December 2002

E

منظمة الأغذية والزراعة للأمم المتحدة | 联合国粮食及农业组织 | Food and Agriculture Organization of the United Nations | Organisation des Nations Unies pour l'alimentation et l'agriculture | Organización de las Naciones Unidas para la Agricultura y la Alimentación

COMMITTEE FOR INLAND FISHERIES OF AFRICA

Twelfth Session

Yaoundé, Cameroon, 2-5 December 2002

Promoting the Implementation of International Codes of Practice and Guidelines for the Responsible Use of Alien[1] and Genetically Modified Aquatic Species in African Fisheries and Aquaculture

SUMMARY

This paper assesses which agreements are applicable to the responsible use of alien and genetically modified aquatic species in African fisheries and aquaculture. The paper identifies the ICES codes of practice on introductions and transfers of marine organisms as a key mechanism to assist in making decisions on the introduction of alien species, and elaborates on the implementation of these codes.

Although the introduction of an alien species always bears some risk, the ICES codes are identified as providing a precautionary approach, and are endorsed in the FAO Technical Guideline for Responsible Fisheries: Precautionary Approach to Capture Fisheries and Species Introductions.

[1] Alien organisms are defined as organisms that are moved by human assistance to an area outside of the organisms' natural range.

W0000

INTRODUCTION

1. The use of alien species[2] in fisheries and aquaculture is a proven method of increasing fishery production; approximately 17% of the world's production of fin fish is made up of alien/exotic species[3]. However, these species are also recognized as one of the most significant threats to the biodiversity in natural ecosystems. The threats to the biodiversity of a habitat can be through competition or hybridization with native species, or the introduction of diseases.

2. Other, indirect consequences could also occur in case of direct introductions in nature: (i) fishing pressures might increase due to the higher value or abundance of fish present. (ii) Access rights might have to change, denying social groups access to previously open access waters. Furthermore, the use of alien species to initiate aquaculture activities may promote too rapid development in areas where the institutional strength is not adequate to oversee and regulate aquaculture development.

3. The African continent has seen quite a number of introductions, from the introduction of Nile perch into Lake Victoria to the introduction of crayfish[4]. Tilapia genetically improved in The Philippines (GIFT), are being considered for re-introduction in Africa[5]. FAO's Database on Introductions of Aquatic Species http://www.fao.org/fi/statist/fisoft/dias/index.htm) has 477 entries for Africa. However, the actual number of introductions to-date might be much higher, as only reported trans-boundary species introductions (not genetically modified species) are recorded in this database.

---

[2] Species is broadly defined, to include different races, strains, genetically differentiated populations, or products of genetic manipulation.

[3] Bartley, D.M. and C. Casal. 1998. Impacts of introductions on the conservation and sustainable use of aquatic biodiversity. FAO Aquaculture Newsletter 20, FAO, Rome, Italy

[4] Satia, B.P. and Bartley, D.M. 1998. Paradox of Species Introduction in Africa. In: Genetics and Aquaculture in Africa, p. 115-122; Jean-François Agnese, Editeur Scientifique, Editions de l'Orstom. Paris 1998. 326 p

[5] Bartley, D.M. and F. Marttin, 2002. Introduction of alien species and genotypes and their impact on biodiversity. ICLARM/FAO Expert consultation on Biosafety and Environmental Impact of Genetic Enhancement and Introduction of Improved Strains/Alien Species in Africa. Kenya

CODES OF PRACTICE AND GUIDELINES[6]

4. Significant international instruments have recently been established addressing the introduction of exotic species, such as the Convention on Biological Diversity, the WTO Agreement on the Application of Sanitary and Phytosanitary Measures (the SPS Agreement), The International Aquatic Health Code of the World Organization for Animal Health (OIE), and the FAO Code of Conduct for Responsible Fisheries[7]. These instruments are calling for accurate assessments of the risks of using exotic species, reduction of these risks, and are promoting the creation of information sources and an exchange of information on exotic species, their biological and ecological attributes, and potential impacts (both positive and negative). The FAO Technical Guideline for Responsible Fisheries 2: "Precautionary approach to capture fisheries and species introductions" refers to the ICES codes of practice on the introductions and transfers of Marine organisms deals with most of the issues addressed in the different other agreements.

