Food and Agriculture Organization of the United Nations

SUSTAINABLE DEVELOPMENT GOALS

VIRTUAL COURSE

26 March to 15 April 2021

Design of an Active Surveillance for Tilapia Lake Virus (TILV) Disease and Its Implementation

TCP/INT/3707: Strengthening biosecurity (policy and farm level) governance to deal with Tilapia lake virus

Food and Agriculture Organization of the United Nations

SUSTAINABLE DEVELOPMENT GOALS

TILAPIA SECTOR PROFILE: PHILIPPINES

26 March 2021

Production, Governance, and Health in the Philippines

Part 1: Industry Profile

MA. JODECEL C. DANTING
Center Chief
Bureau of Fisheries and Aquatic Resources – National Freshwater Fisheries Technology Center
CLSU Compound, Science City of Muñoz, Nueva Ecija, Philippines
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TCP/INT/3707: Strengthening biosecurity (policy and farm level) governance to deal with Tilapia lake virus

TILAPIA SECTOR PROFILE: PRODUCTION, GOVERNANCE AND HEALTH IN THE PHILIPPINES

Part 1: Industry Profile

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A food-secure and resilient Philippines with prosperous farmers and fisherfolk

Masaganang ANI Mataas na KITA

OUTLINE OF PRESENTATION

1. Philippine Fishery Resources At a Glance
2. Aquaculture Rank in the World (2018)
3. Aquaculture Contribution to National Economy
4. Contribution of Tilapia to Aquaculture Production
5. World Tilapia Production (Ranking)
6. Import/Export Data
7. Tilapia Aquaculture Production by Culture Unit and Environment 2020
8. Key Regions in Tilapia Production 2020
9. Genetically Improved Tilapia Strain & Other Tilapia Strains Available for Culture
10. Tilapia species present in the Wild
11. Major Fish Species Caught in Inland Municipal Fisheries 2015-2019
12. Role of BFAR-NFFTC in the Tilapia Industry
13. Government and Private Hatcheries for Tilapia
14. List of Registered Aqua Feed Mills
15. Local Movement Process Flow
16. Technologies to Intensify Tilapia Production
17. List of Tilapia Processing Facilities
18. Common Tilapia Forms
19. Government Interventions
20. Way Forward

Philippine Fishery Resources

5th longest coastline in the world

(1) Canada
(2) Indonesia
(3) Greenland
(4) Russia
(5) Philippines

220 Million Ha. Philippine Waters

7x BIGGER than total land area

Land Area: 29.8 million hectare

RESOURCES AT A GLANCE

Source: BFAR

1.2%(228 B) & 1.3% (125.09B)
GDP
(current and constant 2000 prices)

2018

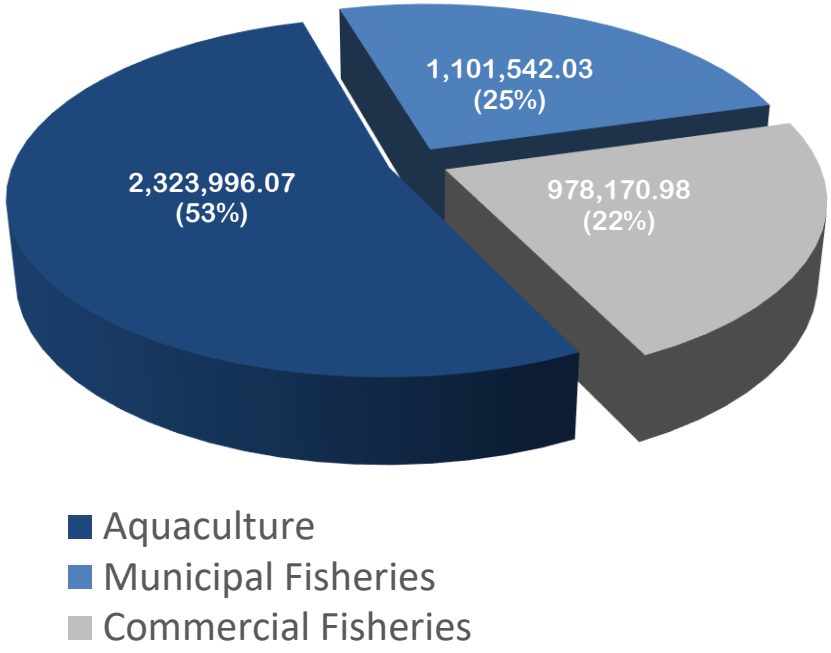
14.7%(227.9B) & 16.5%(125.09B
GVA
(current and constant 2000 prices)

- 8th among the top producing countries(4.354 million MT of fish, crustaceans, mollusks, and aquatic plants)
- Constitutes 2.06% of total world production
- 11th in aquaculture production of fish, crustaceans and mollusks ($1.887B)
- 4th largest producer of aquatic plant (including Seaweeds) w/ production of 1.478 million MT

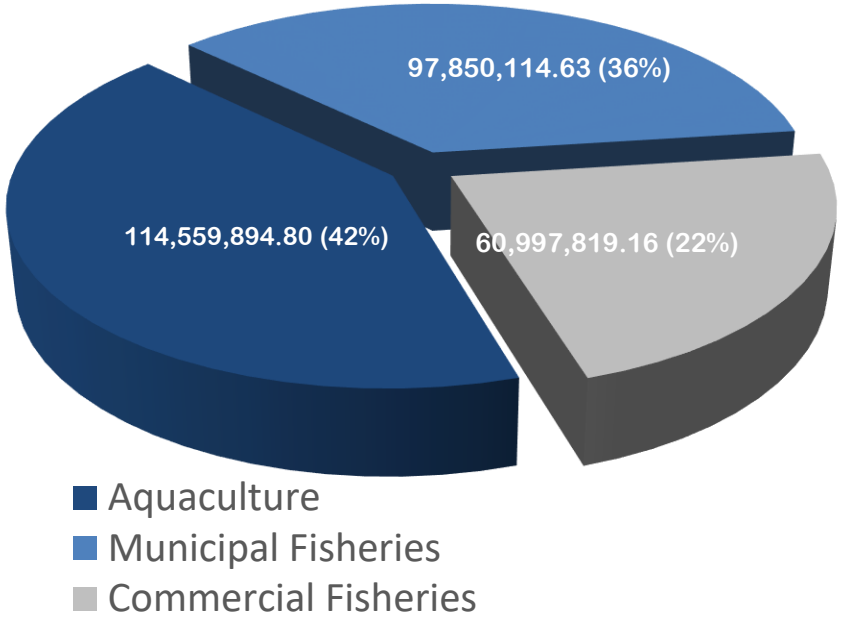
Source: Philippine Fisheries Profile 2019

Contribution to the National Economy (2020)

Fishery Production (MT)



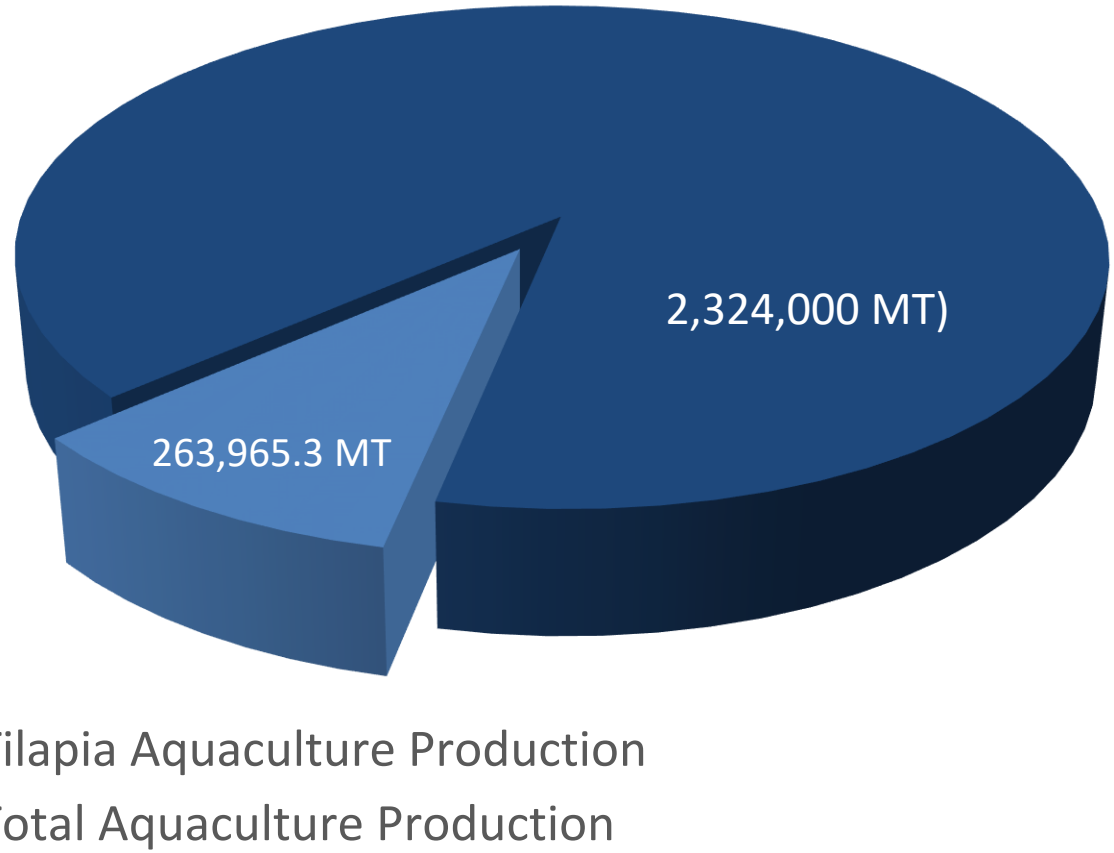
Fishery Production in Value (PhP)



Aquaculture contributed the highest quantity and value among the three sub-sectors

