

<b>FISHERY COUNTRY PROFILE</b>	<b>Food and Agriculture Organization of the United Nations</b>	<b>FID/CP/CZE</b>
<b>PROFIL DE LA PÊCHE PAR PAYS</b>	<b>Organisation des Nations Unies pour l'alimentation et l'agriculture</b>	 June 2005
<b>RESUMEN INFORMATIVO SOBRE LA PESCA POR PAISES</b>	<b>Organización de las Naciones Unidas para la Agricultura y la Alimentación</b>	

## THE CZECH REPUBLIC

### FISHERY SECTOR STRUCTURE

#### Overall fishery sector

Czech Republic is a land-locked country, straddling the watershed of three seas: the North Sea (the Elbe River), the Black Sea (the Morava River as a tributary of the Danube River) and the Baltic Sea (the Odra River). There are 36 000 ha (76 000 km) of running waters in the Czech Republic. There are few natural lakes, mostly small waterbodies at high elevation, with little significance for fisheries.

There are 107 dams and the reservoirs have a total water area of 27 000 ha and a volume of  $(3\ 517 \times 10^6 \text{ m}^3)$ . Fishery management of the reservoirs focuses on recreational fishing and its role for commercial fisheries is negligible. Angling is the only legal form of recreational fishing, but, commercially, it is very important, with some 330 000 anglers.

Between 1993 and 1995, all state-controlled fish production enterprises in the Czech Republic were privatized. From the original 20 large production enterprises, about 40 large companies and several small farms were formed. In 1991, a majority of the large- and medium-sized fish farms joined national anglers' unions, fish farming equipment producers, research institutes, fishery schools and other fishery institutions to form the Czech Fish Farmers Association. Today the association has 60 members. The association is a member of FEAP, manages 80 percent of the national pond area and produces about 85 percent of the fish on the Czech market.

Although generally not well known, ornamental fish (koi carp, goldfish, garden-pond fish and tropical aquarium fish species) have a very significant place in total aquaculture production of the Czech Republic. Based on production figures, the Czech Republic is the fourth largest world producer and exporter of freshwater ornamental and aquarium fish.

#### INLAND SUBSECTOR

##### Catch profile

There is no significant catch fishery. There is only one small fishing group licensed for catch fishery, based at the Vestonice reservoir, but its contribution to total Czech fishery production is negligible.

## Fishing area

The Vestonice reservoir (1 000 ha, in South Moravia) is the only area available for catch fishing, with a total catch of 52 tonnes in 2003.

## Catch fishing gear

Electro-shock fishing gear is used at the Vestonice reservoir.

## Main resources

The Vestonice reservoir's fish stock consists mainly of naturally spawning fish like bream, roach, perch and other coarse fish species. In addition, the waters are regularly stocked, including with common carp, European catfish, *Silurus glanis*), pike, asp, silver carp and pikeperch, *Sanda lucioperca*.

## Fisheries Management

At the Vestonice reservoir there is no closed season nor any total allowable catch limit. This is because the majority of fish caught include coarse fish (bream in particular) that serves for re-stocking purposes. The greater part of the reservoir is a closed area as it is a nature reserve.

## RECREATIONAL SUBSECTOR

### Catch profile

Angling is the only legal form of recreational fishing in the Czech Republic. The Czech Anglers Union and The Moravian Anglers Union together have more than 330 000 members. Angling is also possible in private still waterbodies (all running waters are public property). Angling effort focuses mainly on common carp, followed by bream, coarse fish, salmonids and predators (see Table 1).

**Table 1. Comparison of angling preference and bag in 2003**

Fish species or group	Angling effort (% of anglers' preference)	Bag proportion (% of total bag)	Anglers' bag (tonnes)
Common carp	33.66	78.45	3 909
Common bream	20.46	4.88	243
Perch	10.68	0.60	30
Coarse fish	8.48	4.92	245
Brown trout	7.41	1.00	50
Rainbow trout	6.41	0.88	44
Grayling	2.46	0.26	13
Pike	3.24	3.45	172
Pikeperch	2.19	2.89	144
Other	5.01	2.67	133

## Fishing areas

Recreational fishing is widespread countrywide, and concentrated on reservoirs, rivers and various artificial waterbodies (gravel pits, surface mining pits, etc.).

## Fishing methods

Recreational fishing is controlled by the Fishery Law and Angling Rules, which specify the angling methods allowed and catch limits (e.g. fish bag, size restrictions, etc.). Some additional restrictions may apply to certain angling grounds and waterbodies.

