



MONITORING OF MIGRATORY WATERBIRDS IN SUDAN (FEBRUARY 2018).



Wildlife conservation general administration (WCGA)

Sudanese wildlife society (SWS)

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Cartography by Tour du Valat Research Institute

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Mission

The mission had the following objectives:

- Test of a replicable monitoring method for waterbird, sampling of the Red Sea shore (300 km) and the Khor Abu Habil Alluvial Fan (1500 km²)
- Waterbird counts on the Red Sea Shore and in the Khor Abu Habil Alluvial Fan
- In situ training session on waterbird identification and census
- Start of the multidisciplinary diagnostic of Khor Abu Habil Alluvial fan wetlands and organisation of a Technical Workshop in Khartoum (component 2 of the RESSOURCE project)

Permanent Team for the Mission:

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The mission has been prepared since November 2017 in close cooperation between WCGA (Mohamed Adam & Manal Bihery) and ONCFS (Pierre Defos & Jean-Yves Mondain-Monval), following the list of activities developed during the **RESSOURCE project** meeting, held in Rome in May 2017.



Context

Sudan is a Contracting Party to **AEWA¹** and to the **Ramsar Convention²** aiming at waterbird and wetland conservation. The **RESSOURCE Project** has been designed to help the implementation of these international Agreements in the Lower Nile Valley and the Sahelian Region. RESSOURCE project Component 1 aims at increasing our knowledge on waterbird populations size in the concerned countries, as well as detecting potential trends in their numbers. Migratory waterbirds are by nature highly mobile during most of the year, so studying them require specific programmes. Amongst them, the International Waterbird Census (IWC³) programme, which aims at performing coordinated counts during the middle of the winter/dry season through all their distribution area.

South of Sahara, in the middle of the Dry Season (which corresponds to the middle of the Winter season in Europe and North Africa), roughly from December to February, waterbird populations are indeed "stable", i.e. not performing any major migration movements (either post- or pre- breeding migrations).



Figure 1: waterbirds and people in Tendelti dam

Furthermore, during this time of the year, numerous waterbird species (especially Ducks and Waders) are highly gregarious during day time, making it easier to count them. In Eurasia and Africa, thousands of observers, either volunteer or professional, go out to the fields to simultaneously count waterbirds on a constant sample of sites, with methods as constant as possible, at dates as close as possible from mid-January. This international programme (IWC) is

¹ Agreement on the Conservation of African-Eurasian Migratory Waterbirds <http://www.unep-aewa.org/en/>

² Convention on Wetlands of International Importance especially as Waterfowl Habitat.

<https://www.ramsar.org/>

³ <https://www.wetlands.org/our-approach/healthy-wetland-nature/international-waterbird-census/>

coordinated by Wetlands International who centralise data and evaluate the size and the trend of each waterbird population.

Thanks to these analyses, at the request of AEWA, this NGO drafts every three year and before every Meeting of the Parties (MOP), a report on the **conservation status** of each population of the **254 waterbird species** concerned by the Agreement. This Conservation Status Report (CSR) is reviewed/amended by the AEWA Technical Committee, and the Table 1 of Annex 3 (Action Plan) of the Agreement is modified accordingly. The amendment of Table 1 is later formally adopted by parties during the MOP. This table 1 therefore determines the conservation measures to adopt, particularly the possibility for the parties to exploit, or on the opposite to give full protection to each waterbird population occurring on its own National territory.

The analysis of count data at international scale also allows to estimate the size of each waterbird population and identify **wetland sites of international importance** in order to implement the Ramsar Convention and the AEWA. Indeed, criteria 5 and 6 of the Ramsar convention stipulate that a wetland should be considered internationally important if it regularly supports 20,000 or more waterbirds, and/or if it regularly supports 1% of the individuals in a population of one species or subspecies of waterbird. These criteria also meet the definition of critical sites according to the AEWA.

Between January 2000 and January 2017, Sudan has participated 10 times to the IWC (Table 1), sometimes in bilateral cooperation with foreign observers (Wetlands International, ONCFS etc.). However, the Sudanese network is still recent and gathers only few observers whilst the country and its wetlands are huge. Furthermore, many sites have still not been counted in the framework of the IWC programme, and many gaps remain in the knowledge of waterbird distribution in Sudan.

Year	Month	NB Sites	Total nb of waterbirds	Species richness
2000	1	3	12	8
2002	1	1	6853	17
2003	2	1	45309	36
2004	1	4	3700	31
2010	1	19	68855	73
2011	2	64	38848	63
2012	1	19	62260	79
2012	12	39	128134	81
2014	2	31	54482	71
2017	1	21	16420	74
2018	2	50	23396	86

Table 1: participation of Sudan to IWC from 2000 until 2018

During the RESSOURCE project meeting, held in Rome in May 2017, it has been agreed between the Sudanese Focal Point for the Ressource project, ONCFS and Tour du Valat for February 2018: 1/to develop the capacity of the Sudanese network for waterbird monitoring to participate in the IWC programme, 2/to keep on monitoring waterbirds in the Wetlands of the

Khor Abu Habil Alluvial Fan and in the Red Sea region (i.e. counting the same sites already identified in the Fan and the Red Sea) and 3/ to try to identify new sites of importance for waterbirds in winter in these two areas.

The use of constant methods (itinerary and surface covered, optics used, time and duration of the count, etc.) requires first to look for the more cost/effective method in the fields, then to test it, and once adopted, to write it down. In this way, even in case of a change of observer, a very common situation, especially in Africa, count can be performed in the future in a constant way, allowing more accurate comparisons to be made between different counting periods.



Figure 2: Discussing the field method before the count is essential to optimize time

It is worth noticing that without such documents, it is sometime difficult to seriously compare waterbirds numbers counted today, to numbers recorded some years ago, as methods and coverage are not always known, and might have changed with time.

This gap now tends to be filled-in through the improvement of data bases produced by national networks and/or Wetlands International, but a lot of work remains to be done to describe more accurately the sites and methods. The development of GPS and cartography tools has allowed real progress to be made in this respect. These cartographic/methodologic data should be archived and made accessible to a wider audience, so that waterbird counts of a given wetland in the future by new observers can be more easily done and achieved in a comparable way. All GPS waypoints and tracks collected in February 2018 have therefore been saved and archived.

Capacity building to participate to the IWC programme does not only involve waterbird identification or counting in the fields. A bird count has only a value if it is related to a surface area covered with a given method. It is therefore essential that field observers are also trained to the

design of methods to cover a given site, to the utilisation of GPS and maps reading, as well as to data recording/input, using international standard methods. In the same way, a permanent staff in charge of data management and processing must be trained at Sudan level.

