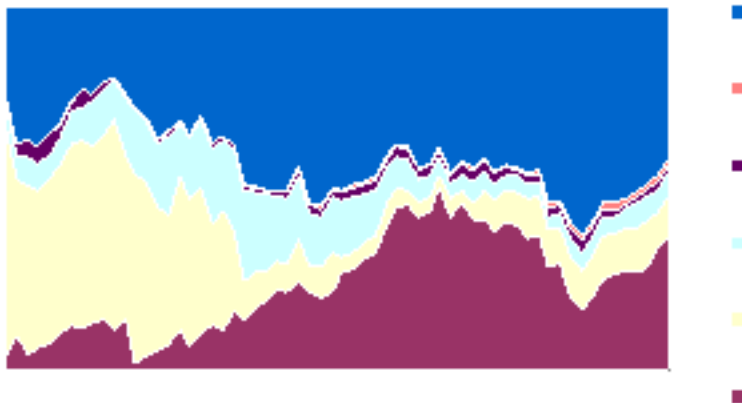
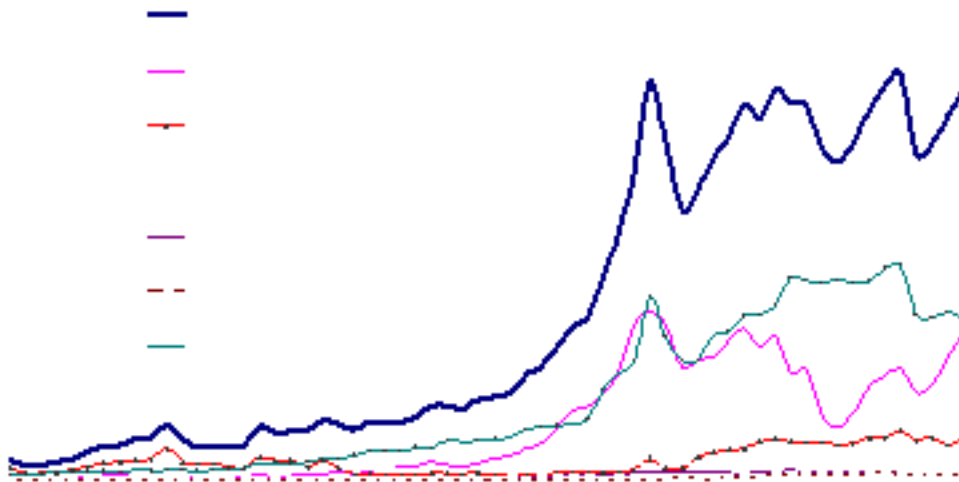


**FISHERY COUNTRY PROFILE****Food and Agriculture  
Organization of the United  
Nations****FID/CP/MEX****December  
2003****PROFIL DE LA PÊCHE PAR  
PAYS****Organisation des Nations  
Unies pour l'alimentation et  
l'agriculture****RESUMEN INFORMATIVO  
SOBRE  
LA PESCA POR PAISES****Organización de las Naciones  
Unidas para la Agricultura y  
la Alimentación****THE UNITED MEXICAN STATES****FISHERIES SECTOR STRUCTURE****General Information**

Before 1960, 50% of Mexico's capture fisheries comprised high-value species (like tuna and shrimp for an export-oriented market). Until 1970 catches amounted to ca.200,000 mt/year. After that year, yield growth came from increases in industrial catches of sardine and anchovy, as well as other species coming from artisanal fisheries. Total catches rose, almost exponentially, to around 1,400,000 mt. The collapse of anchovy fisheries and a mix of environmental and economic factors brought fisheries yield down to around 1,000,000 tons in 1983. Since then,

annual catches oscillate between 1.2-1.4 million mt.



### Overall fisheries sector

Mexican industrial fisheries in the Pacific are concentrated in the Gulf of California. In the Gulf of Mexico the most industrialized fleet, the shrimp fleet, are found mostly in Tamaulipas and Campeche. Mid size and small vessels in artisanal or semi-industrialized fisheries are more widely and evenly spread along Mexican coasts. Inland fisheries amount to ca 7% of the total catch.

