



Tilapia Reveals: Unsustainable Management by an Organization in Charge of Sustainability

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Abstract

After a decade, the efforts and persistence of the Iranian Fisheries Organization and Iranian Fisheries Science Research Institute for introducing tilapia to the aquaculture industry paid off in Iran. Despite the contentions and resistance of the environmentalists, who believe that this introduction has destructive effects on the biodiversity and natural ecosystems as well as variant socio-economic impacts, the Iranian Department of Environment granted tilapia culture license for this species to be introduced to the aquaculture of five central provinces of the country in 2018. According to some characteristics of the species such as feeding on different food resources, high reproductive potential and high ability in resisting of environmental condition and diseases, if the species intentionally or accidentally finds the way into the natural inland water bodies from the aquaculture centers, could cause major impacts on the native species and ecosystems. Many experts agree that such unsustainable decisions reflect the structural weakness of the organization at the level of management and administrative structure. After years of running this organization by non-specialists, the improvement of the current situation is strongly felt.

Keywords: Organizational structure; Invasive Species; Unsustainable Development; Iran's Environmental Policy

Abbreviations

DOE: Department of Environment; IFSRI: Iranian Fisheries Science Research Institute; FIRBS: Federation of Iran Bioscience Societies

Introduction and Case Report

Tilapia is one of the most popular aquaculture species worldwide. This name stands for hundreds of cichlid species (Family: Cichlidae) native to Africa and the southwestern Middle East, formerly considered a member of Tilapiini tribe and now placed in several ones including commercially important species which nested in Coptodonini and Oreochromini. Although, tilapia culture is carried

out in more than 120 countries and territories, only ten countries produced over 90 percent of the 5.7 million tons of global production in 2015 [1,6].

A couple of reasons like economic incentives encouraged Iran's Fisheries Organization to introduce tilapia to the aquaculture industry. According to a conditional agreement with Iran's Department of Environment (DOE), by making a commitment to fulfill eight important conditions (including performing the risk and environmental impact assessments and maintaining in the fully enclosed systems), tilapia (mostly the Nile Tilapia, *Oreochromis*

niloticus L.) was imported and bred as a pilot and research project at the Research Center of Saline Water Aquatics in Bafq City, Yazd Province in 2008. The project led by the Iranian Fisheries Science Research Institute (IFSRI), the research partner of the Fisheries Organization, remained at the small-scale until the end of the tenth government of Iran.

In 2014, during the eleventh government, some of the DOE authorities agreed with expanding the tilapia culture facilities as a pilot breeding in four provinces in the central parts of the country far from important natural water bodies. However, the head of the DOE, and also the experts in the Inland Water Aquatics Group of the organization disagreed with the deal. Therefore, considering the raised opposition, the mentioned approval signature has been withdrawn and the agreement has been terminated.

After the mentioned agreement, public attention to the issue has increased and scientific and social opposition erupted in mass and social media. The environmentalists, such as the Symposium of Wetland-related NGOs, Iranian Society of Ichthyology, Iranian Association for Environmental Assessment, Federation of Iran Bioscience societies (FIRBS) and many ecologists, biologists and environmental experts believe that the introduction of tilapia has huge negative environmental impacts on the freshwater biodiversity and ecosystems. Simultaneously, massive pressure was put on the DOE for accepting the development of tilapia aquaculture by the different stakeholders. One of the principal propaganda of the eleventh government was paying attention to environmental issues, so, the responsible authorities did not give up until the end of the government.

After about a decade in 2018, despite all the resistance and opposition, the DOE in the twelfth government agreed with tilapia aquaculture. The IFSRI claims that sufficient research has been carried out regarding the consequences of the introduction of tilapia to aquaculture centers the country so that the risk assessment reveals that there is no problem in introducing the species in some parts of the country [8].

The opponents, meanwhile, say the assessment report focuses more on the technical issues of the introduction and lacks a proper environmental and ecological risk assessment. While related experts in the DOE oppose, approval for tilapia aquaculture has been signed in four provinces of the central part of the country in 2018 including Qom, Semnan, Yazd, and Southern Khorasan provinces and also the culture of fingerlings in the city of Jiroft, Kerman province. In this regard, three important questions are raised: What is the risk of introducing this species in the freshwater ecosystems in

Iran? What are the laws concerning the introduction of non-native and invasive species in Iran? And if this introduction has significant environmental impacts and also by taking into account the specified laws regarding the issue, why the officials of the DOE whose the main duty is to protect biodiversity and ecosystems agree with such anti-environmental projects?

Negative impacts of tilapia on freshwater bodies in Iran

Tilapia species are listed among invasive fish species by researchers and international conservation organizations such as IUCN and have been demonstrated to have an adverse impact on native species and ecosystems [9].

