Published: December 15, 1999
Last Updated: May 28, 2013

FISHERIES

FISHERIES (*ŠĪLĀT*) **AND FISHING.**There was no real fishing organization in Persia until the second half of the 19th century when Russian subjects, encouraged and backed by the Tsarist Russia's expansionist policy, became increasingly involved in coastal and fluvial fishing activities in the Caspian provinces of Persia, especially when members of the Russian Armenian Lianozov family entered the scene. In the Qajar period, traditionally, bulk fishing in those provinces was leased, if ever, by local governors to private entrepreneurs for annual lump sums regardless of the quantity and composition of fish catches. With the increasing Russian interest in the fishing business, Mīrzā Ḥosayn Khan Sepah-sālār, Nāṣer-al-Dīn Shah's minister of foreign affairs, having obtained in 1293/1876 from the king a ten-year fishing lease for 31,000 tomans per year, subleased in 1296/1879 for five years the concession to the businessman Stepan Martinovic Lianozof for 50,000 tomans annually. At the expiration of the lease, Lianozof obtained in 1300/1882 from the king's influential son Kāmrān Mīrzā a six-year concession, which was renewed in 1306/1888 and then in 1311/1893 for ten years. Upon Lianozof's death in 1896, the concession was transferred (now under Moẓaffar-al-Dīn Shah) with a five-year extension (i.e., until 1925) to his son Georgi Stepanovic Lianozof, and after the latter, to his heirs. Thus the Lianozovs created and gradually expanded a modern fishing industry in the Caspian provinces of Persia. The concession included coastal and riverine fishing from Atrak River in the east to Āstārā seaport (qq.v.) in the west. According to the terms of the concession, all commercial fishing necessaries (vessels, gear, installations, etc.) were provided by Russia, to which were exclusively imported all fish catches

and fish products, particularly the precious caviar (q.v.). The installations furnished by the concessionaire and his agents included two well-equipped cold-storage warehouses, one at Anzalī seaport in Gīlān and the other on Āšūrāda at the southeast corner of the Caspian Sea (qq.v.; Komīsīūn-e mellī, II, p. 1698; for other commodities, see *MA* 3/7, 1371 Š./1992, p. 19).

Pretexting the financial difficulties brought about by the October 1917 Revolution in Russia, the leaseholders refused to pay their dues to the Persian government, which accordingly annulled the contract in June 1918. In 1919, another Russian subject, Grigor Petrovic Vanitsof, rented the southern Caspian fisheries for twenty years, but he could not fulfill his obligations (e.g., as agreed upon, the payment of 100,000 tomans in the first year, 150,000 tomans in the second, 200,000 tomans in the third, and so on). Consequently, in 1921 the government rescinded his lease and confiscated the *šīlāt* assets (*Dāyerat al-maʿāref-e fārsī* II/1, p. 1531). Meanwhile, Gieorgi S. Lianozof's heirs, protesting the Persian government's nullification of the contract and the confiscation of their properties, kept on making reclamations; but the Perso-Soviet friendship treaty, concluded in Esfand 1299 Š./February 1921, put an end to that controversy. Article 14 in the treaty provided that the problem of exploiting the southern Caspian's fish resources be amicably solved between the two states (Hurewitz, ed., II, p. 243). Finally, in Mehr 1306 Š./October 1927, by virtue of an agreement the two parties formed a joint venture (Šerkat-e māhī-e Īrān), to which the Persian government ceded for twenty-five years the concession of catching, processing, and exporting all fish and fish products. On its part, the Russian party was to provide all the fishing equipment, and to pay the Persian government an annual sum of 800,000 rials as royalty plus 15 percent of its gross profit; the remaining net profits were to be equally divided between the two parties (Art. 8, see Hurewitz, ed., II, p. 387-88).

After the expiration of this Perso-Soviet contract in 1953, the government nationalized the fishing industry and formed the Šerkat-e sehāmī-e šīlāt-e Īrān (Iran fisheries joint-stock company), which was affiliated to the Ministry of Finance (Wezārat-e dārāʾī; Komīsīūn-e mellī, II, p. 1699), with an initial capital of 80,000,000 rials. This Šerkat was to incorporate the fisheries both in the north and in the south, but its activity in the south was later carried on by Šerkat-e sehāmī-e šīlāt-e janūb (Southern fisheries joint-stock company), which the government created in 1963 with an initial capital of 500 million rials by splitting the Šerkat into two regional, northern and southern, enterprises with headquarters in Bandar-e Pahlavī and Bandar-e ʿAbbās (Amuzgar, p. 46). The

shareholders of the new southern fishing company were the Ministry of Finance, Agricultural and Rural Credit Bank (Bānk-e eʿtebārāt-e kešāvarzī o rūstāʾī), and two other government bodies (for details of the history of the Caspian fishing industry, Šerkat-e sehāmī-e šīlāt-e janūb, etc., see *Dāyerat al-maʿāref-e fārsī* II/1, p. 1537 and "Šīlāt" and "Šīlāt-e janūb"; Komīsīūn-e mellī, II, pp. 1698-99; *MA* 2/4, 1370 Š./1991, pp. 38-39). Meanwhile, Šerkat-e sehāmī-e šīlāt-e Īrān, although dissociated from the southern fishery organization, continued its activity and expansion under the same name. In 1964 it had numerous installation, fishing stations, and caviar-processing units along the southern coast of the Caspian, at first especially at Anzalī (where the headquarters of the organization was) and then at Āšūrāda as well: administrative buildings; living quarters for the employees; fishing stations along the coast; special jetties for fishing vessels; caviar-processing workshops; and two cold-storage warehouses, one at Anzalī with a storing capacity of 780 tons of fish and another with a capacity of 200-50 tons at Āšūrāda (Komīsīūn-e mellī, II, p. 1711).

