

Contribution about the environment of El-Bayadh region in the southern-west of Algeria

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Abstract

This study is made for the purpose of giving an idea about the biotic components of a steppe zone characterized by a specific richness, the bibliographical synthesis revealed a special floristic wealth is found under three types of landscapes; rocky plateaus with herbaceous vegetation. The second is a shrub steppe and the third is the forest. Despite the scarcity of plants, the plants in the region are specific. The fauna of the region is characterized by a large diversity. In 108 vertebrate species, two birds and four mammals are at risk (Houbara bustard and the bald Ibis.) and (The Dorcas Gazelle, the dune gazelle, the Atlas Goundi and the Fennec are endangered. At the end of this study, it appears that the degradation of the steppe environment has forced migration to the city of El Bhayed as a solution.

Key words: biotic components, floristic, El Bhayed, The fauna, environmental degradation

INTRODUCTION

The arid steppes north of the Sahara occupy an area of 630,000 km², between the isohyets of 100 and 400 mm of mean annual rainfall (MAR), from the Red Sea to the Atlantic Ocean. Physiognomically they may be subdivided into perennial grass, dwarf shrub, tall shrub, crassulescent, succulent and pulvinate steppes [17], Algeria has an ecological vulnerability resulting in fragile ecosystems to drought and desertification, unrestrained coastal erosion and a chronic water stress in some areas. The arid and steppe areas occupy about 32% of the land in Algeria, sensitive to desertification, composed of 20 million hectares of steppe and 12 million ha of pre-Saharan [10]. The action of wind erosion accentuates the desertification process; it varies depending on the plant cover. This type of erosion causes a soil loss of 100 to 250 tons/ha/year in cleared steppes [17]. According to [18], the natural resources of steppe region have undergone severe degradations due to the combined effects of a human and animal pressure increasing and of a worsening dryness on the ecosystems for several decades. These phenomena have contributed to increasing the fragility of ecosystems, reducing their capacity for regeneration and reduce their production potential. In the most vulnerable areas, overexploitation of renewable natural resources has the effect of favoring degradation processes leading to rapid spread of desertification [9], [19] whose major problem facing livestock in these areas is scarce and irregular food supply. Animal ruminant production in arid areas is characterized by periodic crises due to food shortages due to drought [18]. Knowledge, classification, characterization and conservation of different taxa are a global scientific priority for the assessment and management of biodiversity [7].

MATERIEL AND METHODS

Study area:

The territory of El Bayadh borders in a space delimited by longitude 0 ° to 2 ° E and latitude 31 ° to 34 ° N. It divided into three geographical bands parallel to the Mediterranean Sea, successively from is north to south: the high steppe plains, the Saharan atlas zone and the pre-Saharan zone [8]. It is spread over an area of 71 697 km², that is 3% of the national territory. It is dominated by the three jewels of Jebel Amour chain Saharan Atlas, Boudergua 1873 meters, majestic by its mass with its remains of the optical post, El Ouastani 1878 meters and the great Ksel with 2008 meters. The relief of the Wilaya consists largely of: Mountains: 6.111 km², Hills and foothills: 10.422 km², Plains: 47.254 km², Others: 7.910 km². This region shows an ecological importance by its exceptional floristic and faunistic and economic wealth by the occupation of a herd exceeds the 1 million ovine heads.

The objective in this work is to highlight the current state of the environment in El Bayadh region. The average annual rainfall of El Bayadh region is relatively low; it represents 326mm / year on average. The region of El Bayadh, given the morphology of its relief, presents two types of climate (semi-arid in the North and arid in the South) [8], [23].

Objective:

The present study is primarily a synthesis of floristic data followed by a synthesis of faunistic data well a study of the work was conducted in the region of El-Bayad.