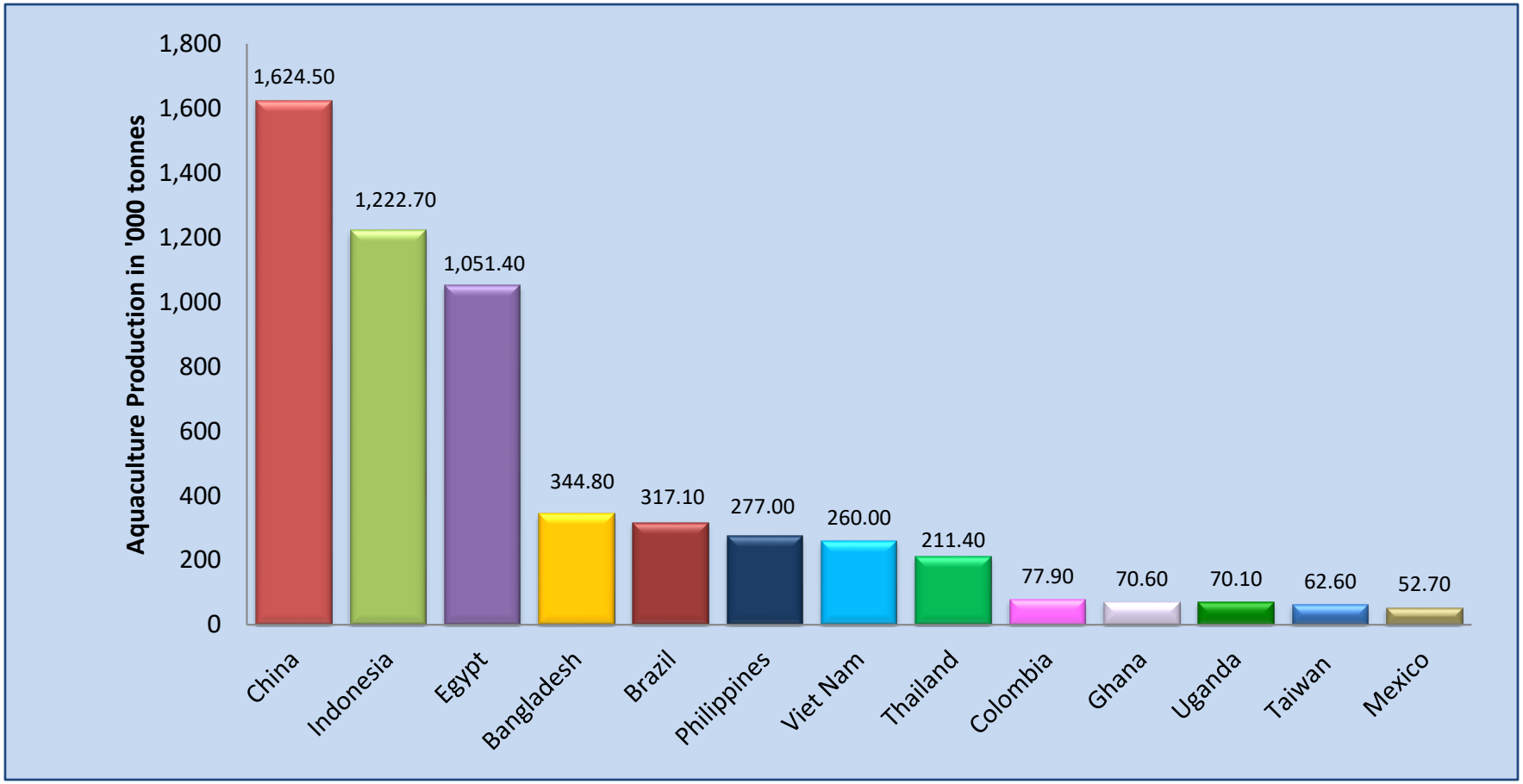
Source: Philippine Statistics Authority, 2020

Contribution of Tilapia to Aquaculture Production



Source: Philippine Statistics Authority, 2020

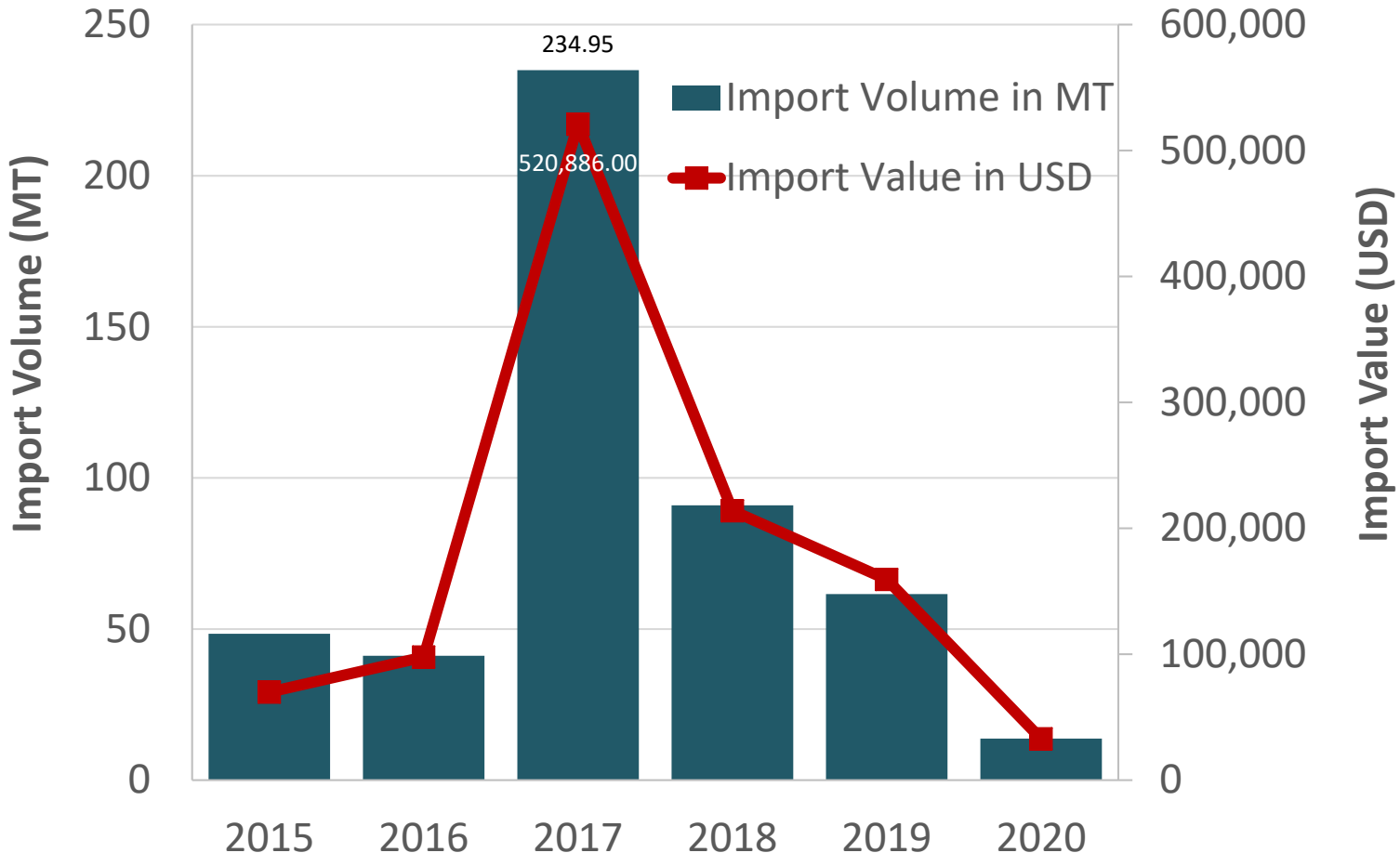
World Tilapia Production



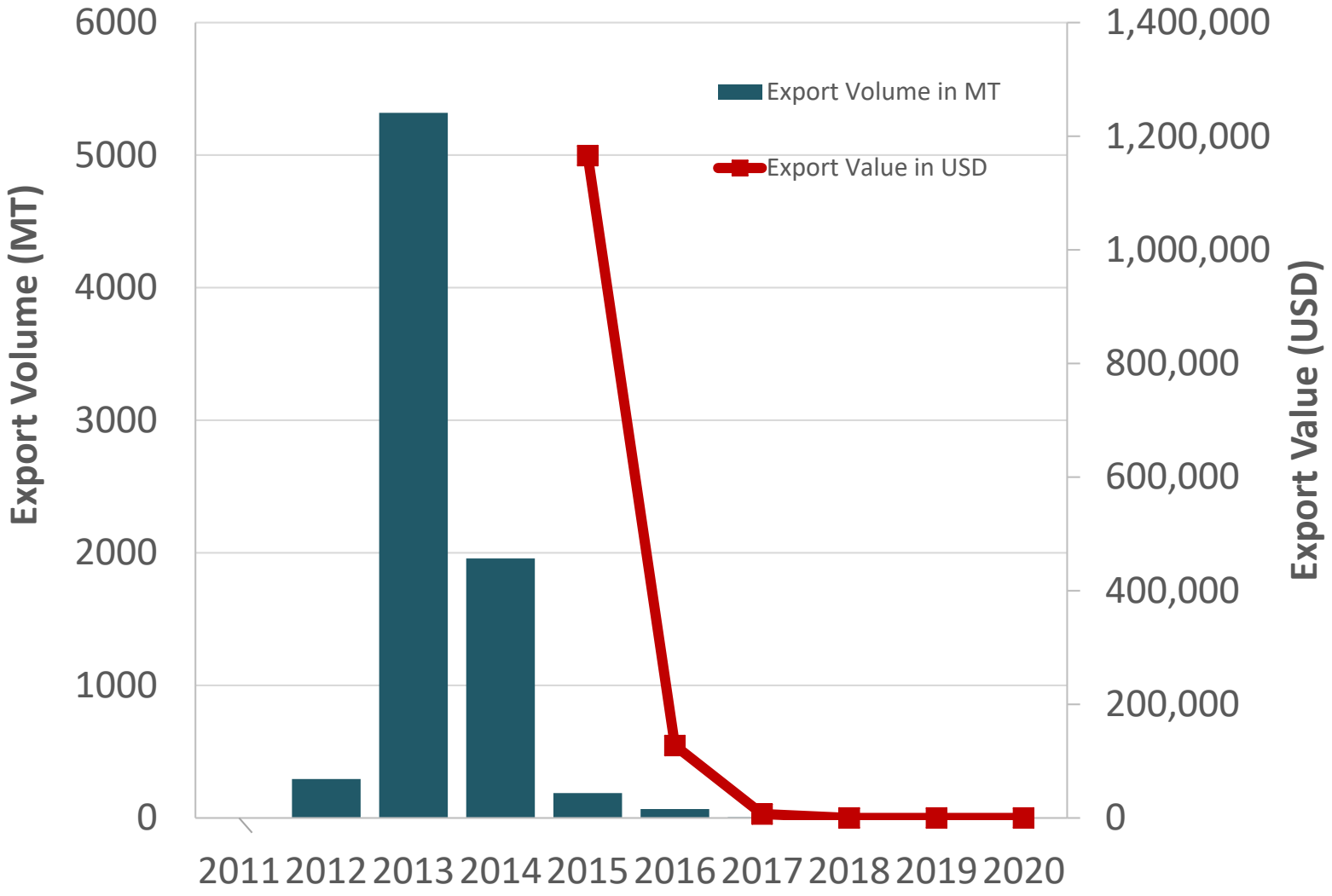
- Philippines ranked 6th in World's Tilapia Production in 2018

Source: Miano, M & Wang, W. (2021). Trends of Aquaculture Production and Trade: Carp, Tilapia and Shrimp, Journal of Asian Fisheries Science

