



**URANIUM GIS OPERATION PROJECT OF THE "ADRAR EMOLES 3"
RESEARCH PERMIT (AGADEZ REGION, NIGER)**



UPDATE OF THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

Report on biodiversity (Dry Season)

March 2022

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INTRODUCTION

As part of the update of the Environmental and Social Impact Assessment (ESIA) of the Adrar Emoles uranium mining project, an important part of the study was devoted to biodiversity. The objective of this study is to provide clear and scientific information on biodiversity and wildlife habitats through an inventory of plant and animal species in the project area and the determination of the protection status of these species in accordance with the IUCN classification. The methodological approach and the results obtained are described in this report.

1. METHODOLOGY

The mission was essentially carried out in a 4*4 vehicle with two (2) observers, a guide, a driver and a security guard. This mission was carried out in several stages, namely reconnaissance, systematic monitoring, the use of photographic traps and drones, and finally the socio-ecological surveys.

1.1. Recognition

A preliminary reconnaissance and mapping stage was carried out to familiarise and gather baseline data on the local geography and to gather the information necessary to make final decisions for a realistic approach to the systematic monitoring stage and to test the data collection methodology. A combination of the use of Cybertracker (www.cybertracker.org) with independent GPS data was used to record and map all observations.

1.2. Systematic monitoring

Following the reconnaissance stage, a transect plan for monitoring covering the site over a radius of 7 km and 15 km was developed. As one of the main objectives of the mission was to provide clear information on the distribution of natural resources, a grid of 5 north-west-south-east transects spaced at 5 km intervals was developed.

All direct and indirect observations of fauna were entered into Cybertracker as well as the vegetation control points (plots) in order to obtain a fully geo-referenced database.

1.3. Camera traps

Two Reconyx were used during the mission. Given the limited number of instruments (2) and the duration of the study, the devices were placed opportunistically and were baited with sardines to maximise the chances of attracting small carnivores during the night. Photo 1 below shows the operator attaching the camera trap.



Photo 1: View of the operator attaching the camera trap

1.4. Drone

A Mavic pro 2 drone was used to map certain habitat points using PIX4D software. The images will be used to characterise the different types of vegetation. Photo 2 below illustrates the preparation of a flight session.



Photo 2: View of the preparation of a flight session

1.5. Socio-ecological surveys

On the basis of the survey sheets that were developed, interviews were held with local communities in the project area. Eight villages (Tagaza, Gololo, Temilt dabous, Oufoud, Inolamane, Gados, Issakanane) were targeted for this study. The themes concerned are flora, fauna, ecosystem services and the threats to them.

2. RESULTS

2.1. Vegetation

2.1.1. Habitat characterisation

The characterisation of the habitats in terms of field geomorphology, floristic composition, type of formation, average height of the flora as well as geographical coordinates and altitude is given in Table 1 below.

Table 1 Characterisation of habitats along the transects

REPORTS	READING POINTS	GEOMORPHOLOGY	FORISTIC COMPOSITION	TYPE OF TRAINING	AVERAGE HEIGHT OF the flora	LATITUDE	LONGITUDE	ALTITUDES (M)
R1	T1	Valley / sandy-clay soil	<i>Balanites aegyptica</i> , <i>Acacia raddiana</i> , <i>Panicum turgidum</i> , <i>Acacia ehrenbergiana</i> , <i>Cyperus conglomeratus</i>	Gallery forest	6 m	17,94736111	7,5845833	449,8628467
R2	T1	Rocky plateau	<i>Panicum Trigidium</i> , <i>Phragmites australis</i> , <i>Acacia ehrenbergiana</i>	Panicum steppe	2 m	17,7985	7,7358056	502,2858884
R3	T1	Rocky plateau	<i>Panicum turgidum</i> , <i>Phragmites australis</i>	rocky expanse	--	17,79619444	7,7455556	513,8677233
R4	T1	Plain	<i>Acacia ehrebergiana</i> , <i>Balanites aegyptiaca</i> , <i>hyphaene thebeica</i> , <i>Panicum turgidum</i> , <i>Phragmites australis</i>	Steppe with <i>Panicum turgidum</i>	3 m	17,75669444	7,7692222	504,7241695
R5	T1	Rocky plateau	<i>Phragmites australis</i> , <i>Panicum turgidum</i> , <i>Acacia ehrebergiana</i>	Grassy steppe	2 m	17,74330556	7,7985	522,0969217
R6	T1	Sandy soil	<i>Acacia ehrebergiana</i> , <i>Panicum trigidum</i>		5 m	17,72716667	7,8192222	-
R7	T2	Rocky Plateau	<i>Acacia ehrenbergiana</i> , <i>Phragmites australis</i>	Serum on the mineral soil part	3 m	17,82325	7,7799722	505,3337397
R8	T2	Mineral soil	<i>Balanites aegyptica</i> , <i>Maerua crassifolia</i> , <i>Panicum turgidum</i> , <i>Acacia ehrenbergiana</i> , <i>Calotropis procera</i> ,		6 m	17,862	7,7880833	485,8274916
R9	T2	Raw mineral soil plain	<i>Calotropis procera</i> , <i>Acacia ehrenbergiana</i> , <i>Balanites aegyptiaca</i> , <i>Panicum turgidum</i>	Steppe with <i>Panicum turgidum</i> and <i>Calotropis procera</i>	6 m	0	0	-
R10	T2	Sandy clay soil	<i>Bossia senegalensis</i> , <i>Balanites aegyptiaca</i> , <i>Acacia ehrenbergiana</i> , <i>Panicum turgidum</i>	Forestry gallery	6 m	17,86008333	7,7111111	464,1877476
R11	T2	Rocky plateau	<i>Balanites aegyptiaca</i> , <i>Acacia ehrenbergiana</i> , <i>Panicum turgidum</i>	Sparse formation	3 m	17,85252778	7,6754722	473,6360866
R12	T2	Rocky plateau	<i>Acacia Ehrenbergiana</i> , <i>Panicum turgidum</i> , <i>Cyperus conglomeratus</i> , <i>Aristida funiculata</i> or <i>Aristida hordeacea</i>	Steppe with <i>Panicum turgidum</i>	2 m	17,88113889	7,6848889	501,6763182
R13	T3	Koris	<i>Acacia ehrenbergiana</i> , <i>Calotropis procera</i> , <i>Maerua crassifolia</i> , <i>Balanites aegyptiaca</i> , <i>Ziziphus mauritiana</i> , <i>Hyphaene thebeica</i> , <i>Panicum turgidum</i> , <i>Corchorus depressus</i>	Tree steppe with <i>Calotropis</i> and <i>Panicum</i>	6 m	17,75544444	7,7252222	480,9509296
R14	T3	Tray covered with raw mineral floor	<i>Acacia ehrenbergiana</i> , <i>Maerua crassifolia</i> , <i>Panicum turgidum</i> , <i>Phragmites australis</i>	Steppe with <i>Panicum turgidum</i>	3 m	17,76811111	7,7084722	492,5327644