Due to different geographical, social, ichthyological, and, to some extent, political conditions in the southern and Caspian areas, fishing and fishery in these regions have had different aspects and developments. Unfavorable environmental conditions (subtropical or tropical climate, lack of fresh water, shortage of arable land, etc.) in the arid or semiarid wide stretch of land along the coast of the Sea of Oman and the Persian Gulf have always made the scant, generally impoverished indigenous population of the area (a mixture of Persians, Arabs, African immigrants, etc.) largely dependent on marine resources (mainly fish) for food and (in more recent times) for income.

The age-old dependence of this desolate area's inhabitants on fish was already mentioned by Nearchus, admiral of Alexander the Great (d. 323 B.C.E.), who sailed on a reconnaissance mission all along the coast from the Indus to the Tigris (narrated by Arrian, bk. 8). Nearchus refers to the people inhabiting the coastal area of Gedrosia (approx. the present Makrān and Baluchistan) as far as the island of Pylora (probably the present Abū Mūsā or one of the two Tonb islands), as "fish-eaters" (Arrian, *Indica*, pp. 16-17, 383, 399, 417), who depended mostly on fish for their food and for some living commodities. They lacked the proper boats and the skill for catching fish offshore; "for the most part it [was] the receding tide that [provided] their catch," which they collected by hand or with primitive nets made "from the bark of the date-palm." In many places, "they [collected] also crabs and oysters and shell-fish.

They [ate] raw□the more tender kinds" of fish, but they dried the larger, tougher ones in the sunshine, then pounded these to "make a flour and bread of themand eveṇcakes of this flour" (ibid., p. 393). However, at an anchorage near which dwelt "the westernmost of the fish-eating tribes," the welcoming natives brought Nearchus and his company as a gift "tunny-fish baked in earthen pans;" thus these "were the first whom the Greeks [during their periplius] had seen cooking their food" (ibid., pp. 387-88). That area producing no grass, even their rare sheep (brought from hinterland) were fed on dried fish, so that "the muttoṇhad a fishy taste," too (ibid., pp. 383, 393). Further, they utilized the bones of any large fish driven ashore by rough sea as beams, doorposts, etc., to construct their huts (ibid., pp. 395, 397). After over two millenia, in Qajar times Moḥammad-Ḥasan Khan Eʿtemād-al-Salṭana (1843-95; q.v.) remarked (I, p. 462) that this practice of feeding sheep and goats on fish still prevailed on the coast of Makrān; and in our time, reportedly it is still prevalent in the more neglected and underdeveloped coastal areas and islands of the Sea of Oman and the Persian Gulf (see, e.g., Barīmānī, p. 7).

The ichthyofauna of Persia's southern waters was first systematically studied in 1937-38, primarily to examine the prospect of initiating and modernizing the fishery in the Persian Gulf. The study was carried out by a team headed by the Danish specialist H. Blegvad invited in 1936 by the Persian government, to which he presented a favorable report on the prospects. Later a detailed account of those marine and ichthyological studies was published in 1942 by Blegvad and his scientific assistant B. Løppenthin, a pioneering work and still a classic which was used as a basis for much later investigations (notably by K. Kuronoma and Y. Abe, *Fishes of Kuwait*, Kuwait, 1972, and by J. E. Randall et al., *Illustrated Identification Guide to Commercial Fishes,* Rome, 1978). It was on Blegvad's recommendation that the Persian government purchased (from Denmark) two fishing vessels (1936, 1940), a fish canning factory, and a fish meal factory, which were set up in Bandar-e ʿAbbās in 1941 (Blegvad and Løppenthin, tr., pp. xviii-xix). Danish participation in the southern fishing industry, disrupted by World War II and its sequels, was resumed in 1950, when another Danish specialist (Petersen?), invited by the government, inspected for about three months the existing fishing centers in the south, studied the most convenient outlets for domestic fish marketing, and stressed the prime importance of developing this national income source (Komīsīūn-e mellī, II, p. 1714).

In 1955 a Japanese firm undertook, with the consent of the former Plan

Organization (Sāzmān-e barnāma), an investigation of fish resources and the best fishing sites in Persian territorial waters in the Sea of Oman and in the Persian Gulf up to an average distance of ten miles offshore. The Japanese research indicated the abundance of commercial fish, and the all-year-long possibility of fishing in the Persian Gulf, provided air-conditioned and adequately equipped vessels (for deep-sea netting in summer, storage of catches, etc.) were available. Further, the Hormuz island and Būšehr area were indicated as the best fishing sites, Ābādān as the best potential center for the southern fishing industry headquarters, and Tehran as the most suitable city for bulk sale and distribution of southern fishes (ibid.).