The training Kit produced by ONCFS⁴ allows to achieve most of these steps, from waterbird and wetlands survey to monitoring, waterbird identification and counting, and ending up with data input and transmission. Only when all these steps have been achieved, can the participation to IWC be considered as efficient and effective. Too often in the past, waterbird counts have indeed been achieved in the fields in different countries of Europe and Africa, but the data had not been properly geo-referenced, input into a standard format nor transmitted. This has kept the data from being used in an optimal way at national then international level for waterbird or wetlands conservation or management purposes. It is therefore essential that all data collected in the framework of a project such as RESSOURCE or SPOVAN are correctly input, stored and transmitted.

Data have been input all along the field trip by observers, checked up and pre-processed by Tour du Valat Research Institute in the framework of a specific LOA within the RESSOURCE project. They must be checked again by all observers having participated to the field trip and edited if necessary. It will then be the role of the Sudanese Waterbird Network Coordinator to send them at international level including to Wetlands International.

Results, comments on methods and census

The following section will rapidly describe the methods tested and the main results obtained in the fields for the three regions visited in February 2018, the Khor Abu Habil Alluvial Fan, the Red Sea region and the sites in Khartoum.

Because Sudan is a huge country, reaching the different mayas⁵ by car can be very time consuming. In the absence of suitable planes to conduct aerial surveys, it is therefore essential that time is not wasted to reach mayas already dry and to focus only on mayas still reasonably filled up with water.

In the framework of Tour du Valat's LOA within the RESSOURCE project coordinated by FAO, open water areas were mapped using remote sensing methodology in the Khor Abu Habil and on the Red Sea Shore. Open water areas were detected through Landsat 8 images acquired in November 2017 and in January 2018. In the Khor Abu Habil, all the detected wetlands were visited in order to check the accuracy of the remote sensing method.

Rare raptors (vultures, eagles etc.) seen during the field trip are also reported here. Although not considered as waterbird, it was felt useful to mention them for the sake of conservation.

⁴ Hecker N., 2012. Hecker N., 2015. Identifying and Counting Waterbirds in Africa – A toolkit for trainers - Sub-Saharan Africa. ONCFS, HirundoFT2E. France.

⁵ "Mayas": temporary wetlands flooded in the rainy season and generally drying out at the end of the dry season

The following figure shows all sites covered in Sudan in the framework of the RESSOURCE project as the Sudanese participation to the IWC programme during February 2018.

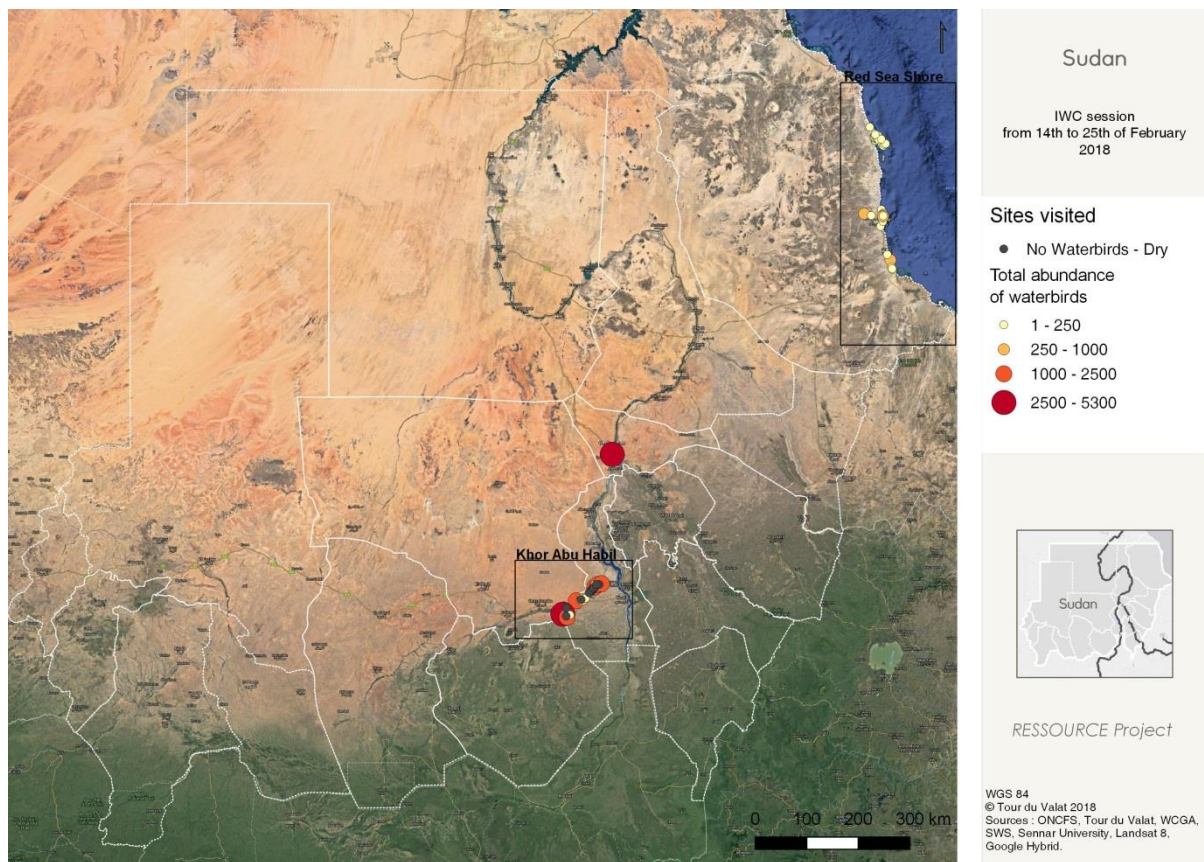


Figure 3: location of all Sudan sites covered in February 2018 in the framework of the RESSOURCE Project

Khor Abu Habil Alluvial Fan

In total 29 sites/mayas belonging to the Khor Abu Habil Alluvial Fan have been covered during the February 2018 field trip (Table 2). Most of the mayas had already been visited once during the SPOVAN project from 2010 to 2014 (ONCFS et al., WCGA, SWS, Sennar University 2016⁶) but several “new” ones (N=12) have also been covered in February 2018.

Because the last “near complete” waterbird survey in the Khor Abu Habil Fan had been done in December 2012, February was chosen for the 2018 survey in order to assess the importance of this site in the late dry season.

The flooding prediction made by Tour du Valat through Remote sensing was remarkably correct and the method sounds very promising. It should of course be tested again next year.

