Reconstructing Iraq's fisheries: 1950-2010[1]

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Abstract

Iraq's fraction of the Persian Gulf waters, surrounding the mouth of the Shatt al-Arab, is tiny, and so are its marine fisheries, which, moreover, have been impacted by a succession of wars over the past few decades. Its fisheries remain underdeveloped and understudied, and hence little documented. Here, Iraqi marine fisheries catches are reconstructed from 1950 to 2010, based on admittedly fragmentary evidence. Overall, the catches reconstructed here are 1.8 times those reported to FAO on behalf of Iraq, and are dominated by unreported catches of hilsa shad (*Tenualosa ilisha*). This study illustrates the need to establish management infrastructure for fisheries monitoring and regulation enforcement, especially in light of the many stocks that are shared with other Persian Gulf countries.

Introduction

Iraq has the smallest fishing grounds of the Persian Gulf countries, essentially near the mouth of the Shatt al-Arab River, which is formed by the confluence of the Euphrates and Tigris river about 200 km upstream. Thus Iraq's marine fisheries are of minor importance compared to its freshwater fisheries. The marine fisheries are all artisanal in nature, with gillnetting for hilsa shad (*Tenualosa ilisha*), pomfret (*Pampus* spp.), and mullet (*Liza* spp.) being dominant fishing activities, complemented by some traditional dhows operating small trawl nets. Fish supply is relatively low throughout the region and does not meet local demand (Jawad 2006). There are apparently no marine recreational fisheries.

Iraq has one of the richest water resources in the Middle East due to the presence of the Tigris and Euphrates rivers, the smaller Shatt al-Arab and Shatt al-Basrah rivers, and the Mesopotamian marshes. The marshlands serve as nursery grounds for a number of migratory fish such as the hilsa shad, and also provide important nutrients to the fisheries of the northern Gulf through the Shatt al-Arab River (Jawad 2006).

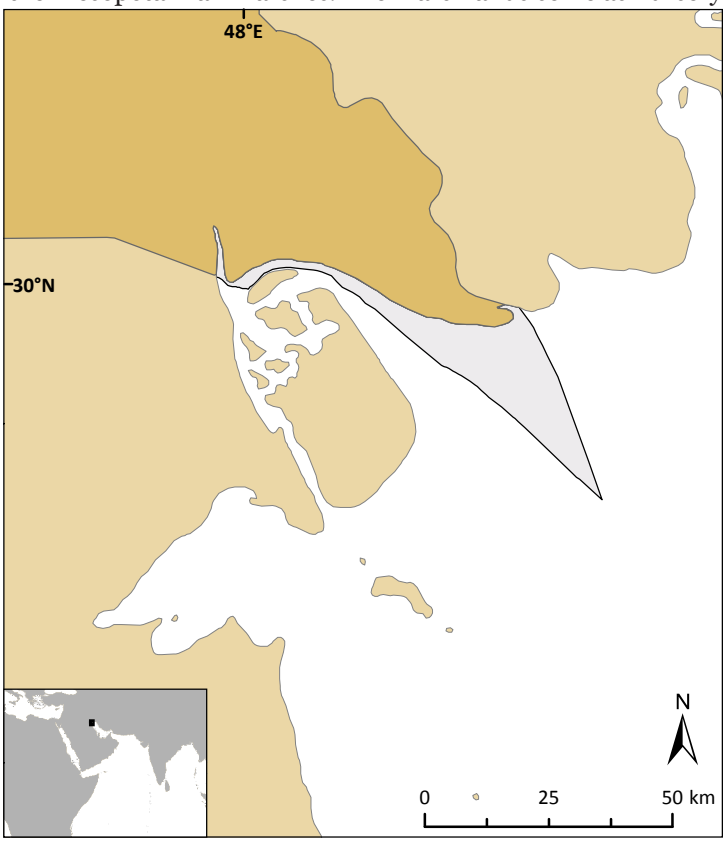

Figure 1. Map of Iraq, showing the extent of its small EEZ (in grey).

