Invasive Fish Species in Sermo:
ECOLOGICAL THREAT AND ECONOMIC VALUE

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Yogyakarta only has one artificial lake, which is Sermo reservoir. Sermo reservoir has many functions, among others, is to provide raw materials of drinking water, irrigation, agriculture, fisheries, and tourism. Sermo reservoir fisheries used to be very beneficial for the local people. After the emergence of invasive species, Red Devil, the yield of the fisheries declined dramatically. This study aims to assess the ecological threat of invasive fish species in Sermo reservoir and the potential economic value gained from local people of this fish. The information about ecological threat and economic value from this fish is assessed using indepth interview with local people and secondary data from other sources. The results indicating that fishery in Sermo were very beneficial for the local people in the past. Around 1995, Red Devil fish accidentally entered to the Sermo Reservoir and dominating the system. The Red Devil prey on other commercial fish. The impact of inclusion Red Devil fish in Sermo reservoir is the number of fish obtained by local people has declined. Red Devil fish is lucrative for sale, so the local people using this fish for feeding duck. In addition to the ecological threat caused by Red Devil fish, the fish was also bring economic benefits to the home industry of local people. Local people take advantage of this fish for making crispy-fried fish. These efforts have constraints in marketing. Therefore the role of government is necessary in helping the home industry in order to optimize profits for local people.

Keywords: Invasive, Red Devil, Sermo, Ecological threat, Economic value

SPESIES IKAN INVASIF DI SERMO: ANCAMAN EKOLOGIS DAN NILAI EKONOMIS

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ABSTRAK

Yogyakarta memiliki sebuah danau buatan, yaitu Waduk Sermo. Waduk Sermo memiliki banyak fungsi, antara lain adalah menyediakan bahan baku air minum, irigasi, pertanian, perikanan dan pariwisata. Dulu perikanan di Waduk Sermo sangat menguntungkan bagi masyarakat. Namun setelah masuknya spesies invasiv yaitu Red Devil, hasil dari perikanan menurun secara drastis. Tujuan penelitian ini adalah mengkaji ancaman ekologis dari spesies ikan invasif di Waduk Sermo dan keuntungan ekonomis yang diperoleh dari ikan ini. Informasi tentang ancaman ekologis dan nilai ekonomis dari ikan ini diperoleh menggunakan *indepth interview* dengan masyarakat dan juga data sekunder dari berbagai sumber. Dari hasil interview dan data sekunder yang berhasil diperoleh, menunjukkan bahwa dulu perikanan di sermo sangat menguntungkan bagi masyarakat. Namun sekitar tahun 1995, ikan *Red Devil* tanpa sengaja masuk bersama benih yang disebarkan di waduk sermo. Ikan *Red Devil* memangsa ikan komersial lain. Akibat masuknya Red Devil di sermo, adalah penurunan hasil tangkapan ikan oleh penduduk. Ikan *Red Devil* tidak laku untuk dijual, sehingga masyarakat menggunakannya untuk memberi makan itik. Di samping ancaman ekologis yang disebabkan ikan *Red Devil*, ikan ini ternyata dapat mendatangkan keuntungan ekonomi bagi industri rumahan masyarakat. Masyarakat memanfaatkan ikan ini untuk membuat keripik ikan. Tapi usaha ini memiliki kendala dalam pemasarannya. Oleh karena itu diperlukan peran serta pemerintah dalam membantu industri rumahan ini agar dapat menghasilkan keuntungan yang lebih besar bagi masyarakat.

Kata kunci: Invasiv, Red Devil, Sermo, Ancaman Ekologi, Nilai Ekonomi

Introduction

Invasive alien species into the territory of Indonesia should be monitored again. Alien species is feared could threaten the existence of native species. Populations of alien species can evolve quickly and become a competitor of the local species. This alien species will be able to threaten the sustainability of local species (indigenous species) , and are known as invasive species (Invasive Aliens Species / IAS) (Anonymous , 2013a). One of alien species come into Indonesia is Red Devil fish. At first the Red Devil fish into Indonesia to be used as an ornamental fish because of its beautiful. The fish turned out to have a very high rate of proliferation . This is of course a threat to ecology , especially if the fish into the waters like a river or a lake. And this has happened in the Sermo Reservoir, which is located in Yogyakarta . Red Devil fish influx into the reservoir is thought to cause a decrease in the number of other species of fish populations contained in this reservoir.