R15	T3	Tray covered with raw mineral floor	<i>Acacia ehrenbergiana, Maerua crassifolia, Panicum turgidum, Phragmites australis, Balanites aegyptiaca</i>	steppe with <i>Panicum turgidum</i>	6 m	17,77513889	7,6873333	480,3413593
R16	T3	Sanded tray	<i>Panicum turgidum, Phragmites australis, Cyperus conglomeratus, corchorus depressus</i>	<i>Panicum</i> steppe	2 m	17,78677778	7,6817222	494,9710454
R17	T3	Sanded tray	<i>Panicum turgidum, Phragmites australis, Maerua crassifolia, Acacia ehrenbergiana, ziziphus mauritiana</i>	<i>Panicum</i> steppe	3,5 m	17,80333333	7,6551111	462,3590369
R18	T3	Sanded tray	<i>Panicum turgidum, Maerua crassifolia, Phragmites australis, Cyperus conlomeratus</i>	Serum on the mineral soil part	3 m	17,85416667	7,6211667	467,2355989
R19	T3	Rocky plateau	<i>Acacia ehrenbergiana, Phragmites australis, Panicum turgidum</i>		2 m	17,81461111	7,6083056	457,1776897
R20	T4	Rocky plateau	<i>Phragmites australis, Panicum turgidum, Acacia ehrrenbergiana, Maerua crassifolia</i>		2 m	17,79441667	7,6006667	470,2834502
R21	T4	Rocky plateau	<i>Acacia ehrenbergiana, Maerua crassifolia, Panicum turgidum, Phragmites autralis, Cyperus conglomeratus</i>	<i>Panicum</i> steppe	4 m	17,76497222	7,6324444	465,102103
R22	T4	Valley	<i>Balanites aegyptiaca, Acacia ehrenbergiana, Panicum turgidum, Maerua crassifolia, Phragmites australis, Eragrostis tremula</i>	Gallery forest	6 m	17,75966667	7,6529444	469,0643097
R23	T4	Tray	<i>Panicum turgidum, Phragmites australis, Acacia ehrenbergiana</i>	Sparse vegetation	2 m	17,74325	7,6649444	479,1222188
R24	T4		<i>Cyperus conglomeratus, Phragmites australis, Panicum turgidum, Acacia ehrenbergiana, Maerua crassifolia</i>	<i>Panicum</i> steppe	5 m	17,73730556	7,687	469,6738799
R25	T5	Tray	<i>Phragmites australis, Cyperus conglomeratus, Panicum turgidum, Acacia ehrrenbergiana, Maerua crassifolia</i>	Grassy steppe	3 m	17,693	7,6416389	465,4068881
R26	T5	Rocky plateau	<i>Phragmites australis, Acacia ehrenbergiana, Maerua crassifolia, Panicum turgidum</i>	Steppe with trees open to the sandy parts of the plateau	3m	17,70947222	7,62275	462,3590369
R27	T5	Tray	<i>Pragmites australis</i>	<i>Phragmites</i> Steppe	60 cm	17,76183333	7,5638333	436,4523011
R28	T5	Valley	<i>Denine, Balanites aegyptica, Acacia ehrenbergiana</i>	Forestry gallery	6 m	17,75094444	7,5828889	437,6714416
R29	T5	Plain	<i>Acacia ehrenbergiana stand</i>		5 m	17,76172222	7,5650278	443,462359