Between the 1950s and 1990s, large areas of the Mesopotamian marshes were drained, at different times and for different reasons (Al-Yamani *et al.* 2007). Although the initial draining of the central marshes was intended for land reclamation for agricultural purposes, it later became a political attempt to force Marsh Arabs (Ma'dan people) out of the area through water diversion tactics. The marshes, which have been reduced in extent by over 90%, have long been considered as a refuge for people persecuted by Saddam Hussein's government. Not surprisingly, thousands of fish and waterfowl died as the waters receded (North 1994). In addition, damming naturally flowing rivers reduces freshwater discharge into the sea, leading to reduced nutrient concentration in coastal waters, which consequently diminishes plankton productivity, and in turn, fish landings (Al-Yamani *et al.* 2007). It is speculated that the damming could also increase the salinity of the northwestern Gulf, raising concerns about jellyfish outbreaks and changes in plankton (and hence fish) community density and distribution (Al-Yamani *et al.* 2007).

A number of major wars have greatly shaped the country's fisheries. The Iran-Iraq war, which lasted from 1980-1988, presumably led to decreased

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marine fisheries catch, though the lack of detailed records precludes firm inferences (Ali 2001). In addition, the first Gulf War in 1991 led to UN imposed sanctions which implied that areas in the Northern Persian Gulf traditionally exploited by Iraqi fishers could no longer be accessed. Thus, patrols by non-Iraqi forces meant that the Shatt al-Arab waterway and areas around Bubiyan Island and Warba Island (Kuwait) were closed to all forms of fishing. This, combined with other factors (general insecurity and perhaps oil pollution, see below), meant that Iraq's reported catches dropped to near zero in 1991 and 1992.

Several studies were carried out on the impact of the 1991 Gulf War oil spill on fisheries stocks (e.g., Linden *et al.* 2004; Al-Sabbagh and Dashti 2009). Impacts of oil spills tend to be highly variable, affecting food webs, life history cycles, and entire marine ecosystems (Al-Sabbagh and Dashti 2009). In this case, it has been suggested that declines in fish stocks were a result of planktonic larval or egg mortality, not adult mortality because many of the fish species live in depths below the oil slick, and because the warm waters sped up the breakdown of oil (Linden *et al.* 2004).

As the northern Gulf became safer to navigate in 1994-1995, fisheries catches started to recover. However, the funds allocated towards fisheries management and monitoring suffered as a result of the UN sanctions, leading fisheries to be essentially unregulated. The damming of the upper Tigris and Euphrates rivers and the draining of the marshes in the Shatt al-Arab delta also negatively affected marine resources, particularly in the case of the hilsa shad, *Tenuolosa ilisha* (Al-Dubakel 2011).

Following the combats that led to the change of government in 2003, Iraqi fishers began to expand their fishing southward, returning to Bubiyan and Warba Islands, as well as fishing illegally in other parts of Kuwait's Exclusive Economic Zone (EEZ).

While the ichthyofauna of Iraq has been reasonably well documented (www.fishbase.org), there are currently no management plans in place for any of Iraq's fisheries. Detailed catch statistics have not been collected since the early 1990s and no stock assessments have been performed. Thus, the numbers presented here will remain tentative until this situation is addressed.

Corrupt governance and lack of infrastructure have complicated data gathering on Iraqi fisheries. For example, under the former Ba'athist government, the State Organization of Fisheries controlled the administration of freshwater and marine fisheries, including the administration of fishing licenses. As such, they discriminated against non-Ba'ath people, especially Marsh Arabs (Jawad 2006), refusing to issue licenses. In addition, Uday Hussein, the eldest son of Saddam Hussein controlled the most productive areas of the marshlands and demanded payments from fishers in exchange for access (Jawad 2006). Later, the State Organization of Fisheries was dissolved and replaced by a marine fisheries cooperative that only served the Basrah province.

