Identification of non-native freshwater fishes in Albania and assessment of their potential threats to the national biological freshawater diversity

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Abstract

In Albania, alien freshwater fish are continuing to steadily increase in number of species (reported in this paper to be more than 17), abundance, and distribution. In general however, their impacts are not well quantified in either environmental or economic terms and current management to reduce their impacts is limited and lacking direction.
From around the middle of the 19th century, international transfers of fish species, especially for sporting purposes and the provision of an additional food supply increased apace. After the end of the Second World War the number of introductions of alien fish species increased still further, helped by the development of advanced artificial spawning techniques (Elvira 2001).
The fact that European countries are important recipients of alien fish is ascribed by Welcomme (1992) to the fact that they have generally impoverished fish faunas and that introductions have been made, with a variety of motives, to increase their ichthyological biodiversity. The naturalization of some of the alien fish species that are able to reproduce successfully in the wild has had catastrophic consequences. There is the case of well established *Lepomis gibbosa* in Macro Prespa Lake.
Species associated with high impact tend to have a broad diet and abundant populations in native and disturbed habitats. Likewise, host aquatic environments resistant to impact tend to be heavily managed or disturbed, productive, and inhabited by complex communities.
In Albania, it was central government until 1990, owner of the all fish farming centers, with a total surface of 215 ha, to occupy on the restocking of the reservoirs, natural and artificial lakes. In this paper we describe the presence and riks of the following species: *Ameiurus melas*, *Carassius auratus, Megalobrama amblycephala, Ctenopharyngodon idella, Cyprinus carpio*, *Gambusia affinis, Hypophthalmichthys molitrix, Hypophthalmichthys nobilis, Oncorhynchus mykiss, Parabramis pekinensis, Poecilia reticulate, Peudorasbora parva, Silurus glanis, Lepomis gibbosus, Stizostedion lucioperca, Perca fluviatilis*, *Tinca tinca*, etc.

Looking towards the concerns for the environmental flow–sustainable action at the protected area, biodiversity conservation, preserving the internationally important species of flora and fauna and recreation– those can be reflected into a regulatory and policy measures, local actions that strives to preserve the biotope conditions.

The aim of this paper was to reveal the rapid invasion of introduced fishes and its possible effects on native freshwater fish species in Albania.
Key Words: *Alien fish species, freshwater bodies, introduction, sustainable actions, biological impacts*

Introduction

Albania is well known for its rich and complex hydrographic network composed of rivers, lakes, reservoirs, coastal lagoons and seas. The area of inland waters is divided as follows: natural lakes 400 km^2; artificial lakes (electricity production) 70 km^2; artificial reservoirs (irrigation) 40 km^2; wetlands and coastal lagoons 150 km2 and rivers.
Invasive alien species (IAS) are now considered to be the second cause of global biodiversity loss after direct habitat destruction and have adverse environmental, economic and social impacts from the local level upwards (Courtenay et alt., 1990; Welcomme, 1988).

The planing of more effective strategies to deal with biological invasions has become a global conservation priority. In recent years, IAS has become a high-profile policy topic for the international community which has emphasized the need for cross-sectoral coordination between competent institutions and stakeholders at all levels.

Material and Methods

During our field works, we caught a considerable number of different alien species samples from various stations with gill nets of 10 mm mesh size in summer 2004, 2005 and 2006. The elektro fishing methods was used to in 2007. Part of specimens were preserved in 4% formalin and deposited in Agriculture University of Tirana. The sampling was performed in different rivers, lakes and reservoirs on Albanian territory.

Results and discussions

After 1992, during economical and political transition due to the lack of funds, only the restocking of natural lakes is taken over by limited public funds, while single or group organized fishermen stock the reservoirs. Stocking every year the natural lakes with millions of fry and fingerlings, Albanian government have taken in consideration any time to conserve the genetic diversity. So breeders taken from the each lake respectively produce the fingerlings of common carp stocked every year in Shkodra, Ohrid, and Prespa Lakes. In 2001, the carp production was 5 million fingerlings. (MAF, 2001). On the other hand, in Ohrid Lake about forty years now, to protect the endemic species, we stocked yearly millions of fry and small quantities of fingerlings of *Salmo letnica*, an old relict species. Since 1965-1966, artificial reproduction has been carried out for *Salmo letnica,* and from this time now, we stock every year millions of advantage fry's and fingerlings. Also in the same lake until 1980 there was good condition from hydrological point of view for natural reproduction of *Chondrostoma nasus ohridanus*. After this time, with the changes of the stream hydrological system there is no more conditions for natural reproduction of this species.