THE ICES CODES OF PRACTICE ON INTRODUCTIONS AND TRANSFERS OF MARINE ORGANISMS[8]

5. A key instrument to assist in making decisions on the introduction of alien species is the Codes of Practice on Introductions and Transfers of Marine Organisms developed by the International Council for the Exploration of the Sea (ICES), herein referred to as the 'codes of practice' and which have been presented to FAO regional bodies. These Codes have been incorporated into the FAO Technical Guideline for Responsible Fisheries (ftp://ftp.fao.org/fi/document/techguid/fishpre2.pdf). At the 8th session of CIFA these codes of practice were judged to be useful as a set of guidelines to Member

---

[6] Bartley, D. M., R. P. Subasinghe, and D. Coates. 1996. Framework for the responsible use of introduced species. EIFAC/XIX/96/inf. 8. Report of the 19th Session of the European Inland Fisheries Advisory Commission, Dublin, Ireland

[7] APEC/FAO/NACA/SEMARNAP. 2001. Trans-boundary aquatic animal pathogen transfer and the development of harmonized standards on aquaculture health management. Report of the joint APEC/FAO/NACA/SEMARNAP Workshop, Puerto Vallarta, Jalisco, Mexico, 24-28 July 2000. Network of Aquaculture Centres in Asia-Pacific, Bangkok, Thailand

Links to the text of the agreements:

Convention on Biodiversity: http://www.biodiv.org/doc/legal/cbd-en.pdf

Cartagena Protocol on Biosafety: http://www.biodiv.org/biosafety/protocol.asp

WTO Agreement on the Application of Sanitary and Phyto Sanitary Measures: http://www.wto.org/english/docs_e/legal_e/15-sps.pdf

The International Aquatic Health Code of the World Organization for Animal Health (OIE): http://www.oie.int/eng/normes/fcode/A_00001.htm

FAO Code of Conduct for Responsible Fisheries: http://www.fao.org/fi/agreem/codecond/ficonde.asp

FAO Technical Guideline for Responsible Fisheries 2: Precautionary Approach to Capture Fisheries and Species Introductions: http://www.fao.org/DOCREP/003/W3592E/W3592E00.HTM

[8] International Council for the Exploration of the Sea. 1995. ICES Code of Practice on the Introductions and Transfers of Marine Organisms - 1994. ICES Co-operative Research Report No. 204.

Countries as how to proceed with their own practices and regulations for introductions of fish species[9]. The ICES codes apply to the purposeful movement of aquatic species[10].

6. Basically the ICES codes stipulate that:

1. the entity moving an exotic species should develop a **proposal,** that would include location of facility, planned use, passport information, and source of the exotic species;
2. an independent **review** should take place to evaluate the proposal and the impacts and risk/benefits of the proposed introduction, e.g. pathogens, ecological requirements/interactions, genetic concerns, socio-economic concerns, and local species most affected would be evaluated;
3. **advice** and comment should be communicated among the proposers, evaluators and decision-makers, and the independent review should **advise** to either accept, refine, or reject the proposal so that all parties understand the basis for any decision or action, thus proposals can be refined and the review panel can request additional information on which to make their recommendation;
4. the decision-maker decides to either **accept or reject** the final proposal;
5. if approval to introduce a species is granted, **quarantine, containment, monitoring, and reporting programmes** need to be implemented; and
6. the **ongoing practice** of importing the (formerly) exotic species becomes subject to **review and inspection** which checks the general condition of the shipments, e.g. checking that no pathogens are present, that the correct species is being shipped, etc.

7. The ICES Codes are general and can be adapted to specific circumstances and resource availability, but none of the above requirements should be waived nor should they be implemented less strictly. For example, a regulatory agency may require a proposal to contain a first evaluation of the risk/benefits, and this evaluation would then be forwarded to an *independent* review or advisory panel; or the advisory panel could make the first evaluation of a proposal. Similarly, States may require quarantine procedures to be explicitly described in the proposal before approval is granted.