R30	T5	Tray	<i>Corchorus depressus</i> , <i>Phragmites australis</i> , <i>Acacia ehrenbergiana</i>	Localized herbaceous vegetation in depressions	4 m	17,25819444	7,50111111	453,8250533
R31	T5	Tray	<i>Phragmites australis</i> , <i>Cyperus conglomeratus</i>	----	--	17,81983333	7,5216944	442,2432185

2.1.2. Floristic composition Vegetation

A total of 29 species were recorded in and around the permit area: 17 herbaceous and 12 woody. The woody species are divided into 7 families including Mimosaceae (4 or 33%), Arecaceae (2 or 17%), Capparaceae (2; 17%), Zygolaceae (1 or 8%), Asclepiadaceae (1; 8%), Rhamaceae (1 or 8%) and Burseraceae (1 or 8%) (see Table 2 below).

Table 2 Woody species recorded in the project area

Woody	Family
<i>Acacia ehrenbergiana</i>	Mimosaceae
<i>Acacia raddiana</i>	Mimosaceae
<i>Accacia nilotica</i>	Mimosaceae
<i>Accacia senegal</i>	Mimosaceae
<i>Balanites aegyptiaca</i>	Zygophyllaceae
<i>Boscia senegalensis</i>	Capparidaceae
<i>Calotropis procera</i>	Asclepiadaceae
<i>Commiphora africana</i>	Burseraceae
<i>Hyphaene thebaica</i>	Arecaceae
<i>Maerua crassifolia</i>	Cappariaceae
<i>Phoenix dactylifera</i>	Arecaceae
<i>Ziziphus mauritania</i>	Rhamnaceae

As for the herbaceous species, they are distributed in 10 families, of which Graminae represent the most important (7 species or 41%), Caesalpiniaceae (1 species or 6%), Amaranthaceae (1 species or 6%), Poaceae (1 species or 6%), Capparidaceae (1 species or 6%), Tiliaceae (2 species or 11%), Cyperaceae (2 species or 11%), Fabaceae (1 species or 6%), and Aizoaceae (1 species or 6%) (cf. Table 3).

Table 3 Herbaceous areas inventoried in and around the permit area

Herbaceous	Family
<i>Andropogon gayanus</i>	Gramineae
<i>Aristida Sp</i>	Gramineae
<i>Cassia obtusifolia</i>	Caesalpiniaceae
<i>Celosia trigyna</i>	Amaranthaceae
<i>Cenchrus bitorus</i>	Poaceae
<i>Chrysopogon aucheri</i>	Graminae
<i>Cleome africana</i>	Capparidaceae
<i>Corchorus depressus</i>	Tiliaceae
<i>Corchorus olitorius</i>	Tiliaceae
<i>Cymbopogon sp</i>	Gramineae
<i>Cyperus Alopecuroides</i>	Cyperaceae

Herbaceous	Family
<i>Digitaria Horizontalis</i>	Gramineae
<i>Eragrostis tremula</i>	Gramineae
<i>Indicofera Nummulariifolia</i>	Fabaceae
<i>Limeum Viscosum</i>	Aizoaceae
<i>Panicum turgidum</i>	Gramineae
<i>Schoenoplectus corymbosus</i>	Cyperaceae

Figure 1 below shows the floristic composition map of the permit area.