### Marine fisheries

Composition of catches varies noticeably between the regions shown on the map. Sardines comprise more than half the catches in region I, with tuna and shrimp being a sizable part of the total. "Others" include tens of species of finfish and shellfish caught by artisanal fisheries. In the other regions this comprises most of the catch.



## Fishing units

In 2001, as has been the case since the forties, more than 90 percent of the fleet was comprised of fiberglass, outboard-engine powered small vessels (up to 36 ft long) called "panga". Out of the 106,425 vessels of the national fleet, 102,807 (96.6 percent) belong to these kinds of boats.

The industrial fleet includes 2,407 shrimp trawlers, 132 tuna seiners and longliners, 89 sardine seiners and 990 vessels catching finfish and other species like octopus. Of these, 70 percent of the shrimp trawlers, 78 percent of the tuna vessels and all the sardine-anchovy seiners are in the Pacific coast and almost all of them (around 90 percent of the Pacific shrimp and tuna fleets and the entire sardine fleet) are concentrated in the four states surrounding the Gulf of California. (Sonora, Sinaloa, Baja California and Baja California Sur).

In contrast, little more than half the artisanal fleet (54 percent) is found in the Pacific coast (that comprises 72 percent of the total coastline length), and only 27 percent of it in the Gulf of California.

Around 86 percent of the shrimp vessel displace more 40 GRT (45 percent in the 40-60 GRT category) and 58 percent of them are 11-20 years old. Tuna vessels are bigger in the Pacific (mostly seiners some baitboats, 75 percent of them above 100 and up to 750 GRT) than in the Gulf of Mexico (longliners, 25 out of 28 displacing less than 100 GRT), 51 percent of them were built less than 10 years ago and the rest are more than twenty years old. Almost half (47 percent) of the sardine fleet displaces between 40 and 80 GRT. Only 24 out of 89 vessels displace more than 100 GRT.

Most (94 percent) industrial vessels catching finfish displace less than 80 GRT and 795 of the total 990 are found in the Gulf of Mexico and the Caribbean.

## **Inland fisheries and aquaculture**

Most (70 percent) of what has been reported as "aquaculture" in Mexican fisheries statistics actually comes from inland fisheries of mostly introduced and few native species.

Inland fisheries catches amounted to 89,513 mt in 2001, with 73 percent tilapia (*Oreochromis niloticus*) and 23 percent carp (*Cyprinus carpio*) yield along with other Chinese carps together produced such a yield as a result of stock enhancement activities (CONAPESCA, 2001). Other species that participate in this sector are rainbow trout (*Onchorhynchus mykiss*) with 3,309 mt, Channel catfish (*Ictalurus punctatus*) 2,294 mt, black bass (*Micropterus salmoides*) 569 mt and the native white fish (*Chirostoma* spp.) 841 mt, as well as gar and pikes (*Atractosteus tropicus* and *A. spatula*) locally known as "catan and pejelagarto", native carps *Algansea lacustris*, catfish from the Balsas and Papaloapan Rivers (*Ictalurus balsanus* and *I. meridionalis*) and the native cichlid *Cichlasoma* sp.

The equivalent figure in 1990 (the historic maximum) was ca. 128,000 mt/yr. Catch composition has remained more or less the same since the late seventies. The only noticeable change comes from a 90 percent fall in reported catches of the family Chirostomidae that comprises several endemic species of cultural and biological value. From a reported catch of ca. 9,000 tons in 1990 production fell to a mere 866 tons in 2001. Overall, inland catches have fallen around 2,500 tons per year since 1990. It is worth remembering that some inland fisheries depended on stocking from hatcheries. Tilapia fingerling production was 93 million in 1991, 86.06 million in 1996 and 75 million in 2001. Other species fingerling and seed stock production was 140 million in year 2001: carp (55 million), trout (2 million) and other species (7 million) were used in stock enhancement, rural and commercial aquaculture. There are 38 Government owned Fish Culture Centers, 16 (42 percent) of them are located in the Pacific coast that produce 45 percent of total fish fry, 7 (18 percent) fish culture centers are in the Gulf of Mexico and produced 9 percent of total fish fry and for inland waters there are 15 (39 percent) fish centers that produced 46 percent of total fingerlings (SAGARPA 2002).

