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## Plenary Session 6

### Freshwater Aquaculture: Status, Problems and Prospects in the Philippines

**Ravelina R. Velasco, Ph.D.**

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ATTAINING SUSTAINABLE DEVELOPMENT GOALS: PHILIPPINE FISHERIES AND OTHER  
AQUATIC RESOURCES 2020  
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## Are fish renewable?

- Yes, they can breed
- Fish become non-renewable if people catch the babies, then no future generation of the fish and the old ones die





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## Philippine Fishing Industry

Marine  
Capture  
Fisheries

Marine Municipal fisheries—yellowfin tuna




Marine commercial fisheries—roundscad





Inland  
Capture  
Fisheries

milkfish



Aquaculture






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- Freshwater aquaculture produces species that are native to rivers, lakes, and streams.
- Freshwater aquaculture takes place primarily in ponds and in on-land, man-made systems such as recirculating aquaculture systems



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## Freshwater aquaculture

- tilapia (mainly Nile tilapia, *Oreochromis niloticus*)
- carp (mainly bighead carp, *Aristichthys nobilis*)
- catfish (*Clarias sp.*, *Pangasius sp.*)
- milkfish (*Chanos chanos*)




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- Freshwater aquaculture in tropical systems has brought economic benefits and increased food security to many communities.
- Freshwater aquaculture is an important source of protein worldwide.
- Contributes significantly to the economy and to reductions in poverty and nutritional insecurity.





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**WATER RESOURCES FOR AQUACULTURE**

Swamplands	246,063 ha.
Freshwater	106,328 ha
Brackishwater	139,735 ha.

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**WATER RESOURCES FOR AQUACULTURE**



Brackishwater pond  
239,328 has



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**WATER RESOURCES FOR AQUACULTURE**

Freshwater fishpond 14,531 has




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**WATER RESOURCES FOR AQUACULTURE**

Other Inland Resources: Lakes-250,000 has





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**WATER RESOURCES FOR AQUACULTURE**

