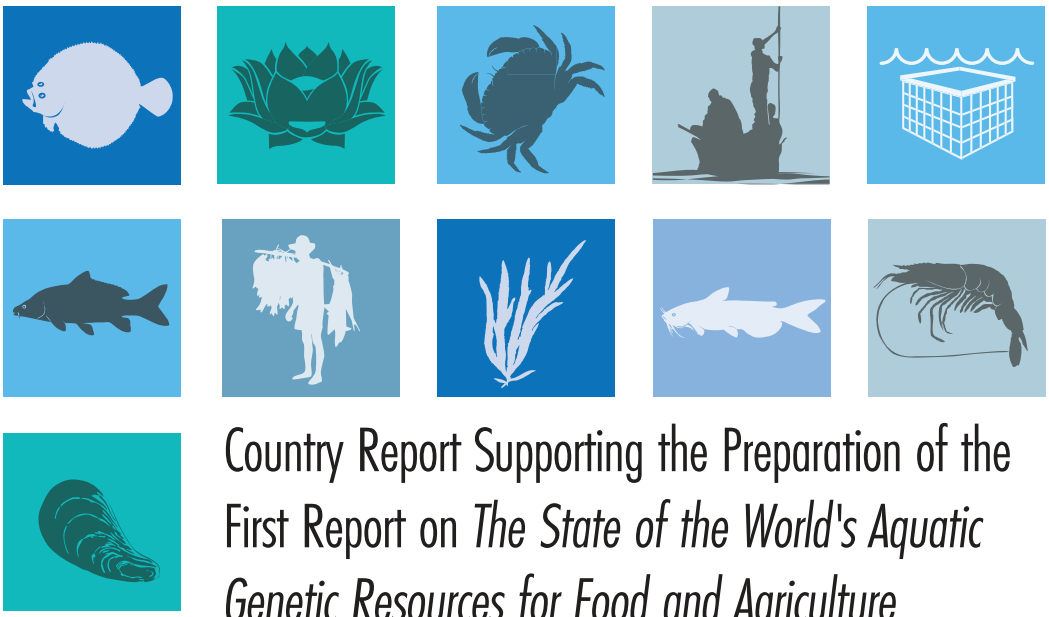
Food and Agriculture Organization of the United Nations

COUNTRY REPORTS

Hungary



Country Report Supporting the Preparation of the First Report on *The State of the World's Aquatic Genetic Resources for Food and Agriculture*

Food and Agriculture Organization of the United Nations

COMMISSION ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE

Questionnaire for the Preparation of Country Reports for *the First State of the World's Aquatic Genetic Resources for Food and Agriculture*

COMMISSION ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE

INSTRUCTIONS FOR COMPLETING THE DYNAMIC GUIDELINES

How do I complete the dynamic guidelines?

1. You will require Adobe Reader to open the dynamic guidelines. Adobe Reader can be downloaded free of charge from: http://get.adobe.com/uk/reader/otherversions/. Use Adobe Reader Version 10 or higher.
2. Open the dynamic guidelines and save it (save as a pdf) on your hard drive.
3. Please rename it <name of your country>.pdf.
4. You may forward the dynamic guidelines to stakeholders you would like to involve or inform by e-mail. You may also print and/or save the dynamic guidelines.
5. It is advisable to prepare textual responses (including any formatting such as bullet points) first in a separate document and then to copy and paste them into the form. Please use font Arial 10. Acronyms and abbreviations should be avoided if possible. If included, they must be introduced (i.e. written out in full) the first time they are used. Note that the text boxes are expandable. Once text has been entered, the box will automatically enlarge to make its content fully visible when you click outside its border. To delete a row you have added, click on the "X" on the far right of the table
6. When you have finished completing the dynamic guidelines, click the “Submit form” button at the end of the form and send the completed dynamic guidelines to Devin.Bartely@fao.org; Matthias.Halwart@fao.org; and ruth.garciagomez@fao.org.
7. This should automatically attach the document to an email that you can then send. Otherwise, please attach the completed dynamic guidelines manually to an e-mail and send it to Devin.Bartely@fao.org; Matthias.Halwart@fao.org; and ruth.garciagomez@fao.org.
8. A letter confirming official endorsement by relevant authorities should also be attached to the email.
9. You will receive a confirmation that the submission was successful.

Where can I get further assistance?
If you have any questions regarding the dynamic guidelines, please contact
Devin.Bartely@fao.org; Matthias.Halwart@fao.org; ruth.garciagomez@fao.org

Several websites provide useful information on aquatic species that can be consulted for proper species names and for information on aquatic genetic resources: AlgaeBase, Aquamaps, Barcode of Life, Census of Marine Life, FishBase, Frozen Ark, GenBank, Global Biodiversity Information Facility, International Union for Conservation of Nature, National Institutes of Health Database on Genomes and Bioinformatics, Ornamental Fish International, SealifeBase, Sea Around Us, and World Register of Marine Species.

How, by whom and by when must the completed dynamic guidelines be submitted?
Once officially endorsed by the relevant authorities, the completed dynamic guidelines should be submitted (click the “Submit form” button on the header banner) by the National Focal Point. **Completed dynamic guidelines should be sent by December 31st 2015.**

www.algaebase.org
www.aquamaps.org
www.barcodeoflife.org
www.coml.org
www.fishbase.org
www.frozenark.org
www.genbank.org
www.gbif.org
www.iucn.org
http://discover.nci.nih.gov/
www.ornamental-fish-int.org
www.sealifebase.org
www.seaaroundus.org
www.marinespecies.org

I. INTRODUCTION

At its Thirteenth Regular Session, the Commission noted that the preparation of a country-driven *State of the World's Aquatic Genetic Resources for Food and Agriculture* would provide countries with opportunities for assessing the status of their aquatic genetic resources for food and agriculture and enhancing the contributions of aquatic genetic resources to food security and rural development. Additionally the process of producing Country Reports will assist countries in determining their needs and priorities for the conservation and sustainable use of aquatic genetic resources for food and agriculture, and will help raise awareness among policy-makers.

II. COUNTRY REPORTS

As with the other sectors, *The State of the World's Aquatic Genetic Resources for Food and Agriculture (SoWAqGR)* will be compiled from Country Reports. It is recognized that guidance is necessary in order to assist countries in completing those reports under a common framework. The Country Reports will become official government documents submitted to FAO.

The following questionnaire is the suggested format for the preparation and submission of Country Reports. The questionnaire has been prepared by FAO to assist in the preparation of Country Reports contributing to the SoWAqGR Report. It has been designed to assist countries to undertake a strategic assessment of their aquatic genetic resources for food and agriculture.

The scope of the first State of the World's Aquatic Genetic Resources for Food and Agriculture, and therefore the emphasis in the Country Reports, is farmed aquatic species and their wild relatives within national jurisdiction.

Country Reports should:

- become powerful tools for improving the conservation, sustainable use and development of aquatic genetic resources for food and agriculture, at national and regional levels;
- identify threats to aquatic genetic resources, gaps in information about aquatic genetic resources and needs for the strengthening of national capacity to manage aquatic genetic resources effectively;
- inform the development of national policies, legislation, research and development, education, training and extension concerning the conservation, sustainable use and development of aquatic genetic resources for food and agriculture;
- contribute to raising public awareness about the importance of aquatic genetic resources for food and agriculture;
- complement other national reporting activities on the conservation, sustainable use and development of aquatic genetic resources.

Timeline and process

In line with the overall process, as established by the Commission, the Director-General of FAO sent a Circular State Letter on 19 April 2012 to countries requesting them to identify National Focal Points for the preparation of Country Reports by 31 December, 2015.

The following steps are recommended in preparing the Country Report, using a participatory approach:

- Each participating country should appoint a National Focal Point for the coordination of the preparation of the Country Report who will also act as focal point to FAO. National Focal Points should be communicated to the Secretary, Commission on Genetic Resources for Food and Agriculture (cgrfa@fao.org) immediatly.
- Countries are encouraged to establish a national committee to oversee the preparation of the Country Report. The national committee should consist of as many representative stakeholders as practical (representing government, industry, research and civil society).
- The national committee should meet frequently to review progress and consult widely with key stakeholders.

- The National Focal Point should coordinate the preparation of the first draft of the Country Report, which should be reviewed by the national committee. The National Focal Point should facilitate a consultative process for broader stakeholder review.
- Following the stakeholder review, the National Focal Point should coordinate the finalization of the Country Report, submit it to the government for official endorsement and transmit it to FAO in one of the Organization's official languages (Arabic, Chinese, English, French, Russian and Spanish) by 31 December 2015.
- The Country Report will be an official government report.
- If countries are unable to submit final Country Reports by the set deadline, preliminary reports of findings should be provided to FAO to contribute to the identification of global priorities for inclusion in the SoWAqGR Report.

QUESTIONNAIRE FOR PREPARATION OF COUNTRY REPORTS FOR *THE STATE OF THE WORLD'S AQUATIC GENETIC RESOURCES FOR FOOD AND AGRICULTURE*

Country report supporting the preparation of

The State of the World's Aquatic Genetic Resources for Food and Agriculture

Country	Hungary
Prepared By	Dr. Zsigmond Jeney*
Date	Dec 31, 2015

TABLE OF CONTENTS

I. EXECUTIVE SUMMARY

The Country Report should contain an executive summary of 2-3 pages highlighting the main findings of the analysis and providing an overview of key issues, constraints and existing capacity to address the issues and challenges. The executive summary should indicate trends and driving forces and present an overview of the proposed strategic directions for future actions aimed at the national, regional and global levels.

Please include the Executive Summary here.

The present country report summarizes the status of aquatic genetic resources in Hungary within the frame of the preparation of "The State of the World's Aquatic Genetic Resources for Food and Agriculture".
While the aquaculture research of Hungary (especially its role in the aquaculture development of developing countries) is well-acknowledged worldwide, the per capita consumption of fish and seafood is very low (5,31 kg in 2014). In view of the consumer preferences, Hungarian fisheries and aquaculture are focused on finfish, other aquatic species do not have any practical importance. Accordingly, this report also deals only with finfish species.
There are about 390 pond farms operating in Hungary, which give 75 percent of the total production. The operating fishpond area was 24,000 hectares in 2014. Sixty-six percent of these farms are operated by private collective enterprises, 17 percent are owned by the State, while the remainder is managed by other organizations or agricultural cooperatives. In addition to fish production, fish ponds provide important ecosystem services including, among others, maintenance of the biodiversity, creation of habitats, flood and drought protection and water purification.
The production of aquatic genetic resources is slowly increasing in Hungary, which trend is expected to continue. Common carp is the most important pond-reared species with a production of 9,600 tonnes. Other important pond-produced species are Chinese carps and predatory fishes (Northern pike, wels catfish, zander).
The intensive fish production plants of the country produce trouts, sturgeons, catfishes and some marine fishes, mostly using geothermal energy. The production volume is slightly more than 3,000 tonnes, whereof 77 percent is for human consumption. Hungary is the largest European producer of African catfish, which makes about 90 percent of the intensive production.
The other sector of fisheries is natural water fishing. Common carp plays an important role here, too, yielding 76 percent of the fish catch in natural waters and reservoirs (7,500 tonnes) (almost all this amount, 99.5 percent, was caught by anglers). The angler community of Hungary consists of about 340,000 persons. Angling is allowed on a water surface of about 140,000 hectares in Hungary, including about 25,000 hectares managed by anglers' associations and societies (630 organizations). Anglers caught 7,000 tonnes of fish in natural waters and reservoirs, which equalled 94 percent of the total reported catch. The utilization of natural waters is currently under transformation, since Act CII of 2013 has banned commercial fishing in the country as of 2016. Instead of commercial fishing, preference is given to recreational fishing and angling, while selective fishing for ecological purposes will be used for regulating the fish communities and stocks.

While the identification and naming of aquatic animals is fairly accurate in the scientific community, there are problems with the practical identification of some commercially used hybrids, in particular, those of Hypophtalmichthys molitrix and H. nobilis or Clarias gariepinus and Heterobranchus bidorsalis. Domesticated broodstocks are available for common carp and Chinese carps, while the breeders of other species (sterlet, pike, pikeperch) are sourced both from the wild and from farmed fish. However, this is expected to change in the future due to the Act CII of 2013 on fisheries and the protection of fish.
With the exception of common carp and brown trout, genetic data are scarce and their use in management is also poor. No real genetic breeding programme exists currently in the country, although there are some successes with hybridization and selective breeding, in particular, with common carp. There are over 20 recognized common carp varieties, but their approval is not based on molecular genetic methods.

The recent imports of fish species mostly concerned new species (African catfish, barramundi, red drum), while the exports were those of common carp, of which Hungary is an important supplier. Quality stocking material of common carp is generally imported from Hungary by countries of Central and Eastern Europe and South-East Asia.

Drivers affecting farmed AqGR include the increasing demand for fish (even though the effect is slight, in particular, as the growing demand is partly met by imported fish), the longer production season due to the climate change and the competition for freshwater resources. Wild relative species are negatively affected by the growing recreational fishing pressure, climate change, competition for resources, habitat loss and degradation and invasive species.

In-situ conservation is mostly limited to legal protection of the rare and endangered species and size limits, bag limits and no-take periods for the commercially important fishable species. Culture-based fisheries does not play a significant role as it is underdeveloped in Hungary. Owners of fishing rights are under the obligation to stock the managed fisheries waters according to a fisheries plan approved by the fisheries authority. However, there is no hatchery in Hungary specifically for stocking purposes, and thus, the stocking material is purchased from commercial farms without regard to genetic variability. In addition, the species and age composition of the stocked fish is mostly determined by economic interests, and thus, the composition of the natural fish community, or even the ecological characteristics of the habitat are generally not taken into account. The existing - generally limited and isolated - restocking campaigns of some species (e.g. beluga or burbot) do not have a measurable effect on the status of their stocks. The propagation and rearing technology of several rare and protected

species has been developed, but, because of their protected status, they cannot be reared in aquaculture, even for restocking purposes.

