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Status of Kuwait's fishery resources: Assessment and perspective

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ABSTRACT

For the first time, the production of fisheries in Kuwait was assessed both quantitatively and qualitatively by comparing the production of the late 1980s and the mid-2000s using official data. The results indicate that total fisheries production has declined over time, with local production (artisanal and industrial) having decreased by approximately 25%, while imports increased by 25%, representing 62% of the total fisheries production over time. Current consumer preferences have led to increased demand of fish species formerly having inferior commercial importance. The verified per capita fish consumption in 2010 was 22.32 kg yr^{-1} suggesting the existence of an unrecorded supplementary supply of fish. Predictions show a dramatic decrease in fishery production by 2025, with a low supply of only 0.5 kg per individual per annum. The results have practical implications for legislators' management strategies for the sustainability of local fishery stocks.

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1. Introduction

Fisheries provide about 16% of the global population's intake of animal protein [1,2]. The global demand for fish is expected to increase by 35 million tons by 2030 due to increased consumption and the rapidly increasing human population [3]. Over the past five decades, global per capita fish supply has increased by approximately 50% [4], reaching a high of 17.1 kg yr^{-1}[1]. In 2009, the global marine fishery production of 79.9 million tons [1] exceeded that recorded in 1950 [5] by fivefold. While global marine production previously accounted for 72% of total fish harvest in 1996 [6], it decreased to 55% in 2009, which is alarming given that the percentage of overexploitation has increased by 4% since 2000 [1,7]. Such increasing demand has caused the depletion of fisheries and the destruction of habitats, which may soon be beyond recovery and restoration [8]. Consequently, global organizations are encouraging nations worldwide to move toward sustainable exploitation of fisheries for future food security [4,9].

The sustainability of marine fisheries is of great significance due to its contribution to the socioeconomic welfare and food security of coastal nations worldwide, including Kuwait [10]. Kuwait's location within the northwestern corner of the Arabian Gulf, mainland coast of approximately 325 km and shallow semi-estuarine systems, has enabled locals to adopt fishing as a primary source of livelihood. Recent Kuwait-British archaeological excavations in the area of Al-Subiya along Kuwait's northern coast found evidence of a population that relied on fishing dating back approximately 7000 yr [11]. During the nineteenth and the early twentieth centuries, fishing in Kuwait was based on a type of partnership between families where their instinct drove them to sustainable fishing, but eventually moved toward overfishing in recent decades [12].

Until the 1940s, traditional artisanal fishing was one of the main maritime sources of income in Kuwait, which was then replaced by oil drilling. With the increase in the country's oil revenues and development, new fishing methods were introduced that led to the emergence of industrial fleets equipped with modern fishing technology. These new fishing methods resulted in a remarkable decrease in recruitment of fishery stock during the 1970s and the early 1980s, prompting the government authorities to impose management strategies for the sustainability of local stocks in the late twentieth century [13–15].

The government's aspiration for state growth and development after the Iraqi invasion in 1991, and Kuwait's modest native population of 654,000 at that time [16], prompted them to recruit expatriates to overcome the shortage of manpower. The resulting increase in total population consequently led to a significant increase in demand for fish as an inexpensive source of animal protein [17], and in turn artisanal and industrial fishery exploitation. This exploitation, coupled with regional anthropogenic impacts associated with urbanization, has clearly exerted a significant pressure on fish stocks [15,18,19] directly or indirectly, thus jeopardizing the fish stocks' contribution to food security in Kuwait, an arid country where fisheries were originally meant to be a main self-sustainable source of protein-rich food.

There is currently a lack of information on the state of fisheries as a natural renewable resource of nutrient-rich food in the

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Western Arabian Gulf, specifically Kuwait, compared to the vast studies on fisheries in developed countries. Research conducted on a national level lacked broadness and mainly concentrated on the sustainability of shrimp fisheries [10,15,20–32]. Therefore, the present study aims to address this void in literature by providing a substantive description of the current status of fishery resources for both finfish and shellfish in Kuwait by (a) assessing the qualitative and quantitative variations in local fishery production and imports over time, (b) determining the estimated and actual per capita fish consumption in Kuwait, and (c) projecting fishery production for 2025 in relation to population growth. Such information will hopefully provide local legislators with substantial fundamental information regarding fishery in Kuwait to enable them to develop and implement future management strategies for the sustainability of local fishery stocks.

