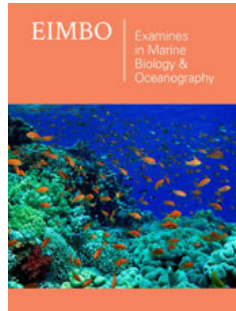


Threats for Endangered Species: Carrying from Oceans to the Public Aquariums

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Introduction

Zoos and aquariums are popular establishments for both education and entertainment, providing visitors with the opportunity to observe and learn about a diverse range of animal species. These two institutions are very valuable as they offer the opportunity for visitors to get access and be in contact with wild animals that are usually inaccessible due to urban life [1,2]. As zoos serve as a shelter for various land animals, aquariums are meant to showcase fish and other aquatic species. However, Aquariums, Freshwater, Marine water or deep-sea are ubiquitous to observing Fish; they ensure limited areas for wild species, especially larger ones [3,4]. In spite of some limitations, aquariums actually play a crucial role in conserving endangered aquatic species. Many aquariums are working to rehabilitate injured fish, breed endangered species, and eventually release them into the wild. Aquariums play an indispensable role in maintaining marine ecosystems and the myriad of species that depend on them by supporting these essential conservation endeavors. However, not all aquariums see the importance of helping these aquatic creatures. They act against these principles; alternatively, they serve a showcase mission by maintaining too many fish species in small areas [5].

Ornamental fish production increased; over 2,500 fish species comprise the global ornamental fish industry, of which over 60% are freshwater species and the rest are saltwater varieties [6]. The most commonly reported 30 freshwater fish species include goldfish, zebra danio, livebearers, neon tetra, angel fish, and discus predominate the global market. Marine species include angelfish, bass, groupers, clownfish, eels, tangs, blowfish, rabbitfish, and seahorses [7]. Similar to mentioned species, small ornamental fish (<20cm) can be produced in artificial conditions, but big ones, such as Sharks, Rays and Muraena, cannot be reproduced, thus they, unfortunately, are transferred from their natural habitats (mainly oceans) to the public aquariums [8]. The capture and transportation processes are stressful and detrimental to the animals, and the conditions under which they are maintained in captivity can also have an impact on their health and welfare [9]. In the presented study, we aimed that show stress, fish welfare problems and threats for endangered species carrying from natural environments to the aquariums [6].

Is Fish Rehabilitation Effective in Aquariums?

Rehabilitation in aquarium fish is quite complex compared to terrestrial animals. The main reason is that most aquarium fish are small, which causes difficulties in catching, keeping, medical approaches and monitoring their treatment. Long-term antimicrobial therapy is required even in aquatic animals' most common bacterial infections, as in other animal species. The use of injections for administering medication to fish can be challenging due

to the inability to consistently capture the same fish or accurately monitor their feed intake [10]. It is easier to uphold treatment protocols in larger fish, as these can be more effectively injected, and medication can also be orally administered via their feed. Although there are more than a hundred wildlife rehabilitation centers worldwide, there are fewer rehabilitation centers for marine mammals. Rehabilitation centers for fish that live in natural environments, but are transferred to aquariums, are limited due to insufficient expert veterinarians and staff [11]. Therefore, diseases in larger fish species are mostly treated simply and empirically; if the treatment fails, new fish are caught to replace the deceased fish.

What is the Risk of Carrying Fish from Nature to Aquariums?

Especially in public aquariums, most fish showcased are endangered species. Among them, primarily, most fish are ray species, guitarfish, cownose ray, manta ray, bat ray and short-tail string rays; in addition, shark species such as horn sharks, leopard sharks, catsharks, and zebra sharks, the majority of them take place in the endangered fish species list in International Union for Conservation of Nature (IUCN) [12]. Although effective disease treatment protocols have been applied for these fish species in public aquariums, species-specific disease diagnosis and treatment protocols are not yet available in most public aquariums. Also, antimicrobial pharmacokinetic/pharmacodynamic studies are very limited for many fish species. Therefore, the diseases that occur in endangered fish could be treated empirically and if the treatment is ineffective diseased fish is easily replaced by capturing healthy ones from their natural habitat [3]. The transfer of fish under the threat of extinction from their natural habitats to aquariums negatively affects their feeding, reproduction, migration, and welfare levels. The fishing operations conducted during breeding seasons, which vary depending on the fish species, result in the separation of fish offspring from their natural environments. For some pregnant fish (such as cownose ray), the dread of being caught during these activities in their natural environments and the stress factors that occur during the transfer to aquariums contribute to offspring mortality [13,14]. The transfer of fish under the threat of extinction from their natural habitats to aquariums negatively affects their feeding, reproduction, migration, and welfare levels. The fishing operations conducted during breeding seasons, which vary depending on the fish species, result in the separation of fish offspring from their natural environments. For some pregnant fish (such as cownose ray), the dread of being caught during these activities in their natural environments and the stress factors that occur during the transfer to aquariums contribute to offspring mortality. In addition, most aquariums balance the salinity with a mixture of sea salt to mimic seawater, and the water is re-used by sterilization several times. The fish kept in aquariums are kept from their natural hunting, hiding, and breeding habits and are unable to experience the temperature, salinity, and depth (and light) differences they would experience in their natural habitats [15]. This is particularly evident in urban aquariums, so the fish cannot thrive under these circumstances. These conditions shorten the

lifespan of fish; thus, their reproductive capacity reduces. All these adverse conditions cause short life cycles that increase fish demand from nature, raising the possibility that many fish species will no longer be seen even in their natural habitats in the near future.

Conclusion

In conclusion, covering all zoos and aquariums, wild animals should be kept in artificial environments that perfectly mimic nature. Also, good maintenance and reproduction programs should be followed; results obtain fish from their reproduction units instead of hunting. Treatment centers must be established working with veterinarian experts for fish and equipped specifically requirements. From a scientific perspective, research projects should be supported on fish treatment, vaccination, reproduction and conservation. For individuals who enjoy observing fish in aquariums as a hobby, it's important to keep in mind that "wildlife supports the future".

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