IMPLEMENTATION

8. The basic codes are simple; their implementation will be more difficult. However, the mere requirement of a proposal will tend to deter many frivolous or poorly planned introductions; other ill-advised introductions will hopefully be rejected quickly by the review process.

---

[9] Res. 8th Session CIFA, 21 – 25 October 1990, Cairo, Egypt, para 45.

[10] Guidelines and policy concerning species introduced inadvertently through ballast water or on ships' hulls are adressed elsewhere, for example at the International Maritime Organization [IMO] (The IMO website: http://globallast.imo.org/index.asp The Globallast programme website: http://globallast.imo.org/index.asp?page=resolution.htm&menu=true)

THE PROPOSAL

9. The PROPOSAL is the most important step because it imposes planning and opens up communication among the developers, regulatory agencies, scientists and the international community. Any person, corporation, or State agency contemplating the use of an exotic species should:

7. present to the appropriate authority a proposal describing the **intended use, benefits and risks associated with the introduction**.
8. Define the **purpose(s) and objective(s)** of the introduction. Quantified objectives should be stated wherever possible, such as increase in *x* tonnes of fish, reduction in *$ z* loss from an agricultural pest, or employment for *y %* of the community.
9. Identify and quantify the **problem the proposal aims to rectify**. A clear statement is needed as to why the problem needs correcting and why the problem will continue without the introduction. Care must be taken to characterize the problem properly to avoid short-sighted interpretations.
10. Identify **alternate methods** of addressing the same problem and quantify the comparison between the use of the exotic species and the alternate method.

The proposal should also:

11. Include source(s) of stock, life history stage to be imported, planned use of stock, description of culture facility (if any) or planned release site, known pathogens, human health risks (for example intermediate host to human parasite), potential ecological, genetic, or disease impacts, and quarantine arrangements.
12. Give consideration to measures that would **avoid the inadvertant introduction of exotic species** during the introduction. This problem may arise in mixed species movements, in movement of early life history stages that are difficult to identify, and in the movement of molluscs that can include a variety of organisms on and within their shells.
13. Include an **environmental impact assessment** if this is requested by regulatory agencies (see ecology section below). However, such an assessment would also have to be independently evaluated.
14. Contain as much information as is available on the **history of movements**, i.e. previous impacts of the species planned for introduction. Such information exists for many inland introductions (DIAS).

Impact evaluation

10. Evaluation of impacts should ideally be part of the proposal. The points raised below will help both in the creation of a clear and complete proposal and in the review of the proposal by an appropriate regulatory or advisory body. Also included in this section are specific measures that can be used to minimize the risk of adverse impacts.

11. **Socio-economics**. Socio-economic benefits and risks should be quantified ***prior*** to considering associated factors, such as ecological and genetic factors. It is the socio-economic aspect of the development programme that utilizes exotic species that determine the *need* for the exotic species. However, in the subsequent process of evaluating the ecological, genetic and disease impacts, other socio-economic risks may be discovered.

15. Identify and quantify the most probable **beneficiaries** from the use of an exotic species. When an introduction is meant to stimulate new development the initial numbers of beneficiaries may be small, but may grow in the longer term. Thus, **potential beneficiaries** should also be considered.

16. Identify and quantify those **people most at risk** from the use of an exotic species.

17. Identify and quantify how the **human community will change** as a result of the introduction. Such changes may be in the form of market changes, changes in activity patterns, changes in food consumption/availability, necessary infrastructure changes or inadequacies, changes in resource allocation, and changes in power structure. Sectors other than fisheries and aquaculture may also be affected and should be considered.

18. A **market analysis/study** should be conducted to determine the **acceptability** of the species (including the acceptability of any genetic modification used), the demand, the target market, the price, etc.

12. **Ecology**. Throughout the Codes very slight distinction is made between organisms introduced for release into the wild and those used in contained facilities. It is assumed that no containment is 100% effective and there is ample evidence to show that organisms will eventually escape their confinement. Therefore, the question more critical than: "Will the organism be introduced into a confined area?", is: "Will the organism be able to survive and reproduce in the natural environment when it escapes confinement?"

