

Interdecadal Changes in Community of the Fish Fauna of the Marine Waters of Iraq



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Abstract In the present chapter, an examination of the deviations over the 20–30 years in the structure of fish group of the marine waters of Iraq was performed. Continuing assessments of fish species inhabiting littoral areas have in several instances displayed variable results ranging between decrease and increase in the values of the species richness and abundance as an outcome of human activities. The number of the studies that have been achieved over the period of three decades was very small in comparison with the actual number of studies need to be completed in order to study the species composition and abundance of the marine waters area of Iraq. The unrest in the political situation in Iraq in the last three decades reduced significantly the ichthyological investigations, which resulted in publishing a narrow and incomplete studies that do not reflect the actual status of the marine fish group of Iraq. Therefore, comprehensive and regular surveys should be planned and performed in the sea waters of Iraq to make possible for the management of the fisheries capabilities to step in especially large number of fish species were recorded for the first time during the last 10 years.

Keywords Fao · Khor al-Zubair · Biodiversity · Fishes

1 Introduction

The most striking issue in reducing biodiversity in the sea is over-fishing that decreases assets for people, have changed habitats, and placed many mammals, birds, reptiles, and fish at the verge of extermination (Costello 2015; Webb and Mindel 2015). Lastly, the movement of people has carried organisms through topographical blockades that long retained the biotic districts of the Earth detached; therefore, several of the ecologically significant biota of many zones have been registered in the list of the extinct species (Vitousek et al. 1997).

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With the continuing of the present human behavior of how to deal with the environment, the latter will endure to change biota. The land management modification is likely to have the main global influence on biota by the year 2100, tailed by climate modification, nitrogen deposition, species inductions, and altering concentrations of atmospheric CO₂ (Sala et al. 2000).

In Iraq the regional coastal waters exposed to a subtropical environment are situated *in* the northern part of the Arabian Gulf, a shallow marginal leeway of the Indian Ocean (Pous et al. 2012). The Iraqi marine region gains enormous quantities of fluvial discharges through the River Shatt Al-Arab.

The publication of Heckel (1843) offered part of the primary data on the fish group of Iraq. There are numerous publications delivering further data on the marine fish group of Iraq recently (Mahdi and George 1969; Mahdi 1971; Al-Daham 1982; Hussain et al. 1988), but there are rare detailed investigations (Jawad 2012).

While the marine fish group of Iraq was authenticated (Khalaf 1961; Mahdi 1971; Al-Daham 1982; Al-Hassan and Al-Badri 1986; Al-Hassan and Miller 1987; Hussain et al. 1988), it nonetheless endures not fully explored and much taxonomic work needs to be done (Jawad 2012). Lately, some plans are in place to investigate the Iraqi marine waters, so the fish group can be encountered and species composition of the area can be set.

The aim of this chapter to study the available species composition data available about the marine fish species of Iraq for the period 1988–2018 and discuss the variation in the presence-absence of species that might happened in the area during the last four decades. Such modifications in the composition of marine fish group could be deliberated in the framework of those signaling features of the regional habitats of Iraq.

2 Comparisons of Ichthyofaunal Compositions for the Period of 1988–2018

In the last three decades, there were not many faunal investigations that have been made on the marine fish community of Iraq in the sense of giving a complete picture about the status of fish composition in the area. In particular, there were six studies ranging in time frame from 1988 to 2018 (Hussain et al. 1988, 1994; Ali and Hussain 1990; Mohamed et al. 1993; Mohamed and Mutlak 2008; Younis and Al-Shamary 2015; Al-Faisal and Mutlak 2018) (Table 1).

Previous to 1988, the ichthyological survey studies in Iraq cannot be relied upon as they compiled data from other works, rather than collected them in the field (Khalaf 1961; Mahdi 1962; Mahdi and George 1969; Al-Nasiri and Hoda 1975; Al-Daham 1977).