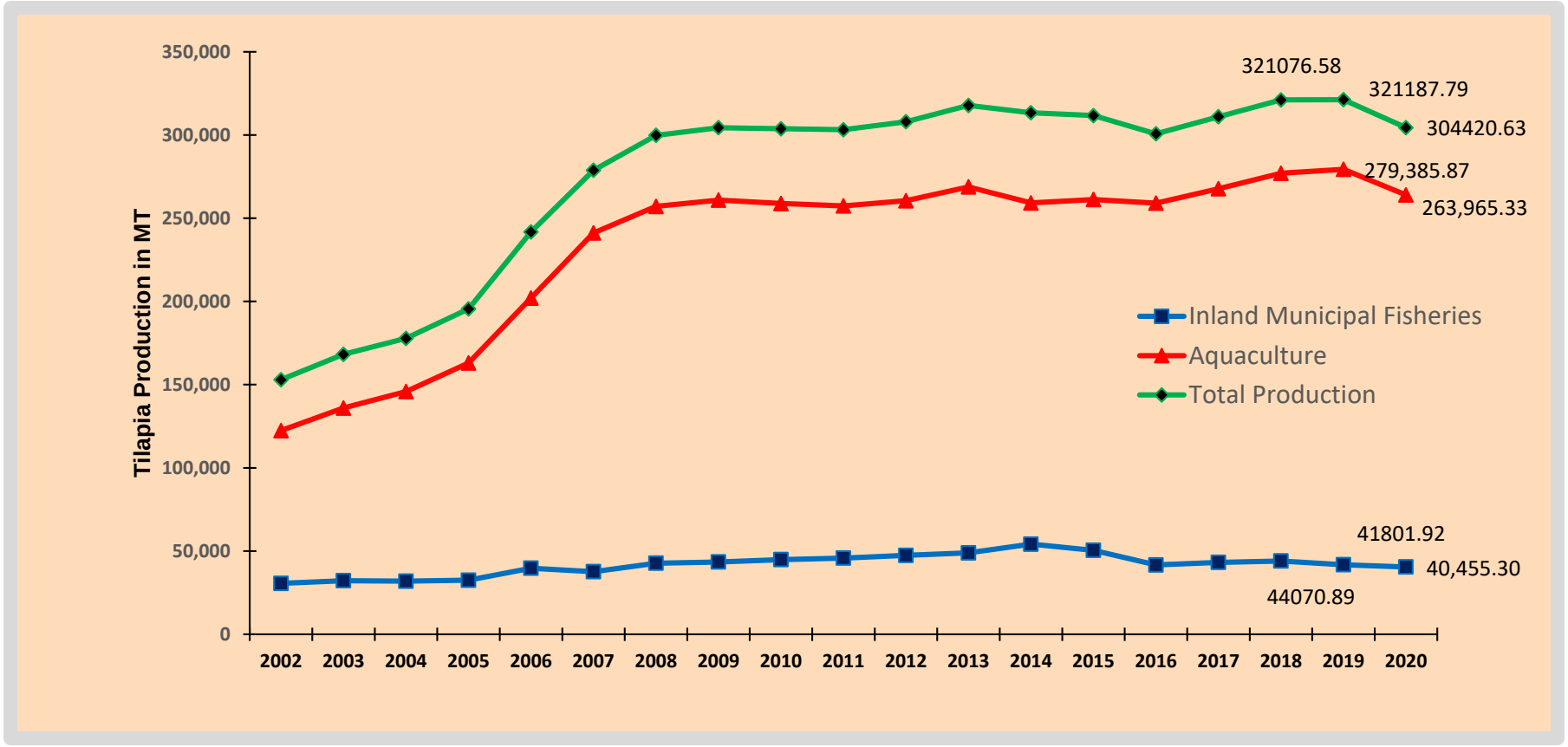
Import Data


250
200
150
100
50
0
Import Volume (MT)
600,000
500,000
400,000
300,000
200,000
100,000
0
Import Value (USD)
234.95
520,886.00
Import Volume in MT
Import Value in USD
2015
2016
2017
2018
2019
2020

Export Data


Export Volume in MT
Export Value in USD
Export Volume (MT)
Export Value (USD)
6000
5000
4000
3000
2000
1000
0
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
2011 2012 2013 2014 2015 2016 2017 2018 2019 2020

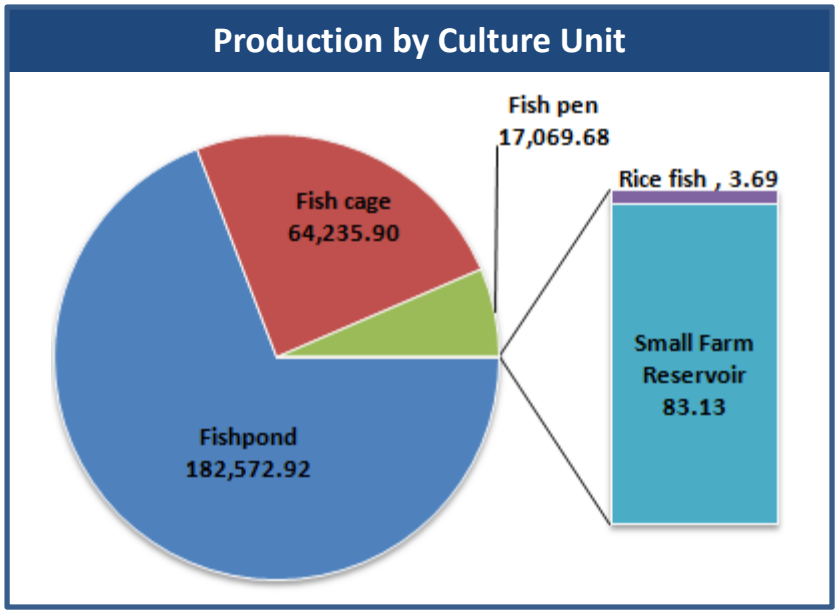
TILAPIA PRODUCTION 2002-2020

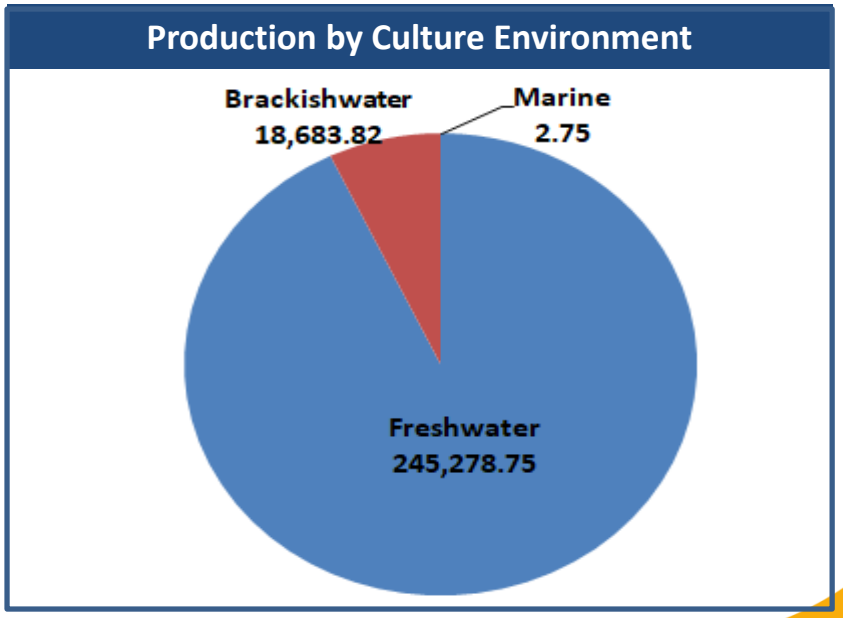


Source: Philippine Statistics Authority, 2020

TILAPIA AQUACULTURE PRODUCTION BY CULTURE UNIT AND ENVIRONMENT 2020

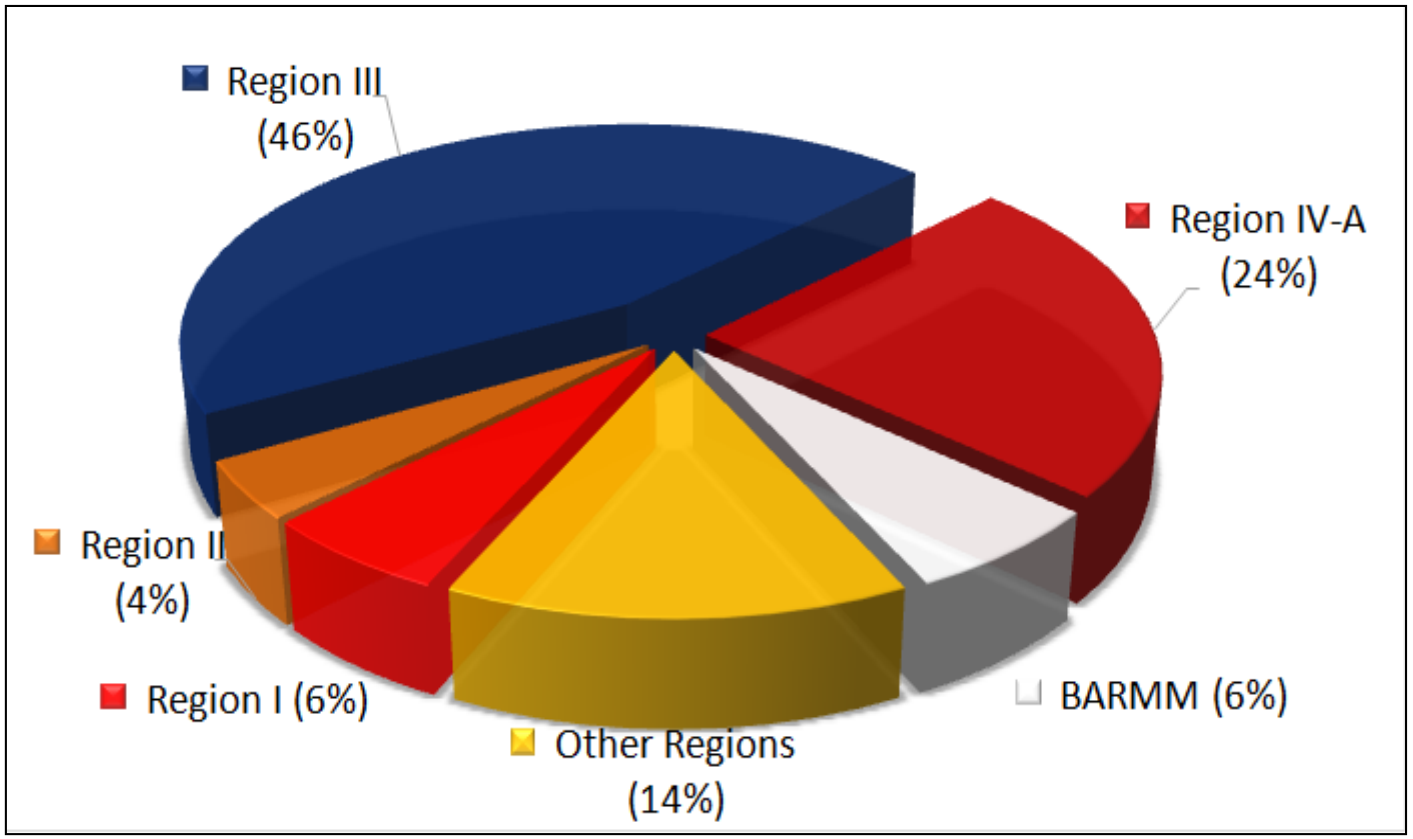
	Freshwater	Brackishwater	Marine	Total
Fishpond	164,060.01	18,512.91		**182,572.92**
Fish cage	64,111.18	122.16	2.56	**64,235.9**
Fish pen	17,020.74	48.75	0.19	**17,069.68**
Rice fish	3.69			**3.69**
Small Farm Reservoir	83.13			**83.13**
Total	**245,278.75**	**18,683.82**	**2.75**	**263,965.32**





Source: Philippine Statistics Authority, 2020

KEY REGIONS IN TILAPIA PRODUCTION 2020



Source: Philippine Statistics Authority 2020

Genetically Improved Nile Tilapia Strains that are Available for Culture in the Philippines as of 2019

Name of Tilapia Strain*	Source Agency*	Description
Freshwater Aquaculture Center Selected Tilapia (FaST or IDRC Strain 39th generation)	Freshwater Aquaculture Center, Central Luzon State University (FAC-CLSU), Science City of Muñoz, Nueva Ecija	Developed at Central Luzon State University – Freshwater Aquaculture Center (CLSU-FAC) Fish Genetics Projects from a sub-project at Aquaculture Genetics Network in Asia (AGNA)
Genetically Improved Farmed Tilapia – Malaysia Strain (GIFT-Malaysia)	Bureau of Fisheries and Aquatic Resources (BFAR in selected regions)	Originally developed from Genetic Improvement of Farmed Tilapia Project
Genetically Male Tilapia of YY Supermale Tilapia (GMT)	FAC-CLSU, Science City of Muñoz, Nueva Ecija	YY male technology conceptualizedas a breeding program that generates monosex tilapia (with yy genotypes instead of xy for normal males) providing alternnative to hormonal sex reversal and hybridization.
Improved EXCEL tilapia	BFAR-National Freshwater Fisheries Technology Center (BFAR-NFFTC), Science City of Muñoz, Nueva Ecija	• The product of the genetic program that emanates from the GIFT project was dubbed "BFAR GET 2002 EXCEL TILAPIA" • The legacy continues, the BFAR-NFFTC is continuously disseminating iEXCEL Tilapia to further benefit the resource-poor fishfarmers.