19. An **ecological analysis** should be done that would examine the exotic species for: reproductive strategy (when, where, how), potential predator - prey relationships, feeding habits, habitat requirements, closely related species with which hybridization is possible, potential range if released or escaped, significant behaviour that may affect the environment, e.g. burrowing by crayfish, migration patterns, and disease history.

20. Identify those **organisms** that would be most **affected** by the introduction. It is important to consider here those local species that may be affected by any newly created fishery that is established to harvest the introduced species. For example, an endangered species may be impacted by a new fishery for an exotic species, but not by the actual exotic species itself. Conversely, a newly created fishery based on an exotic species may relieve fishing pressure on native endangered species.

21. An examination of the effects of **past introductions** of species that are closely related to the species proposed for introduction should also be conducted to give additional insight into the potential impacts of the proposed introduction.

22. Assess the feasibility of utilizing a **native species** in the development project rather than an exotic species.

23. **Monitoring** the ecological effects (see below) of an introduction is crucial because a species' performance, behaviour, choice of prey, etc. in its new environment may be very different from what they were in its native range.

24. Realizing that once an introduction has been made into the natural environment it is extremely difficult to "reverse" if adverse effects are discovered. E**xamination and evaluation of possible control measures, contingency plans, or eradication** plans should be carried out. For many introductions into marine environments or extensive river systems, control and reversal may be almost

impossible which points to the need for good initial decisions on whether or not to utilize exotic species.

25. The use of small-scale, stepwise, or pilot-scale introductions into nature should be carefully considered. Often it is the numbers of an organism that determines success of an introduction or its impacts. Limited numbers of animals introduced may produce no impact, neither good nor bad. Any pilot scale project should only be carreid out after previous evaluations have already decided that an introduction is acceptable. Thus, **pilot scale releases** are an additional safety precaution, but they may not be justified economically nor scientifically.

13. **Genetics.** Genetic impacts are related to ecological impacts in that they may affect the number and distribution of native and exotic species. Genetic concerns will depend on the type of introduction being planned: whether it is to establish reproducing populations, to provide animals for a put and take fishery, or species for rearing in farm situations.

26. The **description** of the exotic species contained in the Proposal should include as much genetic information as possible, such as sub-species/strain designation, meristic information, and allele frequency or other genetic marker information that will assist in identifying the exotic species and differentiating it from native species.

27. To the extent possible, **information** on the genetic stock structure of the exotic species and likely native species with which it may hybridize should be collected.

28. Unless specifically stated as an objective of the proposal, exotic species that can **hybridize** with local species should be **avoided**.

29. The use of **sterile animals** should be considered as a means to reduce genetic interactions between the exotic and native species and to reduce the risk of establishing reproducing populations of the exotic species.

30. Protect and preserve, at the earliest possible stage, the broad genetic diversity present within the indigenous aquatic organisms most threatened by an introduction, by establishing "**reserves**" where no introductions are allowed. International assistance may be solicited when states' own resources are not sufficient.

31. The breeding history of a stock to be introduced should be considered from the point of view that a stock bred for one purpose may not perform well if utilized for another purpose. For example, a domesticated stock used for intensive aquaculture may not perform well if released into the natural environment; wild caught animals may not perform well in captivity.

32. Where possible, states should develop genetically improved breeds from their own breeding programmes **in-country** rather than importing breeds improved elsewhere.

33. A proposal should consider using genetic manipulations to increase the probability of success of an introduction by producing a better product, e.g. faster growing selectively bred fish, and by reducing negative environmental impacts, e.g. the production of sterile triploid fish that would not reproduce if they happened to escape. A wide range of genetic methods can be applied and the choice will depend on the objectives stated in the proposal.

34. The use of introduced species, genetically modified organisms and products of selective breeding, may allow for continued or increased production from habitats that have been degraded or modified so much that native species are no longer viable. Care should be taken **not to use this potential productivity as justification for further abuse** of habitat, or for delaying habitat restoration.

