95	10,576	•	•	•	•	14,417
MALITBOG			1	1	633	586	344	864	386	266	498	1,408				738					6,854
MANOLO FORTICH	•	1	2	9	169	477	339	736	299	1,733	5,247	8,345				342			466	424	18,900
MARAMAG	9	6	S	21	524	13	169	430	909	382	2,964	380	5,035	5,194	-	358	108	•	235	233	16,630
PANGANTUCAN	6	4	54	29	3	131	74	42	۰	62	2,740	7,301	1,768	4,488	•	1,177				2	17,805
JEZON	2	•	9	7	11	7	7.1	•	1,061	2,495	83	240	13,646	282			957	2			18,861
SAN FERNANDO	30	15	41	98	•	3	111	216	1,832	2,028	1,579	2,166			40	32					200'8
SUMILAO		•					110	423	12	2,129	245	817	•		•	42		•	113	5,132	9,023
TALAKAG	•	28	10	89	3,674	7,858	39	086'6	329	6,503	243	5,430		١		14				4,522	38,591
TOTAL	140	114	026	707	10.069	10055	03.00	16112	11702 36761		20127 00001	76106	41.605	12.650	4.254	21 152	10.656	200	1 504	12167	216.076

AGRONOMIC REQUIREMENT OF CACAO PRODUCTION

5	SLOPE (%)	SOIL DEPTH	SOIL TEXTURE	SOIL	SOIL	INHERENT	FLOODING	EROSION	ROCK	ELEVATION	ANNUAL	CLIMATIC
		î			(hd)		Common of the last	-		((mm)	:
	89	>100	CL, SICL, SCL, SC, SIC, C, HC	WD,MWD	5.6-7.2	high	none-slight	none-slight	none-few	<1000	2001-4500	I, III, IV
	8-30	50-100	FSL, L, SIL	Qd'QdS	5.1-5.5	medium	moderate	moderate	common	1000-1500	1000-2000	=;
	>30	<50	S, LS, CSL, SL	VPD,ED	<5.0->7.9	low	severe	severe	many	>1500	<1000	
		SOIL DRAINAGE	ļu.	,	SOIL REACTION (pH)	(hd)		SOILTEXTURE				
-level to gently sloping		ED - exc	 excessively drained 	*	:45 -extre	extremely acid		Coarse		E	ine	
ulatin	50	WD -we	well drained		45 5.0 very:	strongly acid		S - sand	9	8	•	day
-undulating to rolling		MWD - mo	- moderately well drained		11.5.5 strong	gly acid		LS -loar	loamy sand	S	SiC silty clay	33
-rolling to moderately steep	,	SPD son	somewhat poorly drained		16 6.0 medit	um acid		CSL -coa	rse sandy loam	O	•	
		PD - poc	- poorly drained		51 65 slight.	dy acid			sandy loam	Ξ		clay
		VPD -ver	very poorly drained	9	x6-7.2 neutr.	Til.		Medium				
				10	73 78 mildly	y alkaline		FSI fine	- fine sandy loam			
		SURFACE IMPEDIMENT	EDIMENT	15	79 - 84 moderately alkaline	rrately alkaline		L -loar	-loam			
		ROCK OUTCROPS	8	А	strong strong	 strongly alkaline 		St silt	- silt loam			
		< 10% - none - few	ne-few					CL -clay	/ loam			
		10 - 30% - common	moun					SiCL silts	clay loam			
> 100 - deep to very deep		> 30% - many	my					SCL sam	dy clay loam			

SOIL DEPTH Sh2 - Moderately deep (50-100cm) Sh3 - Very shallow to shallow (<50cm) ROCK OUTCROPS Rc2 - Common Rc3 - Many LAND LIMITATIONS DESCRIPTION AND COMBINATIONS BIR STORM STORM DESCRIPTION AND COMBINATIONS BIR STORM STORM DESCRIPTION STORM DESCRIPTION OF THE ST SLOPE/TOPOGRAPHY T2 - Undulating to moderat T3 - Steep to very steep

LANDUSE	ا	Coffee	30	eamole	Mango	Banana	
CODE	P C	11	32 Cacao	34 Pin	35 Max	H Bar	
S	L	Ľ				Ľ	L
CODE LIMITATION	T3-E12-E3-Sh3-Rc3	Z T3-E13-E3	3 T3-E13-E3-Rc3	T3-El3-E3-Sh3-Rc3			
CODE	7 IS	52 T	53 T	75			ŀ
CODE LIMITATION O	T3-E13-E3	T3-E13-E3-Rc2	T3 E13 E3 Sh3 Rc2	T3-E13-E3-Sh3-Rc3	T3	T3-E3	0 0 0 0 0 00
CODE	41	42	43	44	45	46	
CODE LIMITATION	T3-E3	T3-E3-Sh2-Rc3	T3-E3-Sh3-Rc2	T3-E3-Sh3-Rc3	T3-E12	F3-E12-E3	0 0 00 000 000
CODE	31	32	33	34	35	36	200
CODE LIMITATION	T2-E12-E3	T2-E12-E3-Rc2	TZ-E12-E3-Rc3	T2 E12 E3 Sh2 Rc2	T2-E12-E3-Sh2-Rc3	T2-E13-E3	o a ou ou ou
CODE	12	22	23	\$7	25	92	000
LIMITATION	E13-E3-Sh2-Rc3	E13-Rc2	EI3-Sh2-Rc2	Sh2-Rc2	T2	T2-E3	0 0 00 00
CODE	11	12	13	14	15	97	,
LIMITATION	E2 Sh2 Rc2	EIZ	E12-E3-Rc3	E12-E3-Sh2-Rc3	E12-F2-D2	E12-Rc2	0 0 0 0 0
CODE	1	2	3	*	2	9	

Ī	31	T3-E3	Ŧ	T3-E13-E3	2	T3-E12-E3-Sh3-Rc3	4	Com	119	č
	35	T3-E3-Sh2-Rc3	42	T3-E13-E3-Rc2	25	T3-E13-E3	18	Coffee	126	ق
	33	T3-E3-Sh3-Rc2	43	T3-E13-E3-Sh3-Rc2	23	T3-E13-E3-Rc3	85	Cacao	134	ŝ
te2	34	T3-E3-Sh3-Rc3	44	T3-E13-E3-Sh3-Rc3	24	T3-E13-E3-Sh3-Rc3	8	Pineapple	137	2
tc3	35	T3-E12	45	T3			88	Mango		L
	36	T3-E12-E3	46	T3-83			16	Barrana		L
	32	T3-E12-E3-Rc2	42	T3-E3-Sh3-Rc3			105	Fruit trees mixed		_
302	38	T3: E12: E3: Sh2: Rc3	48	T3-E12			112	Sugarcane		L
803	68	T3-E12-E3-Sh3-Rc2	49	T3-E12-E3			115	Mixed crops		L
	04	T3-E12-E3-Sh3-Rc3	20	T3-E12-E3-Rc3			116	Coconut		

SUITABILITY CLASSES:
Highly Suitable (S), Su

Marginally Suitable (53)
Land having littlations which in aggregate are
severe for sustained application of a given use and
will so reduce productivity or benefits or increase
required inputs, bast this expenditure will be only
marginally justified.

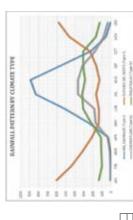
Moderately Sultable (S2)
Land hange planited on which signification which are distributed by the sultable of the planet of a planet with a sultable of the sul

CLIMATE TYPE

TYPE 1: Not personed season day from November to April and
TYPE 11: Not grosson with a very pronounced maximum riming the season of the season with a very pronounced maximum riming from the season of the season s

TYPE III: No very pronounced maximum rain period, with a dry assessing a legislation of the firms emoths, either during the period from December to February or from March to May, This type resembles Type I since it has a short dry sesson.

TYPE IV: Rainfall is more or less evenly distributed throughout the year. This type resembles Type II since it has no dry season.



urce: PAGNA 2018. Climanological Normals (Ranfall), Philippine Atmospheric.
Geophysical and Astronomical Services Administration (PAGNS), accessed 27 July 2018.
4 Ultys: // www.i.pagesa.dost.govalp/index.plp/.climate/.climatological-normals--.

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

CAMIGUIN, REGION X

EXTENT OF SUITABILITY FOR CACAO PRODUCTION BY MUNICIPALITY

					L	Ð	EXPANSION AREA (Ha)	AREA (Ha	-			CONFLIC	CONFLICT RESOLUTION AREA	TIONARE	A (Ha)		
MUNICIPALITY	EXIST	EXISTING CACAO (D(Ha)	TOTAL EXISTING AREA (Ha)	Coo	Coconut	Shrubland, unmanaged	Shrubland, mmanaged*	Grass	Grassland, innanaged*	e5	orn	Paddy rice, non-irrigated	rice, igated	Other crops	suous	POTENTIAL EXPANSION
	S1	7.S	S3		S1	2.5	S1	2.5	81	2.5	S1	25	S1	25	S1	25	Anna (tila)
CATARMAN	•	ľ	•	-	1,979	450	ľ	•	51		•	٠	•	•			2,444
GUINSILIBAN					283				34								621
MAHINOG	•		1	-	812	ľ		•	22		52		•	٠			862
MAMBAJAO			1	1	2,516	495			64	٠	7.5	41					3,172
SAGAY		Ľ	1	1	502	423			28	•	56	3					1,015
TOTAL	•	ľ	3	4	9629	1369	Į.		181	١	125	44					8,115

SUITABILITY CLASSES:

Highly suitable (SI)

and along to significant limitation to
papiestane of genera use, or only min
that well not significantly reduce profit
benefits and not significantly reduce profit
accordinate level.

Marginally Suitable (53)
Land having limitations which in aggregate are
severe for sustained application of a given use and
will so reduce productivity or benefits, or increase
will so reduce productivity or benefits, or increase
uppending plays that this expenditure will be only
marginally instified.

CLIMATE TYPE
TYPE 1: You promoted season duy from November to April and
TYPE 11: No dry osson with a very presented maximum rinis
From Lime to September to Referrancy, There must a mittable
from Lime to September with Maximum min period in
September 1 - November 1

TYPE III:

TYPE IV : Rainfall is more or less evenly distributed throughout the year. This type resembles Type II since it has no dry season.

RAINGAL PATTERN BY CLIMATE TYPE

AGRONOMIC REQUIREMENT OF CACAO PRODUCTION

LAND UTILIZATION TYPE	LAND SUITABILITY UTILIZATION RATING TYPE	SLOPE (%)	SOIL DEPTH (ст)	SOIL TEXTURE	SOIL	SOIL REACTION (BH)	INHERENT	FLOODING	EROSION	ROCK	ELEVATION (masl)	ANNUAL RAINFALL (mm)	CLIMATIC
	1S	8	>100	CL, SICL, SCL, SC, SIC, C. HC	WD,MWD	5.6-7.2	high	none-slight	none-slight	mone-few	<1000	2001-4500	I,III,IV
Cacao	Di	8-30	50 - 100	FSI, L, SIL	GA'GAS	5.1-5.5	medium	moderate	moderate	сошшол	1000-1500	1000-2000	117
	B	>30	<50	S, LS, CSL, SL	VPD,ED	<5.0->7.9	low	severe	severe	many	>1500	<1000	
SLOPE (%)			SOIL DRAINAGE		. 8	SOIL REACTION (pH)	E E		SOIL TEXTURE				
0-3 -lea	-level to gently sloping	_	ED - exc	- excessively drained	7>	< 4.5 extremely acid	nely acid		Coarse		E	ine	
3-8	- gently sloping to undulating	llating	WD -we	-well drained	*	4.5 - 5.0 - very strongly acid	trongly acid		S sand	-	88		day
8-18 -m	adulating to rolling		MWD - mo	- moderately well drained		5.1.5.5 strongly acid	gy acid		LS -loar	loamy sand	B	SiC - silty clay	36
	-rolling to moderately steep	steep	SPD - sor	 somewhat poorly drained 		5.6-6.0 medium acid	m acid		CSI - coa	-coarse sandy loam	U	- clay	
30-50 -ste	-steep		PD -po	- poorly drained	.9	6.1 6.5 slightly acid	y acid		SI. san	-sandy loam	Ī	C - heavy	clay
> 50 -ve	-very steep		VPD ver	- very poorly drained	99	5 7.2 neutra	N N		Medium				
					72	7.3 7.8 mildly alkaline	r alkaline		FSL - fine	fine sandy loam			
SOIL DEPTH (cm)	Œ		SURFACE IMPEDIMENT	EDIMENT	7.5	79-84 mode	-moderately alkaline		L -loam	=			
0-30 -very shallow	ary shallow		ROCK OUTCROPS	8	×	-8.5 -strong	 strongly alkaline 		Silsilt	- silt loam			
30 - 50 shallow	allow		<10% -none-few	ne-few					CL - clay	- clay loam			
50-100 -m	50-100 -moderately deep		10 30% common	попп					SiCL silty	silty clay loam			

LAND LIMITATIONS DESCRIPTION AND COMBINATIONS BLEVATION SOIL DEAIL DEAIL NO.

1 4	-1000m -1500m ->1500m		D2 D3	Somen Very p	that poor	- Somewhat poorly drained to poorly drained - Very poorly drained or excessively drained
LOPE/7	SLOPE/TOPOGRAPHY		SOIL	SOIL TEXTURE	ш	
3 -1	- Undulating to moderately steep - Steep to very steep	deats	Te	- Coarse texture	texture	
CODE	LIMITATION	CODE	LIMITATION	r	CODE	LIMITATION
1	E2-Sh2-Rc2	11	T3-E3-Sh3-Rc2		21	2
24	E12 Sh2 Rc2	12	T3-E3-Sh3-Re3	l		
3	F2 Tc	13	T3-E12			
*	Sh2-Rc2	14	T3-E12-E3-Sh3-Rc2	rc2		
5	TZ	15	T3-E13-E3-Sh3-Rc2	23		
9	T2-E3-Sh2-Rc2	16	T3	r		
- 2	T2-E3-Sh2-Rc3	- 21	T3-E3-Sh3-Rc3			
8	T2-E12	18	T3-E12			
6	T2-E12-E3-Sh2-Re2	19	T3-E12-E3-Sh3-Rc3	23		
				ŀ		

m) 50cm)			
SOLL DEPTH Sh2 - Moderately deep (50-100cm) Sh3 - Very shallow to shallow (<50cm)	ROCK OUTCROPS Rc2 - Common Rc3 - Many	LANDUSE Paddy rice, irrigated	
SOIL Sh2	ROC Rc2 Rc3	CODE	

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

LANAO DEL NORTE, REGION X

EXTENT OF SUITABILITY FOR CACAO PRODUCTION BY MUNICIPALITY

						EXP	EXPANSION AREA (Ha)	AREA (Ha	-			CONF	CONFLICT RESOLUTION (Ha)	OLUTION	(Ha)		
MUNICIPALITY	EXIST	EXISTING CACAO (Ha)	10 (Ha)	TOTAL EXISTING AREA (Ha)	Coconut	nut	Shrubland, unmanaged*	land, aged*	Grassland, unmanaged*	land,	Corn	e.	Rice paddy, non-irrigated	addy, igated	Other crops	crops	POTENTIAL EXPANSION
	SI	ZS	S3		S1	ZS	S1	SZ	SI	25	S1	25	SI	2.5	S1	SZ	AREA (Ha)
BACOLOD					6226		٠				191	•	466				10,396
BALOI					1,425	•	211				8528	117	1,863				11,914
BAROY					6,664						704		377				7,744
LIGAN CITY	159	ø	313	476	7,812	1,288	2,502	1,074	2,328	1,229	430	365	20	20			17,119
KAPATAGAN		ľ	•		7,111	252	30	•	6	•	3,268	•	1,348	2			12,023
KAUSWAGAN	Ī				10,062	483	09	25	Ī	ľ	285	75	252	3	Ī	·	11,275
KOLAMBUGAN	Ī	ľ			4,941	ľ	ľ	ľ	Ī	ľ	99	ľ	122	ľ	ľ	ľ	5,777
	ľ	ľ			2,346	ľ	ľ	ľ	ľ	ľ	4,282	ľ	2,385	ľ	ľ	ľ	9,013
LINAMON		Ĺ			2,701	•	7	ľ	Ī	•	153	•	19				2,879
MAGSAYSAY		Ľ	•		188'9	217	٠	•	Ī	•	•						7,098
MAIGO	3	•	7	10	8,885	3	46			٠	39		2,045				11,018
MATUNGAO	•	•	-	1	689	8	41	36	•	•	2,651	333	159	•	•	•	3,922
MUNAI					926	3,704	2	1,594			363	1,411	87	205			8,323
NUNUNCAN					3,388	1,871	145	184	22	522	288	168	•	2			6,621
PANTAO RAGAT		6	•	2	•	986	54	1,016			265	3,011	11	115			5,409
PANTAR		11	20	31			321	189	•	10	618	1,701	98	59			3,418
POONA PIAGAPO		18	25	43	2,448	265	131	537			1,647	2,284	42	12			869'L
SALVADOR	•				8,521				130	•	3,552	•	009		•	•	12,803
SAPAD	Ī				6,416	120	2	Ī	Ī	•	4,557	1	823		ľ		11,917
SULTAN NAGA DIMAPORO	Ī				6,921	2,697	ľ	19	ľ	2.2	1,839	086	1,722	221	ľ		14,470
TAGOLOAN	1	_	22	24	1,575	105	467	770	317	44	692	268'2	98	227			7,253
TANGCAL	ľ	Ĺ	•		2,531	539	۰	7	ľ	•			7	•	•		2,784
TUBOD		ľ	•		18,523	247	٠			•	345	•	197				19,312
TOTAL	97.5	•	000	000	*****		A. A. A. A.			A. M. A.	M.A.S		00000		Ī		

AGRONOMIC REQUIREMENT OF CACAO PRODUCTION

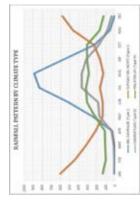
LAND UTILIZATION TYPE	ON RATING	SLOPE (%)	SOIL DEPTH (cm)	SOIL TEXTURE	SOIL DRAINAGE	SOIL REACTION (pH)	INHERENT	FLOODING	EROSION	ROCK OUTCROPS	ELEVATION (masl)	ANNUAL RAINFALL (mm)	CLIMATIC
	S1	8>	>100	CL, SICL, SCL, SC, SIC, C, HC	WD,MWD	5.6.7.2	high	none-slight	none-slight	none-few	<1000	2001-4500	I,III,IV
Cacao	22	8-30	50-100	FSL, L, SIL	GPD,PD	5.1-5.5	medium	moderate	moderate	common	1000-1500	1000-2000	11.11
	S3	>30	<50	S, LS, CSL, SL	VPD,ED	<5.0->7.9	low	severe	severe	many	>1500	<1000	
SLOPE (%)			SOIL DRAINAGE	35		SOIL REACTION (pH)	(ht)		SOILTEXTURE				
0-3	level to gently sloping	th.	ED -ex	 excessively drained 		< 4.5 extremely acid	smely acid		Coarse		Œ	ine	
3-8	-gently sloping to undi-	ulating	WD - we	well drained	*	45.50 very:	strongly acid		s -sand	-	8		ilay
8-18	-undulating to rolling		MWD - mc	- moderately well drained		5.1-5.5 strongly acid	ugy acid		LS -loan	-loamy sand	ði	Sic salty clay	6
18-30	 rolling to moderately steep 	rsteep	SPD - so	somewhat poorly drained	_	5.6 6.0 medii	- medium acid		CSL -coar	-coarse sandy loam	U	- clay	
30-50	-steep		PD - po	 poorly drained 	-		-slightly acid		St sanc	sandy loam	Ĩ	HC - heavy	day
> 20	very steep		VPD -ve	- very poorly drained	-	6.6-7.2 neutral	Te.		Medium				
							 mildly alkaline 		FSI fine	- fine sandy loam			
SOIL DEPTH (cm)	H (cm)		SURFACE IMPEDIMENT	EDIMENT	• •	79 84 mode	 moderately alkaline 		L -loam				
0 30	-very shallow		ROCK OUTCROPS	PS		>85 stron	 strongly alkaline 		Silsilt1	-silt loam			
30-50	-shallow		< 10% none few	ne-few					CL -clay	-clay loam			
20 100	 moderately deep 		10 30% common	пошн					SiCL -silty	silty clay loam			
> 100	-deep to very deep		> 30% - many	any					SCL sank	sandy clay loam			

Ā	LAND LIMITATIONS DESCRIPTION AND COMBINATIONS	SDE	SCRIPTION,	SOM	MBINATION	•				
ELEVA	ELEVATION		SOILD	SOIL DRAINAGE			SOIL DEPTH	HL		S
EIZ	-1000m -1500m		D2	Somewhat	-Somewhat poorly drained to poorly drained	y drained		foderately	Sh2 - Moderately deep (50-100cm)	E E E
E 2	-> 1500m		D3	Very poort	-Very poorly drained or excessively drained	drained	A-	ery shallo	Sh3 - Very shallow to shallow (< 50cm)	2
SLOPE	SLOPE/TOPOGRAPHY		TIOS	SOIL TEXTURE			ROCK OF	ROCK OUTCROPS	_	H
21	- Undulating to moderately steep	y steep	Tc.	Tc -Coarse texture	am		Rc2 - Common	nommo		FZ
13	- Steep to very steep						Rc3 - Many	famy		23
CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION	CODE
1	E2-Sh2-Rc2	11	T2	21	T2 E12 E3 Sh2 Rc3	31	T3 E12 E3 Rc2	41	41 T3-E12-E3	4
2	EIZ	12	T2-E3	22	T2 El3 E3 Sh2 Rc2	32	T3 E12 E3 Sh2 Rc3	42	42 T3-E12-E3-Sh3-Rc3	18
3	El2-E3-Rc3	13	T2-E3-Rc3	23	23 T2-F2-D2	33	T3-E12-E3-Sh3-Rc2	43	43 T3-E13	82
4	E12-Rc2	#	T2 E3 Sh2 Rc2	*	T2-F3-D2	*	T3-E12-E3-Sh3-Rc3			116
S	E12-Sh2-Rc2	15	T2 E3 Sh2 Rc3	52	13	32	T3-E13-E3-Sh3-Rc2			126
9	El2-Sh2-Rc3	91	T2-E12	97	T3-E3	36	T3-F2-D2			134
2	FZ-DZ	21	T2-E12-E3	22	T3-E3-Sh2-Rc3	37	T3			
8	F2-Tc	18	T2 E12 E3 Rc2	87	T3-E3-Sh3-Rc2	38	T3-E3			
6	F3-D2	19	19 T2-E12-E3-Rc3	53	29 T3-E12	39	T3-E3-Sh3-Rc3	П		
10	10 Sh2-Rc2	20	20 TZ-EIZ-E3-Sh2-Rc2	Н	30 T3-E12-E3	40	40 T3-E12			

SUITABILITY CLASSES. Highly Suitable (S) The state of t

CLIMATE TYPE TYPE1 : Two pronouceds

TYPEII: No dry season with a very pronounced maximum rain period from becomber to Pebruary. There is not a single dry noorth, Maximum monthly rainfall occurs during the period from March to May.	TYPE IV; Rainfall is more or less evenly distributed throughout the year. This type resembles Type II since it has no dry season,
TYPE: 1 : Two protocuted season dry from November to April and well during the rest of the years Maximum rain period is from June to September .	TYPE III : No very pronounced maximum rain period, with a dry season lasting only from one to three months, either during the period from December to February or from Narth to Nath. Tist type resembles Type I since it has a short (fly season.
TYPE	TYPE



LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

MISAMIS OCCIDENTAL, REGION X

EXTENT OF SUITABILITY FOR CACAO PRODUCTION BY MUNICIPALITY

MUNICIPALITY						*****	COLUMN TO THE PARTY OF THE PART										:
	XISTING	EXISTING CACAO (Ha)	(Ha)	TOTAL EXISTING AREA (Ha)	Coconu	nut	Shrubland, unmanaged*	and,	Grassland, unmanaged	d,	Сол	_	Paddy rice, non-irrigated		Other crops		POTENTIAL
ľ	S1	SZ	23		S1	25	S1	25	S1	25	. IS	SZ	S1 S	. ZS	S1 S	SZ AREA	AKEA (Ha)
ALORAN					3,656	222	41	24			65						4,090
BALIANGAO	2			2	3,922						544						4,467
BONIFACIO					3,417	384	69	•	10		2,282						6,143
CALAMBA	2			5	4,236	106			489	4	164						5,000
CLARIN					2,942	17	•	3	43	24	252	22					3,302
CONCEPCION					101	236			16	246	9	982					1,770
DON VICTORIANO CHIONGBIAN					47	513	•	146		87	-	292					1,361
ZENEWEZ					2,496	586	6	•	101		96						2,993
LOPEZ JAENA					6,899	132	49		32		275	2					7,395
OROQUIETA CITY	3			3	7,664	420					117						8,201
OZAMIS CITY					9,035	29		ī	33	18	1,727	198					11,067
PANAON					2,317	138					88						2,544
PLARIDEL	1			1	4,919	28					1,038	8					6,024
SAPANG DALAGA	2		1	3	7,190	442	3	-	157		6-4	36					7,895
SINACABAN	2			2	3,475	532			45	68	32						4,174
TANGUB CITY	1			1	6,165	297	54	2	43	22	3,169	101					888'6
TUDELA	٠	-	•		4,148	713	•	•	2	24	43	•			•		4,930
TOTAL	16	•	7	17	72,631	4,911	204	176	1,053	248	1666	1,727					91,242

Delivery of cacao planting materials must be started on the onset of rainy season.
 *establishment of shade trees prior to planting of cacao.

