

## FISHERY COUNTRY PROFILE: THE REPUBLIC OF COLOMBIA

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### GENERAL ECONOMIC DATA

Land area	1 141 748 km <sup>2</sup>
Territorial waters	880 376 km <sup>2</sup>
Continental shelf (Atlantic & Pacific)	48 365 km <sup>2</sup>
Length of Atlantic coastline	1 760 km
Length of Pacific coastline	1 480 km
Total length of rivers	20 000 km
Surface area of swamps & lakes	700 000 ha

National population (2002)	43 834 000 persons
GDP 2002 (at constant 1994 prices)	<b>US\$ 82.2 thousand million</b>
<i>Per capita</i> GNI, Atlas method (current US\$)	<b>US\$ 1 820</b>
Exchange rate (31 July 2003)	<b>US\$ 1 = Col \$ 2.880</b>

### FISHERIES DATA

## Balance of production (2001)

	Production	Imports	Exports	Total supply	Per caput supply
	Tonnes live weight equivalent				Kg/annum
Fish for direct human consumption	190 000	94 437	95 479	191 042	4.5
Fish for animal feed & other purposes	27 736.25	0.00	33 426.13	61 162.38	
Live fish (ornamental & for breeding purposes)	122.00	120.90	0.00	122.00	

Number employed in primary sector (2001)	88 000 persons
• <i>Small-scale fishing in the Atlantic</i>	<i>12 500 persons</i>
• <i>Small-scale fishing in the Pacific</i>	<i>13 500 persons</i>
• <i>Inland fisheries</i>	<i>40 000 persons</i>
• <i>Rural aquaculture</i>	<i>22 000 persons</i>
Number employed in secondary sector (2001)	33 185 persons
• <i>In processing plants</i>	<i>18 500 persons</i>
• <i>In the Atlantic &amp; Pacific fleets</i>	<i>9 985 persons</i>
• <i>In commercial shrimp culture</i>	<i>1 900 persons</i>
• <i>In commercial fish culture</i>	<i>2 800 persons</i>

## STRUCTURE OF THE FISHERIES AND AQUACULTURE SECTOR

Colombia's industrial fisheries take place in the Atlantic and Pacific Oceans, whilst its small-scale fishing takes place along both coastlines and in inland waters (rivers, lakes, lagoons, reservoirs and channels). Fresh and marine water aquaculture began in the eighties and both have since grown significantly. Sport fishing in marine and inland waters is not very important in economic terms.

## Marine industrial fisheries

Colombia's marine fisheries are characterised by a wide variety of resources, but catches of each are small. However, these resources have a high commercial value and are in demand on the international market. From the fifties to the eighties, the industry based on shallow-water shrimp grew significantly. However, by the mid-eighties, as it became clear that shrimp was in crisis, tuna fishing, today's most important commercial activity, reached its peak.

Most marine fishery products are exported, but a small proportion is consumed in the country. The main species targeted in both the Pacific and Atlantic are tuna, shallow and deep-water shrimp, white fish (snapper, grouper and wreckfish), small pelagic species (Pacific anchovy and Atlantic thread herring), crayfish and conch. Catches of other oceanic species such as dolphinfish and giant squid have recently increased.

Tuna, more specifically yellow fin (*Thunnus albacares*) and skipjack (*Katsuwonus pelamis*), are caught mainly within the limits of the Exclusive Economic Zone (EEZ) in the Eastern Pacific. The vessels, with a hold capacity in excess of 400 tonnes, carry observers from the Inter-American Tropical Tuna Commission (CIAT), of which Colombia is not a member, but an observer. However, Colombia does belong to the International Review Panel for the Conservation of Tuna and Dolphin in the Eastern Pacific. Since 2000, there has been a gradual increase in catches of dolphinfish and, to a lesser degree, giant squid, by the tuna and white fish fleet in Pacific waters.

Although shallow-water shrimp has been over-fished since the eighties, it still accounts for 30 per cent and 95 per cent of the industrial fleet's catches in the Pacific and Atlantic respectively. In the Pacific, the deep-water shrimp and thread herring, used in the production of fishmeal and fish oil, are fished on a sustainable basis.