## Main resources

Common carp is the most popular fish for anglers. This stocked fish come either from the production units that belong to the angling unions, or from aquaculture producers. The majority of coarse and riverine re-stocked fish species (barb, *Chondrostoma nasus*, Vimba vimba, chub, etc.) are usually produced by the angling organizations themselves. The same applies to brown trout and grayling, whilst rainbow trout and brook trout for stocking purposes are mostly purchased from commercial trout farms. Predatory fish are either raised by the angling organizations or purchased from commercial aquaculture facilities.

## Fishing management system

The fishing management system is set by the Fishery Law and Angling Rules. Both official acts specify the principles and methods of input and output control for each region and for each angling organization (club).

## Fisher communities

Anglers are organized into two angling unions: Czech Angling Union and Moravian Angling Union. The unions consist of regional associations with a primary structure formed by angling organizations (clubs).

## Aquaculture subsector

In general, aquaculture production in the Czech Republic is characterized by extensive and semi-intensive fish farming in ponds, and has a very long and reputable tradition.

Nowadays, of the 52 000 ha available, 41 000 ha are used for fish production. Production averages around 450 kg/ha, with individual farms ranging between 200 and 800 kg/ha.

Currently, annual fish production fluctuates between 19 000 and 20 000 tonnes. Common carp is the main fish produced (88 percent); other fish produced include grass carp, silver carp, tench, whitefish and predators like pike, pikeperch, European catfish and perch.

About 25–30 percent of carp culture uses active feeding. An overwhelming majority of carp production is based on natural food – zooplankton and zoobenthos. Wheat and barley are the basis for pellet mixtures, but represent only 10 percent of feed used in ponds. Recently, the use of manure has been restricted due to enormous eutrophication (algal blooms caused by high nutrient concentrations). Nowadays, organic manure is applied only in very small amounts and lime is commonly used to counter negative effects.

Polyculture stocks are an important aspect of pond farming in the Czech Republic. Chinese carps (grass carp, bighead and silver carp), together with traditional supplemental fish (tench) and predatory species (pike, pikeperch), (European catfish and perch), are all produced in ponds.

Salmonids are intensively raised in raceways, canals, earthen ponds and cages, but form a minor part of total aquaculture production, at about 700 tonnes/year of rainbow and brook trout. Several facilities, utilizing waste heat and recycling systems, support intensive fish culture. Production of coarse and game fish for angling purposes and production of ornamental and aquarium fish for hobby purposes are highly developed and efficient, meeting the high market demands.

## **POST-HARVEST USE**

### **Fish utilization**

Live fish (carp in particular) are the most important product of Czech aquaculture, because carp is a traditional Czech dish. In past years, domestic consumption of carp has increased moderately but steadily. This increase may be related to the ecological farming approach. Since 1990, live fish sold on the local market has ranged from 8 000 to 9 000 tonnes, with a maximum of 9 900 tonnes in 1992 and a minimum of 7 500 tonnes in 1998. A high proportion of natural foods, extensive production and the practice of holding harvested fish in flow-through storage ponds have brought Czech carp a reputation as a quality product, in both domestic and external markets. Most fish are sold live (2–3 kg) in the Christmas and Easter seasons, but carp is increasingly being offered to the domestic market in processed form. Fish processing is performed in 14 facilities. Ten of them are eligible for export into EU countries. There are also about 25 smaller processing units that only work at full capacity in December to meet the seasonal demand for fish products at Christmas. Products include frozen, chilled, smoked and marinated fish. The proportion of exported and home-sold processed fish is 8–10 percent. As well as freshwater fish processing, the facilities also process marine species. The trend is towards more consumption of processed fish, although that brings technical problems and less profitability for the processing facilities, as well as problems rising from increased competition in supermarket chains.

### **Fish markets**

The Czech Republic is the largest exporter of carp in Europe, where 40–50 percent of exports go to the German market and another 20 percent to the Slovakian market. Around half of fish production is consumed domestically. Domestically processed fish is being exported in only small quantities, because only a few of the leading processing facilities meet EU standards. The trade mark "Czech carp" has been developed to support the marketing of carp.

## **FISHERY SECTOR PERFORMANCE**

### **Economic role of fisheries in the national economy**

The role of fisheries in the Czech national economy is rather marginal. However, due to Czech history, tradition and environmental aspects, fisheries have an established position in the country.

### **Demand**

In the early 1990s, over 85 percent of production was consumed nationally. Currently, demand for freshwater fish covers approximately half of domestic fish production. Demand for marine products is considerably higher than demand for freshwater fish.

### **Supply**

The dominant suppliers of freshwater fish are local sources. Only a small part (notably salmon) of freshwater fish products is imported.

## **Trade**

Since 1998, total imports have been about 30 000 tonnes/year, whilst exports have averaged around 10 000 tonnes/year (9 300 t in 1999; 12 400 t in 2001). The balance of foreign trade in freshwater fish is permanently positive, whilst the total value of fish trade (freshwater and marine fish) is negative, attributable to the high demand for marine fish, which is of course all imported, mainly as processed fish products. Traditionally, common carp is the major category in exports.

