

Conflicts of Interest in the Use of Grass Carp

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Abstract

In biological control of aquatic weeds with herbivorous fish, many potential conflicts exist, since the aquatic environment is generally used simultaneously for various purposes. Three examples are given of situations where conflicts are (or have tried to be) solved or prevented: in Egypt by extension, in the USA by research, and in the Netherlands by regulations. These examples can be used for conflict-counteracting scenarios in future situations; those directed towards prevention of conflicts are expected to be most successful.

Conflicts d'Intérêts dans l'Utilisation de la Carpe Herbivore

La lutte biologique contre les plantes nuisibles aquatiques au moyen de poissons herbivores peut donner lieu à de nombreux conflits, puisqu'en général, le milieu aquatique est utilisé simultanément à diverses fins. L'auteur donne trois exemples de situations où ces conflits ont été résolus ou prévenus (où on a tenté de le faire): en Égypte, par des programmes de sensibilisation, aux États-Unis, par des recherches, et aux Pays-Bas, par la réglementation. On peut avoir recours à ces exemples pour concevoir des scénarios qui permettront de résoudre les conflits à l'avenir; on prévoit que les méthodes destinées à prévenir les conflits donneront les meilleurs résultats.

Introduction

Herbivorous fish are biological control agents of weeds that are used on a practical scale. Many species are used or studied (van Zon 1978), but grass carp (*Ctenopharyngodon idella* Val.; Cyprinidae) is the most important because of its high ecological amplitude and its voracious and unspecific consumption (van Zon 1981; Shireman and Smith 1981; Zonneveld and van Zon 1984). For these reasons this species has often been stocked for weed control purposes, and has been subject to many different conflicts of interest. It is expected that the types of conflicts discussed below will apply equally to other phytophagous fish species when they are used for aquatic weed control.

Reasons for Conflicts

Conflicts about biological control agents in an aquatic environment develop for the same reasons as in terrestrial situations: the agent can pose a threat for areas where it is not wanted (fish cannot fly, but water itself is a perfect transportation medium!) or it can attack desirable (or not troublesome) species of plants. Chances for the latter are even larger when using fish, since this type of agent has most value when it is a non-specific feeder: aquatic weed problems are generally vegetation problems more than species problems. However, the chance that a polyphagous organism will eradicate a plant species is virtually absent, and the presence of commercially important plant species in a habitat suited for fish survival is also very limited.

There is, however, another source of conflict in the aquatic environment, and that is its multifunctional use. A water body rarely has only one function in which aquatic plants play a (positive or negative) role. In general, water bodies can be used simultaneously for agricultural purposes (irrigation, drainage, processing, etc.), fisheries, transportation, recreation, conservation (nature, landscape), and/or drinking water production. Weed control to improve one of these functions does not necessarily improve other functions, and that creates the conflicts. This is also the case in the use of mechanical or chemical methods of aquatic weed control, but even more so when fish are used. The reason for this is that more people or authorities traditionally play a role in fisheries management.

Weed control in traditional ways is often seen in the first place as a responsibility of agriculture authorities only. As soon as fish are stocked, other authorities (sometimes other ministries) also become responsible, based on existing laws or rules. Authorities often start their involvement with the release of a statement; negative statements are normally not easily corrected, and the conflict is born. This sometimes has illogical consequences: if a nature conservancy department opposes publicly use of grass carp (i.e. introduction of an exogenous animal), they in fact vote for the alternatives (chemicals), that are often clearly less suited to serve the specific interest of protection of nature.

A number of this type of conflict arise regularly. In developing countries these are generally between weed control (irrigation) and fishery authorities, whereas in Western Europe and the USA most conflicts arise between weed control authorities and nature conservancy or recreation (sport fishing, hunting) authorities. For these conflicts a few solutions have been reported that partly could be used as scenarios in future situations.

The Egyptian Approach: Extension

In Egypt, irrigation authorities want to use grass carp for weed control as an alternative to application of the toxic chemical acrolein (2-propenal), which has been reported to cause accidents and discomfort (Dubbers *et al.* 1981; Gharably *et al.* 1982; van Zon 1984). Professional fishermen utilize the canals to be stocked, and to protect the stocked grass carp the authorities considered prohibiting fishing. The fishermen, however, did not want to leave their traditional jobs. Agricultural authorities did not want them to, since freshwater fish are an important protein source for the rural population. The conflict was obvious.

An analysis of the problem, however, showed that the irrigation authorities in fact needed the fishermen for guarding and managing the stocked grass carp populations, whereas the fishermen needed to maintain those populations in such a way that weed control was guaranteed. If this did not happen, the irrigation authorities would be forced to return to use of acrolein, which was proven to be detrimental to the fisheries.