Rivers-200,000 has




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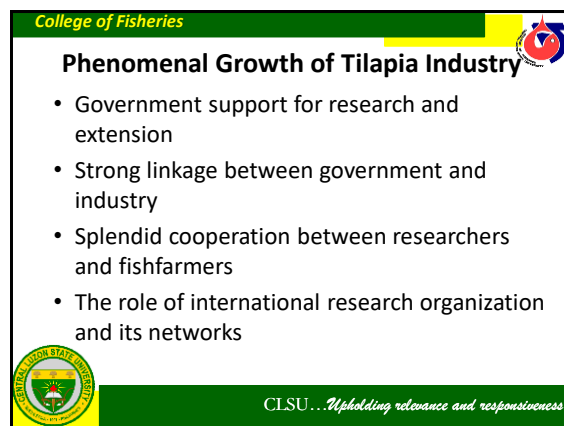
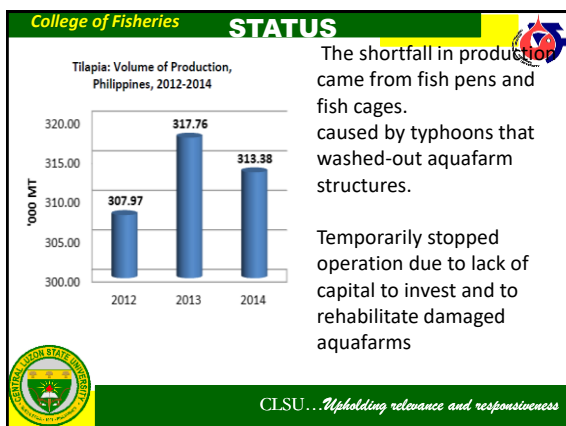
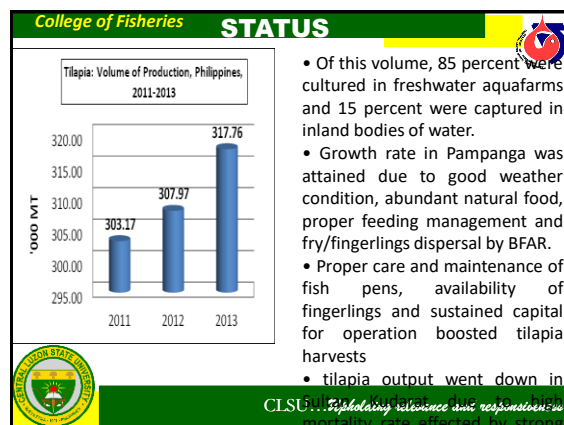
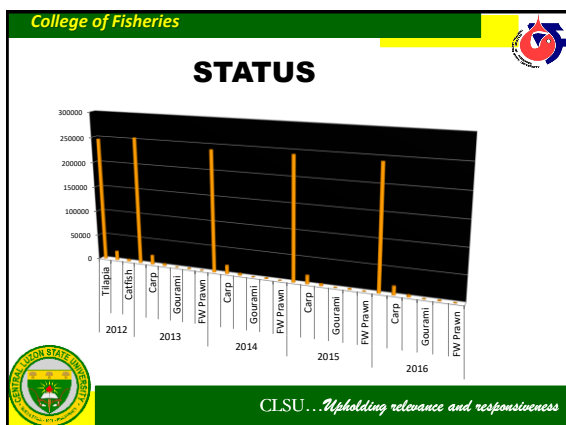
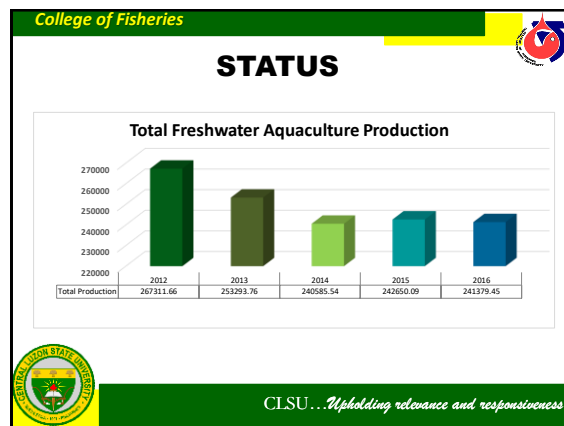
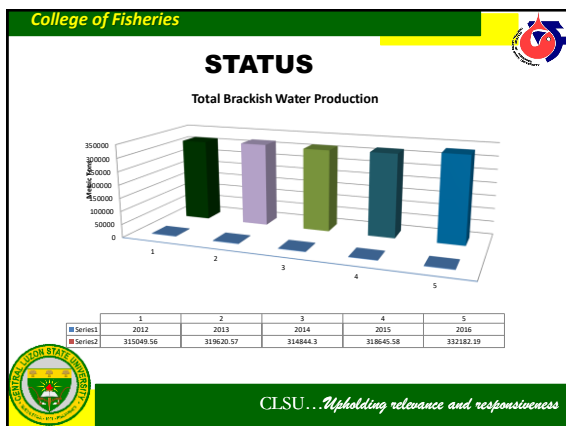
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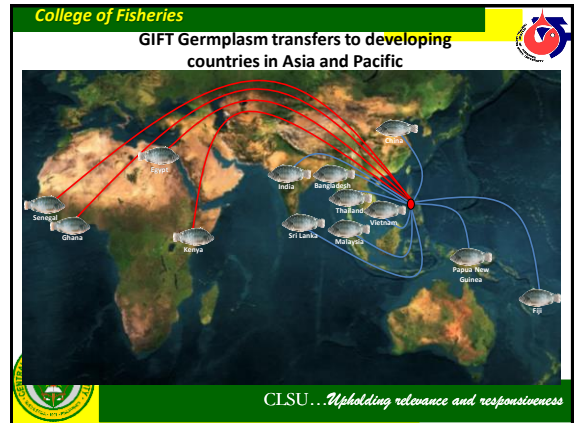
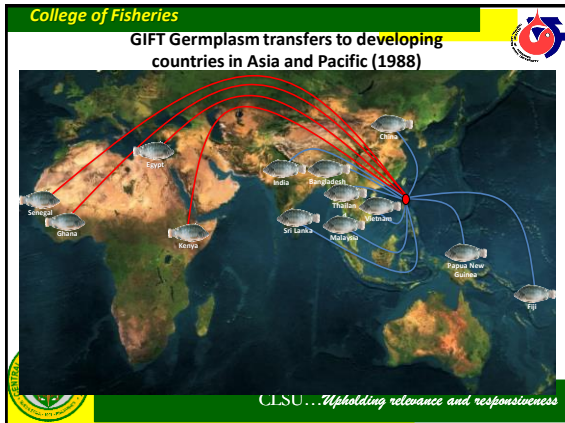
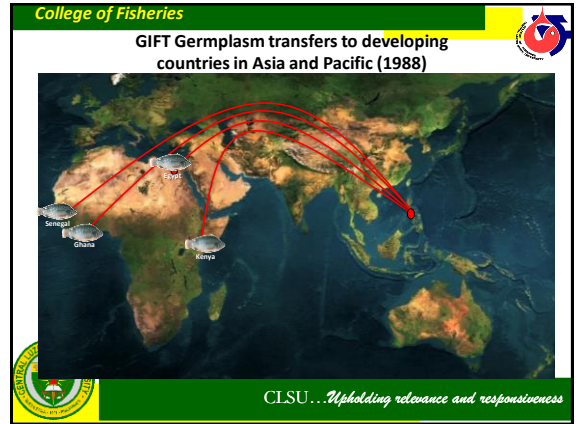
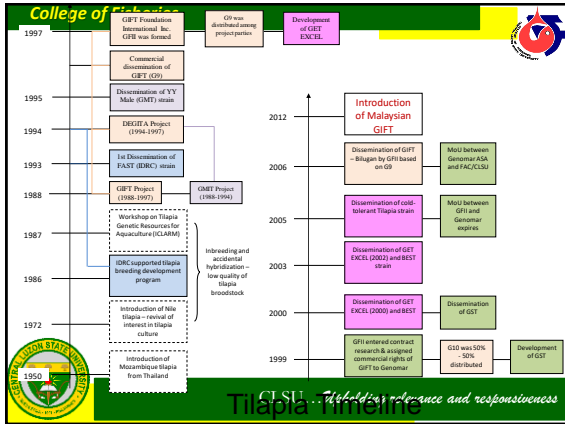
**Freshwater Fishes (Fishbase.org)**

