INVASIVE ALIEN SPECIES: EMERGING THREATS TO LAKE ECOSYSTEM

- The Philippine aquaculture has been enhanced by species introduction.

Major aquaculture commodities are exotics

Exotic species are organisms transported outside their natural habitats

Oreochromis niloticus (1972)

Clarias gariepinus (1985)

Cyprinus carpio (1915,1925)

Arisththys nobilis (1976-77)

Pangasius hypopthalmus (1981)

- Carps
  - Common Carp

  - Silver Carp

  - Bighead Carp

  - Rohu

- Other introductions:
- Gourami
- Dojo
- Golden apple snail
- Pacu
- Mosquito fish

- Catfish – *Clarias gariepinus*

Issues on exotics in aquaculture
Tilapia and the milkfish aquaculture
Tilapia and the sinarapan of Rinconada lakes
Clarias batrachus vs. *C. macrocephalus*
Translocation:
Eulotrids and the endemic
cyprinids of Lake Lanao

- Exotic species have been proven to be quick and easy option for aquaculture development (carps and tilapia)
- Most introductions of exotic species for aquaculture have little or no effects on the receiving environment:

unable to spawn naturally

- Aquatic invasive species
  non-native species
  transported to the new environment
  mass colonization
  Effects:
  1. Damage to prey population
     * non-native species has no adaptive mechanism to deal with invaders
     * invaders are not subjected /vulnerable to existing biological stresses
  2. Erode biodiversity – genetic contamination
  3. Disrupt the ecosystem – effects on food web, community assembly and stability, habitat alteration, disease introduction
  4. substantial socio-economic cost

- Aquatic invasive species cause:
  50% of global animal extinction
  48% of fish extinction
  Ricciardi (2013)

There is a need to protect the aquatic environment from the impacts of invasive alien species

- Stages of response management:

1. Pre-border – preventing the entry

Transport pathways

Aquaculture

Deliberate stocking for fisheries enhancement/ biological control

Ornamental fish trade (escapement from holding facilities, release of hobbyist)

Ballast water

Drifting/Hitchhiking

Live bait disposal

Cultural ceremonies

RA9147

The Wildlife Resources Conservation and Protection – DENR shall regulate the importation of wildlife and exotic species as well as their introductions or stocking in different habitats

RA 8550

BFAR shall regulate the introduction of foreign aquatic species. Introduction shall require sound ecological, biological and environmental justification based on scientific studies and subject to biosafety standards.

FAO 221

Regulating the importation of live fish and fishery/aquatic products

Species Characteristic	Probability of Establishment		Weight	species Rating	How Species are Evaluated	
	Low	High				
1. Resilience (Growth Maturity, fecundity)	Low	High	20	17	**Capacity to withstand Change or exploitation** ***Growth:*** k < 0.05 (2 pts) 0.05-0.15 (4 pts) 0.16-0.3 (6 pts) > 0.3 (8 pts) ***Fecundity:*** **< 100 (2 pts)** **100-1,000 (4 pts)** **1,000-10,000 (6 pts)** **>10,000 (8 pts)**	*0.2 (6 pts fishbase)* *50,000 (8 pts) (Mc Gee)*

Species Characteristic	Probability of Establishment		Weight	Species Rating	How Species are Evaluated	
	Low	High				
					Maturity: ***> 10 yrs (1 pt)*** ***5-10 yrs (2 pts)*** ***2-3 yrs (3 pts)*** ***< 1 (4 pts)***	*2-3 yrs (3 pts)*
2. Food Items (Trophic level)	Narrow range	Wide Range	18	5	Carnivore (18) Omnivore (14) Herbibore (12) Planktivore (8) Detrivore (5)	Pangasius ingest Detritus and obtain nutrition from particulate organic matter microbial biomass and benthic invertebrates tend to be herbivorous in the later stage of life

Species Characteristic	Probability of Establishment		Weight	Species Rating	How Species are Evaluated	
	Low	High				
3. Physiological tolerance Salinity, ph, hardness range (tolerance to changes in water quality)-qualitative			18	10	***Extremely tolerant (18 pts*** ***Tolerant (14 pts)*** ***Moderately Tolerant (10 pts)*** ***Intolerant (6 pts)***	*Tolerant to low D.O but low tolerance to salinity and hardness Excitable and exhibits high stress level*