Stock enhancement is practiced in 20 of the largest water reservoirs in the country with over 10,000 hectares of surface area and in 95 reservoirs that range between 1,000 to 10,000 hectares. Seed, fish fry larvae, and other organisms produced at government fish culture centers are stocked in Mexican water bodies such as lakes, coastal lagoons, inland reservoirs and rivers (Alvarez et al 1999).

Capture yields vary basically depending on the trophic level and range from 100 to 900 kg/ha/yr, although it is possible to find exceptional cases with over 3,000 kg/ha/yr with tilapia *Oreochromis aureus* and carps *Cyprinus* spp. in one hectare small reservoirs averaging 865 kg/ha/yr (Hernandez & Peña 1992), and 480 to 1,877 kg/ha/yr in Mexico State respectively (Rios et al 1999). On the one hand other data yields for micro-reservoirs of 0.09 and 0.6 hectares in Tlaxcala State recorded a production of 200 to 1,250 kg/ha/yr (Hernandez 1999), and 2,750 kg/ha/yr were registered in a two hectare reservoir in Morelos State (Blanquel 1999). Metztilan Lake in Hidalgo State yields are of one mt/ha/yr (Ibañez & García 1999). On the other hand, the fishing yield in large reservoirs such as the Infiernillo Dam in Michoacan-Guerrero States in 1987 was 23,841 mt or 794 kg/ha/yr; nevertheless, production dropped in 1995 to 7,802 mt or 289 kg/ha/yr (Orbe et al 1999).

The current status of the decreasing production trend in fisheries yield is due to overexploitation, poor management, an increase of fishing effort, lack of surveillance,

naturally occurring changes in each reservoir and the poor quality of broodstock and fingerlings produced at government fish culture centers that have resulted in smaller fish size and hybridization.

Inland fisheries' volume and value amount to around 7 percent of the national total, quite uniformly distributed (60 percent equally split between the Pacific and Gulf of Mexico's coasts and 40 percent in the states without coastlines).

Some 3,000 small fishing vessels are registered in inland states. It is not clear how many of the vessels (registered in states having a sea coast) work in inland fisheries. Most of the time inland fishermen devote most of their time to agriculture, with fishing being only a part-time activity. Fishing gears are usually gillnets and castnets, the type of vessel typically found is the panga, although smaller, more primitive wooden ones are also frequently found.

Cultured shrimp comprises 83 percent of the production reported under "controlled systems" (actually intensive or semi-intensive cultures). Trout comes in second with 5 percent, tilapia reaches around 4.7 percent, oyster in relatively low-tech operations comprises 3.5 percent (CONAPESCA, 2001).

### **Fishing communities**

Despite the concentration of industrial fisheries, less than 40 percent of Mexican fishermen are found in Region I, another 40 percent of them are found in the Gulf of Mexico and only 8 percent in the inland states. Most fishing communities are small to mid-size and devoted to artisanal fisheries. Many of the smallest still lack such commodities as electricity and running water. Immigration is an important component of population growth in those communities (Alcalá, 1986).

In those communities, activities related to fisheries, such as ice plants and the sale and maintenance of outboard engines and fishing gear comprise a sizable part of the local economy. In inland communities, fishing is usually a secondary activity, except for those communities near the biggest reservoirs.

### **Recreational sub-sector**

Of the 44 ports where marine recreational fishing vessels are registered, 28 are in the Pacific coast: 7 in Baja California Sur, 3 in Baja California, Sonora, Sinaloa, Nayarit and Oaxaca, 2 in Guerrero and 1 in Jalisco, Colima, Michoacán and Chiapas. In the Gulf of Mexico 5 are located in Veracruz, 4 in Quintana Roo, 2 each in Tamaulipas, Yucatán and Campeche and 1 in Tabasco. Although not yet properly quantified, it has been calculated that recreational fisheries generate 60-100 million USD/year (INP, not pub.). Around 7,500 of the registered vessels are in the Pacific coast and some 3,500 are registered in the Gulf of Mexico and the Caribbean with around 13,000 foreign (tourist) vessels entering Mexican waters each year. Billfishes, dolphinfish and Atlantic tarpon are the main species sought by recreational fishermen.