Live and frozen gene banks of common carp varieties and sturgeon species exist in Hungary. A notable example of their conservation use was the restocking of Croatian fish farms with Croatian common carp breeds lost during the war but preserved in Hungary.

Stakeholders with interest for AqGR include fish farmers, fishermen, traders, policy makers, government resource managers, fishing area managers, fishers' and anglers' associations, producer associations, NGOs, donors and consumers. The role of women is mostly limited to administrative work, as well as processing, marketing and research. In fish farms, they often work in hatcheries.

Legislation on fisheries has been put on a new basis with the Act CII of 2013, which shifted the focus of natural water utilization from commercial to recreational fishing, and banned commercial fishing on Hungarian natural waters from 2016. The Act also puts a strong emphasis on the conservation and protection of native fish stocks. The Act and its implementing regulations are still being amended on the basis of the experiences since its adoption, while its implementing regulation on the rules of conducting aquaculture activities is currently under development.

Research on different aspects of aquatic genetic resources is performed at several research institutions and universities, including NARIC HAKI, Szent István University, the MTA Centre for Ecological Research and National Park directorates. However, because of the lack of national research programmes, the themes of the research mostly depend on the priorities determined by the available funding organization. Different-level courses on aquatic genetic resources, fisheries and aquaculture are offered by Szent István University, Eötvös Loránd University, Debrecen University and the University of Pannonia.

Different aspects related to aquatic genetic resources are coordinated by different ministries (Ministry of Agriculture, Ministry of Interior, Ministry of National Economy, Prime Minister's Office), and thus, coordination of their governance must be done on a governmental level. Data on fisheries and aquaculture are collected by the Research Institute for Agricultural Economics (ASIR - Information System of Agricultural Statistics) and by the National Food Chain Safety Office (National Fisheries Database). The harmonisation of these systems and the improvement of the data quality are important tasks for the future.

Hungary is a member to the Convention on Biological Diversity, the Cartagena Protocol and the Nagoya Protocol; however, there is little information on their effects. International cooperation also takes place in the frame of international projects (e.g. AQUAGAMETE COST Action) or international networks (e.g. Network of Aquaculture Centres in Central and Eastern Europe), which can be an important tool for information exchange and capacity improvement in such important fields as genetic improvement, characterization and monitoring and conservation of genetic resources.

* - Members of the expert-stakeholder group of the AGR report

Name/ Institute,Organisation/ Role in report preparation
Dr. Zsigmond Jeney/ NARIC-HAKI/ coordinator
Dr. Zoltán Szelei/ NARIC-HAKI/ synthesis
Mr. Péter Lengyel/ Ministry of Agriculture/ synthesis
Dr. Vilmos Józsa/ NARIC-HAKI/ member
Mr. László Berzi-Nagy/ NARIC-HAKI/ member
Ms. Mónika Lukácsik/ AKI/ member
Dr. Urbányi Béla/ SzIE/ member
Dr. Ákos Horváth/ SzIE/ member
Dr. Bercsényi Miklós/ Pannon University/ member
Dr. Erős Tibor/ Hungarian Academy of Sciences/ member
Dr. Guti Gábor/ Hungarian Academy of Sciences/ member
Ákos Harka/ Hungarian Ichthyological Society/ member
Dr. László Stündl/ Hungarian Ichthyological Society/ member
Mr. Zoltán Sallai/ Hungarian Ichthyological Society/ member
Mr. Béla Halasi-Kovács/ SCIAP Kutatás-fejlesztési és Tanácsadó Kft./ member
Ms. Ágnes Zelei/ MOHOSz/ member
Dr. László Szathmáry MAHAL member
Dr. László Váradi/ MASz/ member
Mr. Zsolt Udvari/ FM/ member
Ms. Andrea Borbély/ NÉBIH/ member

II. INTRODUCTION

The main objective of the Introduction is to present an overview that will allow a person who is unfamiliar with the country to appreciate the context for the Country Report. The Introduction should present a broad overview and present background information from your country on farmed aquatic species, their wild relatives and culture based fisheries. Detailed information should be provided in the main body of the Country Report. Countries may wish to consider developing their Introductions after completing the main body of their Country Reports.

Please write the overview here

Hungary has always played an important part in the freshwater fish production of Europe, which is a result of the country's favourable hydrographic conditions and the traditions of fish farming.
A determining factor of Hungary's hydrography is the country's position in the middle of the Carpathian Basin. Waters flow from the surrounding mountains toward the central basin (centripetal drainage pattern). Hungary receives 96 percent of its surface water resources from the neighbouring countries. This has the unfavourable effect that many watercourses are strongly polluted when they cross the border. The current hydrographic situation in Hungary is a result of a long development process with multiple changes and diverse human interventions. The hydrographic system is relatively young, the river network only became similar to the actual one in the early Quaternary Period (Pleistocene Epoch). While all watercourses of Hungary belong to the drainage area of the Danube, Hungary's river network has two axes. The western half of the country drains directly to the Danube, while the waters of the Eastern Carpathian Basin are collected by the tributaries of River Tisza, which only joins the Danube after leaving the territory of the country. The lakes of Hungary cover slightly more than 1 percent of the country's territory, and even this area is mostly made up by three lakes: Lake Balaton, Lake Fertő and Lake Velence (904 km2). By origin, the standing waters of Hungary can be classified into two major categories: natural and artificial lakes.
There are about 390 pond farms operating in Hungary. Pond fish farming is responsible for 75% of fish production. According to the data of the Research Institute for Agricultural Economics, fish was produced on 24,000 ha of the available 29,300 ha in 2014. The absolute majority (66 percent) of these farms were operated by private collective enterprises, 17 percent were owned by the State. The remainder is managed by other organizations or agricultural cooperatives. Seven thousand three hundred hectares of the pond farm area are classified as NATURA 2000 areas, but it is typical of the other fish ponds, too, that they assist the conservation of many rare and protected natural values in addition to fish production. Thus, the significant Hungarian populations of otter and great white egret are also a result of the abundant food resource provided by the fish which is stocked and reared in fish ponds.
Even though Hungarian aquaculture has enjoyed a worldwide recognition for several decades, the "golden age" of pond fish farming was in the 1970s, when FAO considered Hungary an "aquaculture superpower" within Europe. According to the latest (2013) FAO statistics, Hungary is the third largest producer of table-size common carp among the EU member states with a production of 9,600 tonnes, next only to Poland (18,800 tonnes) and the Czech Republic (16,800 tonnes). Common carp makes about 80 percent of pond fish production (10,000 tonnes of table fish in 2014), but silver carp, bighead carp, grass carp and some predatory fishes (Northern pike, wels catfish, pike-perch) are also produced. Hungary's production of pond-reared predatory fishes has ranked second among the EU member states for several years on end.
Pond fish culture is in a special position within the agricultural sector, also from an ecological aspect. In the current practice, production mostly takes place in artificial ponds, while the technology is based on material flow processes typical for natural wetlands. Fish ponds act as open ecological systems where the natural and technological processes interact inseparably to yield the fish produced as a primary product and natural values created as a secondary product.
Most intensive fish production plants of the country are systems utilizing geothermal energy. Intensive industrial fish rearing systems mainly produce trouts, sturgeons, catfishes and some marine fishes. The gross yield of these plants is slightly more than 3,000 tonnes, whereof 77 percent is produced for human consumption. The most important species of intensive fish production systems is African catfish, which is responsible for about 90 percent of the production. According to FAO data, Hungary's African catfish production ranked first in the European Union in 2013, similarly to the previous years. Besides Hungary, only the Netherlands produce this species in significant volumes.
Another production base of the fisheries sector is the utilization of natural waters, which has been twofold until 2015: commercial and recreational. The bigger part of recreational utilization consists of angling, the smaller part, of small-scale fishing. However, commercial fishing will not be allowed in Hungary from 2016 (Act CII of 2013). According to the summarized data of angling and fishing for 2013, 76 percent of the fish catch in natural waters and reservoirs (7,500 tonnes) was common carp (whereof 99.5 percent was caught by anglers), which is a significant increase compared to the share of less than 40 percent in the 1990s. The angler community of Hungary consists of about 340,000 persons. Angling is allowed on a water surface of about 140,000 hectares in Hungary, including about 25,000 hectares managed by anglers' associations and societies (630 organizations). Anglers caught 7,000 tonnes of fish in natural waters and reservoirs, which equalled 94 percent of the total reported catch.

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"B" Tételű modul – Természetvédelem, Szaktudás Kiadó Ház ZRt., (TÁMOP 4.1.2 pályázat keretein belül), 2008
Elekházy N. (2013): Halgazdálkodás. Képviselői Információs Szolgálat, Infojegyzet 2013/19.
Halasi-Kovács B., Puskás N., Szűcs I. (2012): A magyarországi halastavi vízgazdálkodás jellemzői, komplex természeti-gazdasági-társadalmi jelentősége, valamint a fenntartható gazdálkodást veszélyeztető problémák értékelése
Lehalászási Jelentés 1995-2015, Statisztikai Jelentések, XX. évfolyam, Agrárgazdasági Kutató Intézet, Budapest, 2015

Magyar Haltermelők és Halászati Vízterület-hasznosítók Szövetségének Jelentése a Szövetség 2014-évi eredményeiről.
MAHAL, Budapest, 2015

III. MAIN BODY OF THE COUNTRY REPORT

Aquaculture, culture-based fisheries and capture fisheries, have differing importance among countries. The structure of chapters in each Country Report will reflect those differences. Countries which do not have a well-developed aquaculture sector but where wild relatives of farmed aquatic species are located, should report on these resources. Countries should decide how to prioritize the coverage of their Country Reports depending on their aquatic genetic resources.

Chapter 1: The Use and Exchange of Aquatic Genetic Resources of Farmed Aquatic Species and their Wild Relatives within National Jurisdiction

The main objective of Chapter 1 is to provide annotated inventories of aquatic genetic resources (AqGR) of farmed aquatic species and their wild relatives.

Farmed aquatic species

1. Over the last 10 years, has production been: ***Please mark appropriate box.***

- (●) Increasing
- ( ) Stable
- ( ) Decreasing
- ( ) Stopped
- ( ) Still in Research and Development
- ( ) Fluctuating
- ( ) Not known

2. What is the expected trend over the next 10 years? ***Please mark appropriate box.***

- (●) Increasing
- ( ) Stable
- ( ) Decreasing
- ( ) Stopped
- ( ) Still in Research and Development
- ( ) Fluctuating
- ( ) Not known

3. Is the identification and naming of farmed species, subspecies, hybrids, crossbreeds, strains, triploids, other distinct types accurate and up- to-date? ***Please mark appropriate box.***

- ( ) Yes
- ( ) No
- (●) Mostly Yes
- ( ) Mostly No

Please include any explanation or additional information here.

- Most of the farmed species are named correctly. Moreover the farmed carp strains are registered in most of all farms. But there is no distinguishing between some species; e.g. Hypophthalmichthys molitrix and H. nobilis, as well as their hybrids in pond fish farming, or Clarias gariepinus and Heterobranchus bidorsalis, as well as their hybrid in RAS. Also the smaller farmed fish species (e.g. Carassius gibelio, Abramis brama, Blicca bjoerkna, Leuciscus idus, Rutilus rutilus) are named as “breams” and registered as an aggregated value in statistics.

- There are over 20 "state approved" common carp strains kept on fish farms and owned by farmers or angler associations, but the approval is not based by molecular methods

- Silver carp and bighead carp are present as hybrids in Hungarian aquaculture. The silver carp phenotype represents a 96% share in the production of Asian carps.

- Identification and naming of species farmed for several decades are well established. Those new for aquaculture (e.g. Percids) and produced to a limited extent are less known.

- The scientific and farming professional community uses an accurate system of identification and naming, however, the general public is not aware of these.

4. To what extent are genetic data for farmed aquatic organisms

a) Available? ***Please mark appropriate box.***

- ( ) Not at all
- ( ) To a minor extent
- (●) To some extent
- ( ) To a great extent

b) Used in management? ***Please mark appropriate box.***

- ( ) Not at all
- (●) To a minor extent
- ( ) To some extent
- ( ) To a great extent

Please add any explanation here.

Genetic data are available for common carp and brown trout and are used in their production.
Carp strains are monitored by so called „performance tests”, which are based mainly on phenotypic data.

5. To what extent are the aquatic organisms farmed in your country sourced as wild seed or from wild brood stock*?*

Please mark appropriate box.

- ○ Not at all
- ◉ To a minor extent
- ○ To some extent
- ○ To a great extent

Please add any explanation here.

Common carp, bighead carp, silver carp and grass carp breeders are used exclusively from domesticated stocks of fish farms.
Sterlet, pike and pikeperch are partly propagated from wild, partly from farmed breeders. Even with these species the trend is expected to shift to an exclusive use of farmed breeders, as a result of the new Act on Fisheries and the Protection of Fish (Act CII of 2013).

6. What proportions (%) of breeding programmes and efforts for the genetic improvement of farmed aquatic species in your country are being managed by the public sector (government research, universities etc.), the private sector, and public-private partnerships?

• Percent managed by public sector.	**Please Enter Percentage Here**	60
• Percent managed by private sector.	**Please Enter Percentage Here**	20
• Percent managed by private /public partnership.	**Please Enter Percentage Here**	20
	Total	100

Please add any explanation here.

No „real" breeding programmes are implemented in Hungarian aquaculture. Different efforts for genetic improvement of farmed fish species (crossbreeding, hybridisation, selection, etc.) are implemented mainly by the public sector (research institutes and universities).
Developing and maintaining carp strains (more than 20 recently) are done by private farmers, under governmental control, which can be regarded as a form of public-private partnership.
A breeding programme has been developed for brown trout by a public/private partnership.