This study aims to assess the ecological threat of Red Devil fish that is invasive fish species in Sermo reservoir and the potential economic value gained from local people of this fish. Information about the ecological threat of Red Devil fish and fish economic value is obtained using indepth interview with the local people and also secondary data from various sources.

Red Devil fish - Red Devil fish (*Amphilophus labiatus*) is a endemic fish to the lakes of Managua and Nicaragua in Central America . These fish belong to the family Cichlidae , an aggressive fish , and belonging to carnivorous fish. In their natural habitat, Red devil fish prey on small fish , small insects , insect larvae and worms. The physical characteristics of this fish have an elongated body and lateral. This fish can grow up to 30 cm long and has a fan - shaped tail fin and the dorsal fin is pointed . Red Devil come in a wide variety of colors, depending on the region from which they originate. These color varieties include yellow, orange, blood-red and even, on rare occasions, white. Those Red Devils bought and sold in the pet trade are usually a gradient between peach and yellow, featuring a pale belly and orange-red eyes. Mature males tend to be larger and more well built than females, and develop longer dorsal and anal fins, and a more

spectacular nuchal hump. These humps only develop during the breeding season in nature, but in aquaria many specimens possess enormous, permanent humps. Photo of Red Devil fish can be seen in Figure 1 . Beginning of this fish into Indonesia is to be used as ornamental fish . But apparently this fish has a high ability to proliferate so the proliferation become unmanageable. Female Red Devil fish capable of laying 600-700 egg. The high rate of Red Devil proliferation is a threat to ecology in Indonesia. One of the Red Devil fish population explosion is the Sermo Reservoir (Tracey , 2005 ; Corfield , 2008 ; Putra , 2012 ; Anne Ahira , ____ ; Nix, ____; Anonymous, ____) .

Figure 1 . Red Devil Fish (*Amphilophus labiatus*)
(*Source:* http://worldcichlids.com/fishprofiles/reddevil.html)

Sermo Reservoir - Sermo Reservoir is the only artificial lake located in the Daerah Istimewa Yogyakarta. Its location is in Sermo Hamlet, Village Hargowilis, Kokap, Kulon Progo Regency with coordinates 07˚49.490' latitude and 110˚ 07.418' E, a distance of ± 35 km from the city of Yogyakarta. Sermo Reservoir location map can be seen in Figure 2. Construction of the reservoir began in 1994 and completed in 1996. Water that can be accommodated by the Sermo Reservoir is 25 million m^3. In addition to

irrigation purposes, Sermo Reservoir is also used as a raw water supply, fisheries and tourism (Profile Sermo Reservoir). Fisherman and community are allowed to catch fish in the Sermo Reservoir, but environmentally friendly manner. Fishing using poisons, explosives and electricity are not allowed. To catch fish with nets, should not be done during the day because it can disrupt a boat tour that was there (Governor Decree No. 9 of 2009 on the Management of the Sermo Reservoir)

In 1995 the government sowing seeds different types of fish in the reservoir. But there is assumption that without realizing it, between in the seeds there are seeds of red devil fish. At first the red devil fish is not too ignored, but now it turns out is actually red devil fish populations is dominates the fish population in Sermo Reservoir. The presence of red devil fish is threatening the existence of other fish that are in the Sermo Reservoir (Putra, 2009).