In inland waters, 73 percent of black bass, the main species, is caught in northern states (above the 23th parallel). Rainbow trout is caught mainly in central and western Mexico (83 percent) and only 11 percent in northern states (INP, not pub.).

### **FISH UTILIZATION**

Around 68 percent of catches were destined to be industrially processed in 2001 (48 percent frozen, 27 percent canned and 23 percent fish meal), 92 percent of which came from the Pacific coast. Some 425,000 mt were sold fresh or iced whole. As mentioned

before, in the Pacific coast there are 282 processing plants, 173 freezing plants, 37 canneries and 15 reducing fish meal plants (8 of them in Sonora, where the sardine industry is concentrated). In the Gulf of Mexico there are 89 freezing plants, 3 canning plants and 33 plants employing other processes. No fish meal plants are found on this coastline. There are seven plants in Central Mexico, 2 in Mexico City and five in Mexico State (freezing and smoking, devoted mainly to processing trout production).

### **Fish markets**

A sizable proportion of fresh products is consumed locally. Processed products are widely distributed although frozen products are restricted to places with proper facilities. Mexico City remains an important hub in the distribution network. A long chain of middlemen characterize the Mexican fish distribution system although reliable data on its structure are lacking.

## **FISHERY SECTOR PERFORMANCE**

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

As shown above, fisheries (including exports) represent only a small contribution to the national economy (0.8 percent of GDP). If the present situation of widespread overexploitation persists, it can be expected that the contribution of fisheries to the Mexican economy would diminish with time.

However, fisheries have a great local importance in some parts of Mexico, as can be seen in the landing sites map. In Sinaloa and Sonora, fisheries comprise nearly 4 percent and 2.3 percent of the GDP. It should be taken into account that many fishermen live in small, relatively isolated fishing communities where fishing is an important part of the local economy.

According to official statistics, in 2001 there were 268,727 persons employed in Mexican fisheries (247,765 in capture fisheries and 20,962 in aquaculture). If we add up fishermen's families and people employed in fisheries-related jobs (processing, trade, retail, management and diverse services) it can be safely said that more than a million people in Mexico depend on the fisheries sector for a living.

The number of those people registered as fishermen rose from 80,000 to 140,000 from 1982 to 2000 (stabilizing at 140,000 near 1992), a 75 percent increment. In the same period, the number of fishermen rose from 40,000 to 100,000 in the Gulf of Mexico, growing 150 percent, the same rate at which the number of artisanal vessels grew. In land-locked states the number of fishermen grew faster from 2,000 to 16,000. However, total catches have been more or less the same. Many important fisheries' catches (for example blue crab, red snapper, mullet and shark in the Gulf of Mexico) have been decreasing at an average rate of 7 percent per year since 1997. Shrimp catches (the most important fishery in the Gulf of Mexico) have been falling 10 percent per year in the same period. The corresponding figure for the Pacific shrimp fishery is a decrease in 6 percent per year. Overall catch per person employed have fallen from 12 mt/person-yr in 1980 to around 6 in 2001.

Processing plants in the country have a reported capacity of little more than 652 mt/hour. That results in a nominal capacity (assuming a 5 day labor week, 8-hours/day for a year) of 1,356,347 mt/yr, almost 50 percent more than the processed volume in 2001. Overcapitalization has been a problem of the national fleet in the last decades (Nadal, 1996).

Fisheries-derived income is very unevenly distributed. A five-fold difference in average income exists between fishermen of the states around the Gulf of California and those in the Gulf of Mexico (INEGI, 2000). The difference is slightly larger (5.3 times) if we compare the Gulf of California (Region I) with the Southern Mexican states (Region II). Nadal (1996) reported that 67 percent of fishing units in Mexico (those in artisanal fisheries) receive just 2.8 percent of the total fisheries income.

Around 83 percent of credits awarded by FIRA (a financing program for agriculture and fisheries) was concentrated in Region I, and almost 40 percent of that was destined to finance shrimp culture (2 percent of volume of the total fisheries production but almost 20 percent of the value).