In the Month of February, the region was already fairly dry, making it easy to reach all the sites by car without problem. Downloading the regional map with existing roads, tracks and villages

⁶ ONCFS, Sennar University, SWS, & WCGA, 2016. Waterbird monitoring in Sudan (SPOVAN Project). 5 Year Report 2010-2014. 22 pages.

on GPS (OpenStreetMap) proved to be particularly time saving. A good proportion of the mayas (17) were already totally dry and supported virtually no birds (see table 1 and figure 4).

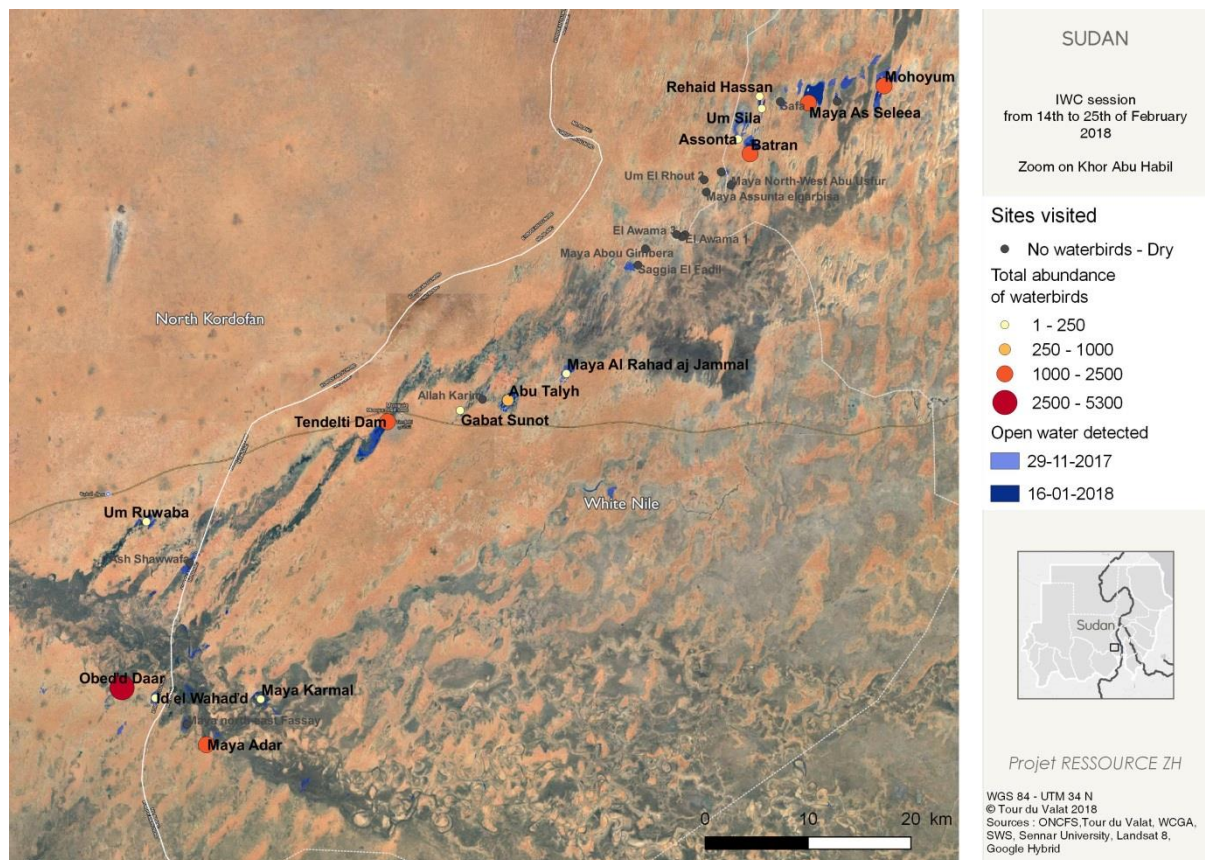


Figure 4: Location of Sites/Mayas counted in February 2018 in the Khor Abu Habil Alluvial Fan

All bird counts were performed using telescopes equipped with 20 x 60 zoom and 10 x 50 binoculars: 1 brand new telescope provided by the project, 2 ONCFS telescopes, 1 provided by the Sudanese Wildlife Society dating back from the SPOVAN project. The SPOVAN telescope provided to WCGA was not available and the one from Sennar University too damaged to be used. Identification guides in Arabic were made available to all trainees plus 1 "Birds of Africa South of Sahara" belonging to ONCFS.

Apart from the Tendelti dam, all mayas in the Khor Abu Habil Fan have a rather small size that makes the method to fully cover them fairly straightforward.

The waterbird count is performed by a single observer, (either an advanced trainee under the control of a trainer or the trainer himself), who scans the maya with a telescope. The observer dictates out the different numbers of individuals of every species he can identify and count during the scan to a secretary who records the numbers on a notebook. During this time, the less advanced trainees try to identify and count as many species as possible with the help of the second trainer.

Table 2 gives for each site the geographical coordinates from where the counts were made. However, in the following years, the observers will probably have to adapt each year according to the water level, the conditions of sun (time of the day) and the distribution of the birds, to find the best observation point(s).

Table 2: List of sites/mayas counted in the Khor Abu Habil Fan during February 2018

Site/Maya Name	Latitude	Longitude	Number waterbirds
Abu Talyh	13,035716	31,965979	399
Allah Karim	13,036409	31,943137	0
Ash Shawwafa	12,890165	31,681073	0
Ashawaf	13,302875	32,260467	0
Assonta	13,269257	32,171795	1
Batran	13,256013	32,18258	1692
El Awama 1	13,183692	32,12448	0
El Awama 2	13,181815	32,121783	0
El Awama 3	13,183915	32,116717	0
Gabat Sunot	13,026542	31,923241	1
Id el Wahaid	12,769419	31,650439	37
Maya Abou Gimbera	13,171122	32,088892	0
Maya Adar	12,727683	31,696089	1223
Maya Al Rahad aj Jammal	13,059482	32,018207	149
Maya As Seleea	13,301505	32,234886	2035
Maya Assunta elgarbisa	13,221798	32,143358	0
Maya Karmal	12,768346	31,744712	228
Maya north-east Fassay	12,745868	31,678857	0
Maya N-Wabu Usfur	13,228111	32,165612	0
Mohoyum	13,316749	32,302477	1499
Obeid Daar	12,778684	31,62065	5291
Rehaid Hassan	13,30742	32,19114	119
Safa	13,302709	32,209596	0
Saggia El Fadil	13,156506	32,082258	0
Tendelti Dam	13,016487	31,858125	1878
Um aoud	13,239794	32,156776	0
Um El Rhout 2	13,232767	32,141555	0
Um Ruwaba	12,927049	31,642423	20
Um Sila	13,29645	32,193001	92

A total of 14 664 waterbirds has been counted in the Region in February 2018. This total is much lower than the December 2012 one (around 95 000 individuals).,

It should be recalled that some mayas have not been counted in 2018 due to a lack of time. At least two other non-exclusive hypotheses can be formulated to explain the lower waterbird numbers in February compared to December 2012:

- a part of the waterbird numbers could have already left the Khor Fan and started their pre-breeding migration,

- as the size of the flooded mayas progressively declines with evaporation, the birds are forced to move out and seek flooded sites in the near vicinity. It must be recalled that the White Nile offering suitable habitats (for instance Um Gar) is at very closed range.

