

The Assess of Pools and Small Lakes as Wetland Sites in Zalingei Area, Darfur, Sudan

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Abstract: The study was conducted at Zalingei area Central Darfur state-Sudan, to assess the technical aspect of wetlands (water in the area, its availability, depth) in Zalingei area, during the period from 2013 to 2014. The methods used to data collected were included; metric tape (50m) and pole made by Jebel Marra Rural development project, and string (50m), coordinates of Each wetlands points were recorded using a GPS. The result showed that the Wetlands in Zalingei area, can take many forms as Wadis (Streams), water Pools (Permanent and temporary) and small lakes, Eight water pools and two lakes were established in the dry season, these pools are: Adam-gola, Fawzei, Hamidia, Saa4, Tarei, Zour, Rejl-aldafa, and Sarei-olmaly. The lakes as: Zour Lake, and Dudei Lake. The study was recommended that to further surveys of wetland should be made in Zalingei area and registrar in Wetland convention as Ramsar site and important bird's area.

Keywords: Wetland, Birds Habitats, Zalingei, Wadi Azoom, Zalingei Pools and Lakes

1. Introduction

According to Ramsar convention [13]; Wetlands are definite as areas of marsh, fen, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water, the depth of which at low tide does not exceed six meters. Wetlands include marshes, swamps, vales, pans, bogs, ponds, reed beds and estuaries. One of the best known functions of wetlands is to provide a habitat for birds [14]. Wetlands are important bird habitats, and birds use them for breeding, nesting, and rearing young. Birds also use wetlands as a source of drinking water and for feeding, shelter, and social interactions. Some waterfowl, such as Pelicans, have been adapted to wetlands to such an extent that their survival as individual species depends on the availability of certain types of wetlands within their geographic range. Other species like spoon bill, Abdim's Stork, Sacred Ibis use wetlands only during some parts of their lives [9].

2. Materials and Methods

2.1. Study Area

Zalingei area lies in the western parts of Jebel Marra (Hunting technical serves [8]. It covers about 4480 square kilometers in the poor savanna zone between latitudes 12°30' and 13°30' North, and longitudes 22°20' and 23°45' East according to Hunting Technical Services [8]. The study area covers alluvial channels, flood plains and terraces forming the drainage basins of the season all large streams known locally as Wadis such as Wadi Areebou and Wadi Azoom. The altitude ranges from 500 to 1200 meters above sea level. The annual rainfall varies between 350 and 750 millimeters. The mean average temperature ranges between 20 and 30 °C. The flatlands and mountain slopes are traversed by many seasonal Wadis and Khors coming from the higher reaches of Jebel Marra (Wadi Azoom, Wadi Areebou). These pass through the Zalingei area, but in dry season they leave many permanent water pools in the Wadi, [8, 11]. These wetlands are important habitats for migratory and resident birds, specially waterbirds, for drinking, nesting, resting and feeding.

In the present study, the study area was divided in to four sites due to their water persistence and topography, these selected sites were surveyed for identifying and quantifying

as far as possible the avifauna. These sites were Zalingei site, Wadi Azoomsite, Shawa site and Terijsite (Figure 1).

