ISSN: 2347-5129
(ICV-Poland) Impact Value: 5.62
(GIF) Impact Factor: 0.352
IJFAS 2015; 3(1): 308-311

www.fisheriesjournal.com
Received: 15-07-2015
Accepted: 17-08-2015

Getachew Senbete
Oromia Agricultural Research Institute, Zeway Fisheries Resources Research Center.

Correspondence
Getachew Senbete
Oromia Agricultural Research Institute, Zeway Fisheries Resources Research Center.

Fisheries and Crocodile Resource Potential of Lake Beseka, East Shoa Zone, Ethiopia

Getachew Senbete

Abstract
Lake Beseka is a gradually expanding lake colonized by Nile crocodile decades ago. The saline lake Beseka has both crocodile and fish resource although crocodile resources is devoid due attention. Day and night count of crocodile was conducted on Lake Beseka during May 2008with the objective to estimate crocodile population of the lake whereas gear selectivity study for fishery was conducted during April 2005 to march 2006 using 75 m long gillnets of 60, 80,100 and 120mm stretched mesh and long line with hook size 5,6,7,and 8 each. *Oreochromis niloticus* and *Claries gariepinus* are the two fish species recorded from the catch. 50.40% by weight of the gillnet catch was *Oreochromis niloticus* whereas 99.2% of the long line catch was *Claries gariepinus*. For the crocodile survey, the lake was stratified in to zones based on the shoreline habitat characteristics. A total of 686 crocodiles were counted from 11 zones of the lake during the survey of which 1-2m long young crocodiles accounted for 67.9% whereas the bigger (2-3 m long) were 21.7%. Moreover, the riparian communities and fishermen have responded that crocodile population of the lake is increasing from time to time. Generally, the survey report indicated that the lake has plenty of crocodile resources which are not yet utilized. Therefore, attention should be given in management and sustainable utilization of this resource.

Keywords: Lake Beseka, Crocodile, Ethiopia

1. Introduction
Being the largest predator in their habitats (Kofron, 2004 [9]; Patrick, 2009 [13]; Pooley, 1982) [14] crocodiles have immense role in selective predation and recycling of nutrients. They have positive effects on their environment and are also called keystone species that maintain aquatic ecosystem structure and function and hence can be considered as umbrella species for the conservation of freshwater ecosystem (King 1988 [8]; Craighead 1968 [1]; Seddon & Leech, 2008) [16]. For instance, Whitaker and Whitaker (1977) [22] reported that aquatic systems to have suffered and fisheries declined as a result of removal of crocodiles in one of the Indian water body.

Worldwide wildlife is under threat mainly from habitat destruction. Similarly, Crocodile population is reduced as a result of exploitation for skin, but more threat is from competition for their aquatic habitat (Jacobsen 1991[7]). Based on IUCN red list report (IUCN/UNEP/WWF, 1980) [5], seven crocodilian species Out 23 of total crocodile species are listed as either endangered or critically endangered.

Crocodiles are cold blooded animals and hence maintain their body temperature within narrow limits. They bask in the sun when the water temperature is cold and go for water or into wetlands when temperature is hot. They are metabolically efficient and have fast spontaneous effect. Crocodilians have complex behaviors including social interactions, dominance hierarchies and coordinated feeding. Communal breeding enclosures of crocodiles have a spectacular attraction for tourists. Most females remain near their nest during incubation to protect the eggs from predators. They have a well-developed maternal care. Hatchlings remain together near the mothers for several months, seeking protection.

Crocodile are farmed on large scale only under semi-domesticated conditions. In Africa, crocodile farms were first started in Zimbabwe but have now been spread over many parts of the continent, particularly Southern and Eastern African countries.