Table 3: Numbers of different waterbirds species counted in Khor Abu Habil in February 2018.

African Openbill	104	Intermediate Egret	16
African Spoonbill	49	Kentish Plover	320
Black Stork	9	Kittlitz's Plover	35
Black-crowned Night-Heron	131	Lesser Jacana	9
Black-headed Heron	17	Little Egret	836
Black-headed Lapwing	6	Little Ringed Plover	44
Black-necked Grebe	1	Little Stint	931
Black-tailed Godwit	351	Long-tailed Cormorant	11
Black-winged Stilt	738	Marsh Sandpiper	178
Caspian Plover	1369	Montagu's Harrier	8
Cattle Egret	197	Northern Pintail	466
Collared Pratincole	7	Northern Shoveler	200
Comb Duck	11	Pallid Harrier	4
Common Greenshank	139	Pied Kingfisher	5
Common Redshank	1	Pink-backed Pelican	7
Common Ringed Plover	25	Purple Heron	3
Common Sandpiper	1	Ruff	459
Common Snipe	94	Sacred Ibis	39
Common Teal	39	Slender-billed Gull	7
Curlew Sandpiper	11	Spotted Redshank	206
Eurasian Marsh-Harrier	8	Spur-winged Plover	278
Eurasian Moorhen	1	Squacco Heron	37
Eurasian Spoonbill	1267	Temminck's Stint	23
Garganey	4193	Whiskered Tern	3
Glossy Ibis	128	White Stork	91
Grey Heron	987	White-faced Whistling-Duck	41
Great Egret	233	White-tailed Lapwing	18
Great White Pelican	1	White-winged Tern	8
Green Sandpiper	8	Wood Sandpiper	159
Gull-billed Tern	18	Yellow-billed Stork	78

It should be interesting in the next field trip to cover simultaneously the Um Gar adjacent wetlands, as well as the Khor Abu Habil wetlands, as these sites are probably complementary and used alternatively by waterbirds.

The above table gives the total number counted for each species in the Khor Abu Habil in February 2018. The coloured cells indicate that the threshold level for the related biogeographical population has been exceeded⁷.

⁷ <http://wpe.wetlands.org/>

The number of counted **European Spoonbill** (*Platalea leucorodia*) in February 2018 clearly exceeds the 1% criteria for this population. The February 2018 count underlines the **international importance of the Khor Abu Habil Fan** for this species since 7,5 % of the biogeographical population have been recorded there in February 2018. The codes on the plastic ring on a single individual could be read with a telescope. It later indicated that this bird was born and marked 5 years ago in Hungary, 3 847 km from the Khor Fan!

Counts made in the Khor Abu Habil Fan also exceeded the thresholds of **international importance** for the **Caspian plover** *Charadrius asiaticus* (2,9 % of the population), **Garganey** *Spatula querquedula* (3% of the population), and **Black-winged Stilt** *Himantopus himantopus* (1,1% of the population).

Thus, for the second time, waterbird counts made in winter underline the international importance of Khor Abu Habil Fan according to the Ramsar Convention criteria related to waterbirds.

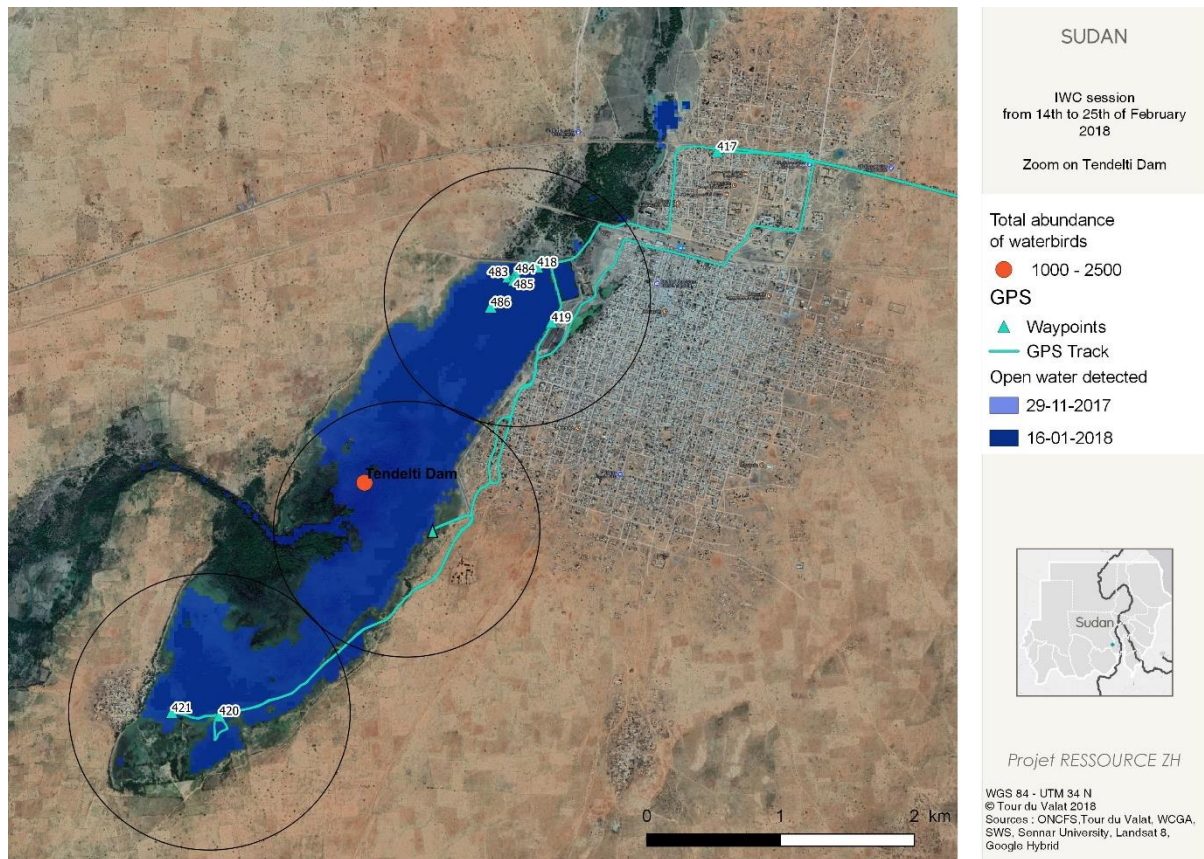


5: a small part of the 1267 European Spoonbill flock counted in the Khor Abu Habil Fan in February 2018