*Source: Tilapia culture : the basics / Maria Rowena R. Romana-Eguia, Ruel V. Eguia, Rolando V. Pakingking, Jr. -- Tigbauan, Iloilo, Philippines : Aquaculture Dept., Southeast Asian Fisheries Development Center, 2020

Genetically Improved Nile Tilapia Strains that are Available for Culture in the Philippines as of 2019

Name of Tilapia Strain*	Source Agency*	Description
Improved Brackishwater Enhanced Selected Tilapia	BFAR-NFFTC, Science City of Muñoz, Nueva Ecija	The product of the project "Development of Improved Breeds of Tilapia for Culture in Saline Waters" aimed to develop tilapia breed which could withstand brackishwater environment and also thrives well in it.
Cold Tolerant Tilapia strain	BFAR-NFFTC, Science City of Muñoz, Nueva Ecija	Another DA-BFAR-NFFTC initiative project to develop a breed of tilapia which could withstand the temperature of the Cordillera and our country's cold season, begetting year round supply of marketable size tilapia.
Molobicus	BFAR-National Integrated Fisheries Technology Development Center (BFAR-NIFTDC), Dagupan, Pangasinan	A tilapia hybrid developed by systematic crossings and back-crossings of two different species of tilapia (*O. mossambicus* and *O. niloticus)* that can grow very well similar to freshwater tilapia at very high water salinity
GenoMar Supreme Tilapia	GenoMar Philippines Incorporated, Science City of Muñoz, Nueva Ecija	Breeding nucleus is located at CLSU-FAC for GENOMAR strain development, growth rate, saline tolerance and fillet yield

*Source: Tilapia culture : the basics / Maria Rowena R. Romana-Eguia, Ruel V. Eguia, Rolando V. Pakingking, Jr. -- Tigbauan, Iloilo, Philippines : Aquaculture Dept., Southeast Asian Fisheries Development Center, 2020

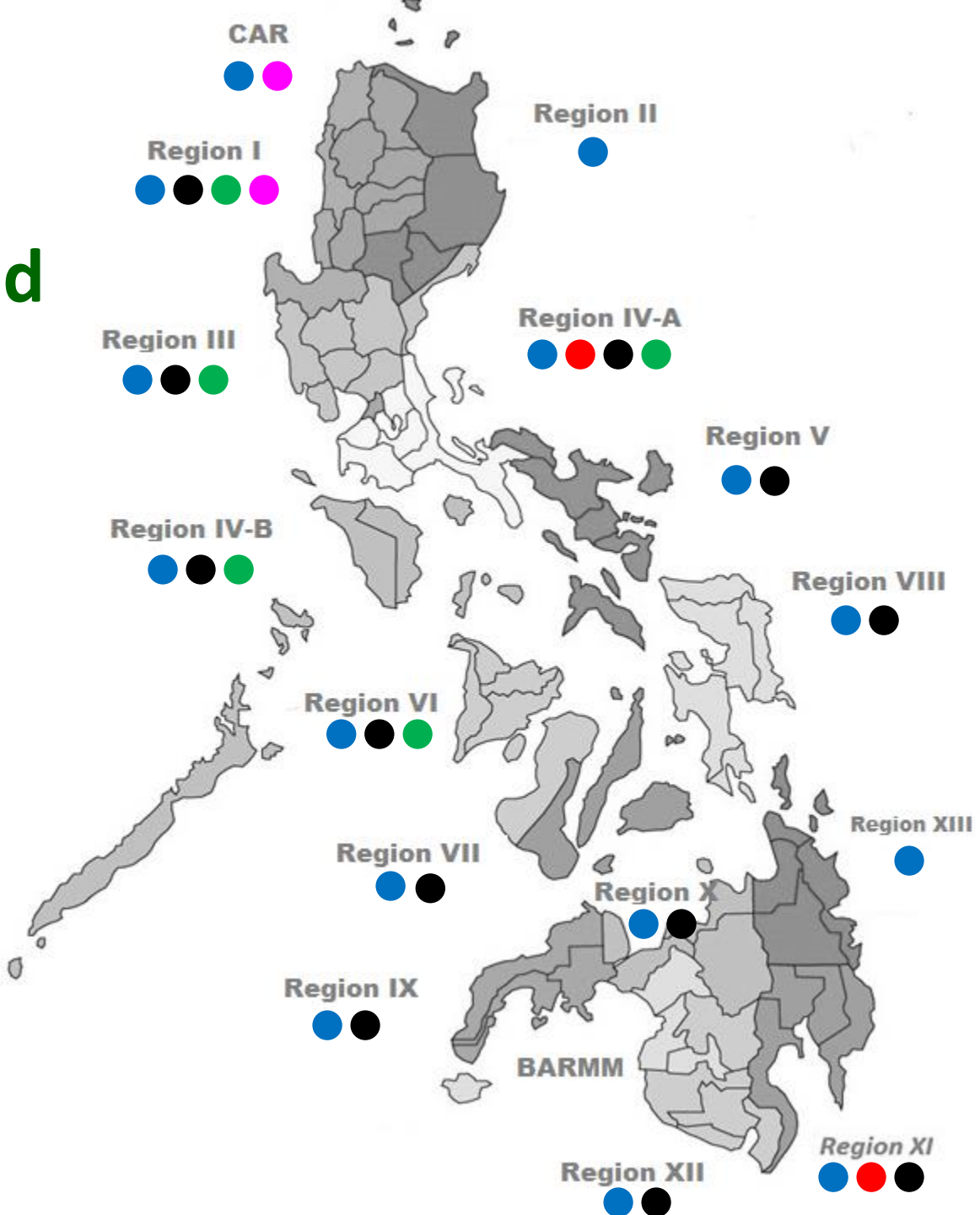
Other Tilapia Strains Available For Culture in the Philippines

Name of Tilapia Strain	Source Agency	Description
SEAFDEC Strain	SEAFDEC, Rizal	A strain developed by SEAFDEC in 1999 based from the mass selection of 100 pairs of domesticate Thai Nile Tilapia (NIFI) stock also known as *Chitralada strain*, geared towards the improvement of growth of Nile tilapia on cage aquaculture.
Oreochromis spp. Red Tilapia	BFAR-NFFTC, Science City of Muñoz, Nueva Ecija	A hybrid of *O. mossambicus, O. niloticus* and *O. aureus*
BEST 200	San Miguel Corporation	A strain developed by San Miguel Corporation (SMC) in 1995 which underwent a selection process that aims to improve the growth of *O. niloticus* over other commercially available strains.
Oreochromis hornorum Hybrid	Negros Island	A saline-tolerant tilapia hybrid (male *Tilapia hornorum* crossed with female *Oreochromis niloticus)* used for green water culture technology by Negros shrimp farmers

Tilapia Species Present in the Wild

Legend:

- *O. niloticus*
- *Oreochromis spp.* (Red Tilapia)
- *O. mossambicus*
- *Sarotherodon melanotheron*
- *T. zilli*



MAJOR FISH SPECIES CAUGHT IN INLAND MUNICIPAL FISHERIES 2015-2019

	Total Catch (MT)	Tilapia (MT)	% to Total	Major Fish Species
2019	156,458.87	5,037.69	3.22	Others (42.11%) Carp (26.72%) Mudfish (8.75%) Gourami (5.29%) Freshwater goby (3.3%) **Tilapia (3.22%)**
2018	164,200.98	44,070.89	26.84	Others (41.37%) **Tilapia (26.84%)** Carp (8.93%) Mudfish (5.89%) Catfish (3.54%)
2017	163,870.46	43,240.00	26.39	Others (42.74%) **Tilapia (26.39%)** Carp (9.83%) Mudfish (5.80%) Catfish (4.83%)
2016	160,989.84	41,676.94	25.89	Others (44.38%) **Tilapia (25.89%)** Carp (9.11%) Mudfish (5.48%) Catfish (4.66%)
2015	204,733.99	50,473.73	24.65	Others (42.32%) **Tilapia (24.65%)** Carp (14.99%) Mudfish (5.74%) Milkfish (4.06%)

FOO 308, Series of 2019: Guidelines on the Dispersal/Distribution of Fish Fingerlings and Broodstock

Source: Philippine Statistics Authority 2020

ROLE OF BFAR-NFFTC IN TILAPIA INDUSTRY

As National Broodstock Center and breeding nucleus of Improved Tilapia breeders

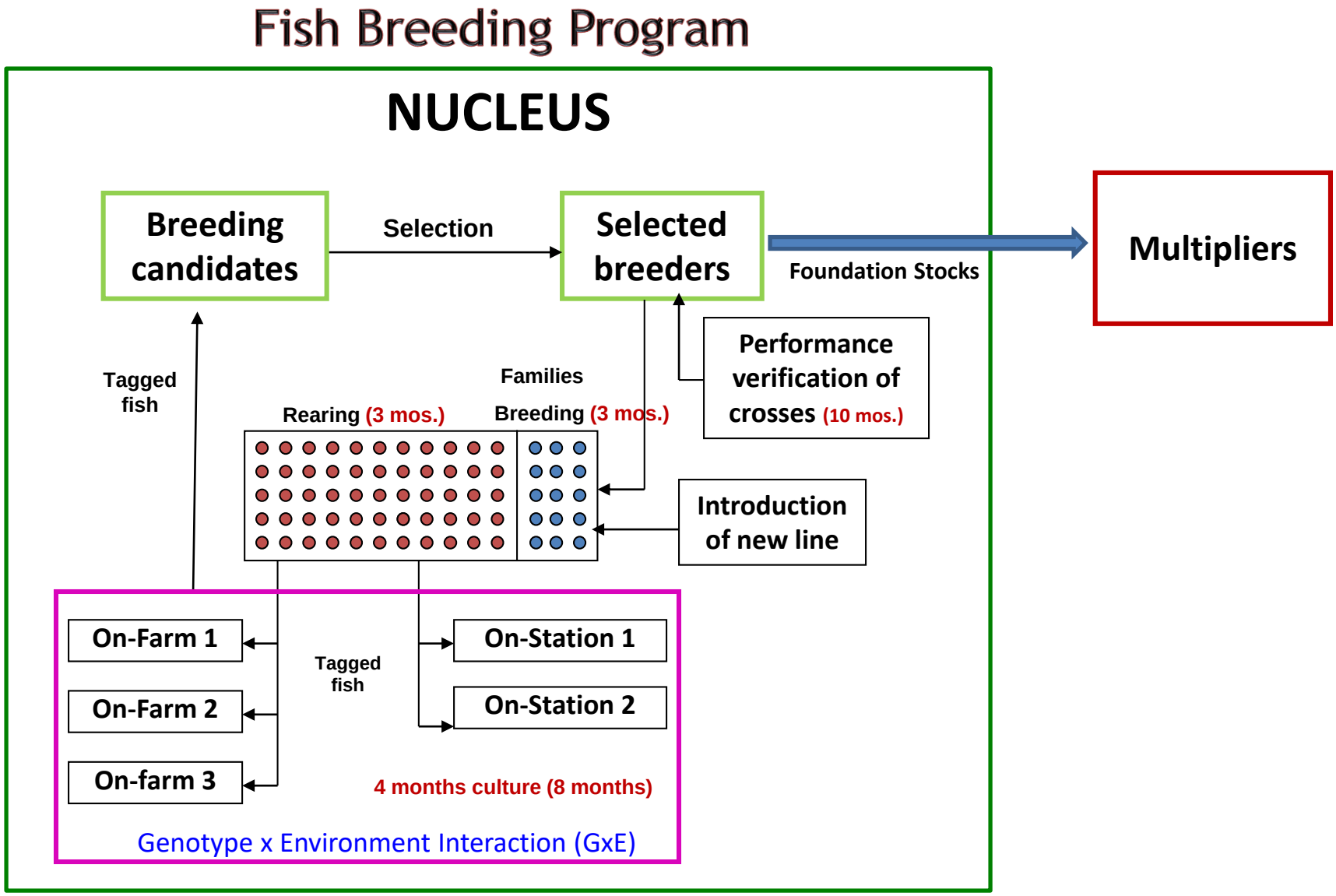
Central Hatcheries Nationwide

Multipliers:

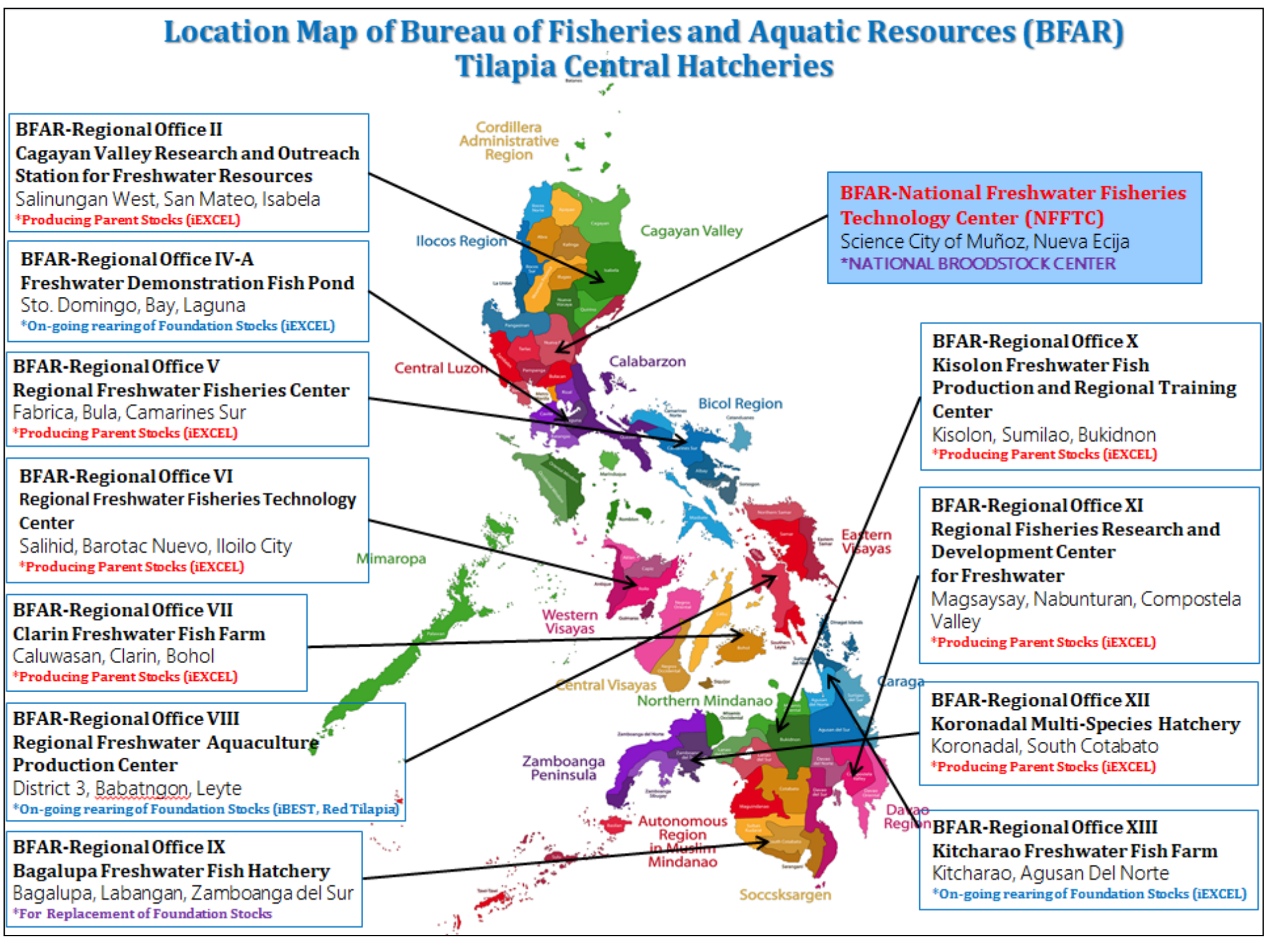
- BFAR-Regional Office Technology Outreach Stations
- Government Hatcheries (Provincial & Municipal)
- State Universities and Colleges Hatcheries
- Registered Private Hatcheries

Consumers

BFAR-NFFTC as the Breeding Nucleus



Location Map of Bureau of Fisheries and Aquatic Resources (BFAR) Tilapia Central Hatcheries



BFAR-Regional Office II
Cagayan Valley Research and Outreach Station for Freshwater Resources
Salinungan West, San Mateo, Isabela
*Producing Parent Stocks (iEXCEL)

BFAR-Regional Office IV-A
Freshwater Demonstration Fish Pond
Sto. Domingo, Bay, Laguna
*On-going rearing of Foundation Stocks (iEXCEL)

BFAR-Regional Office V
Regional Freshwater Fisheries Center
Fabrica, Bula, Camarines Sur
*Producing Parent Stocks (iEXCEL)

BFAR-Regional Office VI
Regional Freshwater Fisheries Technology Center
Salihid, Barotac Nuevo, Iloilo City
*Producing Parent Stocks (iEXCEL)

BFAR-Regional Office VII
Clarin Freshwater Fish Farm
Caluwasan, Clarin, Bohol
*Producing Parent Stocks (iEXCEL)

BFAR-Regional Office VIII
Regional Freshwater Aquaculture Production Center
District 3, Babatngon, Leyte
*On-going rearing of Foundation Stocks (iBEST, Red Tilapia)

BFAR-Regional Office IX
Bagalupa Freshwater Fish Hatchery
Bagalupa, Labangan, Zamboanga del Sur
*For Replacement of Foundation Stocks

BFAR-National Freshwater Fisheries Technology Center (NFFTC)
Science City of Muñoz, Nueva Ecija
*NATIONAL BROODSTOCK CENTER

BFAR-Regional Office X
Kisolon Freshwater Fish Production and Regional Training Center
Kisolon, Sumilao, Bukidnon
*Producing Parent Stocks (iEXCEL)

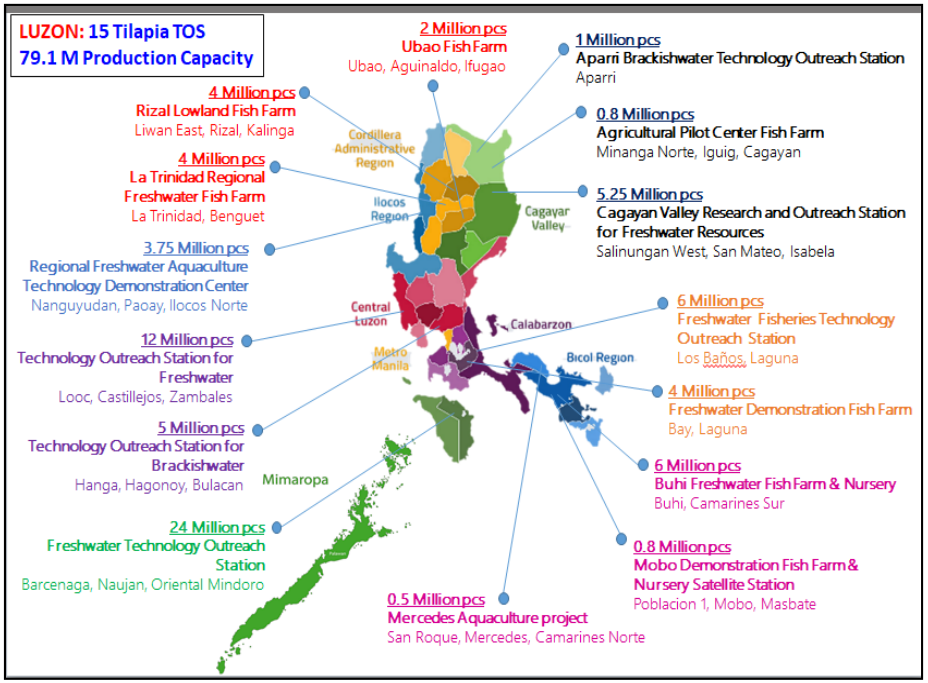
BFAR-Regional Office XI
Regional Fisheries Research and Development Center for Freshwater
Magsaysay, Nabunturan, Compostela Valley
*Producing Parent Stocks (iEXCEL)

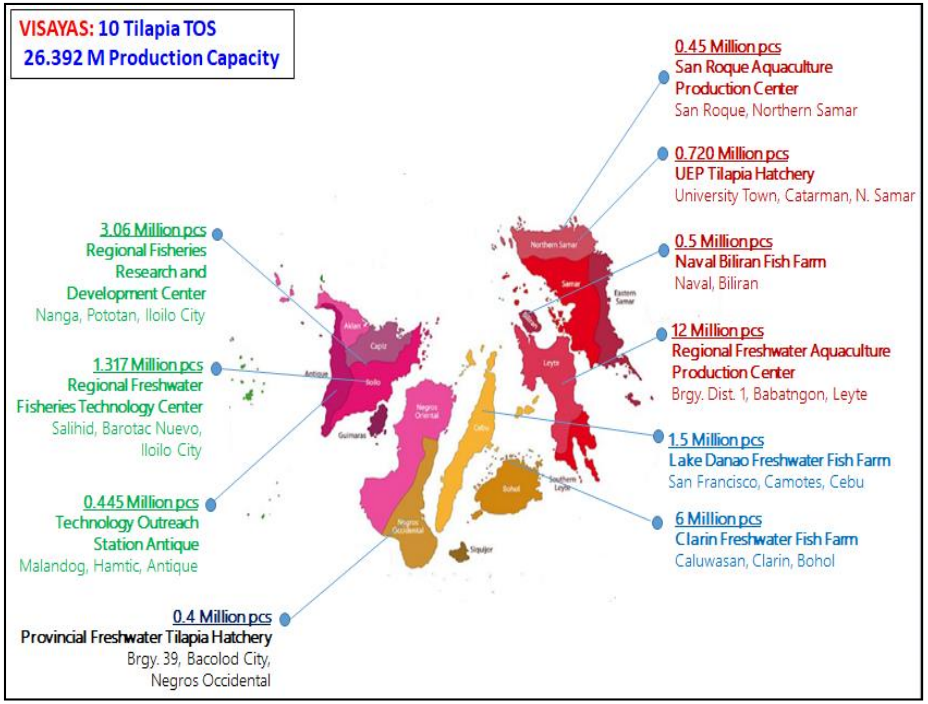
BFAR-Regional Office XII
Koronadal Multi-Species Hatchery
Koronadal, South Cotabato
*Producing Parent Stocks (iEXCEL)