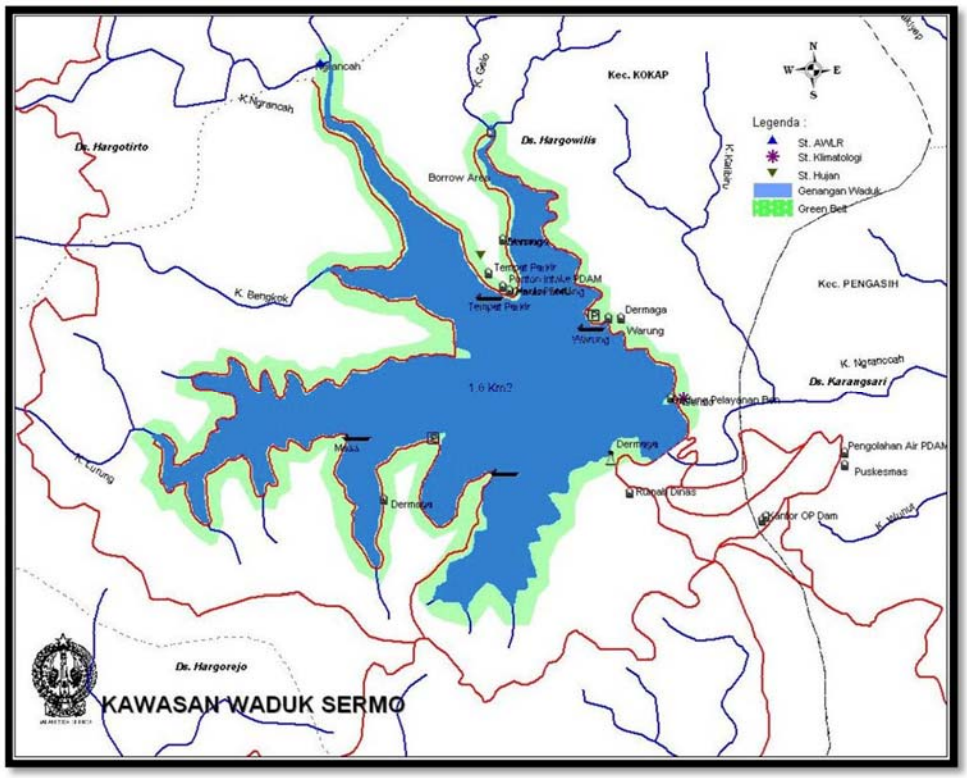

Figure 2. Map Location of Sermo Reservoir

(*Source:* http://free.7host07.com/balaipoo/peta/kawasan_waduk.jpg)

Conseptual Framework

This paper examines the ecological threat of the Invasive Species Aliens / IAS in Sermo Reservoir. Invasive Aliens Species / IAS in here is the Red Devil fish (*Amphilophus labiatus*). Sermo Reservoir has a local fish species from the rivers that flow into the reservoir. In addition to having local fish species, in Sermo reservoir also contained alien fish species from fish stocking by the Department of Fisheries and fishing groups "Pagarindu". The fish is what will be the stock to be harvested by the community. But without realizing it, in this reservoir is also a type of fish go in the Red Devil. The Red Devil fish belong aggressive and can prey on other small fish. As a result, the number of stocks will be reduced and this can reduce yields obtained fishermen and local people.

Rapid breeding led to the fish population into the dominant population in the Sermo Reservoir and is suspected to be the cause of the declining number of other fish populations. But in addition to the ecological threat posed by the influx of Red Devil fish, these fish can provide economic benefits for the people who can process them. The conceptual framework of this paper can be seen in Figure 3.