7. To what extent do genetically improved aquatic organisms, including hybrids, crossbreeds, strains, triploids and other distinct types contribute to national aquaculture production in terms of volume ?

Please mark appropriate box.

- ○ Not at all
- ○ To a minor extent
- ◉ To some extent
- ○ To a great extent

8. Please list most significant examples where genetic improvement contributed to increased production and indicate whether they were developed by public, private or public/private partnerships.

Add Row

Species	Type of genetic improvement *mark all that apply*		Developed By *mark all that apply*	
Clarias gariepinus	☐ Traditional selective breeding		☐ Private Sector ☐ Public Sector ☐ Private/Public partnership	X
	☒ Hybrids	Specify parental species in the box below Clarias gariepinus, Heterobranchus longifilis	☒ Private Sector ☐ Public Sector ☐ Private/Public partnership	
	☐ Triploids and other polyploids		☐ Private Sector ☐ Public Sector ☐ Private/Public partnership	
	☐ Mono-sex production		☐ Private Sector ☐ Public Sector ☐ Private/Public partnership	
	☐ Other		☐ Private Sector ☐ Public Sector ☐ Private/Public partnership	
Cyprinus carpio	☒ Traditional selective breeding		☐ Private Sector ☒ Public Sector ☐ Private/Public partnership	X
	☒ Hybrids	Specify parental species in the box below Cyprinus carpio L Cyprinus carpio L	☐ Private Sector ☒ Public Sector ☐ Private/Public partnership	
	☐ Triploids and other polyploids		☐ Private Sector ☐ Public Sector ☐ Private/Public partnership	
	☐ Mono-sex production		☐ Private Sector ☐ Public Sector ☐ Private/Public partnership	
	☐ Other		☐ Private Sector ☐ Public Sector ☐ Private/Public partnership	

9. Please fill in table 1.1

Table 1.1 Aquatic genetic resources (AqGR) of farmed aquatic species in your country

Add Row

Farmed species	Genetic type	Availability of genetic data	Trends in production	Future trends in production	Genetic improvement	Future genetic improvement	Comments	
List species (scientific names), strains and varieties as scientific names (put in brackets the most widely used national common name or names) and indicate whether native or introduced	*Indicate all genetic types that apply to the species*	Are genetic data available for farmed populations? If yes, give summary details in comments	Over the last 10 years, production has been ***(mark one)***	Expected trend over the next 10 years is that production will ***(mark one)***	Which genetic technologies are currently being used on the species ***(mark all that apply)***	***mark all that apply***	For example important traits improved, how data are used in management or name of breed, source of information, etc.	
◉ Native ○ Introduced Cyprinus carpio	☒ Wild Type ☒ Selective bred type ☒ Hybrids ☐ Cross breeds ☒ Strains ☒ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☒ Selective breeding ☒ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☒ Selective breeding ☒ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☒ Marker assisted selection ☐ Other (specify in comment)	See details in Bakos and Gorda, FAO, 2001	X

○ Native ◉ Introduced Hypophthalmichthys molitrix	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	○ Yes ◉ No ○ Not Known	○ Increasing ○ Stable ◉ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ○ Stable ◉ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)		X
◉ Native ○ Introduced Silurus glanis	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	○ Yes ◉ No ○ Not Known	○ Increasing ○ Stable ◉ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ○ Stable ◉ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)		X

◉ Native ○ Introduced Sander lucioperca	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	○ Increasing ○ Stable ◉ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ○ Stable ◉ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)		X
◉ Native ○ Introduced Esox lucius	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	○ Yes ◉ No ○ Not Known	○ Increasing ○ Stable ◉ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ○ Stable ◉ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)		X

◉ Native ○ Introduced Tinca tinca	☒ Wild Type ☒ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☒ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	○ Increasing ○ Stable ◉ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ○ Stable ○ Fluctuating ◉ Decreasing ○ Stopped ○ Not known	☒ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☒ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☒ Marker assisted selection ☐ Other (specify in comment)		X
○ Native ◉ Introduced African catfish	☐ Wild Type ☒ Selective bred type ☒ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ○ Stable ◉ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☒ Selective breeding ☒ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☒ Selective breeding ☒ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☒ Marker assisted selection ☐ Other (specify in comment)		X

◉ Native ○ Introduced Salmo trutta m. fario	☒ Wild Type ☒ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	○ Increasing ○ Stable ◉ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ○ Stable ◉ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☒ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☒ Marker assisted selection ☐ Other (specify in comment)	☒ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☒ Marker assisted selection ☐ Other (specify in comment)	Concerns brown trout (Salmo trutta m. fario)	X
○ Native ◉ Introduced Oncorhynchus mykiss	☐ Wild Type ☒ Selective bred type ☐ Hybrids ☐ Cross breeds ☒ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☒ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☒ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☒ Marker assisted selection ☐ Other (specify in comment)		X

○ Native ◉ Introduced Ctenopharyngodon idellus	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	○ Yes ◉ No ○ Not Known	○ Increasing ○ Stable ◉ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☒ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☒ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)		X
◉ Native ○ Introduced Carassius carassius	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	○ Yes ○ No ◉ Not Known	○ Increasing ○ Stable ◉ Fluctuating ○ Decreasing ○ Stopped ○ Not known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☒ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☒ Marker assisted selection ☐ Other (specify in comment)		X

◉ Native ○ Introduced Abramis brama	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	○ Yes ○ No ◉ Not Known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ◉ Not known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☒ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☒ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)		X
○ Native ○ Introduced Clarias gariepinus	☐ Wild Type ☐ Selective bred type ☒ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	○ Yes ○ No ○ Not Known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☒ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)		X

10. Which aquatic species in your country are thought to have potential for domestication and future use in aquaculture?

Add Row

Species ***Type and select a species***	Is the species native to your country?	Comments ***For example main sources of information***	
SEE COMMENTS	○ Yes ○ No ◉ Not Known	General statement: There is an overlap between #9. and #10. We can not draw a clear line between the categories of "in production" and "has potential for production". This technology development is an on-going process.	X
Lota lota	◉ Yes ○ No ○ Not Known		X
Silurus glanis	◉ Yes ○ No ○ Not Known	Hungary is aiming to increase its predatory fish production and Silurus glanis is the most promising species in this regard (several national projects).	X

Acipenseridae	(●) Yes ( ) No ( ) Not Known	Some species are indigenous, other are non-indigenous. There is an increasing production of sturgeons both for meat and caviar.	X
Perca fluviatilis	(●) Yes ( ) No ( ) Not Known	Initiation of production by Szabolcsi Halászati Zrt.	X

11. Please list the aquatic genetic resources of farmed aquatic species your country has transferred or exchanged with other countries over the past 10 years.

Add Row

Species	Genetic alteration of exchanged material **Mark all that apply**	Details of transfer or exchange	Type of genetic material exchanged **Mark all that apply**	Country or countries involved with exchange **Hold CTRL button to select more than one country**	Comments ***Please add main purpose or objective of the exchange and main sources of information***	
Lates calcarifer	☒ No deliberate genetic alteration ☐ Traditional selective breeding ☐ Hybrids ☐ Triploids and other polyploids ☐ Mono-sex production ☐ Other	☒ Import ☐ Export	☐ DNA ☐ Genes ☐ Gametes ☐ Tissues ☐ Embryos ☒ Living specimens ☐ Other	Ghana Greece Grenada Guatemala Guinea Guinea-Bissau Guyana Haiti Hungary Iceland India Indonesia Iran (Islamic Republic Iraq Ireland Israel Italy	Production of Lates calcarifer was initiated by one company in 2009 but has stopped in 2015.	X
Cyprinus carpio	☐ No deliberate genetic alteration ☒ Traditional selective breeding ☐ Hybrids ☐ Triploids and other polyploids ☐ Mono-sex production ☐ Other	☐ Import ☒ Export	☐ DNA ☐ Genes ☐ Gametes ☐ Tissues ☐ Embryos ☒ Living specimens ☐ Other	Fiji Finland France Gabon Gambia Georgia Germany Ghana Greece Grenada Guatemala Guinea Guinea-Bissau Guyana Haiti Hungary Iceland India Indonesia Iran (Islamic Republic Iraq Ireland Israel Italy Jamaica Japan	Genetic resources have been used intensively for exchange with genetic resources. Countries include countries of Central and Eastern Europe, as well South-East Asia. The main reasons for exchange are requests from abroad. In certain cases, like Croatia, extinct strains were re-established from the resources of the live gene bank of NAIK-HAKI. In other cases joint R and D activities were supported by the exchange.	X

Salmo spp	☒ No deliberate genetic alteration ☐ Traditional selective breeding ☐ Hybrids ☐ Triploids and other polyploids ☐ Mono-sex production ☐ Other	☒ Import ☐ Export	☐ DNA ☐ Genes ☐ Gametes ☐ Tissues ☐ Embryos ☒ Living specimens ☐ Other	Romania Russian Federation Rwanda Saint Kitts and Nevis Saint Lucia Saint Vincent and the Samoa San Marino Sao Tome and Princip Saudi Arabia Senegal Serbia Seychelles Sierra Leone Singapore Slovakia Slovenia		X
Heterobranchus bidorsalis	☒ No deliberate genetic alteration ☐ Traditional selective breeding ☐ Hybrids ☐ Triploids and other polyploids ☐ Mono-sex production ☐ Other	☒ Import ☐ Export	☐ DNA ☐ Genes ☐ Gametes ☐ Tissues ☐ Embryos ☒ Living specimens ☐ Other	Afghanistan Albania Algeria Andorra Angola Antigua and Barbuda Argentina Armenia Australia Austria Azerbaijan Bahamas Bahrain Bangladesh Barbados Belarus Belgium		X
Sciaenops ocellatus	☒ No deliberate genetic alteration ☐ Traditional selective breeding ☐ Hybrids ☐ Triploids and other polyploids ☐ Mono-sex production ☐ Other	☒ Import ☐ Export	☐ DNA ☐ Genes ☐ Gametes ☐ Tissues ☐ Embryos ☒ Living specimens ☐ Other	Ghana Greece Grenada Guatemala Guinea Guinea-Bissau Guyana Haiti Hungary Iceland India Indonesia Iran (Islamic Republic Iraq Ireland Israel Italy		X

Clarias gariepinus	☒ No deliberate genetic alteration ☐ Traditional selective breeding ☐ Hybrids ☐ Triploids and other polyploids ☐ Mono-sex production ☐ Other	☒ Import ☐ Export	☐ DNA ☐ Genes ☐ Gametes ☐ Tissues ☐ Embryos ☒ Living specimens ☐ Other	Malta Marshall Islands Mauritania Mauritius Mexico Micronesia (Federatec Monaco Mongolia Montenegro Morocco Mozambique Myanmar Namibia Nauru Nepal Netherlands New Zealand		X

Wild relatives of farmed aquatic species

12. Please list any wild relatives of aquatic species present in your country that are farmed in another country (but not in your country) and indicate their uses.

Add Row

This question refers to aquatic genetic resources that are present in the wild in your country and that are being farmed elsewhere (but not farmed in your country), indicating any uses these resources may have in your country.

Species	Use *(mark all that apply)*	Comments	
Perca fluviatilis	☐ Capture fisheries ☒ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☒ Other (specify in comments)	aquaculture	X

13. Please list the aquatic genetic resources of wild relatives of farmed aquatic species your country has transferred or exchanged with other countries over the past 10 years.

Add Row

This question refers to wild aquatic genetic resources collected from the wild, not from farming facilities as in question 11.

Species	Details of transfer or exchange *mark all that apply*	Type of genetic material exchanged	Country **Hold CTRL button to select more than one country**	Comments ***main sources of information, if the transfer was legal or not***	
Sander lucioperca	☐ Import ☒ Export	☐ Tissues ☐ Gametes ☐ DNA ☐ Genes ☐ Embryos ☒ Living specimens ☐ Other	Chad Chile China Colombia Comoros Cook Islands Costa Rica Côte d'Ivoire Croatia Cuba Cyprus Czech Republic Republic of Korea Democratic Republic of th Denmark Diibouti	Szabolcsi Halászati Zrt has sold pikeperch grown in ponds but originating from wild spawners to a Danish company as a legal sale of fish.	X
Acipenser stellatus	☐ Import ☒ Export	☐ Tissues ☐ Gametes ☐ DNA ☐ Genes ☒ Embryos ☐ Living specimens ☐ Other	Norway Oman Pakistan Palau Panama Papua New Guinea Paraguay Peru Philippines Poland Portugal Qatar Republic of Korea Republic of Moldova Romania Russian Federation	Legal trade	X

14. Please fill in table 1.2

Table 1.2 Aquatic genetic resources of wild relatives of farmed aquatic species in your country.