As an objective of the Sectoral Plan of the new administration (after 2000) to "improve social and economic profitability of fisheries", subsidies to diesel and gasoline for industrial and artisanal vessels began to be implemented.

### **Demand and Supply**

Demand for fisheries products, all else considered equal, should rise at least by the same rate of population growth (1.8 percent/yr). However, this has not been the case. Meat (including red meat, poultry and fish and shellfish) consumption in Mexico rose from nearly 3 million mt in 1990 to around 5.5 million in 1999. However, fish and shellfish (that contributed to 31.5 percent of that figure in 1990) reached only 18.1 percent of meat consumption in Mexico in 1998 (Lastra et al. 2000).

### **Trade**

In 2001, fishing exports reached almost 204 000 mt and 602 million USD (less than a fifth of the national catches and more than half the value of Mexican fisheries products). Mexico's main customer is the United States, 59 percent of the total exports' volume but 85 percent of the total value (as frozen shrimp comprises 30 percent of the exports to that country). In terms of volume, other important customers are South Korea (10 percent), Japan (5 percent), Spain (6 percent) and Taiwan (0.5 percent). Frozen shrimp is the most important product (19 percent of volume, 66 percent of value). Although more important in volume (28 percent) frozen fish is not that important in economic terms (only 5 percent of total value). Some products that have gained importance in the international market are octopus (Asia and Europe) and some species like sea urchin and sea cucumber for the Asian markets, although no relevant statistics are available.

Imports come mainly from the United States (34 percent), Chile (15 percent), Canada (2.6 percent) and Spain (1.5 percent). A sizable portion (27 percent) of the 136 000 mt imported in 2001 was frozen or fresh fish. Fish oils comprise another 18 percent and canned fish 12 percent.

### **Food Security**

Although the Mexico's per caput consumption of fisheries products has severely decreased, fisheries sector still play a significant key role in food security around coastal and inland area. Therefore, fisheries management should be conducted within sustainable standards and considered a high priority. Stagnant or decreasing catches that don't keep the pace of population growth, overexploitation of socially important species for artisanal fisheries and an apparent lack of emphasis in rural development alternatives (like management of inland fisheries to increase production) point to this trend to continue in the foreseeable future.

## FISHERY SECTOR STATUS TRENDS

The decreasing trend of catches of many of the important fisheries is a problem that has to be overcome. Overcapitalization of Mexican fisheries is a serious problem that affects economic profitability and the general state of fisheries. Although new investment is not to be expected in most fisheries (with maybe some exceptions like the tuna fishery and much less in the octopus fishery in Yucatan, and some marginal fisheries like sea urchin and sea cucumber) the new subsidies will play a short-term stabilizing role in the fisheries where they are applied, in terms of fishing effort and performance from the restricted profitability point of view. However, the mid and long-term effect has yet to be evaluated, as the well known negative effects, to the resources exploited and the general economy begin to become evident. Social conflicts arising from competition to get access to exploited resources are likely to increase.

## FISHERY SECTOR DEVELOPMENT

### Constraints

At present, the main constraints to effective management are:

**Social constraints.** Unemployment and inequalities in distribution of income drive more and more people into an activity with lax restrictions (like fisheries), managers will be hard pressed to enforce regulations. Mexico faces the dilemma in terms of economic development versus natural resources conservation.

**Legal vacuums.** Lack of definition of particular issues like overfishing and lack of legal and practical guidelines to face it, is a problem that has yet to be overcome. Generally speaking, the fisheries law should clearly state the need to achieve the sustainable use of all natural marine resources.

**Policy definition.** Sustainability has yet to be clearly defined as a management objective. Instead, maximizing catches and profitability seem to be again a high priority.

**Faults in institutional arrangements.** Movements towards a more decentralized institutional scheme empowering state governments should be made, without weakening federal institutions neither putting at risk marine and fisheries resources. Management agencies, as well as research institutions have seen their capabilities decrease noticeably in the last years.

**Faults in institutions' performance.** Improvements should be made on transparency, accountability, public information and stakeholders' participation mechanisms in decision making.