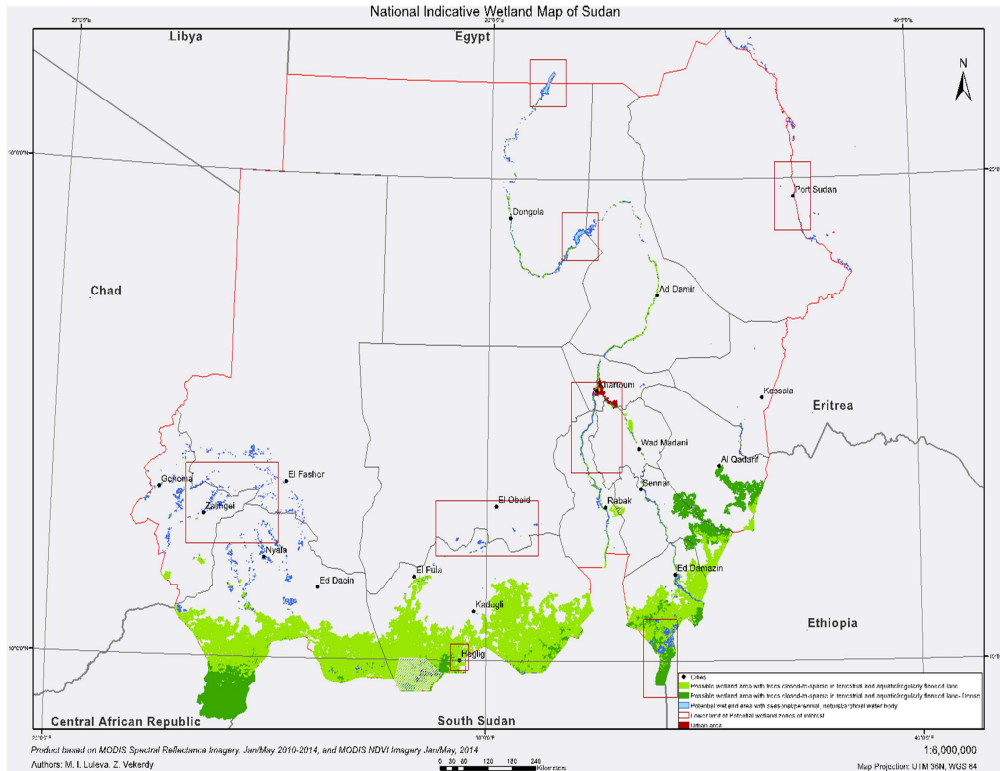
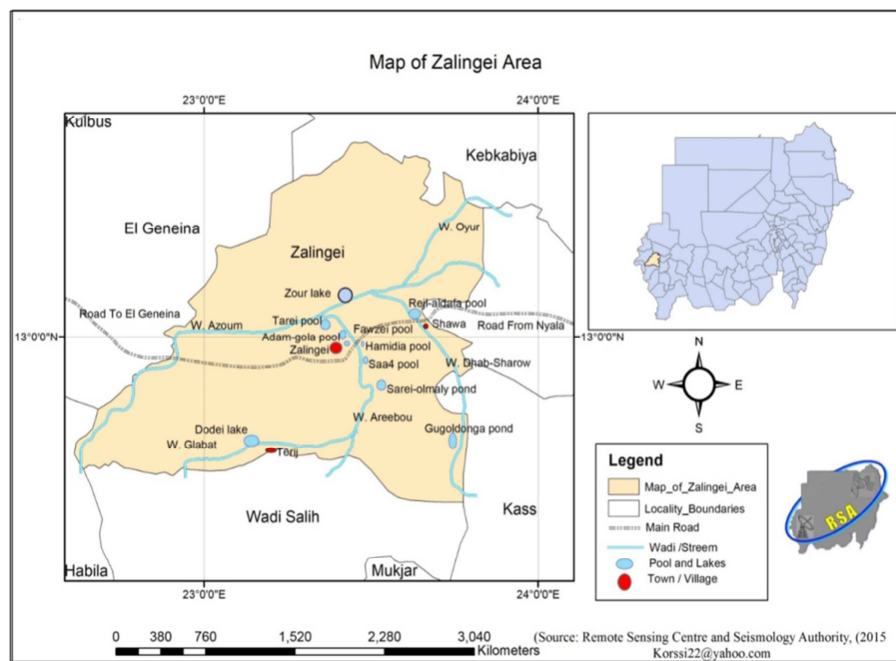


Figure 1. National Indicative Wetlands Map of Sudan [11].

2.2. Tools and Methods

The levels of water at different sites were measured used 50 meter tape and string (50 meter) coordinates of each wetlands site were recorded using a GPS.