The total number of fish species revealed in the analysis of the results of the ichthyofaunal survey obtained for the period 1988–2018 ranges 13–16 and 62–197 for cartilaginous and bony fishes, respectively. It is clear that there is an increasing

Table 1 Number of families, genera, and species of cartilaginous and bony fish species collected from the marine waters of Iraq over the period 1988–2018

Study/fish group	Number of families	Number of genera	Number of species
Cartilaginous fishes			
Hussain et al. (1988)	7	9	13
Ali and Hussain (1990)	–	–	–
Mohamed et al. (1993)	6	7	11
Hussain et al. (1994)	–	–	–
Mohamed and Mutlak (2008)	–	–	–
Younis and Al-Shamary (2015)	2	2	2
Al-Faisal and Mutlak (2018)	9	14	16
Bony fishes			
Hussain et al. (1988)	36	49	62
Ali and Hussain (1990)	37	32	34
Mohamed et al. (1993)	40	59	76
Hussain et al. (1994)	17	23	28
Mohamed and Mutlak (2008)	32	44	53
Younis and Al-Shamary (2015)	28	33	38
Al-Faisal and Mutlak (2018)	65	129	197

trend in the number of the species during the last three decades. The analysis of the results also showed that four out of seven studies have dealt with the cartilaginous fish group (Hussain et al. 1988; Mohamed et al. 1993; Younis and Al-Shamary 2015; Al-Faisal and Mutlak 2018), while those involved cartilaginous fish species were not comprehensive and reported low number of species ranging 11–16.

For the period of nearly 10 years and during the first and second Gulf wars, the scientific investigations in the marine waters of Iraq and specifically the ichthyological studies were heavily affected by the military activities that prevent a comprehensive ichthyological exploration. Therefore, the studies up to 2008 contain an incomplete picture of the fish species composition of the marine area of Iraq. The very low number of cartilaginous fish species that Younis and Al-Shamary (2015) have given (only two species) could be a bycatch because any survey whatever it is limited can get more this number of species. I suggesting that the authors were aimed mainly for bony fishes and the 2 cartilagenous fish species obtained came as a bycatch. On the other hand, the list of species presented by Al-Faisal and Mutlak (2018) exemplifies a great jump in the number of bony fish species from 28 as reported by Hussain et al. (1994) to 197 species as in the work of Al-Faisal and Mutlak (2018). This high number can be explained on the basis that during the last decades a reasonable number of bony fishes were reported as new records to the marine waters of Iraq (e.g., Jawad et al. 2010, 2014a, b, c, 2018, 2019; Ziyadi et al. 2018; Jawad 2015; Jawad and Al-Badri 2014, 2015; Al-Badri and Jawad 2014; Jawad and Hussein 2014; Hussain and Jawad 2014; Al-Mukhtar et al. 2011; Al-Faisal et al. 2016, 2017; Ali 2013a, b, 2016, 2017; Ali and Iwatsuki 2018). In that period, 76 fish species (6 shark species and 70 bony fish species) were reported

from the coastal waters of Iraq. Moreover, the work of Al-Faisal and Mutlak (2018) seems to be a compilation of species that have been reported by others and not genuine sample collection. High number of marine species (both cartilaginous and bony) was also reported by Ali and Iwatsuki (2018). In this study, a total of 322 marine fish species were given, which represent those reported from marine waters, brackish, freshwaters, and marshes of Iraq from 1874 until the mid of 2018. Looking at the checklist given by Ali and Iwatsuki (2018), it seems it is a compilation of results published during the period given, and it also showed some misidentification.

The distribution of the fish families in the marine waters of Iraq during the last three decades showed dominance of certain families in both the cartilaginous and bony fish groups. For the former group, the Dasyatidae and Carcharhinidae appeared as the specious families, while for the latter group, the families Clupeidae, Sciaenidae, Carangidae, and Mugilidae were the most specious among the bony fish assembly. The members of these families seem to be residents in the area and have adapted to its environmental factors and, therefore, accommodate larger number of species. These families were recognized by further scientists as distinctive of ichthyological groups in different water bodies (Elliott and Dewailly 1995; Costa et al. 2002). Costa and Araújo (2003) have suggested that the utmost rich fractions of fish use the further sheltered area in the coastal environment.