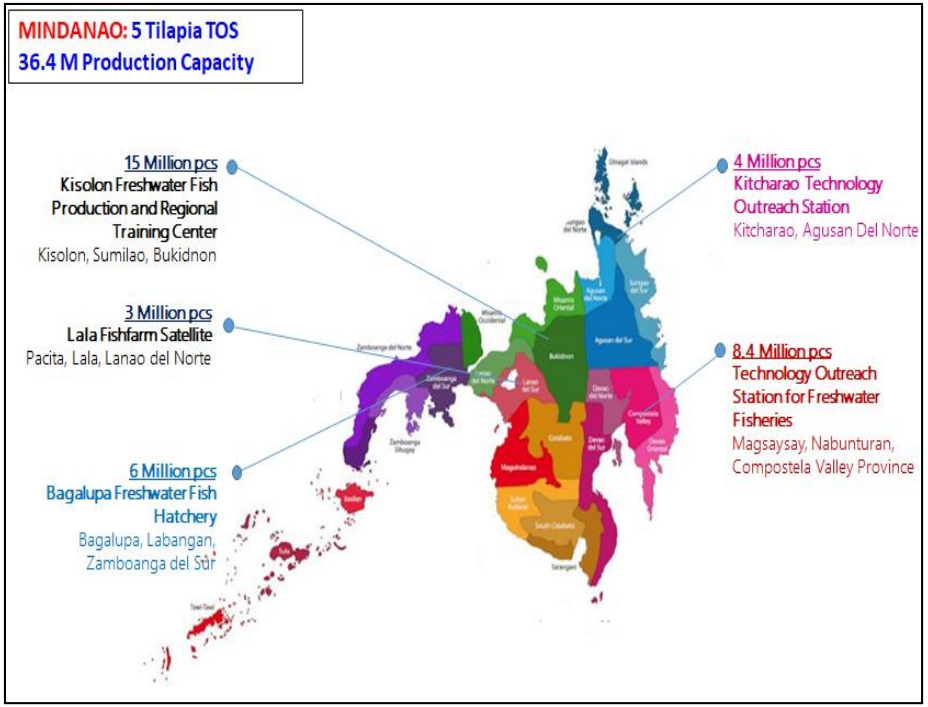
BFAR-Regional Office XIII
Kitcharao Freshwater Fish Farm
Kitcharao, Agusan Del Norte
*On-going rearing of Foundation Stocks (iEXCEL)

Government Hatcheries (BFAR Technology Outreach Stations)

TOTAL NO. OF TOS: 30 TOS
141.892 M Production Capacity







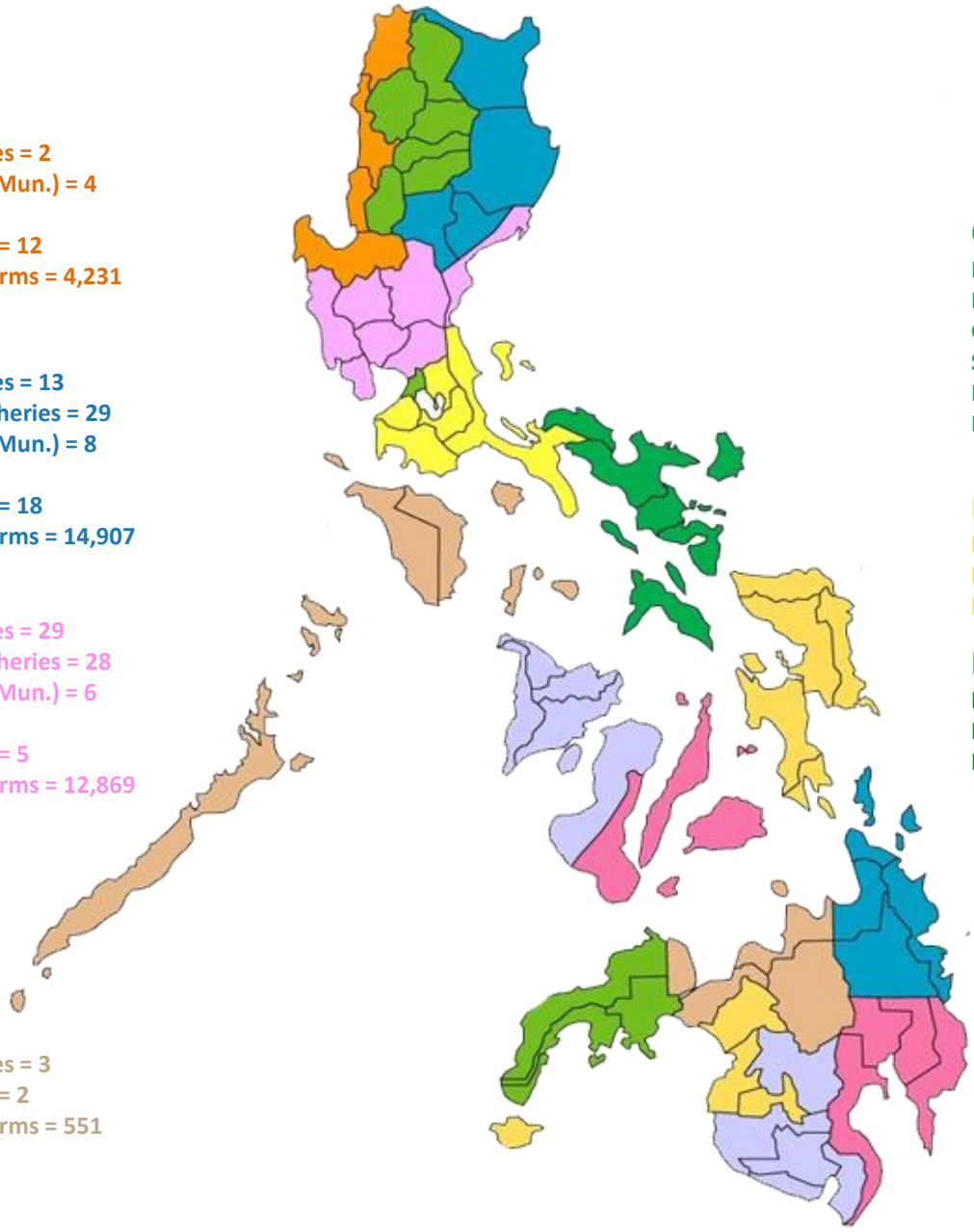
Tilapia Hatchery & Grow-out Farms

Region 1
Registered Private Hatcheries = 2
Gov't. Hatcheries (Prov'l & Mun.) = 4
SUC Hatcheries = 3
Registered Grow-out Farms = 12
Non-registered Grow-out Farms = 4,231

Region 2
Registered Private Hatcheries = 13
Non-registered Private Hatcheries = 29
Gov't. Hatcheries (Prov'l & Mun.) = 8
SUC Hatcheries = 1
Registered Grow-out Farms = 18
Non-registered Grow-out Farms = 14,907

Region 3
Registered Private Hatcheries = 29
Non-registered Private Hatcheries = 28
Gov't. Hatcheries (Prov'l & Mun.) = 6
SUC Hatcheries = 3
Registered Grow-out Farms = 5
Non-registered Grow-out Farms = 12,869

Region 4B
Registered Private Hatcheries = 3
Registered Grow-out Farms = 2
Non-registered Grow-out Farms = 551

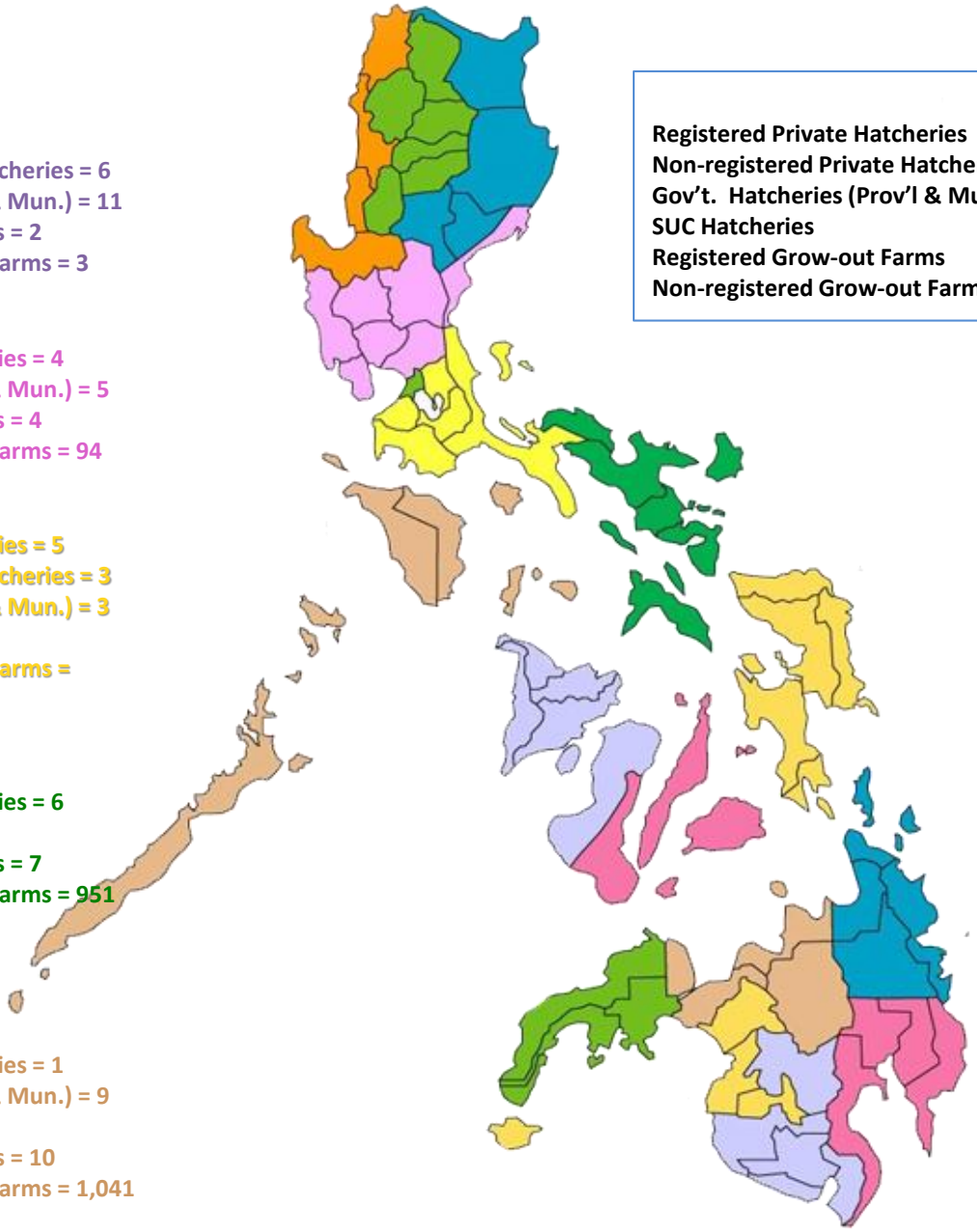


CAR
Registered Private Hatcheries = 4
Non-registered Private Hatcheries = 20
Gov't. Hatcheries (Prov'l & Mun.) = 15
SUC Hatcheries = 2
Registered Grow-out Farms = 6
Non-registered Grow-out Farms = 7,951