## **Food security**

In general, HACCP is applied to all fish production systems.

## **Employment**

Currently, there are more than 2 000 employees in the fisheries sector, mostly involved in the primary sector.

## **Rural development**

Pond farming in lowlands and trout culture at high altitudes play an important social role in maintaining fish populations in their native habitats. However, this is currently of minor significance.

## **FISHERY DEVELOPMENT SECTOR**

### **Constraints**

Environmental regulations severely constrain opportunities for some intensive and even semi-intensive culture systems (i.e. fertilizers and feeds cannot be used without special permission in grow-out ponds). The majority of ponds are heavily silted up with flushed soil particles deposited in thick sediments, considerably reducing pond production capacity and contributing to overgrowing of the littoral zone with water macrophytes. The only solution for this problem is the consistent removal of excessive mud layers, but this is extremely costly and unrealistic without a state subsidy.

Predators are considered an important threat to pond farming and recreational fishing. Currently, the losses caused by predators are estimated at € 13 million/year, with otters, cormorants, grey herons and mink taking about 35, 50, 10 and 5 percent, respectively.

The market image of carp is quite poor, and carp consumption, apart from the traditional Christmas season, is low. It also fails to attract younger consumers. The sector is vulnerable to imports of cheaper fish from both neighbouring European countries and Southeast Asia.

### **Development prospects and strategies**

The future development of Czech fish production should be focused on strengthening the domestic market. Attention should be directed towards production of coarse fish for stocking and re-stocking purposes. Hobby ponds for angling should offer new environmentally friendly agrotourism opportunities.

Possible further developments of the fisheries sector in the Czech Republic include:

- introduction of highly intensive recycling systems, particularly at the hatchery and nursery stages;
- investment in modernizing processing plants with the aim of satisfying demand for

processed fish and creating value-added fish products;

- greater market focus, such as encouraging organic and eco-labelled products;
- better product quality control, including eliminating off-flavours;
- diversification of processing techniques, such as smoking fish (carp); and
- appropriate marketing strategy.

## RESEARCH

### **Research Institute of Fish Culture and Hydrobiology Vodnany**

University of South Bohemia, Ceske Budejovice

- Development of new technologies for breeding economically important species of fish and crayfish threatened by environmental degradation.
- Harmonization with EU norms in application of the principles of pharmacovigilancy in aquaculture in the Czech Republic.
- Detail study of sperm and model species of Chondrostei and Teleostei fish.
- Study of the biology of invasive spiny cheek crayfish (*Orconectes limosus* Raf.) under laboratory conditions.
- The influence of mass selection of common carp (*Cyprinus carpio* L.) upon progeny prosperity, using molecular genetics methods.
- The development of fish production utilizing innovative aquaculture techniques and their integration with pond cultures.
- Protection of common carp (*Cyprinus carpio* L.) stocks from koi herpesvirus diseases (KHV).

### **Institute of Vertebrate Biology**

Czech Academy of Sciences, Brno

- Biological principles of the rehabilitation of natural character, functions and biodiversity of riverine ecosystems of the rivers Dyje and Morava.
- Molecular and other genetic markers applied in conservation of populations of endangered, rare and vanishing fish species in the Czech Republic.
- Characteristics and genetic differences among populations and species of genus *Gobio* and *Romanogobio* – contributions to description of their biodiversity.
- Standards of ichthyocoenoses and biotic integrity of streams in relation to the “health” of river systems in the Czech Republic.
- Ecological parameters of the stone loach (*Barbatula barbatula*) as determinants of its metazoan parasite communities.
- Spatial and temporal distribution of 0+ juvenile fish in a floodplain river system.
- Genetic and population variability of two model fish groups with unisexual-bisexual

reproduction: diploid-polyplloid complex of loaches (*genus Cobitis*) and tetraploid-hexaploid complex of Prussian carp (*genus Carassius*).

- Occurrence and biological consequences of hermaphroditism in the barbel, *Barbus barbus*.
- A multidisciplinary study of larval stages (metacestodes) of tapeworms parasitic on freshwater fishes.
- Diversity of parasites of early stages of fish development under conditions of fragmented habitats.

## **Hydrobiological Institute**

Czech Academy of Sciences, Ceske Budejovice

- Structure, functioning and development of aquatic ecosystems.
- Limnological basis of suitable management of reservoirs.
- Sinusoidal foraging and the role of fish in reservoirs.
- Mechanism of coexistence of *Daphnia* species and clones in a stratified reservoir with planktivorous fish predation.

## **Department of Hydrobotany**

Institute of Botany, Czech Academy of Sciences, Trebon

- Projects related to fisheries and aquaculture, with a focus on consequences of algal and cyanobacterial development in pond farming.