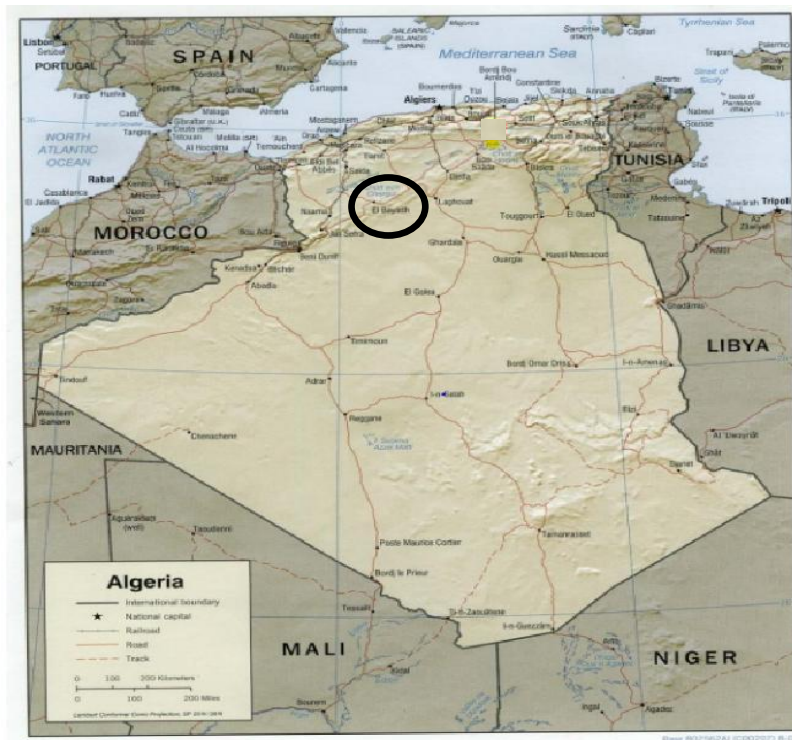


Fig. 1: Geographic position of El Bayadh [20]

RESULTS AND DISCUSSION

1- Flora of the El Bayadh region:

Generally, the vegetation of the steppe and Saharan zones consists of herbaceous and / or more or less shrubby plants. [13]. The same author in (1996 and 1998) recorded 211 species of spermatophytes, belonging to 38 botanical families or 31% of families identified in Algeria and 19, 1% of the floristic diversity of the steppe routes of Algeria, Morocco and Tunisia grouped.

According to [3], there are 3 landscapes in the El Bayadh region, the first of which includes rocky plateaus with herbaceous vegetation with graminaceous vegetation. The second is a shrub steppe and the third is the forest. The first landscape is dominated by perennial grasses such as alfa (*Stipa tenacissima*), sparte (*Lygeum spartum*) and some other less sociable species such as drinn (*Stipa grostis pungens*), zouai (*Stipa barbata* syn. *S. parviflora*) and N'djem (*Cynodon dactylon*). The second landscape is structured by shrubs or sub-shrubs such as sagebrush (*Artemisia herbaalba* syn. *Seriphidium herba-album*, *A.campestris*, *A. monosperma*), arfej (*Rhanterium suaveolens*), rem't (*Hammada scoparia*), baguel (*Hammada schmittiana*), chobrog (*Noaea mucronata*), helianthes (*Helianthemum hirtum*, *H. Ipii*, *H. virgatum*, *H. cinereum*), ajrem (*Anabasis* sp.) and serr (*Atractylis serratuloides* syn *A. phaeolepis*). The third landscape is located on the Saharan Atlas mountains and is mainly composed of the Aleppo pine from the green dam project [1].

In our region the area of rangelands represents 86% of the total area. According to [8] the steppe space is subject to degradation affecting 80% of the total area. It is the most degraded steppe part of the Algerian steppe, this situation directly influences faunistic diversity and human life in this region.

2- Wildlife of El Bayadh region:

In this part invertebrates and vertebrates are developed.

2.1- Invertebrates of El Bayadh Region:

The Invertebrates of the El Bayadh region is little studied, it is worth noting the work of [21] on the Arachnids. Meanwhile for Insects and more specifically for Orthopteroids, The work of [6] should be noted.

The class of arachnids is essentially represented by the orders of Scorpionnida. The species present are mainly *Buthus occitanus tunetanus* (HERBST, 1800), *Antroctonus australis* (HECTOR and KOCH, 1839) and *Antroctonus aeneus* (KOCH, 1839). [21]. Regarding the class of insects, [6] reported the presence of 3 orders. The Blattodea are represented by *Heterogamodes ursina* (BURMEISTER, 1838) and *Heterogamodes bolivari* (ADEIUNG, 1914). The second order of Mantodea is represented by a single species *Eremiaphila denticollis* (LUCAS, 1855). For the third order of the Orthoptera, he noted the presence of six species (*Duroniella lucasi* (BOIVAR, 1881), *Dociostaurus maroccanus* (THUNBERG, 1815), *Gryllus burdigalensis* (LATREIITE, 1804).

