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Original Article

Fishes list of Jabel Awlia Dam Reservoir in the White Nile River, Sudan

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ABSTRACT
This study was carried out in Jabel Awlia Dam Reservoir in the White Nile, in the Sudan region,to update its fish composition list. Four gillnets of different mesh sizes (4cm, 6cm, 8cm, 12cm) were used. Results showed that the total fish species in downstream fishery were 23species belonging to 13 families; whereas, in reservoir fishery were 13 species belonging to 9 families. Results also confirmed that there is a decline infish composition of Jabel Awlia Dam reservoir.Results also showedthat downstream fishery was easier to catch fishes and richer withfish species than reservoir fishery that may be due to its nature. Moreover, sampling method used was not efficient to sampling in the reservoir fishery compared to the downstream fishery.Dominant fish species in the catch from downstream fishery were Alestes sp. (19.26%), Tilapias sp. (16.75%), Labeo niloticus (13.18%), Bagrusbayad (11.98%) and Hydrocynus sp. (10.74%); whereas, those from catch of reservoir fishery were Alestes sp. (38.42%), Tilapias sp. (29.37%) and Synodontis sp. (15.45%).
Key words: *Freshwater fishes, Nile fishes, the White Nile river, Jabel Awlia Dam reservoir*

INTRODUCTION

Jabel Awlia Dam Reservoir (JADR) is the largest reservoir,built in the White Nile river,in the Sudanregion. It was constructed in 1937, to impound water of the White Nile for storage purposes. This dam plays an important role of food security within Khartoum state by agricultural products and providing fresh fishes to fish markets [10]. Its reservoir extends southwards up to Kosti city, with a total area of 120000ha and is the most suitable area for commercial fishing operations [1]. The potential production of this region was reported as 15000t; whereas, the actual production ranged from 7000 to 8000t/yr[2]. The potential yield of JADR was recorded at 4.500t [3]. The annual yield of JADR was calculated at 55 kg/ha for 1981-1982 [4].In 1995, the potential production of JADR was estimated at about 11000t/yr[5].In 2003, the total annual yield of JADR was estimated at 115.732kg and the maximum sustainable yield was 90.706kg [6]. The total annual yield of Khartoum state was estimated at 1000t/yr.; JADR contributed only half of the state's annual yield [7]. The potential storage of JADR from fishes was estimated at around 15000t/yr; whereas, the actual exploitation of the stock was8000t/yr [8].

In 1950, it was recorded 105 fish species belonging to 23 families in the White Nile [9]; whereas, in 1977, commercial fishes in JADFR were reported belonging to 10 fish families [5]; in 1981, 33 fish specieswere recorded in JADR [10]; in 2003,it was recorded 41 fish species and 24 genera belonging to 13 families in JADR; whereas, in El-Giteina south to JADR, there were 37 species and 22 genera belonging to 13 families [6].

The present study aimed to provide an updated record of fish composition list of the JADRand also to study the effect of dam on fish diversity.

MATERIALS AND METHODS

Study area

Jabel Awlia Dam reservoir (JADR) locates at 32°29′07.1″ E and 15°14′18.1″ N with elevation 383m and is at40.6 km² southwards to the capital of Sudan: Khartoum (Plate 1). This study was conducted in the downstream fishery of JADR which had an area of 5km northwards to the dam barrier and 3km southwards the dam barrier in its reservoir [10].

Experimental fishing

Four gillnets made of nylon (multifilament twine) were used for fish sampling during the whole year (2005/2006). They were made of different twine numbers (4cm: 2/210; 6cm: 3/210; 6cm: 6/210;

12cm: 12/210) and different mesh sizes (4cm, 6cm, 8cm and 12cm), but they had the same length (50m) and depth (1m).

Fish sampling was carried out during three days for every two months of the whole year. Fishing nets used in the experiment fishing were set randomly in different places of JADR and these places were shifted to be set in north-south direction sometimes and other time set in east-west direction during both daytime sampling and nighttime sampling. All gillnets were lifted two times before the sunset and after the sunrise to record the fishes caught.

For analysis, descriptive statistics and quantitative analysis techniques were followed and performed by using Microsoft Excel version 2010.

