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Short Communication

Biomass of Fish Species in the Shadegan Wetland, IRAN

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Abstract

Biomass assessment and production of fish species was carried out from April 2010 to March 2011 in the Shadegan wetland. Samples were collected From five stations, Mahshar, Rogbe, Khorosy, Salmane and Ateish, in the Shadegan wetland in Khuzestan Provinces (Iran). More than 3900 specimen fish were measured during the study and depletion method was used for fish stock assessment. Maximum and minimum fish biomass (species) and fish production (species) were Silurs triostegus, Barbus pectoralis and Barbus luteus, Barbus pectoralis respectively. Maximum and minimum biomass (season) measurements were in Spring (380.40 kg/ha/year) and winter (58.41 kg/ha/year) respectively. Fish production and biomass in wetland Shadegan were estimated 137 (kg/ha/year) and 244 (kg/ha/year) respectively.

Key words: Biomass assessment, shadegan wetland, depletion method.

Introduction

Wetlands are supported as significant of species and wild life populations. Loss of wetland has disastrous effects in wild life and biodiversity that has important international and regional effects wild life, scientists believed that wetlands destruction are caused native species global extinction to completely depend on specific habitat[1].

Wetlands in the world are occupying about 7 to 9 million km^2 (4-6 percent of Earth surface). Iran wetland is approximately 1853762 ha and between Middle East wetland was contained 25 %[2]. Shadegan Wetland in Khuzestan province is one of the 18 international wetlands registered on UNESCO's Natural Heritage List. Located 52 km from Abadan and 105 km from Ahwaz, it is Iran's largest wetland and by Linking Jarahi River connect with Persian Gulf waters, the wetland is considered one of the most wonderful natural landscape of the world because of it is unique biodiversity[3]. The Shadegan Wetland is a Ramsar-listed wetland in the south-west of Iran at the head of the Persian Gulf. It is the largest wetland of Iran covering about 400,000hectares.

The wetland plays a significant hydrological and ecological role in the natural functioning of the northern Persian Gulf[4]. The aim of the present study was twofold: (i) to estimate its stock assessment status and fish production (ii) to determine, how population change of Shadegan wetland fish and the exploration pattern of the these population in this water resource. Results will greatly contribute to elaborating management programs for this economically important fish species and preserve other fish species of the region under study.

Maramazi[4], Ansari et al,[5,6] and Hashemi et al[7] were searched fish survey, stock assessment and capture conditions of Shadegan wetland. Lotfi et al.,[3] were considered human activity and effect on shadegan wetland and also diversity and capture situation of Shadegan wetland.

Material and Methods

Biomass assessment and production of fish species was carried out from April 2010 to March 2011 in the Shadegan wetland. Samples were collected from at five stations, Mahshar (48°,45´ E, 30°,33´ N) Rogbe (48°,33´ E, 30°,41´ N), Khorosy (48°,40´ E, 30°,39´ N), Salmane (48°,28´ E, 30°,40´ N) and Ateish (48°,40´ E, 30°,54´ N) in the Shadegan wetland in Khuzestan provinces (figure 1). Shadegan wetland (Iran) is a wetland in the south-west of Iran in Khuzestan province. In each season, 5 stations were selected for sampling. Sampling was carried out by using fixed gill net with 45 mm mesh and then transported to lab, with dry ice. Total length with ±l mm and total weight with ±0.01 (g) were measured for each fish. Depletion method involves deliberately overfishing an isolated population of fish[8]. After the commencement, N_t (Present fish number in time t) will be equal to the $N\infty$ (Original stock size), less the accumulated catch in time t, $\sum C_t$, ($N_t=N\infty- \sum C_t$)**.** Then by definition the catchability coefficient (q), at time t has: $N_t=CPUE_t /q$. By substituting equation is result: $CPUE_t=q N\infty- q \Sigma C_t$. Catch Per Unit Effort at time t, $CPUE_t$ graphed against accumulated catch in time t, ΣCt, referred to as a Leslie plot (a= intercept and b= Slope)[8]. By using data,

biomass amount in enclosed area was calculated and then according to this area, biomass amount in per hectare and finally was investigated for total Shadegn wetland. Amount of 800-2000 m^2 (enclosed area) was changed in different seasons and at each station according to environmental conditions. CPUE in each station was carried out for five days. Amount of habitable area for fish were considered in total al Shadegan wetland using satellite data on 56000 ha. Fish production value was calculated by the formula log $P=0.32+0.94 \log B_t-0.17 \log Wmax$. Wmax and B_t were Maximum fish weight (g) and fish biomass (kg/ha), respectively[9].