2. Material and methods

2.1. Data collection

Fishery production data for the late 1980s and the mid-2000s (1988–1992 and 2005–2007) as well as data on fishing gear and commercially licensed vessels were obtained from the Central Statistical Office–General Secretariat of the Supreme Council for Planning and Development (CSO–GSPD) and the Public Authority for Agriculture Affairs and Fish Resources (PAAF). The fishery production data for Kuwait reported in the state's annual statistical fishery bulletins published by the CSO–GSPD includes 24 types of fisheries (Table 1) [33].

2.1.1. Qualitative and quantitative fisheries analysis

Total fishery production, including local artisanal production, local industrial production, and imported fish (kg or ton) and their corresponding average retail prices (Kuwaiti Dinar per kg=KDkg^{-1}; 1 KD $\approx$ 3 USD) were assessed for their variations over time. This was accomplished by comparing the three-year mean values of both production and average retail price of each source, where Period (*A*) includes production and price data for years 1988, 1989, and 1992. To avoid discrepancy, data for 1990 and 1991 were omitted owing to the absence of complete annual records caused by the Iraqi invasion of Kuwait and the liberation from the Iraqi regime, respectively. Meanwhile, Period (*B*) includes production and retail price data for years 2005, 2006, and 2007.

For an adequate assessment of the commercially important fishery production, fishery data for both periods were also assessed per category based on the 24 fishery species listed in the CSO–GSPD fishery bulletin (Table 1) grouped as follows:

a. Primary fisheries production: species number 1–7;
b. Secondary fisheries production: species number 9–11, 13, 14, 16, 17, and 20;
c. Tertiary fisheries production: species number 8, 12,15, 18, 19, and 21–23; and
d. Quaternary fisheries production: species number 24.

2.1.2. Fish consumption

The standard method for estimating human fish consumption per capita for a country is to divide the net supply by the number of inhabitants [34]. Per capita estimates essentially reflect the amount of food available (e.g., in g or kg) for human consumption during a reference period (e.g., in a day or a year). However, the estimated per capita consumption represents only the average supply available for each individual in the population as a whole and do not indicate what is actually consumed by individuals [35].

The estimated per capita fish consumption in Kuwait was determined using fishery and population census data from the CSO–GSPD and the Public Authority for Civil Identification (PACI), respectively. However, the actual verified per capita fish consumption in Kuwait was assessed through a fish consumption survey during 2010 on the entire Kuwaiti population (i.e., natives and expatriates). Of the 1000 households surveyed, only 813 unambiguous representatives were randomly selected.

Table 1
Type of fisheries listed in the fisheries statistical bulletin published by the CSO–GSPD.

	Bulletin name[a]	Common name[b]	Scientific name[b]
1	Shrimps	Jinga shrimp	*Metapenaeus affinis*
–	–	Tiger shrimp	*Penaeus semisulcatus*
2	Silvery pomfret	Silver pomfret	*Pampus argenteus*
3	River shad	Hilsha shad	*Tenualosa ilisha*
4	Silvery grunt	Javelin grunt	*Pomadasys kaakan*
5	Brown spotted grouper	Orangespotted grouper	*Epinephelus coioides*
6	Blue spotted mullet	Greenback mullet	*Liza subviridis*
7	Silvery croaker	Tigertooth croaker	*Otolithes ruber*
8	Barred Spanish mackerel	Narrowbarred Spanish mackerel	*Scomberomorus commerson*
9	Crimson snapper	Malabar blood snapper	*Lutjanus malabaricus*
10	Large-scaled mullet	Klunzinger's mullet	*Liza klunzingeri*
11	Herring travelly	Longnose trevally	*Carangoides chrysophrys*
12	Thread line	Fourfinger threadfin	*Eleutheronema tetradactylum*
13	Jack pomfret	Black pomfret	*Parastromateus niger*
14	Yellow-finned black porgy	Yellowfin seabream	*Acanthopagrus latus*
15	Berttam [c]	Whiteblotched grouper	*Epinephelus multinotatus*
16	Thread-banded grunt	Trout sweetlips	*Plectorhinchus pictus*
17	Red-finned pigface bream	Pinkear emperor	*Lethrinus lentjan*
18	Cobia	Cobia	*Rachycentron canadum*
19	Gray-finned croaker	Spotted croaker	*Protonibea diacantha*
20	Spotted spanish mackerel	Indo-pacific king mackerel	*Scomberomorus guttatus*
21	Notched thread-fin bream	Japanese threadfin	*Nemipterus japonicus*
22	Spotted lizard fish	Greater lizard fish	*Saurida tumbil*
23	Anda'ac [c]	King soldier bream	*Argyrops spinifer*
24	Others	*Includes various edible finfish and shellfish*	

[a] Names listed in the CSO–GSPD fisheries bulletin from the 1970s to date.
[b] Current names based on Carpenter et al. [33].
[c] Local name.

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