Considering the results of the two Danish investigations and the findings of the Japanese, the former Plan Organization decided in 1956 to create with the Japanese a joint fishing venture named Persian Gulf Fishing Co., Ltd. (Šerkat-e sehāmī-e māhī-gīrī-e Ḵalīj-e Fārs). An initial capital of 30 million rials was earmarked for this enterprise (two-thirds belonging to the Plan Organization, and one-third to the Japanese party), due to increase to 90 million rials in six years. This Perso-Japanese venture, with a mixed board of trustees, was short-lived: The Persian government could not promptly provide adequate infrastructural facilities (mainly, a large modern cold-storage warehouse at Ḵorramšahr, and an appropriate jetty for unloading and delivering massive catches), and the Japanese failed to pay their share in for the purchase of the said warehouse from Japan. Thus the joint venture was dissolved in 1958; the Japanese transferred their share to the Plan Organization, and declared that they were willing to cooperate only as technical assistants. The Šerkat, however, continued its activity by renting the Japanese's 560-ton fishing vessel and by employing three Japanese fish technicians. Because of the said basic shortcomings, in addition to the lack of adequate transportation and distribution facilities, and the unfamiliarity of the nation at large with southern fishes, the Šerkat operated at a loss until mid 1960. Most of the fishes delivered by the Japanese vessel were undersold by the Plan Organization to the poor southerners to make up for the shortage of red meat in those years. New difficulties having arisen with the Japanese, the latter's cooperation definitely stopped in 1960. Finally, in 1961, in accordance with a "law of fisheries" passed on 11 Tīr 1339 Š./2 July 1960, the Plan Organization turned over all the assets of Persian Gulf Fishing Co. to the newly established Šerkat-e šīlāt-e Īrān, and by virtue of another decree passed on 14 Farvardīn 1342 Š./3 April 1963, the above-mentioned Šerkat-e sehāmī-e šīlāt-e janūb was established (*Dāyerat al-maʿāref-e fārsī*, loc. cit.; Komīsīūn-e mellī, II, pp.

1715-16).

In the Caspian provinces, ecological and living conditions are very different from those prevailing in the southern coastal area; hence an abundance of local staple foodstuffs, namely, rice (the principal one), poultry (chicken, duck), milk products, and fishes. Fishing not only supplies a large portion of the population's protein needs, but has long been a considerable source of income (as local tax) during those periods of the country's history when some kind of central control and political stability existed. The earliest reference to this governmental revenue is probably the statement by Ebn Esfandīār (I, p. 75) that under the Taherids (205-60/820-73) the *ḵarāj* on Ṭabarestān's "cereals, fisheries, and waterfowl [was] 1,300,000 dirhams." Much later, Adam Olearius/Ölschläger, who visited Gīlān in 1057/1637, made the following remarks (tr., p. 39; Rabino di Borgomale, p. 44): The king leased the fishing in the rivers emptying into the Caspian Sea, thereby deriving very consid erable revenues. During the fluvial fishing period, from September to April, the leasees blocked widthwise rivers near the mouth with an assembly of stakes and narrow thin planks to trap the [anadromous and catadromous] fishes. Within this restricted zone of the river nobody but the leasee's agents was allowed to fish; but outside it and during the rest of the year, anybody might fish freely.

The temporary fish trapping barrage mentioned by Olearius is locally called *šīl*, whence the collective noun *šīlāt* (see Šafīʿzāda) meaning fisheries or fishery organization in a certain area or country. There is a simpler kind of *šīl* (also called *kolhām* in Gīlān) made up of vertical stakes and wicker or twigs. *Šīl* fishing is still practiced, mainly for trapping sturgeons and the most palatable (and, now, the most expensive) scaly fish of the southern Caspian, *māhī(-e) safīd (Rutilus frisii kutum*; in Western literature, sometimes referred to by its Russian name kutum). During the spawning period (from mid-Dey to late Esfand and early Farvardīn), "tens of thousands" of the anadromous *māhī-e safīd* throng the southern river mouths (especially the Safīdrūd and the Anzalī lagoon in Gīlān) before entering the rivers, where many of them meet their doom in the *šīl*s (Mellatparast, pp. 285 ff.).

In connection with fishing methods and gear used in the Caspian Sea (for a survey thereof see Pāyanda Langarūdī, pp. 681-84, with detailed Gīlakī terminology, and Mellatparast, pp. 303-5), the controversy over fishing with gill nets (*tūr-e gūšgīr*; locally, *dām/dūm* "trap") should be mentioned here. This method affords big catches of various fishes, but in a closed sea like the

Caspian it has proved highly destructive of fish stocks. Installed far beyond coastal waters almost all along the southern Caspian shoreline, gill nets disrupt the annual migration of fishes to coastal areas for wintering or spawning, especially that of sturgeons and some larger economically important bony fishes that get caught in the nets. Thus, usually only small immature sturgeons and adult smaller fishes get a chance to reach the rivers. The 30 percent decrease reported in caviar production in 1372 Š./1993-94 (as against the expected yield) was attributed to abusive gillnetting. Social confusion and economic pressures during the first decade after the 1978-79 Revolution encouraged gillnetting by "licensed" netters and by poachers. Unable to prevent gillnetting, Šerkat-e sehāmī-e šīlāt-e Īrān (IFC) tried to control somewhat the situation by forming "gillnetters' cooperatives" and licensing six thousand gillnetters! Later, during the first five-year socio-economic development plan (see below), when gillnetting proved to be an imminent catastrophe in Caspian fishery, some measures were taken to stop or reduce it. After years of indetermination, finally the government, pressed by Šīlāt and ichthyological authorities (e.g., Wezārat-e nehād-e sāzandagī, *šīlāt* specialists, scholars), officially prohibited the method since the autumn fishing season of 1995 (*MA*, 4/.4, 1372 Š./1993, pp. 83-84, 7/1, 1375 Š./1996, Eng. sec., pp. v-vi).