Source: byauthorinRSA, (2015) Korssi22@yahoo.comsupportedbyhttp://glcf.umiacs.umd.edu/data/landsat.

Figure 2. Map of Zalingei Locality.

3. Results

3.1. Water Pools

There are seven water pools in the study area as:

3.1.1. Adam-golapool and Fawzeipool

Coordinates: 12°54'765N 23°29'063E

This pool was situated in the western bank of Wadi Areebou, near to Areebou Bridge. The pool was perennial, and very small size (145*20), (154*20m) in the first season and (136*20m) in the second season. It had some water sheds. The maximum water depths were in August 2.48m (first season), and 2.32m (second season). The maximum water depths was meanly (2.40m) in August. (Table 1 and Figure 3).

3.1.2. Hamidiapool

Coordinates: 12°54'806N 23°29'211E

This pool was found on the northern bank of Wadi Areebou (near to Areebou Bridge), it was perennial, and very small size, 1600* 400meters in August meanly of the two seasons (Table 1 and Figure 3).

It had a maximum water depth (2.54m) in August of first season and 2.38m in second seasons. Hamidia pool had maximum water depth meanly in August (2.46m). The pool was completely dried during dry season (March, April and May) (Table 1 and Figure 3). The perennial pool flora were *Ceratophyllum deinersuni*, and *Najaspectinata* (covering surface water), the following fishes were identified, *Clariaslazera* and *Tilapiazillii*. Some species of birds were identified during two seasons-

3.1.3. Saa4pool

Coordinates: 12°54'537N 23°29'891E

The pool falls on the northern bank of Wadi Areebou, near to Um-Zeaafa village; the pool was perennial, but of very small size, (11.92*216m) in the wet season, (11.86*220m) in first season and (11.98*212m) in second season (Table 1 and Figure 3).

It had a maximum depth of about (3.20m). The following fishes were identified. *Clariaslazera* and *Tilapiazillii*. There was an artisanal fishery. Waterbirds were hunted by local villagers. The pool is a watering point for wildlife (small mammals).

3.1.4. Tareipool

Coordinates: 12°55'638N 23°27'502E

This pool falls in the western bank of Wadi Areebou, near to Tarei village; the pool was perennial and very small size, (15* 30m) in August (two seasons) (Table 1 and Figure 3).

The pool was recorded flooded during the rainy season. The maximum water depth was (3.46m) in the wet season. The following species of fish were identified as, Grmot (*Clariaslazera*) and Bulty (*Tilapiazillii*). 41 birds species were identified.

3.1.5. Sarei-olmalypool

Coordinates: 12°53'606N 23°29'978E

This lake falls in the eastern bank of Wadi Areebou, near to Yathreeb village; the pool was perennial, and had size of (388* 236m) in the wet season. In August the water covered 386* 242m (first season), and 390* 230m (second season) (Table 1 and Figure 3).

The pool submerged during the rainy season, and fed seasonally by KhorUmzeafa. The water depth was (2.42m) in August the wet season. In August water depth was 4.39m (first season), and 3.15m (second season). There was an artisanal fishery. 49 birds species were identified.

3.1.6. Rejl-aldafapool

Coordinates: 12°57'200N 23°35'680E

This pool was falls on the bed of Wadi Dhab-Sharow, near to Shawa village; the pool was temporary, and of very small size, (15* 20m) in the wet season, 15* 10m in August (first season) and 15* 30m (second season) (Table 1 and Figure 3).

The a maximum water depth (1m) in the two seasons and dried during dry season (from January to May). 41 of birds species were recorded.

3.1.7. Gugoldongapool

Coordinates: 12°53'606N 23°29'978E

This pool falls in the southern Slope of Jebel kasara, the lake was perennial, and it had size of (425*213m) in the two season (Table 1 and Figure 3).

The pool flooded during the rainy; it was fed seasonally by some Khors come down from Jebel kasara. The maximum water depth was (3.15m) in August of the wet season. In August the water depth was 3.20m (first season), and 3.15m (second season). Fifty-one birds species were recorded. The pool was a watering point for wildlife (small mammals), birds and cattle of nomadic herders.