Add Row

Target species, stocks or other management units	Characteristics of species	Capture fisheries	Management measures	Availability of genetic data	Use of genetic data in management	Trends in catches	Future trends in catches	Ecosystem(s) where the fishery is located	Changes in ranges and habitats	Reasons for change in abundance of species	
For each row, list the species as scientific names (put in brackets the most widely used national common For each species, include the named stocks and name of other management units if known)	Is the species ***(mark as appropriate):***	Is this species targeted by capture fisheries?	Are there any management measures in place?	Are genetic data available for the fishery?	Are genetic data used in management?	Over the last 10 years, catches have been:	Expected trend over the next 10 years.	Indicate the ecosystem where the fishery is located (***mark all that apply)***	The habitat or range is	What are likely reasons for changes? (***mark all that apply)***	
Cyprinus carpio	☐ Straddling ☒ Transboundary ☐ Introduced ☐ Native	◉ Yes ○ No ○ Not Known	◉ Yes ○ No ○ Not Known	◉ Yes ○ No ○ Not Known	◉ Yes ○ No ○ Not Known	○ Increasing ○ Stable ○ Fluctuating ◉ Decreasing ○ Depleted ○ Not known	○ Increasing ○ Stable ○ Fluctuating ◉ Decreasing ○ Depleted ○ Not known	☐ Intertital ☐ Coastal in EEZ ☐ High seas ☒ Lake ☒ Reservoir ☒ River ☐ Swamp ☐ Other **(specify)**	○ Increasing ◉ Stable ○ Decreasing ○ Not known	☐ Habitat ☐ Climate ☐ Invasive species ☐ Pollution ☐ Rehabilitation of habitat ☒ Others ☐ Not known	X

Target species, stocks or other management units	Characteristics of species	Capture fisheries	Management measures	Availability of genetic data	Use of genetic data in management	Trends in catches	Future trends in catches	Ecosystem(s) where the fishery is located	Changes in ranges and habitats	Reasons for change in abundance of species	
Carassius carassius	☐ Straddling ☒ Transboundary ☐ Introduced ☒ Native	○ Yes ◉ No ○ Not Known	○ Yes ◉ No ○ Not Known	◉ Yes ○ No ○ Not Known	○ Yes ◉ No ○ Not Known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Depleted ◉ Not known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Depleted ◉ Not known	☐ Intertital ☐ Coastal in EEZ ☐ High seas ☒ Lake ☒ Reservoir ☐ River ☒ Swamp ☐ Other **(specify)**	○ Increasing ○ Stable ◉ Decreasing ○ Not known	☒ Habitat ☐ Climate ☒ Invasive species ☐ Pollution ☐ Rehabilitation of habitat ☐ Others ☐ Not known	X
Tinca tinca	☐ Straddling ☒ Transboundary ☐ Introduced ☒ Native	◉ Yes ○ No ○ Not Known	◉ Yes ○ No ○ Not Known	◉ Yes ○ No ○ Not Known	○ Yes ◉ No ○ Not Known	○ Increasing ○ Stable ○ Fluctuating ◉ Decreasing ○ Depleted ○ Not known	○ Increasing ○ Stable ○ Fluctuating ◉ Decreasing ○ Depleted ○ Not known	☐ Intertital ☐ Coastal in EEZ ☐ High seas ☒ Lake ☒ Reservoir ☐ River ☐ Swamp ☐ Other **(specify)**	○ Increasing ○ Stable ◉ Decreasing ○ Not known	☒ Habitat ☐ Climate ☐ Invasive species ☐ Pollution ☐ Rehabilitation of habitat ☐ Others ☐ Not known	X

Target species, stocks or other management units	Characteristics of species	Capture fisheries	Management measures	Availability of genetic data	Use of genetic data in management	Trends in catches	Future trends in catches	Ecosystem(s) where the fishery is located	Changes in ranges and habitats	Reasons for change in abundance of species	
Ctenopharyngodon idellus	☐ Straddling ☐ Transboundary ☒ Introduced ☐ Native	◉ Yes ○ No ○ Not Known	◉ Yes ○ No ○ Not Known	○ Yes ◉ No ○ Not Known	○ Yes ◉ No ○ Not Known	○ Increasing ○ Stable ◉ Fluctuating ○ Decreasing ○ Depleted ○ Not known	○ Increasing ○ Stable ◉ Fluctuating ○ Decreasing ○ Depleted ○ Not known	☐ Intertital ☐ Coastal in EEZ ☐ High seas ☒ Lake ☒ Reservoir ☒ River ☐ Swamp ☐ Other **(specify)**	○ Increasing ○ Stable ○ Decreasing ◉ Not known	☐ Habitat ☐ Climate ☐ Invasive species ☐ Pollution ☐ Rehabilitation of habitat ☒ Others ☐ Not known	X
Hypophthalmichthys molitrix	☐ Straddling ☐ Transboundary ☒ Introduced ☐ Native	◉ Yes ○ No ○ Not Known	◉ Yes ○ No ○ Not Known	○ Yes ◉ No ○ Not Known	○ Yes ○ No ◉ Not Known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Depleted ○ Not known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Depleted ◉ Not known	☐ Intertital ☐ Coastal in EEZ ☐ High seas ☒ Lake ☒ Reservoir ☒ River ☐ Swamp ☐ Other **(specify)**	◉ Increasing ○ Stable ○ Decreasing ○ Not known	☐ Habitat ☐ Climate ☐ Invasive species ☐ Pollution ☐ Rehabilitation of habitat ☒ Others ☐ Not known	X

Target species, stocks or other management units	Characteristics of species	Capture fisheries	Management measures	Availability of genetic data	Use of genetic data in management	Trends in catches	Future trends in catches	Ecosystem(s) where the fishery is located	Changes in ranges and habitats	Reasons for change in abundance of species	
Silurus glanis	☐ Straddling ☒ Transboundary ☐ Introduced ☒ Native	◉ Yes ○ No ○ Not Known	◉ Yes ○ No ○ Not Known	○ Yes ◉ No ○ Not Known	○ Yes ◉ No ○ Not Known	○ Increasing ○ Stable ◉ Fluctuating ○ Decreasing ○ Depleted ○ Not known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Depleted ◉ Not known	☐ Intertital ☐ Coastal in EEZ ☐ High seas ☒ Lake ☒ Reservoir ☒ River ☐ Swamp ☐ Other **(specify)**	○ Increasing ◉ Stable ○ Decreasing ○ Not known	☐ Habitat ☐ Climate ☐ Invasive species ☐ Pollution ☐ Rehabilitation of habitat ☐ Others ☒ Not known	X
Sander lucioperca	☐ Straddling ☒ Transboundary ☐ Introduced ☒ Native	◉ Yes ○ No ○ Not Known	◉ Yes ○ No ○ Not Known	◉ Yes ○ No ○ Not Known	○ Yes ◉ No ○ Not Known	○ Increasing ○ Stable ◉ Fluctuating ○ Decreasing ○ Depleted ○ Not known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Depleted ◉ Not known	☐ Intertital ☐ Coastal in EEZ ☐ High seas ☒ Lake ☒ Reservoir ☒ River ☐ Swamp ☐ Other **(specify)**	○ Increasing ◉ Stable ○ Decreasing ○ Not known	☐ Habitat ☐ Climate ☐ Invasive species ☐ Pollution ☐ Rehabilitation of habitat ☐ Others ☒ Not known	X

Target species, stocks or other management units	Characteristics of species	Capture fisheries	Management measures	Availability of genetic data	Use of genetic data in management	Trends in catches	Future trends in catches	Ecosystem(s) where the fishery is located	Changes in ranges and habitats	Reasons for change in abundance of species	
Esox lucius	☐ Straddling ☒ Transboundary ☐ Introduced ☒ Native	◉ Yes ○ No ○ Not Known	◉ Yes ○ No ○ Not Known	○ Yes ◉ No ○ Not Known	○ Yes ◉ No ○ Not Known	○ Increasing ○ Stable ◉ Fluctuating ○ Decreasing ○ Depleted ○ Not known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Depleted ◉ Not known	☐ Intertital ☐ Coastal in EEZ ☐ High seas ☒ Lake ☒ Reservoir ☒ River ☐ Swamp ☐ Other **(specify)**	○ Increasing ◉ Stable ○ Decreasing ○ Not known	☐ Habitat ☐ Climate ☐ Invasive species ☐ Pollution ☐ Rehabilitation of habitat ☐ Others ☒ Not known	X
Salmo trutta	☐ Straddling ☒ Transboundary ☐ Introduced ☒ Native	◉ Yes ○ No ○ Not Known	◉ Yes ○ No ○ Not Known	◉ Yes ○ No ○ Not Known	◉ Yes ○ No ○ Not Known	○ Increasing ○ Stable ◉ Fluctuating ○ Decreasing ○ Depleted ○ Not known	○ Increasing ○ Stable ◉ Fluctuating ○ Decreasing ○ Depleted ○ Not known	☐ Intertital ☐ Coastal in EEZ ☐ High seas ☐ Lake ☐ Reservoir ☒ River ☐ Swamp ☐ Other **(specify)**	○ Increasing ○ Stable ◉ Decreasing ○ Not known	☐ Habitat ☒ Climate ☐ Invasive species ☐ Pollution ☐ Rehabilitation of habitat ☐ Others ☒ Not known	X

Chapter 2: Drivers and Trends in Aquaculture: Consequences for Aquatic Genetic Resources within National Jurisdiction

The main objective of Chapter 2 is to review the main drivers and trends that are shaping aquaculture and their consequences for aquatic genetic resources.

15. Please indicate the ways the aquatic genetic resources (AqGR) of **farmed aquatic species** have been impacted by the following drivers. Please give examples of positive and negative impacts for specific drivers.

This question refers to drivers impacting farmed aquatic genetic resources, not about impacts on the entire aquaculture sector. Drivers should be seen from a national perspective.

Driver impacting aquaculture	Effect on AqGR ***Mark appropriate box***	Comments ***List examples or other relevant information***
Human population increase	○ Strongly positive ○ Positive ○ Negative ○ Strongly negative ● No effect ○ Unknown	Hungarian population is decreasing without any effect in AqGR of farmed fish species.
Increased wealth and demand for fish	○ Strongly positive ● Positive ○ Negative ○ Strongly negative ○ No effect ○ Unknown	A slight positive effect in fish consumption is observed as a 10-15-year trend.
Governance (ability of government, industry and the public to work together in managing resources)	○ Strongly positive ○ Positive ○ Negative ○ Strongly negative ● No effect ○ Unknown	
Climate change	○ Strongly positive ● Positive ○ Negative ○ Strongly negative ○ No effect ○ Unknown	At the moment longer production seasons result in larger individual weight of fish in pond farms – consequently larger market-size fish. Long-term effects are not known.
Competition for resources, especially freshwater	○ Strongly positive ○ Positive ● Negative ○ Strongly negative ○ No effect ○ Unknown	Shortage of freshwater decreases the quality of produced fish.

Driver impacting aquaculture	Effect on AqGR ***Mark appropriate box***	Comments ***List examples or other relevant information***
Changes in values and ethics of consumers	○ Strongly positive ○ Positive ○ Negative ○ Strongly negative ● No effect ○ Unknown	
Other ***Add other drivers as necessary*** Add Row / Remove Row	○ Strongly positive ○ Positive ○ Negative ○ Strongly negative ○ No effect ○ Unknown	

16. Please indicate the ways the aquatic genetic resources of **wild relatives of farmed aquatic species** in nature have been impacted by the following drivers. Please give examples of positive and negative impacts for specific drivers.

This question refers to drivers impacting wild aquatic genetic resources of farmed species, not about impacts on the entire aquaculture sector. Drivers should be seen from a national perspective.

Driver impacting aquaculture	Effect on AqGR ***Mark appropriate box***	Comments ***List examples or other relevant information***
Human population increase	○ Strongly positive ○ Positive ○ Negative ○ Strongly negative ◉ No effect ○ Unknown	Hungarian population is decreasing, therefore, the increase has no effect.
Increased wealth and demand for fish	○ Strongly positive ○ Positive ◉ Negative ○ Strongly negative ○ No effect ○ Unknown	Replacement of wild spawning fish stocks with farmed ones due to pressure from recreational fishermen.
Governance (ability of government, industry and the public to work together in managing resources)	○ Strongly positive ○ Positive ○ Negative ○ Strongly negative ○ No effect ◉ Unknown	The prohibition of commercial fishing from 2016 may have both positive and negative impacts on the populations of wild fish. Act CII of 2013 has a strong focus on the protection of native fish stocks, which is expected to have positive effects.
Climate change	○ Strongly positive ○ Positive ◉ Negative ○ Strongly negative ○ No effect ○ Unknown	A slightly negative effect is observed in the wild stocks of brown trout, which are losing habitat to cyprinids.
Competition for resources, especially freshwater	○ Strongly positive ○ Positive ◉ Negative ○ Strongly negative ○ No effect ○ Unknown	

Driver impacting aquaculture	Effect on AqGR ***Mark appropriate box***	Comments ***List examples or other relevant information***
Changes in values and ethics of consumers	◯ Strongly positive ◯ Positive ◉ Negative ◯ Strongly negative ◯ No effect ◯ Unknown	The primary effect is that of recreational fishermen. A change in their ethics and values (catch-and-release) can potentially have a positive effect later.
Other ***Add other drivers as necessary*** Add Row / Remove Row	◯ Strongly positive ◯ Positive ◯ Negative ◯ Strongly negative ◯ No effect ◯ Unknown	

17. What countermeasures might be taken to reduce adverse impacts on the aquatic genetic resources that sustain current aquaculture and/or provide for its future development?

Describe countermeasures

- Keeping the European nesting pool of cormorant on optimal level by culling/reducing their population size.
- Improving the current legislation.
- Sustainable intensification: combining intensive-extensive systems, and water efficient production (pond in pond; pond RAS; RAS+constructed wetland; freshwater IMTA).
- Preventing accidental escapes
- Prohibiting the production of non-indigenous species in systems, which are connected to the natural freshwater system.
- Live and cryopreserved gene banking of common carp varieties and other fish species.
- Developing the connection between research and the production.

Biotechnologies

18. To what extent have the following biotechnologies been used in your country for the genetic improvement of farmed aquatic organisms.

Biotechnology	Extent of use	Comments ***main sources of information, important species for which the biotechnology is applied***
Selective breeding	◯ Not at all ◯ To a minor extent ◉ To some extent ◯ To a great extent	Common carp, brown trout
Hybridization	◯ Not at all ◯ To a minor extent ◉ To some extent ◯ To a great extent	Common carp, African catfish
Polyploidy (chromosome set manipulation)	◯ Not at all ◉ To a minor extent ◯ To some extent ◯ To a great extent	Grass carp
Monosex production	◉ Not at all ◯ To a minor extent ◯ To some extent ◯ To a great extent	
Marker assisted selection	◯ Not at all ◉ To a minor extent ◯ To some extent ◯ To a great extent	Brown trout
Gynogenesis/androgenesis	◯ Not at all ◉ To a minor extent ◯ To some extent ◯ To a great extent	Common carp, African catfish All only experimentally
Other **Continue adding row as necessary** Add Row / Remove Row	◯ Not at all ◯ To a minor extent ◯ To some extent ◯ To a great extent	

19. Please indicate the ways aquatic genetic resources of the wild relatives of farmed aquatic species have been impacted by drivers that are changing aquatic ecosystems. Please give countermeasures that might be taken to reduce adverse consequences for the aquatic genetic resources that sustain capture fisheries on wild relatives of farmed species.