In 1960, for the first time, was imported from China an amount of fingerlings of new fish species such as silver carp, bighead carp and grass carp. The first reproduction of grass and plankton-feeding fish (silver carp *Hyphophtalmichthys molitrix*, bighead carp *Hyphophtalmichthy nobilis,* grass carp *Ctenopharyngodon idella, Megalobrama amblycephala and Carassius carassius*) was done in 1972 in the hatchery of Laknas, near Tirana. In 1978, for the first time, was imported from Italy the rainbow trout *Oncorhynchus mykiss*. In the early 80ies was constructed in Saranda the trout hatchery with a surface 7 ha. This hatchery achieved an annual average production over 200 ton and 1 million fingerlings. In Fierza Lake (5000 ha) shared with former Yugoslavia, beginnings from 1980 there are introduced (escapees from some fish farms) two other species: pike *perch Stizostedion lucioperca* and perch *Perca fluviatilis.* Most of introduced fish species in Albania are aquaculture aimed and more rarely for recreational fishery.

It was central government until 1990, owner of the all fish farming centers, with a total surface of 215 ha, to occupy on the restocking of the reservoirs, natural and artificial lakes. The most important species stocked are Chinese carps *(Hyphophtalmichthys molitrix Aristichthys nobilis, Ctenopharyngodon idella, Megalobrama amblycephala),* common carp *(Cyprinus carpio)* and "koran" *Salmo letnica.* Wild caught fingerlings of grey mullets *(Mugil cephalus and Liza ramada*) are used to restock some reservoirs in southern part of Albania.

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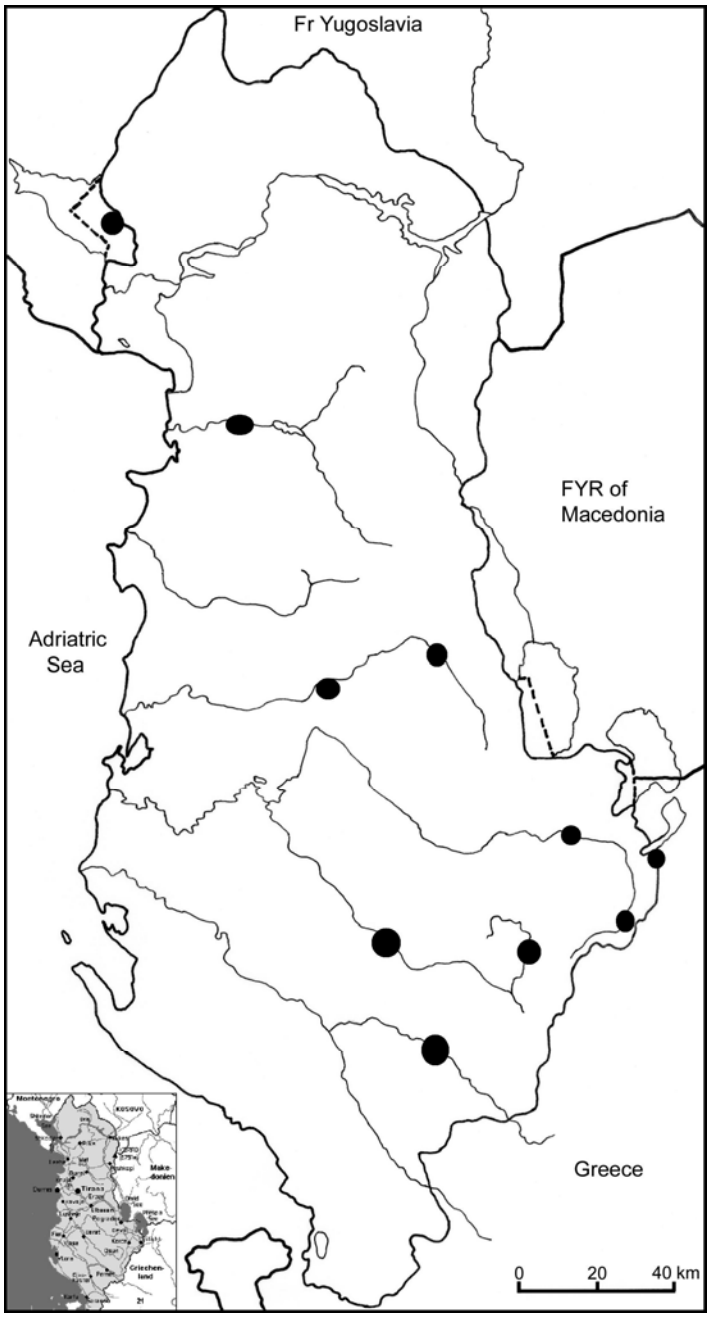

Fig. 1. Distribution of Pseudorasbora parva in Albania

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In addition to records abovementioned we have observed particularly *Pseudorasbora parva* in different localities in the several Albanian catchments (Figure 1). During our field works, we caught a considerable number of *Pseudorasbora parva* samples from various stations with gill nets of 10 mm mesh size in summer 2004, 2005 and 2006. We have not been able to get information from the

fishermens whether fish populations of different water bodies like Shkodra and Micro Prespa Lakes has gradually increased or not due to the fact in our country this fish doesn't have a economic value
Pseudorasbora parva is generally regarded as a pest due to its very high reproductive rate, which gives rise to dense populations of fish that compete with fry of other species (Welcomme, 1988). This species is more resistant than many European fish species to a moderate degree of pollution, elevated temperatures, and low water levels There is evidence that it also can move a limited distance through polluted water (Banarescu, 1999).