THE POST-REVOLUTIONARY PERIOD

In the first decade after the 1978-79 Revolution, the country's fishing industry, like most other governmental and private enterprises, underwent stagnation and/or severe deterioration due to socio-political circumstances, mainly, two years of revolutionary upheaval and confusion (1979-81), followed by a ruinous eight-year war with Iraq (1980-88). Afterwards, in order to revive the country's disrupted development and economy, an ambitious "first five-year socio-economic development plan" (hereafter referred to as "First Plan") was designed to be carried out in 1989-94. In the First Plan a particularly great importance was attached to the development of fisheries, for the following officially proclaimed reasons (Fisheries Share-holding Co. of Iran [FSCI; one of the "official" English names for Šerkat-e sehāmī-e šīlāt-e Īrān, IFC], p. 1): (1) Supplying "a main portion of the [nation's] protein demand." The chronic inability of the government (both before and after the Revolution) to produce in the country enough chicken and red meat for the fast growing population was quickly aggravated after the Revolution. This incapability resulted in heavy foreign currency expenditure for imports of all kinds of foodstuff

(wheat, rice, red meat, chicken, etc.) and, consequently, in the uncontrollable escalation of foodstuff prices, which frightfully continues down to the present day. Since Persians at large (except in littoral provinces) are not a fish-consuming nation (the per capita annual fish consumption was reported to be about 5 kg in 1376 Š./1997-98; see below), efforts have been made by IFC to develop fish consumption habit in non-littoral provinces: It vaunted the nutritional and economic superiority of protein-rich fish over chicken and red meat and tried to interest the private sector in participation and investment in IFC's fishery development projects by pointing out the already existing and practically inexhaustive fish stocks ("God-given boons") in the country's territorial waters, which resources could be profitably increased by developing and encouraging shrimp farming and inland aquaculture. (2) "Creation of job opportunities in the deprived areas, and provision of welfare [sic] for the people living along the [southern] coasts." This sensible objective referred to the miserable living and working conditions of the majority of the indigenous population of the southern coastal areas, particularly Būšehr, Hormozgān, and Sīstān and Baluchistan provinces (there were almost no sweet water, electricity, educational facilities, medical care, decent habitation, etc.), who depended mainly on primitive fishing methods and equipment to earn a living (cf., e.g., the complaints of the representative of southern traditional fishermen to the former president ʿAlī-Akbar Hāšemī Rafsanjānī, and the latter's acknowledgement of that dreadful situation, his promises, etc., in "The first all-Persia conference of fishing unions and cooperatives," Tehran, 1370 Š./1991, both reported in extenso in *MA* 2/2, Tīr 1370 Š./July 1991, pp. 35-43; cf. also Moqaddam, pp. 45-46). (3) "Export of non-oil products to earn [the badly needed] foreign currency for the country." As far as *šīlāt* was concerned, these products included, apart from caviar (the principal and most valuable fish product of Persia; q.v.), canned fish (tuna, sardine, *kīlkā*), shrimp (*meygū*), more recently lobster, and, quite unexpectedly, shark meat and by-products. Concerning the latter, due to the traditional Shiʿite ban on shark meat (disparagingly called *sag-māhī* "dog fish"), by a subterfuge essentially similar to that used in the case of caviar and scaleless sturgeons, the licity of the meat of the scaleless shark was announced on 18 Dey 1371 Š./8 Jan. 1993 (cf. the pro-shark meat insinuations by ʿEmādī in *MA* 5/7, pp. 2-3, and 5/8, pp. 2-5, and the relevant *fatwā* by Ayatollah ʿAlī Ḵāmenaʾī, in *MA* 5/8, p. 2).

Pre-revolutionary experiences and current conditions indicated that any real, far-reaching improvement in and development of the country's fisheries presupposed the provision of adequate basic infrastructural installations and

equipment, as well as huge funds and strong administration. The infrastructural prerequisites, as aptly realized by the regime's planners, included the following: construction of roads connecting the fishing sites and units to urban centers in the south; construction of fishing harbors (jetties, etc.); provision of enough electricity and sweet water; construction of an adequate number of cold-storage warehouses and fish processing and canning factories; provision of modern fishing vessels and equipment; construction of decent habitations for fishermen, their families, and IFC's local personnel.