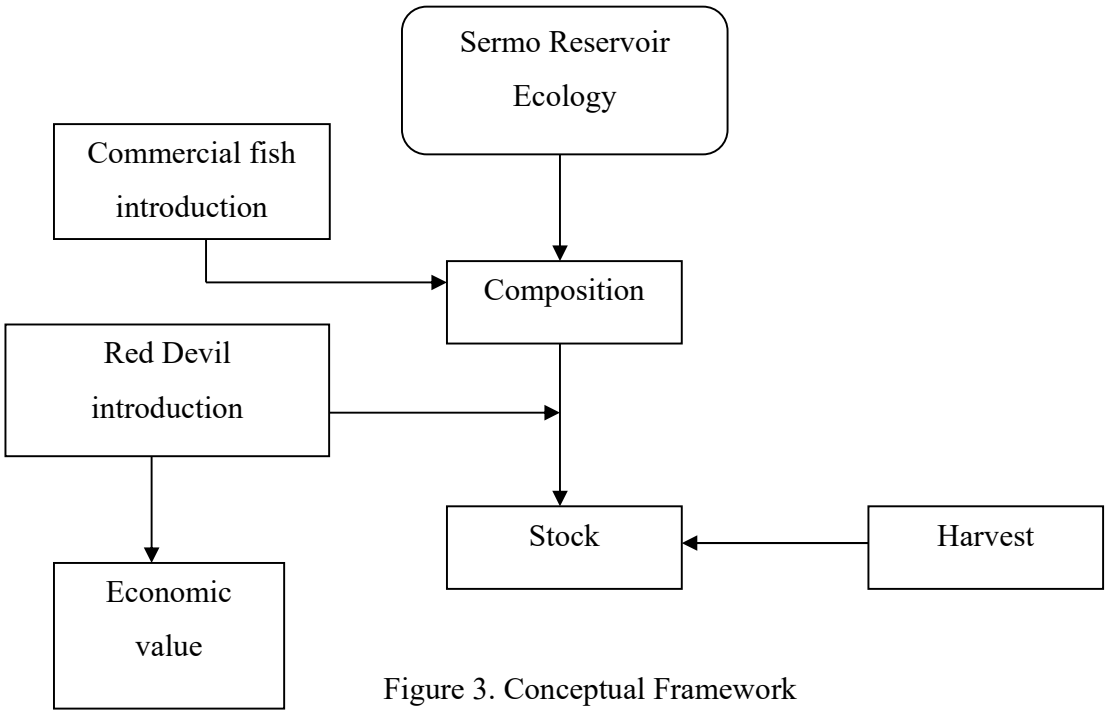

Figure 3. Conceptual Framework

Discussion

Currently, many alien species into Indonesia. Alien species in Indonesia can be brought in because it was accidental, but some are not accidental. Human deliberately include alien species caused economic aspects, needs for food and also for ecosystem manipulation (Kusmana, 2010). This alien species was accidentally imported because it is considered to deliver benefits. However, not all the imported alien species can be profitable. Lack of knowledge about foreign species that was imported can endanger existing ecosystems. Some of these species are breeding out of control and become invasive species that could threaten the existence of local species because it can be a competitor even some that being predator for local species and has no natural predators. Moreover, because of the invasive species has no natural predators, their numbers will more and more and consequently reduce biodiversity. In other words, the existence of IAS (Invasive Alien Species) can be an ecological threat. Some of the species included in the IAS in Indonesia are snails, tilapia fish and *Hypostomus plecostomus* or the suckermouth catfish. Populations of this species are exploding in number resulting in lower local species populations. To protect biodiversity, Indonesia as one of the countries that have ratified the Law No. 5 of 1994 should be trying to control IAS. If the IAS has been damaging the ecosystem and threaten the existence of other species include the local species, these species should be destroyed. One of IAS that have threatened the other fish population is Red Devil fish (Amphilophus *labiatus*). This fish has been invaded in some places, one of which is the Sermo Reservoir.

Sermo reservoir is the only one of artificial lake in Yogyakarta. People around the Sermo reservoir utilize this reservoir as a place to find fish. There are indeed living as fisherman on the reservoir, but many are only as a side profession. There are also people who catch fish only for their own consumption. In the Sermo Reservoir there are different types of fish, whether it is a native species / local species and foreign species into the reservoir. Several types of local fish that exist in Sermo Reservoir come from rivers which empty into here. Local fish species that exist in this reservoir include wader fish (*Rasbora* sp), kutuk fish (*Channa striatus*), catfish (*Clarias* sp), and Pelus fish

(*Anguilla* sp). In addition to local fish, Sermo Reservoir is also contains a variety of foreign fish species. Foreign fish in Sermo reservoir such as tilapia fish (*Oreochromis niloticus*), graskap fish and tombro fish (*Cyprinus carpio*). Fisherman and peoples harvest fish in the reservoir by fishing and catch by net.