In Most of the time, majority of people living alongside crocodiles in Africa derive minimal benefit from them and see crocodiles only as ugly and dangerous problem animals (Graham & Beard, 1973 [3]; McGregor, 2005 [11]; Pooley, 1982 [14]; Ross, 1998 [15]; Thomas, 2006) [19]. For instance the Thailand people have traditionally regarded crocodiles as evil. Frequent killing

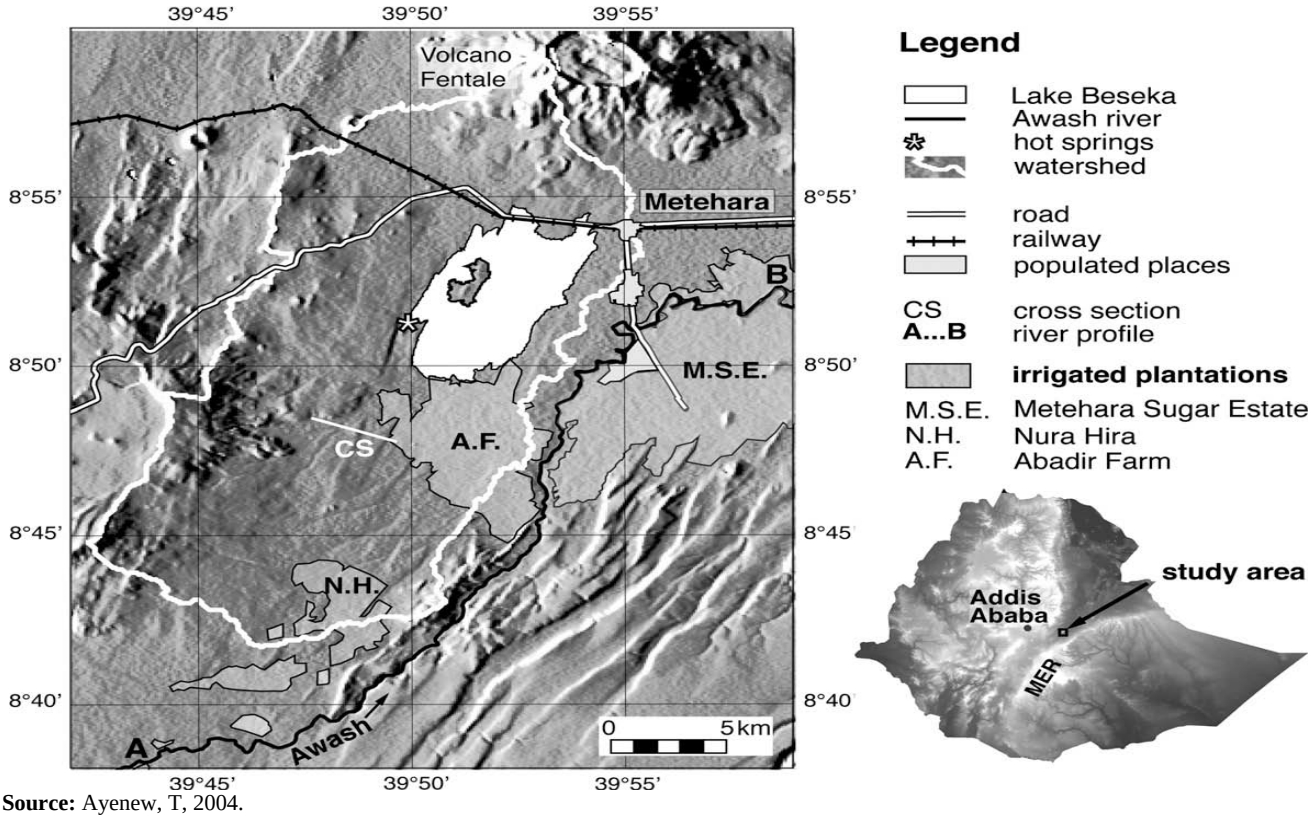
And Disturbance is common in Africa which could lead to stock depletion. This type of attitude increases attacks on humans and livestock resulting in decreased local support for conservation initiatives (McGregor, 2005) [11]. On the other hand, success in conservation programs will result in increase of crocodile populations which will ultimately lead to high crocodile-human conflict. Hence, there must be a creative approach that provides incentives to people living with crocodiles which can also ensure sustainable and rational way of resource utilization technique.