Iranian environmental experts say such farms may have short-term positive economic advantages but the introduction of this species to natural ecosystems and destroying them could certainly have far more negative social and economic impacts in long-term period (Figure 1). Based on previous experiences, escapes from fish farms are fiercely probable. This belief is reinforced when we see the impact of some tilapia species, which have characteristics similar to *O. niloticus* and consequences after introduction to natural ecosystems, in the southwest of Iran. The tilapia species introduction to this area of the country has likely occurred accidentally via water connections with Iraq. Two species, *Coptodon zillii* and *O. aureus* have invaded many southwestern water bodies of Iran and negatively influenced the economy of the local communities [2,11-13].

The problems caused by *C. zillii* for the local people made the former governor of Shadegan county (Shadegan Wetland is one the adversely influenced sites by the invasion of the tilapia species in Iran) to address the problem in this area in a letter to the Provincial Office of Environment of Khuzestan. The Ministry of Energy, considering the characteristics of tilapia fish and the experiences gained from introducing some of these fish to Khuzestan province in the southwestern Iran, warns about tilapia farming and the hazards that this fish can cause in water reserves behind dams and opposed to it.

The principle that tilapia is allowed to be culture only in four provinces located in arid areas and therefore lacking important freshwater ecosystems, apart from the fact that it could be the result of opposing activities and public opinion pressure, points out that in fact, the officials who have given such permission acknowledge that tilapia could pose a serious threat to other parts of the country. Here, a big question arises: Is there enough care and supervision to prevent the illegal spread of this fish from the four provinces to other parts of the country?

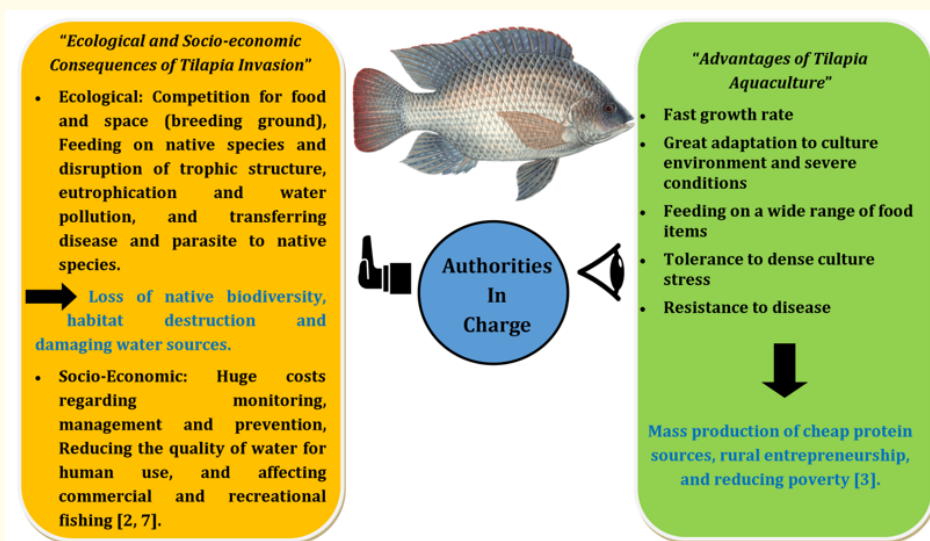


Figure 1: The chart demonstrating how responsible authorities have an unsustainable perspective regarding tilapia’s aquaculture.

It is fairly well understood that there is no accurate supervision by responsible organizations related to fisheries activity in Iran. Considering the fact, there is no wonder that when the activity becomes legal in some provinces, they move to other areas through illegal ways. The non-native fishes that have been introduced in the country for the development of aquaculture in the past decades, such as the rainbow trout (*Oncorhynchus mykiss*), common carp (*Cyprinus carpio*), silver carp (*Hypophthalmichthys molitrix*), big-head carp (*Hypophthalmichthys nobilis*), and grass carp (*Ctenopharyngodon idella*), are now reported in the rivers and wetlands of most of the country's basins. More interestingly, the officials of the DOE stated that illegal tilapia culture activities have already been reported in several provinces, indicating that there is practically no power and surveillance to prevent the species from spreading to restricted areas [4].

Tilapia invasions are problematic to manage so that removing them from natural ecosystems with existing methods is practically impossible and the cost of controlling their population and preventing their spread to non-polluted areas is very staggering. Thus, prevention of the introduction of the alien species to new aquatic ecosystems, especially by aquaculture activities should be considered as the best management strategy [10].