Tendelti Dam:

The Tendelti Dam is the largest site in the Khor Fan and was the third most important as far as counted waterbird numbers are concerned. The proximity of the road makes it rather easy to fully cover. The distance to the birds is rarely too big, which means that it is also a good site to start with in a field trip, so the already advanced trainees can memorize back the different

species. The following figure shows the itinerary and different counting points. One of the biggest difficulty is indeed to count the birds hidden by Acacias sp. It is also preferable to start the count in the morning from the North and move subsequently to the South, ending in Um Magaarin Village.



6 itinerary and observation points to count Tendelti Dam in February 2018

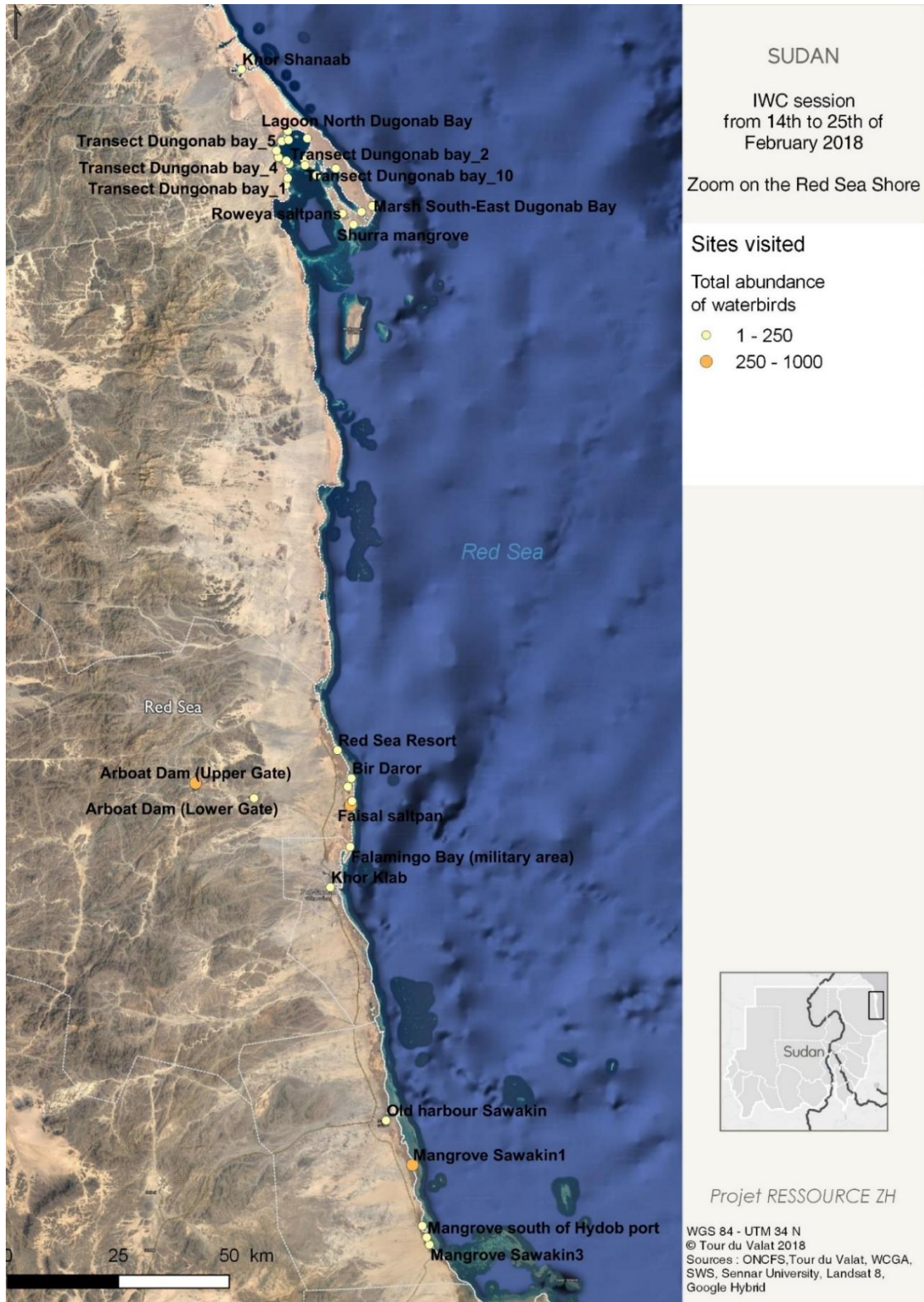
The figure above shows the open water extent in November 2017 and in January 2018. In February 2018, the surface area of the Reservoir had considerably shrunk and the lake was made of several smaller waterbodies separated by mud banks quite favourable to waterbirds.

Red Sea Coast Region

The Red Sea coast of Sudan is undoubtedly of international importance for breeding waterbirds as well as for its extraordinary rich biodiversity (Khalil et al. 2008, 2008⁸). It has been covered only once in the framework of the IWC, in January 2017, by Prof Ibrahim Hashim's team⁹. In this latter year, the counts of wintering waterbirds were rather low (N=1263 for 7 sites).

⁸ Khalil, A. S. M., Elhag E. A. and Elhag A. D. 2008. Information Sheet on Ramsar Wetlands (RIS) - 2006-2008 version - Dongonab Bay-Marsa Waiai.

⁹ But see also: Blackburn, T. M., & Bird, J. P. (2012). The Distribution of gull *Larus* species on the Red Sea coast of Sudan. *Scopus*, 32(1), 10-18.

