

DOI: 10.21625/archive.v3i1.429

Rebuilding Libya a Bird's Eye View**The relationship between the built environment and natural habitat for migratory and resident birds****Hailana Ben Ali¹**¹*Architecture and Urban Planning dept. Faculty of Engineering, Univ. of Benghazi, Libya. Tel.:**00218.091-3482829; e-mail: hailana.benali@uob.edu.ly***Abstract**

There are numerous important human activity factors which cause drastic reduction of the population of migratory birds as well as resident birds in the Libyan coastal areas and inner land too. Resulting into the deterioration of the ecosystems which support life, urban health, and simultaneously causes loss of urban heritage and place-identity. The urban sprawl has increased significantly over the past few decades as a result of population growth and economic activity. This rapid urbanization seriously invaded agricultural land and natural environment to the extent of endangering rural and urban landscape. In the absence of legislative regulations; this uncontrolled spatial development is threatening wildlife habitat. Therefore, we see how urban expansion has gone out of control in many Libyan cities to an alarming rate surmounting the increase rate of population caused by extensive economic policies. These policies lack an ecological vision of preservation of cultural and natural heritage which would have ensured the realization of healthy ecosystem and a sustained vision towards the future of rebuilding Libya. This paper aims to identify the relationship between built environment and natural habitat for migratory and resident birds. The paper is using archival research methods by drawing together mortality causes from various sources so that human related factors can be placed in perspective with one another and perhaps, eventually, with other mortality factors in future studies. The paper attempts to shed light on the dangers faced by these birds including those inflicted by human activities. Finally, the paper tries to formalise general outlines for presenting safer urban environment for birds in the city. A strategy for green buildings and sustained urban design in order to preserve the fragile natural landscape and the endangered biological diversity in our Libyan cities.

© 2019 The Authors. Published by IEREK press. This is an open access article under the CC BY license (<https://creativecommons.org/licenses/by/4.0/>).

Keywords

Biodiversity; Landscape ecology; Resident birds and migratory birds; Collisions with buildings; Bird safe city

1. Introduction

One of the intriguing mysteries of nature is bird's migration. Birds travel thousands of miles to get to areas of more suitable natural environment; where food can be found; where breeding is possible and springs can be nurtured. When the environment changes, this means having to look further for another more suitable habitat. There are many different ways of bird's migration: The majority of birds migrate from northern breeding locations to southern warmer areas away from the cold winter season. However, some types of birds migrate in winter from