The recent study by Al-Faisal and Mutlak (2018) has shown that families other than those mentioned above also showed high number of species; these are Sparidae, Epinephelidae, Haemulidae, and Lutjanidae. The record of the species of these species recently in the marine waters of Iraq could be due to the fact that these species visiting the area in certain season of the year.

There are several numbers of investigations concerning the influence of environmental features in the makeup of fish groupings. The circulation of water masses and currents, temperature, oxygen concentration, and productivity were among those influences affecting the structure of fish groups significantly (La Mesa and Vacchi 1999), while further features like the nature of bottom (Félix-Hackradt et al. 2013), depth (Mérigot et al. 2007), habitat complexity (Kovalenko et al. 2012), or the effect of the topography contributions in certain areas such as estuaries and coastal lagoons (Maci and Basset 2009) are considered likewise as main issues organizing biological groups but upsetting at limited scales.

Ali and Hussain (1990) have suggested both biotic and abiotic factors might affect the assemblage of fishes at Khor al-Zubair area (a part of the marine waters of Iraq). Among the biotic factors is species association. This factor depends on the type of fish group that present at the time of the ichthyological survey. For example, Ali and Hussain (1990) suggested that two fish groups were present in Khor al-Zubair; these are the resident group (*Liza macrolepis*, *Nematalosa nasus*, *Thryssa hamiltonii*, and *T. mystax*) and a seasonal group (*Acanthopagrus latus*, *Brachirus orientalis*, *Eleutheronema tetradactylum*, *Ilisha elongata*, *Scatophagus argus*, *Sillago sihama*). Such migrations indicate a possible usage of Khor al-Zubair area as a spawning grounds. Accordingly, any future ichthyological exploration of the marine waters of Iraq should take into consideration the results obtained by Ali and

Hussain (1990) and perform a 13 months sampling program to cover all the four seasons of the year. In addition, a 5-year period is required to repeat such studies in order to report the presence of any invasive species and departure of any species from the area.

Among the abiotic factors, temperature seemed to act significantly on the species composition, whereas salinity shown a low affirmative link (Ali and Hussain 1990). Such effects were observed during the study of the fish group in the United States. Fishes of the intertidal region are disturbed mainly by temperature, which seems to be the chief important feature in the habitat where the intertidal fishes live and which influences their vertical, seasonal, and latitudinal dispersal (Gibson 1982).

3 The Outcomes of Shifting in Biodiversity

The global biodiversity receives contribution from different sources such as genetic variety inside the groups and the diversity of habitats in the nature. Species variety has practical values since the number and types of species found regulate the organismal qualities that impact habitat courses. The constituents of species variety that decide this appearance of characters contain the number of species found (species richness), their relative abundances (species evenness), the specific species presence (species composition), the relations between species (non-additive effects), and the seasonal and geographical disparity in such issues. Besides its impacts on available effective of habitats, species variety impacts the flexibility and struggle of habitats to environmental alteration.

Most works on the practical importance of altering biodiversity have dedicated to the association between species richness and ecosystem working. While the link between species richness to ecosystem working has fascinated significant theoretical and experimental care for its irreversibility of species extinction, human events affect the relative richness of species more often than the occurrence or absent of species. Variations in species evenness deserve augmented consideration, since they frequently react more quickly to human events than do deviations in species richness and as they have vital concerns to habitats long before a species is endangered by extermination.

4 Conclusion

It is clear that there were not enough ichthyofaunal studies on the marine fishes of Iraq, and what have been performed during the last three decades were incomprehensive studies that have no concrete biodiversity plan to cover as much as possible of the marine habitats in the Arabian Gulf territoriality of Iraq. Therefore, there is an appeal for the concern institutions in Iraq to pursue and develop research programs to investigate regularly (5 years bases) the marine fish fauna of Iraq and put

a clear policy for conservation of such fauna for the next generation. The political events in the last two decades may hinder such studies, but it is time to recover from such dilemma and save the environment.

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