AGRONOMIC REQUIREMENT OF CACAO PRODUCTION

LAND UTILIZATIO TYPE	LAND SUITABILITY UTILIZATION RATING TYPE	SLOPE (%)	SOIL DEPTH (ст)	SOIL TEXTURE	SOIL DRAINAGE	SOIL REACTION (pH)	INHERENT	FLOODING	EROSION	ROCK OUTCROPS	ELEVATION (masl)	ANNUAL RAINFALL (mm)	CLIMATIC	
	SI	8	>100	CL, SICL, SCL, SC, SIC, C, HC	WD,MWD	5.6-7.2	high	none-slight	none-slight	none-few	<1000	2001-4500	L, III, IV	
Cacao	23	8-30	50-100	FSL, L, SIL	GA'GAS	51-55	medium	moderate	moderate	common	1000-1500	1000-2000	11.11	
	83	>30	<50	S, LS, CSL, SL	VPD,ED	<5.0 -> 7.9	low	severe	severe	many	>1500	<1000		
SLOPE (%)			SOIL DRAINAGE	P		SOIL REACTION (pH)	(Hq		SOIL TEXTURE					
0-3 -1	level to gently sloping	50	ED - cxx	 excessively drained 	*	<4.5 extren	 extremely acid 		Coarse		Œ	Fine		
3-8 -1	gently sloping to und	ulating	WD -we	-well drained	4	45-50 very strongly acid	trongly acid		S -sand		SS		lay	
8-18 -1	8-18 - undulating to rolling		MWD - mc	moderately well drained		5.1 5.5 strong	- strongly acid		LS -loan	-loamy sand	SIC	: silty clay		
18-30 -r	- rolling to moderately steep	daes.	SPD - soi	somewhat poorly drained		5.6 - 6.0 medium acid	macid		CSI coar	coarse sandy loam	O	-clay		
30-50 -s	- steep		od - Do	- poorly drained	9		-slightly acid		SI. sand	sandy loam	Ĭ	: - heavy o	lay	
> 20	- very steep		VPD -vet	very poorly drained	9	6.6 7.2 neutral	-		Medium					
					17	73-78 mildly	-mildly alkaline		FSL fine	- fine sandy loam				
SOIL DEPTH (cm)	(m)		SURFACE IMPEDIMENT	EDIMENT	17	79-84 moder	-moderately alkaline		L -loan	_				
0-30 -very shallow	very shallow		ROCK OUTCROPS	28	^	8.5 strong	strongly alkaline		Silsiltl	-silt loam				
30-50 shallow	shallow		< 10% - none - few	ne-few					CL clay	loam				
50-100 -1	50-100 - moderately deep		10 30% common	mmon					SICL silty	- silty clay loam				
> 100	> 100 - deep to very deep		> 30% - many	any					SCT sand	y clay loam				

LAND LIMITATIONS DESCRIPTION AND COMBINATIONS REINATION SOLIDBANAGE EL - 1000m - 1300m DE - 200ment poorly defined to peorly dealed EE - 3100m DE - 3100m

Common section Fig. 2 Common section Fig. 2 Common section Fig. 3 Common section	SLOPE	SLOPE/TOPOGRAPHY		SOIL TEXTURE	TURE			ROCKOD	ROCK OUTCROPS		
LIMITATION CODE LIMITATION CODE LIMITATION CODE LIMITATION CODE LIMITATION CODE LIMITATION CODE LIMITATION CODE		 Undulating to moderate Steep to very steep 	ely steep	Tc -Q	oarse texto	a.i.		Rc2 -Cc Rc3 -M	nomnon		
Product	CODE	· [CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION	COL	JE JE	LANDUS
10 10 10 10 10 10 10 10	Į	E2-Sh2-Rc2	11	T2-E3	21	T2-F3-D2	31	T3	1	_	Corn
BDASANA, B. TALESANA, B. TALES	~	EIIZ	12	T2-E3-Rc2	22	T3	32	T3-E3	8	П	Coffee
No. No. No. P. P. P. P. P. P. P.	8	E12-Sh2-Re2	13	T2-E3-Sh2-Rc2	23	T3-E3	33	T3-E3-Sh3-Rc3	88	П	Cacao
Brisqueta 15 Targe 25 Targe 35 Targe 35 Targe 35 Targe 35 Targe 34	*	EI3	97	T2-E3-Sh2-Rc3	24	T3-E3-Sh3-Rc2	316	T3-E12	11		Coconut
P.P.17	'n	El3-Sh2-Rc2	15	T2-E12	22	T3-E12	35	T3-E12-E3	12	$\overline{}$	Grassland
Prp	9	F2-D2	16	T2-E12-E3	26	T3-E12-E3	36	T3-E12-E3-Sh3-Rc3	13		Shrubs, unmanage
SIAZ 1/8 TZ-RIS 2/9 TZ-RIS 3/8 1/2 1/2 TZ-RIS 2/9 TZ-RIS 3/9 1/2 2/9 TZ-RIS 3/9 1/2 4/9 1/2 2/9 TZ-RIS 4/9 4/9 4/9	8	F3-D2	- 11	T2 E12 E3 Sh2 Rc2	22	T3-E12-E3-Sh3-Rc2	32	T3-E13	13		Rubber
\$12-16.2	8	Sh2	18	T2-E13	28	T3-E13	38	T3-E13-E3-Sh3-Rc3		_	
T2 20 T2-F2-D2 30 T2-F3-D2 40	6	Sh2-Rc2	67	T2-E13-E3-Sh2-Rc2	59	T3-E13-E3-Sh3-Rc2	39	T3-E13		H	
	10	T2	20	T2-F2-D2	30	T3-F3-D2	40	T3-El3-F3-D2	L	H	

	Naturally Statistics of a comparison of the co	Most skillable / Not Resistable / Most skillable / Most
SUITABILITY CLASSES:	Highly with the SCI state of the SCI sta	Moderary-Shitable (2) Moderary-Shitable (2) Moderary-Shitable (2) Land bandy limiting which is aggregate as moderately sever for seasonad upplication of a given user the limiting word for seasonad in pairs of the extent that the vortal admining to be gained from the me, although still attractive, will be approached inferior to that expected on class S1 lands.

CLIMATE TYPE TYPEI : Two pronouced s

period from December to February, There is not a single dry month. Maximum monthly rainfail occurs during the period from March to May.	TYPE.W.; Schinfil is more or less evenly distributed throughout the year. This type recembles Type II since that no day season.	small part in the Western side is climate Type IV.	
wer during the rest of the year. Maximum rain perfed is from June to September	TYPE III: No very peneurosed maximum rain period, with a dry season latentig only from one to the re-months, ether during the pend from the example, states that the drop of their becember to belongry or from Narth o May. Thist up the resemble Type I since it has a short dry season.	Almost while part of Mannis Octabental classified as chimate. Type III and small part in the Western side is climate Type IV	BANNSALI DRITTERN IN' CLIMATE TTPER BANNSALI DRITTERN IN' CLIMATE TTPER BERNOON OF THE PROPERTY OF THE PART

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

MISAMIS ORIENTAL, REGION X

EXTENT OF SUITABILITY FOR CACAO PRODUCTION BY MUNICIPALITY	ILITY	FOR	ACAO	PRODUC	TION	3Y MUI	VICIPA	LITY									
						E	KPANSION	EXPANSION AREA (Ha)				CON	LICT RESC	CONFLICT RESOLUTION (Ha)	Ha)		10000
MUNICIPALITY	Existi	Existing Cacao (Ha)	(Ha)	TOTAL EXISTING AREA (Ha)	Coc	Coconut	Shrubland, unmanaged*	land, aged*	Grassland, unmanaged*	land, aged*	ŭ	Corn	IEW .	Mango	Other Crops	sdou	POTENTI EXPANSIC
	S1	25	83		S1	SZ	S1	S2	S1	25	S1	ZS	1S	25	S1	25	AKEAS (H
ALUBIJID	1	٠	1	2	849	393	161	371	99	316	3,160	26		•			5,5
BALINGASAG	3	1		*	2,215	929	12	192	33	28	2,240	443					5,5
BALINGOAN	2			3	1,406	26	1	207	177	1,136	197	3					3,1
BINUANGAN					757						21						
CAGAYAN DE ORO CITY	ĭ			1	3,282	429	447	212	869	264	3,485	578	8	4			701
CITY OF EL SALVADOR					355	949	30	327	14	223	3,277	1,260					9'
CLAVERIA	٠	2	1	3	497	1,473	22	1,064	•	303	2,898	7777			·		16,0
GINGOOG CITY					11,283	3,526	470	244	22	347	1,120	1,626					19,1
GITAGUM				•	345	•	45			2	2,444	•					2,8
INITAO			1	1	2,903	1,071			15	٠	525						4,5
JASAAN	1	•	1	2	1,721	•	14				1,057	•					2,7
KINOGUITAN	2			2	2,295	107	٠	21	3	314	222	48					3,0
LAGONGLONG	2			2	200				3	٠	509						1,1
LAGUINDINGAN	1			1	125				576		2,561						2,0
LIBERTAD		·			822				40	8	826						1,0
LUGAIT	٠	1	1	2	408	1,025	00	2	52	•	•	•	•	•	•	•	17
MAGSAYSAY	ī			1	2,304	•	539		323		386						3,5
MANTICAG	1	1	•	2	1,407	1,523	4	51	82	19	09	9					3,1
MEDINA					1,311	1,045	•	54		82	2	1					2,
NAMMAN	2	1		3	1,374	922	*	19	5-4096	5-40962966683	101	2	•				27
OPOL		1	1	2	424	174	99	469	302	2,654	893	543					5,5
SALAY	1	•	1	2	1,077	207	•	48	•	531	31	40	•				1,5
SUGBONGCOGON	2			3	1,320	341				376	28	69					2,1
TAGOLOAN	1			1	445	14	68	2	41	7	833	51					17
TALISAYAN					817	221	840	198	186	229	203	8					2,7
VILLANUEVA	•	1	1	2	442	19	12	٠	6	2	995	208					1,5
TOTAL	22	7	7	36	40,681	13,846	2,498	4,485	2,400	7,341	27,772	14,671	80	7			113,7

114. (Ha) 110N (

Note: Delivery of excao planting materials must be started on the onset of rainy season.

AGRONOMIC REQUIREMENT OF CACAO PRODUCTION

ROCK ELEVATION ANNOUN CLIMATIC CLIMATIC (mast) (mm) (mm)	t none-few <1000 2001-4500 I, III, IV	common 1000-1500 1000-2000 I, II	many >1500 <1000 >4500	RE	Fine	sand SC sandy clay	SiC	Э	sandy loam HC heavy clay		-fine sandy loam	-loam	slit loam	- clay loam	-silty clay loam	sandy clay loam
CLASS	none-slight	moderate	severe	SOIL TEXTURE	Coarse	s s	FS ST	CSL	TS	Medium	FSL	7	SIL	G.	SiCI	SCI
FLOODING	none-slight	moderate	severe													
INHERENT	high	medium	low	(hd)	emely acid	strongly acid	ngly acid	ium acid	rty acid	Tal	ly alkaline	 moderately alkaline 	 strongly alkaline 			
REACTION (pH)	2.6-7.2	5.1-5.5	62<-05>	SOIL REACTION (pH)	< 4.5 extremely acid	4.5 5.0 very	51 55 stror	5.6-6.0 medi	61 65 sligh	6.6 7.2 neuti	7.3 7.8 mildly alkaline	79 84 mod	>85 stroi			
SOIL	WD,MWD	GA'GAS	VPD,ED							-						
SOIL TEXTURE	CL, SICL, SCL, SC, SIC, C, HC	FSI, L, SIL	S, LS, CSL, SL	. #	- excessively drained	well drained	 moderately well drained 	 somewhat poorly drained 	- poorly drained	- very poorly drained		EDIMENT	PS	ne-few	mmon	any.
SLOPE (%) SOIL DEPTH (cm)	>100	20-100	05>	SOIL DRAINAGE	ED -ex	WD -w	MWD - m.	os- das	PD - pc	VPD -vc		SURFACE IMPEDIMENT	ROCK OUTCROPS	<10% -none-few	10 30% common	> 30% - many
SLOPE (%)	8>	8-30	>30			dating		deets								
UTILIZATION SUITABILITY TYPE TYPE	IS	ZS	SS		-level to gently sloping	gently sloping to undulating	- undulating to rolling	rolling to moderately steep	da	-very steep		(H)	-very shallow	allow	- moderately deep	- 100 - deep to very deep
UTILIZATION		Cacao		SLOPE (%)	0-3 -lev	3-8	8-18 -une	18-30 -rol	30-50 steep	> 50 -ver		SOIL DEPTH (cm)	0-30 -ver	30-50 -shallow	50-100 -mo	> 100 - dec

SOIL EROSION
E.2. - Moderate erosion
E.3. - Severe erosion
FLOODING
F.2. - Moderate sessonal flooding
F.3. - Severe sessonal flooding

CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION
1	E2 Sh2 Rc2	11	E13 Sh2 Rc2	2.7	T2-E12	31	T3	41	T3 E12 E3 Sh3 Rc3	25	T3-E12-E3-Rc3
2	ElZ	12	F2-D2	22	T2-E12-E3	32	T3-E3	42	T3-EI3	25	T3-E12-E3-SH3-Rc3
3	EIZ-EZ-Rc3	13	F2-Tc	23	T2-E12-E3-Rc2	33	T3-E3-Sh2-Rc3	43	T3-E13-E3	53	T3-E13
*	EIZ-EZ-ShZ-Rc3	14	F3-D2	24	T2-E12-E3-Rc3	34	T3-E3-Sh3-Rc2	444	T3-E13-E3-Sh3-Rc2	54	T3-E13-E3-5h3-Rc3
5	EIZ-E3-Rc3	15	Sh2-Rc2	52	T2-E12-E3-Sh2-Rc2	32	T3-E3-Sh3-Rc3	45	T3-F3-D2	22	T3-E13
9	E12-E3-Sh2-Rc3	91	T2	56	T2-E12-E3-Sh2-Rc3	36	T3-E12	46	T3	56	Tc
2	E12-Rc2	17	T2-E3	- 22	T2-E13	33	T3-E12-E3	47	T3-E3		
8	E12-Sh2-Rc2	18	T2-E3-Rc3	- 28	T2-E13-E3-Sh2-Rc2	38	T3-E12-E3-Rc2	48	T3-E3-Sh3-Rc3		
6	El2-Sh2-Rc3	61	T2-E3-Sh2-Rc2	62	T2-F2-D2	33	T3-E12-E3-Sh2-Rc3	49	T3-E12		
10	513	20	T2-E3-Sh2-Rc3	30	T2-F3-D2	40	T3-E12-E3-Sh3-Rc2	20	T3-E12-E3		

Marghally Sitishle (SS) Land baring littinistics which in aggregate are sever for stacking the gilder of a given use and will so relate productivity or benefits, or will so reduce productivity or benefits, or increase required inputs, that this expenditure will be only marginally justified.	Not Sultable / Not Relevant be termomable to the sultable / Not Relevant be termomable to the sultable in the best of the sultable out the model of the sultable out the minimistors are so sever as to previous successful assultable out the sultable sure of the sult in the goven manner. Susting forces, shridning greater than 18% doing minimistors are so sever as to previous successful and the sultable support that 18% doing minimistors are suffered to the sultable support that 18% doing minimistors are suffered to the sultable support that the sultable subject is not referent,
SUITABILITY CLASSES: Highly Stitubel (Class) Lad brings as galferant teminion to constanted publication of a green or only name imminions that well not algorithm of the control publication of a green or configuration or breaders and suit of the configuration	Medicately Saitable (52) Latel Laving limitation which it agargate are to a latel Laving limitation which it agargate are of a great over the fathering of process or each fathering and process required layers to the content that it overall advantees to be gained from the attempt and the correlative will be appreciably inferior to that expected or class 31 land.

CLIMATE TYPE TYPE: 1 'No promote case day from Kovenber to April an TYPE: 1 'No promote case day from Kovenber to April an TYPE: 1 'No promote case day from Kovenber to April an Forest from December to Releasing Three was a might from Jine to Stypenioser April 2 - Apr

Period from Nurth to May,

TYPE III: No very presenced maximum rata period, with a day

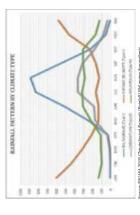
TYPE IV: Platinid is now or less evenly distributed introgeous the

Annea de May in the presented to referring or from

Season.

Nurth de May in they recentible 1 yes I since it has
a shorted by soon.

rt of Misamis Oriental is classified as climatic Type III and North Eastern part is climatic Type IV.



LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

COMPOSTELA VALLEY, REGION XI

EXTENT OF SUITABILITY FOR CACAO PRODUCTION BY MUNICIPALITY

					L	EX	PANSION.	EXPANSION AREA (Ha)		r			٥	ONFLICT	RESOLU	CONFLICT RESOLUTION AREA (Ha)	EA (Ha)				
MUNICIPALITY	EXISTI	EXISTING CACAO (Ha)	(Ma)	TOTAL EXISTING AREA (Ha)	Cocc	Coconut	Shrubland, unmanaged*	and, ged*	Grassland, unmanaged*	ged*	Banana	- Ba	Corn	_	Oil palm	4	Mango	08	Other crops	crops	POTENTIAL
	S1	25	S3	,	S1	25	S1	SZ	S1	25	S1	SZ	S1	25	21	25	S1	25	S1	25	AREA (Ha)
COMPOSTELA		ľ	ľ		2,326	ľ	78	19	18	t-	3,760	ŀ	1,133	r	43			ľ	29	•	7,457
IAK	63	1	18	111	10,778	740'61	3,515	5,699	1,455	1,051	292	268	711	403				ľ			41,019
ABINI		,			2,356	8	83	ŀ	250	792	1,223		٠	۰							4,712
ACO		ľ	Ĺ		4,367	3	157	2.1	157	1,805	1,197	۰	254	۰	۰	ľ	۰	•	2	•	2,966
ARAGUSAN		,			ľ			200				22	٠	۰						14	692
MAWAB		ľ	Ĺ		2,794	34	672	۰	954	810	785	2	1,229	22		ľ	21	•	21	•	7,326
ONKAYO	207	61	281	548	12,096	268'2	2,053	ŀ	626	1,411	2,239	۰	285	۲	7.1	ľ			6	•	21,797
MONTEVISTA		,			2,093	58139	460	18	185	162	1,037	1	15	7				2	2	2	10,118
NABUNTURAN		ľ	ľ		8,356	193	195	ŀ	202	476	292	19	7.5	r	182	٦	1		8	•	10,969
JEW BATAAN	15	ĺ	12	63	5,921		388	ŀ	20	240	116	H	306	۰		۰		Ī			7,022
PANTUKAN		,			6,798		06	99	313	1,763	1,153	216	123	۰			51		51		10,621
TOTAL	350	19	311	722	57,884	27,842	169'2	3,065	5,026	8,517	13,040	098	4,425	415	596	٦	7.3	2	124	15	129,275

SUITABILITY CLASSES:



Moderates Statible (SS, Statish

CLIMATE TYPE
TYPE: Two promoused season, dry from November to April and word during the tree of the year. Maximum rain period is from lare to September.

TYPE III: No very pronounced maximum rain period, with a dry season listing to prior on the remote season listing the period from December to Repure sether during the period from December to Repurary or from Narria to May, This type resembles Type I since it has a short day season.

TYPE IV : Rainfall is more or less evenly distributed throughout the year. This type resembles Type II since it has no dry season.

RAINFALL PATTERN BY CLIMATE TYPE

AGRONOMIC REQUIREMENT OF CACAO PRODUCTION

Check St. Check St.	Coo SS (SS (SS (SS (SS (SS (SS (SS (SS (S	(cm)	(cm) SOIL TEXTURE	DRAINAGE	(pH)	FERTILITY	CLASS	CLASS	OUTCROPS	(masl)	(mm)	TYPE
State Stat	(%) - Invest to greatly slopping permit should be promitted from the promit should be promitted and the promitted promitted the promitted promitted than the promitted promitted than the promitted		CL, SICL, SCL, SC, SIC, C, HC	WD,MWD	5,6-7,2	high	none-slight	none-slight	wel-euou	<1000	2001-4500	I, III, IV
Si Si Si CSC, Si CSC, Si VPDED CSC Si Si Si Si Si Si S	(%) - tower to grantly despite the control and contro		FSL, L, SiL	Od'0dS	51.55	medium	moderate	moderate	сошшол	1000-1500	1000-2000	1,11
SOUTH DRAWING SOUTH DRAWIN	§ E		S, LS, CSL, SL	VPD,ED	<5.0 -> 7.9	low	severe	severe	many	>1500	<1000	
Levels generally obliging ED conveying dental 6.45 -convey partle Course partle Fine general specific controllation WD -very dental 5.155 -very groundly and 15.55 -very partle 15.5 -very partle 15.6 -very partle 15.6 -very partle 15.6 -very partle 15.7 -very partle	Ē	SOIL DRAI	VAGE		SOIL REACTION (E.		SOIL TEXTURE				
Second content	<u> </u>	ED	 excessively drained 	•		nely acid		Coarse		E	ne	
	£	WD	- well drained	4	15.50 verys	trongly acid		s - san	_	86		clay
Fig. 1 Fig. 2 F	18-30 - rolling to moderately steep 30-50 - steep 550 - very steep 500. DEPTH (cm) 0-30.	MWD	 moderately well drained 		1 5.5 strong	dy actd		LS - loar	ny sand	Š		ı,
PD - pondy-dathed 64,-45 - slighely scale S1 - sandy-loam HC	30-50 -steep > 50 -very steep SOIL DEFTH (cm)		 somewhat poorly draines 			macid		CSL - coa	se sandy loam	0		
VID - very poorly drained 64-72. entertain Medium SIRRACE MYERDMENT 72-73. entertain FIS. SIRRACE MYERDMENT 72-54. entertain FIS. SIRRACE MYERDMENT 73-84. entertain FIS. CLUM - nome-few very	SOIL DEPTH (cm)	PD	- poorly drained	,		y acid			ly loam	Ī		clay
12-20	SOIL DEPTH (cm)	MPD	 very poorly drained 	•		78						
STRIPACE INFORMENT 729-84 - molecularly alkaline L ROCKOUTGORY 749-84 - molecularly alkaline SL CUN	SOIL DEPTH (cm)			15		alkaline		•	sandy loam			
ROCKOUTODINS	n=30 -vorsechallour	SURFACE	MPEDIMENT	15		ately alkaline		L -loar				
(10% roune-few CL epp 10-30% common SQL epp >30% roung SQL	and the second second	ROCK OUT	ROPS	А		dy alkaline		Silsilt	oam			
- moderately deep 10-39% - common S/CL - deep to very deep > 30% - many S/CL	30-50 -shallow	< 10%	-none - few						loam			
-deep to very deep > 30% - many SCL		10-30%	-common					SICL -sllty	clay loam			
		> 30%	- many						ty clay loam			

LAND LIMITATIONS DESCRIPTION AND COMBINATIONS

ELEVATION	SOIL DRAINAGE	SOIL DEPTH	SOIL EROSION
El2 -1000m-1500m	D2 - Somewhat poorly drained to poorly drained	Sh2 - Moderately deep (50 - 100cm)	E2 - Moderate ero
El3 ->1500m	D3 -Very poorly drained or excessively drained	Sh3 - Very shallow to shallow (< 50cm)	E3 -Severe erosio
SLOPE/TOPOGRAPHY T2 - Undulating to moderately stoop T3 - Steep to very steep	SOIL TEXTURE Te - Coarse texture	ROCK OUTCROPS Rc2 - Common Rc3 - Many	FLOODING P2 - Moderate sea F3 - Severe season

. Marina maria	Con	terrame mass.	2000	The state of the s	2000	Tables America	2000	Contract and Contract of	June		5	distribute t	Con	
LIMITATION	CODE	MILATION	CODE	MILLION	CODE	MILLION	CODE	MOLLYTIME	CODE	MILITARION	3	LANDUSE	COD	TOWN
E2 Sh2 Rc2	11	F2-D2	2.1	Z13-Z.L	31	T3-E3-Rc2	- 41	T3-E13-E3-Sh3-Rc2	23	T3-E13	~	Uplandrice	126	Grassland
EIZ	12	F3-D2	22	T2-812-83	32	T3 E3 Sh3 Rc2	- 45	T3-E13-E3-Sh3-Rc3	25	T3-E13-E3-Sh3-Rc3	*	Corn	127	Pasture
E12-E2-Sh2-Rc3	13	Sh2	23	T2-E12-E3-Rc2	33	T3-E3-Sh3-Rc3	43	T3	83	T3-E13	81	Coffee	134	Shrubs, unmana
E12-E3-Sh2-Rc3	14	Sh2-Rc2	24	T2-812-82-10-2T	34	T3-E12	9.9	T3-E3			82	Cacao	137	Rubber (T.)
E12 Rc2	15	T2	25	T2-812-83-8c3	35	T3-E12-E3	45	T3-E3-Rc3			88	Otrus, calamansi	136	Falcata
El2-Sh2-Rc2	16	T2-E3	26	T2-E13	36	T3-E12-E3-Rc2	46	T3-E3-Sh3-Rc3	Г		85	Mango	H	
El2 Sh2 Rc3	17	TZ-E3-Rc2	22	TZ-E13-E3-Sh2-Rc2	32	T3-E12-E3-Sh2-Rc3	42	T3-E12			16	Banana		
E13-E3-Sh2-Rc3	18	T2-E3-Rc3	28	T2-E13-E3-Sh2-Rc3	38	T3-E12-E3-Sh3-Rc2	89	T3-E12-E3			100	Fruit trees, mixed		
El3 Sh2 Rc2	19	T2-E3-Sh2-Rc2	56	T3	36	T3-E12-E3-Sh3-Rc3	- 49	T3-E12-E3-Rc3			116	Coconut		
El3-Sh2-Rc3	20	TZ-E3-ShZ-Rc3	30	T3-E3	40	T3-E13	20	T3-E12-E3-Sh3-Rc3			110	Oil palm		

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

DAVAO CITY, REGION XI

EXTENT OF SUITABILITY FOR CACAO PRODUCTION BY MUNICIPALITY

						EXI	ANSION A	REA (Ha	_				J	ONFLICT	RESOLUT	YON ARE.	A (Ha)			1	
MUNICIPALITY	EXISTI	NG CACA(0 (Ha)	TOTAL EXISTING AREA (Ha)	8	onut	Shrubland unmanagec	and,	Grassland	and,	Bana	e	Mango	9.	Pineapple		Sugarcane	De De	Other crops		POTENTIAL EXPANSION
	51	25	23		S1	25	S1	SS	S1	25	S1	SS	S1	25	S1	SS	S1	25	S1	25	ANEA (III)
DAVAO CITY	154	491	826	1,603	42,559	10,910	2,452	914	7,140	3,780	2,601	2,523	1,187	11	992	553	16	22	437	116	76,063
TOTAL	154	491	958	1,603	42,559	10,910	2,452	914	7,140	3,780	2,601	2,523	1,187	11	200	253	16	52	437	116	76,063

SUITABILITY CLASSES:



Moderately Suitable (S2) Land Invanye ilmation which in aggregate are moderately severe for sustained application of a moderately severe for sustained application of a presence of the limitation of the several adventage of the benefits and increase nequired imputs to the error that the overall adventage to be gained from the nex, althoring and latterately will be appreciably inferor to that expected on dasses I hand.