35. Risks from the use of genetically modified organisms, including products of selective breeding, chromosome manipulation and hybrids, should be evaluated based on the change the modification makes on the organism and the level of uncertainty about what that change really involves. Evaluation should not be based solely on the technology used to create the modification. Certain new technologies, such as gene transfer, have high levels of uncertainty, e.g. the effects of the new gene, where in the genome it gets inserted, how it will be transferred, can it "spread" to different species. Therefore, thorough evaluation of several generations of transgenic animals may be required to make informed judgement on the effect of the genetic modification.

36. **Socio-economic studies should be completed** before utilizing a genetic modification to ensure that there is no consumer rejection of such products.

37. The importation of gametes, for example frozen milt, or embryos of exotic species should be subject to regulation and these guidelines. The use of such material may also reduce the risk of introducing disease or unintended organisms.

Review panel

14. The review panel is another crucial element of the codes. It is necessary that the review process is independent and not linked to the introducing entity. Consideration should be given whether to formulate an external review panel, with the potential participation of foreign experts, or to formulate a local review panel, with participation of those knowledgeable in local conditions and priorities. A combination of local and external participants should also be considered.

38. Composition of review panel should be **multidisciplinary** and include expertise in: capture fisheries, aquatic ecology, aquaculture, fish health and quarantine, human health, socio-economics (micro and macro), conservation, genetics, agriculture, private sector development, and rural development. Members of the panel may expertise in several of the above areas.

39. A core review panel should be established on a relatively **permanent** basis.

40. Decisions, recommendations, and questions that the panel has pertaining to the proposal should be **communicated** in a constructive manner to those concerned, with the aim to make the proposal better and to improve the decision-making process.

41. Where a panel cannot agree on a recommendation, an "opionnaire" similar to the one included in EIFAC Occasional Paper No. 23 (Turner 1988)[11] can be utilized.

Government infrastructure and policy

[11] Turner, G. editor. 1988. Codes of Practice and Manual of Procedures for Consideration of Introductions and Transfers of Marine and Freshwater Organisms. - EIFAC Occasional Paper No. 23. European Inland Fisheries Advisory Commission. Food and Agriculture Organization of the United Nations, Rome, Italy.

15. The ministries or agencies responsible for decision-making, policy formulation, monitoring and enforcement of the elements of the codes will play a key role in the responsible use of exotic aquatic species.

42. States should ensure that the **jurisdiction** over the importation of exotic species is vested in an **appropriate ministry** or department (or agreed combination of departments, for example rural development, agriculture and fisheries), with expertise in fisheries, aquaculture and aquatic ecology.

43. States should establish a national **co-ordination/consultation mechanism** to review evaluations of proposals, forward decisions, and facilitate monitoring and reporting impacts of introductions.

44. Regulatory authorities should establish and **publicise the criteria** for which introductions will be considered.

45. Regulatory agencies of all states are encouraged to use the strongest possible **measures to prevent unauthorized or unapproved introductions**. Sections of this framework may be suitable for adaptation into national legislation.

46. The proposal and evaluation process described here help to reduce the chance of a harmful introduction. States may wish to consider for national legislation that if these elements are not followed, the importer of an exotic species may be **financially responsible and subject to liability**, should significant negative effects arise.

47. States should prepare a **list of species** eligible for introduction, as well as a list of species that are ineligible. This list should be made readily available to inspection staff (customs officials), potential importers, and other interested parties.

48. States are encouraged to establish strong legal measures to regulate the release of **genetically modified organisms**, including the mandatory licensing of those engaged in modifying, importing, using or releasing any genetically modified organism.

49. States should promote **co-operation** between the fisheries/aquaculture sector and other sectors dealing with the aquatic environment and development in general in order to co-ordinate policy and regulation of introduced species.

50. States should promote education on training in, and awareness of, the **responsible use** of introduced species.

51. States should encourage self-policing and self-enforcing of the elements of these codes by the users of the exotic species.