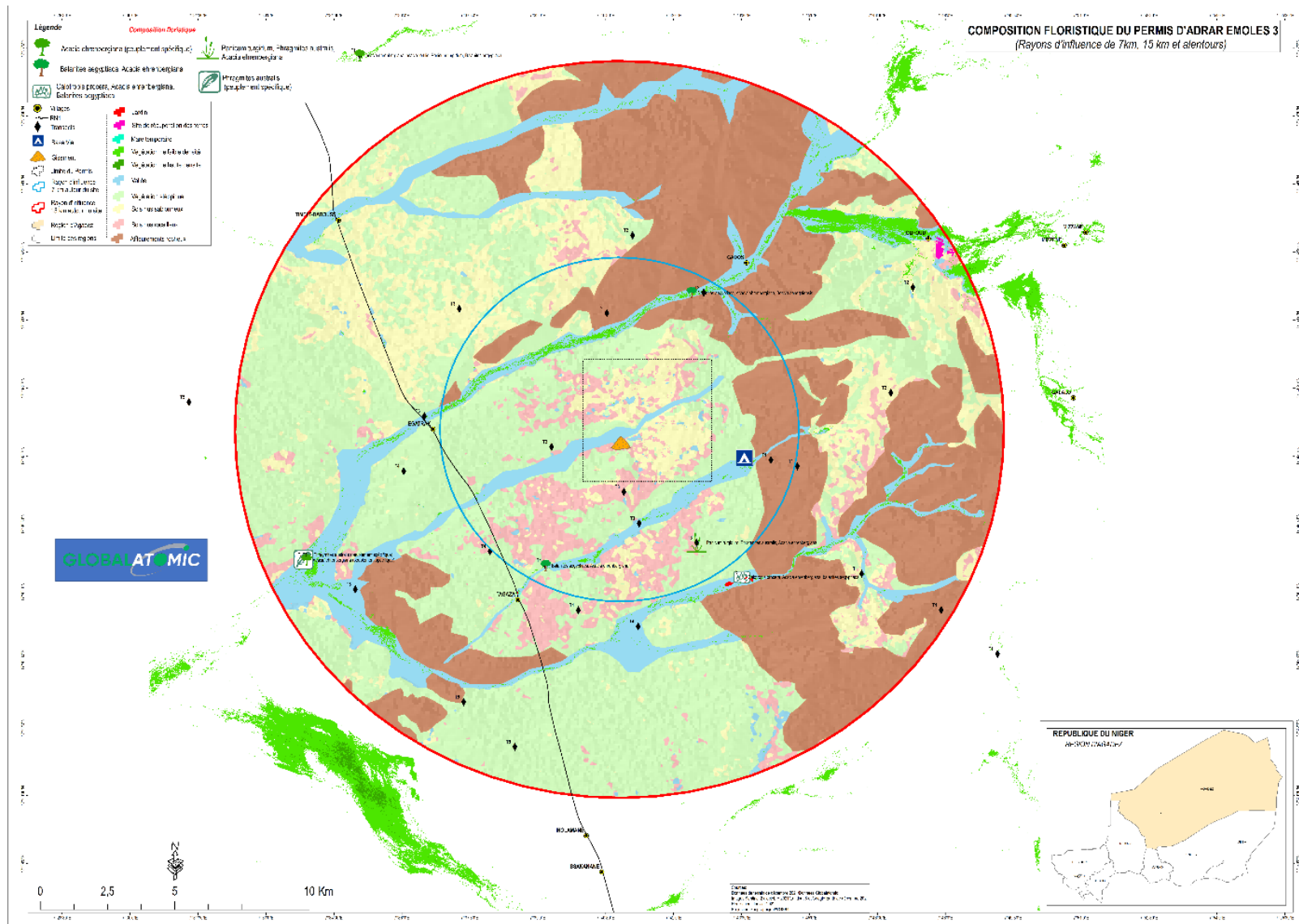


Figure 1 Floristic composition of the permit area

2.1.3. Vegetation cover of the permit area

The average cover of the vegetation cover is between 1 and 75%. The highest cover is found in R1, R3, R8, R9, R14, R20, R23, R29, R31, which varies between 50-75%. The lowest cover is found in R2, R5, R6, R10, R12, R16, R18, R21, R22, R25, R27, R30, with a cover of between 1-5%. Table 4 below gives the overlap per survey.

Table 4 Vegetation cover

TRANSECTS	SECTOR	PLANT COVER
T1	R1	50 - 75 %
T1	R2	1 - 5 %
T1	R3	50 - 75 %
T1	R4	20 - 50 %
T1	R5	1-5%
T2	R6	1 - 5 %
T2	R7	20 - 50 %
T2	R8	50 - 75 %
T2	R9	50 - 75 %
T2	R10	1 - 5 %
T2	R11	20 - 50 %
T2	R12	1 - 5 %
T3	R13	> 75 %
T3	R14	> 75 %
T3	R15	20 - 50 %
T3	R16	1 - 5 %
T3	R17	20 - 50 %
T3	R18	1 - 5 %
T3	R19	1 - 5 %
T3	R20	50 - 75 %
T3	R21	1 - 5 %
T4	R22	1 - 5 %
T4	R23	50 - 75 %
T4	R24	5 - 20 %
T4	R25	1 - 5 %
T4	R26	5 - 20 %
T4	R27	1 - 5 %
T4	R28	5 - 20 %
T5	R29	50 - 75 %
T5	R30	1 - 5 %
T5	R31	50 - 75 %
T5	R32	5 - 20 %
T5	R33	5 - 20 %

TRANSECTS	SECTOR	PLANT COVER
T5	R34	5 - 20 %

2.1.4. Floristic groups

In the course of the study, seven (7) floristic groupings associated with the morphology of the terrain were observed (see Table 5 and Figure 2 below).