CLIMATE TYPE
TYPE 1: You promoted season, day from Rovember to April 1sh
TYPE 11: So day season with a very promoted maximum raine for a feed and the test of the son a range from Rovember to Robentary, There is not a range from a feed many Robentum member to Robentary, There is not a range from a feed from the feed from th

Rainfall is more or less evenly distributed throughout th year. This type resembles Type II since it has no dry season TYPE IV:

TYPE III:

CLIMATIC TYPE LIII, IV

ELEVATION ANNUAL (masl) (mm)

ROCK OUTCROPS

FLOODING EROSION CLASS CLASS

LAND LAND SULPHING SULPE (%) SOIL DEPTH SOIL TEXTURE SOIL REACTION FERTILITY TYPE (ph)

AGRONOMIC REQUIREMENT OF CACAO PRODUCTION

WD,MWD GH, GPB

No very pronounced maximum rain period, with a dry season lasting only from one to three months, either during the period from December to February or from March to May. This type resembles Type I since it has a short dry season.

sandy clay silty clay clay heavy clay

SOIL TEXTURE Coarse severe

5.1-5.5 medium 7.3-7.8 low

S, L.S, CSL, SL

50-100 <50

8-30

RAINDALL PATTERN BY CLIMATE TYPE

SLOPE (%)	9	SOIL DRAINAGE	INAGE	SOIL REA	SOIL REACTION (pH)
0-3	- level to gently sloping	ED	-excessively drained	< 4.5	- extremely acid
3-8	 gently sloping to undulating 	WD	-well drained	45-50	very strongly acid
8-18	- undulating to rolling	MWD	-moderately well drained	51.55	5.1-5.5 strongly acid
18-30	- rolling to moderately steep	SPD	 somewhat poorly drained 	26-60	- medium acid
30-50	daets-	PD D	-poorly drained	61-65	- slightly acid
>20	-very steep	VPD	-very poorly drained	6.6 7.2	- neutral
				73-78	- mildly alkaline
SOIL DE	SOIL DEPTH (cm)	SURFACE	SURFACE IMPEDIMENT	79-84	 moderately alkaline
0-30	-very shallow	ROCK OUTCROPS	CROPS	>8.5	 strongly alkaline
30-50	30-50 -shallow	< 10%	< 10% - none - few		
50-100	50-100 -moderately deep	10-30%	10-30% -common		

ELEVATION	SOIL DRAINAGE	SOIL DEPTH
El2 -1000m-1500m	D2 - Somewhat poorly drained to poorly drained	Sh2 - Moderately deep (50 - 100cm)
El3 -> 1500m	D3 -Very poorly drained or excessively drained	Sh3 - Very shallow to shallow (< 50cm)
SLOPE/TOPOGRAPHY T2 - Undulating to moderately steep T3 - Seep for very steep T3	SOUL TEXTURE To -Coarse texture	Rock outcrops Rc2 - Common Rc3 - Many

CODE	_	IMITATION	CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION	00 00	3 LANDUSE
1	E2-Sh2-Rc2		11	F2-D2	21	T2-E12-E3	31	T3-E3-Sh3-Rc2	41	T3	51	T3-El3	4	Com
2	EIZ		12	F3-D2	22	T2-E12-E3-Rc2	32	T3-E3-Sh3-Rc3	42	E3-E3			34	Diversified crops
3	E12 E2 Sh2 Rc3	Rc3	13	Rc2	23	T2-E12-E3-Rc3	33	T3-E12	43	T3-E3-Sh3-Rc3			26	Pincapple
*	E12-E3-Sh2-Rc3	Rc3	2.4	Sh2	24	T2 E12 E3 Sh2 Rc2	34	T3-E12-E3	44	T3-E12			82	Mango
5	E12-Rc2		15	Sh2-Rc2	52	T2-E12-E3-Sh2-Rc3	32	T3-E12-E3-Rc2	45	T3-E12-E3			91	Banana
9	E12-Sh2-Rc2		97	T2	92	T2-E13-E3	36	T3-E12-E3-Sh3-Rc2	94	T3-E12-E3-Rc3			105	Fruit trees, mixed
2	E12-Sh2-Rc3		17	T2-E3	27	T2-E13-E3-Sh2-Rc2	37	T3-E12-E3-Sh3-Rc3	47	T3-E12-E3-Sh3-Rc3			112	Sugarcane
8	EII3		18	T2-E3-Sh2-Rc2	28	T2-El3-E3-Sh2-Rc3	38	T3-El3	48	T3-El3			116	Coconut
6	E13-E3-Sh2-Rc3	Rc3	- 67	T2-E3-Sh2-Rc3	5.0	T3	39	T3-E13-E3	64	T3-E13-E3			126	Grassland
27	BI3-Sh2-Rc2		20	T2-E12	30	T3-E3	40	T3-EI3-E3-Sh3-Rc2	20	T3-E13-E3-Sh3-Rc3			131	lidilidi

_	auoo	and a second	auros	TANDUNG
ī	3		3	TOTAL
	4	Com	134	Shrubs, unmanaged
_	34	Diversified crops		
_	84	Pincapple		
	82	Mango		
	16	Banana		
_	105	Fruit trees, mixed		
_	112	Sugarcane		
	116	Coconut		
_	126	Grassland		

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

DAVAO DEL NORTE, REGION XI

EXTENT OF SUITABILITY FOR CACAO PRODUCTION BY MUNICIPALITY

						EXI	EXPANSION AREA (Ha)	. ВЕЛ (На	,				CONFLIC	F RESOLI	CONFLICT RESOLUTION AREA (Ha)	EA (Ha)			10000
MUNICIPALITY	EXIST	EXISTING CACAO (Ha)	0 (Ha)	TOTAL EXISTING AREA (Ha)	Coconut	nut	Shrubland, unmanaged*	md, ged*	Grassland, unmanaged*	md, ged*	Banana	ma	Соги	п	Mango	og	Other crops	crops	POTENTIAL EXPANSION
	S1	25	23		S1	2.5	S1	25	\$1	25	S1	25	21	SZ	S1	25	SI	25	AREA (Ha)
ASUNCION	ľ				3,485	69	1.266	ľ	2,327	S	3,616	169	101	6	36		06		11.173
BRAULIO E. DUIALI					26				123	•	3,280	٠	84						3,513
CARMEN					1,318	12	3		1,762	9	4,150	•	1,485		25		234		8,995
CITY OF PANABO	33	•	17	20	2,938	353	20	r	289	32	13,629	764	230	1	184	89	244		19,119
CITY OF TAGUM					9,053	390		•	414	47	1.823	83	16				28	13	11,927
ISLAND GARDEN CITY OF SAMAL		•			14,963	3,844	225	24	343	12	7	24	20		270	9	4	17	19,761
KAPALONG	•			•	99	9	2,828	358	4,394	480	6,137	156	134	46	549	3	2	1	15,159
NEW CORELLA	ľ		-		1,210	40	436	۰	96	-	3,814	•	222	13	18		6329	143	12,352
SAN ISIDRO				•	175	1	1,318	•	5,005		9	•	•	•		•	160	1	299'9
SANTO TOMAS					278	S	1,189	47	1,197	75	8,585	244	222	8	342		278	,	12,802
TALAINGOD	ľ				87	4	260	۰	5,809	6	774	12	3			•			4,262
TOTAL	33		18	15	33 597	9627	928.2	429	429 19158	699	669 45 822	1 452	2 849		76 1423	16	7.458	175	125 728

SUITABILITY CLASSES: Highly Suitable (S1)

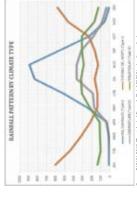
ingliny suitable (S.f.) and hadne no slamificant limitation to sustained
application of a given use, or only minor limitations
that will not significantly reduce productivity or
benefits and will not raise inputs above an
acceptable level,



CLIMATE TYPE
TYPE 1: Not grounded season, dry from November to Apell and
TYPE 11: Not grounded season with a very personanced maximum rain
period from December to Referrency There is not a lingle
from line to September 2.

TYPE III: No very pronounced maximum rain period, with a dry second lasting portion of the control for the con

TYPE IV : Rainfall is more or less evenly distributed throughout the year This type resembles Type II since it has no dry season.



AGRONOMIC REQUIREMENT OF CACAO PRODUCTION

LAND TILIZATION TYPE	THIZATION RATING	SLOPE (%)	SLOPE (%) SOIL DEPTH (cm)	SOIL TEXTURE	SOIL DRAINAGE	SOIL REACTION (pH)	INHERENT	FLOODING	EROSION	ROCK OUTCROPS	ELEVATION (masl)	ANNUAL RAINFALL (mm)	CLIMATIC	
	15	8>	>100	CL, SICL, SCL, SC,	WD,MWD	5.6-7.2	high	none-slight	none-slight	none-few	<1000	2001-4500	I, III, IV	
Cacao	SZ	8-30	50-100	FSI, L, SiL	SPD,PD	5.1-5.5	medium	moderate	moderate	common	1000-1500	1000-2000	11.11	
	53	>30	<50	S, LS, CSL, SL	VPD,ED	<5.0 -> 7.9	low	severe	severe	many	>1500	<1000		
LOPE (%)			SOIL DRAINAGE	35		SOIL REACTION (pH)	(ht)		SOIL TEXTURE					
-3 lev	- level to gently sloping	54	ED - cx	excessively drained		4.5 extre	extremely acid		Coarse		Œ	ne		
. B	- gently sloping to undulating	ulating	WD -w	well drained	7	5 50 very	-very strongly acid		s sand		88		ilay	
-18 -unc	- undulating to rolling		m- GWM	moderately well drained			strongly acid		LS -loam	loamy sand	Š	SiC -silty clay	, Ai	
8-30 roll	- rolling to moderately steep	deats	os- Ods	 somewhat poorly drained 			- medium acid		CSL -coar	-coarse sandy loam	O	-clay		
	da		PD - pc	poorly drained			slightly acid		St. sand	sandy loam	Ξ	- peavy	day	
50 -ver	- very steep		VPD - ve	- very poorly drained	9		76		Medium					
					7		- mildly alkaline		FSL - fine	fine sandy loam				
OIL DEPTH (cm)	(H		SURFACE IMPEDIMENT	EDIMENT	7	79-84 mode	- moderately alkaline		L -loam					
-30 - very shallow	ry shallow		ROCK OUTCROPS	PS		-8.5 -stron	strongly alkaline		Silsilth	ж				
0-50 shallow	ullow		< 10% - none - few	ne-few					CL -clay	-clay loam				
0-100 -mo	3 - 100 - moderately deep		10 - 30% - common	mmon					SiCL -silty	clay loam				
100 -dee	- deep to very deep		> 30% - many	any					SCL -sand	 sandy clay loam 				

LAND LIMITATIONS DESCRIPTION AND COMBINATIONS RELATION DISLABOR DESCRIPTION AND COMBINATIONS DESCRIPTION DESCRIPTION AND COMPUTATION DESCRIPTION DESCRIPTION DESCRIPTION DESCRIPTION DESCRIPTION DESCRIPTION DESCRIPTION DE

		2				,			
ELEVATION	NOLL		SOIL DR	SOIL DRAINAGE			SOIL DEPTH	ЕРТН	
El2 -	El2 -1000m-1500m El3 -> 1500m		D2 8	omewhat	 Somewhat poorly drained to poorly drained Very month drained on excessively drained 	y drained	SP SP SP SP SP SP SP SP SP SP SP SP SP S	-Moderately deep (50-100cm) -Very shallow to shallow (< 50c	-Moderately deep (50-100cm) -Very shallow to shallow (<50cm)
SLOPE	SLOPE/TOPOGRAPHY		SOILTEXTURE	XTURE			ROCK	ROCK OUTCROPS	Ì
12	- Undulating to moderately steep	ly steep	Tc =(Tc - Coarse texture	ture		Re2	Rc2 - Common	
E.	- Steep to very steep						Rc3	- Many	
CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION	CODE	E LANDUS
1	E2-Sh2-Rc2	11	T2-E3	21	T3-E3	31	T3-E3-Sh3-Rc3	*	Corm
2	EIZ	1.2	T2-E3-Rc3	22	T3-E3-Sh3-Rc2	35	32 T3-B12	47	Vegetable
8	E12-Sh2-Rc2	13	T2-E3-Sh2-Rc2	23	T3-E3-Sh3-Rc3	33	T3-E12-E3-Sh3-Rc3	18	Coffee
+	E12 Sh2 Rc3	<i>‡I</i>	T2-E3-Sh2-Rc3	47	T3-E12	34	T3-El3	88	Mango
'n	F2-D2	15	T2-E12	25	T3-E12-E3-Rc2			06	Pomelo
9	F2-Tc	97	T2-E12-E3-Rc2	26	T3-E12-E3-Sh3-Rc2			16	Banana
2	F3-D2	21	T2 E12 E3 Sh2 Rc2	27	T3-E12-E3-Sh3-Rc3			105	Fruit trees, mixed
8	Sh2	18	T2-E12-E3-Sh2-Rc3	28	T3-F3-D2			116	Coconut
6	Sh2-Rc2	61	19 T2-F3-D2	53	T3			115	mlea lio ett

П	CODE	LANDUSE	CODE	LANDUSE
	÷	Corm	134	Shrubs, unmanaged
П	47	Vegetable	137	Rubber (T)
П	18	Coffee		
П	58	Mango		
П	06	Pomelo		
П	16	Banana		
П	105	Fruit trees, mixed		
П	116	Coconut		
П	611	Oil palm		
П	126	Grassland		

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

DAVAO DEL SUR, REGION XI

SUITABILITY CLASSES:

EXTENT OF SUITABILITY FOR CACAO PRODUCTION BY MUNICIPALITY

	L					EXP,	ANSIONA	EXPANSION AREA (Ha)		r			ľ	ONFLICT	CONFLICT RESOLUTION AREA (Ha)	TION ARE	A (Ha)			ľ		
MUNICIPALITY	EXIST	EXISTING CACAO	AO (Ha)	TOTAL EXISTING AREA (Ha)	Coconut	ığ .	Shrubland, unmanaged*	and, ged*	Grassland, unmanaged*	and, ged*	Mango	2.	Banana	g	Corn	_	Sugarcane	911	Other crops	rops	TOTAL POTENTIAL EXPANSION	
	S1	22	S3		S1	SZ	S1	SZ	SI	SZ	S1	S2	5.1	SZ	S1	SZ	S1	SZ	S1	25	AKEA (BA)	
BANSALAN	ľ	L	ľ		4,705	1,274	4	105	ľ	ľ	2,393	129	ŀ	-	24	ŀ	28		137	18	8,817	
CITY OF DIGOS	ľ	L	ľ		3,579		13	ŀ	36	ľ	670		9	ľ	47	ŀ	17		175	ľ	4,605	
HAGONOY	ľ	L	Ľ		169			ŀ	ľ	ľ	86	ŀ	1,302	16	42	ŀ	13		188	77	2,428	
KIBLAWAN	Ĺ	L	Ĺ	•	1,549		35	143	162	392	50	٠	1,768	ľ	1,632	٠	1,376	14	ŀ		7,101	
MAGSAYSAY		L		•	5,435	28	2	7	82	195	423				119	7			2,034	•	8,365	
MALALAG		L			5,603	٠	95	۰	78	٠.	127	٠.	245	۰	126		2.1		٠		6,583	
MATANAO		L			1,927				145	109	4,038	٠.	18	۰	222		902	۰	89	•	7,566	
PADADA		L			1,672						30	٠.	757	۰	7.2						2,531	
SANTA CRUZ		L			5,234	179	٠	۰	26	6	1	۰	211	۰	٠		-	٠	877	•	692'9	
SULOP		L		•	5,317	138	146	۰	10	ŀ	135	۰	1,567	۲	160		19	2	١	•	7,536	
TAYNA .	Ĺ	L	Ĺ		01440	1000	746	and C	Visid	104	670 6	00+	000/ 000	44	4000	-	0000	7.5	Oak C	10	10107	

Not Suitable / Not Relevant
Land having limitations which may
in time but which cannot be correct
knowledge at currently acceptable
limitations are so sewere as to have

CLIMATE TYPE TYPEI : Two pronouced seat



Wilder Street Street Street	al Normals (Rainfall), Philippine Atmospheric,	ical Services Administration (PAGASA), accessed 27 July 2018,	st gov.ph/index.php/climate/climatological-normals>.
and the control of th	rrce: PAGASA 2018, Climatological Norma	Geophysical and Astronomical Servi	https://www1.pagasa.dost.gov.ph

AGRONOMIC REQUIREMENT OF CACAO PRODUCTION

LAND LIMITATIONS DESCRIPTION AND COMBINATIONS

SOIL EROSION
E2 - Moderate erosion
E3 - Severe erosion

ELEV.	ELEVATION		SOIL	SOIL DISMINAGE	99			SOIL DEPTH	5	
EIZ .	El2 -1000m-1500m		DZ	-Somew	D2 - Somewhat poorly drained to poorly drained	poorly da		Sh2 - M.	Sh2 - Moderately deep (50-100cm)	_
EII	-> 1500m		D3	-Very pa	-Very poorly drained or excessively drained	sively dr.		Sh3 -Ve	Sh3 - Very shallow to shallow (< 50cm)	(m)
SLOPE	SLOPE/TOPOGRAPHY		TIOS	SOIL TEXTURE	ш		-	ROCK OUTCROPS	TCROPS	
175	- Undulating to moderately steep	itely stee		Tc - Coarse texture	texture		-	Rc2 - Common	nomino	
13	- Steep to very steep						_	Rc3 - Many	any	
CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION	
1	E2-Sh2-Rc2	11	Sh2-Rc2	21	T2-813-83	31	T3-E12-E3	41	T3-E12	
2	EIZ	12	T2	22	T2-EI3-E3-Sh2-Rc2	32	T3-E12-E3-Sh3-Rc2	42	T3-E12-E3	
3	E12-Sh2-Rc2	13	T2-E3	23	T2-F2-D2	33	T3-E12-E3-Sh3-Rc3	ш	43 T3-E12-E3-Sh3-Rc3	
*	E12-Sh2-Rc3	14	T2-E3-Rc2	24	T2-F3-D2	34	T3-E13-E3-Sh3-Rc2	#	44 T3-El3-E3-Sh3-Rc3	
2	EI3	15	T2-E3-Sh2-Re2	52	T3	32	T3-F2-D2	45	T3-EI3	
9	El3-Sh2-Rc2	91	T2-E3-Sh2-Rc3	97	T3-E3	36	T3-F3-D2	9\$	Tc	
2	F2 D2	21	T2-E12	27	T3-E3-Rc2	37	T3			
×	22.00	2	T2, E12, E2	28	28 T2 F2 Ch2 Dr 2	30	38 T2.F2			

		F3 - Severe seasonal flooding	flooding	
NOIL	CODE	LANDUSE	CODE	LANDUSE
	4	Corn	105	Fruit trees, mixed
	34	Diversified crops	107	Abaca
13-Rc3	20	Rootcrops	112	Sugarcane
13-Rc3	81	Coffee	911	Coconut
	88	Pineapple	126	Grassland
	28	Mango	134	Shrubs, unmanaged
Г	68	Durian	137	Rubber (T)
Г	06	Pomelo		
Г	91	Banana		
Г	65	Mangosteen		

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

DAVAO OCCIDENTAL, REGION XI

EXTENT OF SUITABILITY FOR CACAO PRODUCTION BY MUNICIPALITY

						EXI	EXPANSION AREA (Ha)	AREA (Ha	3)		_	CONFLICT RESOLUTION AREA (Ha	RESOLU	TION ARI	EA (Ha)		
MUNICIPALITY	EXISTI	EXISTING CACAO (Ha	0 (Ha)	TOTAL EXISTING AREA (Ha)	Coconut	nut	Shrubland, unmanaged*	hrubland, ımanaged*	Grassland, unmanaged*	land, aged*	Banana	Ba .	Corn	_	Other crops	rops	POTENTIAL EXPANSION
	S1	2.5	S3		S1	2.5	S1	2.5	S1	2.5	S1 S2	Н	S1	2.5	S1	2.5	AREA (Ha)
DON MARCELINO		ľ		•	696	481			122	1	40	41					1,65
IOSE ABAD SANTOS					2,794	212	-	4	720		1		21	٠	1	ŀ	3,75
MALITA		ľ			3,904	2,194	36	12	497	394	65	398	80	ľ	30	123	92'2
SANTA MARIA				•	5,127				361	7					17	٠.	15'5
SARANGANI					2,247	64											2,31
TOTAL					15,041	15,041 2,951	38	16	1,699	401	1,699 401 133 438	438	101	ľ	47	123	20,989

AGRONOMIC REQUIREMENT OF CACAO PRODUCTION

UTILIZATION TYPE	UTILIZATION SUITABILITY TYPE TYPE	SLOPE (%)	SOIL DEPTH (cm)	SLOPE (%) SOIL DEPTH SOIL TEXTURE (cm)	SOIL	REACTION (pH)	INHERENT	FLOODING	EROSION	ROCK OUTCROPS	ELEVATION (masl)	RAINFALL (mm)	CLIMATIC	
	S1	<8	>100	CIL, SICIL, SCIL, SC,	WD,MWD	5.6-7.2	high	none-slight	none-slight	wej-euou	<1000	2001-4500	I, III, IV	
Cacao	SZ.	8-30	50 - 100	HSI' I' SII	GP, PD	5.1-5.5	medium	moderate	moderate	сошшоэ	1000-1500	1000-2000	11.11	
	53	>30	<50	S, LS, CSL, SL	VPD,ED	<5.0->7.9	low	severe	severe	many	>1500	<1000		
SLOPE (%)			SOIL DRAINAGE	. 25		SOIL REACTION (pH)	(Hd)		SOIL TEXTURE					
1-3 -lex	vel to gently sloping		ED - ex	- excessively drained		c 4.5 extremely acid	amely acid		Coarse		Œ	e e		
ad 8-1	3-8 - gently sloping to undulating	ulating	WD -w	well drained			strongly acid		purs - s	_	8		day	
3-18 -un	- undulating to rolling		m- DWM	moderately well drained		51 55 stroi	- strongly acid		LS -loan	-loamy sand	SIC	: silty clay		
(8-30 -m)	- rolling to moderately steep	steep	os- das	somewhat poorly drained			- medium acid		CSI coan	-coarse sandy loam	U	- clay		
30 - 50 - steep	das		DD - bc	-poorly drained	_	61 65 sligh	- slightly acid		St sanc	sandy loam	HC		day	
.50 -ve	- very steep		VPD -ve	- very poorly drained	_	6.6 7.2 neutral	ral		Medium					
						73-78 mild	mildly alkaline		FSL - fine	- fine sandy loam				
SOIL DEPTH (cm)	(m)		SURFACE IMPEDIMENT	EDIMENT		79 8.4 mod	moderately alkaline		L -loan	e				
3-30 -very shallow	rry shallow		ROCK OUTCROPS	PS .		-85 stroi	 strongly alkaline 		Silsilt1	oam				
30-50 shallow	allow		<10% none few	me-few					CL -clay	- clay loam				
50-100 -mc	0-100 - moderately deep		10 30% - common	mmon					SICL silty	-silty clay loam				
- 100 - de	- 100 - deep to very deep		> 30% - many	any					SCT sand	ty clay loam				

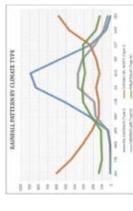
LAND LIMITATIONS DESCRIPTION AND COMBINATIONS BLEATION SOLUBLANGE D2 - Stornwish provide dained uppostly drained PR - - 100m-150m PR - - 100m-

ELEV	ELEVATION		ELEVATION SOIL DRAINAGE	SOIL DRAINAGE	H.	2	S	SOIL DEPTH	E	
EII3	-1000m -1500m		D2 D3	Somew Very po	 Somewhat poorly drained to poorly drained Very poorly drained or excessively drained 	poorly dr sively dra		h2 - M	Sh2 - Moderately deep (50 - 100cm) Sh3 - Very shallow to shallow (< 50cm)	_ 18
SLOP 72 73	SLOPE/TOPOGRAPHY TZ - Undulating to moderately streep T3 - Steep to very steep	itely steep		SOIL TEXTURE Tc - Coarse texture	E			ROCK OUTCROPS Rc2 - Common Rc3 - Many	rcrops mmon	
CODE	ELIMITATION	CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION	[8
7	E2-Sh2-Rc2	17	T2-E3-Rc2	2.7	T2-F2-D2	31	T3-E12-E3-Sh3-Rc2	⊢	41 13-612	L
24	EIZ	12	T2-E3-Sh2-Rc2	22	T2-F3-D2	32	T3 E12 E3 Sh3 Rc3	45	T3-E12-E3	L
ťη	E12-E3-Re3	13	T2-E3-Sh2-Rc3	23	T3	33	T3-E13-E3-Sh2-Rc3	43	T3-E12-E3-Sh3-Re3	L
*	E12-Sh2-Rc2	14	T2-E12	24	T3-E3	33	34 T3-E13-E3-Sh3-Rc2	\$	44 T3-El3-E3-Sh3-Rc3	L
50	F2-D2	27	T2-E12-E3	25	T3-E3-Rc2	32	T3-F2-D2	45	T3-E13	L
9	F2-Tc	97	T2-E12-E3-Rc3	- 56	T3-E3-Sh3-Rc2	36	T3-F3-D2	99	Tc	_
В	F3-D2	- 23	T2-E12-E3-Sh2-Rc2	22	T3-E3-Sh3-Rc3	37	T3			
80	Sh2	18	T2-E12-E3-Sh2-Rc3	28	T3-E12	38	T3-E3	L		_
6	T2	67	T2-E13-E3-Rc3	56	T3-E12-E3	39	T3-E3-Rc3	L		_
10	T2-E3	20	20 T2-E13-E3-Sh2-Rc2	30	30 T3-E12-E3-Sh2-Rc3	40	40 T3-E3-Sh3-Rc3			
	00.01		2 C C C C C C C C C C C C C C C C C C C		con man on man or		20 000 000			



CLIMATE TYPE TYPEI : Two pronouced

TYPEI	TYPEI: Two promotes weasth, day from November to April and west during the rest of the year. Maximum rain period is from June to September	TYPE I: No dry season with a very promoted maximum rain period from December to Returnary. There is not a single dry month. Maximum monthly rainfall occurs during the period from Marth to May.
TYPEIII	TYPE III : No very pronounced maximum rain period, with a dry season lating uply from one to these nonths, either during the period from December to February or from March to May, This type resembles Type I since it has a aftort dry season.	TYPE IV : Rainfall is more or loss evenly distributed throughout the year. This type resembles Type II since it has no dry season.



LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

DAVAO ORIENTAL, REGION XI

EXTENT OF SUITABILITY FOR CACAO PRODUCTION BY MUNICIPALITY

						EXP.	EXPANSION AREA (Ha)	REA (Ha				_	CONFLICT	RESOLU	CONFLICT RESOLUTION AREA (Ha)	EA (Ha)			momer
MUNICIPALITY	EXISTR	XISTING CACAO (Ha)	(Ha)	TOTAL EXISTING AREA (Ha)	Coconut	unt	Shrubland, unmanaged*	md, ged*	Grassland, unmanaged	and,	Banana	g	Corn		Mango	oğ	Other crops	crops	POTENTIAL EXPANSION
	S1	25	S3		Sı	25	S1	25	S1	25	S1	25	S1	25	S1	25	S1	25	AREA (Ha)
BAGANGA	76	8		102	1,123	197	6,439	4,445	26	56	2,258	2,605	26	21			4	2	17,204
NAYBANAY	ľ		ľ	ľ	2,272	11	22	141	883	6	70	ľ	20	ľ	3	ľ	-	ľ	3,572
NOTEC	1		12	13	1,122	ŀ	2,066	92	242			ľ	73						3,532
ARAGA	287	628	_	516	1,496	1,139	96	260	209	203		•						•	3,703
TEEL	12	S	1,851	1,868	1,846	175	6,474	1,975	573	88	699	982	369	7	•	•	•	•	12,861
TY OF MATI	1	,	39	40	10,315	2,026	218	27	474	22	363	33	451	49	651	•	2,588	251	17,840
GOVERNOR GENEROSO	١		•		3,509	H	672	۰	730		549	F.	20	١	1	•			5,481
NOM		•	10	10	4,154	62	1,290	20	150	62	4,546	34	184	٦	6		10		10,572
NAY	1	13	•	14	4.150	2,587	31	21	1,869	1,819			,						10,475
NISIDRO	•	•			3,154	675			362	100	332	6	78	18	992			•	4,993
ARRAGONA	•	•	1		74	231	۰	11	451	255	19	42	103	78	7		•	1	1,275
TOTAL	396	654	1,913	2,963	33,215	7,103	17,663	92669	6,271	2,724	8,806	3,408	1,357	190	937	•	2,603	255	91,508
Note: Delivery of cacao planting materials must be started on the onset of rainy season.	erials must	be started	ton the ons	et of rainy season.															

SUITABILITY CLASSES:
Highly Strabel (67)
Lond hove; to supplicant luminon to extained
Lond hove; to supplicant luminon to extained
Lond hove; to supplicant luminos
Lond luminos of a general conflict many reduces
that will not suggitted they benefit and will not raise injura above an
scorptable level.



CLIMATE TYPE

TYPE II. The promoted cannot define from Normalner to pight land

TYPE II. I will represent which represented the pight land

TYPE II. I will represent the pight land

TYPE II. I will represent the pight represented to the pight represented to the pight land. The pight land the big spight land to the pight land to th

TYPE IV: Rainfall is more or less evenly distributed throughout the year. This type resembles Type II since it has no dry seazon.

TYPE III: No very pronounced maximum rain period, with a dry season listing period from one to three months, either during the period from December 10 effectuary or from Narth O May, they resembles Typel since it has a short of Passon.