**Institutional capabilities.** Raising technical standards of research institutions to provide a better basis for decision making and management should be a high priority.

### Development strategy

A clear development strategy has yet to be defined. For example, the present Sectoral Plan states awarding longer term permits as a strategy to reduce overexploitation of fisheries resources. Subsidies began to be implemented to increase short term profitability but long-term measures, like effective effort regulations, have yet to be applied. Changes in policy every few years as a result of a new administration taking office are a constant feature that hampers long-term progress in policy definition. A sign of shifting priorities is the transfer of fisheries related institutions from the former Ministry of Environment, Natural Resources to the present Ministry of Agriculture, Livestock, Rural Development, Fisheries



and Food aiming to promote development of the fisheries sector above the ideal of establishing a balance between the use and conservation of natural resources.

## **Research**

Fisheries research is conducted by the National Fisheries Institute (INP). Although it still includes 13 regional centers (CRIPs) and includes in its ranks some of the most experienced researchers in the country, it has been severely downsized by at least 100 of its formerly 400 researchers and technicians, still suffering from budget restrictions. A strong cooperation link with academic institutions is still missing. Besides, fisheries research is still financed entirely by federal funds with no possibility of receiving either non-governmental or private funding, thus resulting in a serious constraint for the decision making process.

## **Education**

Several universities, including the National University (UNAM), the National Polytechnic Institute (INP), several state universities and some private institutions offer programs in Marine Sciences and Fisheries. Standards of these programs have been getting higher in the last years

Foreign aid <http://www.sagarpa.gob.mx/pesca/Anuario2000>

Joint technical exchange programs within MEX-US have been set up with the USA for decades. Technical assistance from Japan has been important in the past, particularly during the seventies and eighties. Mexico has set up technical cooperation programs with Central American countries. Technical assistance from FAO has been received along the years. However, since Mexico's enrollment to the OCDE is not any longer eligible to receive such funds.

## **INTERNET LINKS**

<http://www.sagarpa.gob.mx/conapesca>

<http://www.sagarpa.gob.mx/pesca/Anuario2000>

<http://www.sagarpa.gob.mx/pesca/Anuario2001.zip>

<http://www.bancomext.gob.mx/>

<http://info.main.conacyt.mx/fondos/sagarpa/%20sagarpa2002-01.html>

<http://www.cna.gob.mx/portal/switch.asp?param=4010>

<http://www.conapo.gob.mx/publicaciones/2000.htm>

<http://www.countryreports.org/>

<http://www.fonaes.gob.mx/presentacion.htm>

<http://www.fira.gob.mx/>

[http://www.focir.gob.mx/prog\\_acu.htm](http://www.focir.gob.mx/prog_acu.htm)

<http://www.bancomext.gob.mx/%20programasectorialdeapoyointegral2001.htm>

<http://www.cna.gob.mx/portal/switch.asp?param=4010>

<http://www.fao.org/ag/agl/aglw/aquastat/>

<http://www.cna.gob.mx/portal/switch.asp?param=4010>

<http://www.cia.gov/cia/publications/factbook/geos/mx.html>

<http://www.countryreports.org/>

<http://www.inegi.gob.mx/difusion/espanol/poblacion/definitivos/nal/tabulados/indice.html>

<http://www.cia.gov/cia/publications/factbook/geos/mx.html>

<http://www.conapo.gob.mx/publicaciones/2000.htm>  
[http://www.mapzones.com/world/north\\_america/mexico/dataindex.php](http://www.mapzones.com/world/north_america/mexico/dataindex.php)  
[http://209.15.138.224/hechos\\_y\\_cifras\\_df.htm](http://209.15.138.224/hechos_y_cifras_df.htm)  
<http://www.cia.gov/cia/publications/factbook/geos/mx.html>  
<http://www.countryreports.org/>  
<http://www.cna.gob.mx/portal/switch.asp?param=4010>  
[http://209.15.138.224/hechos\\_y\\_cifras\\_df.htm](http://209.15.138.224/hechos_y_cifras_df.htm)  
<http://www.cia.gov/cia/publications/factbook/geos/mx.html>  
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