A solution for the conflict was found by granting permission to the fishermen to take out (and market) any grass carp above a certain size, as long as they put back all smaller individuals. This system raised the fishermen's income substantially and continuously (especially since endemic fish catches also improved after the discontinuance of acrolein use) and weed control was obtained.

The United States Approach: Research

In the USA a number of parties from different ministries or administrative levels are interested in grass carp: Game and Fish Authorities, Departments of Natural Resources, Universities, the Army Corps of Engineers, Weed Control Authorities,

Agricultural Research Stations, commercial fish producers, etc. In different States different conflicts arose, since the opinions of the authorities were different. Sometimes Game and Fish authorities are in favour of use of grass carp and Natural Resources authorities are against its introduction; sometimes the opposite happens.

The main subject of all the conflicts, in fact, was always the same: the yes-or-no chance that grass carp could breed naturally in the States, and could become an unwanted problem (Sutton 1977; Stanley *et al.* 1978; Proceedings Grass Carp Conference 1979).

The actual 'wanted' or 'unwanted' was dependent on the working programme of the authority concerned; if, for example, Natural Resources had to deal with the control of *Hydrilla verticillata* Lf. Royle (Hydrocharitaceae) (as in Florida), they were supporters of use of grass carp, since this remedy was considered less serious than the disease. Natural Resources departments in States without *Hydrilla* in general opposed use of the fish. Game and Fish authorities were generally only strongly against use of grass carp when duck hunting was important in their area, since duck hunting will decrease with aquatic plant control. A number of lawsuits passed (with different outcomes), and the situation became unworkable.

A solution to this series of conflicts can be found through research into the actual cause of the conflicts: if natural breeding could be made impossible, most problems could be solved. Various techniques have been tested, including monosex culture, sex reversal, and sterilization, but none of them were suited for mass production. In recent years all effort has been directed toward mass production of sterile hybrids of grass carp and other cyprinids, mainly the bighead, *Aristichthys nobilis* Rich. (Miley 1980; Kilambi and Zdinak 1981; Krasznai *et al.* 1982).

The Dutch Approach: Regulations

In the Netherlands it became clear during the first experiments with grass carp that potential conflicts were to be expected between the waterboards (responsible for quantitative water management, and thus weed control), the Water Quality Authority, Nature Conservancy (responsible for the numerous small aquatic reserves in the Rhine and Meuse Delta), and/or the Anglers Association (subsidizing artificial fish breeding and stocking).

Actual occurrence of conflicts was prevented in the Netherlands by the formation of a Grass Carp Working Group, in which all parties potentially involved tried to determine under what conditions they could accept the release of the fish.

The discussions in that Working Group (and the results of research undertaken under the auspices of the Group) led to the development of the following Rules and Regulations (van Zon 1979; van der Zweerde 1983): (1) There has to be an aquatic weed problem in the water concerned (i.e. grass carp will only be stocked in problem situations); (2) There are no conservation interests in the water concerned (determined by advice from the regional advisor in question); (3) The water should be suited for fish (determined by advice from the regional fishery advisor in question); (4) The water should be fishtight, naturally or artificially (to be checked by the regional fishery advisor); and (5) The grass carp should be bought from the official Dutch fish breeding organization (which means artificially bred fish, clean from exotic parasites or diseases). This organization also takes care of the stocking of grass carp after permission mentioned above has been received.

For this procedure a special administrative procedure has been developed by the Ministry of Agriculture and Fisheries, and in practice the whole procedure runs

smoothly. At the same time it is strictly forbidden for anglers to remove grass carp (as printed on their fishing permit), unless thinning-out of the stocked population in question has been agreed by the waterboard and the angler's organization.

Summary

It can be seen from the Egyptian and the Dutch cases that in principle, conflicts in the use of grass carp can be solved best by prevention. People or organizations that object to biological weed control in general expect their own interests to be injured. By getting them involved from the very start of a control programme (even in the research phase) the potential opponents not only have the possibility to bring into the programme their own specific interests, but they are also from the beginning co-responsible for results and trials. And, *qualitate qua*, they are the best persons to defend such a control programme in their own circle.

One group of conflicts is not discussed here: those between grass carp supporters (in the widest sense) and the herbicide industry. In the industrial countries this type of conflict does not normally arise, since the use of herbicides in water bodies is generally well regulated and grass carp are often stocked where approved chemicals are not effective or too expensive. In developing countries, however, these problems do exist: biological control programmes sometimes have to fight against a financially strong industrial lobby. These conflicts can best be prevented by keeping discussions open. An integrated approach is often feasible, such as the combination of grass carp with certain herbicides against marginal weeds or for plot treatment. If conflicts arise, they often cannot be solved because of lack of data. It is recommended therefore, that research on effects and/or side-effects of biological agents includes those of existing methods, instead of those of a situation without any control method. Only then an acceptable solution of the conflict is possible, based on comparison of data.

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