southern areas in Africa to northern areas or they migrate horizontally to enjoy the moderate climate in coastal areas. Whereas other birds spend winter time in low ground and in the summer they move to high mountains. When do birds migrate? Between mid March to beginning of June, spring migration. Between mid August to beginning of November, autumn migration. Libya's location at the southern coast of the Mediterranean renders it as one of the internationally important routes of bird's migration between their breeding location in Europe and Asia to winter areas in Africa. Every spring and autumn millions of birds move across the Mediterranean among them too a huge number of European migration birds. A study carried out in March 2014 suggested a plan of action to deal with the problem of birds over hunting in the Mediterranean coastal line between Egypt and Libya. Plan of Action to Address Bird Trapping along the Mediterranean Coasts of Egypt and Libya. [1]. The study was conducted by Nature Conservation Egypt (NCE) sponsored by the UN Environmental Program, along with the agreement of conservation of migrating water birds in Africa, Europe and Asia. The UNEP/AEWA secretariat recorded a descending ratio of bird's migration on the African, European Asian routes. The ratio descended to 64 (34%) from 188 of sitting birds or in other less accurate expression; chirping birds. Establishing the highest descending ratio in the mostly well known types such as: Barn Swallow (*Hirundo rustica*), Eurasian Cuckoo (*Cuculus canorus*), Yellow Wagtail (*Motacilla flava*), European Turtle Dove (*Streptopelia turtur*) [Tab.1]. While other types such as Red-backed Shrike (*Lanius collurio*), Eurasian Wryneck (*Jynx torquilla*), disappeared from their sites [Tab.2]. Libya is like a paradise to bird lovers around the world. According to recent formal review of the Birds of Libya run by Bundy[2]. in 1976; 317 types were numerated. Never-the-less, during the last 30 years, there has not been any similar serious study of birds in Libya. Moreover, there are areas in Libya which have not been exploited and studied. Many areas in Libya need to be explored and discovered. The situation has recently changed and reports have been modernized and field studies carried out and informative material have been produced on the three major territories of Libya covering 90% the whole country. Tripolitania in the west, Cyrenaica in the east and Fezzan in the south. Each of these three areas has its own climate, habitat and hence its own bird life varieties. Tripolitania: There are many good bird watching areas within the capital. Interesting passerines include Barbary Partridge, Black Wheatear, Eurasian Spoonbills (*Platalea leucorodia*), Moussier's Redstart, Cream-coloured Courser [Tab.3]. Cyrenaica also has a number of interesting birds including: Greater Flamingo, Collared Pratincole, Long-legged Buzzard, Lesser Short-toed Lark, Lesser Crested Tern, White Stork [Tab.4]. Fezzan holds many desert species and considerable unexplored territory: Desert Sparrow, White-crowned Black Wheatear, Bar-tailed Lark [Tab.5]. Such varied environmental systems in Libya, and natural habitat provide support and protection to natural resources and hence to migrating birds specially those which settle and stay there for food, rest, nesting and mating. Migratory birds visiting the cities in Libya such as: 1. Spanish sparrow (in the western part of Libya) 2. House sparrow (in the eastern part of Libya) 3. Laughing dove 4. White wagtail 5. Great Grey Shrike 6. Chiffchaff 7. Robin 8. Barn swallow 9. Pallid Swift 10. Kestrel 11. Pied flycatcher 12. Common Pigeon 13. Eurasian Blackcap 14. Common Starling. Coastal. ,Khaled Etayeb,2017 Email correspondence. Wetlands providing nesting and breeding habitats for migratory birds, like Ain Alshqaiqa near the estuary of Wadi Jarjarumeh, is an example of the cultural heritage of preservation of birds, the field observation, site was visited by the team of Designation and classification on nature reserves on several occasions since 2010, Birds were not studied per se, the focus was mainly on plants, biotic components of lake sediments and site's landscape features . According to data collected from 2005 to 2010 demonstrated by Atlas of Wintering Waterbirds of Libya, 101 types of birds have been identified (including some seabirds and some raptors associated with wetlands), 110 wetlands were visited (and many others worthy of future investigation identified), while six globally threatened bird species (not yet including the very rare Slender-billed Curlew!) were recorded [Fig.1]. [5]. p6. The three general areas of coastal Libya which appeared as hot-spots for waterbird abundance and diversity: Farwah area, Tawurgha wetland complex and Benghazi area [Fig.2].[3].

2. Birds and the built environment

Birds are essential to healthy ecology: Birds consume billions of insects daily, pollinate plants disperse seeds. Some birds are acclimatized to built environment and urban life and remain in the location throughout the year and

do not move anywhere else. Other birds move in autumn to other locations where there is food and to the south to spend the winter and return to the north in the spring to make breeding sites in the summer. It is indeed amazing how birds find safe flyways* in astonishing accuracy [Fig.3]. Scientists have found out that these birds use the sun for its fly directions during daytime, while during night time birds use stars and pole illumination and according to the earth magnetic field. The migration journey encounters many dangers and numerous threats caused by human activities which threaten birds resting points and their winter locations in all of their geographical migration scope. *(Flyways: corridors of bird migration). [4]. Such threats and dangers reduce chances of survival and only diminishing number of birds manage to make the journey back to their breeding area every year because of climate change, pollution and poisonous air emitted by insecticides. Beside all these serious threats there are the threats of wetland loss and natural environment abuse due to unsustainable farming, over hunting and other negative effects inflicted by human activities. This issue is encountered by birds living inside cities or by migrating birds with less experience when passing through cities during their migration routes:

1. There are many changes taking places on important wetland locations inside cities and within urban and rural areas. These changes inflict drastically negative effects on bird migration cycle and reduce their chances of survival. Such changes are caused by urban invasion and the incessant change in the infrastructure as well as the pollution of water soil and air. The urban linkages surrounding cities which are parts of the birds flying routes or rest points are usually used for dumping city rubbish. All these negative activities threaten birds' life cycle and reduced their chances of survival to a serious level of extinction. The destruction of wetland areas in the Mediterranean has been another cause of serious threat to waterbird life since the 19th century. In Libya, the ratio of wetland loss has been estimated at 1.6% compared to 1.2% in Morocco (Green et al. 2002). [5]. Tab.8. p32.
2. Bird mortality caused by their collision with buildings, roads, vehicles, bridges, electricity towers and electrical cables. But in fact the majority of injuries and deaths are caused by their collision with the transparent and reflective parts of building where there is glass. Thirty years of studies and observations have documented that the second cause of bird mortality in North America after the loss of habitat is collision with buildings and windows. The studies estimated number of deaths at 100 million to one billion in North America every year. [6]. p2. "Without question, bird collisions are one of the most significant causes of bird mortality worldwide," says Christine Sheppard, manager of ABC's birdcollisions campaign and the author of its design guidelines. "It's a problem that is probably escalating every year." [7].
3. Night illumination drastically interferes with bird migration. Beside loss of colonies and natural habitat, increasing number of night-migrating-songbirds- dies because of collision with illuminated buildings at night. [6]. p10.
4. Unsustainable trapping practices. [1].
5. Conflicting environmental policies: Strategies involving improvement of standards and specifications of urban design or sustainable urban environment may indeed help in the development of bird-safe cities. San Francisco has established a long term policy prohibiting the use of reflecting glass on building exteriors to meet aesthetic goals. This strategy has helped the birds too which mistake reflections for real space and don't perceive the glass as a hazardous object. The Environment's voluntary Lights Out San Francisco program in 2008 which was released by the Golden Gate Audubon Society, Pacific Gas and Electric Company links smart energy policy with bird preservation strategies. Sometimes, strategies objectives may conflict, but we have to reach a balance between the benefits of a certain policy and the cost of a conflicting strategy. For example the benefits acquired by wind generators may have negative effects on the environment, if such elements are based at locations where birds are threatened and killed. [6]. p3.
6. Green buildings too may endanger birds and cause their death by attracting them to internal lush green sceneries witch birds cannot reach because of unseen transparent glass surfaces and so they collide and die. Windows with adjacent vegetation that is reflected in the glass are most commonly associated with collisions. [6]. The Chicago Tribunal Newspaper in 2011 reported that a ratio of 10 birds a day collided with the FBI's Chicago office, a Platinum LEED Building during the migration season (DeVore 2011). [6]. p6.
7. Here we ought to mention that migration birds cause a threat to civil and military aviation when they collide with flying airplanes and hit the glass or smash through the engine. Birds are also attracted to airports where there are

vast areas of greenery with biodiversity and where there are dumping areas of kitchens and restaurants waste.[8].

3. Constitutional protection for environmental rights in Libya

During the 70s of the last century, a number of environmental protection laws were issued. Some of these laws concerned the water sources, pastures, forestry, animal life, trees, cultivation land and water life. Other legislations were issued for the protection and enhancement of the environment to prevent pollution by certain causes. Legislation number 15/2003 of Environment Protection Law, is considered most exhaustive and explicit in so far as its definition of “environment” which in many ways is consistent with definitions stated by other laws in many other countries. The second paragraph of this law states the following: The legislation targets supervision and control of the environment for the purpose of protecting and improving it, as the surroundings where humans and all other creatures live. The surroundings consist of water, soil and food which the legislation protects too.[9].

3.1. Libya and the conventions on waterbird and wetland conservation

The United Nations Environment Programme (UNEP) established a work programme concerning the Mediterranean alone (MAP) which includes 21 Mediterranean countries among which Libya. These countries act within the framework of the Barcelona convention for the protection of marine environment and the coastal region of the Mediterranean. They adopted in 1995 a “Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean”, administered by RAC/SPA, which includes in its Annex II a “List of Endangered or Threatened Species. In the year 2000 Libya also became a party to the Ramsar convention. In the year 2005 Libya became a member of AEWA, the Agreement on the Conservation of African-Eurasian Migratory Waterbirds. Accordingly, Atlas of Wintering Waterbirds of Libya was issued. [5]. p10.

3.2. The Ramsar Classification System for Wetland Type

Ramsar Convention 1971, Article 1:

Wetlands are areas of marsh, fen, peat land or water, whether natural, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine waters the depth of which at low tide does not exceed six meters [Fig. 4]. Since becoming a member Libya has declared two wetlands as Ramsar sites, the adjacent coastal lagoons of Ain ash Shaiqah and Ain az Zarga, both located within the Kuf National Park in the Jabal Akhdar. The Atlas team defined further more wetlands as Ramsar sites which appear to meet the bird criteria as a guide for the Libyan authorities 2005-2010. [5]. p9.