2.2- Amphibians of the El Bayadh region:

Amphibians are poorly studied in the El Bayadh area. According to the work of [16] and [15], only three species are noted. These species are listed in the table (1)

Table 1: List of Amphibians in the El Bayadh Region

Orders	Families	Species	Common name in French
Anoures	Bufonidae	<i>Bufo viridis</i> (Laurenti, 1768)	Crapaud vert
		<i>Bufo mauritanicus</i> (Schlegel, 1841)	Crapaud de Maurétanie
	Ranidae	<i>Ranaridibunda</i> (Pallas, 1771)	Grenouille rieuse

2.3- Reptiles of El Bayadh region:

Reptiles in the El Bayadh area are poorly studied. Since the completed list of [15] in 1989, no work has been done on reptiles until 1995. [16] in 1995 completes the list of this class. These authors report the presence of three orders. The order of Sauriens is the best represented with 15 species divided between 7 families. Followed by the order of the Ophidiens represented by 6 species divided between 2 families. Then the order of the Testudines least represented by a single species. These results are shown in the table (2).

Table 2 -Reptile of the El Bayadh region

Orders	Families	Species	Common name in French
Testudines	Testudinidae	<i>Testudo graeca</i> (Linné, 1758)	Tortue mauresque
Squamata	Colubridae	<i>Rhagerhis moilensis</i> (Reuss, 1834)	Couleuvre moilensis
		<i>Malpolon monspessulanus</i> (Hermann, 1804)	Couleuvre de Montpellier
		<i>Macroprotodon cucullatus</i> (G.De St-Hilaire, 1827)	Macroprotodon cucullatus
		<i>Lytrohynchus diadema</i> (D, Bibron & Duménil, 1854)	Couleuvre diadème
	Varanidae	<i>Varanus griseus</i> (Daudin, 1803)	Varan du désert
	Elapidae	<i>Naja haje</i> (Linnaeus, 1758)	Cobra égyptien
	Chamaeleonidae	<i>Chamaeleo chamaeleon</i> (Linnaeus, 1758)	Caméléon commun
	Viperidae	<i>Cerastes cerastes</i> (Linnaeus, 1758)	Vipère à cornes
		<i>Cerastes vipera</i> (Linnaeus, 1758)	Vipère céraste
	Agamidae	<i>Uromastyx acanthinura</i> (Bell, 1825)	Fouette-queue
		<i>Agama impalearis</i> (Boettger, 1874)	Agama impalearis
		<i>Trapelus mutabilis</i> (Merrem, 1820)	Trapelus mutabilis
	Lacertidae	<i>Mesalina olivieri</i> (Audouin, 1829)	Mesalina d'olivier
		<i>Mesalina guttulata</i> (Lichtenstein, 1823)	Mesalina à gouttelettes
		<i>Mesalina rubropunctata</i> (Lichtenstein, 1823)	Mesalina à points rouges
	Scincidae	<i>Scincopus fasciatus</i> (Peters, 1864)	Scinque de Géry ville
	Phyllodactylidae	<i>Tarentola mauritanica</i> (Linnaeus, 1758)	Tarente de Maurétanie
<i>Ptyodactylus oudrii</i> (Lataste, 1880)		Gecko	
Gekkonidae	<i>Stenodactylus petrii</i> (Anderson, 1896)	Gecko de pétri	
	<i>Stenodactylus sthenodactylus</i> (Lichtenstein, 1823)	Gecko de Stenodactylus	

2.4- Birds of El Bayadh region:

The table (3) groups the results of avian species recorded by [11], [12] and [15] in the El Bayadh region.