2. Methodology

2.1 Description of the study area

Lake Beseka is located about 190 km from Addis Ababa, the capital of Ethiopia) to the East. The lake is found in the rift valley system at 955m.a.s.l. It is known by its alkaline water chemistry, high pH (pH = 9.5), saline with electrical conductivity of 6300 µS/cm) (Mamo & Getaneh, 2003) [10]. The time series of satellite data documented that Lake Beseka's surface area was about 3KM^2 in 1957 (Tessema, 1998) [17] but reached 54KM^2 in 2006. Several studies (Halcrow and Partners, 1979 [4]; IAEA, 1999 [6]; Tenalem, 2004[21] concluded that the major contributor for expansion of the lake volume is the sugar cane irrigation scheme known as Metehara sugar cane plantation located at the south and south-east of the lake.

This has brought a number of challenges on the major infrastructure facilities in and around Metehara town including, sugar cane plantation found at the southern part of Beseka (Tenalem, 2004) [21].



Source: Ayenew, T, 2004.

Lake Beseka has attractive landscape and important biodiversity; the ice lands two commercially important fish species (Cat fish and Nile tilapia), Crocodiles, alligators, different birds and hot springs. The fish resource of the lake was estimated to be about 205 tonnes per year whereas current production does not exceed 17 tonnes per year. For its high salinity, the lake water is not used for drinking purpose both for human and domestic animals although it is in area where water scarcity is much prominent.

2.2 Fishing gear selectivity

Three local wooden boats, four different gillnets of 60, 80, 100, 120mm stretched mesh each 75 m long each, and 240 hooks of hook size 5,6,7,8 each in number was constructed. Five fishermen were selected from the existing fishery cooperatives on voluntary bases to participate on the data collection. Filwuha, Jamaica, Gimel meda, Deset, Wacho, and Hadid were randomly selected as sampling site. Both gillnet and long line was set overnight (from 5:00pm to 7:00am) at a depth of 3-6 m. Live bait (insect) was used for line fishing as that of local fishermen. Sample from each fishing gears under evaluation was recorded separately and measured for total length (TL) and total weight (TW) to the nearest 0.1 cm and 0.1g, respectively and sexes of most specimen were determined by pressing the abdomen and/or dissected the gonads.

2.3 Crocodile counting

A fiber glass boat and 15 hp engine was employed for transportation during the survey period. Marine binocular was used for counting and identification for the day count conducted between 0900h and 1300h) whereas 12V spot light was used for the night count conducted between 1900h-2200h. The whole lake side shore line was covered within four days and the traveling was made on average distance of 50-75m from the shore line. The lake was purposely divided in to eleven zones and the same zone was used both for day and night count.

Crocodiles are primarily nocturnal animals which feed and are most active in the dark. Reflective sparkling tapetum in the eyes of the crocodile is highly reflective especially during night time. This is one of the important behaviors which make the night count most effective and easy.

PRA was undertaken in selected districts and local fishers to know the perception of the local communities and to know whether there is crocodile human conflict history.

3. Result

From 35 settings done in the experimental period a total of 1066 fish were collected from all gillnets under evaluation. Catch composition of the gillnet shows that 186 (17.44%) fish were *Claries gariepinus* whereas the remaining 880 (82.55%) was *Oreochromis niloticus.* On the other hand 49.6% of the catch by weight was *Claries gariepinus* whereas 50.4 % was *Oreochromis niloticus.*

Compared with other gillnets, Gillnet with stretched mesh size 80mm has got maximum catch which is 622 fish (58.35 %) by weight of the total catch from gillnet. However gillnet which showed high catch was repeatedly attached by crocodiles. From 35 setting, 12 crocodile attacks were recorded on Gilnet with mesh size 80mm and 10 crocodiles were recorded died entangled in the net set for fishing. This high interference is because crocodile are much attracted by the fish caught in the net (Getachew 2008) [2].