Region 4A
Non-registered Private Hatcheries = 25
Registered Grow-out Farms = 3
Non-registered Grow-out Farms = 57

Region 5
Registered Private Hatcheries = 18
Registered Grow-out Farms = 36
Non-registered Grow-out Farms = 176

Tilapia Hatchery & Grow-out Farms



	LUZ	VIS	MIN	TOTAL
Registered Private Hatcheries =				
Non-registered Private Hatcheries =				
Gov't. Hatcheries (Prov'l & Mun.) =				
SUC Hatcheries =				
Registered Grow-out Farms =				
Non-registered Grow-out Farms =				

Region 6
Non-registered Private Hatcheries = 6
Gov't. Hatcheries (Prov'l & Mun.) = 11
Registered Grow-out Farms = 2
Non-registered Grow-out Farms = 3

Region 7
Registered Private Hatcheries = 4
Gov't. Hatcheries (Prov'l & Mun.) = 5
Registered Grow-out Farms = 4
Non-registered Grow-out Farms = 94

Region 8
Registered Private Hatcheries = 5
Non-registered Private Hatcheries = 3
Gov't. Hatcheries (Prov'l & Mun.) = 3
SUC Hatcheries = 2
Non-registered Grow-out Farms =

Region 9
Registered Private Hatcheries = 6
SUC Hatcheries = 2
Registered Grow-out Farms = 7
Non-registered Grow-out Farms = 951

Region 10
Registered Private Hatcheries = 1
Gov't. Hatcheries (Prov'l & Mun.) = 9
SUC Hatcheries = 1
Registered Grow-out Farms = 10
Non-registered Grow-out Farms = 1,041

Region 11
Non-registered Private Hatcheries = 2
Registered Grow-out Farms = 4
Non-registered Grow-out Farms = 3,388

Region 12
Registered Private Hatcheries = 2
Non-registered Private Hatcheries = 173
Registered Grow-out Farms = 1
Non-registered Grow-out Farms =

Region 13
Gov't. Hatcheries (Prov'l & Mun.) = 4
Registered Grow-out Farms = 5
Non-registered Grow-out Farms =

List of Registered Aqua Feedmills

Region I (2)
1) Cargill Phils., Inc., Pangasinan
2) San Miguel Foods, Incorporated, Pangasinan

Region 2 (2)
1) New Hope Isabela Agriculture, Inc., Isabela
2) San Miguel Foods, Inc., Isabela

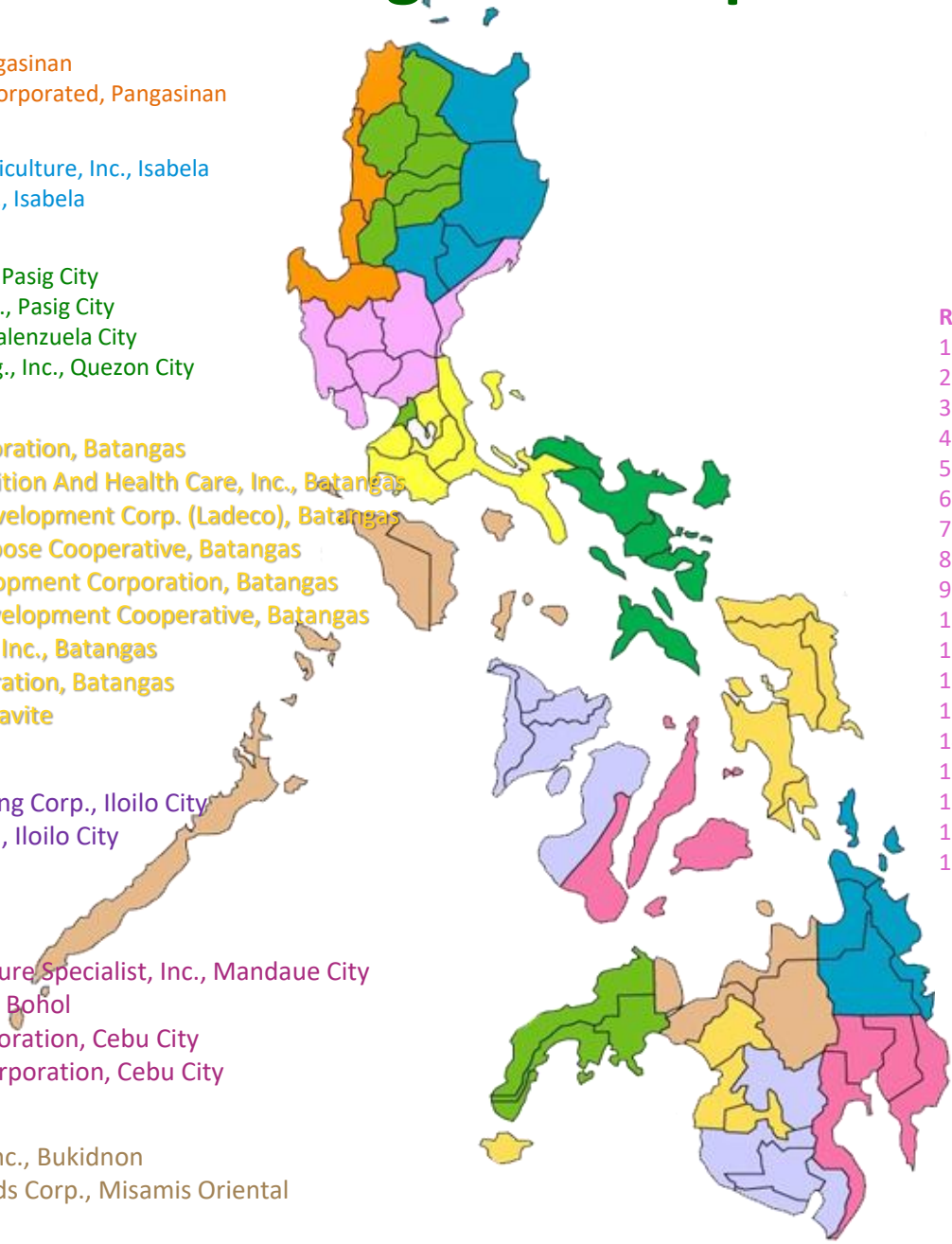
NCR (4)
1) General Milling Corp., Pasig City
2) Universal Robina Corp., Pasig City
3) Sahara Feeds Corp., Valenzuela City
4) First El Presidente Mfg., Inc., Quezon City

Region 4A (9)
1) Armor Milling Corporation, Batangas
2) Jetbest Animal Nutrition And Health Care, Inc., Batangas
3) Lipa Agricultural Development Corp. (Ladeco), Batangas
4) Limcoma Multi-purpose Cooperative, Batangas
5) Primera Agro-development Corporation, Batangas
6) Soro-soro Ibaba Development Cooperative, Batangas
7) Solid One Mill Phils, Inc., Batangas
8) Tower Feeds Corporation, Batangas
9) Welgro Phils, Inc., Cavite

Region 6 (2)
1) Phil. Foremost Milling Corp., Iloilo City
2) Vitarich Corporation, Iloilo City

Region 7 (4)
1) Integrated Aquaculture Specialist, Inc., Mandaue City
2) Marcela Farms, Inc., Bohol
3) Oversea Feeds Corporation, Cebu City
4) Popular Feedmill Corporation, Cebu City

Region 10 (2)
1) San Miguel Foods, Inc., Bukidnon
2) Tateh Premium Feeds Corp., Misamis Oriental



LUZON	=	35
VISAYAS	=	6
MINDANAO	=	7
		48

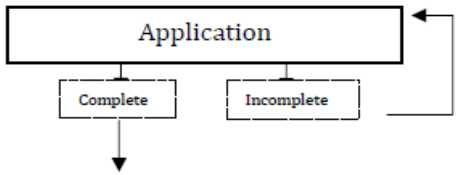
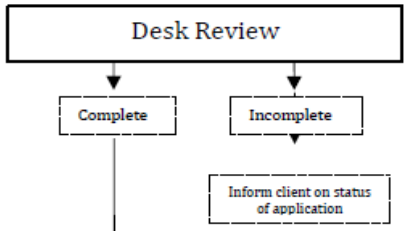
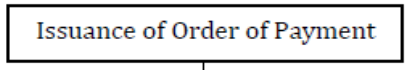
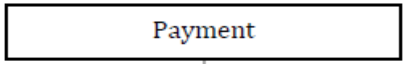
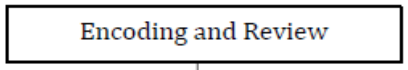
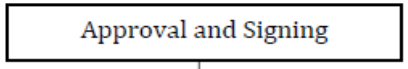
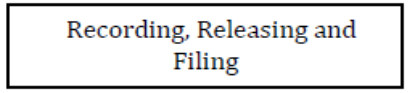
Region 3 (18)
1) Charoen Pokphand Foods Philippines Corp., Bataan
2) Charoen Pokphand Foods Philippines Corp., Tarlac
3) Grobest Feeds Philippines, Inc, Tarlac
4) New Hope Tarlac Agriculture, Inc., Tarlac
5) Charoen Pokphand Foods Philippines Corp., Bulacan
6) New Hope Bulacan Agriculture Inc., Bulacan
7) Feedmix Specialist, Inc Ii, Bulacan
8) Texicon Agri Ventures Corp., Bulacan
9) Cargill Phils., Inc., Bulacan
10) Hoc Po Feeds Corporation, Bulacan
11) Mersan Agri Development, Inc., Bulacan
12) Sunjin Phil Corporation, Bulacan
13) Santeh Feeds Corporation, Bulacan
14) Southeast Feed Specialist Corporation, Bulacan
15) New Hope Central Luzon Agri Inc., Pampanga
16) Feedworld, Inc, Pampanga
17) Gold Label Feedmill, Pampanga
18) Aces Agri-manufacturing Corp, Nueva Ecija

Region 11 (2)
1) Julu Enterprises Incorporated, Davao City
2) Vitarich Corporation, Davao City

Region 12 (3)
1) Arowana Agriventures Corp. , South Cotabato
2) Tateh Premium Feeds Corp., South Cotabato
3) San Miguel Foods Inc. , General Santos City

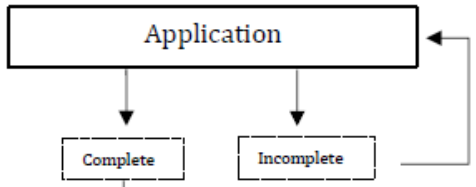
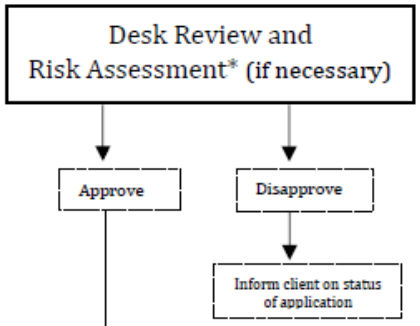
LOCAL MOVEMENT PROCESS FLOW

Issuance of Health Certificate for Domestic Movement of Fish and Fishery/Aquatic Products