Drivers that are changing aquatic ecosystems	Effect on AqGR ***mark appropriate box***	Countermeasures and effects
Habitat loss and degradation	○ Strongly positive ○ Positive ◉ Negative ○ Strongly negative ○ No effect ○ Unknown	In general countermeasures should aim at habitat conservation and restoration, as well as at establishing protected areas. This should include restoration of side arms to improve habitat quality for riverine fish, developing a network of spawning areas along the larger rivers and adjustment of the water level in reservoirs during spawning, supporting longitudinal permeability by functional fish ladders. Sustainable water management should be implemented, taking into consideration the ecological demands. Ex situ protection of native fish populations should be promoted.
Pollution of waters	○ Strongly positive ○ Positive ◉ Negative ○ Strongly negative ○ No effect ○ Unknown	Collapse of industrial activities and large scale using of fertilisers, and the subsequent improvement in water quality have now a positive effect on Hungarian fish assemblages. Further countermeasures should include construction of more wastewater treatment plants in order to further improve water quality. Diffuse pollution (e.g. agricultural pollution, soil erosion) should be further reduced.
Increased frequency of extreme climatic events and long-term climate change	○ Strongly positive ○ Positive ◉ Negative ○ Strongly negative ○ No effect ○ Unknown	Unstable water supply especially in smaller watercourses has a negative effect on local fish populations. Currently no countermeasures are taken. Future countermeasures should include sustainable water management, including maintenance of minimum ecological flow in small streams, water retention outside of the floodplain in reservoirs (supplying water back to the rivers), as well as balancing water use and water retention.
Establishment of invasive species	○ Strongly positive ○ Positive ○ Negative ◉ Strongly negative ○ No effect ○ Unknown	Countermeasures should include: - prohibition of import of non-indigenous species; - enforcing the prohibition of stocking non-indigenous species to natural waters; - in case of production of non-indigenous species at fish farms and/or RAS, their escape should be avoided; - the existing populations of invasive species should be controlled by selective fishing; special attention should be given to selective capture fisheries of silver carp. In some water bodies, 50% of the fish biomass consists of the invasive silver carp. - production of invasive species should be done only in closed systems. The spreading of invasive species can have a significant effect on native fish populations (for example, the effect of Amur sleeper on native fish and amphibians). Since the eradication of these invasive fish is almost impossible, care should be taken to prevent their introduction to and spreading among water bodies. (Reshetnikov, A. N. (2013): Spatio-temporal dynamics of the expansion of rotan Perccottus glenii from West-Ukrainian centre of distribution and consequences for European freshwater ecosystems. Aquatic Invasions 8(2), 193–206.

Drivers that are changing aquatic ecosystems	Effect on AqGR ***mark appropriate box***	Countermeasures and effects
		Kati S., Mozsár A., Arva D., Cozma N. J., Czeglédi I., Antal L., Nagy S. A., Erős T. (2015): Feeding ecology of the invasive Amur sleeper (Perccottus glenii Dybowski, 1877) in Central Europe. International Review of Hydrobiology 100: 116-128.)
Introductions of parasites and pathogens	○ Strongly positive ○ Positive ○ Negative ○ Strongly negative ○ No effect ◉ Unknown	Countermeasures should include the enforcement of the prohibition to release non-indigenous fish species into natural surface waters because of the risk of introducing new pathogens and diseases, e.g. Koi Herpes Virus (KHV) could endanger native carp populations.
Impacts of purposeful stocking and escapes from aquaculture	○ Strongly positive ○ Positive ◉ Negative ○ Strongly negative ○ No effect ○ Unknown	The problem exists in Hungary, although no detailed studies exist to estimate the real effect. Impacts of purposeful stocking could include: illegal stocking and escape of non-indigenous species (grass carp, as well as silver and bighead carps); in addition, stocking of individuals of carp with non-typical genetic background for the given water system spoils the existing indigenous population's genetic pool. A special problem is that purposeful stocking of many farmed species was performed during the entire 20th century, thus, their effect on wild stocks is difficult to assess as almost no pure wild stocks remain. One of the countermeasures could be ecologically based fisheries management in natural freshwater systems.
Capture fisheries	○ Strongly positive ○ Positive ◉ Negative ○ Strongly negative ○ No effect ○ Unknown	The effect of commercial fishing in Hungary has been under debate. Some studies were done on the matter. Under Act CII of 2013, commercial fishing will be banned from 2016 in Hungary, which will create a fully new situation. Angling pressure is expected to continue to increase. Due to its character, angling may result in unbalanced populations in natural waters, which should be balanced by selective fisheries of non-indigenous and invasive fish species. Holders of the fishing rights are expected to be charged with this job. In general, an integrated, ecologically based fisheries management in the natural freshwater system would be important.
Other ***Continue listing other driverst*** Add Row / Remove Row	○ Strongly positive ○ Positive ○ Negative ○ Strongly negative ○ No effect ○ Unknown	

Chapter 3: *In Situ* Conservation of Aquatic Genetic Resources of Farmed Aquatic Species and their wild Relatives within National Jurisdiction

The main objective of Chapter 3 is to review the current status and future prospects for the *in situ* conservation of aquatic genetic resources of farmed aquatic species and their wild relatives within national jurisdiction for food and agriculture.

The specific objectives are as follows:

- To review the current and likely future contributions to *in sit*u conservation of aquatic genetic resources of farmed aquatic species and their wild relatives by those who use them in responsible and well managed capture fisheries, aquaculture, and culture-based fisheries.
- To identify and describe any existing and planned aquatic protected areas that are contributing, or will contribute, to *in situ* conservation of aquatic genetic resources of wild relatives of farmed aquatic species.
- To identify and describe any major existing and planned efforts for the *in situ* conservation of threatened or endangered aquatic genetic resources (farmed and wild).
- To review needs and priorities for the future development of *in situ* conservation of aquatic genetic resources of farmed aquatic species and their wild relatives.

Overview of the current status and future prospects for the *in situ* conservation of aquatic genetic resources of farmed aquatic species and their wild relatives

20. To what extent are responsible and well managed aquaculture and culture-based fisher*ies* contributing to *in situ* conservation of the aquatic genetic resources of farmed aquatic species and their wild relatives.

Please mark appropriate box.

- ○ To a great extent
- ◉ To a limited extent
- ○ Not at all
- ○ Not applicable

Please include any additional information

Currently, culture-based fisheries is underdeveloped in Hungary. Owners of fishing rights are under the obligation to stock the managed fisheries waters according to a fisheries plan approved by the fisheries authority. However, there is no hatchery in Hungary specifically for stocking purposes, and thus, the stocking material is purchased from commercial farms without regard to genetic variability. In addition, the species and age composition of the stocked fish is mostly determined by economic interests, and thus, the composition of the natural fish community, or even the ecological characteristics of the habitat are generally not taken into account. The existing - generally limited and isolated - restocking campaigns of some species (e.g. beluga or burbot) do not have a measurable effect on the status of their stocks. The propagation and rearing technology of several rare and protected species has been developed, but, because of their protected status, they cannot be reared in aquaculture, even for restocking purposes.

Under Act CII of 2013, commercial fishing will be banned from 2016 in Hungary, which will create a fully new situation. Angling pressure is expected to continue to increase. Due to its character, angling may result in unbalanced populations in natural waters, which should be balanced by selective fisheries of non-indigenous and invasive fish species. Holders of the fishing rights are expected to be charged with this job.

21. To what extent are existing facilities contributing to *in situ* conservation of aquatic genetic resources of wild relatives of farmed aquatic species?

Please mark appropriate box.

- ○ To a great extent
- ◉ To a limited extent
- ○ Not at all
- ○ Not applicable

Please include any additional information

Currently, culture-based fisheries is underdeveloped in Hungary. Owners of fishing rights are under the obligation to stock the managed fisheries waters according to a fisheries plan approved by the fisheries authority. However, there is no hatchery in Hungary specifically for stocking purposes, and thus, the stocking material is purchased from commercial farms without regard to genetic variability. In addition, the species and age composition of the stocked fish is mostly determined by economic interests, and thus, the composition of the natural fish community, or even the ecological characteristics of the habitat are generally not taken into account. The existing - generally limited and isolated - restocking campaigns of some species (e.g. beluga or burbot) do not have a measurable effect on the status of their stocks. The propagation and rearing technology of several rare and protected species has been developed, but, because of their protected status, they cannot be reared in aquaculture, even for restocking purposes.

Under Act CII of 2013, commercial fishing will be banned from 2016 in Hungary, which will create a fully new situation. Angling pressure is expected to continue to increase. Due to its character, angling may result in unbalanced populations in natural waters, which should be balanced by selective fisheries of non-indigenous and invasive fish species. Holders of the fishing rights are expected to be charged with this job.

22. Please provide ex*amples* of current or planned activities for the *in situ* conservation of endangered or threatened farmed species and their wild relatives with demonstrated or potential importance for aquaculture, culture-based fisheries, and capture fisheries.

Please describe examples

Endangered or threatened fish species are generally not farmed in Hungary.

23. Please rank (from 1 to 10) the importance of the following objectives for *in situ* conservation of aquatic genetic resources of farmed aquatic species and their wild relatives in your country.

Objectives of *in situ* conservation	Rank 1=Very Important 10=No importance
Preservation of aquatic genetic diversity	1
Maintain good strains for aquaculture production	9
Meet consumer and market demands	9
To help adapt to impacts of climate change	3
Future breed improvement in aquaculture	9
Please continue listing any other objectives as needed	
Add Row / Remove Row	

Review of the *in situ* conservation of aquatic genetic resources of farmed aquatic species and their wild relatives through their use in responsible and well managed aquaculture and culture-based fisheries

24. Is the *in situ* conservation of aquatic genetic resources included in the policy as an objective in the management of aquaculture and/or culture-based fisheries in your country?

Please mark appropriate box

- (●) Yes
- ( ) Not yet, but planned to be included
- ( ) No
- ( ) Unknown

If yes, please give examples

It is included in Act CII of 2013 on fisheries and the protection of fish (Chapter II).
In-situ conservation measures in Hungary include the assignment of protected zones where recreational fishing is not allowed and prohibition of fishing during the spawning season of the most important species. As most of these species are also stocked, it is difficult to assess the impact of these measures on the populations of fish.

25. To what extent are collectors of wild seed and brood stock for aquaculture and culture-based fisheries contributing to the conservation of aquatic genetic resources by maintaining habitats and/or limiting the quantities collected?

Please mark appropriate box

- ( ) To a great extent
- ( ) To a limited extent
- ( ) Not at all
- (●) Not applicable

Please include any additional details

There is a very limited collection of wild seed or broodstock of fish from Hungarian waters. In addition, some wild stocks (e.g. common carp) are of mixed origin (stocked/wild), thus, it is difficult to assess whether wild stocks are in fact wild.

Review of the *in situ* conservation of aquatic genetic resources of farmed aquatic species and their wild relatives through their use in responsible and well managed capture fisheries

26. Is the conservation of aquatic genetic resources of wild relatives of farmed aquatic species included as an objective in the management of any capture fisheries in your country?

Please mark appropriate box

If yes, please give examples

- (●) Yes
- ( ) Not yet, but under development
- ( ) No
- ( ) Unknown

It was included up to 2015. Commercial fishing is banned in Hungary from 2016. The protection of natural fish stocks remains a priority of the fisheries policy, but these resources will be utilized by recreational fishing and angling instead of commercial fishing. Selective fishing for ecological purposes remains an important tool of regulating the natural water fish communities (and the only source of fish to the market in addition to aquaculture).

Review of the *in situ* conservation of aquatic genetic resources of farmed aquatic species and their wild relatives through the establishment and management of aquatic protected areas

27. Please list any aquatic protected areas in your country that are contributing to the *in situ* conservation of aquatic genetic resources of wild relatives of farmed aquatic species and an assessment of effectiveness

Add Row

Aquatic protected area	Effectiveness of conserving Aquatic Genetic Resources	Comments ***provide any additional information***	
National park areas in aquatic habitats	( ) Very effective ( ) Somewhat effective (●) Not effective ( ) Unknown	No special restriction or treatment to protect the aquatic genetic resources of farmed aquatic species	X
NATURA 2000 area in aquatic habitats	( ) Very effective ( ) Somewhat effective (●) Not effective ( ) Unknown	No special restriction or treatment to protect the aquatic genetic resources of farmed aquatic species.	X
Fisheries areas, larger than 200 ha, or longer than 20 km	( ) Very effective (●) Somewhat effective ( ) Not effective ( ) Unknown	All activities in a fisheries area need to be executed in a manner which enables or does not adversely affect the preservation, natural renewal and increase of fish stocks (Act CII of 2013. 7.§) The holder of fisheries rights must protect the fish stocks, communities and the habitat of fish within the fisheries area, assist the natural feeding and reproduction of fish and rescue the stocks of indigenous fish species in case of flooding or if there is a risk of the water-body's drying up (Act CII of 2013. 8.§)	X

Aquatic protected area	Effectiveness of conserving Aquatic Genetic Resources	Comments ***provide any additional information***	
		For the protection of indigenous fish populations, wintering areas and spawning grounds must be marked out in fisheries areas that larger than 200 ha or longer than 20 km (in rivers) (133/2013 MA)	
All surface waters	○ Very effective ◉ Somewhat effective ○ Not effective ○ Unknown	The catching of Acipenser ruthenus is prohibited in all Hungarian surface water under Act CII of 2013	X

Chapter 4: *Ex Situ* Conservation of Aquatic Genetic Resources of Farmed Aquatic Species and their Wild Relatives within National Jurisdiction

The main objective of Chapter 4 is to review the current status and future prospects for the *ex situ* conservation of aquatic genetic resources of farmed aquatic species and their wild relatives.

