

Preliminary Impacts Assessment of Alien aquatic species on Biodiversity as well as invasion of native fishes in Aquaculture and some Management measures.

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ABSTRACTS. 1) There are 48 Alien Aquatic Animal/Fish species (AAA/F) which were introduced into Viet nam territory, for Fishes: 38 species, Aquatic animals (excluding Fishes) 10 species. There are 7 species not living now. 2) The country origins of Alien Aquatic Animal/Fish species in Viet nam territory are numerous: South America, Africa, North East Asia, North America... Almost of Alien Aquatic Animals/Fishes which have been introduced in Viet nam not directly from country origin, normally via China, Malaysia, Singapore and Indonesia. 3) There are 7 Ecological Agriculture regions in Viet nam: Mountainous North, Red River delta, North An nam, South An nam, Highland central, East South and Mekong River delta. Two of them are main Aquaculture regions which content the abundant AAA/F species: Red River delta, Mekong River delta. 4) Classifying into three lists (Black, Grey, White) of AAA/F species in Viet nam. List of White species includes all introduced species long ago over three decades, they were considered as local species; list of Black species (7 species are necessary to eradicate) includes the alien species which are harmful to aquatic biodiversity and in competition with the native species. 5) Vietnam up to now, there is no real measures to manage them. It is necessary to apply all measures which were applied in developed countries for control of Invasive Alien Aquatic species.

1. INTRODUCTION

To develop aquaculture, one of the key things is to introduce many alien aquatic animals/fishes from foreign countries into Vietnam. However, we are not taking into consideration their invasion to native fishes in Aquaculture as well as causing biodiversity degradation.

The Biodiversity Convention (CBD) and Global invasive species Programme (GISP) have recommended that all countries in the world should be consideration for influence of alien aquatic species to native species.

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2. METHODS AND MATERIALS

Using questionnaires to interview local farmers and authorities about impacts of the alien aquatic species to aquaculture and aquatic biodiversity at different regions.

Information about biology, ecology and impact on environment of alien aquatic species was referred using domestic and foreign literatures.

Based on the above information, the alien aquatic species were categorized into 3 groups (Black, White, Grey). This division is referred by Wittenberg, R, et al. (2001).

3. RESULTS

3.1. The composition of Alien Aquatic species in Viet Nam

There are 48 the alien aquatic species introduced to Vietnam. (Table 1) Of those, 38 species are fishes and there are 7 species disappeared.

Most of the alien aquatic species introduced into Vietnam were used for aquaculture. Some of them were used for aquarium and only a species was used to control paludism disease.

3.2. Origin and time of the alien aquatic species introduced

The alien aquatic species introduced into Vietnam usually came from South America, Africa, North- Est Asia, South Asia, North America...

Most of alien aquatic species have not directly been introduced into Viet nam but transferred via some adjacent countries as China, Malaysia, Singapore...

It is necessary to put attention that Vietnam is divided into two different sub regions: in the north is South China sub region and in the south belonging to Indochina sub region. Therefore impact assessment of the same alien species is different between the North and the South. Some species can have negative impacts to the north but not influence to the south.

Before 1975, there were very few alien species introduced into Vietnam However since 1990 up to now there have been so many alien aquatic species normally each year there are about 5 – 6 species introduced into Vietnam. These may cause negative impacts to native species. There are 7 species in the black list, all of them are introduced recently.

3.3. Geographical distribution of alien aquatic species in Viet nam

There are 7 agricultural ecological regions in Vietnam or 10 regions in term of biodiversity regions. The agricultural ecological regions are northeastern mountain, Hoang Lien Son Mountain, northwestern mountain, Red River Delta, Highland central, North central, and Mekong River Delta.

Geographical distribution of the alien aquatic species is highest in the Deltas of the north and south. All alien species is distributed in these two regions. There have been the alien aquatic species in some large islands such

as Cat Ba, Phu Quoc. These indicated that the alien aquatic species occupied on most of high biodiversity regions in Vietnam.

3.4. Lists of the alien aquatic species in Viet nam (black, white, grey group) .

- There are 7 alien sepecies removed from the list because now they are not living in Vietnam:

- List of species belonging to White group: 4 species

- List of species belonging to black group: Of those, group A is species which are harmful to aquatic biodiversity and group B is species which are competitive with the native species.

The species in group A need to be eradicated

The species in group B must be investigated in term of economical aspects.