3.2. Small Lakes

3.2.1. Zour Lake

Coordinates: 12°57'295N 23°31'785E

The pool was falls in the northern bank of Wadi Azoom, the pool was not dried all months of the year, and very big size, (2000*500m) in August of two season (Table 1 and Figure 3).

The pools flooded during the rains; it's feeding seasonally by wadi Azoom. The maximum water depth (1.50m) in August (wet season) (Table 1 and Figure 3). Grmot (*Clariaslazera*) and Bulty (*Tilapiazillii*) were identified as fish species. 46 species of birds were recorded. The pool was a watering point for wildlife (small mammals and birds), and cattle of nomadic herders.

3.2.2. Dodei Lake

Coordinates: 12°54'017N 23°28'053E

The pool was falls in the bed of Wadi-Glabat, near to Glabat Hill; the pool was perennial, and of very big size, (3000* 500m) in August of two season. (Table 1 and Figure 3).

The pool was flooded during the rainy season; it was fed seasonally by Wadi-Glabat. The maximum water depth was

(3.20m) in August of two season. 3.14m in August (firstseason) and 3.26m (secondseason). The following species of fish was recorded as, Grmot (*Clariaslazera*) and

Bulty (*Tilapiazillii*). 49 birds species were recorded. The pool was a watering point for wildlife (smallmammals), birds.

Table 1. Compared the lake sand Lakes measurement of two season (2013-2014).

StudySide	Pools and Lakes	Water depth (meters)	Area (meters)	Availability of water (month)
Zalingei	Adam-golapool	2.40	145*20	12
	Fawzeipool	2.50	20* 20	12
	Hamidiapool	2.46	600* 40	9
	Saa4pool	3.20	11.92* 216	12
	Sarei-olmalypool	2.42	388* 236	12
	Gugoldongapool	3.15	425* 213	12
Wadi-Azoom	Tareipool	3.46	15* 30m	12
	Zourlake	1.50	2000* 500	12
Shawa	Rejl-aldaapool	1	15* 20	7
Terij	Dodeilake	3.20	3000* 500	12