CLIMATIC LIII, IV

ELEVATION (masl)

ROCK

EROSION

FLOODING

SOIL DEPTH SOIL TEXTURE SOIL REACTION (pil) FERTILITY (pil)

TYPE SUITABILITY SLOPE (%)

AGRONOMIC REQUIREMENT OF CACAO PRODUCTION

2001-4500

1000-1500 <1000 >1500

moderate

5.6-7.2 high 5.1-5.5 medium 7.3-7.8

SPD,PD WD,MWD VPD,ED

> FSI, L, SIL S, LS, CSL, SL

50 - 100 >100 <50

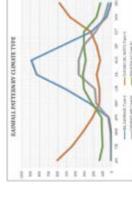
> 8-30 >30

Cacao

<5.0 -> 7.9

severe

- excessively drained
- well drained
- moderately well drained
- somewhat porty drained
- poorty drained
- very poorty drained



SOIL REACTION (pH) < 4.5 extremely acid 4.5-5.0 - very strongly acid	Coarse Sand	TURE - sand	Fine	- sandy clav		
51 55 strongly acid	SI	loamy sand	SIC	-silty clay		
diumacid	S	-coarse sandy loam	υ	-clay		BARNIALL PATTED
htty acid	SL	- sandy loam	ЭН	- heavy clay	-	
itral	Medium					
ldly alkaline	PSI	- fine sandy loam			2	
oderately alkaline		-loam			-	
- strongly alkaline	SIL	-silt loam				
		- clay loam			2	
		- silty clay loam			-	
		- sendy clay loam				
						/
						1
					1	>
					1	1
						1
					1 0	4 40 40 400
SOIL DEPTH		SOIL EROSION				
Sh2 - Moderately deep (50-100cm)	0cm)	E2 - Moderate erosion				
Sh3 - Very challow to challow (< 50rm)	Com	E2 - Servero errorion				

LAIND LIMITATIONS DESCRIPTION AND COMBINATIONS	TION AIND COMBINATIONS	
ELEVATION	SOIL DRAINAGE	SOIL DEPTH
E12 -1000m-1500m	D2 - Somewhat poorly drained to poorly drained	Sh2 - Moderately deep (50-100cm)
El3 -> 1500m	D3 - Very poorly drained or excessively drained	Sh3 - Very shallow to shallow (<50cm)
SLOPE/TOPOGRAPHY T2 - Undulating to moderately streep	SOIL TEXTURE Te - Coarse texture	ROCK OUTCROPS Rc2 - Common
T3 - Steep to very steep		Rc3 Many

CODE	LIMITATION	CODE	CIMITATION		CODE LIMITATION	CODE	MILATION	CODE	CIMITATION	CODE	MALIATION	CODE	CIMITATION
1	E2	11	E13-E3-Sh2-Rc3	21	T2-E3-Rc2	31	T2-E13-E3-Rc3	41	T3-E3-Sh3-Rc3	23	T3-F2-D2	19	F3-E13-E3-Sh3-Rc3
2	E2-Sh2-Rc2	12	E13-Sh2-Rc2	22	T2-E3-Rc3	32	T2-EI3-E3-Sh2-Rc2	42	T3+E12	25	T3-F3-D2	29	T3-F2-D2
3	EIZ	13	E13-Sh2-Rc3	23	T2-E3-Sh2-Rc2	33	T2-El3-E3-Sh2-Rc3	43	T3-E12-E3	23	T3	63	T3-F3-D2
*	E12 E2-Rc3	7.7	F2-D2	24	T2-E3-Sh2-Rc3	34	T2 F2 D2	\$	T3 E12 E3 Rc2	24	T3-E3	35	F3-E13
25	E12-E2-Sh2-Rc3	15	F3-D2	52	T2-E12	32	T2-F3-D2	45	T3 E12 E3 Sh2 Rc3	22	T3-E3-Rc3	59	Te Te
9	E12-E3-Rc3	97	Rc2	36	T2-E12-E3	36	T3	9\$	T3-E12-E3-Sh3-Rc2	99	T3-E3-Sh3-Rc3		
2	E12 E3 Sh2 Rc3	21	Sh2	22	T2-E12-E3-Rc2	32	T3-E3	25	T3 E12 E3 Sh3 Rc3	25	T3-E12		
8	E12-Rc2	18	Sh2-Rc2	28	T2-E12-E3-Rc3	38	T3-E3-Rc2	89	T3 E13 E3 Sh2 Rc3	28	T3-E12-E3		
6	E12-Sh2-Rc2	61	77	53	9 T2-E12-E3-Sh2-Rc2	33	T3-E3-Sh2-Rc3	69	T3-E13-E3-Sh3-Rc2	65	T3-E12-E3-Rc3		
1.0	C) 2 CP 3 C/3	20	23 64 63	06	Cod CN3 C3 C13 C4	40	Con C13 C3 GA	02	TO E12 E2 CB Do2	0.5	C O C 43 C 3 C 12 C 4		

	41	Vegetable	116	Coconut
П	20	Rootcrops	126	Grassland
П	51	Cassava	134	Shrubs, unmanaged
П	81	Coffee	137	Rubber
П	85	Cacao		
П	82	Mango		
Г	06	Pomelo		
П	16	Banana		
Т	105	Fruit trees, mixed		

 CODE
 LANDUSE
 CODE

 4
 Corn
 107
 Abaca

FLOODING
FZ - Modernte seasonal flooding
F3 - Severe seasonal flooding

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

COTABATO CITY, REGION XII

EXTENT OF SUITABILITY FOR CACAO PRODUCTION BY MUNICIPALITY

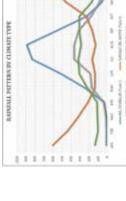
MUNICIPALITY EXISTING CACAO (Ha)				EXI	ANSION /	REA (Ha			0	ONFLICT	RESOLUT	ION ARE	(Ha)		1.000
	EXIS	TOTAL EXISTING REA (Ha)	Сосопи	TI I	Shrubland, unmanaged*	and,	Grassland, unmanaged*	and,	Corn		Paddy rice, non-irrigated	ice,	Other croj	sdo	POTENTIAL EXPANSION
S1 S2 S3	Г		S1	25	SI	SS	S1	25	S1	ZS	S1	25	S1	SZ	ANEW (Hat)
COTABATO CITY				,	4			,							
TOTAL	_	•			4										,

SUITABILITY CLASSES:
Heighty sembles (18 till ministen to sorts and honey no septiment in the sort and honey no sort and honey no sort sort sort of the younger of the sort sort of the younger to sort and the volt and significantly retake productively benefits and will not raise in pairs above an acceptable level.

TYPE II : No dry season with a very pronounced maximum rain period from December to Rebusary. There is not a single dry month Maximum monthly rainfall occurs during the period from March to May. CLIMATE TYPE
TYPE: Two pronouced season, dry?
wet during the rest of the year
from June to September

TYPE III: No very pronounced maximum rain period, with a dry season isting upof from one to there months, other during the period from December 10 February or from Nacre to New Type resemble. Type I since R has a short of New Type resemble.

TYPE IV : Rainfall is more or less evenly distributed throughout year. This type resembles Type II since it has no dry season.



AGRONOMIC REQUIREMENT OF CACAO PRODUCTION

>100 CL, SELL, SALL, SALL 50-100 FSL, L, SL <50 S, LS, CSL, SL
SOLD DRANAGE 110 - excessively drained WD - week distance WD - week distance STR - scrownship poorly drained WD - poorly drained WD - poorly drained WD - rowery peorly drained WD - rowery peorly drained STRRACE DREDDINET FORMACTION OF THE PROPER FORMACTION OF THE PRO
10-30% -common - 30% -many

LAND LIMITATIONS DESCRIPTION AND COMBINATIONS

ELEVATION	NOL		SOIL	SOIL DRAINAGE	
El2	-1000m -1500m		D2	-Somewhat poorly dra	-Somewhat poorly drained to poorly drained
EI3	-> 1500m		D3	-Very poorly drained or excessively drained	ir excessively drained
SLOPE	SLOPE/TOPOGRAPHY		SOIL	SOIL TEXTURE	
E E	- Undulating to moderately steep - Steep to very steep	y steep	£	Tc -Coarse texture	
CODE	LIMITATION	CODE	LIMITATION	CODE	LANDUSE
1	F2+D2	111	T3-E13	116	116 Coconut
2	F2-Tc			134	Shrubs, unmanaged
3	F3-D2			L	
*	12				
2	T2-F2-D2				
9	T2-F3-D2				
2	T3			L	
8	T3-F2-D2				
6	T3-F3-D2				
,	00 00 00				

SOLDEPTH Sh2 -Moderately deep (50-100cm) Sh3 -Very shallow to shallow (<50cm) ROCK OUTCROPS Rc2 - Common Rc3 - Many

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

GENERAL SANTOS CITY, REGION XII

EXTENT OF SUITABILITY FOR CACAO PRODUCTION BY MUNICIPALITY

						EX	PANSION	AREA (Ha				CONFLIC	RESOLUT	TONARE	A (Ha)		11000
MUNICIPALITY	EXISTI	NG CACA() (Ha)	TOTAL EXISTING AREA (Ha)	Сос	Soconut	Shrubland, unmanaged*	Shrubland, nmanaged*	Grassland, unmanaged	and,	Cor	u.o	Pineapple	ple	Other crops	rops	POTENTIAL EXPANSION
	SI	SS	S3		S1	22	SI	25	SI	SZ	SI	SZ	S1	SZ	SI	SS	AREA (Ba)
JERAL SANTOS CITY					2,785	IS	593	59	4001	3,388	7,296	1,826	66	12	3		20,084
TOTAL		Ŀ			2,785	51	293	29	4001	3,388	7,296	1,826	66	12	m	Г	20,084

SUITABILITY CLASSES:
Highly Suitable (S1)
Land having no significant lim
application of a giran use, or o
application of a giran use, or o
that will not sagnificantly redu
the well is and will not raise input
acceptable level.

Not Suitable / Not Relevant

Moderately Suitable (S2)
Land having initiation which in
moderately severe for austrines
given use; the limitation will red
benefits an increase required;
that the overall advantage to be
use, although still attractive, will
inferior to that expected on class.

CLIMATE TYPE

CLIMATIC L, III, IV

ROCK ELEVATION ANNUAL OUTCROPS (masl) (mm)

FLOODING EROSION CLASS CLASS

LAND UTILIZATION SUITABILITY SLOPE (%) (cm) (cm) SOIL TEXTURE SOIL REACTION (PH)

AGRONOMIC REQUIREMENT OF CACAO PRODUCTION

2001-4500 1000-1500 1000-2000 <1000

none-slight none-few moderate

5.1 - 5.5 medium 7.3 - 7.8 high

<50 S, LS, CSL, SL VPD, ED <5.0 -> 7.9

CL, SICL, SCL, SC, WD,MWD SIC, C, HC FSL, L, SIL SPD,PD

50-100

8-30 >30

S S

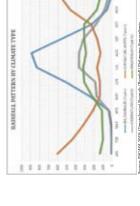
Cacao

severe

TYPE II : No dry season with a very pronounced maximum rain period from December to February. There is not a single dry morth, Maximum monthly rainfall occurs during the period from Burch to May.

TYPE.III: No very pronounced maximum rain period, with a dry servon lasting they from one to three months, either during the period from lower of very or from Martin to May, from 18 per resemble to Referrancy or from the rain to May, from the person of the service of the serv

TYPE IV: Rainfall is more or less evenly distributed throughout the year. This type resembles Type II since it has no dry season.



- excessively drained - well drained - moderately well drained - somewhat poorly drained - poorly drained SLOPE (%) 10-3 - elevel to gently sloping 10-3 - gently sloping to middeng 18-18 - undulating to rolling 18-20 - rolling to moderately steep 30-50 - every steep SOIL DEPTH (cm) 0 - 30 - very st 30 - 50 - strallov 50 - 100 - moders > 100 - deep to

y steep	VPD very poorly drained	66-72
		73-78
T	SURFACE IMPEDIMENT	7.9-84
y shallow	ROCKOUTCROPS	> 8.5
llow	< 10% - none - few	
denately deep	10 30% common	
o to nost door	- 2005 manuar	

- shallow	< 10%	- none - few	
-moderately deep	10-30%	10-30% - common	
- deep to very deep	> 30%	many	

TION AND COMBINATIONS	SOIL DRAINAGE	D2 - Somewhat poorly drained to poorly drained	D3 - Very poorly drained or excessively drained	SOIL TEXTURE Tc - Coarse texture
LAND LIMITATIONS DESCRIPTION AND COMBINATIONS	ELEVATION	El2 - 1000m - 1500m	El3 -> 1500m	SLOPE/TOPOGRAPHY TZ - Undulating to moderately steep T3 - Steep to very steep

SOIL DEPTH
Sh2 - Moderately deep (50 - 100cm)
Sh3 - Very shallow to shallow (< 50cm)

LIMITATION	T3-E3-Sh3-Rc3	T3-E12-E3-Sh3-Rc3	513							
CODE	21 T3-E	22 T3-E	23 T3-E13	24 Tc						
LIMITATION	T2 E3 Sh2 Rc3	T2-E12	TZ EIZ E3 Sh2 Rc2	T3	T3-E3	T3-E3-Sh3-Rc2	T3-E3-Sh3-Rc3	T3-E12	T3 E12 E3 Sh3 Rc2	113.63
CODE	111	12	13	14	15	91	- 17	81	61	06
LIMITATION	E2-Sh2-Rc2	E12	El2-Rc2	El2-Sh2-Rc2	F2-D2	F3-D2	Sh2-Rc2	T2	T2-83	670 CHS 2.8 CLL
CODE	1	2	3	+	S	9	2	8	6	0.0

ROCK OUTCROPS R2 - Common R3 - Many D01				_							
	ROCK OUTCROPS Rc2 - Common Rc3 - Many	LANDUSE	Corn	Cassava	Pineapple	Mango	Coconut	Grassland	Shrubs, unmanaged		
		CODE	4	51	84	82	116	126	134		

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

NORTH COTABATO, REGION XIII

ENT OF SHITABILITY FOR CACAO PRODUCTION BY MIINICIPALITY

INCIPALITY					EXP	EXPANSION AREA (Ha)	EA (Ha)				00	FLICT R	SOLUTIC	CONFLICT RESOLUTION AREA (Ha)	(a)		
	EXISTING CACAO (Ha)	0 (Ha)	TOTAL EXISTING AREA (Ha)	Coconut	l	Shrubland, unmanaged*	+ + + +	Grassland, unmanaged		Corn	-	Sugarcane	_	Pincapple		Other crops	POTENTIAL EXPANSION
ALAMADA ALEOSAN ALEOSAN ARATIPAS ARAKIAN BANISILAN GITY OF KIDAPAWAN GITY OF KIDAPAWAN	25	23		S1	25	Sı	S2	S1	S S	S1 S	S2 S	S1 S	S S	S1 S2	S1	25	AREA (Ha)
ALEOSAN ANTIPAS ARAKIAN GARSILAN GARRIEN CITY OF KIDAPAWAN		ľ		1,169	673		1,147	1,479	7,263 5	5,411	7,275				Ļ	L.	24417
ANTIPAS ARAKAN BARAKAN - BANISILAN CARVIEN - CITY OF KIDAPAWAN - CITY OF KIDAPAWAN -				724	266	87	511	7	640	2,229	1,246	3,156	3,685		- 1,036	1,168	15288
ARAKAN BANISILAN CARMEN CITY OF KIDAPAWAN				1,141	4,518			3	170	334	288						5569
BANISILAN				682	4,355	84	6	225	1,961	914	4,412	37					12765
CARMEN CITY OF KIDAPAWAN			•	13	31	2	069	21	2,621	207	3,082	16 10	10,143				16830
CITY OF KIDAPAWAN				1,405	532	270	1,208	5,304	2,239 19	286'61	2,812	135	162			247	34102
			•	16,097	3,329			١.	7	2,183	299		. 1	1,349 1	081		23437
KABACAN				635	3	11	528	455	2,347 5	5,358	718						10055
LIBUNGAN			•	289	1,115		-	1,628	92	1,905	390	972	98		- 67	944 770	1618
MAGPET .				4,357	1,284		4	22	898	921	884					1	8374
MAKILALA	4	•	+	6,155	3,237	335	26	639	•	3,049	84		+	4,262 1	101		17920
MATALAM -				2,098	3,361	87	221	569	3,184 13	13,413	3,393						26027
MIDSAYAP			•	632	•	464		١.		6,726	611	450	925		- 1,87	873 2,073	13436
M.LANG				5,764	41				. 11	11,117	24		- 2	2,489			19436
PIGKAWAYAN -				4,955	158	82	9	1,484	381	628,1	108				- 21	218	9279
PIKIT				3,657	377	720	171	44	1,220 9	605'6	268	10	49				16326
PRESIDENT ROXAS -				2,337	2,362	34	357	4,624	2,987	4,974	399					20	19095
TULUNAN				2,509	3	19	-	3,789	147 7	7,569				701			14737
TOTAL -	4		+	54,621	26,177	2,223	5,053	20,027	26,121 97	97,636 28	7 58094	4,779	14,703 8	8,802	281 4,139	4,013	296,670

GRONOMIC REQUIREMENT OF CACAO PRODUCTION

	A CHIEF WAS		7	NOTICE OF THE PROPERTY OF THE									
LAND UTILIZATI TYPE	LAND SUITABILITY UTILIZATION RATING TYPE	SLOPE (%)	SOIL DEPTH (cm)	SOIL TEXTURE	SOIL DRAINAGE	SOIL REACTION (pH)	INHERENT	FLOODING	EROSION	ROCK	ELEVATION (masl)	ANNUAL RAINFALL (mm)	CLIMATIC
	SI	89	>100	CL, SICL, SCL, SC, SIC, C, HC	WD,MWD	5.6-7.2	high	none-slight	none-slight	mone-few	<1000	2001-4500	LIII, IV
Cacao	25	8-30	50-100	FSL, L, SIL	SPD,PD	5.1-5.5	medium	moderate	moderate	common	1000-1500	1000-2000	1,11
	SS	>30	<50	S, LS, CSL, SL	VPD,ED	<5.0 -> 7.9	low	severe	severe	many	>1500	<1000	
3 (%)			SOIL DRAINAGE	99		SOIL REACTION (pH)	pH)		SOIL TEXTURE				
	-level to gently sloping	56	ED -ex	 excessively drained 		<4.5 extrer	 extremely acid 		Coarse		Ē	oe e	
3-8	-gently sloping to und	fulating	WD -W	-well drained	7	45.50 verys	very strongly acid		S - sand	_	8		lay
8-18	 undulating to rolling 		MWD - m	moderately well drained		51-55 strong	 strongly acid 		LS - loan	- loamy sand	SIC		
	- rolling to moderately steep	dauts /	SPD -so	 somewhat poorly drained 		5.6-6.0 mediu	medium acid		CSL - coar	coarse sandy loam	U	clay	
30-50	daays-		DD - bc	poorly drained	_	6.1-6.5 slight	- slightly acid		SI sund	- sandy Joann	H	- heavy c	tay
> 50	-very steep		VPD -ve	-very poorly drained	_	6.6 7.2 neutral	F		Medium				
						7.3.7.8 mildly	- mildly alkaline		FSL - fine	fine sandy loam			
SOIL DEPTH (cm)	H(cm)		SURFACE IMPEDIMENT	EDIMENT		79-84 model	moderately alkaline		L -loam	,			
	very shallow		ROCK OUTCROPS	Sd		85 strong	strongly alkaline		Sil. silt1	siltloam			
	-shallow		<10% -none-rew	one - few					CL - clay	clay loam			
> 100	-moderately deep		10-30% - common > 30% - many	-common					SICL - SIRV	silty clay loam candy clay loam			
	down from mydaga.			and a					Out.	of casty reference			

LAND LIMITATIONS DESCRIPTION AND COMBINATIONS ELEVATOR EL

SOIL TEXTURE
To - Coarse text

SLOPE/TOPOGRAPHY T2 - Undulating to mos

SOLL DEPTH
SAZ - Moderately deep (50 - 100cm)
SA3 - Very shallow to shallow (<50cm)
ROCK OUTGROPS
ReZ - Common

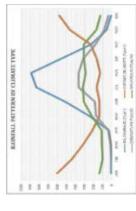
CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION	CODE
1	E2-Sh2-Rc2	11	F3-D2	21	T2-E12-E3-Sh2-Rc2	31	T3-E12-E3-Rc2	41	T3-E12-E3-Sh3-Rc3	_
2	EIZ	12	Sh2-Rc2	22	T2-E12-E3-Sh2-Rc3	32	T3 EI2-E3-Sh3-Rc2	42	T3-E13-E3-Sh3-Rc3	×
3	E12 E2 Sh2 Rc3	13	T2	23	T2-El3-E3-Sh2-Rc2	33	T3-E12-E3-Sh3-Rc3			8
*	E12-E3-Sh2-Rc3	74	T2-E3	24	T3	Ħ	T3 E13 E3 Sh3 Rc2			16
S	E12-Rc2	22	T2-E3-Rc3	22	T3-E3	32	T3			105
9	E12-Sh2-Rc2	97	T2-E3-Sh2-Rc2	97	T3-E3-Sh2-Rc3	36	13-63			112
2	EIZ-Sh2-Rc3	- 27	T2-E3-Sh2-Rc3	22	T3-E3-Sh3-Rc2	37	T3-E3-Sh3-Rc3			116
8	EIS	18	T2-EI2	28	T3-E3-Sh3-Rc3	38	T3-E12			126
6	El3-Sh2-Rc2	- 67	T2-E12-E3	53	T3-E12	33	T3-E12-E3			134
10	F2-D2	20	T2-E12-E3-Re2	30	T3-E12-E3	95	40 T3-E12-E3-Rc3			137

SUITABLITY CLASSES: | Highly stinible (SI) | Land bank plantations which in agreement of agreem

CLIMATE TYPE

	wee during the exer of the year. Maximum rull peried is profession because it efebruary. There is not a front june to September when the second front Maximum monthly runtial secure during period from March to May.		period from December to Pebruary There is not a dry month. Maximum monthly rainfall occurs duri period from March to May.
# A A A	No very pronounced maximum rain period, win a try season lasting only from one to three months, either during the period from December to February or from March to May. This type resembles Type I since it has	A GAA	s Kannan is more or less evenly distributed unrough year. This type resembles Type II since it has no dr season.

Catabato is mostly classified as climatic Type III and partly Type IV in the Eastern pa



e PAGASA 2018. Climazalogical Normals (Rainfall), Philippine Atmospheric. Geophysical and Astronomical Services Administration (PAGASA), accessed 27 July 2018 ehttps://www.lapagasadost.gov.ph/index.php/climats/climatological-normals-.

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

SARANGANI, REGION XII

EXTENT OF SUITABILITY FOR CACAO PRODUCTION BY MUNICIPALITY

						E	EXPANSION AREA (Ha)	AREA (H	e		J	ONFLIC	CONFLICT RESOLUTION AREA (Ha)	TION ARE	A (Ha)		2000
MUNICIPALITY	EXISTI	EXISTING CACAO (Ha	(eH) O	TOTAL EXISTING AREA (Ha)	o ₃	Soconut	Shrut	Shrubland, nmanaged*	Grass	Grassland, nmanaged*	Corn		Paddy rice, non-irrigated	ice,	Other crops	sdo.	POTENTIAL EXPANSION
	S1	2.5	23		S1	2.5	S1	ZS	21	25	S1	25	S1	25	S1	25	AREA (Ha)
NLABEL	Ľ	ľ	Ľ		5,745	564	635	13	3,584	1,290	898	3	ŀ		ŀ		12,705
TTVN			ľ		7,445	5 2,498	06	33	2,421	1,094	211	32					13,82
GAMBA	Ľ	ľ	Ľ		5,250	52	407	131	147	38	1,410	ľ	ŀ		ŀ		7,43
AAASIM		ľ	Ľ		4,417	926 2	356	20	1,790	1,645	18	ľ		٠			9,29
AAITUM	Ľ	ľ	Ľ		2,944	4 670	117	47	96	53	1,441	7.1	ŀ		ŀ		5,43
AALAPATAN		ľ	Ľ		5,11	889	63	21	1,076	995	22	2	۰	۰	۰		192'2
MALUNGON	38	ľ	14	52	9,327	11	1,798	40	1,793	112	7,151	299		٠	7		30,996
TOTAL	38		14	52	40,24	5,643	3,465	988	10.900	4,956	11.189	210		٠	7		77,448

AGRONOMIC REQUIREMENT OF CACAO PRODUCTION

TYPE	CIII.IV	117														
ANNUAL CLI RAINFALL T (mm)	2001-4500 (,	1000-2000	<1000			- sandy clay	-silty clay	-clay	- heavy clay							
	200		∇ X		Fine	×	SiC	o	ЭН							
ELEVATION (masl)	<1000	1000-1500	>1500													
ROCK OUTCROPS	we-few	common	many			2	-loamy sand	coarse sandy loam	- sandy loam		- fine sandy loam	-loam	loam	- clay loam	silty clay loam	sandy clay loam
EROSION	none-slight	moderate	severe	SOIL TEXTURE	Coarse	purs- s	LS -loa	CSL -cox	SI - sar	Medium	PSI. fin	r - loa	Stlsalt	CL -cla	SiCL - silt	SCI sar
FLOODING	none-slight	moderate	severe													
INHERENT	high	medium	low	Hd.	extremely acid	-very strongly acid	- strongly acid	-medium acid	-slightly acid	76	- mildly alkaline	- moderately alkaline	 strongly alkaline 			
SOIL REACTION (pH)	5.6-7.2	51.55	<5.0 -> 7.9	SOIL REACTION (pH)	:45 extres		1 5.5 strong				7.3.7.8 mildly	9 84 mode	8.5 strony			
SOIL	WD,MWD	GA'GAS	VPD,ED		,	4			•	•						
SOIL TEXTURE	CI, SiCI, SCI, SC, SiC, C, HC	FSL, L, SIL	S, LS, CSL, SL	14	 excessively drained 	well drained	 moderately well drained 	somewhat poorly drained	- poorly drained	 very poorly drained 		EDIMENT	82	ne-few	mmon	, was
SOIL DEPTH (ст)	>100	50-100	<50	SOIL DRAINAGE	ED -ex	WD - W	MWD - m	os - Ods	PD - px	VPD - ve		SURFACE IMPEDIMENT	ROCK OUTCROPS	< 10% - none - few	10-30% - common	> 30% - many
SLOPE (%)	8	8-30	>30			dating		deats								
SUITABILITY RATING	13	ZS	53		- level to gently sloping	- gently sloping to undulating	- undulating to rolling	- rolling to moderately steep	d.	- very steep		î	v shallow	low	derately deep	deep to very deep
LAND UTILIZATION TYPE		Cacao		SLOPE (%)	0-3 -leve	3-8 - gen	8-18 -und	18-30 roll	30-50 steep	> 50 - ver		SOIL DEPTH (cm)	0 - 30 very shallow	30 - 50 shallow	50-100 - moderately deep	> 100 - dee

LAND LIMITATIONS DESCRIPTION AND COMBINATIONS SOIL DERANAGE

ELEVATION Bi2 -1000m-1500m Bi3 -> 1500m		SOIL DRAINAGE D2 - Somewhat D3 - Very poort	MINAGE omewhat p ery poorly	SOIL DRAINAGE 22 - Somewhat poorly drained to poorly drained 33 -Very poorly drained or excessively drained	drained	SOIL DEPTH Sh2 - Moder Sh3 - Verys	TH oderately d ery shallow	SOIL DEPTH th2 - Moderately deep (50-100cm) th3 - Very shallow to shallow (<50cm)	
SLOPE/TOPOGRAPHY TZ - Undulating to moderately steep T3 - Steep to very steep	ely steep	SOIL TEXTURE To -Coarse te	SOIL TEXTURE To -Coarse texture	٤		ROCK OUTCROPE Rc2 - Common Rc3 - Many	ROCK OUTCROPS Rc2 - Common Rc3 - Many		
CODE LIMITATION	CODE	LIMITATION CODE LIMITATION CODE	CODE	LIMITATION CODE	CODE	LIMITATION CODE	CODE	LIMITATION	00

,	E2-502-RC2		202-KC2	77	24512-EC3-RC3	35	3-E3-SUZ-RC3	7.	13-13-13-13-14-14-12-1	70	19-15-15-15-15-15-15-15-15-15-15-15-15-15-	
2	E12	12	T2	22	T2-E12-E3-Sh2-Rc2	32	T3-E3-Sh3-Rc2	42	T3-F2-D2	25	T3-E13	
3	EI2-E2-Sh2-Rc3	13	T2-E3	23	T2 E12 E3 Sh2 Rc3	33	T3-E3-Sh3-Rc3	43	T3	23	Tc	
*	E12-E3-Rc3	14	T2-E3-Rc2	24	T2-E13-E3-Rc3	34	T3-E12	44	T3-E3			
S	E12-E3-Sh2-Rc3	15	T2-E3-Rc3	52	T2 813 83 Sh2 Rc2	32	T3-E12-E3	45	T3-E3-Rc3			
9	E12-Re2	91	T2-E3-Sh2-Rc2	92	T2-F2-D2	36	T3-E12-E3-Re2	46	T3-E3-Sh3-Re3			
2	E12-Sh2-Rc2	- 21	T2-E3-Sh2-Rc3	22	T2-63-D2	32	T3-E12-E3-Sh2-Rc3	47	T3-E12			
8	E13-Sh2-Rc2	18	T2-E12	28	13	38	T3-E12-E3-Sh3-Rc2	-88	T3-E12-E3			
6	F2-D2	19	T2-E12-E3	53	T3-E3	33	T3-E12-E3-Sh3-Rc3	65	T3-E12-E3-Rc3			
10	F3-D2	20	T2-E12-E3-Rc2	30	T3-E3-R/2	40	T3-E13-E3-Sh2-Rc3	20	T3-E12-E3-Sh3-Rc3			

CODE

4 Com

81 Coffe

82 Caca

85 Man

91 Bane

105 Fruit

106 Cocu

116 Cocu

116 Cocu

116 Cocu

117 Cocu

118 Shrui

SUITABILITY CLASSES:

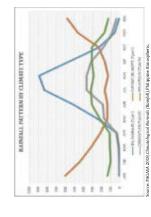


CLIMATE TYPE

TYPEI	 : Two pronouced season, dry from November to April and	TYPE II : No dry sea	No dry season with a very pronounced n
	wet during the rest of the year. Maximum rain period is		period from December to February, Then
	from June to September		dry month. Maximum monthly rainfall o
			period from March to May.