- 308 ( goby, eel, sea catfish, liwalo, tawes, mullet, mudfish, milkfish, carp, gourami, channel catfish, sap, sap, rohu, alakaak, buan buan, s inarapan



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**Tilapia Strains**


- Genetically Improved Farmed Tilapias (GIFT strain (1988-2006)
- FaST (aka IDRC renamed FAC selected tilapia)- 36<sup>th</sup> generation rotational mating to avoid inbreeding (1998-present)

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### Tilapia strains

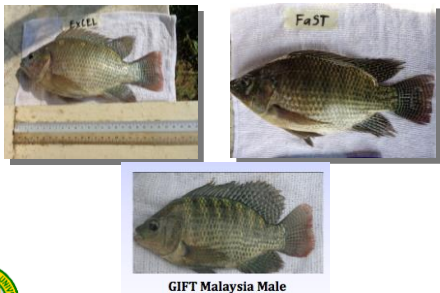

- GIFT-derived strains (GIFT Malaysia-half of the Breeding Nucleus went to WorldFish/ Department of Fisheries Malaysia, 23rd generation of selection)
- GIFT-derived strain (GenoMar Supreme ) Tilapia)
- GIFT-derived strain( ExCEL)
- Molobicus & Best (saline tolerant)



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### Improved Strains of Tilapia


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### Evaluation of Nile tilapia strains for Aquaculture in the Philippines

-Overall no statistical difference among strains across regions in Productivity (Prd) and Profitability (Prf)

- Reg 2: GIFT Malaysia – Prd & Prf
- Reg 3: FaST – Prd & Prf
- Reg 10: GET-EXCEL: Prd
- Reg 8: Not enough evidence




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### What are the main problems with aquaculture?