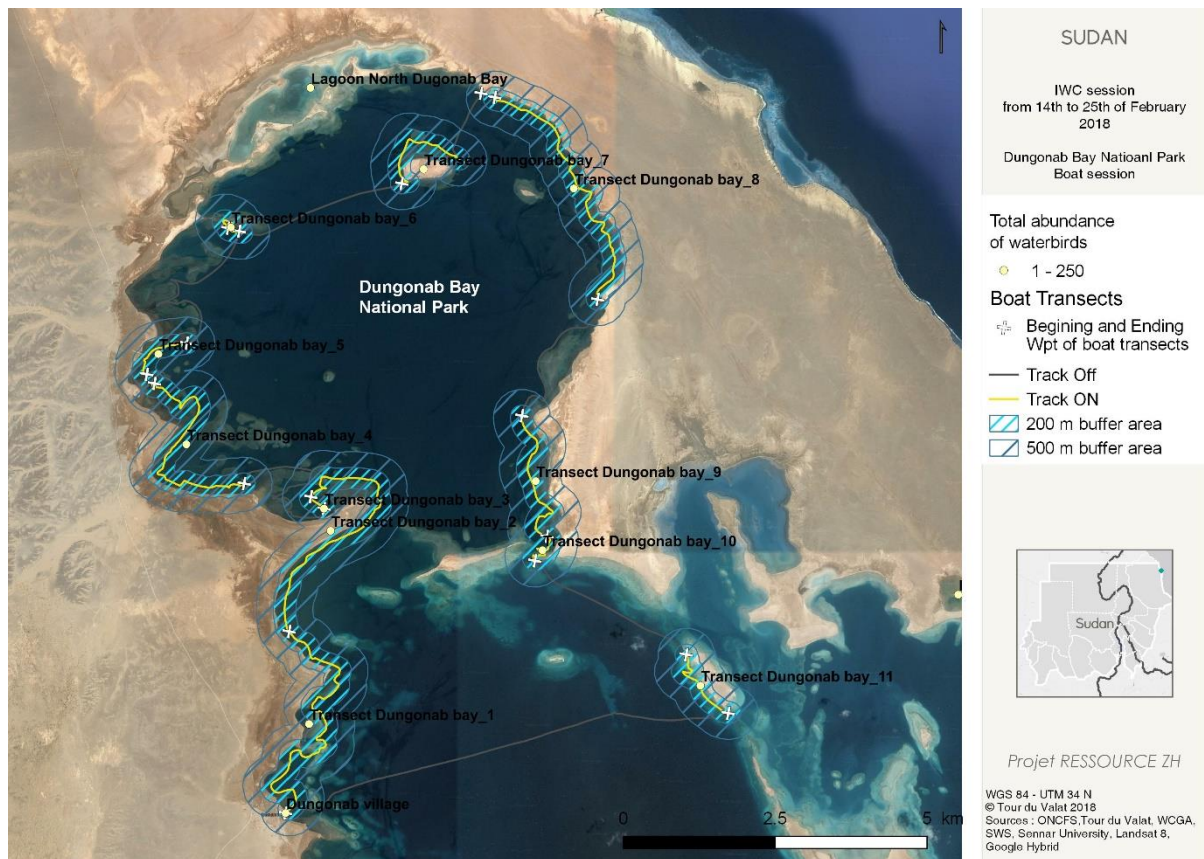


7 Sites counted along the Red Sea Coast of Sudan in February 2018

It was therefore interesting to cover the same sites one more time to check for variability but also to try to cover as many sites as possible in the allotted time, to identify potentially interesting new sites.

For this purpose, again, Tour du Valat has produced maps indicating all open water areas detected by remote sensing in November 2017 and January 2018.

All sites covered during the February 2018 Field trip are indicated on the map above. A good proportion of the shore of Dongonab Bay has been covered by boat, using mainly 10 x 50 binoculars (see figure 8 below). Following the shore at closed range was not always possible because of the presence of Reefs and where the water is too shallow to navigate.



8: Itinerary and surface area covered in the Dongonab Bay in Fenruary 2018

Apart from the Dongonab Bay, all other sites were covered from the ground and moving by 4x4 vehicles, most of the time from only 1 observation point, and using a telescope 20 x 60 following the same process as for Khor Abu Habil wetlands.

Because the small bays were sometimes located far from the tarred road, GPS navigation to reach these sites identified as potentially interesting by Tour du Valat provided very useful and time saving. All GPS tracks have been archived and stored so they can be used if necessary in the coming years combined with local knowledge.

Table 4: list of all sites covered on the Red Sea coast of Sudan in February 2018

Site	Latitude	Longitude	Total Waterbird
Dongonab National Park			
Dungonab village	21,10611	37,121096	84
Khor Shanaab	21,352715	37,026382	21
Lagoon North Dugonab Bay	21,221148	37,125035	23
Marsh South-East Dugonab Bay	21,06078	37,306137	43
MarshEast Dugonab Bay	21,140752	37,22774	2
Ras abu Shagara	21,04828	37,282506	3
Roweya salt pans	21,0448	37,241709	106
Shurra mangrove	21,021293	37,26549	20
Transect Dungonab bay_1	21,12022738	37,12481789	18
Transect Dungonab bay_10	21,14779467	37,16182345	27
Transect Dungonab bay_11	21,12631333	37,18686903	14
Transect Dungonab bay_2	21,150867	37,12823555	11
Transect Dungonab bay_3	21,15732568	37,122299	17
Transect Dungonab bay_4	21,16459057	37,10536228	38
Transect Dungonab bay_5	21,17892044	37,10092937	16
Transect Dungonab bay_6	21,19901439	37,11242259	5
Transect Dungonab bay_7	21,20183755	37,12674033	9
Transect Dungonab bay_8	21,20516731	37,16679499	26
Transect Dungonab bay_9	21,15876267	37,16074853	6
Port Sudan and surroundings			
Arboat Dam (Lower Gate)	19,796833	37,05305	143
Arboat Dam (Upper Gate)	19,829046	36,928211	369
Bir Daror	19,839513	37,260957	226
Khor Klab	19,606571	37,216013	104
Red Sea Resort	19,899158	37,2313	69
Faisal saltpan	19,782051	37,259593	616
Falamingo Bay (military area)	19,6929	37,258422	121
Halot bay	19,790319	37,262466	168
Saltpan Bir Darur	19,821206	37,253451	152
Sawakin Surroundings			
Mangrove Sawakin1	19,01384	37,39128	543
Mangrove Sawakin2	18,8838	37,41252	20
Mangrove Sawakin3	18,84366	37,42792	67
Mangrove south of Hydob port	18,859341	37,42178	147
Old harbour Sawakin	19,10884	37,335015	61

On the sites counted both in January 2017 and February 2018, the 2018 total was slightly above the 2017 count, but within the same range of magnitude (1661 vs. 1110 waterbirds respectively). Differences might have also occurred in the surface area covered and the methods used between these 2 years. The total counted in 2018 on all sites was 3295 waterbirds (see table below for details).