TYPE III:



LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

SOUTH COTABATO, REGION XIII

EXTENT OF SUITABILITY FOR CACAO PRODUCTION BY MUNICIPALITY

	L					EXP	EXPANSION AREA (Ha)	REA (Ha)		H			CO	VFLICT A	CONFLICT AREA (Ha)				
MUNICIPALITY	EXIST	EXISTING CACAO (Ha)	10 (Ha)	TOTAL EXISTING AREA (Ha)	Coconut	unt	Shrubland, unmanaged*	md,	Grassland, unmanaged*	and,	Соп	_	Pineapple	ple	Banana	EG .	Other crops	rops	POTENTIAL EXPANSION
	S1	22	\$3		S1	25	S1	ZS	SI	S2	S1	25	S1	25	S1	S2	S1	25	ANEA(DA)
BANGA	Ľ	Ľ	Ĺ		623	66			468	1,246	269'6	395			25				12,526
CITY OF KORONADAL	Ľ	Ľ			2,546	20	7.3	29	692	764	6,413	192							10,817
LAKE SEBU	Ľ	Ľ	Ĺ		9	516	20	154	755	2,525	1,155	2,827	r		۰	1			196'2
NORALA	Ľ	Ľ			387	120			380	338	2,071	34					٠		3,329
POLOMOLOK		Ĺ			843	692	2	389	11	1,030	8,824	2,407	3,519	4,056					21,850
SANTO NIÑO	Ľ	ľ			20		٠		19	۰	1,875	۰	ŀ	۲	۰		•	•	1,944
SURALLAH	Ľ	Ľ		•	819	7	66	۰	642	219	219 11,641	153		۰	ŀ		þ		13,584
TAMPAKAN	ľ				1,884		٠	611	384	692	2,990	۰	2						6,148
TANTANGAN	Ľ	Ľ			288	23	11	8	2,153	726	3,691	82	2	ľ	4				7,291
TBOUL				•	93	51	H	158	444	4,594	2,436	2,436 2,190	۰		1	1			896'6
TUPI	Ľ	Ľ			3,758	369	۰	39	320	1,641	1,931	1,726	4,061	914	۰				14,790
TOTAL		Ü		•	11,597	2,017	205	935	6,298	13,852	6,298 13,852 52,724 10,009	10,009	7,585	4,971	6	3	4	•	110,208
Note: Delivery of cacao planting materials must be started on the onset of rainy season.	g materic	als must b	be started	on the onset of ra.	iny season.														

SUITABILITY CLASSES:

Highly Suitable (S1)

Angle so significant limitation
application to significantly reduce principle in the configuration of the config

Moderately Suitable (S2)
Land having limitation which in a moderately sewere for sustainen given use; the limitation will red

CLIMATE TYPE

TYPE I. : Two promotes because day from November to goal and TYPE II. : Not for some that we represented in many format from the format from the format format format format from the format format format format format format from the format

TYPE III:

TYPE IV : Rainfall is more or less evenly distributed throughout the year. This type resembles Type II since it has no dry season.

RAINGALL PATTERN BY CLIMATE TYPE

AGRONOMIC REQUIREMENT OF CACAO PRODUCTION

LAND UTILIZATIOI TYPE	UTILIZATION RATING TYPE	SLOPE (%)	SOIL DEPTH (cm)	SOIL TEXTURE	SOIL	SOIL REACTION (pH)	INHERENT	FLOODING	EROSION	ROCK OUTCROPS	ELEVATION (masl)	ANNUAL RAINFALL (mm)	CLIMATIC	
	SI	89	>100	CL, SICL, SCL, SC, SIC, C, HC	WD,MWD	5.6-7.2	high	none-slight	none-slight	none-few	<1000	2001-4500	LIII, IV	
Cacao	ZS	8-30	50-100	FSL, L, SIL	SPD,PD	5.1 - 5.5	medium	moderate	moderate	common	1000-1500	1000-2000	11.11	
	SS	>30	<50	S, LS, CSL, SL	VPD,ED	<5.0->7.9	low	severe	alanas	many	>1500	<1000		
(%)			SOIL DRAINAGE	. 35		SOIL REACTION (pH)	(Hd)		SOIL TEXTURE					
0-3 -le	level to gently sloping	95	ED -ex	 excessively drained 	,	c45 extres	extremely acid		Coarse		E	Fine		
3-8	gently sloping to undulating	ulating	WD - W	well drained	•	4.5 5.0 very strongly acid	strongly acid		S -sanc		×		clay	
8 18 n	- undulating to rolling		MWD - m	 moderately well drained 	-	5.1 5.5 strongy acid	gly acid		LS -loan	- loamy sand	Š	SiC - silty clay	ie.	
18-30 -rs	rolling to moderately steep	daays.	SPD sxo	 somewhat poorly drained 		5.6 6.0 medium acid	um acid		CSL -coa	se sandy loam	C	- clay		
30-50 -81	-steep		PD - po	- poorly drained		61 65 slightly acid	by acid		SI sanc	-sandy loam	#	C - beavy	clay	
> 20	-very steep		VPD - ve	 very poorly drained 	-	6.6 7.2 neutral	Tel.		Medium					
						7.3 7.8 mildly alkaline	y alkaline		FSL - fine	- fine sandy loam				
SOIL DEPTH (cm)	(cm)		SURFACE IMPEDIMENT	EDIMENT		7.9 8.4 moderately alkaline	rrately alkaline		L -loan	-				
0 30 v	-very shallow		ROCK OUTCROPS	PS		×8.5 strong	 strongly alkaline 		StL stlt1	-silt loam				
30 - S0 - sl	- shallow		< 10% - none - few	ne-few					CL -clay	loam				
50-100 -n	moderately deep		10 30% common	nomm					SiCL -silty	- silty clay loam				
> 100 d	-deep to very deep		> 30% - many	any					SCL sand	by clay loam				

LAND LIMITATIONS DESCRIPTION AND COMBINATIONS ELEVATION SOLD DIAMAGE D2 - 1001m-1500m

5	LAIND LIMITATIONS DESCRIFTION AND COMBINATIONS	200	SCAL HONA	3	MIDITALION	•					
ELEV.	ELEVATION		SOIL DRAINAGE	INAGE			SOIL DEPTH	TH			S
EI2	-1000m -1500m		D2 S	mewhat	-Somewhat poorly drained to poorly drained	drained		foderatel	Sh2 - Moderately deep (50 - 100cm)		m
E113	-> 1500m		D3V	ery poorly	-Very poorly drained or excessively drained	drained	Sh3 V	ery shallo	- Very shallow to shallow (< 50cm)		(H)
SLOP	SLOPE/TOPOGRAPHY		SOIL TEXTURE	TURE			ROCK OF	ROCK OUTCROPS			100
17	T2 - Undulating to moderately steep	dy steep	D- 2L	Tc - Coarse texture	The same		Rc2 - Common	nommo			14
E	- Steep to very steep						Rc3 - N	Many			E.
CODE	EIMITATION	CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION	0	8
1	E2 Sh2-Rc2	11	T2	21	T2-E12-F2-D2	31	T3-E12-E3-Rc2	- 77	T3-E12		*
2	EIZ	12	T2-E3	22	T2-813-83	32	32 T3-E12-E3-Sh3-Rc2	- 45	42 T3-E12-E3	_	81
65	E12-E2-Sh2-Rc3	13	T2-E3-Rc2	23	T2-E13-E3-Sh2-Rc2	33	33 T3-E12-E3-Sh3-Rc3	69	43 T3-E12-E3-Rc3	L	82
*	E12-E3-Sh2-Rc3	14	T2-E3-Sh2-Rc2	24	T3	34	34 T3-E12-F2-D2	50	44 T3-E12-E3-Sh3-Rc3		8
S	E12-F2-D2	57	T2-E3-Sh2-Rc3	25	25 T3-B3	32	35 T3-813-83	- 42	45 T3-El3-E3	Ш	16
9	El2-Rc2	16	T2-E12	52	T3-E3-Rc2	36	T3 El3 E3 Sh3 Rc2	46	46 T3-El3-E3-Sh3-Rc3		105
7	E12-Sh2-Rc2	- 27	T2-E12-E3	27	T3-E3-Sh3-Rc2	32	T3				116
8	E13-Sh2-Rc2	18	T2-E12-E3-Rc2	28	T3-E3-Sh3-Rc3	38	T3-E3				126
6	F2-D2	67	19 TZ-E12-E3-Sh2-Rc2	52	29 T3-E12	33	T3-E3-Rc3				134

312	*	Corm
312-E3	18	Coffee
312-E3-Rc3	82	Cacao
32-E3-Sh3-Rc3	88	Mango
313-E3	16	Banana
313-E3-Sh3-Rc3	105	Fruit trees, mixed
	116	Coconut
	126	Grassland
	134	Shrubs, unmanaged

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

SULTAN KUDARAT, REGION XIII

EXTENT OF SUITABILITY FOR CACAO PRODUCTION BY MUNICIPALITY

						EXF	ANSION	EXPANSION AREA (Ha)	(8)			ŭ	CONFLICT AREA (Ha)	REA (Ha)		٦	
MUNICIPALITY	EXIST	EXISTING CACAO (Ha)	(Ha)	TOTAL EXISTING AREA (Ha)	Coconut	nut	Shrubland, unmanaged*	land,	Grassland, unmanaged*	land, aged*	3	Corn	Oil palm	4	Other crops	sd	POTENTIAL
	\$1	25	83		S1	25	S1	ZS.	SI	25	S1	25	S1	25	SI	ZS	AREA (Da)
AGUMBAYAN					2,527	225	28		342	5,303	3,623	10,892	22	31			23,374
TY OF TACURONG	ĺ	Ĺ			162	•	Þ	•	2,904	29	3,175	•	1,809	١	6		8,122
OLUMBIO					41		14	8	4,312	237	1,942		ľ	۰			6,555
SSPERANZA	ĺ	Ĺ			692	603	ľ	31	28	100	168'8	1,567		٠		٠	6,913
SULAN					461	280	28	179	•	1,317	4,999	1,319	1,556	146			10,285
ALAMANSIG	ĺ	Ĺ			2,516	•	371	10	173		22			٠		٠	3,147
AMBAYONG					152					•	4,262	11	ľ	۰			4,425
EBAK	20	Ĺ		20	4,456	2,035	87	109	210	92	520	2,258			1		692'6
JTAYAN					920		331	•	638		3,857		ľ				5,746
ALIMBANG					6,589	871	9	747	•	1,447	1,276	1,656		٠			12,593
RESIDENT QUIRING	ľ	ľ			1,277	•				•	3,590		•	۰			4,868
EN, NINOY AQUINO						١				3,208		- 12,607		٠			15,815
TOTAL	20	ľ		20	19,795	4,310	668	1,084	8,607	11,764	31,212	30,312	3.442	177	10		111,611

AGRONOMIC REQUIREMENT OF CACAO PRODUCTION

LAND TILIZATION TYPE	TILIZATION SUITABILITY TYPE TYPE	SLOPE (%)	SOIL DEPTH (cm)	SOILTEXTURE	SOIL	SOIL REACTION (pH)	INHERENT	FLOODING	EROSION	ROCK	ELEVATION (masl)	ANNUAL RAINFALL (mm)	CLIMATIC	
	SI	8	>100	CL, SICL, SCL, SC, SIC, C, HC	WD,MWD	5.6-7.2	high	none-slight	none-slight	none-few	<1000	2001-4500	C.III, IV	
Cacao	ZS	8-30	50-100	FSL, L, SIL	SPD,PD	51-55	medium	moderate	moderate	common	1000-1500	1000-2000	11'11	
	SS	>30	<50	S, LS, CSL, SL	VPD,ED	<5.0->7.9	low	severe	severe	many	>1500	<1000		
LOPE (%)			SOIL DRAINAGE	. 88		SOIL REACTION (pH)	(bd)		SOIL TEXTURE		-			
-3 -lev	-level to gently sloping		ED -ex	excessively drained	•	c4.5 extre	extremely acid		Coarse		Ē	Fine		
-8 -ge-	- gently sloping to undulating	nating	WD - we	well drained	4	45 5.0 very	very strongly acid		S - sand	_	SC		lay	
- 18 - unc	-undulating to rolling		MWD - mc	moderately well drained	-,	51 5.5 stron	strongly acid		LS - loan	loamy sand	SiC	silty clay	۵.	
3-30 -rol	-rolling to moderately steep	steep	SPD - so,	somewhat poorly drained		5.6 6.0 medi	medium acid		CSI - coar	coarse sandy loam	O	-clay		
0-50 -steep	dax		od- dd	- poorly drained		6.1 6.5 slight	slightly acid		SI sanc	sandy loam	H	- heavy	ilay	
50 -ver	-very steep		VPD -ve	 very poorly drained 		6.6-7.2 neutral	72		Medium					
					•	73-78 mildl	- mildly alkaline		FSL - fine	fine sandy loam				
OIL DEPTH (cm)	(H		SURFACE IMPEDIMENT	EDIMENT		79-84 mode	moderately alkaline		L -loam					
-30 -ver	-very shallow		ROCK OUTCROPS	PS -	Д	-8.5 stron	 strongly alkaline 		Sil silt.	- silt loam				
0 - 50 shallow	allow		< 10% - none - few	ne-few					CL - clay	- clay loam				
0-100 -mc	0-100 -moderately deep		10 30% - common	mmon					SICL - silty	silty clay loam				
100 - dec	-deep to very deep		> 30% - many	, me					SCI sand	sandy clay loam				

LAND LIMITATIONS DESCRIPTION AND COMBINATIONS

ELEVATION	TION		SOIL DRAINAGE	AGE			SOIL DEPTH			SOII	SOIL EROSION	
EI2	El2 -1000m-1500m		D2 - Some	ewhat poo	- Somewhat poorly drained to poorly drained	ined	Sh2 - Moderately deep (50-100cm)	ately deep	(50-100cm)	E2	- Moderate erosion	
Ell3	El3 -> 1500m		D3 - Very	poorly dr	-Very poorly drained or excessively drained	pau	Sh3 - Very sl	hallow to s	Sh3 - Very shallow to shallow (< 50cm)	83	Severe erosion	
SLOPE,	SLOPE/TOPOGRAPHY		SOIL TEXTURE	IRE			ROCKOUTCROPS	SdO		FLO	FLOODING	
2 2	TZ - Undulating to moderately steep T3 - Steep to very steep	y steep	Tc - Coarse texture	se texture			Rc2 -Common Rc3 -Many	El C		2 2	-Moderate seasonal flooding -Severe seasonal flooding	99
CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION	COD
1	E2-Sh2-Rc2	11	11 F2-D2	21	T2-El2-E3	31	31 T3-E3	41	41 T3-El3-E3-Sh3-Rc2	51	T3-E12-E3-Sh3-Rc3	Ш
2	E12	12	12 F3-D2	22	T2-E12-E3-Rc2	32	T3-E3-Rc2	42	42 T3-E13-E3-Sh3-Rc3	25	52 T3-El3-E3	Ш
3	E12-E2-Sh2-Rc3	13	13 Sh2	23	T2-E12-E3-Sh2-Rc2	33	33 T3-E3-Sh3-Rc2	43	43 T3-F3-D2	23	53 T3-E13-E3-Sh3-Rc3	82
*	E12-E3-Sh2-Rc3	14	14 Sh2-Rc2	24	T2 E12 E3 Sh2 Rc3	34	34 T3-E3-Sh3-Rc3	## T3	T3	35	T3-El3	16
S	E12-Rc2	15	15 T2	25	T2-E13-E3	32	35 T3-E12	45	45 T3-E3	SS	Tc	116
9	E12-Sh2-Rc2	91	16 T2 E3	52	T2-E13-E3-Sh2-Rc2	36	36 T3-E12-E3	46	46 T3-E3-Rc3			119
7	El2-Sh2-Rc3	17	T2-E3-Rc2	27	T2-El3-E3-Sh2-Rc3	37	T3-E12-E3-Rc2	45	T3-E3-Sh3-Rc3			126
8	EI3	18	T2-E3-Sh2-Rc2	28	T2-F2-D2	38	T3-E12-E3-Sh3-Rc2	48	48 T3-E12			134
6	E13-E3-Sh2-Rc3	61	T2-E3-Sh2-Rc3	53	ZQ-£4-Z.L	36	39 T3-E12-E3-Sh3-Rc3	64	49 T3-E12-E3			Ш
70	10 E13-Sh2-Rc2	20	20 T2-E12	30 T.3	13	40	40 T3-EI3-E3	20	50 T3-E12-E3-Rc3			L

SUITABILITY CLASSES: Integration is the statement of the

CLIMATE TYPE

TYPE II : No day season with a wery pronounced maximum rain period from December to Schrausy. There is not a single day month, Maximum monthly rainfall occurs during the period from March to May.	TVBERV: Bainfall's more or less evenly distributed throughout the year. This type resemblen type II since it has no dry season.
TYPE: Two pronouced season, dry from November to April and wet during the vest of the year-Maximum rain period is from June to September	TYPE III; No very pronounced maximum rain period, with a dry asson its large only from each of three months, either section for the period of the control of
TYPE	TYPE

BARNARILE PATTTERN BY CLIMATETTEPE

THE STATE OF THE STAT

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

AGUSAN DEL NORTE, REGION XIII

EXTENT OF SUITABILITY FOR CACAO PRODUCTION BY MUNICIPALITY

						EX	EXPANSION AREA (Ha)	AKEA (HE	a)			CONFLIC	CONFLICT RESOLUTION AREA (Ha)	I ION A	EA (Ha)		
MUNICIPALITY	EXIST	EXISTING CACAO (Ha)	(Ha)	TOTAL EXISTING AREA (Ha)	Coconul	nut	Shrubland, unmanaged*	and,	Grassland, unmanaged*	land, aged*	3	Corn	Padd) non-irr	Paddy rice, non-irrigated	Other crops	crops	POTENTIAL EXPANSION
	S1	25	83		S1	25	S1	25	S1	25	S1	25	S1	25	S1	25	AREA (na)
DENAVISTA	1	ľ	Ľ	1	7,898	103	434	130	892	80	089	ľ					10,216
UTUAN CITY		ľ	Ľ		20,582	2	249	4	200	٠	7,145	Ľ			٠		28,181
ARMEN					1,839	92			362		141						2,370
TY OF CABADBARAN		ĺ	Ĺ	٠	3,703	۰	•		199		2,974	ľ					9/8/9
BONGA		ľ	_	1	1,031	221			109	16	820	ľ.					2,197
TCHARAO	T			1	1,038	62	15	1	24	9	307						1,420
AS NIEVES		1		1	6,345	365	450	٢	319		1,381	7					898'8
AGALLANES	Ī	ĺ	1	1	815			•	•		183	ľ					466
ASIPIT					1,175	23			616	62	420						2,262
EMEDIOS T, ROMUALDEZ	1	ĺ	Ĺ	1	874						543						1,417
ANTIAGO	2	ľ	Ľ	2	1,417			ľ	159		460				1	1	2,036
UBAY	Ţ		ĺ	1	1,996	338			13	164	445						2,955
TOTAL	9	_	2	89	48,714	1,107	1,148	134	2,893	296	15,498	1~	•	•	•	•	69,795

SUITABILITY CLASSES: Highly Suitable (S1) Land having so significantly reduce pot application of a given use, or only maken will not a given to be prefered to the world of the sea of the

Marginally Suitable (S3)
Land having limitations volich in aggregate are
severe for standen application of a given use and
will so reduce productivity or benefits, or increase
required inputs has this sexpenditure will be only
marginally instified.

AGRONOMIC REQUIREMENT OF CACAO PRODUCTION

CLIMATIC	L.III, IV	11.11				clay	av.		clay							
ANNUAL RAINFALL (mm)	2001-4500	1000-2000	<1000		Fine			-clay	heavy							
ELEVATION (masl)	<1000	1000-1500	>1500		Œ	8	SiC	U	Ĭ							
ROCK	wej-euou	common	many			_	- loamy sand	coarse sandy loam	-sandy loam		- fine sandy loam	_	silt loam	- clay loam	silty clay loam	- sandy clay loam
EROSION	none-slight	moderate	severe	SOIL TEXTURE	Coarse	pues - s	LS -loar	CSI coan	SI. sanc	Medium	FSL - fine	L -loam	Silsilt.	CL - clay	SiCL silty	SCI - same
FLOODING	none-slight	moderate	severe													
INHERENT	high	medium	low	(Hd	 extremely acid 	-very strongly acid	- strongly acid	- medium acid	- slightly acid	Tel.	mildly alkaline	-moderately alkaline	strongly alkaline			
SOIL REACTION (pH)	5.6.7.2	51-55	<5.0 -> 7.9	SOIL REACTION (pH)	:4.5 extres	45-50 very s	5.1-5.5 strong	5.6-6.0 medit	6.1 6.5 slight	66 7.2 neutral	73.78 mildly	79-84 mode	-8.5 strong			
SOIL	WD,MWD	OH, GPD, PD	VPD,ED		,	4					,,		^			
SOIL TEXTURE	CL, SICL, SCL, SC,	FSL, L, SIL	S, LS, CSL, SL		 excessively drained 	well drained	-moderately well drained	 somewhat poorly drained 	-poorly drained	-very poorly drained		EDIMENT	Sc	ne-few	поши	nv
SOIL DEPTH (ст)	>100	50-100	<50	SOIL DRAINAGE	ED -exo	WD -wc	MWD - mc	SPD - so	PD - po	VPD -ve		SURFACE IMPEDIMENT	ROCK OUTCROPS	< 10% - none - few	10 30% common	> 30% - many
SLOPE (%)	8>	8-30	>30			alating		steep								
LAND SUITABILITY TYPE RATING	S1	25	SS		el to gently sloping	3-8 - gently sloping to undulating	dulating to rolling	18-30 - rolling to moderately steep	de	- very steep		î	y shallow	llow	derately deep	- 100 - deep to very deep
LAND UTILIZATION TYPE		Cacao		(%) 34OTS)-3 -lev	3-8 - ger	3-18 -um	18-30 - rol.	30-50 -steep	.50 -ver		SOIL DEPTH (cm)	30 -very shallow	30 50 shallow	50 100 moderately deep	· 100 - des

CLIMATE TYPE

11461 in wel chroning the executed by Sect. Machinum Falls period is a first in well-chroning the executed by Sect. Machinum Falls period is a first in well-chroning the sect. Machinum Falls period in the September Sect. Machinum Falls for in the September Sect. Machinum Falls for period from Machinum Sect. Machinum Falls for period from Machinum Sect. Machinum Falls for the Sect. Machinum	TYPE III: No very presenced rankinum nik period with 4cty TYPE IV: I shadell is near or loss evenly distributed throughout the diverse like period from the best reaches evenly effective the second section. March 10, 8,7, 16 spec recentleer to Reheart or the second section. March 10, 8,7, 16 spec recentleer Type I since it has no dry substant of years.
wet during the rest of the from June to September	1 : No very pronounce season lasting only during the period fi March to May This a short dry season.
	TYPEIII

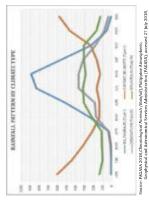
SOIL EROSION E2 - Moderate erosion E3 - Severe erosion

SOIL DEPTH Sh2 - Moderately deep (50-100cm) Sh3 - Very shallow to shallow (<50cm)

LAND LIMITATIONS DESCRIPTION AND COMBINATIONS
RELEVANTOM
ET - 1000n-1500n DZ - Somewhat peoply dained to postry durined
ET - 1000n-1500n DZ - Somewhat peoply dained to postry durined
ET - 1500n

SLOPE/TOPOGRAPHY
T2 - Undulating to moderal
T3 - Steep to very steep

ROCK OUTCROPS Rc2 - Common Rc3 - Many



LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

AGUSAN DEL SUR, REGION XIII

EXTENT OF SUITABILITY FOR CACAO PRODUCTION BY MUNICIPALITY

						EXI	EXPANSION AREA (Ha)	VREA (H:	_		-	CONFLIC	r resoll	CONFLICT RESOLUTION AREA (Ha)	EA (Ha)		
MUNICIPALITY	EXISTI	EXISTING CACAO (Ha)	0 (Ha)	TOTAL EXISTING AREA (Ha)	Coconut	nut	Shrubland, unmanaged*	and, ged*	Grassland, unmanaged*	and,	Oil Palm	щ	Co	Corn	Other crops	crops	POTENTIAL EXPANSION
	S1	22	23		S1	25	S1	25	S1	2.5	S1	25	S1	25	S1	SZ	AKEA (Ha)
JNAWAN	104	4		108	5,953	225	721	ľ	2,645	89	180	ľ			534	34	10,380
TY OF BAYUGAN	93	79	•	172	2,664	12	1,484	2	5,606	298	r	Ī			278	•	10,913
SPERANZA	336			336	1,573	428	3,942	112	10,084	63	ľ				114	11	16,327
APAZ	168	10	•	178			7,113	128	4,096	228	r	ľ			102	•	11,667
DRETO	31			31	484		9,478	108	7,747	15	ľ				179	•	18,012
OSPERIDAD	3	•		3	1,967	252	295	46	10,765	1,500	ŀ	ľ			920	9	15,802
OSARIO	•				3,900	7.5	1,637	21	2,200	4	1,598				702	•	10,137
AN FRANCISCO	2		·	2	2,784	18	550	248	2,899	413	3,536	Ī	•	·	831	23	11,333
IN LUIS	•			•	1,493		15,727	420	8,235	58	ŀ				427		26,359
INTAJOSEFA				•	1,172	7	1,644	12	51	·	2,687	-		•	7.5	•	5,649
BAGAT	44	22		65	321		3,689	419	3,152	1,268	۰	Ì			99		8,914
ALACOGON	62		•	62	3,448		8,335	3	2,323	80	09			•	200	2	14,679
RENTO	1	1		2	15,770	294	2,744	۰	521	۰	467				20		19,817
ERUELA	121	T	•	122	4,688		10,005	106	861	•	216			•	107	•	15,620
TOTAL	932	117	•	1.049	46.218	1.311	598'29	1.675	1.675 60.523	4.513	9.044				4.854	106	195.609