Table 3: List of birds from El Bayadh region

Orders	Families	Species	Common name in French
Pelecaniformes	Ardeidae	<i>Bubulcus ibis</i> (Linnaeus, 1758)	Héron garde-bœufs
	Threskiornithidae	<i>Geronticus eremita</i> (Linnaeus, 1758)	L'Ibis chauve
Ciconiiformes	Ciconiidae	<i>Ciconia ciconia</i> (Linnaeus, 1758)	Cigogne blanche
Accipitriformes	Accipitridae	<i>Circus aeruginosus</i> (Linnaeus, 1758)	Busard des roseaux
		<i>Circus pygargus</i> (Linnaeus, 1758)	Busard cendré
		<i>Circaetus gallicus</i> (Gmelin, 1788)	Circaète Jean-le-Blanc
		<i>Buteo rufinus</i> (Cretzschmar, 1829)	Buse féroce
Falconiformes	Falconidae	<i>Falco biarmicus</i> (Temminck, 1825)	Faucon lanier
		<i>Falco tinnunculus</i> (Linnaeus, 1758)	Faucon crécerelle
Passeriformes	Emberizidae	<i>Emberiza calandra</i> (Linnaeus, 1758)	Bruant proyer
	Passeridae	<i>Passer hispaniolensis</i> (Temminck 1820)	Moineau espagnol
	Passeridae	<i>Passer domesticus</i> (Linnaeus, 1758)	Moineau domestique
	Corvidae	<i>Corvus corax</i> (Linnaeus, 1758)	Grand Corbeau
	Laniidae	<i>Lanius excubitor</i> (Linnaeus, 1758)	Pie-grièche grise
	Laniidae	<i>Lanius senator</i> (Linnaeus, 1758)	Pie-grièche à tête rousse
	Leiostichidae	<i>Turdoides fulva</i> (Desfontaines, 1789)	Cratérope fauve
	Phylloscopidae	<i>Phylloscopus trochilus</i> (Linnaeus, 1758)	Pouillot fitis
	Phylloscopidae	<i>Phylloscopus collybita</i> (Vieillot, 1817)	Pouillot véloce
	Scotocercidae	<i>Scotocerca inquieta</i> (Cretzschmar, 1830)	Dromoïque du désert
	Sylviidae	<i>Sylvia communis</i> (Latham, 1787)	Fauvette grisette
	Sylviidae	<i>Sylvia cantillans</i> (Pallas, 1764)	Fauvette passerinette
	Sylviidae	<i>Sylvia conspicillata</i> (Temminck, 1820)	Fauvette à lunettes
	Sylviidae	<i>Sylvia deserti</i> (Loche, 1858)	Fauvette du désert
	Acrocephalidae	<i>Hippolais polyglotta</i> (Vieillot, 1817)	Hypolaïs polyglotte
	Muscicapidae	<i>Ficedula albicollis</i> (Temminck, 1815)	Gobe-mouche à collier
	Muscicapidae	<i>Cercotrichas galactotes</i> (Temminck, 1820)	Agrobate roux
	Muscicapidae	<i>Oenanthe oenanthe</i> (Linnaeus, 1758)	Traquet motteux
	Muscicapidae	<i>Oenanthe leucura</i> (Gmelin, 1789)	Traquet rieur
	Muscicapidae	<i>Phoenicurus phoenicurus</i> (Linnaeus, 1758)	Rougequeue à front blanc
	Muscicapidae	<i>Phoenicurus ochruros</i> (Gmelin, 1774)	Rougequeue noir
	Muscicapidae	<i>Oenanthe hispanica</i> (Linnaeus, 1758)	Traquet oreillard
	Motacillidae	<i>Motacilla alba</i> (Linnaeus, 1758)	Bergeronnette grise
	Motacillidae	<i>Motacilla flava</i> (Linnaeus, 1758)	Bergeronnette printanière
	Hirundinidae	<i>Delichon urbicum</i> (Linnaeus, 1758)	Hirondelle de fenêtre
	Hirundinidae	<i>Hirundo rustica</i> (Linnaeus, 1758)	Hirondelle de cheminée
	Alaudidae	<i>Eremophila alpestris</i> (Linnaeus, 1758)	Alouette hausse-col
Alaudidae	<i>Melanocorypha calandra</i> (Linnaeus, 1758)	Alouette calandre	
Alaudidae	<i>Ammomanes deserti</i> (Lichtenstein, 1823)	Ammomane isabelline	
Alaudidae	<i>Ammomanes cinctura</i> (Gould, 1839)	Ammomane élégante	
Coraciiformes	Meropidae	<i>Merops apiaster</i> (Linnaeus, 1758)	Guêpier d'Europe
Bucerotiformes	Upupidae	<i>Upupa epops</i> (Linnaeus, 1758)	Huppe fasciée
Galliformes	Phasianidae	<i>Coturnix coturnix</i> (Linnaeus, 1758)	Caille des blés
Pterocliiformes	Pteroclididae	<i>Pterocles alchata</i> (Linnaeus, 1766)	Ganga cata
	Pteroclididae	<i>Pterocles orientalis</i> (Linnaeus, 1758)	Ganga unibande
Apodiformes	Apodidae	<i>Apus affinis</i> (Gray, 1830)	Martinet des maisons