Fishermen on the lake responded that there were no crocodiles by the time the lake was small, about 35 years ago. However, current evidence revealed that they are increasing in number from time to time and the species is also identified as Nile crocodile (*crocodile's niloticus).*

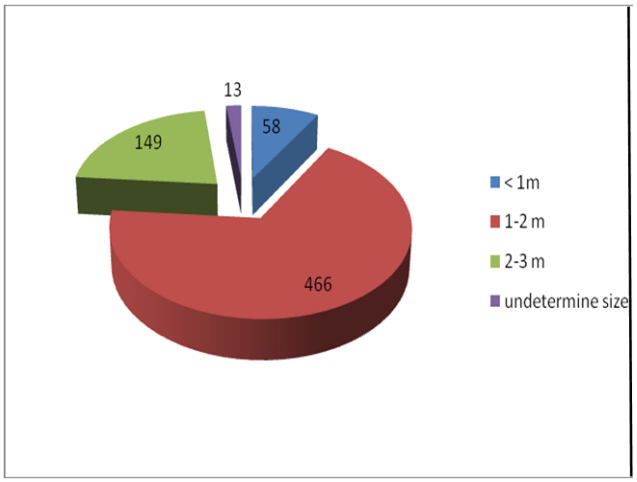
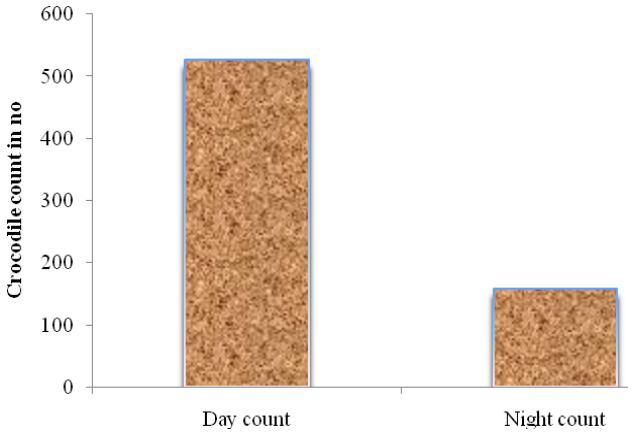


Fig1: Distribution of crocodile by size class

Size class in meters				
zone	<1	1-2	2-3	undetermined
Harro Adi	16			
Deset		32	10	5
Filuha Deset		47	53	
Dingay mefca		5	21	
medium Beseka	16	90	11	
little Beseka	5	27	11	
Gimel meda	16	122	27	
yellow island				8
Gimel mateca		11		
Fila	5	132	16	
Total	58	466	149	13
Over all total	686			

Based on the response from the riparian community, there is no crocodile human conflict history except occasional predation on chicken and wild birds. Therefore, the response indicated that the crocodiles in the area are not aggressive. Patrick, 2009 [13] estimated an annual loss of between 255 and 6864 cattle per year and damage to an estimated 71500 fishing nets per year in North Eastern Namibia.



The crocodile population structure of Lake Beseka has got three size categories. 67.9% of the total population was found in the size range of 1-2m, whereas 21.7% of the total crocodile population is in the size range of 2-3m long. The small size crocodiles (<1m) were few in number which could be due to their small to be include in the counting conducted during survey work. The biggest size group which ranges from 2-3m were also small in number. Breeding (nesting) site were not well identified on this study, but local fishers reported that bigger Iceland and yellow Iceland are the breeding sites of the crocodiles. However, Harro Adi, Gimel Meda, and medium Beseka are areas where small size crocodiles were recorded. This could be because of ample fish offal (damping site and shallow water depth where the small crocodiles prefer to grow.

From day count, medium size (1-2m) long crocodiles were much more abundant in Fila site (132 and Gimel Meda (122). Fila is local name for wetland vegetation dominated by thypha whereas Gimel meda is to mean camel watering field. Gimel meda is near to fish landing, where disturbance is frequent but fish offal is plenty. However, fila is near to the hot spring and disturbance is relatively low.

Crocodile resources of Lake Beseka did not get due attention so far and the effort to establish its sustainable utilization is not yet started. However, the potential to exploit the resource in more sustainable is already visible. Establish crocodile farm and use the natural stock as tourist destination, and biodiversity hotspot is high. The area has ambient temperature to establish crocodile farm. In addition Lake Beseka is adjacent to Awash national park with plenty of infrastructure like road, railway, electricity and tape water. Detailed

Population monitoring and ecological research has to be designed to establish sustainable resource utilization in such a way that it will create an opportunity for better fishing with reduced risk and loss of resource.