- Low production ,high mortality due to extreme temperature conditions
- Depletion of freshwater sources to build aquaculture ponds-pollution of water sources & improper resource mgt/overstocking
- Intensified resource use competition and conflict (electricity generation vs food production)
- High Cost of feeds
- Financing assistance




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### Practical options for reducing vulnerability in fisheries and aquaculture

Extreme weather events	Improve farm siting and design; individual/cluster insurance use indigenous or non-reproducing stocks to minimize biodiversity impacts;
Temperature rise	Better water management, feeds, handling; selective breeding/genetic improvements; adjust harvest and market schedules




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### Practical options for reducing vulnerability in fisheries and aquaculture

- Sea level rise and other circulation changes
- Eutrophication/ upwelling

Shift sensitive species upstream; introduce marine or euryhaline species  
Better planning; farm siting, regular monitoring




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### Practical options for reducing vulnerability in fisheries and aquaculture

- Water stress and drought conditions

Improve efficacy of water usage; shift to coastal aquaculture, culture based fisheries; select for short-cycle production; improve water sharing improve seed quality, efficiency,




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### Practical options for reducing vulnerability in fisheries and aquaculture

Increased virulence of pathogens, new diseases	Better management to reduce stress; biosecurity measures; monitoring; improved treatments and management strategies ; genetic improvement for higher resistance.
Acidification impact on shell formation	Adapt production and handling techniques, move production zones,
Limits on fish and other meal	Fish meal/oil replacement; better feed and oil supplies/price management genetic improvement for alternative feeds; shift from carnivorous species; culture of bivalves and seaweeds




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### What kind of aquaculture is sustainable?

- Only species that are plant eaters
- Species who can breed in captivity
- Farming that does not produce high levels of nutrient output can be cultivated sustainably.



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### An aquaculture operation can only be regarded as sustainable :

- Moving towards plant-based feeds
- Does not use fishmeal or fish-oil-based feeds from unsustainable fisheries;
- Does not use wild-caught juveniles;
- Only cultivates species that are native in open water systems




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### An aquaculture operation can only be regarded as sustainable:

- Does not result in negative environmental effect
- Does not result in negative effects to local wildlife (plants as well as animals) or represents a risk to local wild populations;
- Does not use genetically engineered fish or feed;
- Uses stocking densities that minimize the risk of disease outbreaks
- Does not deplete local resources, for example, drinking water supplies and mangrove forests;
- Does not threaten human health;
- Supports the long-term economic and social well-being of local communities.




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### Prospects

- Climate Smart Aquaculture farming
- Culture Based Fisheries** (CBF) is typically a stock enhancement process, practiced in smaller water bodies, perennial and or seasonal, that under normal conditions are incapable of supporting a fishery through natural recruitment (Amarasinghe and Nguyen, 2009)




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## Prospects

- WorldFish Project

Identifying the climate effect on tilapia value chain (Central and Southern Luzon areas)



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## Prospects

**Integrated aquaculture as a means of improving resilience**

Integrated aquaculture systems share resources, water, feeds, management, etc., with other farming systems; commonly a different aquaculture species and or agricultural or agro-industrial system. Commonly, an output from one subsystem have been wasted, becomes an input to another subsystem resulting in a greater efficiency of output .



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## Prospects

- Government and non-government sector policies and development** -strengthening of various types of partnerships. It may involve partnership between government and business sector, as well as between local fishing communities and civil society groups




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## Regulations

- Aquaculture regulations are covered in the Philippine Fisheries Code of 1998 and the Local Government Code of 1991. Some of the Fisheries Administrative Orders issued by the Bureau of Fisheries and Aquatic Resources (BFAR) concern the granting of Fishpond Lease Agreements for public lands; importation and exportation of aquatic organisms; and food safety.




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## Concerns

- Inadequate management systems and structures
- No current certification scheme
- Best aquaculture management practices




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“I shall pass this way but once;  
any good that I can do or any kindness I  
can show to any human being;  
Let me do it now. Let me not defer nor  
neglect it,  
for I shall not pass this way again”

-Stephen Grellet



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