PROCESS FLOW	INTERFACES
	1. Health Certificate Application Form 2. Document requirements
	Document requirements
	Order of Payment
	Official Receipt
	1. Health Certificate Application Form 2. Document requirements
	Health Certificate
	1. Health Certificate 2. Releasing Logbook 3. HC File Copy

LOCAL MOVEMENT PROCESS FLOW

Issuance of Local Transport Permit (LTP)

PROCESS FLOW	INTERFACES
	1. LTP Application Form 2. Documentary Requirements
	1. Application Form 2. Documentary Requirements 3. FCS Routing Slip*
Issuance of Order of Payment	Order of Payment
Payment	Official Receipt
Encoding and Review	LTP Form
Approval and Signing	LTP
Recording, Releasing andFiling	1. LTP 2.Releasing Logbook

LOCAL MOVEMENT PROCESS FLOW

Fisheries Office Order 241: Mandatory screening for TiLV and Issuance of Health Certificate for Transboundary Movement of Tilapia for Aquaculture Purposes

Republic of the Philippines
Department of Agriculture
Bureau of Fisheries and Aquatic Resources
PCA Compound, Elliptical Road, Diliman, Quezon City
Tel. No. 9299597/9295847 Telefax No. 9298074

04 August 2017

Fisheries Office Order No. 241
Series of 2017

SUBJECT: Mandatory Screening for Tilapia Lake Virus (TiLV) and Issuance of Health Certificate for Transboundary Movement of Tilapia for Aquaculture Purposes

Tilapia Lake Virus (TiLV) is an emerging viral disease causing mortalities in wild and cultured tilapia. So far, tilapia is the known susceptible species. TiLV was originally observed and reported in Israel, Ecuador, Colombia and Egypt. Recently, TiLV is confirmed in Thailand and Taiwan causing tilapia mortalities.

Based on the results of the on-going surveillance by BFAR, TiLV was detected in tilapia nursery and hatchery in Bulacan and Bataan, respectively. In order to control and prevent the spread of TiLV, tilapia (egg, fry, fingerling, juvenile, breeder) for transboundary movement intended for aquaculture purposes shall be screened and negative for TiLV by BFAR Fish Health laboratory and other BFAR recognized laboratory. The result of the screening is a requirement for issuance of Health Certificate by BFAR for transboundary movement.

This Order takes effect immediately. All orders/memoranda inconsistent herewith are hereby revoked.

COMMODORE EDUARDO B GONGONA PCG (Ret)
Director/Undersecretary for Fisheries

TECHNOLOGIES TO INTENSIFY PRODUCTION

Modified Intensive Tilapia Hatchery System

- Technology Adopted from Aqua Farming Tech, California, United States
- Increased tilapia production by at least 30%

Seining of breeders in pond

Collection of eggs

Cleaning of eggs

Hatching of Eggs using Macdonald Jar

Set-up of Artificial Incubation System

Rearing of fry in fine mesh hapaas

Source: BFAR-NFFTC

TECHNOLOGIES TO INTENSIFY PRODUCTION

Fry Rearing of Tilapia to Advanced Fingerling Stage

Fry from Artificial Incubation System

Stocking of fry to fine mesh rearing hapas

Feeding of fry

Grading and hauling of fingerlings for dispersal

Advanced fingerling stage (3 weeks old, 2.4 g)

TECHNOLOGIES TO INTENSIFY PRODUCTION

Green Water Technology

- A technique that cultures shrimps in water that is abundant in phytoplankton i.e. Chlorella, turning the water green hence, its name.
- The green water produced from tilapia helps control the growth of luminous bacteria that is bad for the growth of the shrimps.
- In this system, tilapia is also grown in the reservoir or net cages/ pens in the ponds.
- The green water technology consists of: pond preparation, water culture/fertilization, stocking and stock sampling, feeding management, water management and aeration, and harvest and post-harvest handling.

Photo source: DA-BAR

Photo source: *Nicholas James*

TECHNOLOGIES TO INTENSIFY PRODUCTION

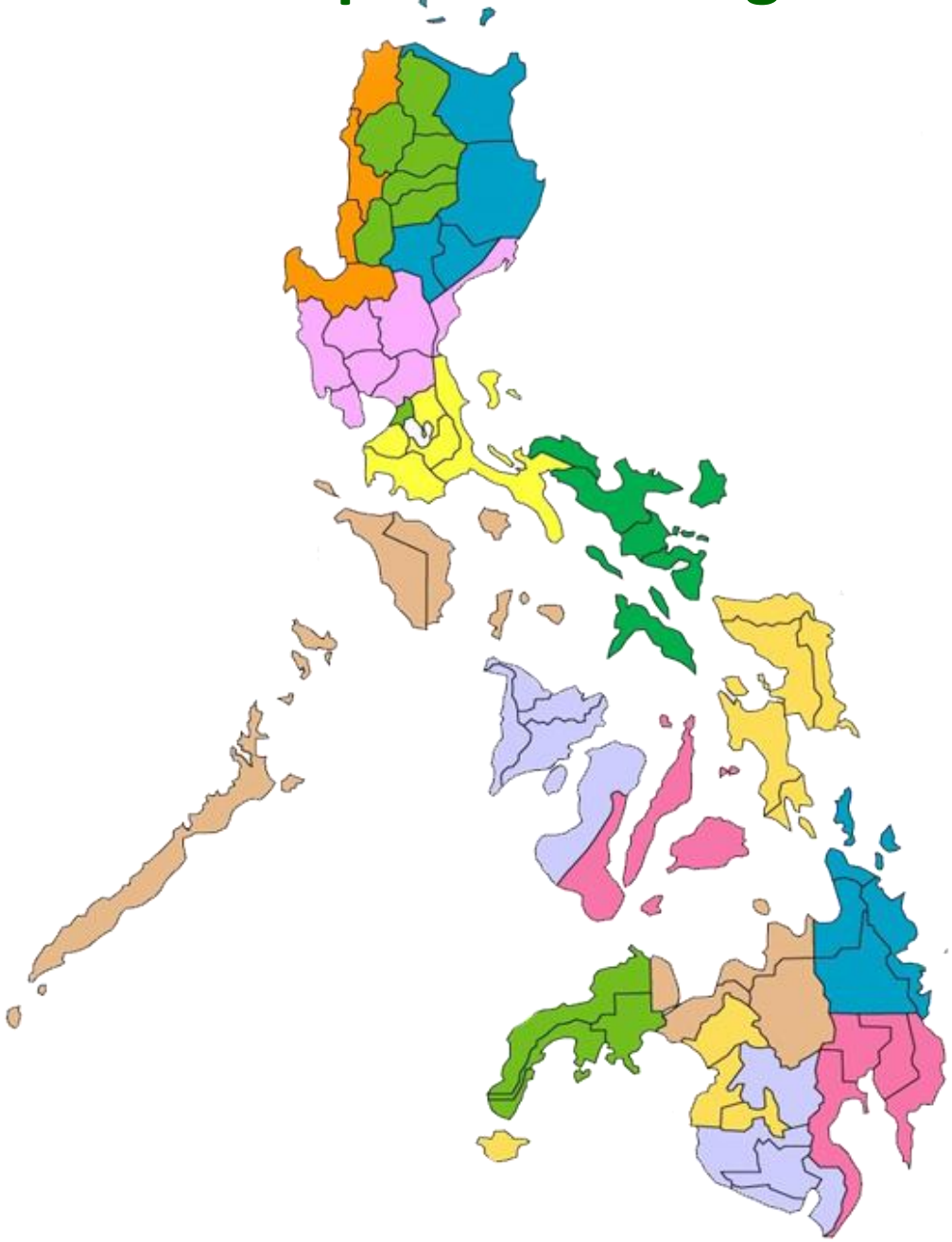
Solar- Powered Venturi Aeration System

Aquaculture modernization through Solar-Powered Venturi Aeration System

Solar-Powered Venturi Aeration System is a pond energy-saving oxygen enhancer that aims to increase fisheries production through increasing the dissolved oxygen (D.O) in ponds with limited areas. **Higher D.O → Higher Stocking Density→ Higher Yield**

Source: BFAR - Region 3 S

List of Tilapia Processing Facilities



Common Tilapia Forms

- Whole Fish
  - Live
    - fry
    - fingerlings
    - broodstock
  - Fresh
  - Frozen
  - Dried/ Smoked
- Fillet
  - Fresh
  - Frozen
- Pulp/Minced parts
  - Surimi
  - Nuggets
  - Tofu
  - Tocino
  - Siomai
  - Longganisa
  - Kroepeck
  - Quekiam
  - Ice cream
- Skin
  - Leather
  - Gelatin

(Adapted from PRDP, 2014; The Technical Tilapia Committee, 2018)

Tilapia Ice Cream

Daerrys Tilapia Ice cream line was awarded the Salon International de L'Agroalimentaire (SIAL) Innovation Gold Award 2016 (Photo from Nicolas Trentesaux https://twitter.com/TrentesauxN/status/737869693550243840 http://pbs.twimg.com/media/Cj1wk6BWYAAg9l4.jpg)

- A project of the Central Luzon State University (CLSU), Science City of Muñoz, Nueva Ecija, and funded by Department of Science and Technology.
- Made with tilapia fillet, all purpose cream, condensed and fresh milk, chopped walnut, and diced cheese.
- The flavor was a result of the study of Assistant Professor Dana D. Vera Cruz. The recipe was developed from the idea of Dr. Tereso A. Abella.
- The product name, *Daerrys*, was coined from the combination of the proponents' nicknames, Dana and Terry.
- The Tilapia Ice Cream line includes Original Flavored Tilapia Ice Cream, Tilapia Sansrival, Tilapia Ice Cream Pops, and Tilapia Ice Cream Sandwich.

GOVERNMENT INTERVENTIONS TOWARDS INCREASING PRODUCTION AMIDST COVID-19 PANDEMIC

Programs
Fingerlings Distribution
Techno Demo Projects
Fishing Gear Paraphernalia
Kadiwa Activities
Social Amelioration Program (SAP) Distribution
Issuance of Food Pass and Local Transport Permit
Credit Loan Assistance
Plant, Plant, Plant Program 1. Distribution of Aquaponics units
BASIL Program 1. Fingerlings Distribution 2. Components of BASIL Program to IUU Fishing

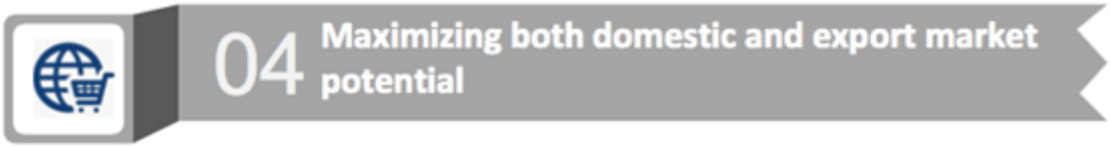
Photo source: DA and BFAR official website

WAY FORWARD

1. Continue implementation of tilapia hatchery technology
2. Technology demonstration of technologies developed
   - Rearing of fry to advance fingerlings (with particular use of low cost feeds) up to grow-out

1. Production expansion in brackishwater and small water impoundments
2. Support resource enhancement of communal bodies of water

WAYS FORWARD



- Strengthening local and international market networking

- Broodstock development of tilapia (climate resilient tilapia breeds)
- Biotechnological approach in breeding and detection of pathogen
- Low-cost feed formulation

THANK YOU!

A food-secure and resilient Philippines

with prosperous farmers and fisherfolk

Masaganang ANI Mataas na KITA