Methods

Iraq reports to FAO only a miscellaneous category called 'marine fishes nei' up until 2003. From 2004 on, catches are also reported for 'hilsa shad, 'mullets' (Family Mugilidae) and '*Penaeus* shrimps'. To improve the taxonomic resolution, taxonomic information from the 2004-2010 time period, as well as information on the species caught in the waters of neighbouring Kuwait, was used to disaggregate the data from 1950-2003. The 'marine fishes nei' category was initially assigned to 76% Mugilidae, 2% Penaeidae, 22% miscellaneous marine fish, which was adapted from relative proportions in the reported data. The miscellaneous marine fish portion was then broken down further; ten percent remained miscellanous marine fish, while the other 90% was assigned to the four most common families found in Kuwait waters (croakers, 40%; groupers, 35%; grunts, 15%; and snappers 10%) (see Kuwait; Al-Abdulrazzak, this volume). These methods were also utilized (with slight adjustments) for the 2004-2010 time period as there was still large amounts of 'marine fishes nei' reported. Note that 'hilsa shad' was not part of the disaggregation breakdown as there was additional information utilized to reconstruct these catches.

Al-Dubakel (2011) reports shad catches from 1990-2007, as well as average percentages of shad catches compared to total catch from 1965-1975 (56.9%), 1990-1992 (38.9%), and 2003-2007 (5.1%). Because Al-Dubakel's total catch estimates are much higher than FAO's over the same time period, and because they were not reported as part of the freshwater catches, we assumed that the shad is not already reported in the miscellaneous marine fishes category and therefore adopted Al-Dubakel's (2011) estimates as unreported 'hilsa shad' catch.

Iraq's coastline is very short (Figure 1) and only 0.001% of the population of Iraq lives within 10 km of the coast. We assume a conservative subsistence catch rate of 500 g/person/week (i.e., the equivalent of two servings per week) and apply this to the derived coastal population from 1950-2010. We used the 2004-2010 FAO data (excluding shrimp) as a guideline to derive a subsistence breakdown (approximately 44% *Tenualosa ilisha*, 32% miscenalleous marine fish, and 24% Mugilidae).

A number of accounts exist of significant illegal fishing by Iraqi trawlers and gillnetters in Kuwait's and Iran's EEZs (e.g., De Young 2006; Al-Saadoun 2012; Saleh 2012). We estimated illegal fishing in Kuwait's EEZ to be 10% of reported catches for the years 2003-2010, and disaggregated it into shrimp (Penaeidae, 5%), pomfret (*Pampus*

argenteus, 2%), shad (*Tenualosa ilisha*, 2%), and mullet (Mugilidae, 1%). For illegal fishing in Iran, we estimate catches to be 3% of reported and apply the same species composition ratios used for catches in Kuwait.

Finally, we apply a bycatch ratio (15:1) to reported, estimated and illegal Iraqi shrimp catches, of which 98% of the fish is discarded and only 2% is retained (as miscellaneous marine fishes), derived from the nearby Kuwait shrimp fishery (Ye *et al.* 2000). We also applied the same species composition from Kuwait to the discards.

Results and discussion

Data supplied to FAO offer poor taxonomic resolution and omit illegal catches and shrimp discards. After incorporating these components in our reconstruction, our catch estimates over the 1950-2010 time period are 1.8 times what is reported to FAO (Figure 2a; Appendix Table A1). We predict that our reconstructed catches are likely to be an underestimate, as without more information on fishing practices in Iraq, our assumptions were conservative.

Since shrimp stocks are shared with Iran and Kuwait, the unregulated and illegal trawling may impact landings in these countries. Iraqi vessels are landing significant quantities of shrimp, particularly species that have not been previously landed in Iraq in these large quantities (Al-Dubakel 2011). Catches from Iran and Kuwait waters (2003-2010) were estimated to be 3% and 10%, respectively, of the total reonstructed catch from 1950-2010.