Table 5: Numbers of different waterbirds species counted in the Red Sea Region in February 2018.

Black-bellied Plover	13	Greater Flamingo	192
Black-headed Gull	62	Greater Sand-Plover	159
Black-tailed Godwit	17	Greater Spotted Eagle	1
Black-winged Stilt	18	Green Sandpiper	2
Brown Booby	2	Gull-billed Tern	15
Calidris sp.	17	Hooded Vulture	2
Caspian Gull	1	Kentish Plover	214
Caspian Gull Lesser Black-backed Gull	10	Lanner Falcon	2
Caspian Tern	49	Lesser Black-backed Gull	2
Cattle Egret	1	Little Egret	11
Common Greenshank	22	Little Grebe	107
Common Pochard	7	Little Stint	190
Common Redshank	14	Marsh Sandpiper	8
Common Ringed Plover	124	Northern Pintail	17
Common Sandpiper	4	Northern Shoveler	94
Common Teal	56	Osprey	38
Curlew Sandpiper	272	Purple Heron	1
Duck sp.	4	Ruddy Turnstone	38
Dunlin	121	Ruff	170
Eurasian Coot	102	Sanderling	11
Eurasian Curlew	67	Saunders's Tern	20
Eurasian Moorhen	29	Shorebird sp.	130
Eurasian Oystercatcher	3	Slender-billed Gull	204
Eurasian Spoonbill	32	Sooty Gull	152
Eurasian Wigeon	1	Spur-winged Plover	32
Gadwall	15	Squacco Heron	4
Goliath Heron	4	Striated Heron	1
Grey Heron	44	Terek Sandpiper	26
Great Black-headed Gull	3	Western Reef-Egret (Eastern)	46
Great Cormorant	17	Whimbrel	8
Great Crested Tern	251	White Egret sp.	13
		White-eyed Gull	3

The big majority of the counted Palearctic ducks were staying on the Arboat dams. These 2 freshwater bodies also shelter good numbers of Little grebes *Tachybaptus ruficollis*. Although there were no big concentrations of wintering waterbirds in the visited sites, the area seems relatively important for several species with unfavourable conservation status such as the White headed gull *Larus leucopthalmus*, Near Threatened on the IUCN Red list, AEW column A1a, or the Red Sea population of the European Spoonbill *Platalea leucorodia archeri*. The area may also be of importance to wintering Greater spotted eagle *Clanga clanga* which is rated as vulnerable on the IUCN Red list.

Khartoum Sites : As a practical exercise during the training of University and Colleges teachers on Waterbird monitoring co-funded by Fondation François Sommer (see next section

on training), 3 well known sites have also been counted in Khartoum by the trainers and trainees.

Table 6: list of all sites covered on the Khartoum surroundings in February 2018

Khartoum Sites	Latitude	Longitude	Waterbird numbers
Mayo Sewage	15,50453	32,546979	825
Confluence White Nile/Blue Nile	15,60965	32,495519	606
UmShugeira Island	15,593667	32,491111	4081

These sites held a good diversity and high numbers of waterbirds, and are fairly easy to reach.

Table 7: Numbers of different waterbirds species counted in the Khartoum sites in February 2018.

Black Kite	3	Little Egret	6
Black-necked Grebe	3	Little Ringed Plover	2
Black-tailed Godwit	204	Little Stint	88
Black-winged Stilt	3	Long-legged Buzzard	1
Caspian Tern	3	Long-tailed Cormorant	1
Cattle Egret	7	Lesser Moorhen	40
Eurasian Coot	54	Northern Pintail	2738
Eurasian Curlew	2	Northern Shoveler	40
Eurasian Moorhen	176	Pied Kingfisher	1
Eurasian Wigeon	905	Ruff	122
Allen's Gallinule	4	Spur-winged Plover	148
Garganey	320	Squacco Heron	4
Glossy Ibis	15	White-faced Whistling-Duck	55
Grey Heron	48	White-winged Tern	510
Great Egret	4	Wood Sandpiper	1
Kentish Plover	4		

The numbers of Pintails (*Mareca acuta*) counted in Khartoum was very closed to the 1% criterion of international importance for this population (i.e. 2800!).

Focus on Training

Training has been performed in two different ways. Respectively 8 and 4 Field observers have been trained in situ during the two different field sessions, and a full 5-day session has been organised in Khartoum, back to back with a specific project funded by Fondation François Sommer (FFS).

In situ Training of observers

In total, nine trainees have been trained in the fields. They belong to the WCGA, the Sudanese Wildlife Society (Darfur branch), and to the University of Sennar, Faculty of natural resources and environmental studies, Department of Wildlife (SUDW).

Eight of them had already been trained in the past and had a fairly good knowledge, although unequal, of the different waterbird species. Three of them had been trained by ONCFS during the previous SPOVAN project.



Figure 9: In situ training in February 2018 in Tendelti Dam.

It must be acknowledged that once the basis of waterbird identification and counting is understood, it is the trainee's personal "homework" that will bring him/her to a sufficient knowledge, allowing him/her to participate into real waterbird count sessions. Ornithology is somewhat comparable to Music. Few one-week training sessions are necessary and possibly sufficient to understand the basics of mechanisms and theory, and identify few species. However, without regular personal or supervised practice, the trainee will remain to the same level until a possible next, preferably intensive, training.

All trainees have been given an identification guide in Arabic which allows identifying all the migratory waterbird species of Sudan. Each one of their Institutions has been given a telescope and binoculars. It is now the responsibility of the trainees and their institutions to make progress towards autonomy.

Training of trainers

Training in Ornithology in Africa is often performed by European Ornithologists who do not master well enough local languages and may only pop up occasionally. Conversely, African trainees do not always master English or French or other European languages. This inevitably entails an immediate loss of understanding and transfer of knowledge.

At the request of African Colleagues involved in the teaching of Wildlife Management and Conservation, and following the recommendations of the AEWA Plan of Action for Africa, a specific project funded by the Fondation François Sommer has therefore been recently

launched. This project aims at including recent Training of Trainers tool kit on waterbird monitoring in the curricula of the main African Institutions, Colleges or Universities, teaching Wildlife Management.