Laws regarding the alien and invasive species

Article 50 of the constitution of the Islamic Republic of Iran states that “The preservation of the environment, in which the present as well as the future generations can have the right of flourishing social existence, is regarded as a public duty in the Islamic Republic. Economic and other activities that inevitably involve pollution of the environment or cause irreparable damage to it are therefore forbidden”. Also, Article 3 of the Law to Protect, Restore, and Manage the Country’s Wetlands (2017) says that the introduction of harmful non-native plant and animal species into wetlands is prohibited and requires the DOE to draw up a list of such harmful species and revise it every two years. Interestingly, the DOE has publicly announced in an official newspaper, Jomhuri E Eslami no. 21309, on 10 May 2018, that the species *O. niloticus*, *O. aureus*, and *C. zillii* are included in the list.

Also, the country is a member of the Convention on Biological Diversity (1992); Article no. 8 (h) of the convention states that each Contracting Party shall, as far as possible and as appropriate: prevent the introduction of, control, or eradication of those alien species which threaten ecosystems, habitats, or species. Considering the reasons mentioned above, it becomes clear why an organization that recognizes this species as invasive and accepts that the introduction of such species could have environmental consequences, acts against the law and allows its culture.

According to Paragraph no. 7 (a) of Article no. 42 of the executive regulation for conservation and exploitation of aquatic resources, it is the duty of the Fisheries Organization to select aquatic species for breeding and aquaculture as much as possible from native species occurring in the country. Also, according to Paragraph no. 2 (b) of Article no. 42 of the mentioned executive regulations, the DOE is responsible for confirming the aquatic species selected by the Fisheries Organization to be released into inland water sources or breed. Considering the aforementioned items, it is obvious that there are clear rules regarding the prevention of introducing non-native and invasive species to the country.

Reasons for this unsustainable decision of the DOE authorities

One of the most significant factors that can influence the unsustainable decisions of the heads of the organization is related to the organizational structure of the DOE. The organization is under the direct supervision of the presidency and the head is chosen by the president in person. In this system, of course, the individuals will be chosen who are in the same or at least affiliated political parties and have high flexibility for some destructive plans of the government ministries to the environment. During the last four decades, almost all the chiefs had a similar political orientation to the established government, and with the change of the government, they were replaced.

According to what is stated, the DOE is under the direct supervision of the president, which means that selecting the head for this organization is not evaluated by the parliament (i.e., motion of no confidence process) unlike ministers of cabinet and interpellation of this position is not possible as well. As it seems, personal tendencies and affiliation of political parties are important factors instead of specialty regarding the selection of the position.

Another factor for this unsustainable view by the heads of the DOE could arise from their academic education. The investigation of education of all the heads in the DOE since the beginning of the establishment of this organization till now demonstrates the fact that none of them has no academic experience regarding environmental and ecological issues.

Another important factor that can influence decisions related to environmental issues is when a decision, some aspects of which involve the environment, is made by the organizations with power established outside the government. If such decisions are contrary

to environmental principles, the DOE usually does not have the power to oppose them. These factors have led to the largest number of unsustainable development decisions in recent decades, despite numerous environmental laws and international agreements.

The current situation

In the case of the tilapia aquaculture license, it turns out that the relevant laws and common rights have been ignored. The permission could be considered as a special prerogative to the IFSRI, the Fisheries Organization and also the Ministry of Agriculture and it demonstrates the unsustainable perspective of the DOE which agreed to the project without a proper environmental and ecological risk assessment and as a result, has ignored the environmental issues of the facility.

At the moment, one of the solutions to terminate the tilapia aquaculture facility in the country is to recourse to the judicial system. The environmentalists hope that the Iranian judicial system can stand against such actions and prevent destruction and damage to natural ecosystems which are considered as common rights. The environmentalists have demanded the judicial system to analyze and terminate the tilapia aquaculture facilities. At present, the complaint of the Law Committee of the Association of Nature and Environment Lovers of Khuzestan Province against the current head of the DOE has been successful and granting any new tilapia culture license has been temporarily suspended. They hope that this lawsuit will work out and that tilapia culture will be permanently banned in Iran [5].

Conclusion

The invasion of the introduced tilapia species, one of which has the same genus as the species requested for farming, to the southwest of Iran has a clear message for the authorities. Iran is facing a tough challenge of drought and water pollution in most of the inland water bodies; hence the introduction of a species that is invasive potentially will increase the negative impacts on the native species and ecosystems. The case of tilapia clearly shows how an organization with the inherent duty of protecting the environment acts against it in an inefficient structure and in this situation how social pressure can be important to stop or at least slow down the effects of such non-environmental decisions. In conclusion, increasing the power of the DOE and retaining the independence of this organization beside more organizational observation and also sensitivity in choosing the specialists for systematic and practi-

cal management of this key organization of the country could be promising solutions to guarantee sustainable environmental management in Iran.

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Conflict of Interest

There is no financial interest or any conflict of interest.

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