	Apodidae	<i>Apus pallidus</i> (Shelley, 1870)	Martinet pâle
Strigiformes	Tytonidae	<i>Tyto alba</i> (Scopoli, 1769)	Chouette effraie
	Strigidae	<i>Bubo bubo</i> (Linnaeus, 1758)	Hibou grand-duc
	Strigidae	<i>Athene noctua</i> (Scopoli, 1769)	Chevêche d'Athéna
Columbiformes	Columbidae	<i>Columba livia</i> (Gmelin, 1789)	Pigeon biset
	Columbidae	<i>Streptopelia turtur</i> (Linnaeus 1758)	Tourterelle des bois
	Columbidae	<i>Streptopelia senegalensis</i> (Linnaeus 1766)	Tourterelle maillée
	Columbidae	<i>Streptopelia decaocto</i> (Frivaldsky, 1838)	Tourterelle turque

According to the census of [2]. In 2006, birdlife in the El bayadh region reached 53 species of birds distributed among 24 families and 10 orders. The order Passeriformes is the most represented in number of species with 30 species. In this list, there are more than 2 species threatened to disappear such as the houbara bustard and the bald Ibis.

2.5- Mammals of El Bayadh Region:

The results of the mammalian species found by [15], [14] and [16] are shown in the table (4)

Table 4: List of Mammals in El Bayadh Region

Orders	Families	Species	Common name in French
Artiodactyla	Bovidae	<i>Gazella dorcas</i> (Linnaeus, 1758)	Gazelle dorcas
		<i>Gazella leptoceros</i> (F. Cuvier, 1842)	Gazelle leptocère
	Suidae	<i>Sus scrofa</i> (Linnaeus, 1758)	Sanglier
	Felidae	<i>Felis silvestris</i> (Schreber, 1777)	Chat sauvage
	Mustelidae	<i>Ictonyx libyca</i> (Hemprich & Ehrenberg, 1833)	Zorille de Libye
		<i>Mellivora capensis</i> (Schreber, 1776)	Zorille du Cap
	Canidae	<i>Canis aureus</i> (Linnaeus, 1758)	Chacal doré
<i>Vulpes vulpes</i> (Linnaeus, 1758)		Renard roux	
<i>Vulpes zerda</i> (Zimmermann, 1780)		Fennec	
Chiroptera	Vespertilionidae	<i>Pipistrellus kuhlii</i> (Natterer in Kuhl, 1817)	Pipistrelle de Kuhl
	Rhinopomatidae	<i>Rhinolophus blasii</i> (Peters, 1866)	Chauve-souris
		<i>Rhinopoma hardwickii</i> (Gray, 1831)	Petit rhinopome
Erinaceomorpha	Erinaceidae	<i>Atelerix algirus</i> (Lereboullet, 1842)	Hérisson d'Algérie
Lagomorpha	Leporidae	<i>Paracichnus aethiopicus</i> (Ehrenberg, 1833)	Hérisson du désert
Macroscelidea	Macroscelididae	<i>Lepus capensis</i> (Linnaeus, 1758)	Lièvre du Cap
Rodentia	Scuridae	<i>Elephantulus rozeti</i> (Duvernoy, 1833)	Rats à trompe
		<i>Atlantoxerus getulus</i> (Linnaeus, 1758)	Écureuil de Berberie
	Gliridae	<i>Eliomys quercinus</i> (Linnaeus, 1758)	Lérot commun
	Ctenodactylidae	<i>Ctenodactylus gundi</i> (Rothmann, 1776)	Goundi de l'Atlas
		<i>Jaculus jaculus</i> (Linné, 1758)	Gerboise des steppes
	Dipodidae	<i>Jaculus orientalis</i> (Erxleben, 1777)	Grande gerboise d'Égypte
		<i>Dipodillus campestris</i> (Loche, 1867)	Gerbille champêtre
		<i>Gerbillus nanus</i> (Blanford, 1875)	Gerbille du Baluchistan
		<i>Gerbillus pyramidum</i> (Geoffroy, 1825)	Grande gerbille
		<i>Meriones libycus</i> (Lichtenstein, 1823)	Mérione libyen
		<i>Meriones shawi</i> (Duvernoy, 1842)	Mérione de shaw
		<i>Mus musculus</i> (Linnaeus, 1758)	Souris grise
		<i>Pachyuromys duprasi</i> (Lataste, 1880)	Gerbille à queue en massue
Psammomys obesus (Cretzschmar, 1828)	<i>Psammomys obesus</i> (Cretzschmar, 1828)	Rat du sable	
	<i>Rattus rattus</i> (Linnaeus, 1758)	Rat noir	
Soricomorpha	Soricidae	<i>Crocidurawhitakeri</i> (Winton, 1898)	Musaraigne de Whitaker