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Major introduced species in Albanian freshwater fish catches

English name	Scientific name	Year of introduction
Silver carp	*Hyphophtalmichthys molitrix*	1959; 1968; 1988
Bighead carp	*Hyphophtalmichthys nobilis*	1968; 1988
Grass carp	*Ctenopharyngodon idellus*	1959; 1968; 1988
Wuchang bream	*Megalobrama amblycephala*	1968
Crucian carp	*Carassius carassius*	1968
Rainbow trout	*Oncorhynchus mykiss*	1978
Perch	*Perca fluviatilis*	1980
Pike-perch	*Stizostedion lucioperca*	1980
Tilapias nei	*Tilapia spp.*	2001
Common carp	*Cyprinus carpio*	1968; 1988
Stone moroko	*Pseudorasbora parva*	1998
Pumpkinseed	*Lepomis gibosa*	1994
Tinka	*Tinca tinca*	1988
Wels catfish	*Silurus glanis*	1991
White Amur bream	*Parabramis pekinensis*	1978
Mosquitofish	*Gambusia affinis*	1979
Guppy	*Poecilia reticulata*	

The spread of invasive alien species is creating complex and far-reaching challenges that threaten both the natural biological riches of the earth and the well-being of our people. While the problem is global, the nature and severity of the impacts on society, economic life, health, and natural heritage are distributed unevenly across nations and regions (Anon, 2000; Arnold, 1999, balon 1995 etc).
Some aspects of the global IAS problem require solutions tailored to the specific values, needs, and priorities of nations while others call for consolidated action by the larger world community. Preventing the international movement of invasive alien species and coordinating a timely and effective response to invasions requires cooperation and collaboration among governments, economic sectors, non-governmental organizations, and international treaty organizations.
Currently, according to IAS, the situation at the national level that we are facing:

- low public awareness and opposition to government intervention;
- Shortage and inaccessibility of scientific information (for species identification, risk analysis, detection and mitigation techniques etc.);
- absence of clear and agreed priorities for action;
- ease of introduction and movement (e.g. through the post), inadequate inspection and quarantine;
- inadequate monitoring capacity;
- lack of effective emergency response measures;
- outdated or inadequate legislation;

At the national level, consolidated and coordinated action is required. This could be part of a national biodiversity strategy and action plan, with close involvement of the economic sectors and identifying people responsible for operative actions involving potential IAS as a key prerequisite. Clear responsibilities for each relevant sector would need to be identified.
Insurance mechanisms and liability regulations for the spread of IAS are almost non-existent, presenting a major deficiency for controlling the problem. Capacity and expertise to deal with IAS are not yet sufficient. Further research on and capacity building around the biology and control of IAS and biosecurity issues therefore need to be given attention and priority. A global information system regarding the biology and control of IAS is also required. Tools, mechanisms, best management practices, control techniques and resources need to be provided and exchanged. Such a proposed system is currently developed as part of the Global Invasive Species Information Network (GISIN) and is intended to link to the Clearing House Mechanism of the Convention on Biological Diversity.
Awareness raising and education regarding IAS should be given high priority in action plans, and development of economic tools and incentives for prevention are urgently needed. Biological invasion in Albania deserves the attention of researchers, decision-makers and the public as well. Public interest focuses mainly on human health impacts of some allergenic and pest species, but the society is also sensitive to the degradation of natural values of protected and urban areas. However, the public awareness and personal responsibility for introduction and spreading of invasive species and their impacts on native species and ecosystems is very low.

Conclusions

There is a general consenss that the international introduction of species should be avoided unless detailed assessments show that the benefits of an introduction are much greater than the associated risks.

The subset of alien species that are invasive can have significant environmental, economic, public and health impacts and present a significant risk of the wholesale homogenization of ecosystems. Invasive alien species can have a major impact on Albania's environment, threatening individual species and reducing overall species abundance and diversity.

An detection and rapid action is crucial to prevent its establishment the preferred response is often to eradicate the organisms as soon as possible. Where eradication is not feasible or resources are not available, containment and long-term control measures should be implemented. However, it is important to go further than this basically defensive approach. Conservation policies need to include restoration measures for species, natural habitats and ecosystems that have been affected by biological invasions.

The government has to minimize the entry of invasive species into the country thorough inspections of international shipments, customs checks, and proper quarantine regulations.

To better controll the entry of invasive insect’s messurements as light and ground traps and early dedections has to be applayed.

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