Table 5: Plant groups associated with the morphology of the terrain

FLORISTIC GROUPING	CHARACTERISTIC SPECIES	GEOMORPHOLOGY	GEOGRAPHICAL COORDINATES	
G1	<i>Acacia ehrenbergiana</i> , <i>Acacia tortilis</i> , <i>Panicum turgidum</i> , <i>Balanites aegyptiaca</i>	Valley	N 17°56'50.5"	E 007°35'04.5"
G2	<i>Calotropis procera</i> , <i>Acacia ehrenbergiana</i> , <i>balanites aegyptiaca</i>	Plain	N 17°45'19.6"	E 007°43'30.8"
G3	<i>Balanites aegyptiaca</i> , <i>Acacia ehrenbergiana</i>	Plain	N 17°45'34.8"	E 007°39'10.6"
G4	<i>Balanites aegyptiaca</i> , <i>Acacia ehrenbergiana</i> , <i>Boscia senegalensis</i>	Valley	N 17°51'36.3"	E 007°42'40.0"
G5	<i>Phragmites australis</i> (specific stand)	Plain	N 17°45'42.6"	E 007°33.49.8"
G6	<i>Acacia ehrenbergiana</i> (specific stand)	Plain	N 17°45'42.2"	E 007°33'54.1"
G7	<i>Panicum turgidum</i> , <i>Phragmites australis</i> , <i>Acacia ehrenbergiana</i>	Sandy plateau / rocky plateau	N 17°46'05.2"	E 007°42'30.5"

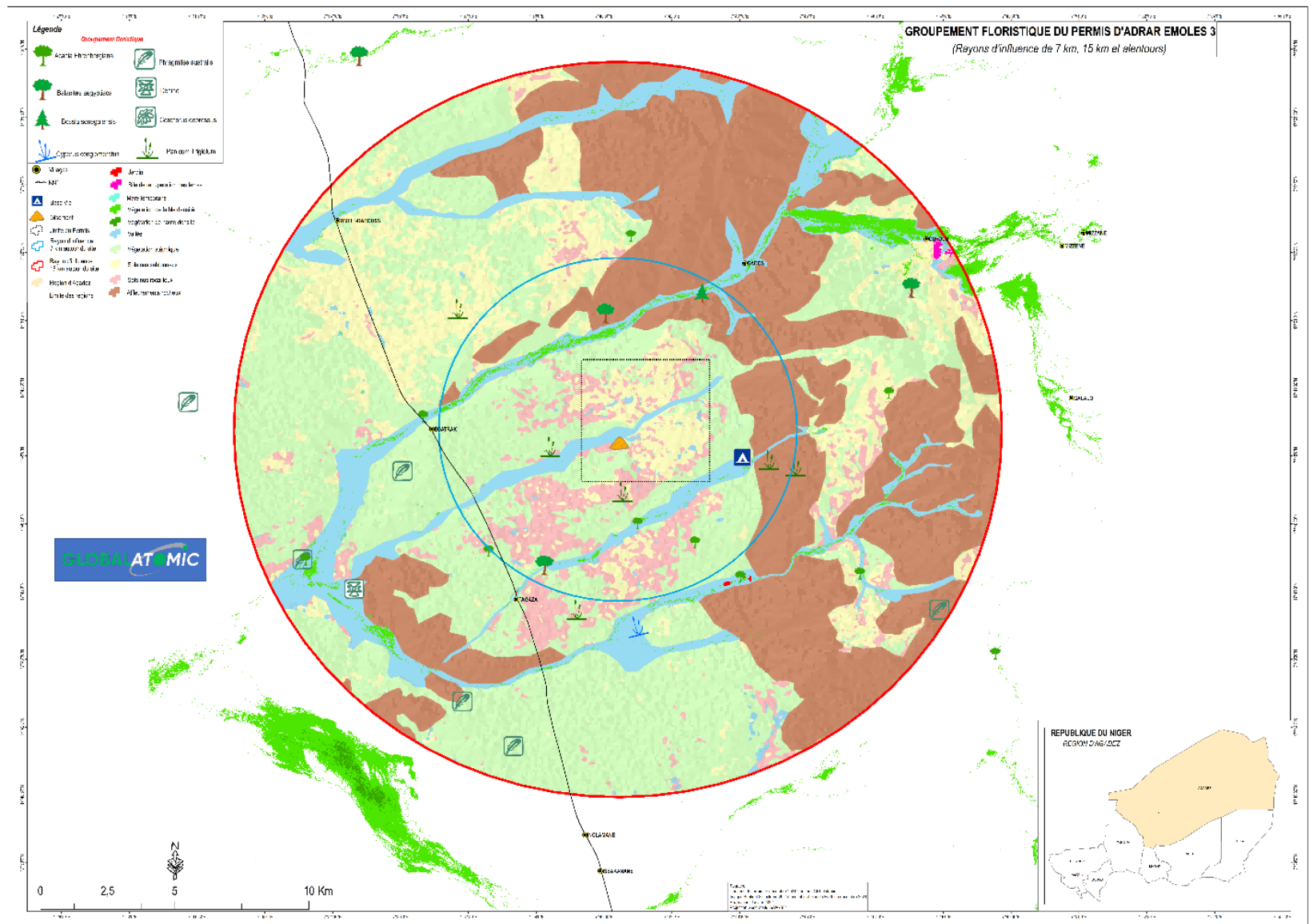


Figure 2 Floristic groups in the permit area

Photos 3, 4 and 5 illustrate some of the associations observed in terms of clustering in the permit area.