AGRONOMIC REQUIREMENT OF CACAO PRODUCTION

LAND TILIZATION TYPE	SUITABILITY RATING	SLOPE (%)	SOIL DEPTH (cm)	SOIL TEXTURE	SOIL DRAINAGE	SOIL REACTION (pH)	INHERENT	FLOODING	EROSION	ROCK OUTCROPS	ELEVATION (masl)	ANNUAL RAINFALL (mm)	CLIMATIC
	S1	8>	>100	CL, SICL, SCL, SC, SIC, C, HC	WD,MWD	5.6-7.2	high	none-slight	none-slight	waj-auou	<1000	2001-4500	L.III, IV
Cacao	25	8-30	50-100	FSL, L, SIL	GPD,PD	5.1-5.5	medium	moderate	moderate	uowwoo	1000-1500	1000-2000	11.11
	S3	>30	<50	S, 1.S, CS1, S1.	VPD,ED	<5.0->7.9	wol	asanes	severe	Auem	>1500	<1000	
Š) lond recommended and one		SOIL DRAINAGE	NAGE		SOIL REACTION (pH)	(pH)		SOIL TEXTURE				
	eres to gently atoping	dotino	9	unall degined		TE GO NORTH	ethery actu		ocupae compa	_	5		lone
	muy stoping to unar	mennig		All distilled		to see very scrongly acid	strongy actu				8 8	service can	Sedy
	 undulating to rolling 		_	 moderately well drained 		51 55 stroi	igly acid		LS - loan	- loamy sand	SIC.		۵
8-30 -ro	- rolling to moderately strep	strep	SPD so	 somewhat poorly drained 		56-60 mediumacid	ium acid		CSI, - coan	coarse sandy loam	0		
	daags		pp - px	- poorly drained	~	61-65 slight	- slightly acid			- sandy loam	H		lay
50 -ve	- very steep		VPD -ve	 very poorly drained 	7	5.6 7.2 neutral	ral		Medium				
						7.3 7.8 mildly alkaline	ly alkaline		FSL - fine	- fine sandy loam			
OIL DEPTH (cm)	(m)		SURFACE IMPEDIMENT	EDIMENT		79-84 - moderately alkaline	erately alkaline		L -loam				
 30 very shallow 	rry shallow		ROCK OUTCROPS	JPS		-85 stron	 strongly alkaline 		Sil silt1	- silt loam			
0-50 shallow	allow		< 10% - none - few	waj - auc					CL - clay	loam			
0-100 -m	0-100 - moderately deep		10 - 30% - common	иоши					SICL - silty	-silty clay loam			
100 - de	- deep to very deep		> 30% - many	any					SCI - same	sandy clay loam			

	CHOILE GIVE CONTRACT TO THE CONTRACT OF THE CO					2					
ELEVA	ELEVATION		SOILD	SOIL DRAINAGE			HIA30 DEPTH	PTH			SOILE
E13	-1000m -1500m -> 1500m		D2 D3	Somewhat Very poorly	-Somewhat poorly drained to poorly drained -Very poorly drained or excessively drained	y drained drained		Anderatel	Sh2 - Moderately deep (50-100cm) Sh3 - Very shallow to shallow (<50cm)		E2
SLOPE	SLOPE/TOPOGRAPHY		L'IIOS	SOIL TEXTURE			ROCKOL	ROCK OUTCROPS			FLOOD
21	- Undulating to moderately steep	dy steep	Tc	Tc -Coarse texture	nue		Rc2 - Common	nommon			12
E E	-Steep to very steep						Rc3 - Many	famy			22
CODE	LIMITATION	CODE	UMITATION	CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION	CODE	9
1	E2-Sh2-Rc2	11	11 F3-D2	21	T2-E12-E3	31	31 T3-E3-Sh2-Rc3	41	41 T3-El3-E3-Sh3-Rc2	*	Corn
2	EIZ	12	Sh2	22	T2-E12-E3-Rc2	32	T3-E3-Sh3-Rc2	45	13	81	
3	E12-E2-Sh2-Rc3	13	Sh2-Rc2	23	TZ-E12-E3-Rc3	333	T3-E3-Sh3-Rc3	43	T3-E3	82	Caca
9	E12-E3-Rc3	14	T2	27	T2 E12 E3 Sh2 Rc2	₩.	T3-E12	20	T3-E3-Rc3	88	
2	E12-E3-Sh2-Rc3	15	T2-E3	22	T2 E12 E3 Sh2 Rc3	32	35 T3-E12-E3	45	45 T3-E3-Sh3-Rc3	16	Banz
9	E12-Rc2	91	T2-E3-Rc2	56	TZ-El3-E3-Sh2-Rc2	36	36 T3-El2-E3-Rc2	9#	46 T3-E12	88	Ram
2	E12-Sh2-Rc2	- 12	T2-E3-Rc3	22	T2 F2 D2	37	37 T3-E12-E3-Sh2-Rc3	20	47 T3-E12-E3	105	5 Fruit
8	E12-Sh2-Rc3	18	T2 E3 Sh2 Rc2	28	T3	38	T3-E12-E3-Sh3-Rc2	48	T3-E12-E3-Rc3	107	7 Abac
6	El3-Sh2-Rc2	19	T2-E3-Sh2-Rc3	53	T3-E3	39	T3-El2-E3-Sh3-Rc3	49	T3-E12-E3-Sh3-Rc3	115	
10	F2-D2	20	20 T2-E12	30	T3-E3-Rc2	40	40 T3-El3-E3-Rc2	20	50 T3-El3-E3-Sh3-Rc3	116	116 Cocc

Marginally Stiliable (S3) Land laving limitations which in aggregate are grown for stastland ordering the order growing on a grown use and will so return productivity for their control control or and an arrangement of parts. But his expenditure will be only marginally justified.	Not Sultable / Not Relevant Lucal bowering Instances where my summanishe In me bowering Instances with my better In me bout white cannot be corrected with existing Instances of the sultable
SUITABILITY CLASSES; Highly scribted (CI) Land Lande lander or sequenteral martine no sestained application of a green task or other and marken that well not againframely reduce productivity or benefits and will not mise injust above an exceptibile level.	Moderately Sultable (S2) aggregate are familiar being intermedy Sultable (S2) aggregate are moderately severe for satisfied application of a given use for satisfied application of a given use for limitation will represent the productively or that the overall attendant on the pained from the constitution of the produc

CLIMATE TYPE

TYPEI	TYPE: Two pronounced states, day from November to April and west during the rest of the year Maximum rain period is from June to September	TYPE II: She day season with a wryp promoted maximum rain period from December to Sebruary. There is not a single dry month, Maximum monthly rainfall occurs during the period from March to May.
TYPE III :	TYPE III: No very pronounced maximum rain period, with a dry season lasting only from one to three months, either during libe period from December to lefterary or from March to May, This type resembles Type I since it has a short of vession.	TYPE IV: Rainfull is more or less evenly distributed throughout the year. This type resumbles Type II since it has no dry season.

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

DINAGAT ISLAND, REGION XIII

EXTENT OF SUITABILITY FOR CACAO PRODUCTION BY MUNICIPALITY

						EX	ANSION	EXPANSION AREA (Ha)	a))	ONFLIC	CONFLICT RESOLUTION AREA (Ha)	TION ARI	A (Ha)		10101
MUNICIPALITY	EXISTI	EXISTING CACAO (Ha)	0 (На)	TOTAL EXISTING AREA (Ha)	Cocc	Coconut	Shrub	Shrubland, inmanaged*	Grassland, unmanaged*	and,	Corn		Paddy rice, non-irrigated	ice, gated	Other crops	sdo	POTENTIAL EXPANSION
	S1	25	S3		S1	25	S1	25	S1	S2	S1 S2	SS	S1	25	S1	25	AREA (Ha)
PASILISA			1	1	325	432	266	266	205	1,092	63	80	ŀ		ŀ.		2,729
OVNVIGDVO			1	1	202	153	185	281	232	920	157	171		•			2,933
DINAGAT	ľ				757	156	8	1	238	28	63	33	٠				1,282
ofarr				•	306	128	138	933	214	2,636	64	375	ŀ		ŀ.		4,824
LORETO	ľ			•	417	550	73	373	132	208	218	289	ľ		ľ		2,760
SAN JOSE	ľ				277	230	2	66	7	89	15	56	٠				724
TUBAJON	1	2	1	3	111	473	20	132	185	1,724	49	68					2,782
TOTAL	1	2	2	+	5,696	2,121	693	2.084	1,512	7.208	829	1,063					18,035

SUITABILITY CLASSES:

Highly Suitable (S1)

Land Moving no significant in

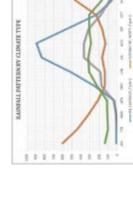
papilication of agonificant or

papilication of agonificant or

benefits and will not significantly rebenefits and will not raise in

coepable level.

CLIMATE TYPE
TYPE: Two pronouced season, wet during the rest of the from June to September



AGRONOMIC REQUIREMENT OF CACAO PRODUCTION

-	_	_		ı
CLIMATIC	UIIIII	1171		chay ay chay
ANNUAL RAINFALL (mm)	2001-4500	1000-2000	<1000	Fine SG - sandy clay SG - salty clay SG - clay SG - clay SG - clay AG - heavy clay
ELEVATION (masl)	<1000	1000-1500	>1500	Filter
ROCK OUTCROPS	none-few	common	many	TURE -sand -loamy sand -coars sandy loan -coars sandy loan -fine sandy loan -loam -sity clay loan -sity clay loan -sity clay loan -sity clay loan
EROSION	none-slight	moderate	severe	SOIL TEXTURE Coarse S - sand IS - leamy san CSL - coarse sa SL - coarse sa Medium - sandy loa FSL - leom SIL - leam GL - cleam GL - cleam GL - cleam SIL - silt leam GL - cleam SIL - silt leam GL - cleam SIL - silt leam SIL - silt leam SIL - silt leam SIL - silt leam SIL - silt leam SIL - silt leam SIL - silt leam SIL - silt leam SIL - sandy cla
FLOODING	none-slight	moderate	severe	
INHERENT	high	medium	low	cutron (ph) -extremely acid -extropy acid -extropy acid -extropy acid -inclium acid -i
SOIL REACTION (pH)	5.6-7.2	5.1.5.5	<5.0 -> 7.9	5011. REACTION (p.ft) 4-45 - extremely 4-5 - extremely 54 5.0 - very seron 54 5.0 - very seron 64 6.0 - medium a 66. 7.2 - medra a 66. 7.2 - medra a 7.9 - 8.4 - medra a 7.9 - 8.4 - medra a 8.8.5 - strongly a
SOIL	WD,MWD	GH,GRS	VPD,ED	
SOILTEXTURE	CL, SICL, SCL, SC, SIC, C, HC	FSL, L, SiL	S, LS, CSL, SL	NAGE Conserved drained veel drained veel drained veel drained ponty drained ponty drained ponty drained myegony drained ponty drained myegony drained
(сш)	>100	50-100	<50	SOIL DRAINAGE ED - caccassedy (WD - well denined) MWD - mederately well channed (PD - poorly denin (PD - poo
SLOPE (%)	8>	8-30	>30	lating steep
LAND SUITABILITY UTILIZATION RATING TYPE	SI	ZS	83	10 of the control of
LAND UTILIZATION TYPE		Cacao		SLOPE (%)

LAND LIMITATIONS DESCRIPTION AND COMBINATIONS

ELEV	ELEVATION		SOIL	SOIL DRAINAGE	GE			
El2	-1000m -1500m		DZ	- Somev	- Somewhat poorly drained to poorly drained	poorly drained	_	
El3	->1500m		D3	- Very p	-Very poorly drained or excessively drained	sively drained		
SLOPI	SLOPE/TOPOGRAPHY		TIOS	SOIL TEXTURE	w			
22	- Undulating to moderately steep - Steep to very steep	itely stoep		Tc - Coarse texture	- texture			
CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION		CODE	ı
1	E2	11	T2-E3	21	T3-E3-Sh3-Rc3	_	4	8
2	E2-Sh2-Rc2	12	T2-E3-Rc3	22	T3-E12-E3-Sh3-Rc3		28	ಿ
8	E12-E3-Rc3	13	T2-E12-E3-Rc3	23	T3-E13		116	8
4	El2-Sh2-Re2	ž	T2-F3-D1	24	Tc	_	126	Ü
55	F2-D1	15	T3				134	ő
9	F2-Tc	91	T3-E3					Ш
	F3-D1	- 17	T3-E3-Sh2-Rc3					
8	Sh2	18	T3-E12-E3-Sh2-Rc3					
			FO 00 000				Ī	

2 2	Day Man
F2	Rc2 - Common
FLOOD	ROCK OUTCROPS
E3	Sh3 - Very shallow to shallow (< 50cm)
E2	Sh2 - Moderately deep (50-100cm)

SOIL DEPTH

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

SURIGAO DEL NORTE, REGION XIII

ENT OF SUITABILITY FOR CACAO PRODUCTION BY MUNICIPALITY

					Ш	EX	EXPANSION AREA (Ha)	AREA (H	a)		٠	ONFLICT	CONFLICT RESOLUTION AREA (Ha)	TION AR	A (Ha)		1000
MUNICIPALITY	EXIST	EXISTING CACAO (Ha)	10 (Ha)	TOTAL EXISTING AREA (Ha)	Coo	Coconut	Shrubland, unmanaged*	land,	Grassland, unmanaged*	and,	Сот	-	Paddy rice, non-irrigated	rice, gated	Other crops	sdo.	POTENTIAL EXPANSION
	S1	2.5	S3		S1	2.5	S1	25	SI	S2	S1	25	S1	25	SI	25	AKEA (Da)
ALEGRA	3	•		•	1,321	95	24	4	9	•	382	•		•		٠	1,793
BACUAG	,	,			1,350	7	7.1	•	381		528	7					2,339
BURGOS		Ĺ			198	ľ	190		ľ		207	,			ľ		1,258
	,	•			711	685	20	122	193	1,210	247	210					3,302
					2,318	13	187	6	345	•	305						3,177
DEL CARMEN		•			4,196	15	906	1	248	•	1,434					·	6839
GENERAL LUNA					1,341	•	710	66			1,302	*				٠	3,453
GIGAQUIT					1,451	246	218	8	62		644	193					2,822
	,		_		4,236	14	49	3	139	8	1,289	11					5,749
MALIMONO					764	135		12	80	123	49	9					1,169
					2,397		427		18		1,568	•	•	•		٠	4,411
		,			1,677	£06	19	ř	214	15	232	32					3,092
SAN BENITO				•	1,150		212	2	10	•	88	•					1,770
SAN FRANCISCO	,	•		7	549	EII			38	24	147						871
SAN ISIDRO	ľ	ľ	ľ	ľ	1,981		645		ľ		1,284						3,910
SANTAMONICA	•	•		•	1,715	S	89	•	+		375	2					2,173
					3,048	408	•	62	191	20	546	67					4,340
SOCORRO		ĺ			532	318	331	315	86	1,570	292	881	•	ľ	•	·	4,808
SURIGAO CITY		•		7	3,845	196	362	168	1,825	1,285	2,323	294					11,356
TAGANA-AN					1,467	391	'n	2	29	m	130	52					2,053
		•			1,214	35	47	•	21	•	264	23					1,630
TOTAL		Ĺ		c	30.125	2011	4010		-			-	l	l		ŀ	

. Delivery of cacao planting materials must be started on the onset of ra searblishment of stade trace prior to planting of page

AGRONOMIC REQUIREMENT OF CACAO PRODUCTION

LAND UTILIZATIO TYPE	LAND SUITABILITY UTILIZATION RATING TYPE	SLOPE (%)	SOIL DEPTH (cm)	SOILTEXTURE	SOIL	SOIL REACTION (pH)	INHERENT	FLOODING	EROSION	ROCK OUTCROPS	ELEVATION (masl)	ANNUAL RAINFALL (mm)	CLIMATIC
	IS	8	>100	CL, SICL, SCL, SC, SIC, C, HC	WD,MWD	5.6-7.2	high	none-slight	none-slight	none-few	<1000	2001-4500	UIIIII
Cacao	ZS	8-30	50-100	FSL, L, SIL	GP, PD	5.1-5.5	medium	moderate	moderate	иошшоэ	1000-1500	1000-2000	11'11
	SS	>30	<50	S, LS, CSL, SL	VPD,ED	<5.0->7.9	low	severe	severe	many	>1500	<1000	
SLOPE (%)			SOIL DRAINAGE	AGE	,	SOIL REACTION (pH)	(bd)		SOIL TEXTURE				•
0-3	-level to gently sloping	9.0	ED	 excessively drained 		< 4.5 extremely acid	mely acid		Coarse		Œ	Fine	
3-8	- gently sloping to undulating	fulating	WD	- well drained	-	15 50 very:	- very strongly acid		S sand	_	8		rlay
8-18 -1	-undulating to rolling		MWD - n	- moderately well drained		5.1 5.5 strongly acid	gly acid		LS -loan	- loamy sand	Si	SiC - silty clay	Át.
18-30 -1	-rolling to moderately steep	, steep	s- das	somewhat poorly drained		56 60 medit	- medium acid		CSI coar	- coarse sandy loam	U	-clay	
30-50	-steep		d- dd	poorly drained	_		- slightly acid		SI sand	- sandy loam	HC		clay
> 50	-very steep		VPD v	 very poorly drained 	_	66 72 neutral	le:		Medium				
						73.78 mildly	- mildly alkaline		FSL - fine:	- fine sandy loam			
SOIL DEPTH (cm)	(cm)		SURFACE IMPEDIMENT	IPEDIMENT	•	79-84 mode	moderately alkaline		L -loam	e e			
0-30 -very shallow	very shallow		ROCK OUTCROPS	OPS		-85 strong	 strongly alkaline 		Silsilt)	oam			
30-50	shallow		< 10% none few	none - few					CL -clay	loam			
50-100	50-100 -moderately deep		10 - 30% - common	common					SICL -silty	- silty clay loam			
>100 - 0	- deep to very deep		> 30% - many	memy					SCI - sand	sandy clay loam			

LAND LIMITATIONS DESCRIPTION AND COMBINATIONS

ELEVA ELS ELS	512 -1000m-1500m 513 ->1500m		SOIL DRAINAGE D2 - Somewhat D3 - Very poort	NGE what poo poorly dr:	-Somewhat poorly drained to poorly drained -Very poorly drained or excessively drained	ined	SOIL DEPTH Sh2 - Moderately deep (50 - 100cm) Sh3 - Very shallow to shallow (< 50c	ely deep	- Moderately deep (50 - 100cm) - Very shallow to shallow (< 50cm)
SLOPE T2	SLOPE/TOPOGRAPHY T2 - Undulating to moderately steep	daats	SOIL TEXTURE Tc -Coarse texture	RE e texture			ROCK OUTCROPS Rc2 - Common	8 -	
P	- Steep to very steep						Rc3 - Many		
CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION
1	EZ	11	772	2.1	T2-F3-D2	3.1	T3-F2-D2	41	Te
24	E2-Sh2-Rc2	12	T2-E3	22	T3	32	T3-F3-D2		
3	EIZ	13	T2-E3-Rc2	23	EB-EL	33	T3		
*	El2-E3-Rc3	91	T2 E3 Rc3	24	T3-E3-Rc2	34	T3-E3		
Ŋ	E12-Sh2-Rc2	15	T2 E3 Sh2 Rc2	25	T3-E3-Sh2-Rc3	35	T3-E3-Rc3		
9	F2-D2	91	T2 E3 Sh2 Rc3	92	T3-E3-Sh3-Rc2	36	T3-E3-Sh3-Rc3		
8	F2-Tc	21	T2 El2 E3	27	T3-E3-Sh3-Rc3	37	T3-E12-E3		
8	F3-D2	81	T2 E12 E3 Rc3	28	T3-E12-E3	38	T3-E12-E3-Sh3-Rc3		
6	Sh2	61	T2 E12 E3 Sh2 Rc2	62	T3-E12-E3-Sh2-Rc3	39	T3-F3-D2		

Marginally Suitable (S3) Marginally Suitable (S3) occurs for a constance department of a generate such well so reduce producting to therefore or increase required inputs, that this expenditure will be only marginally justified.	Not suitable / Not Belevant Lund hang limitions which may be summarble I to the brook limition between the state of In the brook limition between the state of In the brook limition between the state of Interesting a return with opposite of the state of Interesting a return with opposite of the state of Interesting the state of the given manner Return (for each inhabite the given manner Return (for each inhabite the given manner Interesting beddy vie each mancellamene has upon a net relevant.	TYPE II : No dry sosoni with a very pronounced maximum rinh period from the forest and the forest are in selected dry meants Asiamama monthy raunful occurs during the period from March to May.	TYPE.W.; Marinful is more or less evenly distributed throughout the year, "The type resembles Type I since it has no dry season.	E D
SUITABILITY CLASSES: Highly Suitable (ST) Interston in contained copportunition of a geometre or order name institutes that will not significantly reduce productivy or benefits and well not raise inputs above an accorpiable level.	Moderately Solitable (C2) Lind having illustroom (solitable) in aggregate received the solitable of the solitable of the solitable of prevent are the limitation stronger between the solitable solitable of the s	CLIMATE TYPE TYPE 1 : Two promonent season, dry from November to April and wet during the rest of the years Maximum rain period is from June to September	TYPE III; No very pronounced maximum nain periods, with a dry season stating male from one to inter-stationals, chart was a contract of the period from bocombor to fortunary or from a short dry season. Surgino Del Norte is dissipled as climate Type III.	BANNSAL DATTERNITY CLURATE TTPT

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

SURIGAO DEL SUR, REGION XIII

Marginally Suitable (53)
Land having litturions which in aggregate are
seever for sustained application of a given use and
will so reduce productivity or benefits, or increase
requived inputs, bat this expenditure will be only
marginally justified.

SUITABILITY CLASSES:
Highly suitable (SI)
Land throng no significant limition
Land throng no significant limition
limit will not significantly reduce produ
limit will not significantly reduce produ
morphable level.

INT OF SUITABILITY FOR CACAO PRODUCTION BY MUNICIPALITY

						EXI	ANSION,	EXPANSION AREA (Ha)	1)			CONFLIC	CONFLICT RESOLUTION AREA (Ha)	TON ARE	A (Ha)	Tomor
MUNICIPALITY	EXISTI	EXISTING CACAO (Ha)	(O (Ha)	TOTAL EXISTING AREA (Ha)	Coconut	nut	Shrubland, unmanaged*	and,	Grassland, unmanaged	and,	9	Corm	Paddy rice, non-trigated	ice, ated	Other crops	POTENTIAL EXPANSION
	S1	ZS.	S3		S1	SZ	S1	25	SI	2.5	S1	S2	S1	25	S1 S2	AREA (IIII)
BAROBO	ľ	•			11,830	2,063	715	25	64	6	517	42				15,264
BAYABAS		Ī	ľ		1,620	36	141	ľ	ľ	ľ	278	25	-	١	Ļ	- 2,101
CAGWAIT					2,853	99	99				322					3,296
CANTILAN					791	420	53	18	38	100	1,808	143		۰		3,409
CARMEN	•				635	22	39	198	23	94	273	17				1.334
CARRASCAL	Ĺ	Ī	ľ		228	510	965	754	109	927	308	33	-	ŀ	ļ.	3,467
DITY OF BISLIG	3			3	12,730	1,754	2,471	1.2	549	82	1,280	2				18,943
CITY OF TANDAG	•				1,308	2,795	230	98	22	124	322	337		۰		- 5,225
CORTES	•				711	1,643	Т	39			16	43		٠		. 2,529
HINATUAN					14,187	10,068	338	593	547	156	383	22	-			. 26,293
ANUZA		•	ľ		240	262	3	274	18	281	129	2	۰	ŀ	L	1,795
JANGA	1	•	1	2	2,575	926	177	169	ľ	137	22					4,112
INGIG	•				2,650	7	908	ľ	158	•	83		-	۰		3,704
MADRID					629	492	12	47	43	20	1,594	38				2,904
MARIHATAG	•				4,262	329	171	471	•	73	810	ľ		۰		- 6,117
SAN AGUSTIN			ľ		1,912	216	86	285	8	163	497		-	۰	_	3,475
SAN MIGUEL	•				3,178	522	222	472	335	169	5,745	100				. 11,299
TAGBINA			ľ		24,841	6,486	370	06	1,102	313	190	34	-	۲	_	33,427
TAGO				•	2,921	1,462	182	-	15	14	3,707	2,890	-	۰		. 11,192
TOTAL.	4	7	-	ır	00,680	30.188	7221	3 955	3.031	2,663	18415	3.732	ŀ	ľ	_	159 885

Delivery of cacao planting materials must be started on the onset of establishment of shade trees prior to planting of cacao.

AGRONOMIC REQUIREMENT OF CACAO PRODUCTION

CLIMATE TYPE
TYPE 1: You promoted section day from Movember to April and
TYPE 11: Not prosessor with a very promotined imaximum rain period is
from Type 11: Not prosessor with a very promotined imaximum rain period is
from Type 12: Not prosessor with a very promotined imaximum rain period is
from Type 13: Not from April 20: Not from A

TYPE IV : Rainfall is more or less evenly distributed throughout the year. This type resembles Type II since it has no dry season.

TYPE III: No very pronounced maximum rain period, with a dry season lating only from once of there months, either during the period from Bearten with the season.

Nate to May This type resembles Type I since it has a short dry season.