White fish includes species that inhabit rocky bottoms (snappers, groupers and wreckfish), sharks (already showing signs of over-fishing), horse mackerel, swordfish and marlin. Most of the wet fish and fresh fillets are packed in ice for export, while frozen fillets and whole fish go to the domestic market.

In 2001, the licensed fishing fleet, registered with the National Fishery and Aquaculture Institute (INPA), the body responsible until June 2003 for implementing fishery and aquaculture policy, comprised 591 motor vessels used for the following fisheries:

Fishery	Pacific Ocean	Atlantic Ocean
Tuna	68	88
Oceanic pelagics	2	0
Shallow-water shrimp	70	70
Deep-water shrimp	36	0
White fish	180	46

Small pelagics	11	0
Crayfish - Conch	0	20
<b>Total</b>	<b>367 (62%)</b>	<b>224 (38%)</b>

Source: INPA 2001

### Small-scale marine fisheries

The Atlantic and Pacific coastal communities use wooden or fibreglass boats fitted with outboard motors of 15, 40 or 75 HP, and oars or sails, depending on their economic circumstances and the species targeted. These include shallow-water shrimps, tuna, snapper, "corvina" (*Plagiosion auratus*), dolphinfish, "sierra", "picuda", shark, "piangua", clam, crayfish and conch.

Most small-scale fishermen make day trips with two or three crew because they operate within five nautical miles of the coast. Fishermen who have motor vessels, which allow them a greater range, and navigation systems such as GPS and echo sounders undertake trips of one to two weeks with 10 to 15 crewmembers. Their catches are larger and more valuable and are often sold to the processing plants, thereby increasing industrial production. The fishing gear used are seine nets ("chinchorros"), gillnets and casting nets for white fish and shrimp; longlines and hand lines also for white fish; and traps and baskets for crayfish, conch and other fish and crustaceans.

Depending on their range and target species, the fishermen have different ways of keeping catches fresh: ice boxes or banana leaves for fish, crustaceans and molluscs, and synthetic or natural fibre sacks for crayfish, swimming crabs and other live crustaceans. The products are marketed fresh, whole or gutted, dry-salted or smoked. Shrimps and swimming crabs are usually pre-cooked.

With regard to marketing, the products are distributed through the unions and cooperatives to their members, whereas those who work independently sell their catches to middlemen with whom they have special arrangements and to industrial producers. It is usual to find up to six middlemen in the chain. However, this depends on the products, their destination and the distance between the fishing zone and the selling or processing points. Prices may increase by between 50 percent and 120 percent between the fishermen and consumers, but the fishermen are often not aware of these increases and do not benefit from them.

### Inland fisheries

Inland fisheries take place in the rivers of the Magdalena, Orinoco and Amazon catchment areas. Most fishermen alternate fishing with other jobs, e.g. in agriculture, trade and building construction. This ensures that the household economy is diversified, as formal job opportunities are few and far between.

Inland fishing was an important source of income, food security and local development until the mid-eighties when the main fisheries began to collapse due to the contamination of the water sources and deforestation, especially in the Magdalena river basin. Fresh water

fishing has since then continued to decline, but at a slower pace, due to the effects of medium and long-term management measures currently being implemented.

As is the case in small-scale marine fisheries, prices in inland fisheries are affected by the number of middlemen involved in the marketing chain. One of the factors responsible for this is the fishermen's isolation from the marketing and service centres, especially in the Orinoco and Amazon basins.

## **Sport fishing**

This activity is not significant for the national or regional economy, but is important in social and recreational terms for low, medium and high-income earners alike. Since catches in this sub-sector are small, the fishery authorities do not record statistical data and management plans have not been drawn up for this fishery.

A number of recognised sport fishing events take place in Colombia, including the international marine sport fishing competitions held every year in Solano Bay (Pacific coast) and the competitions organised from time to time in Cartagena (Atlantic coast). In inland waters, two competitions are held every year in the Meta River (Orinoco basin) and another five in the Magdalena basin on the Magdalena and Cauca rivers (the latter being the main tributary of the Magdalena).

In addition to the above events, sport fishing is done in the reservoirs and in some rivers, for which the national fishery authorities issue annual permits. Permits are also needed for the specific events or competitions held in the country.