Photo 3: Tree steppe with a herbaceous carpet dominated by *Phragmites australis*



Photo 4: Specific grassy steppe of *Panicum turgidum*



Photo 5: Stand of *Acacia ehrenbergiana*

2.1.5. Services provided to local communities

As part of this update of the environmental and social impact assessment of the Adrar Emoles 3 exploration permit, an evaluation of ecosystem services was carried out and

concerned the different uses of vegetation (food, pharmacopoeia, service wood, firewood, grazing, etc.) by local communities. The results are given in the table below.

Table 6 Services provided by flora

SCIENTIFIC NAME	FAMILY	LOCAL NAME	BETAIL FOOD	HUMAN FOOD	PHARMACOPHY	OTHER
LIGNEUX						
<i>Acacia ehrenbergiana</i>	Mimosaceae	Tamat	Yes	Yes	Yes	Firewood, construction
<i>Acacia raddiana</i>	Mimosaceae	Afagak	Yes	No	No	Firewood
<i>Accacia nilotica</i>	Mimosaceae	tiggaert	Yes	No	Yes	Firewood
<i>Accacia senegal</i>	Mimosaceae	Dibshi	Yes	No	Yes	Firewood
<i>Balanites aegyptiaca</i>	Zygophyllaceae	Aborak	Yes	Yes	Yes	Firewood, Handicrafts
<i>Boscia senegalensis</i>	Capparidaceae	Tedent	Yes	Yes	Yes	Firewood
<i>Calotropis procera</i>	Asclepiadaceae	Tirza	Yes	No	Yes	Firewood
<i>Commiphora africana</i>	Burseraceae	Adäras				Firewood
<i>Hyphaene thebaica</i>	Arecaceae	Taggeyt	Yes	Yes	Yes	Firewood
<i>Maerua crassifolia</i>	Capparidaceae	Agar	Yes	No	Yes	Firewood
<i>Phoenix dactylifera</i>	Arecaceae	Talizouk	Yes	Yes	Yes	Firewood
<i>Ziziphus mauritania</i>	Rhamnaceae	Abaka	Yes	Yes	Yes	Firewood
HERBACEES						
<i>Andropogon gayanus</i>	Gramineae	Katagoêts				
<i>Aristida Sp</i>	Gramineae	Tazmei				
<i>Cassia obtusifolia</i>	Caesalpiniaceae	Abaezzy	Yes	Yes	Yes	
<i>Celosia trigyna</i>	Amaranthaceae	Tajelanghitayt.				
<i>Cenchrus bitorus</i>	Poaceae	Wajjag	Yes	No	No	
<i>Chrysopogon aucheri</i>	Graminae	Taezmé				
<i>Cleome africana</i>	Capparidaceae	Taedak				
<i>Corchorus depressus</i>	Tiliaceae	Amadghos				
<i>Corchorus olitorius</i>	Tiliaceae	Melahya	Yes	Yes	Yes	
<i>Cymbopogon sp</i>	Gramineae	Tebéremt	Yes	No	Yes	
<i>Cyperus Alopecuroides</i>	Cyperaceae					

SCIENTIFIC NAME	FAMILY	LOCAL NAME	BETAILED FOOD	HUMAN FOOD	PHARMACOPHY	OTHER
<i>Digitaria Horizontalis</i>	Gramineae	Ishibaen	yes	yes		
<i>Eragrostis tremula</i>	Gramineae	Tegit	yes			
<i>Indicofera Nummulariifolia</i>	Fabaceae	Agarof	Yes	Yes	Yes	
<i>Limeum Viscosum</i>	Aizoaceae	Tamasalt				
<i>Panicum turgidum</i>	Gramineae	Afazo	Yes	No	No	Construction secko
<i>Schoenoplectus corymbosus</i>	Cyperaceae	Alögi				

2.2. Wildlife

2.2.1. Results of the observations

During the monitoring mission, direct and indirect observations were recorded. In practice, these observations mainly concerned the most easily observable mammals, birds and reptiles.

The two photographic traps used during five (5) nights, i.e. 10 different positions, allowed us to record some carnivores that were difficult to observe during the day.

In addition, the socio-ecological surveys allowed us to confirm the presence of certain species in the area.

A total of 54 animal species were observed, including 34 birds, 13 mammals and 7 reptiles.

2.2.1.1. Mammals and reptiles

During this mission 6 dorcas gazelles were observed in two direct observations with a flight distance of about 300-500 m, 4 squirrels, 1 jackal and 5 cape hares,

Indirect observations include dorcas gazelles, mouflon, patas, jackal, fennec, pale fox, raccoon, Libyan cat. Photo 4 below shows a fennec photographed by the trap camera.

Of these mammals, only the Dorcas Gazelle and the mouflon are classified as vulnerable on the IUCN red list.



Photo 6 Fennec photographed by the camera

As far as reptiles are concerned, among the species inventoried are the Horned Viper, Snake, Cobra, and the Sand Boa, the Uromastix (see Photo 7 below) and the common lizards.



Photo 7 View of a Uromastyx (direct observation)

The IUCN status of these species (mammals and reptiles) is given in the table below.