Discards are likely present from more than just the shrimp fishery, but scant information exists, and is therefore difficult to quantify. In Iraq, the majority of fishermen are Shiite Muslims who therefore do not consume fish without scales visible to the naked eye. Therefore, bycatch species such as *Muraenesox cinereus, Arius thalassinus,* and *Trichiurus lepturus* are discarded back to sea (Jawad 2006). Discards made up 26% of the total estimated catch.

The main species of Iraq's marine fisheries were Mugilidae (39%), *Tenualosa ilisha* (17%), *Arius thalassinus* (8%), Sciaenidae (5%), and *Epinephelus* spp. (5%) (Figure 2b; Appendix Table A2).

Jawad (2006) suggests that regulating access may be more effective than implementing catch or effort controls. Due to the remoteness of certain areas in the marshlands, and because most fishers make their own gear, size and gear control are difficult to implement. Concerns have also been raised concerning oil pollution and runoff from industrial and household wastes (Al-Dubakel 2011). Oil spills are commonly seen along the Shatt Al-Arab, particularly from the *Abu Flous* port (Al-Dubakel 2011).

A number of major challenges hinder Iraq's ability to manage its fisheries. First, infrastructure for fisheries management and monitoring needs to be rebuilt. Enforcement of existing and new fisheries legislature cannot be implemented otherwise. Second, marine habitat degradation, particularly the draining of the marshes, must be addressed. Finally, and perhaps most importantly, Iraq should be incorporated into regional fisheries management plans since many stocks are shared with other Gulf countries.