LAND UTILIZATIO TYPE	LAND SUITABILITY TYPE RATING	SLOPE (%)	SOIL DEPTH (cm)	SOIL TEXTURE	SOLL	SOIL REACTION (pH)	INHERENT	FLOODING	EROSION	ROCK	ELEVATION (mast)	ANNUAL RAINFALL (mm)	CLIMATIC
	SI	8>	>100	CL, SICL, SCL, SC, SIC, C, HC	WD,MWD	5.6-7.2	high	none-slight	none-slight	wej-euou	<1000	2001-4500	U.III, IV
Cacao	ZS	8-30	50-100	FSL, L, SIL	GP, PD	5.1-5.5	medium	moderate	moderate	common	1000-1500	1000-2000	II'II
	S3	>30	<50	S, LS, CSL, SL	VPD,ED	<5.0->7.9	low	severe	severe	hueun	>1500	<1000	
SLOPE (%)			SOIL DRAINAGE	**	. «	SOIL REACTION (pH)	(Hd		SOIL TEXTURE				
0-3	-level to gently sloping	~	ED -ex	 excessively drained 	v	< 4.5 extremely acid	nely acid		Coarse		Ē	Fine	
3-8	gently sloping to undi.	ulating	WD -we	- well drained		5 50 verys	trongly acid		S -sand	_	SC		lay
8-18	undulating to rolling		MWD - mc	- moderately well drained		51-55 strongy acid	gy acid		LS -loan	-loamy sand	SIC		ń.
18-30 -r	-rolling to moderately steep	deets		 somewhat poorly drained 	_	5.6-6.0 mediu	- medium acid		CSL -coar	-coarse sandy loam	0	-clay	
30-50 -s	steep		PD -po	-poorly drained		1-65 slight	y acid		SI sand	- sandy loam	HC		day
> 20	-very steep		VPD -ver	-very poorly drained	9	6 7.2 neutra	72		Medium				
					7	7.3 7.8 mildly alkaline	alkaline		FSL -fine	- fine sandy loam			
SOIL DEPTH (cm)	(m)		SURFACE IMPEDIMENT	EDIMENT	7	7.9 8.4 moderately alkaline	rately alkaline		L -loam				
0-30 -very shallow	very shallow		ROCK OUTCROPS	PS.	٨	85 strong	- strongly alkaline		Sil silt1	oam			
30 - 50 - shallow	shallow		< 10% - none - few	ne-few					CL -clay	- clay loam			
50-100 -1	50-100 -moderately deep		10-30% -common	mmon					SiCL - silty	clay loam			
> 100	-deep to very deep		> 30% - many	ww					SCI. sand	- sandy clay loam			

LAND LIMITATIONS DESCRIPTION AND COMBINATIONS BULNATION BULNALING C - 1000m-1500m D3 - 4500m D3 - 4500m D3 - 4500m

SLOPE, T2 T3	SLOPE/TOPOGRAPHY TZ - Undulating to moderately steep T3 - Steep to very steep	y steep	SOIL TEXTURE To - Coarse te	IL TEXTURE - Coarse texture	an		ROCK OUTCROPS Rc2 - Common Rc3 - Many	OUTCROPS - Common - Many	
CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION
1	E2-Sh2-Rc2	111	F3-D2	21	T2 E12 E3	31	T3-E3-Sh2-Rc3	41	T3
2	812	12	Sh2	22	T2-E12-E3-Rc2	32	T3-E3-Sh3-Rc2	42	T3-E3
3	E12-E2-Sh2-Rc3	13	Sh2-Rc2	23	T2-E12-E3-Rc3	33	T3-E3-Sh3-Rc3	43	T3-E3-Sh3-Rc3
P	E12-E3-Rc3	97	T2	24	T2 E12 E3 Sh2 Rc2	₽€	T3-E12	2.0	T3-E12
2	EI2-E3-Sh2-Rc3	15	T2-E3	52	T2-E12-E3-Sh2-Rc3	32	T3-E12-E3-Rc2	45	T3-812-83
9	E12-Rc2	16	T2-E3-Rc2	36	T2-F2-D2	36	T3 E12 E3 Sh2 Rc3	46	T3-E12-E3-Rc3
2	E12-Sh2-Rc2	- 12	T2-E3-Rc3	27	T2-F3-D2	28	T3-E12-E3-Sh3-Rc2	47	T3-E12-E3-Sh3-Rc3
8	E12-Sh2-Rc3	18	T2-E3-Sh2-Rc2	28	T3	88	T3-E12-E3-Sh3-Rc3	48	T3-E13
6	F2-D2	67	T2-E3-Sh2-Rc3	53	T3-E3	39	T3-F2-D2	49	Tc
93	E2_To	20	T2-E12	30	T3-F3-Dc2	08	T3-E3-D2		

E			X		į
PARTET	1		1)	100
RAINGACL PATTERN BY CLIMATE TYPE	_	\	1	1	1 1
U. PATTE			1		No.
RAININ			/	11	4 44
		/		11	
-	11			1 -	

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

PROVINCE OF BASILAN, ARMM

EXTENT OF SUITABILITY FOR CACAO PRODUCTION BY MUNICIPALITY

						EXI	EXPANSION AREA (Ha)	AREA (Ha				CONE	CONFLICT RESOLUTION (Ha)	LUTION	(e)		
MUNICIPALITY	EXISTI	EXISTING CACAO (Ha)	(Ha)	TOTAL EXISTING AREA (Ha)	Coconut	nut	Shrubland, unmanaged*	land, aged*	Grassland, unmanaged*	land, aged*	Co	Corn	Paddy rice, non-irrigated	rice, gated	Other crops	rops	POTENTIAL
	S1	ZS	S3		S1	25	SI	25	S1	25	51	25	S1	ZS	S1	25	AKEA (III)
WEAR					1,083	1,272			6	10							2,374
AL-BARKA		ľ			285	2,733			2								3,320
CLLA OF LAMITAN					062'6	6,902	21	25	82								16,348
HADJI MOHAMMAD AJUL					2,364	1,791			124	33							4311
DANATHUM HIGH						13				409							422
NVMVANYT					8,572	1,900	9	•	32								10,511
OSITIVM			•		699%	265	2		29	•							5,337
disimos					4,552	8,475	7	15									13,049
ASMINAURAT					15				267	2							323
Odil-Odil					1,467	2,278											3,744
TUBURAN		ľ			1,921	1,151											3,073
UNGKAYA PUKAN					38%	3,947		•									4,331
Total Area (Ha)	•	•	•		34,935	31,059	33	89	286	456	•	•	•	•	•	•	67,143

SUITABILITY CLASSES:

Highly Suitable (S1)	Land having no significant limitation to sustained	application of a given use, or only minor limitations	that will not significantly reduce productivity or	benefits and will not raise inputs above an	acceptable level.	



AGRONO	MIC REQU	IREMENT	OF CACAC	AGRONOMIC REQUIREMENT OF CACAO PRODUCTIO	NO								
LAND UTILIZATION TYPE	SUITABILITY RATING	SLOPE (%)	SOIL DEPTH (ст)	SOIL TEXTURE	SOIL	SOIL REACTION (pH)	INHERENT	FLOODING	EROSION	ROCK	ELEVATION (masl)	ANNUAL RAINFALL (mm)	CLIMATIC
	\$1	8	>100	CL, SICL, SCL, SC, SIC, C, HC	WD,MWD	5.6-7.2	high	none-slight	none-slight none-slight	none-few	<1000	2001-4500	LIII, IV
Cacao	SZ	8-30	50 - 100	FSI, L, SiL	GP, GPS	51-55	medium	moderate	moderate	common	1000-1500	1000-2000	11.11
	SS	>30	<50	S, LS, CSL, SL	VPD,ED	<5.0 -> 7.9	low	severe	severe	many	>1500	<1000	

CLIMATE TYPE

TYPE : Two personness season, cay from Kowenber to April and
TYPE II: No dry season with a very protonneed maximum rain
from the season with a very protonneed maximum rain
from that the season with season monthly rainful secure during the
from that the season with the season and the season of the season of the season of the season of the season of the season of the season with the season of

TYPE IV ; Rainfall is more or less evenly distributed throughout the year. This type resembles Type II since it has no dry season.

TYPE III: No very pronounced maximum rain period, with a dry season lasting only from one to three months, either during the period from December to February or from March to May. This type resembles Type I since it has

	ALON CLA ONE CHARLES FOR FROM FOR CO. O. O.								
SLOPE (%)			SOIL DRAINAGE	AGE		SOIL REACTION (pH)	(hd) NC	SOIL TEXTURE	
-3	 level to gently sloping 		ED	 excessively drained 	•	c4.5 em	dremely acid	Coarse	
8-	 gently sloping to undulating 	alating	WD	-well drained	-	15.50 ve	rry strongly acid	ues - s	P
-18	- undulating to rolling		MWD -1	 moderately well drained 		51.55 st	rongly acid	LS - loan	purs áu
18-30	- rolling to moderately.	daas	SPD	somewhat poorly drained		m 09-99	edium acid	CSI COS	irse sandy loam
30-50	0 - 50 - steep		t- Od	- poorly drained		51 65 sli	ightly acid	SI san	- sandy loam
.20	- very steep		VPD	very poorly drained		56-72 ne	cutral	Medium	
						73-78 m	73-78 mildly alkaline	FSL - fine	- fine sandy loam
OIL DEP	SOIL DEPTH (cm)		SURFACE IM	URFACE IMPEDIMENT		79-84 m	-moderately alkaline	L -loa	- loam
3-30	- very shallow		ROCK OUTCROPS	OPS	А	,8.5 st	strongly alkaline	Sil silt	loam
05-08	- shallow		<10% -none-few	none-few				CL - clay	y loam
0-100	 moderately deep 		10 30% common	common				SICT - silt	y clay loam
100	100 - deep to very deep		> 30% - many	many				SCI san	dy clay loam

Manual LIMITATIONS DESCRIPTION AND COMBINATIONS

CODE	LIMITATION	GODE	LIMITATION	CODE	LIMITATION
Ţ	E2-Sh2-Rc2	II	T2-E3-Sh2-Rc2	- 21	T3-E3
2	EIZ	21	T2-E3-Sh2-Re3	22	T3-E3-Sh3-Rc3
8	E12-E3-Sh2-Rc3	13	T2-E12-E3-Sh2-Rc2	23	T3-E12-E3-Sh3-Rc3
4	E12 Sh2 Rc2	74	T2-E12-E3-Sh2-Rc3	24	T3-F3-D2
S	F2-D2	51	T2-F3-D2	52	T3-E13
9	F2-Tc	97	T3-E3		
7	F3-D2	17	T3-E3-Sh3-Rc2		
8	Sh2-Rc2	81	T3-E3-Sh3-Rc3		
6	772	61	T3-EIZ-E3-Sh3-Rc2		

L, III, IV	113																				
3	ï				clay	lay.		clay													
2001-4500	1000-2000	<1000		Fine	- sandy clay	- silty clay		- heavy clay													
<1000	1000-1500	>1500	-	Ē	Sc	SiC	U	H									nosion	sion		- Moderate seasonal flooding	Severe seasonal flooding
none-few	common	many			_	- loamy sand	- coarse sandy loam	- sandy loam		- fine sandy loam		- silt loam	- clay loam	silty clay loam	- sandy clay loam	SOIL EROSION	E2 - Moderate erosion	E3 -Severe erosion	FLOODING		F3 Severe sea
none-slight	moderate	severe	SOIL TEXTURE	Coarse	S - sand	LS - loan	CSI coar	SI sanc	Medium	FSL - fine	L -loam	Sil silt1	CL -clay	•	SCT same	•,			_		
none-slight	moderate	severe															- Moderately deep (50 - 100cm)	- Very shallow to shallow (< 50cm)			
high	medium	low	Æ	extremely acid	very strongly acid	-strongly acid	-medium acid	y acid	78	-mildly alkaline	-moderately alkaline	-strongly alkaline				SOIL DEPTH	- Moderately du	- Very shallow	ROCK OUTCROPS	Rc2 Common	- Many
2	5 80	7.9	TION (pH)	-extren	very s.	-strong	-mediu	slightly acid	neutral	mildly	moder	strong				SOII	Sh2	Sh3	ROC	Rc2	Rc3

		1	/	1)	1
34.0				K	Di de
HY CLISKATE!	5		()	444
STERNIES (ì		(1	5
160				X	100
RAINFALL			/		1
		1	/	1	1
	1 1 1	1.1	1.1	1 1 1	

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

PROVINCE OF LANAO DEL SUR, ARMM

EXTENT OF SUITABILITY FOR CACAO PRODUCTION BY MUNICIPALITY

MUNICIPALITY	EXISTI	EXISTING CACAO (Ha)	(O (Ha)	TOTAL EXISTING AREA (Ha)	Coconut	unt	Shrubland, unmanaged*	and,	Grassland, unmanaged*	and, ged*	Corn	e e	Paddy rice, non-irrigated	rice, gated	Other crops	sdo	POTENTIAL EXPANSION
	S1	25	S3		S1	SZ	S1	25	S1	25	S1	2S	S1	ZS	S1	25	AREA (Ha)
BACOLOD-KALAWI			Ĺ			86	•	•									6
BALABAGAN					4,528				0	٠	189						4,717
BALINDONG			Ĺ			309	•	100		42	•	202					1,157
BAYANG	•			•	•	569	۰	125	•	•	•	619	•	•			1,043
BINIDAYAN						154	•	69				519					742
BUADIPOSO-BUNTONG	ľ		Ĺ				ľ	69	ľ	2		1.057					1.128
BUBONG	ľ		Ĺ					155	ľ	1		1.977	•	•		ľ	2.133
BUMBARAN	ľ	ľ	Ľ			2	ľ	914	ľ	387	ľ	6.239		ľ		ľ	7.543
BUTIG	ľ	ľ	Ĺ		ľ	100	ľ	88	ľ	155	ľ	1.210	ľ	ľ	ľ	ľ	1.562
CALANOGAS	•		Ĺ		1,152	1,014	•	70	•	529	•	819					3,614
DITSAAN-RAMAIN			ľ					12				733					744
GANASSI	ľ		Ĺ			130	ľ	35				812					926
KAPAI	•						•	264	•			1,680		•			2.244
KAPATAGAN					2,377	39	120	7	65		62	17					2,710
LUMBA-BAYABAO	•							20	•	65	٠	1,423	•				1,585
LUMBACA-UNAYAN					20	223		28				192					1,001
LUMBATAN	ľ		Ĺ		ľ	93	ľ	17	ľ			1,084			ľ	ľ	1.193
LUMBAYANAGUE	•		Ĺ			47	•	38				328	•				413
MADALUM						42	•	99	•	240	•	539					882
MADAMBA	•	,		•	•			264	•	165	•	1,046					1,475
MAGUING	•				•	,	,	250		2,872	•	6,415					9,536
MALABANG		,			2,498	40	43	•	19	152	336						3,129
MARANTAO			Ĺ	'	ľ	342	•	16	ľ	11	•	1,968	ľ	ľ		ľ	2,336
MARAWI CITY	•			•	•	7	•	145	•	66	•	2,277	•	•			2,524
MAROGONG	Ī		1	1	6,893	1.850	143	394	Ī	7	433	63				ľ	6,782
MASIU					•			19		204		1,156					1,379
MULONDO	Ī				•	,	,	101		221	•	593			•	·	916
PAGAYAWAN	•				131	521	80	55	•			2,106		•	•		2,820
PIAGAPO		•	-		•	8	2	185		6	•	1,804	•	•	•	·	2,008
PICONG	Ī		Ī		4,674	163	÷	•	17	33	Ť	Ť	·	Ť	,	٠	4,891
POONA BAYABAO			,		'	•		22		28		898	•	•	•		950
PUALAS		·			•	251	•	178	,	482	•	949	•	•	•		1,859
SAGUIARAN	Ī				•	1	99	159	٠	8	٠	436	·	·	·	٠	668
SULTAN DUMALONDONG	•	ĺ	Ī			15	,	•				524			•		275
TAGOLOAN II	Ī				•	0	112	19	•	168	•	208	•	•			1,276
TAMPARAN	Ī							6	۰			457					465
TARAKA	•		Í		'	•	,	•		17	•	610					627
TUBARAN	•		Ĺ		289	743	•	87	7	8	r.	1,223					2,389
TUGAYA						142		25	ľ	21	•	84					272
WAO					14		88	7.02	ľ	017	1,636	5.189	ľ	ľ	66009	1,669	C70 51
											2000				200		4 5000 4

AGRONOMIC REQUIREMENT OF CACAO PRODUCTION

UTILIZ	LIZATION	RATING	SLOPE (%)	UTILIZATION SULTABILITY SLOPE (%) SOLL DEFINE (cm)	SOIL TEXTURE	DRAINAGE	REACTION (pH)	FERTILITY	FERTILITY CLASS CLASS OUTCROPS (mast)	CLASS	OUTCROPS	(masl)	RAINFALL (mm)	TYPE
		SI	89	>100	CL, SICL, SCL, SC, SIC, C, HC	WD,MWD	5.6-7.2	high	none-slight	none-slight none-slight	mone-few	<1000	2001-4500	L III, IV
ð	Cacao	23	9-30	50-100	FSL, L, SIL	ga'gas	5.1-5.5	medium	moderate	aterabom	common	1000-1500	1000-2000	1,11
		SS	>30	<50	S, LS, CSL, SL	VPD,ED	<5.0->7.9	low	severe	severe	many	>1500	<1000	
SLOPE (%)	(%)			SOIL DRAINAGE	. 8		SOIL REACTION (pH)	(Hd)		SOIL TEXTURE				
0-3	-level	level to gently sloping		ED ex	excessively drained		< 4.5 extremely acid	mely acid		Coarse		Œ	Fine	
3-8	Bent	ly sloping to undu	ulating	WD -w	- well drained		45-50 very	strongly acid		S - sank	_	8	sandy c	lay
8-18	npun-	undulating to rolling		MWD - m	moderately well drained		5.1.5.5 stron	gly acid		LS -loan	- loamy sand	Sic	c -silty clay	
18-30	-rollir	rolling to moderately steep	daats	SPD -so	 somewhat poorly drained 		5.6-6.0 medit	um acid		CSL - coar	se sandy loam	C	-clay	
30-50	-steep	•		PD -px	 poorly drained 	_	6.1 6.5 slight	dy acid		SL sank	- sandy loam	H	- heavy c	lay

TYPE	RATING	SLUFE (%)	Œ)	SOIL LEAT URE		DRAINAGE REALTION (pH)	FERTILITY	CLASS	CLASS	OUTCROPS	(masl)	(mm)	TYPE
	IS.	89	>100	CL, SICL, SCL, SC, SIC, C, HC	WD,MWD	5.6-7.2	high	none-slight	none-slight	none-few	<1000	2001-4500	UIIIII
Cacao	22	8-30	50-100	FSL, L, SiL	GA'GAS	5.1-5.5	medium	moderate	moderate	common	1000-1500	1000-2000	11'11
	SS	>30	<50	S, LS, CSL, SL	VPD,ED	<5.0->7.9	low	severe	severe	many	>1500	<1000	
SLOPE (%)			SOIL DRAINAGE	GE		SOIL REACTION (pH)	(Hd)		SOIL TEXTURE				
0=3 -leve	- level to gently sloping	o*	ED -cc	 excessively drained 		< 4.5 - extre	- extremely acid		Coarse		Ξ	Fine	
3-8 -Ben	 gently sloping to undulating 	ulating	WD -w	-well drained	9	45-50 very	- very strongly acid		S - sand		88	: - sandy clay	lay
8-18 -und	- undulating to rolling		MWD - m	- moderately well drained		5.1-5.5 stron	strongly acid		LS - loan	- loamy sand	SiC	•	*
	 rolling to moderately steep 	daats.	SPD -st	 somewhat poorly drained 			- medium acid		CSL - coar	 coarse sandy loam 	C		
30 - 50 steep	da		PD -p	 poorly drained 		6.1 6.5 slight	 slightly acid 		SL sand	sandy loam	HC	: - heavy clay	day
> 50 ver	-very steep		vPD -v	- very poorly drained		56 7.2 neutral	78		Medium				
						73.78 mildl	 mildly alkaline 		PSL - fine	fine sandy loam			
SOIL DEPTH (cm)	î		SURFACE IMPEDIMENT	PEDIMENT	••	79-84 mode	moderately alkaline		L -loam	_			
0-30 very	very shallow		ROCK OUTCROPS	Sdc	,,	>8.5 stron	 strongly alkaline 		Sil silt loam	nam			
30-50 shall	-shallow		< 10% - none - few	one -few					CL - clay	- clay loam			
50-100 -moo	- moderately deep		10 - 30% - common	ommon						silty clay loam		CODE	E LIMIT
>100 -dee	-deep to very deep		> 30% - 11	- many					SCI sand	sandy clay loam		7	in
T AND I	MATATI	did Social	TIAN MATE	AND I MITATIONE DESCRIPTION AND COMPINATIONS	SINO							2	El2
THIND THE	MINION	DESCRIP	HONAIN	COMBINAL	CNIC							3	E12-E2-Sh
ELEVATION			SOIL DRAINAGE	IAGE		SO	SOIL DEPTH		S	SOIL EROSION		*	E12-F2-D2
El2 1000m 1500m	1500m		D2 - Some	D2 - Somewhat poorly drained to poorly drained	poorly drained	Sh	Sh2 - Moderately deep (50-100cm)	eep (50 - 100cm)		E2 - Moderate erosion	nosion	5	B12-F3-D2
El3 -> 1500m			D3 -Very	- Very poorly drained or excessively drained	ssively drained	Sh	Sh3 - Very shallow to shallow (< 50cm)	to shallow (< 50c		3 - Severe eros	ion	9	E12-Rc2
												_	E12 Sh2 R
SLOPE/TOPOGRAPHY	RAPHY		SOIL TEXTURE	IRE		RO	ROCK OUTCROPS		-	FLOODING		8	E12-Sh2-R
T2 - Undulati	T2 - Undulating to moderately steep	steep	Tc - Coarse texture	se texture		Rei	Rc2 - Common		ш.	F2 - Moderate seasonal flooding	sasonal flooding	6	Ell3
T3 - Steep to very steep	nery steep					Re	Rc3 - Many		11	F3 - Severe seasonal flooding	onal flooding	10	E13-E2-Sh

SUITABILITY CLASSES:	Monada	Monday Cuttable (C2)
Land through so split care thin that one southerned and the control of the care that t		an guard y autore to a care to make a standard proper are sever to instance application of a green to and visit or releve productivity or benefits, or increase required input, that this expenditure will be only marginally justified.
Moderately Squinker Indicatery Squinker Indicatery Squinker Indicates Squinker Indi		Authorised (Not Berkel and Personal Per
CLIMATE TYPE		
TYPEI: Two promotes season, of yr from November to April and west during the rest of the year. Maximum rain period is from lause to September	TYPE II	TYPE II : Yo dry season with a very pronounced maximum rain profol from December to February. There is not a single dry month, Maximum monthly rainful occurs during the period from March to May.
TYPE III. So we represented activation rip profession devits a dry season lating only from one to three months, other during the period from December in Polyanary or from March to May, This type resembles Type I since it has a short day season.		TYPE IV. Bainfull is more or less evenly distributed throughout the year. This type resembler. Type II since it has no dry season,
Lanao Del Sur is classified as climatic Type III.		

		1	X	/ ·	
RAINFALL PATTERN BY CLYMATE TYPE	(9 1 1	- physici achorocy.
RAINFALL PATT			X	- No. 100	
1	1.1	/		1	

CODE	TSHIGHT
2	Paddy rice non-irrigated
4	Com
81	Coffee
82	Cacao
112	Sugarcane
116	Coconut
126	Grassland
134	Shrubs, unmanaged

00	CODE LIMITATION	N	LIMITATION	CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION
_	E2-Sh2-Rc2	11	E13-Sh2-Rc2	21	T2-E12	31	13	41	T3-E13	23	T3-El3
2	EIZ	12	El3-Sh2-Rc3	22	TZ-EIZ-E3	32	T3-E3	42	T3 El3 E3 Sh3 Rc2	25	T3-El3-E3-Sh3-Rc3
3	E12-E2-Sh2-Rc3	13	F2-D2	23	T2-E12-E3-Rc2	33	T3-E3-Sh3-Rc2	43	T3 E13 E3 Sh3 Rc3	23	T3-E13
*	E12-F2-D2	14	F2-Tc	24	T2 E12 E3 Sh2 Rc2	34	T3-E3-Sh3-Rc3	9.9	T3-F3-D2		
2	E12-F3-D2	15	F3-D2	22	T2 E12 E3 Sh2 Rc3	322	T3-E12	45	13		
9	E12-Rc2	16	Sh2-Rc2	56	T2 E12 F2 D2	36	T3-E12-E3	46	T3-E3		
^	E12-Sh2-Rc2	17	T2	27	T2-E13	37	T3-E12-E3-Rc2	- 45	T3-E3-Sh3-Rc3		
8	E12-Sh2-Rc3	18	T2-E3	28	T2-E13-E3-Sh2-Rc2	38	T3-E12-E3-Sh3-Rc2	-48	T3-E12		
6	El3	£1	T2 E3 Sh2 Rc2	58	T2 El3 E3 Sh2 Rc3	33	T3-E12-E3-Sh3-Re3	46	T3-E12-E3		
ľ	to so to the state of the	90	0 0 0 0 00	000	Oct on the oct		On the same of	2	the same of the same of the same		

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

PROVINCE OF MAGUINDANAO, ARMM

EXTENT OF SUITABILITY FOR CACAO PRODUCTION BY MUNICIPALITY

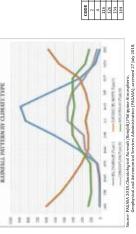
						EXE	EXPANSION AREA (Ha)	REA (Ho)							(a)		
MUNICIPALITY	EXISTI	EXISTING CACAO (Ha)) (Ha)	TOTAL	Coconut	1	Shrubland, unmanaged*	and,	Grassland, unmanaged*	md,	Corn		Paddy rice, non-irrigated	rice, gated	Other crops	sdor	TOTAL POTENTIAL EXPANSION
	5	8	63	ARCA (HB)	2	6.0		6.0	1.0	6.0	10	3	6.4	8		ε	AREA (Ha)
	7.	4	00		1	-	1					ı	ı	4	7.	4	
AMPATUAN	1		•		250	95	1	33	44	1,239	1,869	-	1		1	1	4,696
BARIRA	İ		•	•	3,818	5,566	1	105	•	•	1,032	343				•	10,864
BULDON					2,753	3,183	92	19	1,003	192	934	421	ĺ			ĺ	8,597
BULUAN	•			•	1,000	•	0	•	1		2,583						3,584
DATU ABDULLAH SANGKI					282	99	ľ		ľ		3.124	159					3.931
DATH ANGGAL MIDTIMBANG					208	S	ľ	2	ľ	9	381		ľ		ĺ.	ľ	1 353
DATE BLANT SINGUAT	ľ	ľ			2,403	200	ď	172	187	165	99	20	ľ	ľ	ľ	Γ	4.426
DATH HORRED AMBATHAN	ľ	ľ			190	0			17	1 207	158	372	ľ	1	ľ	Γ	1 046
DATE OF STREET		ľ			2.704	020	99	1 0.62	46	4 2 2 2 7	16.3	1 000	ľ		ľ	ľ	TAS C1
DATE BACT AS					662	370	42	1,700	1 407	1707	0000	1,000	ĺ			Ī	12021
T Miles		1			325		200	3	1,007	Ť	4004	,		Ī	1	Ī	0.440
DATU PIANG					694	77	99	*	1	1	1.234	17			1		2110
DATUSALIBO	'		•		120	1	•	•		•	591	S		•	•	٠	716
DATU SAUDI-AMPATUAN			•		196	15	13	140	20	64	1,356	2					1,806
DATU UNSAY	•			•	315	31	1	113	0	1,814	364	371					3,009
GEN SK PENDATUN	•			•	1,343	•	•	•	•		1,051						2,394
GUINDULUNGAN					794	160	86	845	338	2,157	1,356	162			ľ		5,910
KABUNTALAN				•	609	4	168			•	1,080	0					1981
MAMASAPANO				•	299	17	•		•	•	1,037	43			•		1,764
MANGUDADATU				•	377	•	99	٠	168	•	439						1,050
MATANOG			·	•	1,758	3,246	41	82			102	310			,		5,539
NORTHERN KABUNTALAN	ľ	ľ	ľ		28						3,720			ľ		ľ	3,778
PAGAGAWAN	ľ			•	2,035						4,465				ľ		0,500
PAGALUNGAN	ľ	ľ			2,642	ľ	ľ	ľ	ľ	ľ	978				ľ	ľ	3.620
PAGLAT		•			573	•	•		۰	•	934	6					1,515
PANDAG				•	848	•	13	•	12	,	1,836						2,709
PARANG				•	3,231	2,637			2,575	334	418	24					9,218
RAJAH BUAYAN				•	515	11	381	329			3,315						4,644
SHARIFF AGUAK		ľ		•	202	,			23	99	674	10					978
SHARIFF SAYDONA MUSTAPHA	ľ	ľ			285	99	509	553			2,156	10			ľ		3,332
SOUTH UP!	ľ	ľ	ľ		-	2,317	22	307	22	1,058	362	6,347	ľ		ľ	ľ	10,437
SULTAN KUDARAT				•	8,771	27	30		1,419	191	2,370						12,777
SULTAN MASTURA				•	2,257	184			884	38	868	2			•		4.263
SULTAN SA BARONGIS					396			ľ			2,632	13			ľ		3,606
TALAYAN					486	95	11	394	338	704	1,353	872					4,753
TALITAY				•	925	•					257				,		1,182
				•	3,389	1,621	26	263	1,014	2,291	1,614	4,636					14,925