## **Aquaculture**

Commercially produced species in inland water aquaculture are red and white tilapias (*Oreochromis spp.*), rainbow trout (*Oncorhynchus mykiss*), "cachamas" (*Piaractus brachypomus* and *Colossoma macropomum*), and, on a smaller scale, "bocachico" (*Prochilodus magdalenae*), carp (*Cyprinus carpio*) and "yamu" (*Brycon spp.*). Research into the culture of native species such as "bagre rayado" (*Pseudoplatystoma fasciatum*) and "capaz" (*Pimelodus grosskopfii*) has progressed in the past three years.

The most important species in marine aquaculture is white shrimp (*Penaeus vannamei*), which has also been subjected to trials in fresh water. The technology for mangrove cupped oyster (*Crassostrea rhizophorae*) farming in the Caribbean has been developed and work on spotted rose snapper (*Lutjanus guttatus*) and mutton snapper (*Lutjanus analis*) is going ahead. This development is reflected in the rise of aquaculture's share of total fishery production. This share stood at three per cent in the mid-eighties but had risen to 20 per cent in 2001. Farmed fish products are mainly intended for the domestic market and are produced on both a commercial and a small scale. Shrimp is produced on a commercial scale, with more than 95 per cent of the output exported to Europe (mainly Spain, Italy and France), the United States and Japan.

Because Colombia has various relatively constant temperature zones, climates and microclimates throughout the year, fresh water fish farming is carried out throughout the country, but especially in the Andean region. Shrimp farming takes place on the Atlantic and Pacific coasts, although the Pacific coast activity has declined in the past three years due to the presence of pathogens such as white spot. However, given Colombia's progress

in genetic improvement and the study of diseases, the seed is obtained in a closed cycle and surpluses are produced for export to Central American countries.

Colombia's main competitors in the farmed shrimp market are Ecuador and China. Despite the excellent quality of the seed produced, Colombia's efforts are hampered by the high cost of feed concentrate, the risk of new diseases due to the high sensitivity of shrimp, and changes in public order, which affect this activity's environment. The high cost of feed concentrate and the presence of rebel groups also hinder the development of fresh water fish culture.

## **USE OF THE CATCHES**

Eighty five per cent of Colombia's fishery products are intended for human consumption and 14.5 per cent for industrial use in the production of feeds and other products. The remaining 0.5 per cent is made up of ornamental fish and seed for aquaculture. Most of these products are intended for export, as their commercial value is high. The domestic market accounts for 65 per cent of national production, with 35 per cent coming from imports.

## **Markets to which fishery products are exported**

Colombia's main markets are the United States, Japan, some EU countries (Italy, Spain, France, Germany, Belgium, the UK and Portugal), and some Latin American countries (Mexico, Panama, Costa Rica, El Salvador and Puerto Rico). Exports include tuna (whole and in loins), farmed and wild shrimp, crayfish, conch, snapper, swimming crab, farmed rainbow trout, ornamental fish, shrimp seed and fish for aquaculture.

Imports include high value added fish and shellfish, canned tuna and sardines, and processed sub-products such as fishmeal, which is made into feed and which accounts for 30 to 40 percent of imports. The main supplying countries are Ecuador, Peru, Venezuela, Chile, the United States, Spain and Puerto Rico.

## **THE PERFORMANCE OF THE FISHERY AND AQUACULTURE SECTOR**

Fisheries and aquaculture have a significant impact on the people and regions involved and, consequently, help to meet national objectives by providing income, jobs, food security and regional development, despite the difficulties facing both the country and the activities.

## **Fisheries' economic role in the national economy**

The Colombian economy is sustained by coffee, oil, and coal production, manufacturing, various agricultural and mining products, construction and trade. In 2001, the agricultural sector accounted for 14 per cent of national production, of which fisheries and aquaculture accounted for 3.86 per cent.

These Gross Domestic Product data for the agricultural sector and the fisheries sub-sector show that fisheries and aquaculture do not play a very significant role in terms of national wealth generation. However, their impact is considerable in that they generate employment

and income for those involved in the activities, provide food security and promote regional and local development.

## **Demand**

Demand varies widely depending on the region, economic group and consumer habits. The high and medium-high income groups prefer shellfish, marine fish, high value added imported products and aquaculture products. The medium and low-income groups tend toward river fish, farmed and canned fish (canned tuna and sardines). Demand is also affected by the season, increasing during Lent (March and April) and, to a lesser degree, during the Christmas and New Year period.