Meeting these long-neglected basic needs and handling some subsidiary issues (e.g., acquainting traditional fishermen with modern methods and equipments, conducting fundamental research in fields related to fishery, and assessment of various marketable fish stocks) during the First Plan and thereafter, if only partly, necessitated not only fantastic expenditures, but also specialized personnel and a powerful, well-organized administration. The regime's planners initially estimated at 312 billion rials the cost of implementing IFC's development and modernization schemes. The Jehād-e sāzandagī and the IFC, soon awakened to the fact that, despite their tremendous budget, they could not bear all the predicted and unpredictable expenses, and proclaimed that the IFC's role would be limited mainly to the general or basic supervision and administration (*tawallī*) of *šīlāt* affairs, and that the actual execution of specific projects (*taṣaddī*) should be turned over to the private sector, semi-private banks, etc. The so-called *tawallī* policy's function was conceived to consist in the following activities: general planning and programming; international relations and cooperations; determination, assessment, protection, and regeneration of aquatic resources; study of new fishing techniques; introducing, emphasizing, and encouraging inland aquaculture; conducting or supervising various scientific and technological research projects; provision of academic education and practical training to prepare *šīlāt* specialists and technicians; supervision of manufacturing fishing vessels and gear; and paving the way for the increasing export of aquatic products (IFC, Moʿāwanat-e ṭarḥhā o barnāma; FSCI, pp. 1-2).

A post-revolution petty institution that later played an important role in the country's politics and economy was Jehād-e sāzandagī (Construction crusade), originally designed to participate in reconstruction and development in remote underdeveloped rural districts. It was upgraded in 1983 to a state ministry (Wezārat-e jehād-e sāzandagī). Several important functions previously performed by some other ministries were turned over to it to

aggrandize its status; for instance, in Šahrīvar 1366 Š./1987 Ayatollah Ruhollah Khomeini (Rūḥ-Allāh Ḵomeynī) was induced to order the incorporation of IFC into it (*MA* 2/4, 1370 Š./1991, pp. 38-39).

Under its new, financially powerful administration, IFC elaborated a large-scale organization, comprising a state board of directors, a managing director, and six deputy directorates (*moʿāwanat*s), including those of projects and plans, development of fishing harbors, and aquaculture. Further, it included three general directorates (*edāra-ye koll*) and four subsidiary organizations: Iranian Fisheries Research and Training Organization (IFRTO)/Moʾassasa-ye taḥqīqāt o āmūzeš-e šīlāt-e Īrān; Iranian Industrial Fishing Co. (Šerkat-e ṣayd-e ṣanʿatī-e Īrān); Fisheries/Šīlāt Trading Corporation (Šerkat-e bāzargānī-e šīlāt); and Kilka Industries Corporation (Šerkat-e ṣanāyeʿ-e kīlkā). A similar, but smaller elaborate organization was designed and set up in the following seven provinces: Māzandarān, Gīlān, West Azarbaijan, Ḵūzestān, Būšehr, Hormozgān, and Sīstān o Balūčestān (FSCI, p. 5).

Since privatization of many *šīlāt* activities and projects was found to be necessary and, in some cases (e.g., inland aquaculture, shrimp farming, fish processing and canning), "inevitable," a wide publicity was (and still is) conducted to attract the private sector's interest and involvement (cf., e.g., Lāhījānīan, in *MA* 2/1, pp. 36-37; IFC, "Esteqbāl-e šīlāt-e Īrāṇ"), by vaunting the prospect of good, secure returns for the investors. Private participation and investment were sought especially in three sectors: "building fishing vessels and manufacturing fishing equipment, fish processing industry, and inland aquaculture" (Lāhījānīān, in *MA* 5/1-2, 1994, p. vi [Eng. sec.]). It seems, however, that private enthusiasm was much less than IFC's expectation; in Lāhījānīān's words (ibid.): "Unfortunately, lack of investment by Persian banks in the last five years has been one of the obstacles to rapid growth in this industry."

Taking into account unpredictable adverse circumstances (sea pollution, over-fishing of sturgeons in the Caspian Sea by the newly independent littoral states of the former Soviet Union, fluctuation in the government's oil revenues, lack of interest of the general public in new aquatic products, etc.), one could say that IFC has been successful on the whole in its multifarious activities and plans. Following is a summary record of IFC's main achievements during the First Plan (and in the ongoing Second Plan, 1994-) in various fields.