The specific objectives are:

- To review existing *ex situ* conservation of aquatic genetic resources of farmed aquatic species and their wild relatives in aquaculture facilities, culture collections and gene banks, research facilities, zoos and aquaria;
- To review the contributions that various stakeholders are making to the *ex situ* conservation of aquatic genetic resources of farmed aquatic species and their wild relatives;
- To review needs and priorities for the future development of *ex situ* conservation of aquatic genetic resources of farmed aquatic species and their wild relatives, including any that are threatened or endangered.

Review of existing and planned collections of live breeding individuals of aquatic genetic resources of farmed aquatic species and their wild relatives

28. Please list your country's existing collections of live breeding aquatic organisms that can be considered as contributing to the *ex situ* conservation of aquatic genetic resources. This includes not only collections of species farmed directly for human use, but also collections of live feed organisms (e.g., bacterial flocs, yeasts, microalgae, rotifers and brine shrimp (*Artemia*)).

Add Row

Species (*include information on subspecies or strain in comments if available*)	Type of use ***Please mark all that apply***	Is the species (or subspecies) threatened or endangered for example in the IUCN Red List, CITES Appendices or national lists? ***Please mark appropriate box***	Comments ***Please list any additional information***	
Cyprinus carpio	☒ Direct human consumption ☐ Live feed organism ☐ Other	◉ Yes ○ No ○ Unknown	Seventeen strains in the cryopreserved gene bank (NAIK-HAKI). More the thirty strains are managed by the farmers (NEBIH). Wild forms (Danube and Tisza strains) are vulnerable in IUCN Red List.	X
Acipenser ruthenus	☒ Direct human consumption ☐ Live feed organism ☐ Other	◉ Yes ○ No ○ Unknown	Vulnerable	X
Acipenser gueldenstaedtii	☐ Direct human consumption ☐ Live feed organism ☒ Other	◉ Yes ○ No ○ Unknown	Critically endangered	X

Species (*include information on subspecies or strain in comments if available*)	Type of use ***Please mark all that apply***	Is the species (or subspecies) threatened or endangered for example in the IUCN Red List, CITES Appendices or national lists? ***Please mark appropriate box***	Comments ***Please list any additional information***	
Acipenser stellatus	☐ Direct human consumption ☐ Live feed organism ☒ Other	◉ Yes ○ No ○ Unknown	Critically endangered	X
Acipenser nudiventris	☐ Direct human consumption ☐ Live feed organism ☒ Other	◉ Yes ○ No ○ Unknown	Vulnerable	X
Huso huso	☐ Direct human consumption ☐ Live feed organism ☒ Other	◉ Yes ○ No ○ Unknown	Critically endangered	X
Polyodon spaAcipenser baeriithula	☒ Direct human consumption ☐ Live feed organism ☐ Other	◉ Yes ○ No ○ Unknown	non-indigenous Endangered	X
Polyodon spathula	☒ Direct human consumption ☐ Live feed organism ☐ Other	◉ Yes ○ No ○ Unknown	non-indigenous Vulnerable	X
Acipenser ruthenus marsiglia	☐ Direct human consumption ☐ Live feed organism ☒ Other	○ Yes ◉ No ○ Unknown	non-indigenous	X

Review of existing *ex situ* conservation activities of aquatic genetic resources of farmed aquatic species and their wild relatives *in vitro.*

29. Please list your country's *in vitro* collections and gene banks of the gametes, embryos, tissues, spores and other quiescent forms of farmed aquatic species and their wild relatives , using cryopreservation or other methods of long-term storage. Describe the major examples, identifying the facilities in which the collections are held. Include examples of any such genetic material from your country that is being kept in *in vitro* collections outside your country on behalf of beneficiaries in your country.

Add Row

Species (include information on subspecies or strain if available in comments)	Users and managers ***List all that apply***	Type of *ex-situ* conservation collection *in vitro* ***mark all that apply***	Facilities where collection is located ***mark all that apply***	Comments ***list all breeds, subspecies of the species and any additional information***	
Cyprinus carpio	Managed by NAIK HAKI. Used by farmers.	☒ In vitro collection of gametes ☐ In vitro collextion of embryos ☒ In vitro collection of tissues ☐ Spores ☐ Other	☐ Aquaculture facilities ☒ Research facilities ☐ Universities ☐ Zoos and aquaria ☐ Other	Twenty-one strains in cryopreserved gene bank in NAIK-HAKI.	X

30. Please rank (from 1 – 10) the importance of the following objectives for ex situ conservation of aquatic genetic resources of farmed aquatic species and their wild relatives in your country

Objectives of *ex situ* conservation	Rank 1=Very Important 10=No importance
Preservation of aquatic genetic diversity	3
Maintain good strains for aquaculture production	1
Meet consumer and market demands	7
To help adapt to impacts of climate change	9
Future breed improvement in aquaculture	2
Other ***Continue adding row as necessary***	
Add Row / Remove Row	

Chapter 5: Stakeholders with Interests in Aquatic Genetic Resources of Farmed Aquatic Species and their Wild Relatives within National Jurisdiction

The main objective of Chapter 5 is to provide an overview of the perspectives and needs of the principal stakeholders who have interests in aquatic genetic resources of farmed aquatic species and their wild relatives for food and agriculture. Stakeholder groups can be identified from existing institutional knowledge, from sectoral and sub-sectoral consultations conducted during the country reporting process and where necessary from expert opinions. Gender issues pertaining to the conservation, sustainable use and development of aquatic genetic resources of farmed aquatic species and their wild relatives should be considered, as well as the perspectives and needs of indigenous peoples and local communities.

The specific objectives are:

- To describe the different principal stakeholder groups with interests in aquatic genetic resources of farmed aquatic species and their wild relatives To identify the type(s) of aquatic genetic resources of farmed aquatic species and their wild relatives in which each stakeholder group has interests and why.

- To describe the roles of stakeholder groups and the actions they are taking for the conservation, sustainable use and development of the aquatic genetic resources in which they have interests.

- To describe the further actions that stakeholder groups would like to see taken for the conservation, sustainable use and development of aquatic genetic resources in which they have interests, and the constraints that are hindering those actions, including lack of capacity and perceived threats.

Overview of the principal stakeholder groups who have interests in aquatic genetic resources of farmed aquatic species and their wild relatives

31. Please indicate the principal stakeholder groups who have interests in aquatic genetic resources of farmed aquatic species and their wild relatives including, *inter alia*: fish farmers; fishers in capture fisheries; persons involved in stocking and harvesting in culture-based fisheries; persons employed in postharvest chains; government officials; staff and members of aquaculture associations; managers of aquatic protected areas and others working for the conservation of aquatic ecosystems; researchers; and civil society.

Stakeholders	Role of stakeholder in regards og AqGR ***mark all that apply***		Genetic resource of main interest ***mark all that apply***	Comments ***Please provide any information or explanation of stakeholders' role***
Fish Farmers	☒ Conservation ☐ Production ☐ Feed manufactoring ☒ Breeding ☐ Research	☐ Marketing ☐ Processing ☐ Advocacy ☐ Outreach/Extension ☐ Other (**specify**)	☐ DNA ☒ Stock, breed or variety ☒ Species ☐ Other	
Fishers	☐ Conservation ☐ Production ☐ Feed manufactoring ☐ Breeding ☐ Research	☐ Marketing ☐ Processing ☐ Advocacy ☐ Outreach/Extension ☒ Other (**specify**) Fishermen could contribute to the conservation of valuable fish species with "population-regulating fishing" of non-desirable (e.g. non indigenous) invasive species.	☐ DNA ☒ Stock, breed or variety ☒ Species ☐ Other	

Stakeholders	Role of stakeholder in regards og AqGR ***mark all that apply***	Genetic resource of main interest ***mark all that apply***	Comments ***Please provide any information or explanation of stakeholders' role***
Fish hatchery people	☒ Conservation ☒ Production ☐ Feed manufactoring ☒ Breeding ☐ Research ☐ Marketing ☐ Processing ☐ Advocacy ☐ Outreach/Extension ☐ Other (**specify**)	☐ DNA ☒ Stock, breed or variety ☒ Species ☐ Other	Basically, the same as fish farmers. There are no specialized hatcheries in Hungary that would limit their activity to seed production. Fish farmers generally have their own hatcheries producing their own seed.
People involved in marketing	☐ Conservation ☐ Production ☐ Feed manufactoring ☐ Breeding ☐ Research ☐ Marketing ☐ Processing ☐ Advocacy ☐ Outreach/Extension ☐ Other (**specify**)	☐ DNA ☐ Stock, breed or variety ☒ Species ☐ Other	
Government resource managers	☒ Conservation ☐ Production ☐ Feed manufactoring ☒ Breeding ☒ Research ☐ Marketing ☐ Processing ☒ Advocacy ☒ Outreach/Extension ☐ Other (**specify**)	☐ DNA ☒ Stock, breed or variety ☒ Species ☐ Other	

Stakeholders	Role of stakeholder in regards og AqGR ***mark all that apply***	Genetic resource of main interest ***mark all that apply***	Comments ***Please provide any information or explanation of stakeholders' role***
Fishing or aquaculture associations	☒ Conservation ☐ Production ☐ Feed manufactoring ☒ Breeding ☒ Research ☐ Marketing ☐ Processing ☒ Advocacy ☒ Outreach/Extension ☐ Other (**specify**)	☐ DNA ☐ Stock, breed or variety ☐ Species ☒ Other	
Aquatic protected area managers	☒ Conservation ☐ Production ☐ Feed manufactoring ☐ Breeding ☒ Research ☐ Marketing ☐ Processing ☒ Advocacy ☒ Outreach/Extension ☐ Other (**specify**)	☐ DNA ☒ Stock, breed or variety ☒ Species ☐ Other	
Policy Makers	☒ Conservation ☐ Production ☐ Feed manufactoring ☐ Breeding ☒ Research ☐ Marketing ☐ Processing ☒ Advocacy ☒ Outreach/Extension ☒ Other (**specify**) Creating laws and regulations aiming sustainable development and conservation of AGR.	☐ DNA ☐ Stock, breed or variety ☐ Species ☒ Other	

Stakeholders	Role of stakeholder in regards og AqGR ***mark all that apply***	Genetic resource of main interest ***mark all that apply***	Comments ***Please provide any information or explanation of stakeholders' role***
Non-Governmental Organizations	☒ Conservation ☐ Production ☐ Feed manufactoring ☐ Breeding ☒ Research ☐ Marketing ☐ Processing ☒ Advocacy ☒ Outreach/Extension ☐ Other (**specify**)	☐ DNA ☒ Stock, breed or variety ☒ Species ☐ Other	
Intergovernmental Organizations	☒ Conservation ☐ Production ☐ Feed manufactoring ☐ Breeding ☒ Research ☐ Marketing ☐ Processing ☒ Advocacy ☒ Outreach/Extension ☐ Other (**specify**)	☐ DNA ☐ Stock, breed or variety ☐ Species ☒ Other	
Donors	☒ Conservation ☐ Production ☐ Feed manufactoring ☐ Breeding ☒ Research ☐ Marketing ☐ Processing ☒ Advocacy ☒ Outreach/Extension ☒ Other (**specify**) Supporting areas not covered by national sources.	☐ DNA ☐ Stock, breed or variety ☐ Species ☒ Other	

Stakeholders	Role of stakeholder in regards og AqGR ***mark all that apply***	Genetic resource of main interest ***mark all that apply***	Comments ***Please provide any information or explanation of stakeholders' role***
Consumers	☐ Conservation ☐ Production ☐ Feed manufactoring ☐ Breeding ☐ Research ☐ Marketing ☐ Processing ☐ Advocacy ☐ Outreach/Extension ☐ Other (**specify**)	☐ DNA ☐ Stock, breed or variety ☐ Species ☐ Other	

a) Please indicate the most important role of women in regards to AqGR

Fisheries and aquaculture is a hard profession with lot of physical work, therefore women are rarely involved/employed in these sectors. Fish processing plants tend to hire mainly women (90% of total employment of the fish processing sector), but also in other areas, such as sorting of harvested fish or stripping of fishes, the women's role (expertise) is dominant. Women also play a role in the marketing activities. They are also employed in administrative positions as well as in hatcheries and in research.

b) Please indicate the most important role of indigenous and local communities in regards to AqGR

During the annual harvest the local population (in some places especially the local minority) takes part in the work. Local communities are employed in a significantly greater amount for guarding, protecting and maintenance works (e.g. mowing) of fish ponds. Local marketing and gastronomical trainings and events also involve local communities.

Chapter 6: National Policies and Legislation for Aquatic Genetic Resources of Farmed Aquatic Species and their Wild Relatives within National Jurisdiction

The main objective of Chapter 6 is to review the status and adequacy of national policies and legislation concerning aquatic genetic resources of farmed aquatic species and their wild relatives including access and benefit sharing.

The specific objectives are as follows:

- To describe the existing national policy and legal framework for the conservation, sustainable use and development of aquatic genetic resources of farmed aquatic species and their wild relatives.
- To review current national policies and instruments for access to aquatic genetic resources of farmed aquatic species and their wild relatives and the fair and equitable sharing of benefits arising from their utilization.
- To identify any significant gaps in policies and legislation concerning aquatic genetic resources of farmed aquatic species and their wild relatives..

Review of national policies and legislation for Aquatic Genetic Resources of farmed aquatic species and their wild relatives within national jurisdiction

32. Please list national legislation, policies and/or mechanisms that address aquatic genetic resources of farmed species and their wild relatives (see question 47 regarding international agreements).