Fishery products have gradually grown in importance and popularity as consumers have become more aware of their nutritional quality, urged on by health workers' recommendations to include these products in their diets. However, there are still some problems to be overcome. For instance, consumers feel that fishery products are expensive, know little about the variety of products available, preparation methods other than frying, stewing or baking, and keeping the product fresh. They are also put off by the presence of bones and the smell during preparation.

Despite these drawbacks, Colombia's fishery product market has expanded with the rise in national production and imports. It is thought that demand is limited by supply and that the domestic market could gradually absorb potential increases in demand, especially for good quality fish and shellfish to meet the requirements of households, restaurants and hotels.

## **Consumption**

The largest consumers of fishery products are the people who live close to inland waterways, on the coasts, in the aquaculture areas and in the major towns (Bogotá, Calí, Medellín, Cartagena, Baranquilla, Bucaramanga and Villavicencio). These products are not often consumed in other regions due to irregular and/or inadequate supplies, their relatively high price compared with that of meat products (beef, chicken and pork) and the lack of promotional campaigns.

The majority of consumers are those aged between 4 to 65 years, which account for 84 per cent of the population. Of these, the largest consumers are those aged between 31-50 years, 19-30 years and 10-18 years age brackets, accounting for 31, 24 and 21 per cent of the population respectively. The products showing the sharpest rise in consumption are farmed tilapia, trout and "cachama", some marine and inland species, such as snapper, "bocachico" and catfish, and local and imported canned tuna and sardines.

Official figures show a gradual rise in per caput consumption from 3.8 kg/annum in 1993 to 6.5 kg/annum in 1998. Although consumption in 2001 was 4.5 kg/annum, this decline may be explained by the difficulties experienced by INPA in obtaining these data, and not by changes in consumers' preferences. In fact, there was an increase in trade in fishery products, especially in supermarkets.

## **Trade**

A wide variety of national and imported products are available but not all consumers are aware of this as, with the exception of canned tuna, advertising for this type of product is virtually non-existent. Supply involves a chain of middlemen, which varies depending on the products and the use for which they are intended.

The wholesale market is supplied directly by the producers, by middlemen who assemble products in the ports, and by imports. These markets are usually located in the marketplaces in the towns and supply the retailers. Traders who have processing plants are also to be found among the wholesalers.

Retailers supply the consumers. They include small shops in the marketplaces, fishmongers' shops, supermarkets and travelling fish sellers. Supermarkets and hypermarkets now account for a growing share of this market. They are located in various parts of the towns, offer a wide range of high-quality products, good prices and customer services, thereby generating consumer loyalty and encouraging consumption. Other important marketing channels are restaurants, hotels, clubs and institutions (hospitals, schools, the armed forces and company canteens) whose menus now offer a wider variety of fish products.

## **Food security**

Small-scale fishermen and rural aquaculturists themselves consume the products that do not sell, either because they are not commercially attractive or do not meet size or quality requirements. Fish and meat from their own regions and products such as rice, cassava, potatoes and bananas are the main foods in their daily diet.

With regard to the rural population's food security, in June 2003, there were 375,000 persons who had been displaced as a result of violence and who were extremely vulnerable in nutritional terms. The National Government, therefore, signed a three-year agreement for US\$ 48 million with the World Food Programme (WFP) to feed those most affected (children, the elderly, women heads of household, pregnant women and nursing mothers, indigenous peoples and Afro-Colombians), in Bogotá and in the departments of Cundinamarca, Chocó, Antioquia, Santander, North Santander, Bolívar, Magdalena, La Guajira, Cesar, Atlántico, Sucre and Córdoba. This project may, in future be extended to other regions.

Consumers have a good range of fishery products available to them at various prices in the markets and the potential exists for an even greater supply of both national and imported products.

## **Employment**

Industrial fisheries generate employment in processing plants, marketing enterprises and with the fleet fishing for tuna, shallow-water and deep-water shrimp, white fish, conch, crayfish, small pelagics, as well as with vessels with multi-purpose licences. These job opportunities exist mainly in Cartagena, San Andrés, Buenaventura, Tumaco, Bahía Solano, Medellín, Calí and Bogotá. An estimated 28,485 jobs were available in these activities in 2001. Thirty per cent of these jobs were on the payroll and 70 per cent involved piecework in the processing plants.