4. Some published studies about wetlands and migratory birds in Libya (Juliana lake)

4.1 Juliana Lake: A Benghazi Wetland In Distress, Available from: Mansour M Elbabour, EGU General Assembly, 2013. ” Of all the remaining natural habitats of Benghazi’s urban area (NE Libya), perhaps the most threatened are its karst lakes and coastal salt marshes (locally known as Sebkhas). Juliana Lake stands out as one example of a fragile ecosystem that is steadily shrinking and exposed to dredging and, consequently, possible damage to its aquatic organisms, and the inevitable loss of its renowned biodiversity. Several 19th & 20th-century traveler’s sketches and maps, soil maps, photographs and satellite images provide the bases for change in the size and magnitude of the lake and its adjacent areas over time. It is concluded that the distribution, diversity and abundance of the total benthic organisms recovered in this survey reflect that the local habitat of the Juliana Lake were rich in nutrients and consequently providing an important food source for fishes, birds, and mammals. In fact, without these benthic organisms, these larger animals would not be able to survive. Finally, it is recommended that more specialized and detailed landscape ecological studies need to be undertaken by specialists to fully assess the peculiarities of Juliana Lake. Similar survey work should also be completed for other wetland natural habitats in the

region to fully understand their original functions and values, and assess recent alteration trends and consequences.” [Fig.6.7]. [10].

4.2 Report on restoration and extension of Lake Jeliana islet. Technical Report, Available from: Khaled Etayeb- April 2012- Initiative PIM. “This report presents a restoration action made to enhance the quality of breeding habitat at Juliana Lake islet. It is the last discovered breeding site for lesser crested terns in Libya and the Mediterranean. The work was conducted during the period from 5-7.04.2012. Sand and gravel sacs were carried to the islet in order to increase its surface space and to raise its level to avoid nest inundation, which was the cause nesting failure of lesser crested tern in 2010 and 2011. The work was conducted by the members of Libyan Birds Society (LBS), volunteers and coordinated by Natural conservation department (EGA).” [Fig.8]. [11].

4.3 Results of the eighth winter waterbird census in Libya in January 2012. Available from: Khaled Etayeb- March 2015- Biodiversity Journal. “After sporadic observations and reports on Libyan birds during the last century, a regular census of wintering birds at Libyan coastal wetlands started in January 2005. Results of each winter census till 2011 have been published. The survey of 2012 was carried out by the authors of the present paper. The general aim was to continue the census of wintering waterbirds in Libya, despite the difficulties that faced the team after the War of Liberation, and the fact that certain areas, very important for birds, have been declared military areas. A total of 29,314 individuals belonging to 69 waterbird species were counted. Comparatively, the number of sites covered in 2012 was less than that in previous years of the survey. The majority of individuals counted belong to seven gull species. This survey also observed a total of 56 individuals of *Aythya nyroca* Guldenstadt, 1770, a Near Threatened species, as well as, for the first time, a single individual of Canada Goose *Branta Canadensis* (Linnaeus, 1758) in eastern Libya. [12].

Cultural and natural heritage importance of (Juliana Lake)

4.4 The changing landscapes of Benghazi. 2012 Available from: Mansour M Elbabour The site occupied by the modern city of Benghazi has been chosen to highlight urban and environmental peculiarities and transformations of a city deeply rooted in history for over two and a half millennia. Focus will be on the specific *Karst* lakes and Sebkha wetlands, which abound in the area, their environmental attributes, and their ultra-sensitivity. A continuous belt of karst lakes and salt marshes defined the northeastern, eastern, southern, and southwestern limits of the old city. This elongated stretch of urban wetlands continues beyond the city limits in a north-easterly and southwesterly directions for tens of miles. Lakes and marshes are fed by an extensive system of underground channels, i.e., the legendary Lethe River and a group of surface karst lakes (Ain Zayana, Budezira, Maqarin, etc.). For most of the city’s long history, these extensive wetlands provided a valuable source of salt which was exported to other places. Wetlands served as effective natural defensive barriers for the city until the Italians built a defensive wall shortly after their occupation of the city. In addition to their cultural and scenic role, these urban wetlands also provided many valuable ecological and biodiversity services. Equally important, they served as natural flood control mechanisms and alleviated flood hazard during rainy seasons. Urban development and human activities in the city of Benghazi has resulted in the direct loss and alteration of a significant portion of its lakes and salt marsh wetlands. Half a century ago, the extensive central marsh of al-Salmani had disappeared completely. Now, a similar fate awaits another no less extensive and perhaps more ecologically sensitive natural habitat, i.e., Juliana Sebkha/Lake. [13].