Add Row

National legislation, policy and/or mechanism	Date established	Scope ***Select all that apply***	Comments ***Please provide any additional information for example whether it has been effective or not; and main sources of information***	
Act CII of 2013 on fisheries and the protection of fish	Dec. 29. 2013	☐ Genes or molecules only ☒ Aquaculture ☒ Capture fisheries ☐ Conservation ☐ Intellectual property protection ☐ Importation ☒ Trade and commerce ☐ Access and benefit sharing ☐ Other	Under constant development based on the experiences. The latest amendment has been adopted in December 2015.	X
Decree of the Minister of Agriculture No. VM 133/2013. (XII.29.) on setting some rules of fisheries and fish protection	Dec. 29 .2013	☐ Genes or molecules only ☐ Aquaculture ☒ Capture fisheries ☒ Conservation ☐ Intellectual property protection ☐ Importation ☐ Trade and commerce ☐ Access and benefit sharing ☐ Other	Under constant development based on the experiences. The latest amendment has been adopted in 2015.	X

National legislation, policy and/or mechanism	Date established	Scope ***Select all that apply***	Comments ***Please provide any additional information for example whether it has been effective or not; and main sources of information***	
Act LIII of 1996 on nature conservation	Jul. 03 .1996	☐ Genes or molecules only ☐ Aquaculture ☐ Capture fisheries ☒ Conservation ☐ Intellectual property protection ☐ Importation ☐ Trade and commerce ☐ Access and benefit sharing ☐ Other	Declares the importance of biodiversity for the maintenance of fish populations and states that fishing should not jeopardize the survival of natural stocks. Bans the release of non-indigenous fish species into natural waters.	X
Government Decree No. 314/2014. (XII. 12.) on fisheries and fish protection fines	Dec. 12 .2014	☐ Genes or molecules only ☐ Aquaculture ☐ Capture fisheries ☒ Conservation ☐ Intellectual property protection ☐ Importation ☐ Trade and commerce ☐ Access and benefit sharing ☐ Other		X
Act XLVI on the food chain and its control	Sept. 01 .2008	☐ Genes or molecules only ☐ Aquaculture ☐ Capture fisheries ☐ Conservation ☐ Intellectual property protection ☒ Importation ☒ Trade and commerce ☐ Access and benefit sharing ☐ Other	Determines the tasks and responsibilities (including fisheries-related) of the National Food Chain Safety Office (NFCSO).	X
Decree No. 34 of 2011 (IV.28.) of the Ministry of Rural Development regarding the operation of fish hatchery plants and offering and marketing of breeding fish and fish breeding materials	Apr. 28 .2011	☐ Genes or molecules only ☒ Aquaculture ☐ Capture fisheries ☐ Conservation ☐ Intellectual property protection ☐ Importation ☒ Trade and commerce ☐ Access and benefit sharing ☐ Other		X

National legislation, policy and/or mechanism	Date established	Scope ***Select all that apply***	Comments ***Please provide any additional information for example whether it has been effective or not; and main sources of information***	
Decree No. 127 of 2008 (IX. 29.) FVM of the Ministry of Agriculture and Rural Development on animal health requirements for aquaculture animals and products, and on the prevention and control of certain diseases in aquatic animals	Sept. 29 .2008	☐ Genes or molecules only ☒ Aquaculture ☐ Capture fisheries ☐ Conservation ☐ Intellectual property protection ☐ Importation ☐ Trade and commerce ☐ Access and benefit sharing ☐ Other		X
Act No. VIII. of 2014 publishing the Nagoya Protocol on Access to Genetic Resources and their Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity	Feb. 11 .2014	☐ Genes or molecules only ☐ Aquaculture ☐ Capture fisheries ☐ Conservation ☐ Intellectual property protection ☐ Importation ☐ Trade and commerce ☒ Access and benefit sharing ☐ Other		X
Multiannual National Strategic Plan for Aquaculture of Hungary	Jun. 23 .2015	☐ Genes or molecules only ☒ Aquaculture ☐ Capture fisheries ☐ Conservation ☐ Intellectual property protection ☐ Importation ☐ Trade and commerce ☐ Access and benefit sharing ☐ Other		X
Decree of the Minister of Environmental Protection and Water Management No. KvVM 24/2008. (X. 8.) on the exploitation of protected sturgeon species	Oct. 08 .2008	☐ Genes or molecules only ☒ Aquaculture ☐ Capture fisheries ☒ Conservation ☐ Intellectual property protection ☐ Importation ☐ Trade and commerce ☐ Access and benefit sharing ☐ Other		X

National legislation, policy and/or mechanism	Date established	Scope ***Select all that apply***	Comments ***Please provide any additional information for example whether it has been effective or not; and main sources of information***	
Decree of the Minister of Environment No. KöM 13/2001. (V. 9.) on protected and strictly protected plant and animal species, strictly protected caves, and the publishing of the list of plant and animal species of nature conservation importance in the European Community	May.09 .2001	☐ Genes or molecules only ☐ Aquaculture ☐ Capture fisheries ☒ Conservation ☐ Intellectual property protection ☐ Importation ☐ Trade and commerce ☐ Access and benefit sharing ☐ Other		X
Government Decree 348/2006. (XII. 23.) on the detailed rules of conservation, keeping, exploitation and presentation of protected animal species	Dec. 23 .2006	☐ Genes or molecules only ☐ Aquaculture ☐ Capture fisheries ☒ Conservation ☐ Intellectual property protection ☐ Importation ☐ Trade and commerce ☐ Access and benefit sharing ☐ Other		X

Review of the current status and gaps in national policies and legislation for the conservation, sustainable use and development of aquatic genetic resources of farmed aquatic species and their wild relatives

33. Please list any gaps in the coverage or constraints in implementing national legislation, policies and/or mechanisms in regard to aquatic genetic resources.

Translocation and introduction of fish between water basins is uncontrolled. Care should be taken to introduce fish from within the same basin, whenever possible, or from the closest possible site (i.e. from a population with the most similar genetic structure). These issues are expected to be regulated in an implementing regulation of Act CII of 2013 on fisheries and the protection of fish regulating the rules of conducting aquaculture activities, but it is still under development.

34. Please indicate any national aquatic genetic resources of farmed aquatic species and their wild relatives for which your country restricts access.

Type of genetic resource (can be species name, DNA, gametes or other descriptor)	Comments ***Please, provide verifiable main sources of information, effectiveness of the restriction, description of type of restriction and for whom does the restriction apply***
DNA	
Stock, breed or variety	
Species	-Act CII of 2013 on fisheries and the protection of fish does not allow issuing commercial fishing licences on fisheries waters of Hungary from 1 January 2016. Fish catching in natural waters will be possible only in the frame of recreational fishing, angling, selective fishing for ecological purposes, as well as for scientific purposes. Act CII of 2013 on fisheries and the protection of fish and the Decree of the Minister of Agriculture No. VM 133/2013. (XII.29.) on setting some rules of fisheries and fish protection limit the movement of alien and locally absent species among fisheries waters and between fisheries waters and fish production facilities. The Decree of the Minister of Environment No. KöM 13/2001. (V. 9.) defines the list of protected plant and animal species (including aquatic species) whose catching or other exploitation is prohibited.
Other	
Continue adding row as necessary	
Add Row / Remove Row	

35. Over the past 10 years, indicate the actions your country has taken to maintain or enhance access to aquatic genetic resources of farmed aquatic species and their wild relatives located outside your country; for example, by establishing germplasm acquisition agreements or material transfer agreements.

Add Row

Action taken to enhance access to aquatic genetic resources outside your country	Type of genetic resource ***Mark all that apply***	Comment ***for example other types of genetic resources***	
Not applicable	☐ DNA ☐ Genes ☐ Gametes ☐ Tissues ☐ Embryos ☐ Living specimens		X

36. Please indicate any obstacles your country has encountered when trying to access aquatic genetic resources of farmed aquatic species and their wild relatives outside of your country (including access for research purposes).

Obstacles to accessing aquatic genetic resources	Please describe type of genetic resource ***mark all that apply***	Comments ***please include additional information as needed***
Intellectual property protection	☐ DNA ☐ Stock, breed or variety ☒ Species ☐ Other	
National laws of your country	☐ DNA ☒ Stock, breed or variety ☒ Species ☐ Other	-The valid legislation requires the permission of the National Food Chain Safety Office for the imports of live fish or aquatic animals, which may be a lengthy and complicated procedure.
National laws of donor country	☐ DNA ☐ Stock, breed or variety ☒ Species ☐ Other	
Internationl laws or protocols	☐ DNA ☒ Stock, breed or variety ☒ Species ☐ Other	
Too expensive	☐ DNA ☒ Stock, breed or variety ☒ Species ☐ Other	
Material transfer agreements required	☐ DNA ☒ Stock, breed or variety ☒ Species ☐ Other	
Knowledge gaps	☐ DNA ☒ Stock, breed or variety ☒ Species ☐ Other	
Public perception	☐ DNA ☐ Stock, breed or variety ☒ Species ☐ Other	

Obstacles to accessing aquatic genetic resources	Please describe type of genetic resource ***mark all that apply***	Comments ***please include additional information as needed***
Other **Continue adding row as necessary** Add Row / Remove Row	☐ DNA ☐ Stock, breed or variety ☐ Species ☐ Other	

Chapter 7: Research, Education, Training and Extension on Aquatic Genetic Resources within National Jurisdiction: Coordination, Networking and Information

The main objective of Chapter 7 is to review the status and adequacy of national research, education, training and extension, coordination and networking arrangements and information systems that support the conservation, sustainable use and development of aquatic genetic resources of farmed aquatic species and their wild relatives for food and agriculture.

The specific objectives are:

- To describe the current status, future plans, gaps, needs and priorities for research, training, extension and education on the conservation, sustainable use and development of aquatic genetic resources of farmed aquatic species and their wild relatives
- To describe existing or planned national networks for the conservation, sustainable use and development of aquatic genetic resources of farmed aquatic species and their wild relatives.
- To describe existing or planned information systems for the conservation, sustainable use and development of aquatic genetic resources of farmed aquatic species and their wild relatives.

Research

37. Does your national research programme support the conservation, sustainable use and development of aquatic genetic resources of farmed aquatic species and their wild relatives? If yes, give details of current and/or planned research; if no, explain the main reasons why not in box below.

Please mark appropriate box

- (●) Yes
- ( ) No
- ( ) Unknown

Please provide details

Recently, conservation of genetic resources of farmed animals, including fish, in form of live and cryopreserved genebanks, has been prioritised and partly financed.
Particular research activities depend on priorities of competitive research funds (e.g. the National Science Fund or funds provided by the Ministry of Agriculture).
- Completed research projects covered the genetic basis of disease resistance in common carp (NAIK-HAKI), as well as phylogenetic origin and genetic structure of wild trout (Salmo trutta) populations (Szent István University).
- Planned research includes comparison of the genetic structure of farmed carps and their wild relatives, as well as study of the effect of fragmentation (i.e. barriers) on the genetic structure of wild fish populations.

38. Please list main institutions, organizations, corporations and other entities in your country that are engaged in field and/or laboratory research related to the conservation, sustainable use and development of aquatic genetic resources of farmed aquatic species and their wild relatives.

Add Row

Main institutions, organizations, corporations and other entities	Area of research ***Mark all that apply***	Comments ***Please provide any additional information***	
National Agricultural Research and Innovation Center (NARIC) - Research Institute for Fisheries and Aquaculture (HAKI)	☒ Genetic resource management ☒ Basic knowledge on aquatic genetic resources ☒ Characterization and monitoring of aquatic genetic resources ☒ Genetic improvement ☐ Economic valuation of aquatic genetic resources ☒ Conservation of aquatic genetic resources ☒ Communication on aquatic genetic resources ☒ Access and distribution of aquatic genetic resources ☐ Other		X
National Park Directorates (10 National Parks)	☐ Genetic resource management ☒ Basic knowledge on aquatic genetic resources ☒ Characterization and monitoring of aquatic genetic resources ☐ Genetic improvement ☐ Economic valuation of aquatic genetic resources ☒ Conservation of aquatic genetic resources ☐ Communication on aquatic genetic resources ☒ Access and distribution of aquatic genetic resources ☐ Other		X

Main institutions, organizations, corporations and other entities	Area of research ***Mark all that apply***	Comments ***Please provide any additional information***	
Department of Aquaculture, Szent István University	☒ Genetic resource management ☒ Basic knowledge on aquatic genetic resources ☒ Characterization and monitoring of aquatic genetic resources ☒ Genetic improvement ☐ Economic valuation of aquatic genetic resources ☒ Conservation of aquatic genetic resources ☒ Communication on aquatic genetic resources ☐ Access and distribution of aquatic genetic resources ☐ Other		X
Hungarian Academy of Sciences (MTA) Centre for Ecological Research	☐ Genetic resource management ☒ Basic knowledge on aquatic genetic resources ☒ Characterization and monitoring of aquatic genetic resources ☐ Genetic improvement ☐ Economic valuation of aquatic genetic resources ☒ Conservation of aquatic genetic resources ☐ Communication on aquatic genetic resources ☐ Access and distribution of aquatic genetic resources ☐ Other		X

39. What capacity strengthening is needed to improve national research in support of the conservation, sustainable use and development of aquatic genetic resources of farmed aquatic species and their wild relatives?

Please rank the following in regard to capacity strengthening.

Capacities	Rank 1=Very Important 10=No importance
Improve basic knowledge on aquatic genetic resources	7
Improve capacities for characterization and monitoring of aquatic genetic resources	5
Improve capacities for genetic improvement	3
Improve capacities for genetic resource management	2
Improve capacities for economic valuation of aquatic genetic resources	5
Improve capacities for conservation of aquatic genetic resources	2
Improve communication on aquatic genetic resources	6
Improve access to and distribution of aquatic genetic resources	5
Add other rows as appropriate and rank Development of accessible database and improvement of data collection Add Row / Remove Row	1

Please describe any other capacity building needs in regards to aquatic genetic resources

Education, training and extension

40. Please indicate the extent that education, training and extension in your country covers the conservation, sustainable use and development of aquatic genetic resources of farmed aquatic species and their wild relatives? List the main institutions involved and the types of courses offered.