Specialized education, training, and research. These were (and are) carried in

several ways and through several agencies: (1) Through two affiliated teaching centers: Mirza Koochek Khan Higher Education Center for Fisheries Science and Technology (Markaz-e āmūzeš-e ʿālī-e ʿolūm o ṣanāyeʿ-e šīlātī-e Mīrzā Kūčak Ḵān), in Rašt (continuation and expansion of Āmūzešgāh-e ʿālī-e māhī-šenāsī o ṣanyeʿ-e šīlāt, established in 1968 in Bandar-e Anzalī) to train Caspian fishery technicians, and another "higher education center" established in Būšehr in 1989 to prepare technicians and experts in southern fisheries (for details in English about these two centers see FSCI, p. 14). (2) Through IFC's seven research centers in Sārī, Anzalī, Ahvāz, Būšehr, Bandar(-e) ʿAbbās, Bandar(-e) Lenga, and Čābahār (for details in English see FSCI, pp. 10-13). The completed research projects are published in *MA* and in *Majalla-ye ʿelmī-e šīlāt-e Īrān/Iranian Fisheries Scientific Journal*, and ongoing research projects are reported annually. (3) By promoting the establishment of college departments and courses related to fisheries in some institutions of higher education, e.g., at Gorgān College of Natural Resources and Fisheries (Dāneškada-ye manābeʿ-e ṭabīʿī o šīlāt-e Gorgān), and at Nūr College of Natural Resources and Marine Sciences (Dāneškada-ye manābeʿ-e ṭabīʿī o ʿolūm-e daryāʾī-e Nūr), founded in 1990 in Tamīšān (Nūr *šahrestān*) by Dānešgāh-e tarbīat-e modarres, a post-Revolution university for preparing college and university teachers. (4) Holding short-term training courses, mainly in inland aquaculture, for actual and prospective fish farmers; for instance, sixteen such courses were offered in eleven provinces in 1370 Š./1991-92, and forty-two courses in ten provinces in 1373 Š./1994-95. (5) Organizing seminars and congresses, e.g.: "The first national conference on fish and fingerling culture" (Naḵostīn konferāns-e mellī-e takṯīr o parvareš-e ābzīān-e Īrān, Tehran, 1991); "Fish processing seminar" (Semīnār-e ʿamal-āvarī-e ābzīān, 1991), the first of its kind by the private sector; "The first seminar on aquaculture development in Lorestān" (Awwalīn semīnār-e tawseʿa wa tarwīj-e parvareš-e māhī dar ostān-e Lorestān, Ḵorramābād, 1994); "The sixth Persian fisheries national conference" (Šešomīn konferāns-e mellī-e šīlāt-e Īrān), on the general theme of "fisheries marketing," Tehran, 1996 (*MA* 2/8, 1992, pp. 53, 55, 58-59, 5/1-2, 1994, pp. 82-86, 7/8, 1375 Š./1996, p. 27). (6) Publications: In addition to the *Atlas of the Persian Gulf and the Sea of Oman Fishes* (1997) and various promotional pamphlets, they include the quarterly *Majalla-ye ʿelmī-e šīlāt-e Īrān*, founded in 1993 by IFRTO (in Persian, with abstracts in English), the latter's quarterly *Newsletter* (in English), and annual reports on current research projects, in Persian (*Ketāb-e sāl*) and in an English version (*Annual Report*). The previously monthly *Māh-nāma-ye Ābzīān (MA)*, partly subsidized by IFC, has been publishing since 1370 Š./1991 the latter's news, development reports, and

interviews.

Promotional activities. These activities aimed at (1) familiarizing the public with traditional and new aquatic products, thereby developing the so-called *farhang* (culture) of seafood consumption, and (2) displaying IFC's achievements and prospects in order to attract domestic and foreign interest and investment, and consisted mainly in holding *šīlāt* exhibitions in non-littoral areas, e.g.: exhibition of IFC's trade and development activities in Saraḵs (in Khorasan), the nearest town to Turkmenistan, obviously aimed at interesting this new republic (1996); seafood exhi bitions in Tabrīz, November 1994, Shiraz, January 1995, Kermānšāh, January 1997, etc.

Inviting the cooperation of foreign countries and organizations. By cooperation (*hamkārī*) IFC actually meant to involve some foreign countries and organizations in its activities and projects in order to benefit from their expertise, technology, and material assistance. Among international organizations, Food and Agriculture Organization (affiliated to the United Nations) has been invited several times to help carry out some of IFC's projects, e.g., stock assessment of the small deep-sea lantern fishes (fam. Myctophidae) in the Sea of Oman (September 1994; see fishmeal below). Among "cooperation" agreements the one signed with Ireland (April 1994) provided, strangely enough, for "export of canned herring and tuna, and frozen and smoked salmon to Persia, and caviar export from Persia to European countries through Ireland by private companies in both countries" (report in *MA* 5/1-2, Eng. sec., p. vi). Russia, the strongest of the Caspian's new littoral states, had the greatest interest in Caspian fisheries. Several cooperation agreements between the two countries have been signed: e.g., the one in 1994 provided also for sending Persian students to Russia for specializing in various fields of fishery science (report in *MA* 5/1-2, Engl. sec., p. v), and another, signed in May 1996, emphasized the two parties' cooperation for the preservation and development of sturgeon stocks, and for preventing illegal sturgeon overfishing by the new Caspian coastal republics (IFRTO, *Newsletter*, no. 13, Summer 1996, p. 2).

Infrastructure. Following is a summary of IFC's "infrastructural" achievements and projects (electrification, desalination, and road construction, which were to be undertaken by other state agencies, e.g., Wezārat-e nīrū [Ministry of energy], will not be mentioned here).

1. Fishing harbors. The execution by the end of the First Plan of ten projects of

constructing fishing harbors mainly in the south (including jetties for landing fish catches, refrigerating units, and repair workshops), with the expenditure of ca. 100 billion rials, increased quantitatively and qualitatively the annual fishing yield from 120,000 tons in 1366 Š./1987-88 to 320,000 tons in 1372 Š./1993-94. The completion of 23-26 more projects during the current Second Plan is under way with an allotted credit of 300 billion rials. It is predicted that by the end of the Second Plan, the country's fishing harbors would be able to take delivery of 500,000 tons of fish annually (IFC's official report, in *MA* 8, N.S. 76-78, 1997, pp. 24-25).

2. Cold-storage warehouses. In 1368 Š./1989-90, in the south they numbered sixteen, with a total capacity of 14,500 tons; in 1375 Š./1996-97, they had increased to sixty-eight, with a capacity of 83,000 tons, which was sufficient for the storage of frozen fish catches (ibid., p. 17).