Table 7 Status of mammal species and reptiles

N°	TYPE OF OBSERVATION	FRENCH NAME	SCIENTIFIC NAME	LOCAL NAME	IUCN STATUS	CMS	CITES
1	Direct, Questionnaires	Squirrel	<i>Xerus erythropus</i>	KolanKolan	Least Concern		
2	Camera trap, questionnaires	Fennec	<i>Vulpeszerda</i>	Ezagaz	Least Concern		
3	Direct and indirect, Questionnaires	Dorcas	<i>Gazella dorcas</i>	Azankat	Vulnerable	I	III
4	Direct, Questionnaires	Cape Hare	<i>Lepus capensis</i>	Tamarwarlt	Least Concern		
5	Indirect, Questionnaires	Mouflons_manchette	<i>Ammotragus lervia</i>		Vulnerable	II	II
6	Indirect, Questionnaires	Patas	<i>Erythrocebus patas</i>		Least Concern		
7	Indirect, Questionnaires	Ratel	<i>Mellivora capensis</i>		Least Concern		III
8	Indirect, Camera trap	Libyan cat	<i>Felis lybica Felis silvestris</i>		Least Concern		
9	Indirect, direct, camera trap, questionnaires	Common Jackal	<i>canis aureus</i>		Least Concern		III
10	Questionnaires	Gerbil	<i>Jaculus jaculus</i>		Least Concern		
11	Questionnaires	Pork spices	<i>Hystrix cristata</i>	Takonichit	Least Concern		
12	Camera trap, Questionnaires	Pale fox	<i>Vulpes pallida</i>		Least Concern		
13	Direct, Questionnaires	Herison	<i>Paraechinus aethiopicus</i>		Least Concern		
14	Direct, Questionnaires	Uromastyx	<i>Uromastyx geyri</i>	Amakachaw	Nearly menaced		
15	Direct, Questionnaires	Lezard	<i>Agama agama</i>		Least Concern		
16	Direct, Questionnaires	Desert monitor	<i>Varanus griseus</i>		Least Concern		I
17	Indirect, Questionnaires	Cobra	<i>Najanigri collis</i>	Safaltas	Least Concern		
18	Indirect, Questionnaires	Horned Viper	<i>Cerastes ceraste</i>	Tachile	Least Concern		
19	Direct, Questionnaires	Snake	<i>Psammophissibilansor</i> <i>Psammophissubtaeniatus</i>	Koumoetcho	Least Concern		
20	Questionnaires	Sand Boa	<i>Eryx jaculus</i>		Least Concern		
21	Questionnaires	Black Scorpion	<i>Pandinus imperator</i>	Tazardimet	Least Concern		II
	Disappeared from the project area	Gazelle dama	<i>Nanger dama</i>		Critically endangered	I	I
	Disappeared from the project area	Oryx	<i>Oryx dammah</i>		Extinct in the wild	I	I
	Disappeared from the project area	Austria					

2.2.1.2. Birds

Several bird species were observed in the project area. Identification was made using the Birds of Western Africa guide, 2nd edition by Nik Borrow and Ron Demey and resulted in 34 species being identified. The raptors observed were the Oricou Vulture, Egyptian Vulture, Great Horned Owl, Short-toed Eagle and Kestrel. The following pictures 8 and 9 illustrate respectively an Oricou Vulture and an Egyptian Vulture observed in the project area.



Photo 8 Oricou Vulture



Photo 9 Egyptian woodpecker

Of these birds, only the Oricou Vulture and the Egyptian Vulture are classified as endangered on the IUCN Red List (see Table 7 below), in CITES Appendix II and CMS Appendix II/I for the Egyptian Vulture and CMS Appendix I for the Oricou Vulture.