AGRONOMIC REQUIREMENT OF CACAO PRODUCTION

																9		
UIII)IV	17.11				clay	lay		clay										
2001-4500	1000-2000	<1000		a			-clay	- heavy										
<1000	1000-1500	>1500		Œ	8	SIC	U	Ħ										rrosion
none-few	common	many			_	y sand	se sandy loam	ly loam		sandy loam		oam	loam	clay loam	ly clay loam		OIL EROSION	E2 -Moderate erosion E3 -Severe erosion
none-slight	moderate	severe	SOIL TEXTURE	Coarse	S sanc	LS -loan	CSL -coar	SL sanc	Medium	FSL -fine	r -loan	Sil silt1	CL -clay				•,	
none-slight	moderate	auanas																Sh2 - Moderately deep (50-100cm) Sh3 - Very shallow to shallow (< 50cm)
high	medium	wol	(Hd)	mely acid	strongly acid	gly actd	macid	ly acid	e	y alkaline	rately alkaline	gly alkaline					LDEPTH	Sh2 -Moderately deep (50-100cm) Sh3 -Very shallow to shallow (<50c
5.6-7.2	5.1-5.5	<5.0 -> 7.9	OILREACTION														ōs	Sh2
WD,MWD	SPD,PD	VPD,ED	. «	٧	*			9	9	7	7	^				IONS		poorly drained savely drained
CL, SiCL, SCL, SC, SiC, C, HC	FSL, L, SIL	S, 1.S, CS1., SL	100	ressively drained	H drained	denately well drained	mewhat poorly draine	orly drained	ry poorly drained		EDIMENT	S	ne-few	nomn	iny	COMBINAT	GE	D2 - Somewhat poorly drained to poorly drained D3 - Very poorly drained or excessively drained
>100	50-100	05>	SOIL DRAINAG	ED -ex	WD -w	MWD -m	SPD -80	PD - po	VPD -ve		SURFACE IMP	ROCK OUTCRO	<10% - no	10-30% -co	> 30% - m:	TION ANI	SOIL DRAIN/	D2 Some D3 Very j
8	8-30	>30			llating		daots									S DESCRIF		
SI	S	83		el to gently sloping	thy sloping to undu	fulating to rolling	ling to moderately.	ch.	y steep		Œ	y shallow	llow	derately deep	sp to very deep	MITATION		1500m
	Cacao		SLOPE (%)	0-3 -leve	3-8 - gen	8-18 -und	18 30 roll	30 - 50 stee	> 50 - very		SOIL DEPTH (c	0-30 -very	30 - 50 - shal	50 100 moi	> 100 - deep	LAND LIN	ELEVATION	El2 -1000m-1500m El3 ->1500m
	<8 >100 CL, SCL, SCL, SCL, SC, WD, WD, WW B 5.6-7.2 high none-slight none-clight none-lew <1000 2001-4500	S1 G4 S-100 C1-SecLSSLS, WD.MVO S6-7.2 high none-slight none-slight none-slight none	S1 G4 S10 G1,864,281.5. WD,MVD S6,72 high none-slight	S1 S2 S-10 C1-SGL/SGL/SGL/SGL/SGL/SGL/SGL/SGL/SGL/SGL/	S1 S2 S2 S2 S2 S2 S2 S2	S1 S4 S10 C1.SCL.SCL.SCL. WDAWD S6.72 high non-slight non-slight non-slight non-sl	St 4-0 St 5-10 CL St St St St St St St S	S1 -49 S10 CLSCL-SLSL WDAWP S6-72 high non-silight nun-silight nun-sil	Carlo Carl	Size Size	Si Si Si Si Si Si Si Si	State Act State	Si	State 4-9 5-10 GL SCL, SCL, SCL, WIDAMO SL-5.2 high none-slight none-slight none-slight ronn-clight Size	Size Size	St ct ct ct ct ct ct ct	State Act State	

Marginally Satistities Marginally Satistities (SC) Marginally Satistities Land Favority International Appetent companies of the Compan	Not Statish of Mot Statish of Mot Bedward to the promountable of the statish of t	Wornther to April and TYPE II. 186 day season with a very pronounced maximum rain knimum rain period is in the season of the season of the season of the season of the season of the season that the season of the season season where the season season is the season season of the season seas	in period with a day TYPE IV ! Bankali is more or less evenly distributed throughout the year, the type resembles Type I since when we day year, the type resembles Type I since when we day year the type is the second to the type of the type I since it has second.	
SUITABILITY CLASSES: Rich by samble difficult inclusion to sustained the format as significant inclusion to sustained application of good core or only inclusions that will not significantly reduce productively or beaufist and will not rate inputs above an accognible level.	Mederabby Sultable (Sc) in geograe re- Load haven in amount which in geograe re- Load haven in amount with a geograe of geown user the lamination will reduce produced in a geown see the lamination will reduce produced to be beetless and investment required impact to the the control of the control of the control inc. although still interestive, well be-approached inferior to that expected on class \$1 land.	CLIMATE TYPE TYPE: 1. Two promoted sesson, day from November to April and west during the rest of the year. Maximum rain period is from lines to September	TYPE III. 3 No very pronounced maximum rain period with a dry change in along poly from one to in their nouting, other changes in the property of the change	

TUNE	
SY CLIMA	
ž	
RABNEAL	



LANDUSE	y rice, non-irrigated		nut	dand, unmanaged	os, unmanaged	
CODE	2 Padd	4 Corn	116 Cocos	126 Grass	134 Shrub	144 Palest

CODE	LIMITATION	CODE	NOLLVLIMIT	CODE	LIMITATION	CODE	NOLLVLIMIT	CODE	NOLLVLIMIT
- 1	E2-Sh2-Rc2	H	F3-D2	21	T2-E12-E3	31	T3-E3-Sh2-Rc3	14	T3
2	EIZ	12	Sh2	22	T2 E12 E3 Sh2 Rc2	35	T3 E3 Sh3 Rc2	45	T3-E3
3	E12 E2 Sh2 Rc3	13	Sh2-Rc2	23	T2-E12-E3-Sh2-Rc3	33	T3-E3-Sh3-Rc3	89	T3-E3-Rc3
*	E12-E3-Sh2-Rc3	14	7.1	24	T2 E13 E3 Sh2 Rc2	374	T3-E12	59	T3-E3-Sh3-Rc3
2	EI2-Sh2-Rc2	15	T2-E3	52	T2-E13-E3-Sh2-Rc3	32	T3 E12 E3	45	T3-E12
9	El2-Sh2-Rc3	91	T2-E3-Rc2	97	T2-F2-D2	98	T3-E12-E3-Sh3-Rc2	94	T3-E12-E3
- 2	El3	21	T2-83-Re3	22	T2 F3 D2	37	T3-E12-E3-Sh3-Rc3	24	T3-E12-E3-Sh3-Rc3
8	El3-Sh2-Re2	18	T2 E3 Sh2 Rc2	28	T3	38	T3-El3-E3-Sh3-Re2	48	T3-E13-E3-Sh3-Rc3
6	F2-D2	6J	TZ-E3-Sh2-Rc3	53	T3-E3	39	T3-E13-E3-Sh3-Rc3	6#	T3-E13
10	F2-Tc	20	Z13-Z.L	30	T3-E3-Rc2	04	T3-F3-D2		

SLOPE/TOPOGRAPHY
TZ - Undulating to moderately
T3 - Steep to very steep

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

PROVINCE OF SULU, ARMM

EXTENT OF SUITABILITY FOR CACAO PRODUCTION BY MUNICIPALITY

						EX	EXPANSION AREA (Ha)	AREA (F	(a)			CONFI	CONFLICT RESOLUTION (Ha)	CULTION	(Ha)		TOTAL
MUNICIPALITY	EXISTI	EXISTING CACAO (Ha)	.0 (Ha)	TOTAL EXISTING AREA (Ha)	Coconu	onut	Shrubland, unmanaged	Shrubland, unmanaged*	Grassland, unmanaged*	land,	Corn	F	Paddy rice, non-irrigated	rice, igated	Other crops	sde	POTENTIAL EXPANSION
	21	25	S3		S1	25	S1	25	5.1	25	S1	25	51	25	S1	25	AREA (DA)
IADJI PANGLIMA TAHIL					-	,	ľ		19								64
					6,447		9		860	ľ	146	·				٠	7,459
					11				·	ľ		·				٠	11
CALINGALAN CALUANG		٠			3,565		ľ		1,846	ľ							5,411
					1,666	ľ	ľ		1,112	ľ						ŀ	2,779
					3,444		ľ		3,483	ľ			ľ			ľ	6,928
MAIMBUNG					2,863		ľ		287		912						4,062
D PANAMAO					3,720		31		1,422		533						2,706
					2,547	,	953		2,202		143						5,844
					1,964	,			410								2,374
ANGLIMA ESTINO					935	,	12		448		820						2,245
ANGUTARAN					580'6												6,085
					5,704	,			43		367					,	6,114
					1,738	,			2,342	•		·	ľ			,	4,080
					7,494	,	121		2,380	•	498	·	ľ			,	10,493
			•		4,137				1,537	•					,		5,675
					8,905		54	2	1,521	ľ	4,409						14,892
					086				838				·			,	1,818
		٠			959	,	140	ľ	26		52		·			,	873
Total Area (Ha)					65,860		1.317	S	20.821		7,909				,		95.912

AGRONOMIC REQUIREMENT OF CACAO PRODUCTION

S1 S4 S40 S100 S12, S12, S12, S12, S12, S12, S12, S12,	LAND JTILIZATION TYPE	SUITABILITY RATING	SLOPE (%)	son рертн (сm)	SOILTEXTURE	SOIL	SOIL REACTION (pH)	INHERENT	FLOODING	EROSION	ROCK OUTCROPS	ELEVATION (mast)	ANNUAL RAINFALL (mm)	CLIMATIC
1.00 1.00		S1	8	>100	CIL, SICIL, SCIL, SC, SIC, C, HC	WD,MWD	5.6-7.2	high	none-slight		we-tew	<1000	2001-4500	U,III,IV
5.00 6.00 5.05 COL.SL. 19.01 6.45 - 7.59 10 m 10 m 10.00 10.	30	25	8-30	50 - 100	FSL, L, SIL	GPD,PD	51-55	medium	moderate	moderate	uouuwoo	1000-1500	1000-2000	11.11
SOUL DANAMAGE SOUL IDANAMAGE SOUL		S3	>30	<50	S, LS, CSI, SL	VPD,ED	<5.0->7.9	low	ацалая	severe	unem	>1500	<1000	
10	(%) -lev	el to gently sloping		SOIL DRAINAG	aE cessively drained	, S	OIL REACTION (pH) nely acid		SOIL TEXTURE Coarse		E	ine	
1	es-	atly sloping to undu	dating		ll drained		5 50 verys	trongly acid		S - sand	_	S	SC - sandy clay	lay
According SED - commonwhile Set-Go. Transformed SED - Set-Go. Transfor		hulating to rolling			derately well drained		1.55 strong	gly acid		LS loan	ay sand	Si		N.
PD - proof defined G1-62 - signify scale Statement Stateme	lou-	ling to moderately:	deats	SPD - sor	newhat poorly drained		6-60 mediu	macid		CSL -coar	se sandy loam	0	-clay	
VPD - very pearly drained VG+72 - institute Medium Newton Va-74 - institute Medium Newton Va-74 - institute Medium National Va-14 - institute	- stra	8		PD - po	orly drained		1 65 slight	ly acid		SL sand	ty loam	H	- heavy c	day
No. No.	- Ver	y steep		VPD - ves	ry poorty drained	ď		æ		Medium				
STREACE INPUDINKYT 7.7-0.4 - moderately piloline L ROSC OFTEGOPS > 0.65 - strongly alkaline C, C 10% - strong strong strong strong S 10.50% - common strong strong S 10.50% - common strong strong S 10.50% - common strong strong S 10.50% - common strong strong S 10.50% - common strong strong S 10.50% - common strong S 10.50% - common strong S 10.50% - common strong S 10.50% - common strong S 10.50% - common strong S 10.50% - common S						12	3 7.8 mildly	r alkaline		FSL - fine	sandy loam			
SIGNCONTINUENTS S.B.Sstrongly-alkaline SLI	ерти (с	î		SURFACE IMPI	EDIMENT	12	9-84 model	rately alkaline		L -loan				
 10% none-few 10 soft-common 20% common 20% soft-common 20% soft-com	-ver	y shallow		ROCK OUTCRO	22	٨		dy alkaline		SIL - siltl	oam			
10-30% - common SiG >30% - man SiG SiG.	-sha	llow		<10% - noi	ne-few					CL -clay	loam			
- deep to very deep > 30% - many SCL -	- mo	derately deep		10 30% coi	noun					StCL stlty	clay loam			
		ab to very deep		> 30% - ma	my					SCT sand	ty clay loam			

gated LAND LIMITATIONS DESCRIPTION AND COMBINATIONS REPORTED RES. - 1000n-1500n RE. - 1000 CODE LIMITATION CODE LIMITATION

SOIL DEPTH Sh2 - Moderately deep (50-100cm) Sh3 - Very shallow to shallow (<50cm)

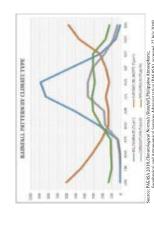
ROCK OUTCROPS
Rc2 - Common
Rc3 - Many

1 124-50-242 11 124-551-842 4 0 0 0 0 0 0 0 0 0						
7. 7. 7. 7. 7. 7. 7. 7. 7. 7. 7. 7. 7. 7	7	E12-Sh2-Rc2	11	T3-E3-Sh3-Rc2	2	Paddy rice, non-irrig
9.02 9.03 7.15 (1942) 8.2 1.01 7.15 (1942) 110 1.02 1.03 1.04 1.03 1.04 1.04 1.04 1.04 1.04 1.05 1.04 1.04 1.04 1.04 1.04 1.05 1.04 1.04 1.05 1.04 1.04 1.05 1.04 1.04 1.05 1.04 1.04 1.05 1.04 1.04 1.05 1.04 1.04 1.05 1.04 1.04 1.05 1.04 1.04 1.05 1.04 1.04 1.05 1.04 1.04 1.05 1.04 1.04 1.05 1.04 1.04 1.05 1.04 1.04 1.05 1.04 1.04 1.05 1.04 1.04 1.05 1.04 1.04 1.05 1.04	2	F2-Tc	12	T3-El2-E3-Sh3-Rc2	*	Com
83 (4 73 716 716 716 716 716 716 716 716 716 716	67	F3-D2	13	T3-F3-D2	82	Cacao
126 124-13 126 124-13 126 124-13 124 124-13 124 124-13 124 1	*	T2	2.6	T3	116	ř
7 T3-E3-Sh3-Re3 7 T3-E12-E3-Sh3-Re3 78 T3-E13 19 Tc	2	T2-E3	15	T3-E3	126	Grassland, unmanage
T 71 T 81 T 91	9	T2-E3-Sh2-Rc2	97	T3-E3-Sh3-Rc3	134	Shrubs, unmanaged
18 19	2	T2-E12-E3-Sh2-Rc2	17	T3-E12-E3-Sh3-Rc3		
9 T3 19 Tc	8	T2-F3-D2	18	T3-El3		
10 T3-E3	6	T3	19	Tc		
	10	T3-E3				

	Murginally Statistics (as Land hong limitations which in aggregate are severe fire statistical application of a given true and will so whose productivity or benefits, or increase required injusts, that this expenditure will be only marginally instified.	Note that the A not feel t
SUITABILITY CLASSES:	Imply Statistics of the programment of the programm	Moderately Supplied (e.g.) Land having limitation which in agregate are formed to the property of the propert

CLIMATE TYPE TYPE1 : Two pronouced

the state of the s	period from December to Febr	dry month, Maximum monthly	period from March to May.		
	wet during the rest of the year. Maximum rain period is	from June to September			



LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

PROVINCE OF TAWI-TAWI, ARMM

EXTENT OF SUITABILITY FOR CACAO PRODUCTION BY MUNICIPALITY

				EXP	ANSTON	EXPANSION AREA (Ha)	1)			CONFL	CONFLICT RESOLUTION (Ha)	UTION (Ha)	٦	TOTAL
EXISTING CACAO (Ha) TOTAL EXISTING COC AREA (Ha)		Cov	8	Coconut	Shrubland, unmanaged*	and,	Grassland, unmanaged*	and,	Сол		Paddy rice, non-irrigated	ice,	Other crops	S.	POTENTIAL
S3 S1	S	S1	_	25	S1	25	S1	ZS	S1	25	S1	25	S1	25	AREA (Da)
3,	. 3,	3,	3,356	2,123	345	2	19		12						5,857
			75	1,538	9	226	8	336	•	51					2,789
- 4,7	. 4,7	4,7	4,745	863		,			٠		٠				29907
- 1,8	. 1,8	1,81	,882	1,156	212	996	20			•					4,266
- 2,992	- 2,99	2,99	2		943	0	57		38	•					4,030
		ı,	544		4,526	34	720	•	1,004	2	٠				6,831
- 3,659	9'8	3,6	59		1,840	,	21								5,520
. 1,3	. 1,3	1,3	,359		287		521		٠						2,167
- 1,6	1,6	1,6	673		224		2								1,900
. 1,8	. 1,8	1,8	1,820	9	2,109	1,089	1,240	9			٠				6,270
	. 22	22.	22,106	5,685	10,490	2,867	2,640	342	1,055	23	ī	-	Ī	ī	45.237

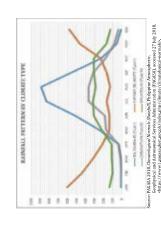
Marginally Stituthe (SS) Land Marginally Stituthe (SS) Land Marginally margine and a marginal	Not Suitable / Not Relevant by extrementable in the Work of the Country of the Co
SUITABLITY (LAZAS.ES. Highly Suitable (SI) Land howing southeast matheton to sestamed Land howing southeast matheton to sestamed spik and the standard of a great use, or or off names rimateons that will not suitable end, or craste upon a shore an acceptable level. not craste upon a shore an	Moderately Saltable (53) moderately Saltable (53) moderately Served: for statistication of a moderately Served: for statistication of a properate special matternorm transferation application of a beautiful and interacts required inputs to the control when the statistication of the statistical statistical statistical statistical statistical statistical statistical statistics on their expected on class \$1 land.

AGRONO	MIC REQU	KEMEN	OF CACA	AGRONOMIC REQUIREMENT OF CACAO PRODUCTION	NO								
LAND UTILIZATION TYPE	SUITABILITY RATING	SLOPE (%)	SOIL DEPTH (cm)	SOIL TEXTURE	SOIL	SOIL REACTION (pH)	INHERENT	FLOODING	EROSION	ROCK	ELEVATION (masl)	ANNUAL RAINFALL (mm)	CLIMATIC
	SI	8>	>100	CL, SICL, SCL, SC, SIC, C, HC	WD,MWD	5,6-7,2	high	none-slight	none-slight	none-few	<1000	2001-4500	I, III, IV
Cacao	28	8-30	50-100	FSL, L, SIL	Od'OdS	5.1-5.5	medium	moderate	moderate	common	1000-1500	1000-2000	11.11
	S3	>30	<50	S, LS, CSL, SL	VPD,ED	<5.0 -> 7.9	low	severe	severe	many	>1500	<1000	
SLOPE (%)			SOIL DRAINAGE	35		SOIL REACTION (pH)	(bd)		SOIL TEXTURE				
0-3 -leve	level to gently sloping		ED -ex	 excessively drained 	,	c4.5 extret	extremely acid		Coarse		-	Fine	
Ť	gently sloping to undulating	lating		- well drained	4		-very strongly acid		S sand	T.	s		clay
Ť	- undulating to rolling			- moderately well drained			- strongly acid			- loamy sand	8		se.
	rolling to moderately steep	steep		somewhat poorly drained			- medium acid		CSL -coar	coarse sandy loam	0	•	
30 50 steep	£			 poorly drained 			-slightly acid			- sandy loam	_	HC - heavy clay	clay
> 50 -ver	-very steep		VPD -ve	 very poorly drained 		56-72 -neutral	Te.		Medium				
						73-78 mildly	- mildly alkaline		FSL - fine	fine sandy loam			
SOIL DEPTH (cm)	m)		SURFACE IMPEDIMENT	EDIMENT		7.9 8.4 mode	 moderately alkaline 		L -loam				
0 30 -very	-very shallow		ROCK OUTCROPS	Sde	А.	>8.5 strong	 strongly alkaline 		Sil silt.)	-silt loam			
30 - 50 shallow	llow		<10% - no	-none - few					CL -clay	- clay loam			
50-100 - moc	- moderately deep		10 30% common	nommon					StCL stlty	silty clay loam			
> 100 - deel	- deep to very deep		> 30% - many	AUE					SCL sand	sandy clay loam			

CLIMATE TYPE

1. I you by Second with exp pronouncest manifold and period from Becember to February There is not a single dry month. Maximum monthly rainfall occurs during the period from March to May.	TYPE IV ; Bainfull is more or less evenly distributed throughout the year. This type resembles Type II since it has no dry season.
	TYPE
ver during the rest of the year Marieum rain period for the rest of the year Marieum rain period for the rest of the year Marieum rain period for the rest of the	TYPE III: 5 No very pronounced maximum rain period, with a dry accord lasting only from one to three months, ether during the period from December to February or from March to Nay, This type resembles Type I since it has a short dry season.
	TYPEIII

n rain a single rring the



LAND LIMITATIONS DESCRIPTION AND COMBINATIONS BEAVIOR BEAVIOR 12 - 1000n-1500m 13 - 1000n-1500m 13 - 1500n-1500m 14 - 1500n 15 - 1500n-1500m 16 - 1500n 17 - 1500n-1500m 18 - 1500n 19 - 15 SOIL TEXTURE Tc -Coarse text SLOPE/TOPOGRAPHY T2 - Undulating to moderately st T3 - Steep to very steep

CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION
ī	E2-Sh2-Rc2	11	T2-F3-D2	23	T3-E3
2	F2-D2	12	T3	22	T3-E3-Rc3
3	F3-D2	13	T3-E3	23	T3-E3-Sh3-Rc3
*	Sh2-Rc2	14	T3-E3-Rc2	\$2	T3-E12-E3-Sh3-Rc
2	T2	15	T3 E3 Sh2 Rc3	22	T3-F3-D2
9	T2-E3	91	T3-E3-Sh3-Rc2	56	T3-E13
2	T2-E3-Rc2	- 17	T3-E3-Sh3-Rc3	22	Tc
8	T2-E3-Rc3	81	T3-E12-E3-Sh3-Rc2		
6	T2-E3-Sh2-Rc2	61	T3-F3-D2		

In ingated				nanaged	aged		
raduy tice, noteliti	Corn	Cacao	Coconut	Grassland, unmar	Shrubs, unmanaged		
7	4	82	116	126	134		

SOIL DEPTH Sh2 - Moderately deep (50-100cm) Sh3 - Very shallow to shallow (< 50cm) ROCK OUTCROPS Rc2 - Common Rc3 - Many 2 8

APPENDIX 4. DIRECTORY OF THE PHILIPPINE CACAO INDUSTRY COUNCIL

Membership	Representative	Designation	Contact Details		
Chairperson:					
Armson Corporation	Consul Armi Lopez Garcia	Director	09173222764 armilopezgarcia@yahoo.com		
Co-Chairperson:					
Department of Agriculture	USec. Evelyn Laviña	Undersecretary	(02) 8 926 8444 agri.hvc.da@gmail.com		
Vice-Chair (Private Secto	or):				
- Luzon Island	Sylvia Ordoñez	Chairperson, R3- Central Luzon	09178403711; sylviaordonez@gmail.		
- Visayas Island	Buen Mondejar	Chairperson, R6- Western Visayas	09998803022; buenmondejar@gmail.		
- Mindanao Island	Christopher H. Lindo	Chairperson, R13- CARAGA	09177060600; chrizlindo24@gmail.		
Vice-Chair (Gov't Sector):				
Department of Trade and Industry	USec. Blesila A. Lantayona	Undersecretary	(02) 751 3335 rog@dti.gov.ph		
Value Chain Cluster Rep	resentative:				
- Trader/Export	Simon Bakker	CEO, Kennemer Foods International	simon.bakker@kennemerfoods.com		
- Nursery	Charita Puentespina	Proprietor, Malagos AgriVenture Corp.	charitap1939@gmail.com 09176327686		
- Production	Cristopher Fadriga	Farmer	chrisfadriga1958@gmail.com; 09565919071		
- Processing	Auro Chocolate	Kelly Go, Managing Director	k.go@aurochocolate.com		
Secretariat:					
Department of Trade and Industry	Romeo L. Castañaga	DTI-NICC for Cacao	RomeoCastanaga@dti.gov.ph		

Membership	Representative	Designation	Contact Details
Government Sector:			
Mindanao Dev't	Atty. Nathaniel D.	OIC-Chairperson	(082) 221 8109
Authority	Dalumpines		info@minda.gov.ph; officeofthechairman@minda.gov.ph; ernie.tomas@minda.gov.ph
Dept. of Science and	Dir. Leila C. America,	Director., DOST	(049) 521 8564
Technology	PhD	PCAARRD	leila_america@yahoo.com; tinbar16@ yahoo.com
Philippine Coconut Authority	Dennis Andres	Manager of Operations Dept.	(02) 928 4501 loc. 509 / Fax no. (02) 926 7631
			pca_ofad@yahoo.com; ofad@pca. gov.ph; admin@pca.gov.ph
Dept. of Environment	Nonito M. Tamayo,	Director	(02) 920-6215; 927-4788; 925-2139
and Natural Resources	Ceso IV		mbdenr@mozcom.com; jiniayaneza@yahoo.com
Dept. of Agrarian	Usec. Emily Padilla	Undersecretary	(02) 426-7484
Reform			dar.gov.ph@gmail.com; usec.sso@ dar.gov.ph
Land Bank of the Philippines	Edgardo S. Luzano	Dept. Head , LBP	(02) 405-7450; 405-7309
Small Business Corporation	Ma. Luna E. Cacanando	President & CEO	(02) 751 1888 / (02) 813 5720
'			mlunacacanando@sbgfc.org.ph; fgonzaga@mail.sbgfc.org.ph
Private Sector:			
REGIONAL	Victorino B. Barona	CAR	09159340038
CACAO COUNCIL	Jr.		vbbaronajr@gmail.com; vbbarona@ gmail.com
	Atty. Robert B.	R1-Ilocos Region	09163712021
	Tudayan		tudayanattyrobert@yahoo.com
	Pepito Dizon	R2-Cagayan	09194891899
		Valley	pdizonjr2017@yahoo.com
	Sylvia Ordonez	R3-Central Luzon	09178403711
			sylvia.ordonez@gmail.com

Membership	Representative	Designation	Contact Details		
	Florencio A. Flores	R4A-	09989800477		
		CALABARZON	florencio.a.flores@gmail.com		
	Bernardo F.	R4B-MIMAROPA	09175414945		
	Sampayan		bern_fsampayan@yahoo.com		
	Eduardo R. Pilapil Jr	R5-Bicol Region	09175014000		
			edpilapil@gmail.com		
	Buen Mondejar	R6-Western	09998803022		
		Visayas	c/o andreareyes@dti.gov.ph		
	Consul Armi Lopez	R7-Central	09173222764		
	Garcia	Visayas	armilopezgarcia@yahoo.com		
	Isidro Estrerra	R8-Eastern	09166204648		
		Visayas	c/o bdd.dti8@gmail.com		
	Louie Nova	R9-Zamboanga	09459610336		
		Peninsula	jasagriventureszc@gmail.com		
	Agustin Mercado, Jr.	R10-Northern	09179843780		
		Mindanao	agustin_mercado@yahoo.com		
	Charita Puentespina	R11-Davao	09176327686		
		Region	charitap1939@gmail.com		
	Ronie L. Jitotowani	R12-SOCCSK-	09515353143		
		SARGEN	rljitotowani.tibudskmpc@gmail.com		
	Christopher H. Lindo	R13-CARAGA	09177060600		
			chrizlindo24@gmail.com		
Non-Government Organ	nizations:				
Cacao Industry Dev't Assn of Mindanao Inc.	Valente D. Turtur	President	v_turtur@yahoo.com; cidami.center@ gmail.com		
Pilipinas Cacao Sensory Resources, Inc.	Jo-ann Sandique	President			
Academe:					
University of Southern Mindanao	Dr. Edward Barlaan	Agricultural Research Center	(064) 248 2426; 248 2672		
University of the Philippines Los Baños	Dr. Calixto M. Protacio	Professor 9, Crop Science Cluster, College of Agriculture	(049)536-2567/536-2894/536-2354; Fax 536-3673;		