Commercial and rural fish farming take place mainly in the departments of Valle, Huila, Antioquia, Meta, Tolima, Cundinamarca, Santander, Cauca and Córdoba. Shrimp farming



takes place in Sucre, Córdoba, Bolívar and Nariño, where staff is employed in seed production farms and laboratories. Processing is carried out in the processing plants in Cartagena (Bolívar) and Tumaco (Nariño). In short, aquaculture provides about 26,700 jobs. Jobs in small-scale marine and inland water fishing are more difficult to quantify given that declining catches and changing socio-economic conditions have meant that most fishermen combine fishing with work in agriculture, mining, trade and the building sector. However, in 2001 estimates put the number of jobs in this sector at 66,000.

## **Rural development**

In the towns and ports with processing plants and fish product marketing enterprises, and in the rural areas where aquaculture takes place, there has been an increase in the number of suppliers and jobs both in the sector and in related activities.

In recent years, there has been some degree of development in public services, such as electricity, telephones and water, in fishing villages close to the major ports, but the same is not true of the more marginalised communities. Because of the marked seasonal variability of fish stocks and because catches of the most important species are small, fishing is not a permanent activity for most fishermen. There has also been an increase in the number of rebel groups in the communities – a situation which impacts upon the design and implementation of management measures and on fishery and aquaculture development generally.

## **TRENDS IN THE FISHERY AND AQUACULTURE SECTOR**

The shallow-water marine shrimp fishery is in decline, but the tuna fishery continues to be the mainstay of the industry. Development prospects are good for white fish and other promising resources such as snapper, giant squid and other deep-sea species, which is why the small-scale fishery will have to modernise in order to access new commercial species.

Aquaculture continues to progress, as exemplified by improvements in seed quality for species such as shrimp, tilapia, trout and “cachama” and the introduction in marine aquaculture of new resources of high economic value such as snapper and mangrove cupped oyster. The culture of ornamental species, highly appreciated on the international market, is another important item with a bright future, which Colombia is well placed to exploit.

The downward trend in inland fisheries is continuing, mainly in the Magdalena basin where, although decline has slowed to some extent, over-fishing has affected important resources such as “bocachico” (*Prochilodus magdalenae*), catfish and “nicuro” – a situation further aggravated by environmental problems. Stocks in the Orinoco and Amazon basins do not appear to have been affected in the same way and, except for large catfish and ornamentals for which management measures have been taken, their use is sustainable.

## **FISHERIES AND AQUACULTURE DEVELOPMENT**

Despite some continuing technological and socio-economic difficulties, the activities with the best prospects in Colombia are aquaculture and marine oceanic fishing. As regards small-scale fishing, there is a need for diversification and additional non-regulatory management measures and efforts.

## **Difficulties**

The following major difficulties are encountered in marine fisheries: the need to reconvert the fleet and adapt the fishing gear and fishing methods in order to access new resources; the processing plants' failure to fully utilise their operating capacity, thereby reducing the industry's economic performance; the high cost of inputs such as fuel (marine diesel), whose supply is regulated by the national government to prevent its use in the transport of illegal goods; and the need to regulate the fishing of over-fished resources to allow them to recover.

One particular problem for the tuna industry concerns the availability of raw material. Vessels flying foreign flags, which are affiliated to Colombian processing plants, take Ninety per cent of catches and, consequently, landings depend on the country's economic conditions being favourable.

Aquaculture is being hampered by economic difficulties, such as the high cost of feed (accounting for 60 per cent of production costs), small profit margins and insufficient production to generate significant amounts for export, and is also in need of more efficient technologies. The presence of rebel groups in aquaculture areas is also a problem.

Inland fisheries are affected by over-fishing and environmental problems, the inadequate processing and conservation methods used by the fishermen, the long distances between fishing and marketing centres, and changes in public order.

## **Development prospects**

The future of marine fisheries depends on the sustainability of the tuna fishery (national and international management measures are already in place), and of other oceanic species such as dolphinfish (catches of which are already reported in the statistics), giant squid and resources such as conger eel and horse mackerel.