4. Acknowledgment

I would like to acknowledge Oromia Agricultural Research Institute for funding this survey work, ZFRRC and all the staffs, Lake Beseka Fishery Cooperative and Fish for all NGO for technical and material support for the success of this work.

5. Reference

1. Craighead Fc. The role of the Alligator in shaping plant communities and maintaining wildlife in the Southern Everglades. Florida Nat 1968; 41 :(2)769-74.
2. Getachew Senbete. Participatory Evaluation of Gillnet and Long Line on Lake Beseka, Ethiopia. Proceeding of Ethiopian Society of Animal production, Addis Ababa, Ethiopia, 2008.
3. Graham A, Beard P. Eyelids of Morning: The Mingled Destinies of Crocodiles and Men Greenwich, CT: New York Graphic Society, 1973.
4. Halcrow, Partners. Master Plan for the Development of the Surface Water Resources in the Awash Basin, vol. 6. Ministry of Water Resources, Addis Ababa, Ethiopia, 1979.
5. Iucn/Unep/Wwf. World Conservation Strategy Living resource conservation for sustainable development. IUCN, UNEP and WWF, Gland, Switzerland, 1980.
6. Iaea. Water and Environment News. Isotope Hydrology Section, International Atomic Energy Agency, Vienna. Quarterly, 1999, 8/9.
7. Jacobsen Nhg. Crocodiles (Crocodylus niloticus) survey and management proposals. Internal Report. Transvaal Chief Directorate: Nature and Environmental Conservation, Pretoria, 1991.
8. King Fw. 1988 Crocodiles: Keystone wetland species. In: Wildlife in the Everglades and Latin American wetlands. Abstracts of the Proceedings of the First Everglades Nat. Park Symposium, Miami 1985.
9. Kofron Cp. The trial intensive management area for crocodiles: A crocodile removal zone in Queensland, Australia. Coastal Management 2004; 32:319-330.
10. Mamo T, Getaneh E, The geology and surface hydrothermal alteration mapping of Fentale geothermal prospect, intern report of the Geological Survey of Ethiopia, Hydrogeology, Engineering Geology and Geothermal Department, 2003, 29.
11. Mcgregor J. Crocodile crimes: people versus wildlife and the politics of postcolonial conservation on Lake Kariba, Zimbabwe. Geoforum 2005; 36:353-369.
12. Mwr. Study of Lake Beseka (Main Report, Vol. 1). Ministry of Water Resources, Addis Ababa, Ethiopia, 1999, 203.
13. Patrick WA. The ecology, conservation and management of Nile crocodiles Crocodylus niloticus in a human dominated landscape. Imperial College London, 2009.
14. Pooley T. Discoveries of a crocodile man William Collins Sons & Co Ltd, Johannesburg, 1982.
15. Ross Jp. Crocodiles: status survey and conservation action plan, 2nd edn, 1998.
16. Seddon, P.J. & Leech, T. (2008) Conservation short cut, or long and winding road? Acritique of umbrella species criteria. Oryx, 42, 240-245.
17. Steve P. Hand book for Farmers and investors, Rural Industries Research and Development Corporation 2006, 1-7.
18. Tessema Z. Hydrochemical and Water Balance Approach in the Study of High Water Level Rise of Lake Beseka. M.Sc. thesis, University of Birmingham, UK, 1998.
19. Thomas Gd. Human-crocodile conflict (Nile crocodile: Crocodylus niloticus) in the Okavango Delta, Botswana, Stellenbosch, Stellenbosch, 2006.
20. Tsegaye Tadesse. Money needed for Ethiopian Crocodile farm (internet source), 2006.
21. Tenalem A. Environmental implications of changes in the levels of lakes in the Ethiopian Rift since 1970. Reg. Environ. Change, Springer-Verlag, 2004.
22. Whitaker, R. & Whitaker, Z. (1977) Sri Lanka crocodile survey. Loris, 15, 239–241.