Species Characteristic	Probability of Establishment		Weight	Species Rating	How Species are Evaluated	
	Low	High				
4. Temperature range (utilized latitudinal data as a substitute, distance from native source)	Narrow	Wide or Matches that of receiving country	10	5	Tropical = 10 Sub-Tropical = 5 Temperate= 3 Polar/boreal = 0	Sub-tropical Vietnam (18°C) Latitude (16° 0' N & 106° 0'E) Philippines (26°C) 13° 0' N & 122° 0' E
5. Reproductive guild	Non-guarders (3)	Guarders (5), mouth brooder (8), live bearers (10)	10	3	Degree of parental care: Non-guarders (3); Guarders (5) Mouth brooder (8) Live bearers (10)	Larva hatch at only 3 mm, dispersed by river currents highly vulnerable to predation and natural mortality

Species Characteristic	Probability of Establishment		Weight	Pangasius Rating	How Species are Evaluated	
	Low	High				
6. Economic utilization (additive)			9	2	Food fish (2 pts) Ornamental (3 pts) Bio control (4 pts) Research purposes (2 pts) Stock enhancement (4 pts) Game fishing (4 pts)	
7. Maximum Length	High	Low	5	0	Size of longest individual recorder. (SL≤10 (5 pts); SL = 11-20 (4 pts), 21-40 (3 pts), 41-80 (2 pts), 81-160 (1 pt), >160 cm	

Species Characteristic	Probability of Establishment		Weight	Species Rating	How Species are Evaluated	
	Low	High				
8. Longevity	High	Low	5	4	Life span of the species (1-3 years = 2, 4-10=3; 11-30 = 4; >30 years = 5)	
9. Reported establishment	Low	High	5	0	% establishment global information [0 establishment = 0, 1-20%=1; 2 1-40%=2; 41-60%=3;61-80%=4; 81-100%=5]	
TOTAL			100	46		

- 2. Border activities – detection, surveillance, short term response to detection, monitoring
  building a rapid response task force (species identification and confirmation, delineation of population, risk assessment, spread prevention and management)
  Stakeholders involvement (citizen science)
  Baseline fishery survey
  socio-economic survey
  Biological examination

Policies to prevent spread of potential invasive fishes

- FAO 243 – Guidelines on the Environmentally Sound Culture of Pangasius in the Philippines
- FAO 214 – Code of Practice for Aquaculture

- 3. Post border activities – eradication, long term control

  Inter-agency Technical Working Group


Massive Retrieval



Intervention in the Life cycle

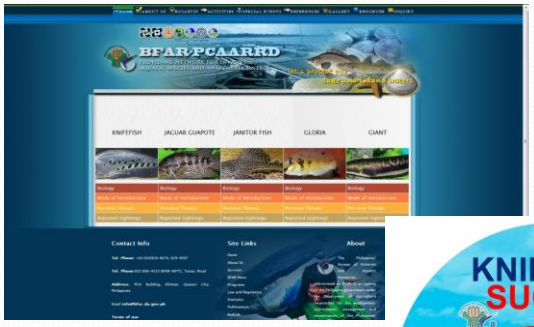


Economic utilization





IEC


BFAR-PCAARRD
KNIFEFISH
JAGUAR GUAPOTE
JANITOR FISH
GLORIA
GIANT


"KNIFEFISH
Sugpuin"
Laguna de Bay Pasiglahin


KNIFEFISH
SUGPUIN!
LAGUNA DE BAY
PASIGLAHIN

R and D


Don't Dump!
Invading Species threaten Philippine Lakes and fishery
KNIFEFISH
Chitala sp.
JAGUAR GUAPOTE
Parachromis managuensis
JANITOR FISH
Pterygoplicthys disjunctivus
GLORIA
Sarotherodon melanotheron
GIANT THAI SNAKEHEAD (TOMAN)
Channa micropeltes
To report sightings and dumping activities please contact:
(02) 806-43-23
bfarniftc_tanay@yahoo.com.ph
BFAR
PCAARRD-DOST