## **EDUCATION**

The Czech education system covers the whole range of fisheries-related education, from vocational training to university doctoral studies.

The Fisheries Vocational Training School at Trebon provides vocational training aimed at basic fish farming skills and manual fish handling skills.

The Fisheries College and the Water Management and Ecology College are at Vodnany. The Fisheries College focuses on education in pond management, fish breeding, intensive aquaculture technologies, etc., whilst education targets at the Water Management and Ecology College cover water management practices and hydro-ecological issues.

University-level studies of fisheries are provided by the University of South Bohemia in Ceske Budejovice and by Mendel´s University of Agriculture and Forestry in Brno.

Graduates gain an MSc. degree in Fisheries and Zootechnology, specializing in fisheries or agriculture. Both universities also provide PhD study facilities in topics related to fisheries.

The Research Institute of Fish Culture and Hydrobiology at Vodnany, which is a part of the University of South Bohemia, has been accredited for doctoral studies in fisheries, including accepting foreign students.

## **FOREIGN AID**

The PERCATECH project is supported by the 6FP CRAFT Programme Securing juvenile

production of Eurasian perch by improving reproduction and larval rearing. It focuses on stabilization of perch (*Perca fluviatilis*) juvenile production by combining intensive farming indoor technologies and recycling systems with traditional pond culture. The project is being implemented in the Research Institute of Fish Culture and Hydrobiology, and has a planned duration of three years (2004–2006).

The CSN-INTRAN project Creating supporting network for international transfer of innovative technologies in European aquaculture deals with international cooperation in aquaculture networking, workshop organization, study visits, etc. The Czech part of the project is coordinated by the Research Institute of Fish Culture and Hydrobiology, and planned project duration is 2002–2005.

By the end of 2006, the Czech fisheries sector should benefit from modernizing and expanding existing fish farming sites and should switch to more environmentally-friendly production techniques. Investment are also planned for processing facilities and marketing in order to expand the range of processed products and thus increase choice in the retail sector.

## **FISHERY SECTOR INSTITUTIONS**

Former state farms were part of State Fishery Enterprises in Ceske Budejovice. In 1991, they were transformed into the Fish Farmers Association. It now has 63 corporate members, including fish farmers, processing industry, trade, angling unions, educational and research institutions, and represents 85 percent of the total fish production industry.

The largest Czech fish pond farming companies operate in South Bohemia, where more than 70 percent of the Czech pond area is situated. Four production companies (Rybarstvi Trebon a.s., Rybnikarstvi Hluboka a.s., Rybarstvi Tabor a.s. and Ceske rybarstvi s.r.o.), who have merged to form the Fishery Group Trebon, have a 35 percent share of Czech carp production. Their sales of live and processed freshwater fish have been through two subsidiary companies Fish Market a.s. and Fish Food a.s., respectively. The main domestic customers are supermarket chains and restaurants.

## **Internet links**

Fish Farmers Association Ceske Budejovice: <http://www.rybsdr.fishnet.cz> /  
e-mail: RYBSDR@pvt.net.cz

## **Major producers**

Rybarstvi Trebon a.s. [http://www.rybarstvi.cz/](http://www.rybarstvi.cz)  
Rybnikarstvi Pohorelice a.s. <http://www.rybnikarstvi-pohorelice.cz/>  
Blatenska ryba s.r.o., Blatna <http://web.quick.cz/blatenska.ryba/>  
Rybarstvi Hluboka a.s. <http://hluboka.rybarstvi.cz/>  
Rybarstvi Tabor a.s. <http://tabor.rybarstvi.cz/>  
Klatovske rybarstvi a.s., Klatovy <http://www.klatryb.cz/>  
Ceske rybarstvi s.r.o., Marianske Lazne <http://www.rybml.cz/>

## **Research institutions**

University of South Bohemia, Research Institute of Fish Culture and Hydrobiology Vodnany: <http://www.vurh.jcu.cz/>

Institute of Vertebrate Biology, Academy of Sciences of the Czech Republic, Brno: <http://www.ivb.cz/>

## **GENERAL LEGAL FRAMEWORKS**

Law on Agriculture, No. 252/1997

Law on Veterinary Care, No. 166/1999

Law on Commercial Animal Breeding, No. 154/2000

Act on Commercial Animal Breeding, No. 471/2000

Law on Animal Welfare, No. 246/1992

Act on Animal Slaughtering, No. 245/1996

Law on Water, No. 254/2001

Law on Gamekeeping, No. 449/2001

Law on Foodstuffs, No. 306/2000

Law on Fisheries, No. 99/2004

Law on Environment, No. 17/1992

Law on Nature and Landscape Protection, No. 114/1992

Act on Water Environment and Loading Limits, No. 61/2003