Fresh water fish farming arousing great interest in the production sector. This is reflected in growing demand for information, applications for credit for the activity and research into diversification through the use of native species. Although tilapia, trout and "cachama" will continue to be the main commercial species, "bocachico", carp and "yamú" farming are beginning to develop. Prospects are also good for farmed ornamental species and research into their development is also under way.

Marine aquaculture will continue to develop based on the marine shrimp. Prospects are also bright for the farming of both Pacific and Atlantic snapper once research has been completed. Commercial-scale mangrove cupped oyster farming projects are also being implemented in the Caribbean region.

Inland fisheries could recover once the regulatory and non-regulatory management measures in place take effect. In the short term, development will be based on improving post-production techniques and on the measures taken by the environment authorities to reduce contamination in the water bodies where this fishery takes place.

## **Development projects**

Generally speaking, the most outstanding fishery and aquaculture projects currently under way in the public and private sectors are:

- Experimental breeding of spotted rose snapper (*Lutjanus guttatus*) in Málaga Bay (Colombian Pacific) using waste from the fisheries industry as feed. Projects initiated by INPA, with the participation of the industrial fisheries' guild ACODIARPE, with national co-financing.
- Development and production of two lines of genetically-improved red tilapia and a biological and fishery assessment of four species of Silurids, native to the Meta and Magdalena river basins (*Leiarius marmoratus*, *Pimelodus blochii*, *Pimelodus grosskopffi*, and *Ageneiosus caucanus*). Projects funded by the Ministry of Agriculture and Development and implemented by the NGO CORMAPA.
- Identification of pathogens in the fry of *Piaractus brachypomus* and growth trials on *Pseudoplatystoma fasciatum* in the eastern plains region (Meta department). Projects initiated by INPA with national co-financing.
- Renewal of fishing equipment and fishing gear and provision of technical assistance on Colombia's Atlantic and Pacific coastlines, with a view to modernising small-scale fishing. Project implemented and partly funded by INPA.
- Trials on the breeding and culture of *Lutjanus analis* in Colombia's Caribbean region. This project was started by INPA and continued by the Colombian Aquaculture Research Centre (CENIACUA).

## Research

The research currently under way in Colombia is related to the development projects described above. Other research projects have been formulated but have not yet been implemented due to a lack of economic resources and the uncertainty surrounding Colombia's fishery institutions over the past three years. This matter was finally resolved by the winding up of INPA and the creation of a new government body to take over its duties.

Generally speaking, management research is led by the national government. Fishery and aquaculture development research is implemented jointly by the State, the production sector and the universities, through a system of strategic alliances. Some of the projects implemented in this way include breeding, genetic improvement and pathology research in aquaculture, and research into the location of new fishing grounds, and the improvement of fishing gear and fishing methods in marine fisheries.

## Education

At professional level, universities in the cities of Bogotá, Calí and Santa Marta offer academic training programmes in biology, marine biology and fisheries engineering. In recent years a Chair of Aquaculture has been added to the Animal Husbandry and Veterinary Faculties.

Villavicencio and Tumaco Universities have also offered aquaculture at degree and post-graduate level, but these courses have not been as well received as expected, probably due to the recession the country has experienced in recent years. A number of Colombian public and private sector professionals have trained in fisheries and aquaculture at universities in other countries.

## **International aid**

Colombia has access to various sources of international technical cooperation, but there are no fisheries and aquaculture assistance programmes under way in the country at the present time. The last programmes of more than one year's duration ended in 1998 and 1999 (FAO and the European Union respectively). However, an FAO cooperation project with the governments of Colombia and Peru was carried out between May 2002 and May 2003 to lend support to fisheries management in the Putumayo river.

Another international aid scheme used in Colombia is the exchange of experts in specific areas of fisheries and aquaculture. Since 1997 the areas covered in this scheme have been genetics, pathology, breeding, nutrition and feeding, the adaptation and adjusting of farming and fishing technologies. So far this cooperation has involved Brazil, Cuba, Mexico, Peru and Norway. It is hoped that the recent governmental changes and the new direction of fishery and aquaculture policy will help reactivate international cooperation.