Source [11]

Plate 1. Depicts Jabel Awlia Dam Reservoir in the White Nile River, Sudan

RESULTS

Fish Families

Results showed that the downstream fishery of JADR was easier to catch fishes and was richer with fish families than reservoir fishery. The total fish families recorded from downstream fishery were 13; whereas, those recorded from reservoir fishery were only 9 families (Table 1). Characidae scored the highest catch by weights in downstream fishery (41.14%) and reservoir fishery (30.09%); whereas, the least caught fish families in downstream fishery was Distichodontidae(3.5%) and those caught in reservoir fishery was Schilbeidae (1.6%). On the other hand, four fish families were not recorded during the sampling in reservoir fishery. They were Distichodontidae, Tetraodontidae, Gymnarchidae and Malapteruridae (Table 1).

Fish species

Results showed that the total fish species number recorded in downstream fishery was 23; whereas, that recorded in reservoir fishery was13. Five fish species recorded the highest percentages in caught fishesfrom the downstream fishery. They were*Alestes sp.*(19.26%), *Tilapias sp.* (16.75%), *Labeo niloticus* (13.18%), *Bagrusbayad*(11.98%) and *Hydrocynus sp.* (10.74%).In contrary, caught fishes such as: *Alestes sp.*, *Tilapias sp.* and *Synodontissp* were the most dominant fish species in the reservoir fishery and scored 38.42%, 29.37% and 15.45% respectively (Table 2).

Table 1: Fish families by weight (kg) in Jabel Awlia Dam Reservoir (JADR) in the White Nile,Sudan

No	Fishery / Family	Downstream Wt (kg)	%	Reservoir Wt (kg)	%
1	Bagridae	269.1	19.61	55	6.71
2	Centropomidae	89.5	6.52	5	0.61
3	Characidae	413.05	30.09	339.5	41.4
4	Cichlidae	229.9	16.75	240.5	29.33
5	Claridae	21.5	1.57	30.5	3.72
6	Cyprinidae	211.9	15.44	19.7	2.4
7	Distichodontidae	3.5	0.25	0.0	0.0

8	Gymnarchidae	6.5	0.47	0.0	0.0
9	Malapteruridae	17.5	1.27	0.0	0.0
10	Mochokidae	68.2	4.97	126.5	15.43
11	Mormyridae	12.2	0.89	2	0.24
12	Schilbeidae	22.2	1.62	1.3	0.16
13	Tetraodontidae	7.5	0.55	0.0	0.0

Table 2: Fish species by weight(kg) in Jabel Awlia Dam Reservoir (JADR) in the White Nile,Sudan

No	Fishery / Species	Downstream Wt. (%)(kg)		Reservoir Wt. (%) (kg)	
1	*Alestes sp.*	264.3	19.26	314.7	38.42
2	*Auchenoglanis sp.*	24	1.75	3.0	0.37
3	*Bagrusbayad*	164.4	11.98	48	5.86
4	*Bagrusdocmak*	69.5	5.06	4.0	0.49
5	*Barbusbynni*	29.5	2.15	12.5	1.53
6	*Brycinus nurse*	1.4	0.10	0.0	0.0
7	*Chrysichthysauratus*	11.2	0.82	0.0	0.0
8	*Clarias sp.*	19.5	1.42	30.5	3.72
9	*Distichodus niloticus*	3.5	0.25	0.0	0.0
10	*Gymnarchus niloticus*	6.5	0.47	0.0	0.0
11	*Heterobranchusbidorsalis*	2.0	0.15	0.0	0.0
12	*Hydrocynus sp.*	147.35	10.74	24.8	3.03
13	*Hyperopisusbebe*	1.7	0.12	0.0	0.0
14	*Labeocoubie*	1.5	0.11	0.0	0.0
15	*Labeo niloticus*	180.9	13.18	7.2	0.88
16	*Lates niloticus*	89.5	6.52	5.0	0.61
17	*Malapteruruselectricus*	17.5	1.27	0.0	0.0
18	*Mormyropsanguilloides*	1.0	0.07	0.0	0.0
19	*Mormyrussp*	9.5	0.69	1.0	0.12
20	*SchilbeIntermedius*	22.2	1.62	1.3	0.16
21	*Synodontis sp.*	68.2	4.97	126.5	15.45
22	*Tetraodonlineatus*	7.5	0.55	0.0	0.0
23	*Tilapias sp.*	229.9	16.75	240.5	29.37

DISCUSSION

Fishes, like other organisms interact with the surrounding environment where they live. This interaction may effect on them either positively or negatively represented by their dominant species and their numbers in the affected environment. The White Nile falls under this environmental concept where it had a known phenomenon of boomed water hyacinth during 1970s which covered its reservoir and reached up to its barrier. This environmental changing besides fishing activity were responsible for decline in fish family in JADR where the present study recorded 13 fish families in downstream and only 9 in reservoir with total number of 23 fish species in downstream and 13 in reservoir (Tables 1, 2). This result is supported by previous studies that conducted in the White Nile since the mid of last century. In 1950, they were recorded 105 fish species belonging to 23 fish families in the White Nile[9]; whereas, in 1981, only 33 fish species were recorded [10] and 41 fish species belonging to 13 families were recorded in 2003 [6].