16. Where an introduction into one country is likely to affect others (e.g. stocking into shared waterbodies or rivers that flow through more than one country), the countries likely to be affected should be consulted, as should be the regional fisheries bodies or other appropriate international groups with expertise in species introductions (e.g. ICES, EIFAC, CIFA).

Quarantine and health certification

17. Trade in living aquatic animals or aquatic animal products without risk of transfer of disease, is not possible. Quarantine policies and practices must therefore operate within the concept of minimizing the risk of disease introduction, and must be formulated and implemented to support trade in aquatic animals and aquatic animal products without imposing unjustifiable or unnecessary impediments to trade. Such policies and practices must not be so lax, however, as to permit the entry and establishment of disease.

18. Quarantine and health certification are considered to be separate but related aspects of procedures necessary to minimize risk of disease introduction. Quarantine can be defined as the holding or rearing of animals under conditions which prevent their escape, or the escape of organisms and potential disease agents infecting or associated with them, into the natural environment. Quarantine programmes for aquatic organisms typically involve protocols for inspection, i.e. the examination of animals for disease agents and certification, the issuing of a certificate stating that a particular lot of animals or a production facility has been inspected and is free from infection by a particular pathogen or pathogens.

19. Health certification may be defined as the determination of the health status of a particular animal or group of animals through laboratory examinations on samples from the animals, on absence of clinical disease, or on other criteria on which the health status of an animal may be assessed. Health certification may be conducted in quarantine before or after the quarantine process, and may be an integral part of the quarantine process itself.

Monitoring

20. States should ensure introductions are adequately monitored after they occur. Monitoring should encompass ecological, genetic, fish health, and socio-ecological impacts and should be scheduled to take place over a number of years. Results of the monitoring programme should be used to evaluate the success of the introduction, and to adapt policy and practice concerning exotic species.

21. Accurate baseline data on the local ecological biota and socio-economic status of human community should be collected and are essential to assist monitoring programmes. States should keep a registry of introductions, including both imports and movements within a country. Such a registry should include details on species, strain, source, numbers imported/moved, site of import, intended use, and quarantine. Details of the monitoring and evaluation, such as impacts, benefits, problems, etc. could also be added to the registry, when determined.

22. States are encouraged to submit their registries of introductions to international repositories of such information, such as FAO and ICLARM, so that this information is readily available to all countries contemplating the use of exotic species.

23. Monitoring programmes may be carried out in conjunction with others working in the aquatic sector, such as commercial/sport fishers, universities, or aid agencies. Furthermore, fishery and agricultural surveys that are already in place in many countries could be used to gather information. The costs of the monitoring programmes should be included into the economic cost/benefit evaluation.

FAO Technical Guideline for Responsible Fisheries 2: Precautionary approach to species introduction

24. Because of the high probability that the impacts of an introduction in the natural environment are irreversible and unpredictable, species introductions are not precautionary[12]. However, a precautionary approach to introductions would discourage release into natural waters, strive to reduce adverse impacts, and establish corrective or mitigating procedures (e.g. contingency plan) in advance of actual adverse impacts.

25. Codes of practice and guidelines, such as developed above, are the best precautionary measures that can be applied to species introductions.

SUGGESTED ACTION BY COMMITTEE

26. The Committee is invited to review the issues and suggestions highlighted in the paper and to provide guidance to members and FAO, as well as other agencies and international organizations on how to facilitate the implementation of international codes of practice and guidelines for the responsible use of alien and genetically modified aquatic species in CIFA countries. In particular, the Committee may wish to emphasize on:

52. How to implement the ICES Codes of Practice on Introductions and Transfers of Marine Organisms.
53. How to implement FAO's Technical Guideline for Responsible Fisheries 2: Precautionary Approach to Capture Fisheries and Species Introductions.
54. How to raise awareness.
55. How to develop alternatives (e.g. native species) to the introduction of alien species.
56. How to promote intra-regional collaboration on the issue of species introductions.

[12] FAO, 1995. Precautionary Approach to Fisheries. Part 2: Guidelines on the precautionary approach to capture fisheries and species introductions. - FAO Fisheries Technical Paper 350/1. Food and Agriculture Organization of the United Nations, Rome, Italy