Table 1: List of Alien Aquatic animals/Fishes which were introduced in Vietnam

No	Scientific names fishes	English names	Original country	Group
1	Gambusia affinish	Mosquito fish	Central America	White
2	Helostoma temmincki	Kissing gourami	Malaysia	
3	Osphyronemus goramy	Giant gourami	Malaysia	
4	Ctenopharyngodon idellus	Grass carp	China	
5	Colossoma brachypomus	Red pirapatinga	South America/via China	Black A
6	Hypostomus punctatus	Suckermouth catfish	South America/via Hongkong	
7	Clarias gariepinus	North African catfish	Africa	
8	Cherax quadricarinatus	Redclaw crayfish	Australia/via China	
9	Pomacoeae canaliculata	Golden snail	South America/via Philippine	
10	Rana catesbiana	North American Bullfrog	USA/via Cuba	
11	Trachemys scripta	Red eared slide turtle	USA/via Hong Kong	
12	Crocodylus rhombitfer	Cuba crocodile	Cuba	
13	Cyprinus carpio	Common carp	Hungaria	Black B
14	Hypophthalmichthys molitrix	Silver carp	China	
15	Cirrhinus mrigal	Mrigal	India	
16	Labeo rohita	Rohu	India	
17	Pygocentrus nattereri	Red pirenha	South America/via Singapore	Died
18	Hypomesus olidus	Pond smel	Canada	
19	Anguilla anguilla	European eu	Europa	
20	Silurus glanis	Wels catfish	France	
21	Macculochella poellii	Murray cod	Australia	
22	Micropterus dolomieu	Smallmouth bass	Canada	
23	Myocastor coypus	Nutria	South America/via China	
24	Catla catla	Cat la	India	Grey
25	Piaractus mesopotamicus	Pirapitinga	South America/via China	
26	Anguila japonica	Japanese eel	China	
27	carassius auratus	Common goldfish	China	
28	Sciaenops ocellatus	Red drum	USA/ Via china	
29	Tor putitora	Putitor (golden) masheer	Nepal	
30	Aristichthys nobilis	Bighcad card	China	
31	Sinipeca chuats	Chinese perch	China	
32	Oreochromis aureus	Blue tilapia	Africa/via Philippines	

33	<i>O. niloticus</i>	Nile tilapia	Africa/via Taiwan	Grey
34	<i>O. mosambicus</i>	Mozambic tilapia	Africa/via Indonesia	
35	<i>Oreochromis</i> sp.	Red tilapia	Africa/via Cuba	
36	<i>Acipenser sinensis</i>	Chinese sturgeon	China	
37	<i>Acipenser baeri</i>	Siberian sturgeon	Russia	
38	<i>Neosalanx taihuensis</i>	Taihu icefish	China	
39	<i>Ictiobus cyprinellus</i>	Bigmouth buffalo	USA/Via Cuba	
40	<i>Micropterus salmoides</i>	Largemouth bass	USA	
41	<i>Prochilodus argenteus</i>	White prochilodus	South America/via China	
42	<i>Oncorhynchus mykiss</i>	Rainbow trout	Finland	
43	<i>Paralichthys lethastigma</i>	Southern flounder	USA/via China	
44	<i>Cichla ocellaris</i>	Peacock bass	Africa/via Singapore	
45	<i>Artemia salina</i>	Brine shrimp	USA, Belgium	
46	<i>Litopenaeus Vannamei</i>	White legs shrimp	USA	
47	<i>Procambarus clarkii</i>	Redswamp crayfish	USA/via China	
48	<i>Crassostrea gigas</i>	Pacific oyster	Japan	

3.5. Management measures of the alien aquatic species

Up to now there is no powerful policy to manage the alien aquatic species in Vietnam. But the Ministry of Agriculture and Rural Development have deliberated some decrees to eradicate the alien species such as nutria and golden snails. Management measures to remove nutria are successful, but for golden snail, it seems to be fail.

It is necessary to follow up the measures which were applied in developed countries to control alien aquatic species such as:

- Legislation and Institutional Organization
- Sciences of technologies. Formation/training
- Upgrading awareness
- Investments budgets, materials, infrastructure
- International cooperation

Legislation and Institutional mechanism were considered as priorities measures.

4. CONCLUSIONS

There are 48 the alien aquatic species introduced into Vietnam

Their original countries are numerous but mostly are from South America, Africa, South Asia, China, Malaysia,... where are the adjacent countries of Vietnam.

Two main regions where alien aquatic species are most abundance are Red River Delta and Mekong River delta.

There are 7 species in the Black list. It is necessary to eradicate them.

Up to now, there is very few optimal measure to manage the alien aquatic species in Vietnam .

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