3. Canning. In 1368 Š./1989-90 there were only four fish canneries with an annual production of 65 million cans; in 1375 Š./1996-97 the number of fish processing and canning factories reached twenty-seven with an annual production of 118 million cans of canned fish (sardine, tuna, *kīlkā*; ibid.). However, here as in many other cases, the official and unofficial statements and statistics are not always concordant and reliable. For instance, a responsible official of Šīlāna Co. (one of the country's largest canneries, established in 1979) revealed the following facts (ibid., pp. 18-19): "Domestic fish catches do not wholly meet the needs of canneries, and imported fish is expensive Fishing with traditional vessels cannot supply adequate amounts of fish to canneries. So, it is necessary to increase the number of [modern] industrial fishing vessels, each of which costs at least twelve million dollars, a price which the private sector cannot afford or is not interested in...The per capita annual fish consumption of canned fish in Persia is almost one can, which is far less than per capita consumption thereof in most countries in the world...The packaging cost of canned foodstuffs in the world is at most 17 per cent of the foodstuff price, but in Persia, because of the high cost of packaging raw materials [metal, etc.], an empty can itself sometimes costs more than its contents."

4. Ice making. The number of ice production factories in the south, 10 in 1357 Š./1978-79, increased to 25 in 1368 Š./1989-90, and 138 in 1375 Š./1996-97 with a total daily production of 5,800 tons (ibid.).

5. Fish refrigeration. The number of freeze-drying units, eighteen in 1368

Š./1989-90, with a daily refrigeration capacity of 360 tons, reached forty-five in 1375 Š./1996-97 with a daily capacity of 620 tons (ibid., p. 17).

6. Manufacturing fishing gear and vessels. Self-sufficiency in making fishnets and ropes was achieved by two privately owned factories (in Būšehr and Zāhedān) with an annual production of 2,500 tons of nets and 4,500 tons of ropes (official report in *MA*, N.S. 76-78, 1997, p. 16). As to vessels, which were traditionally made in the south mainly with the durable southeast Asian teakwood (*sāj*), because of the increasing unavailability and costliness of the imported teakwood, production and use of the more durable fiberglass was undertaken and encouraged for making dhows (locally, *lanj/lenj)* and boats. Reportedly, self-sufficiency in building fiberglass vessels has been achieved (ibid.). The number of fishing vessels in Persian waters in 1370 Š./1991-92 was estimated as follows (FSCI, p. 36, Table 9): 5,940 to 6,482 boats, 2,578 to 2,643 *lenj*es, and 122 to 158 vessels (probably meaning modern industrial fishing vessels).

Aquaculture.In Persia, aquaculture has a dual function: raising fingerlings of some economically important fishes to be released into the Caspian (to make up for the ominous decrease in sturgeon stock and caviar yield) and inland fresh water bodies, and to be supplied to pond aquaculturists.

Breeding sturgeon fingerlings, the country's earliest experiment in aquaculture, was started in 1923 (FSCI, p. 24). At present, three centers, all run by the IFC, are actively engaged in breeding sturgeon larvae and fingerlings: two in Gīlān (Rašt and Sīāhkal) and one in Gorgān province. In 1375 Š./1996-97, about 12.5 million sturgeon fingerlings were released into the Caspian and the Safīdrūd. Cold-water fish farming began with trout (*qezel-ālā*) in 1339 Š./1960-61. Of course, trout angling as a sport has been practiced during an authorized period of the year in Lār, Jājrūd, and Polūr rivers, and later in the artificial lakes behind the dams on Lār and Karaj rivers. Pond culture of warm-water fishes (mainly the common carp) had a start in 1345 Š./1966-67. Before the 1978-79 Revolution, there were hardly ten aquaculture units in the country.

During the 1980s, the IFC seriously took up the encouragement and technical support of aquaculture by the private sector for breeding *māhī-e safīd* and, later, when *sīm, sūf* and salmon stocks were also endangered, for pond culture of these warm-water species. Early success encouraged the IFC and the private sector to expand aquaculture to Ḵūzestān and, gradually, to the country's non-

littoral provinces, where the favorite fish species for breeding have proved to be indigenous and Chinese carps and the cold-water trout. The growth of aquaculture was so rapid that the annual yield of various cultured fish (exclusive of sturgeons) reached 4,735 tons in 1364 Š./1985-86, 24,492 tons in 1369 Š./1990-91, and 40,420 tons in 1992, mainly in three provinces with adequate fresh water supply, i.e., Gīlān, Māzandarān, and Ḵūzestān. It had been predicted in the First Plan that, by gradually allocating about 37,000 ha of land to freshwater aquaculture all over the country, new jobs would be created for about 9,713,000 persons, and that by the end of the First Plan the annual yield of cultured fish would be 122,600 tons. In 1992, reportedly 775 tons of rainbow trout were produced in 28 farms and 21,463 tons of various carps in 2,443 farms (for detailed statistics of inland aquaculture—fish species, number of fish farms and farmers, number of fingerlings, etc.—in 1989-92, see FSCI, pp. 30-32; information above culled mainly from: IFC's Moʿāwanat-e ṭarḥ o barnāma, in *MA* 2/1, 1370 Š./1991, p. 37; Šarīʿatī, in *MA* 3/1-2, 1371 Š./1992, pp. 4-11, 41; and FSCI, pp. 23-32).