The management of Iraq's marine fisheries has deteriorated

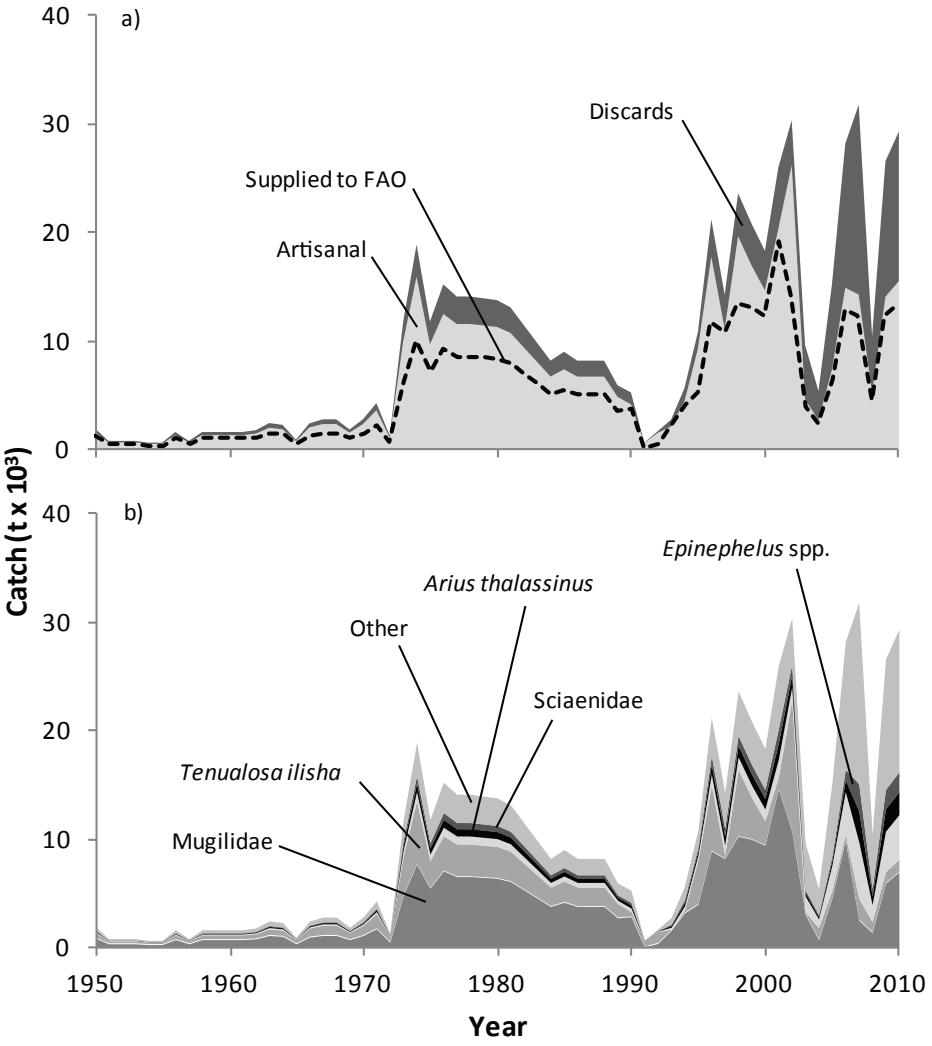

Figure 2. Total reconstructed catch for Iraq, 1950-2010, by a) sector (with comparison to FAO), and b) major taxa. Note that subsistence catches were included in the sector graph (a) but are not visible (too small).

significantly since 2003, while increased fishing effort (and a corresponding increase in landings) has occurred during the same time. This does not bode well for the long-term sustainability of the country's fisheries. It is clear that unregulated fishing of shared fish and shrimp stocks of the northern Gulf must be brought under control.

Acknowledgements

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Appendix Table A1. FAO landings vs. total reconstructed catch (t) for Iraq, 1950-2010, as well as catch by sector.

Year	FAO landings	Total reconstructed catch	Artisanal	Subsistence	Discards
1950	1,200	1,970	1,620	1	350
1951	500	820	670	1	150
1952	500	820	670	1	150
1953	500	820	670	1	150
1954	400	660	540	2	120
1955	400	660	540	2	120
1956	1,000	1,640	1,350	2	290
1957	500	820	670	2	150
1958	1,000	1,640	1,350	2	290
1959	1,000	1,640	1,350	2	290
1960	1,000	1,640	1,350	2	290
1961	1,000	1,640	1,350	2	290
1962	1,100	1,810	1,480	2	320
1963	1,500	2,460	2,020	2	440
1964	1,400	2,300	1,880	2	410
1965	500	940	790	2	150
1966	1,300	2,430	2,050	2	380
1967	1,500	2,810	2,360	2	440
1968	1,500	2,810	2,360	2	440
1969	1,000	1,870	1,580	2	290
1970	1,500	2,810	2,360	3	440
1971	2,300	4,300	3,620	3	680
1972	700	1,310	1,100	3	210
1973	6,300	11,780	9,920	3	1,850
1974	10,100	18,880	15,910	3	2,970
1975	7,200	11,810	9,690	3	2,120
1976	9,283	15,230	12,490	3	2,730
1977	8,601	14,110	11,580	3	2,530
1978	8,600	14,110	11,580	3	2,530
1979	8,500	13,940	11,440	3	2,500
1980	8,400	13,780	11,310	4	2,470
1981	8,000	13,120	10,770	4	2,350
1982	7,000	11,480	9,420	4	2,060
1983	6,000	9,840	8,080	4	1,760
1984	5,000	8,200	6,730	4	1,470
1985	5,500	9,020	7,400	4	1,620
1986	5,000	8,200	6,730	4	1,470
1987	5,000	8,200	6,730	4	1,470
1988	5,000	8,200	6,730	4	1,470
1989	3,617	5,940	4,870	4	1,060
1990	3,754	5,280	4,180	5	1,100
1991	125	670	630	5	40
1992	543	1,710	1,550	5	160
1993	2,133	2,780	2,150	5	630
1994	4,221	5,690	4,450	5	1,240
1995	5,253	10,830	9,280	5	1,540
1996	11,688	21,200	17,760	5	3,440
1997	10,783	14,270	11,100	6	3,170
1998	13,463	23,610	19,640	6	3,960
1999	13,093	20,830	16,970	6	3,850
2000	12,389	18,310	14,660	6	3,640
2001	19,200	25,970	20,320	6	5,640
2002	14,100	30,340	26,180	7	4,150
2003	4,000	9,630	4,620	7	5,000
2004	2,355	5,410	2,720	7	2,690
2005	6,359	15,160	7,350	7	7,810
2006	12,959	28,170	14,910	7	13,250
2007	12,319	31,760	14,280	7	17,470
2008	4,486	10,430	5,180	8	5,240
2009	12,246	26,570	14,090	8	12,470
2010	13,490	29,300	15,520	8	13,770