Moreover, the previous studies also confirm the present decline of fish composition of JADR representing in the total production of the dam. A decline clearly appeared after the first estimation held in mid 1970swhich reported the actual production was at 8000t/yr [2], but after few years, the annual fish catch was estimated to be 1.189.052kg for downstream fishery and 1.945.582kg for reservoir fishery [5].In mid-1990s, the potential production was estimated to be 11000t/yr [5], but in 2003, the total annual yield was 115.732kg [6].

In addition, downstream fishery was easier to catch fishes and richer of fish species (more diversity) than reservoir fishery (Tables 1, 2). This may be due to the effect of dam related to: 1) low level of water in the downstream fishery which helps fishermen to practice fishing activity intensively and easily that allow them to catch many different fish species compared to reservoir fishery;

2)downstream fishery has a limited area for fishing compared to the reservoir fishery which needs to less effort of fishing activity; 3) there is no strong currency as in reservoir fishery that may postpone fishing operations during particular seasons of the year such as autumn; 4) a higher diversity in downstream fishery that may be due to fishes found in it were more adapted to lotic conditions, so that they were easy to catch in; whereas, those found in reservoir fishery were more adapted to lentic conditions, so using floating gillnets like those of the present study were not effective to catch the lentic fishes. Only a few species those may be able to survive in the reservoir fishery; whereas, more species may be adapted to lotic conditions in downstream fishery; 5) sampling method used was not efficient to sampling in the reservoir fishery. It seems that it is easy to sample downstream fishery and that's why the fishing nets of the present study found more species in downstream fishery than in the reservoir fishery. Therefore, fishermen were able to catch fishes as high as possible from downstream fishery.

REFERENCES

1. SRE (1964). Study on the Fish Resources of the White Nile. Report, Soviet Research Expedition (cited by Hamza, 1981).
2. Henderson, H.F. (1975). The Fisheries of the Reservoirs of Central Sudan. Cairo, FAO Report, Near East Reg. Office: 5 p.
3. FAO (1982). The Sudan: The Sudd Fisheries: potential and prospects. Report of the seminar in Juba, FAO/UNDP, Rome, Italy.
4. Kapetsky, J.M. (1986). Management of fisheries on large African reservoirs - An overview. In: G.E. Hall and M.J. van den Avyle (eds.). Reservoir Fisheries Management; Strategies for the 1980s. Reservoir Committee, Southern Division American Fisheries Society, Bethesda, Maryland.
5. Adam, A.E. (1977). Some Studies on the Productivity of Jabel Aulia Reservoir. M. Sc. (Zoology) thesis. University of Khartoum, Khartoum, Sudan.
6. Abdel-Rahman, M.E. (2003). A study on catch assessment in the northern part of Jabel Awlia reservoir. M. Sc. (Zoology) thesis. University of Khartoum, Khartoum, Sudan.
7. FDKS (2003). Database program of the Khartoum state fisheries. Report (in Arabic), Fisheries Department, Ministry of Agriculture and Animal Wealth, Khartoum State (FDKS), Khartoum, Sudan, p. 32.
8. FDMARF (2006). Fisheries Sources of the Sudan. Report, Ministry of Animals Resources and Fisheries (FDMARF), Sudan. http://marf.gov.sd/.
9. Sandon H. (1950). An Illustrated Guide to the Freshwater Fishes of the Sudan, 25th Ed, , Sudan Notes and Records, McCorguodale Co., London,p. 53.
10. Hamza, K.M. (1981). Studies on fish populations in Jabel Awlia reservoir. M. Sc. (Zoology) thesis. University of Khartoum, Khartoum, Sudan.
11. Mohammed, M.O. (2006). Effects of gillnets and fishers on fisheries of Al-Kalakla and Jabel Awlia Dam reservoir. M. Sc. (Aquatic Animal), thesis. Sudan Academy of Sciences, Khartoum, Sudan.