Results and Discussion

In this study, the fish biomass in spring and summer was calculated 381 kg/ha, 71 kg/ha, respectively. Average fish biomass in spring and summer of 1997, 70.2 kg/ha &109.2 kg/ha, and in 2001, 186.5 kg/ha & 269.4 kg/ha and in 2009, 249 kg/ha & 216 kg/ha was calculated, respectively[4,5,6,7]. In spring, summer and winter were increased of biomass comparing 1997, 2001, 2009 and in autumn was decreased comparing other of years (table 3). It seems, climate change and wetland nutrient elements are very effective factor that influenced on biomass. Based on this study, the maximum fish biomass was obtained is spring, it seems appropriate to wetland climate status[7,10] and nutrients entering for river flow may be due to the reason and also maximum phytoplankton production, wetland phytobentos was showed in spring time[10]. Total fish biomass of the total Shadegan wetland that multiple average fish biomass (kg/ha) in amount of habitable area for fish 56000 ha was estimated about 14000 t /year. In 1997, the Maramazi, estimated that the total biomass of fish in Shadegan was 22,000 tonnes[4], while this amount calculated 15,000 tons in 2003[11] and in 2009 was about 11000 tonnes[7].

Total of fish biomass in with comparing 1997, 2001 was decreased, but in 2011 were increased. The productivity of these areas may have been reduced in approximate proportion to this loss of their floodplain areas. Also, the construction of dams in Khuzestan (Iran) since 1980 has also altered the hydrological regime dramatically[7,10] . Water quality has also declined in both the Karoon and Jarahi rivers, with waters now carrying increased salinity from upstream irrigation works, and higher levels of agricultural chemicals and urban and industrial effluents[10]. Maroon dam construction and irrigation development in upper plains was changed in water flow[3].

The aggregate impact of these changes is most of the remaining area was in Shadegan wetland. It seems induces four species of Cyprinidae (Cyprinus carpio, Hypophthalmichthys molitrix, Hypophthalmichthys nobilis, Ctenopharingodon idella) to Shadegan wetland in 2010 to 2011; biomass and production fishes have increased. Abundance of fish populations in river, lake with river source and reservoirs widely changed from year to year and the relative frequency of different species is different in population. This change is affected by rainfall fluctuation and floods. The increasing area and flood flow time is improved spawning, growth and survived rate. Positive correlation between being floods and amount capture has in the next year[12,13] . From a fisheries production perspective, it is important to recognize the enormous hydrological modifications suffered by the marshes in recent times. The fisheries productivity of healthy floodplain rivers is roughly proportional to the total area of the waters in the high-water flood season[12].The Khorosy stations in different seasons have high amount of fish biomass.

It seems, that entering the jarahi river for east side of the wetland and location of Khorosy station in near the river month and entering of nutrition element was caused to increase phytoplankton and phytobentozic production that caused to increase fish biomass in these areas. The high diversity of phytoplankton has due to stable ecological condition constant in Khorosy station in over the year[10]. With survey frequency of fish species in Shadegan wetland was changing comparing 1997 and 2009[4,5,6]. According to data this study, species biomass B. sharpeyi, B. lutus, C. carasius, L. abu, B. grypus, S. triostegus was increased and species of A. vorax, B. pectoralis, C. carpio was decreased. It seems, with change in chemical, physical and ecological in wetland is changing diversity. Big species with high valuable were decreased and small species with less valuable species were increased. The increase catch in prolonged years can decrease species with high length and long Life and replace low length and low life[7]. The C. carpio has highest rate of biomass to seem than can adapt with Shadegan wetland condition in different season. In autumn, with Increasing freshwater input to wetland has increased diversity of river species such as B. grypus, B. pectoralis while in summer and early autumn (before rain fall) with increasing salinity were increased Marine species to wetland such as Th.ilisha, T.ilisha, A.lutus[7].

The native marshland fish populations were originally dominated by Cyprinid fish of the genus Barbus. River species were usually reached for feeding and marine species for spawning and passing larval stages to the Shadegan wetland[4]. Coastal fisheries in the Persian Gulf used the marshlands for spawning migrations, and they was be used as nursery grounds for shrimp and fish. Several marine fish species of great economic importance are dependent on the estuarine systems and marshes for spawning, namely the Pampus argenteus, and Tenualosa ilisha. The penaeid shrimp, Metapenaeus affinis, undertakes seasonal migrations between spawning in the gulf and nursery and feeding grounds in the Shadegan wetland[11]. Amount of fish biomass and production in Shadegan wetland was 244 (kg/ha/year), 137 (kg/ha/year), respectively. Fish production in various

water body was (flood plains, water reservoirs, lakes and wetland) 8.8-54.7 (kg/ha/year). These changes are shown in table 4[14, 15, 16, 17, 18].

Conclusion

Considering fish production and biomass values it can be concluded that: fish production of Shadegan wetland was most of inland water and is one of area with high potential.

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