According to [2] The Dorcas Gazelle (*Gazella dorcas*), the dune gazelle (*Gazella leptoceros*), the Atlas Goundi (*Ctenodactylus gundi*) and the Fennec (*Fennecus zerda*) are endangered species. This situation has led the state to make protection programs and projects of multiplication and reintroduction. Only two species are protected in a multiplication reserve project (the Dorcas Gazelle and the dune gazelle) in the Brezina region.

3- The migration of the companions to the town of El Bayadh:

The steppe population represented 25% of the total Algerian population. Most of the population in scattered areas of the steppe has become semi-sedentary. Pastoralists have modified their production system by combining cereal cultivation, breeding and sedentarization. The environmental degradation in this area is forcing pastoralists and their families to migrate to the city of El Bayadh. In all the world the unfavorable condition influences the distribution of the inhabitants [22]. The evolution of the number of inhabitants of El Bayadh is in the following figure (2).

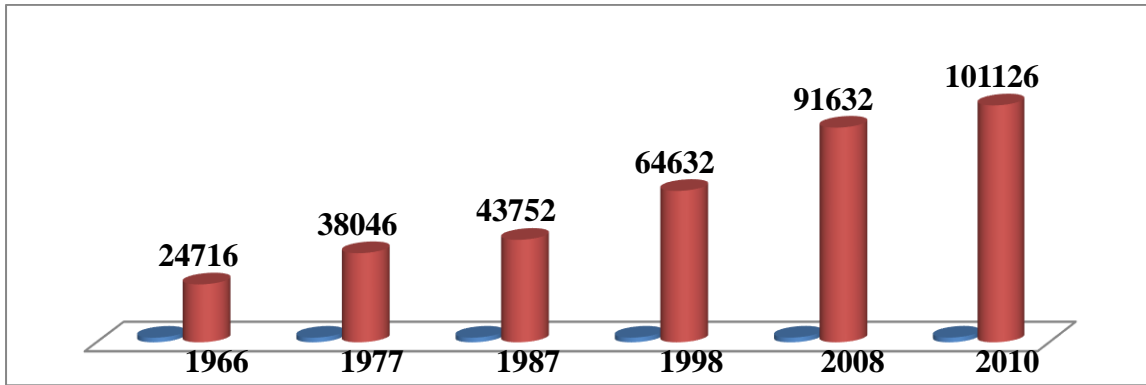


Fig. 2: Evolution of number of inhabitants from 1966 to 2010 in the municipality of El Bayadh

In the city of El Bayadh the natural birth reaches 3.1%, while the growth rate of this city is exceeded 33.93%. The unfavorable conditions of life in the degraded steppe favor the internal migration of the population towards the city of El Bayaed. About 30% of the population had to migrate between 1966 and 2010, in search of better living and working conditions.

Conclusion:

From this study there is a large list of animal species at risk of disappearing. This list bears the two birds Houbara Bustard and Bald Ibis four mammals are the Dorcas Gazelle, the dune gazelle, the Atlas Goundi and the Fennec. This state requires immediate intervention by protection programs and multiplication and reintroduction projects before it is too late. Diversity in the Algerian steppe remains unscathed; it is in need of new research. For example on nematodes, we find only the work of [5] in the region of M'sila. The same for work on insects, they are rare in the El Bayadh region and also in all Algerian steppes except the work of [4] in Ghardaya.

With regard to population migration from steppe areas to cities such as the case of the city of El Bayadh, remains the result of the degradation of the environment.

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