Table 8 Status of bird species in the project area

FRENCH NAME	SCIENTIFIC NAME	IUCN STATUS
Podobean Agrobate	<i>Cercotrichos podobe</i>	Least Concern
Rufous Agrobate	<i>Cercotrichas galactotes</i>	Least Concern
Sahara Bunting	<i>Emberiza striolata</i>	Least Concern
Red-billed Hornbill	<i>Tockus nasutus</i>	Least Concern
Crested Cocksucker	<i>Galerida cristata</i>	Least Concern
Capuchins silver beak	<i>Euodice cantans</i>	Least Concern
Blue-eared Choucador	<i>Lamprotornis chalybaeus</i>	Least Concern
White-winged Eagle	<i>Circaetus gallicus gallicus</i>	Least Concern
Brown Raven	<i>Corvus ruficollis</i>	Least Concern
Short-tailed Raven	<i>Corvus rhipidurus</i>	Least Concern
Pied Raven	<i>Corvus albus</i>	Least Concern
Ruffed Collie	<i>Urocolius macrourus</i>	Least Concern
Tawny Cratérope	<i>Turdoides fulvus</i>	Least Concern
Kestrel	<i>Falco tinnunculus</i>	Least Concern
Brown-bellied Ganga	<i>Pterocles exustus</i>	Least Concern
Lichtenstein Ganga	<i>Pterocles lichtensteinii</i>	Least Concern
African Hoopoe	<i>Upupa epops senegalensis</i>	Least Concern
Great horned owl	<i>Bubo ascalaphus</i>	Least Concern
Hoopoe	<i>Upupa epops</i>	Least Concern
House Swift	<i>Apus affinis</i>	Least Concern
Golden sparrow	<i>Passer luteus</i>	Least Concern
White-fronted sparrow	<i>Eremopterix nigriceps</i>	Least Concern
Egyptian Percnopter	<i>Neophron pernopterus</i>	At risk
Little green bee-eater	<i>Merops orientalis</i>	Least Concern
Southern Shrike	<i>Lanius meridionalis</i>	Least Concern
Rock pigeon	<i>Columba guinea</i>	Least Concern
Guinea fowl Common	<i>Numida meleagris</i>	Least Concern
Collared dove	<i>Streptopelia senegalensis</i>	Least Concern
Masked dove	<i>Oena capensis</i>	Least Concern
Mourning Dove	<i>Streptopelia decipens</i>	Least Concern
White-headed Wheatear	<i>Oenanthe leucopyga</i>	Least Concern
Desert Parrot	<i>Oenanthe desertii</i>	Least Concern
Isabella Wheatear	<i>Oenanthe isabellina</i>	Least Concern
Oricu Vulture	<i>Torgos tracheliotos</i>	At risk

2.2.2. Threatened or extinct species

From interviews with local communities, it was found that in the project area, the dama gazelle (*Nanger dama*), the Oryx (*Oryx dammah*) and the Red-necked Austria (*Struthio camelus*) existed.

Today, these species have completely disappeared due to poaching, combined with drought and climate change.

2.2.3. Use of wildlife

As with the flora, the different uses of the fauna by local communities were studied, particularly in terms of food and pharmacopoeia, etc. The results of this are recorded in Table 9 below.

Table 9 Wildlife services

N°	SPECIES	SCIENTIFIC NAME	LOCAL NAME	USES/SERVICES
1	Squirrel	<i>Xerus erythropus</i>	KolanKolan	
2	Fennec	<i>Vulpeszerda</i>	Ezagaz	
3	Dorcas	<i>Gazella dorcas</i>	Azankat	Consumption
4	Cape Hare	<i>Lepus capensis</i>	Tamarwart	Consumption, ornament of nature
5	Mouflons_manchette	<i>Ammotragus lervia</i>		Consumption
6	Patas	<i>Erythrocebus patas</i>		
7	Ratel	<i>Mellivora capensis</i>		Snake hunter
8	Libyan cat	<i>Felis lybica Felis silvestris</i>		
9	Common Jackal	<i>canis aureus</i>		Traditional medicine
10	Gerbil	<i>Jaculus jaculus</i>		
11	Pork spice	<i>Hystrix cristata</i>	Takonichit	
12	Pale fox	<i>Vulpes pallida</i>		
13	Herison	<i>Paraechinus aethiopicus</i>		
14	Uromastyx	<i>Uromastyx geyri</i>	Amakachaw	Traditional medicine
15	Lezard	<i>Agama agama</i>		
16	Desert monitor	<i>Varanus griseus</i>		Traditional medicine
17	Cobra	<i>Najanigri collis</i>	Safaltas	
18	Horned Viper	<i>Cerastes ceraste</i>	Tachile	
19	Snake	<i>Psammophissibilans or Psammophissubtaeniatus</i>	Koumoetcho	
20	Sand Boa	-----		
21	Black Scorpion	<i>Pandinus imperator</i>	Tazardimet	

CONCLUSION

This biodiversity study undertaken as part of the update of the Environmental and Social Impact Assessment of the Adrar Emoles 3 Exploration Permit has provided an overview of the plant and animal species present in the project area.

The methodological approach used combined the use of modern means (Cybertracker, GPS, camera traps, Drone) and socio-ecological surveys (with local communities) in order to have scientifically valid data that will allow an objective assessment of the risks and potential impacts of the project on the environment (particularly on fauna and flora) as well as a proposal of mitigation and/or compensation measures.

Thus, for the vegetation, at the end of this work, a total of 29 species were identified in and around the permit area, including 17 herbaceous and 12 woody species.

As for the fauna, 6 dorcas gazelles, 4 squirrels, 1 jackal and 5 cape hares were observed (direct observations) in terms of mammals and reptiles. Indirect observations included dorcas gazelles, mouflon, patas, jackal, fennec, pale fox, raccoon and Libyan cat. Among the mammals, only the dorcas gazelle and the mouflon are classified as vulnerable on the IUCN red list. Concerning reptiles, among the species inventoried, the Horned Viper, Snake, Spitting Cobra, and the Sand Boa, Uromastix, should be noted.

For birds, 34 species were distinguished during the study. However, the Oricou vulture and the Egyptian vulture are classified as endangered on the IUCN red list.

Finally, the study also took stock of the different ecosystem services in the project area.