The fish were obtained in the Sermo Reservoir utilized by fisherman and the people not only for their own consumption but also for sale. By selling fish that obtained, it will provide economic benefits for them. But lately, fisherman and the people fidgety of the population of Red Devil. Fish species that origination in Central America is a cannibal and prey the other baby fish and fish seeds. With the increasing number of fish in the reservoir Sermo red devil caused the number of other types of fish became less and less. There are 2 versions developed in the society about the origin of Red Devil can enter the Sermo Reservoir. The first version says that the Red Devil fish come into Sermo Reservoir together with the other seed that sowing in here. Because of the shape of Red Devil fish is similar to tilapia fish, so when sowing seeds no one realized that the red devil fish come inside. While the second version says that when there was floating stalls in Sermo Reservoir, there is a red devil fish culture as ornamental fish in karamba. But the red devil fish breeding and the baby fish is loose from karamba. From 2 versions of opinion in society, it's difficult to prove the right opinion because there is no one knows for sure how Red Devil fish could come in Sermo Reservoir.

Presence of red devil fish in reservoirs Sermo raises concerns especially for fisherman because this fish preys on all species of fish that are smaller, including high economic value fish such as tilapia. They prey on eggs and baby fish of tilapia. This led tilapia in Sermo Reservoir in difficult to develop. The impact is the declining populations of tilapia in this reservoir. With the decline of commercial fish species in the Sermo Reservoir, the income of fisherman also decreased.

Groups of fisherman "PAGARINDU" have actually done restocking of fish seed in the Sermo Reservoir. This activity is done minimal once a year. Types of fish that entered into this reservoir are economically important fish such as tilapia. But with the red devil fish seeds cannot be develop because preyed upon by red devil.

But there is an interesting fact because the fishermen reveal that local fish apparently more resistant to the red devil attacks than tilapia which is deliberately stocked in this reservoir. Kutuk fish which is also a local fish in reservoirs is also a predator of red devil fish.

Fisherman and people hope that the invasion of red devil fish can be overcome, but there has been no attempt by the government to overcome the red fish devil in the Sermo Reservoir. Red Devil fish not only attack Sermo Reservoir, but also attack others reservoir, such as Kedungombo reservoir. Of several studies conducted on fish red devil, has not been found effective ways to eradicate these fish.

Red devil fish considered as a pest fish and have less benefit for fisherman and people who catch it. This fish has a low sale price when compared with other commercial fish. Sale price of Red Devil fish only Rp 5,000 / kg. A little meat and sharp spines make the fish is not favored by the people for consumption. Sale price of this fish is different from other commercial types of fish such as tilapia. Sale price of tilapia can reach Rp 26.000/kg. At first the fisherman and the people who got caught red devil used this fish to feed the ducks, but now there are home industries that process red devil fish. Home industry process fish into Red Devil fish crispy and also shredded fish. Processed products of red devil can be seen in figure 4. After processed, red devil fish can provide economic benefits. Red devil fish used as crispy fish sold for Rp 50.000/kg. While that is processed into shredded fish sold for Rp 70.000/ kg. In addition to providing benefits to owners of home industry, red devil fish processing also create new jobs for the people who work at home industry. Around Sermo Reservoir, there are only few industries that process Red Devil fish. Because the amount of industry that process Red Devil fish is still slightly, this raises allegations of monopoly price red devil fish. Fisherman and the people must accept the price given for the Red Devil fish they catch. This industry has received help from the government to develop their business. However, constraints in this industry are in terms of its marketing. Industries that process Red Devil have constraints in marketing. Therefore the role of government is necessary in helping the home industry in order to optimize profits for local people.

Figure 4. Red Devil Crispy (Processed products red devil)

(*Source*: http://ralfinissyaphp.blogspot.com/)

Conclusion

Sermo Reservoir which is the one and only artificial lake in Yogyakarta has got the invasion of red devil fish. Breeding fast and ferocious nature led to decrease the number of other commercial fish populations. Fisherman and people have started restless with this fish. There has been no effort by the government to tackle red devil fish which population is increasing. Although regarded as a pest, but there are local people who get the economy benefit of this fish. Red devil fish can be processed into products that have economic value such as red devil crispy and shredded fish. But this home industry is still having difficulty in marketing. Fisherman and other people actually wants red devil eradicated immediately so the population of other commercial fish can increase. However, if these fish were eradicated of course home industry that process red devil will be suffering a financial loss. Therefore necessary to find a solution that everyone feels they have benefited.

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