Mr. Hichem Azafzaf, chairman of the Tunisian *Association des amis des oiseaux* – Birdlife partner, Arabic speaking with a long experience of training in ornithology, was hired to lead, back to back with the RESSOURCE project activities in Sudan, a 5 days training specifically designed in Arabic for teachers. Twenty-four people involved at different level in teaching, most of them teaching in a University or members of Conservation/Research institutions attended this training session. During the session, practical exercises have also been performed outdoor, which allowed to count 3 sites in Khartoum (see previous section). The content of the training session can be found at the following address.

http://www.oncfs.gouv.fr/IMG/file/oiseaux/afrique/Waterbird_Training_Course_for_Sub-Saharan_Africa-2015.pdf



Figure 10: Training of University & College teachers in Waterbird monitoring using ONCFS TOT toolkit

Workshop on Khor Abu Habil Wetlands

In the framework of component 2, a workshop has been organized by WCGA in Khartoum to gather scientists working in different disciplines in the Khor Abu Habil and start the discussions about possible future cooperation in the framework of the RESSOURCE project, although not exclusively. The aim was also to inform each other about the work being done and collect opinions about the possibility to declare it as a Ramsar Site. About 30 people attended this workshop, coming from Sudanese, German and French Universities or Institutions (WCGA, ONCFS, CIRAD), FAO, UNEP. The workshop program is given below:

NO	PROGRAM	Program provider	Duration	TIME
1.	Holly of Quran	-	5 min	– 9:00 9:05
2.	Welcome by Director General Of WCGA	Director General Of WCGA	15 min	– 9:05 9:20
3.	Overview of Sudanese wetlands of international importance	Dr. Alhaj Abo Jabra	25 min	– 9:20 9:45
4.	Overview of Khor Abou Habil hydrogeology	Mrs Aicha Seifelislam and colleagues	25 min	– 9:45 10:05
5.	Overview of waterbirds communities	WCGA/ONCFS	25 min	– 10:05 10:25
6.	Breakfast	-	30 min	– 10:25 10:55
7.	Presentation of proposed research project on the Khor Abu Habil in the framework of the RESSOURCE project	Team Of Survey	30 min	– 11:00 11:30
8.	Discussion	Invited	30 min	– 11:30 12:30
9.	Coffee Break	-	30 min	– 12:30 1:00
10	Discussion	Invited	30 min	– 1:00 1:30

After the Holly of Quran and the opening Ceremony by WCGA Director, Dr. Alhaj Abo Jabra (Sudan), gave a presentation of the wetlands of Sudan, with a special reference to the Sudanese Ramsar sites.

Mrs Aicha Seifelislam (University of Bayreuth, Germany) presented the first results of her Study on the hydrology of the Khor Abu Habil Alluvial Fan, a rather unique type of wetlands. She will undertake a PhD in cooperation with Bayreuth and Sudan University as well as ONCFS on the ecosystem services provided by water and soils in the Fan.

Mrs Manal Bihéry and Mr. Mondain-Monval then presented the results of a five-year project on waterbird and wetlands survey in Sudan. The waterbird counts made in the Khor Abu Habil Alluvial Fan wetlands show the international importance of this site according to criteria 5 and 6 of the Ramsar Convention (Specific criteria based on waterbirds).¹⁰

¹⁰ https://www.ramsar.org/sites/default/files/documents/library/ramsarsites_criteria_eng.pdf

Mrs Luisa Arango (University of Strasbourg, France) presented the project SAVNAT-Afrique in the field of social sciences. It focuses mainly on questions of sharing knowledge about wetlands and birds by different social actors. Mrs Arango introduced 2 Master students working in relation with this project, 1 being based in Tendelti.

Mr Sébastien Lebel (CIRAD) introduced the work being currently done in the Khor Fan in the framework of the RESSOURCE project (component 3, socioeconomics of waterbird uses). One team, based in Tendelti, conducted interviews in the Fan's villages.

A fruitful discussion took place between the different participants and it was agreed that all the partners should be kept informed about the progress made. The presentations delivered during the workshop should be centralised by the RESSOURCE project focal point.



11: workshop on Khor Abu Habil Alluvial Fan, Khartoum, February 2018

Main Conclusions and Recommendations

The February RESSOURCE missions (Component 1, 2 & 3) brought up a lot of new information regarding waterbird populations in Sudan.

The international importance of the Khor Abu Habil Fan regarding waterbirds in winter is confirmed, whilst the Red Sea coast seems more important for the breeding season.

Several further surveys in the Khor Fan should be planned:

- one in December 2018 to try to count again the already known mayas and try to find new ones i.e. to complete the inventory of mayas of the area. The adjacent wetlands of Um Gar and surrounding wetlands and Nile course should also be covered so as to assess importance of waterbird exchanges between those two wetland complexes.
- one during the 2019 breeding season, in order to try to assess the importance of this area for breeding waterbirds. Means to visit the area during this season should be looked for.
- It should be interesting to undertake new socioeconomics surveys of other human activities occurring in the area (cattle breeding, fishing & agriculture for instance) with the existing partners
- It will also be necessary to complete our knowledge by undertaking additional biodiversity surveys regarding other taxa than birds (Fishes, Amphibians, Snakes, Dragonflies etc.)

As a follow-up to this **first training of University/Institution Teachers**, a second session should be organised, especially with professional teachers in order to accompany the teachers having already used the kit in their curriculum. This would allow to answer their questions and help them in adapting the modules if necessary.

Newly trained **observers should practise** regularly. Means should be looked for to organise a monthly survey of some of Khartoum wetlands (like e.g. Um Shigueira), under the supervision of a confirmed ornithologist.

A small **training session related to the use of GPS**, related software and maps reading should be organised during the next field trip. GPS should be provided to institutions involved in waterbird monitoring.

Regarding the **possible designation of the Khor Abu Habil Fan as a Ramsar site**, the WCGA, the RESSOURCE Focal point and the National Waterbird network coordinator should already liaise with the authorities in charge of the application of the Ramsar Convention in Sudan, as well as with the Ramsar Convention Senior Advisor for Africa.

Considering the **complexity of the RESSOURCE project** in Sudan (5 components involved and implying several teams in the field at the same time), the Focal point should be appointed with some official help from the International Wildlife Department within WCGA.

Thanks: The February 2018 RESSOURCE Mission would never had been possible without the help and kindness of too many people to be individually thanked without inevitably forgetting someone. We would like to thank all our colleagues involved at one stage or another in this mission, from WCGA and the ONCFS administration, the Sudanese Wildlife Society, University of Sennar, Faculty of natural resources and environmental studies, Department of Wildlife, AAO, WCGA delegations and staff in Kosti, Port Sudan, Tendelti and Muhammad Qol. The RESSOURCE project is financed by the FFEM (French Facility for Global Environment) and FAO.



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12 Participants to the Training of Trainers in Khartoum (February 2018)