Add Row

Institution	Thematic Area	Type of courses **mark all that apply**	Comments	
Department of Aquaculture, Szent István University	Genetic resource management	☐ Undergraduate ☒ Post-graduate ☒ Training ☐ Extension		
	Characterization and monitoring of aquatic genetic resources	☐ Undergraduate ☒ Post-graduate ☐ Training ☐ Extension		
	Genetic improvement	☐ Undergraduate ☒ Post-graduate ☐ Training ☐ Extension		X
	Economic valuation of aquatic genetic resources	☐ Undergraduate ☒ Post-graduate ☐ Training ☐ Extension		
	Conservation of aquatic genetic resources	☒ Undergraduate ☒ Post-graduate ☐ Training ☒ Extension		

Eötvös Loránd University, Budapest	Genetic resource management	☐ Undergraduate ☐ Post-graduate ☐ Training ☐ Extension		
	Characterization and monitoring of aquatic genetic resources	☒ Undergraduate ☒ Post-graduate ☐ Training ☐ Extension	General knowledge on molecular methods, including the characterization of genetic resources, but not specifically for aquatic organisms	
	Genetic improvement	☐ Undergraduate ☐ Post-graduate ☐ Training ☐ Extension		X
	Economic valuation of aquatic genetic resources	☐ Undergraduate ☐ Post-graduate ☐ Training ☐ Extension		
	Conservation of aquatic genetic resources	☐ Undergraduate ☐ Post-graduate ☐ Training ☐ Extension		
Debrecen University	Genetic resource management	☐ Undergraduate ☐ Post-graduate ☐ Training ☐ Extension		
	Characterization and monitoring of aquatic genetic resources	☒ Undergraduate ☒ Post-graduate ☐ Training ☐ Extension	General knowledge on molecular methods, including the characterization of genetic resources, but not specifically for aquatic organisms	
	Genetic improvement	☐ Undergraduate ☐ Post-graduate ☐ Training ☐ Extension		X
	Economic valuation of aquatic genetic resources	☐ Undergraduate ☐ Post-graduate ☐ Training ☐ Extension		
	Conservation of aquatic genetic resources	☐ Undergraduate ☐ Post-graduate ☐ Training ☐ Extension		

Pannon Egyetem, Veszprém, Georgikon Faculty, Keszthely	Genetic resource management	☒ Undergraduate ☒ Post-graduate ☐ Training ☐ Extension		
	Characterization and monitoring of aquatic genetic resources	☐ Undergraduate ☐ Post-graduate ☐ Training ☐ Extension		
	Genetic improvement	☒ Undergraduate ☒ Post-graduate ☐ Training ☐ Extension		X
	Economic valuation of aquatic genetic resources	☐ Undergraduate ☐ Post-graduate ☐ Training ☐ Extension		
	Conservation of aquatic genetic resources	☒ Undergraduate ☒ Post-graduate ☐ Training ☐ Extension		

Coordination and networking

41. Please list any mechanisms within your country responsible for coordinating the aquaculture, culture-based fisheries and capture fisheries subsectors with the other sectors that use watersheds and coastal ecosystems and have impacts on aquatic genetic resources of wild relatives of farmed aquatic species (e.g., agriculture, forestry, mining, tourism, waste management and water resources).

If no mechanism exists check here: ☐

Add Row

Name of mechanism	Description of how mechanism operates	
High level coordination between involved ministries.	Sectors that use watersheds and have impacts on aquatic genetic resources of wild relatives of farmed aquatic species are managed by different ministries, like fisheries, agriculture and forestry by the Ministry of Agriculture, tourism by the Ministry of National Economy, waste management and water resources by the Ministry of Interior, the management of EU operational programmes (including the Fisheries OP) by the Prime Minister's Office. Coordination between them takes place at governmental level.	X

42. Please indicate how capacity strengthening can be improved in intersectoral coordination in support of the conservation, sustainable use and development of aquatic genetic resources.

Please rank the following in regards to capacity strengthening.

Capacities	Rank 1=Very Important 10=No importance
Increase awareness in institutions	2
Increase technical capacities of institutions	2
Increase information sharing between institutions	1
Add other rows as appropriate and rank Add Row Remove Row	

Please specify in box below

43. Please list any national networks in your country or any international networks your country belongs to that support the conservation, sustainable use and development of aquatic genetic resources.

Add Row

Network	Objectives of the network ***Please mark all that apply*** to your country	Comments	
COST Action FA1205 AQUAGAMETE	☐ Improve basic knowledge on aquatic genetic resources ☐ Improve capacities for characterization and monitoring of aquatic genetic resources ☒ Improve capacities for genetic improvement ☐ Improve capacities for economic valuation of aquatic genetic resources ☒ Improve capacities for conservation of aquatic genetic resources ☒ Improve communication on aquatic genetic resources ☐ Improve access to and distribution of aquatic genetic resources		X
Network of Aquaculture Centers in Central and Eastern Europe (NACEE)	☒ Improve basic knowledge on aquatic genetic resources ☐ Improve capacities for characterization and monitoring of aquatic genetic resources ☒ Improve capacities for genetic improvement ☐ Improve capacities for economic valuation of aquatic genetic resources ☐ Improve capacities for conservation of aquatic genetic resources ☒ Improve communication on aquatic genetic resources ☒ Improve access to and distribution of aquatic genetic resources		X

Network	Objectives of the network ***Please mark all that appl***y to your country	Comments	
Network of Aquaculture Centers in Asia-Pacific (NACA)	☒ Improve basic knowledge on aquatic genetic resources ☐ Improve capacities for characterization and monitoring of aquatic genetic resources ☒ Improve capacities for genetic improvement ☐ Improve capacities for economic valuation of aquatic genetic resources ☐ Improve capacities for conservation of aquatic genetic resources ☒ Improve communication on aquatic genetic resources ☒ Improve access to and distribution of aquatic genetic resources		X

Information systems

44. Please list any information systems existing in your country for receiving, managing and communicating information about the conservation, sustainable use and development of aquatic genetic resources of farmed aquatic species and their wild relatives.

Add Row

Name of information system	Type of information stored ***mark all that apply***	Main stakeholders ***mark all that apply***	
ASIR - Information System of Agricultural Statistics, Research Institute of Agricultural Economics (AKI)	☐ DNA sequence ☐ Genes and genotype ☒ Breeds, strains or stocks ☐ Species names ☒ Production figures ☒ Distribution ☐ Level of endangerment ☒ Other	☒ Fish farmers ☐ Fishers in capture fisheries ☒ Fish hatchery people ☐ People involved in marketing ☒ Government resource managers ☒ Fishing or aquaculture associations ☒ Aquatic protected area managers ☒ University and academic people ☒ Non-Governmental Organizations ☒ Intergovernmental Organizations ☒ Policy makers ☐ Donors ☐ Consumers ☐ Politicians **Please list other stakeholders as necessary**	X

Name of information system	Type of information stored ***mark all that apply***	Main stakeholders ***mark all that apply***	
National Fisheries Database - NFD (Országos Halászati Adattár) - Managed by NAIK-HAKI until December 31, 2014. - Managed by the National Food Chain Safety Office (NFCSO) from January 1, 2015.	☐ DNA sequence ☐ Genes and genotype ☐ Breeds, strains or stocks ☒ Species names ☒ Production figures ☒ Distribution ☐ Level of endangerment ☐ Other	☒ Fish farmers ☒ Fishers in capture fisheries ☒ Fish hatchery people ☐ People involved in marketing ☒ Government resource managers ☒ Fishing or aquaculture associations ☒ Aquatic protected area managers ☒ University and academic people ☒ Non-Governmental Organizations ☐ Intergovernmental Organizations ☒ Policy makers ☐ Donors ☐ Consumers ☒ Politicians **Please list other stakeholders as necessary**	X

45. What capacity strengthening is needed to improve national information systems to support the conservation, sustainable use and development of aquatic genetic resources?

Please describe what capacities need to be strengthened

- On-line access to the two major databases (ASIR and NFD)
- Harmonisation of their data collection and improving the data quality
- Funding possibilities, research possibilities and the will from the side of the fisheries and conservation management to support the conservation of aquatic genetic resources.
- Better cooperation between the production sector and research/education institutions.

Please describe any other capacity building needs in regards to information systems for aquatic genetic resources

Chapter 8: International Collaboration on Aquatic Genetic Resources of Farmed Aquatic Species and Their Wild Relatives

The main objective of Chapter 8 is to review the mechanisms and instruments through which your country participates in international collaborations on aquatic genetic resources of farmed aquatic species and their wild relatives.

The specific objectives are:

- To identify your country's current participation in bilateral, sub-regional, regional, other international and global forms of collaboration on aquatic genetic resources. List national memberships, status as a Party and other forms of affiliation in agreements, conventions, treaties, international organizations, international networks and international programmes.
- To identify any other forms of international collaboration on aquatic genetic resources.
- To review the benefits from existing forms of international collaboration on aquatic genetic resources.
- To identify needs and priorities for future international collaboration on aquatic genetic resources

International collaboration includes bilateral arrangements and the sharing of particular waters and stocks of wild relatives of farmed aquatic species.

International, regional or sub-regional agreements, conventions and treaties concerning aquatic genetic resources of farmed aquatic species and their wild relatives

46. Please list the international, regional or sub-regional agreements your country subscribes to that cover aquatic genetic resources of farmed species and their wild relatives, such as the Nagoya Protocol[2] the Convention on Biological Diversity and the Cartagena Protocol and how they have impacted aquatic genetic resources and stakeholders in your country. Examples could include:

[2] http://www.cbd.int/abs/nagoya-protocol/signatories/

- Establishment and management of shared or networked aquatic protected areas as far as wild relatives of farmed aquatic species are concerned
- Aquaculture and culture-based fisheries in transboundary or shared water bodies
- Sharing aquatic genetic material and related information
- Fishing rights, seasons and quotas as far as wild relatives of farmed aquatic species are concerned
- Conservation and sustainable use of shared water bodies and watercourses as far as wild relatives of farmed aquatic species are concerned
- Quarantine procedures for aquatic organisms and for control and notification of aquatic diseases

Add Row

International, Regional, bilateral or Sub-Regional agreement	Year your country ratified or subscribed to the agreement	Impact on aquatic genetic resources	Impact on stakeholders	Comments	
Nagoya Protocol2	2014-04-29 Ratification	○ Strongly positive ○ Positive ○ Negative ○ Strongly negative ◉ No effect	○ Strongly positive ○ Positive ○ Negative ○ Strongly negative ◉ No effect		X

International, Regional, bilateral or Sub-Regional agreement	Year your country ratified or subscribed to the agreement	Impact on aquatic genetic resources	Impact on stakeholders	Comments	
Convention on Biological Diversity	1994-02-24 Ratification	○ Strongly positive ○ Positive ○ Negative ○ Strongly negative ◉ No effect	○ Strongly positive ○ Positive ○ Negative ○ Strongly negative ◉ No effect	Not known	X
Cartagena Protocol	2004-01-13 Ratified	○ Strongly positive ○ Positive ○ Negative ○ Strongly negative ◉ No effect	○ Strongly positive ○ Positive ○ Negative ○ Strongly negative ◉ No effect	Not known	X

47. Please list the priority needs regarding collaboration on conservation and sustainable use of aquatic genetic resources of farmed aquatic species and their wild relatives. Are they being addressed, i.e. are there any critical gaps?

Collaboration is needed in order to ...	Rank 1=Very Important 10=No importance	To what extent are the needs being met	Comments ***For example any critical gaps***
Improve information technology and database management	1	○ To a great extent ● To some extent ○ None ○ Unknown	
Improve basic knowledge on aquatic genetic resources	3	○ To a great extent ● To some extent ○ None ○ Unknown	
Improve capacities for characterization and monitoring of aquatic genetic resources	2	○ To a great extent ● To some extent ○ None ○ Unknown	
Improve capacities for genetic improvement	2	○ To a great extent ● To some extent ○ None ○ Unknown	
Improve capacities for economic valuation of aquatic genetic resources	4	○ To a great extent ● To some extent ○ None ○ Unknown	
Improve capacities for conservation of aquatic genetic resources	2	○ To a great extent ● To some extent ○ None ○ Unknown	
Improve communication on aquatic genetic resources	6	○ To a great extent ○ To some extent ○ None ● Unknown	

Collaboration is needed in order to ...	Rank 1=Very Important 10=No importance	To what extent are the needs being met	Comments ***For example any critical gaps***
To improve access to and distribution of aquatic genetic resources	2	○ To a great extent ◉ To some extent ○ None ○ Unknown	
Other **Continue adding row as necessary** Add Row / Remove Row		○ To a great extent ○ To some extent ○ None ○ Unknown	

48. Please describe the types of collaboration that have been most beneficial for your country, and why?

Exchange of genetic material of farmed fish with cooperating countries, which made possible the diversification of the production.
Exchange of information and expertise with partners from neighboring countries (Czech Republic, Poland, Croatia, Serbia, Slovenia, Romania).
Joint research projects, like EUROCARP, which resulted in disease resistant strains of carp.

49. Is there a need for your country to expand its collaboration concerning the conservation, sustainable use and development of aquatic genetic resources? If yes, give details, including any requirements for capacity strengthening in box below

- (•) Yes
- ( ) No

If yes, please give details

Collaboration is needed for an improved culture and conservation of sturgeon species. Joint research projects would be the most effective form.

50. Describe important roles that your country performs within its region (and/or sub-region) and globally in terms of being a keeper, user and sharer of aquatic genetic resources.

Hungary has a live and cryopreserved gene bank of common carp that is unique in Central Europe. This genebank was used for restoration of some lost carp strains in the region. This collection is open to further exchange and joint R and D activities.

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