The latest "official" data on aquaculture (available to the present writer), relating to 1375 Š./1996-97 (reported by IFC in Mehr 1376 Š./September-October 1997 and published in *MA* 8, January 1998, pp. 20-22), may be summarized as follows: Total number of bony fish fingerlings: 142,092,000 [sic], including 8,478,000 *sīm*, 424,000 salmon, 2,414,000 *sūf*, and 17,295,000 trout fingerlings; fish yield for consumption from inland aquaculture (special ponds, natural and seminatural bodies of water): about 65,000 tons (i.e., 16.2 percent of the country's total aquatic yield); fingerling breeding was carried out in 54 centers, 8 of which run by the IFC; cyprinids (including Chinese carps) and trout varieties were the principal cultured fishes.

Kīlkā and fishmeal. Potential massive exploitation of *kīlkā* (*Clupeonella* spp.; see above) opened up new vistas for IFC in the southern Caspian, where the densest population of this small pelagic fish (average length: 7-10 cm; average weight: 7-10 gr) is found. The former Soviet Union fisheries had long realized its high nutritional value and freely exploited its very abundant stock. *Kīlkā* fishing in Persian waters goes back only to 1939. Almost unknown to Persian consumers, southern Caspian *kīlkā was* marinated and sent exclusively to the Soviet Union (e.g., about 100 tons annually in the 1322-27Š./1943-49 period; Aḥmadī, p. 40).

Commercial exploitation of *kīlkā* in Persia, begun in 1971 on a small scale, was to become, after sturgeon and caviar industry, IFC's main concern in the First

Plan for several reasons: abundance of *kīlkā*, its widely vaunted nutritional value, its potential use for fishmeal, etc. The prospect was so promising and profitable that IFC established in 1990 the Kilka Industries Corporation to plan and coordinate the related activities with three main objectives: promoting and publicizing *kīlkā* as a valuable seafood, obtaining rather cheap material for fishmeal, and exporting processed *kīlkā.* Of course, attaining these goals necessitated preliminary marine studies and the costly provision of appropriate fishing vessels, equipment, and coastal installations. IFC's efforts and investment for promoting the *kīlkā* industry during the First Plan and afterwards did not come up to its great expectations. Whereas Russia has been harvesting about 350,000 tons of *kīlkā* annually, Persia's catch, despite its estimated annual exploitation potential of 100,000 tons, was expected to reach 40,000 tons by the end of the First Plan. During the Second Plan, in 1376 Š./1997-98 this figure increased to 50,000 tons, and was predicted to reach 95,000 by the end of the Second Plan (1998). To keep this increase continuing, the IFC was planning in 1997 to add 28 new *kīlkā* refrigerating, processing, and canning units in Gīlān and Māzandarān. Appeal was also made to non-Russian foreign agencies for technical and financial help. For instance, by virtue of an agreement signed in 1997(?) between the IFC and the United Nations Industrial Development Organization (UNIDO), the latter undertook to allocate $556,000 for the purchase of a *kīlkā* processing factory to be installed in Bandar-e Anzalī (*MA* 8, N.S. 74-75, 1997, p. 62)

General reception of frozen or canned *kīlkā*, especially in Caspian provinces, has not been encouraging, mainly because canned *kīlkā*, awkwardly processed as it was, did not please the consumers' taste; but thanks to better conservation and processing techniques, more palatable canned *kīlkā* (smoked or in tomato sauce) has been marketed recently (Aḥmadī).

Of course, better quality means higher prices for consumers. The retail price of a can of smoked *kīlkā* (net weight: 180 gr) produced at Anzalī is now (January 1999) around 2,300 rials, a price that makes it a kind of luxury food item for the masses. The following facts, expressed by an IFC official (reported in *MA* 8, N.S. 74-75, 1997, pp. 5-6), reflect the disappointment and uncertainty about the hoped-for widespread consumption of *kīlkā* in Persia: Of more than 50,000 tons of *kīlkā* fished in 1376 Š./1997-98, only 4 percent were consumed by people, and the remaining 96 percent were turned into fishmeal for use in chicken and cattle farming; however, it is hoped that by the end of the Second Plan, human consumption of *kīlkā* (in canned form, "sausage," "crackers," etc.)

would absorb 50 percent of the *kīlkā* catch.

Probably on account of the growing cost of *kīlkā* fishing and marketing, IFC has been looking for other abundant but cheaper raw materials for fishmeal. IFC is now exploring the ways and means of exploiting the estimated 2-4 million ton stock of the inedible lantern fishes (*fānūs-māhī*) in the Sea of Oman. Reportedly, in 1997 there were 25 active fishmeal factories with a total capacity of utilizing 350 tons of raw fish materials daily, and of producing 20,000 tons of fishmeal annually. This last figure falls very short of the 100,000 tons of fishmeal imported annually at a cost of 60 million US dollars (*MA*, N.S. 74-75, 1997, p. 5).

As far as human consumption of fish and fish products in the country is concerned, the result of the IFC's activities and propaganda in the last two decades seems disheartening: the annual per capita consumption, reportedly about 1 kg in 1357 Š./ 1978-79, reached about 2.5 kg in 1366 Š./1987-88, and about 5 kg in 1376 Š./1997-98, with the (wishful) expectation that it would reach "at least 11 kg by 1400 Š./2021-22" (*MA* 8, N.S. 79, 1998, p. 2), which would still be less than the average consumption (ca. 13 kg) in the world in 1991 (*MA*, 2/5, 1991, p. 36).

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