Appendix Table A2. Total reconstructed catch (t) for Iraq by major taxa, 1950-2010.

Year	Mugilidae	*Tenualosa ilisha*	*Arius thalassinus*	Sciaenidae	*Epinephelus*	Others[a]
1950	910	409	110	100	83	360
1951	380	171	40	40	35	150
1952	380	171	40	40	35	150
1953	380	171	40	40	35	150
1954	300	137	40	30	28	120
1955	300	137	40	30	28	120
1956	760	341	90	80	69	300
1957	380	171	40	40	35	150
1958	760	341	90	80	69	300
1959	760	341	90	80	69	300
1960	760	341	90	80	69	300
1961	760	341	90	80	69	300
1962	840	375	100	90	76	330
1963	1,140	511	130	120	104	460
1964	1,060	477	120	110	97	430
1965	380	285	40	40	35	150
1966	990	741	110	100	90	400
1967	1,140	855	130	120	104	460
1968	1,140	855	130	120	104	460
1969	760	570	90	80	69	300
1970	1,140	855	130	120	104	460
1971	1,750	1,310	200	180	159	700
1972	530	400	60	60	49	210
1973	4,790	3,586	560	500	437	1,910
1974	7,680	5,748	890	800	700	3,060
1975	5,470	2,449	640	570	499	2,180
1976	7,060	3,158	820	740	643	2,820
1977	6,540	2,926	760	680	596	2,610
1978	6,540	2,925	760	680	596	2,610
1979	6,460	2,892	750	670	589	2,580
1980	6,380	2,858	740	670	582	2,550
1981	6,080	2,722	710	630	554	2,430
1982	5,320	2,382	620	550	485	2,120
1983	4,560	2,042	530	480	416	1,820
1984	3,800	1,702	440	400	347	1,520
1985	4,180	1,872	490	440	381	1,670
1986	3,800	1,702	440	400	347	1,520
1987	3,800	1,702	440	400	347	1,520
1988	3,800	1,702	440	400	347	1,520
1989	2,750	1,232	320	290	251	1,100
1990	2,850	402	330	300	260	1,140
1991	100	502	10	10	9	40
1992	410	1,002	50	40	38	170
1993	1,620	2	190	170	148	650
1994	3,210	202	370	330	293	1,280
1995	3,990	4,002	460	420	364	1,590
1996	8,880	6,002	1,030	930	810	3,550
1997	8,200	252	950	850	747	3,270
1998	10,230	6,103	1,190	1,070	933	4,090
1999	9,950	3,803	1,150	1,040	907	3,970
2000	9,420	2,203	1,090	980	859	3,760
2001	14,590	1,003	1,690	1,520	1,331	5,830
2002	10,720	12,003	1,240	1,120	977	4,280
2003	3,090	107	1,500	320	277	4,330
2004	760	1,014	810	230	205	2,400
2005	4,570	627	2,340	470	409	6,750
2006	9,880	466	3,970	1,100	966	11,780
2007	2,530	1,935	5,240	2,860	2,504	16,680
2008	1,410	913	1,570	820	719	4,990
2009	5,920	1,001	3,740	2,070	1,812	12,020
2010	6,960	1,104	4,130	2,120	1,859	13,130

[a] Others category includes 8 additional taxonomic groups.