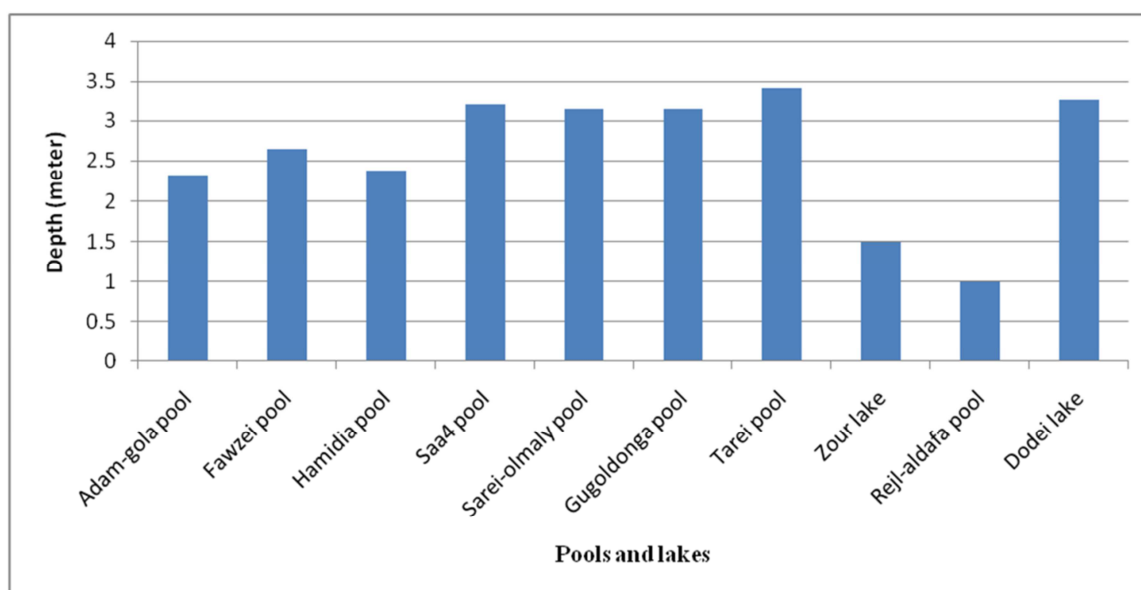


Figure 3. Wetlands measurements were calculated in both seasons (2013-2014).

4. Discussion

In this study, the Wetlands in Zalingei area, can take many forms as Wadis (Streams), water Pools (Permanent and temporary) and small lakes. Ramsar convention [13] was including these three types in Wetland definition. Eight water pools and two small lakes were established in the dry season, these pools are: Adam-gola, Fawzei, Hamidia, Saa4, Tarei, Gugoldonga, Rejl-aldafa, and Sarei-olmaly. The small lakes are Dodei and Zour.

The maximum water depth in Pools and small lakes was recorded in August of the two wet seasons. These pools are provided water in dry season to use by various species of birds for drinking, feeding and nesting [10].

The availability of water in these wetlands tells all months of the years, except Hamidia and Rejl-aldafa (ninemonths, seven months respectively). Because Hamidia was more used in horticultural irrigated, for this reason it was drought (from March to May), while Rejl-aldafa was temporary, and of very small size and low water depth so that it was drought during the dry season (from January to May). This study was the

first work in the field of the wetland habitats for birds in the Sudan.

Awide variety of habitat types, in the Sudan, are classified as wetlands; these were; The Nile, Blue Nile, White Nile and their flood plains and Sunut Forests. Seasonal streams (Khores): Khor AbuHabil. Seasonal rivers: Atbara, Rahad, Dinder, Gash and Baraka are among the largest. Mountain streams: KhorArbat in the eastern Sudan, Wadi Gallol in Darfur [1, 6]. Fresh water lakes: Examples are ErRahad, Kundi, Keilak and Abyad, in western Sudan [3]. Seasonal lakes: These are found in different regions and include UmBadir, ElFula, RasAmir, UmBaggara [12]. Craterlakes: Two volcanic lakes are found in JebelMarra (Dariba) and Malha in the Medob Hills [4]. HotSprings: Perhaps Akasha hot springs, at the tail of Lake Nubia are the most accessible [4]. Others are found in Quella (JebelMarra), elHarra (wadiAzoom) and in the Meidoub Hills [4]. Oasis: Nukhaila Oasis, Selima Oasis, Atroun Oasis, elBashiri Oasis [4]. Mayaas: They are either fed from rivers or by sheet flow or both. They frequently border or rental rivers like Dinder and Rahad [5, 7]. TheRedSea: Important wetlands habitats have been listed by [12] such as Coralreefs, mangrove Creeks, bays and lagoons, seagrassbeds,

small off-shore islands and other coastal sites significant for birds and other terrestrial wildlife Senganeb. Dams on the Nile: Lake Nasser/Nubia, Sennar, Jebel Aulia, Roseires, Khashm-elGirba, and Meraowe [2, 17].

According to these studies [10, 15, 16]; Zalingei area is traversed by many seasonal streams and khors. These seasonal streams come down from Jebel Marra and flow westwards. Wadi Azoom and Wadi Areebou are the most important seasonal streams. In the dry season these two Wadis stop running and many permanent water pools are left in their bed.

5. Conclusion

Zalingei area is qualified to be listed as one of Ramsar site in the Sudan. According to [13] there were three types of Wetland were defined in Zalingei area. The availability of water in these wetlands tells all months of the years, except Hamidia and Rejl-aldafa (nine months, seven months respectively)

Wadi Azoom and Wadi Areebou are the most important seasonal streams, the seasonal streams come down from Jebel Marra and flow west wards.

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