5. Recommended actions towards bird-safe cities

Nature and birds are an important part of the city’s sustainable future. The following are some recommended actions and strategies that improve the urban design quality or sustainability of the built environment and help to make a more bird-safe city:

- It is through education and involvement of people that will lead to creating the balance between needs of human domains and animal environment. This will gradually and eventually reduce the number of deaths of migrating birds.

- It is indeed up to the local governments and wildlife protection organizations, and other similar bodies to establish strategies for green buildings in Libya. Bird collisions could be reduced through bird-friendly building design. The rebuilding of Libya offers an extraordinary opportunity to create solutions to this design challenge. Areas to consider include building height; night lighting; types, placement and amount of glass; alternative curtain-wall materials; and landscaping, both interior and exterior.
- The fragile natural habitat and the threatened biological diversity should be included in the new strategies of sustainable urban design and environment planning too.
- Listing migrating birds and their natural habitat among national protection rights legislation in order to preserve the Libyan natural heritage.
- Supporting scientific studies and research of the sustainable biodiversity.
- Establishing ecotourism projects and wildlife national parks and national camping sites which encourage environmental awareness.
- Reduce the killing of protected species, improve the protection of migratory birds' main sites and ensure law enforcement.

6. Future studies

Sprawling land-use patterns and intensified urbanization degrade the quality and quantity of bird habitat across the globe. Cities and towns encroach on riverbanks and shorelines. Suburbs, farms, and recreation areas increasingly infringe upon wetlands and woodlands. Some bird species simply abandon disturbed habitat. For resident species that can tolerate disturbance, glass is a constant threat, as these birds are seldom far from human structures. Migrating birds are often forced to land in trees lining our sidewalks, city parks, waterfront business districts, and other urban green patches that have replaced their traditional stopover sites. [14]. p8. A research study to establish the principles of birds-friendly urban design in Libya. One of the main methods of reducing the mortality of resident birds and migratory birds is to redress their collisions into buildings as well as by mortality caused by light pollution. These methods will also help in saving energy, and reducing the cost of construction as well as heat emission. Moreover such procedures will also increase the aesthetic value of the urban environment through the implementation of these suggested guidelines towards an environmental and a bird-friendly development during Libya's reconstruction phase in order to limit the threats before they become irretrievable disasters The aim is to make cities safer both for wildlife and human beings. Libya should be an environmental leader and a role model for the Mediterranean countries and Africa in general.

7. Conclusion

Migrating birds have been passing through these areas for thousands of years. Threats and dangers undergone by these birds in urban areas may be considered as quite recent in relation to time development. Birds do not change their instinctive behavior in such relatively short span of time. However, flocks of birds have been rapidly eradicated all over the world by human intrusion, that one cannot even imagine that these birds can adapt quickly enough to the huge urban development, forests destruction and other drastic threats to birds survival. It is indeed in cities themselves that radical changes ought to be done with human activities in to help bird protection.

8. Acknowledgments

I am especially grateful to :

Dr. Christine Sheppard, Bird Collisions Campaign Manager at American Bird Conservancy ABC who have directed me to references on avian mortality factors and bird friendly design solutions. Dr. Mansour M Elbabour, Professor of Geography, University of Benghazi Urban geography, who have directed me to references on urban and regional planning, research methodology and geographical and environmental thought. Dr. Khaled Etayeb, Professor of Zoology, University of Tripoli, who have shared with me data of monitoring birds of Libya. Dr. Abdul Salam Al-Shukri Professor of Architecture and Urban Planning at Benghazi University, who guided me in the research method.

9. References

- [1] Plan of Action to Address Bird Trapping along the Mediterranean Coasts of Egypt and Libya. 2014. p4
- [2] Bundy, G. 1976. The Birds of Libya: An annotated check-list. Check-list No. 1, British Ornithologists' Union, London.
- [3] African Bird Club. Libya, Introduction. 2013. <https://www.africanbirdclub.org/countries/Libya/introduction>
- [4] Boere, G.C. & Stroud, D.A. 2006. The flyway concept: what it is and what it isn't. Waterbirds around the world. Eds. G.C. Boere, C.A. Galbraith & D.A. Stroud. The Stationery Office, Edinburgh, UK. pp. 4047.
- [5] Atlas of Wintering Waterbirds of Libya data collected from 2005 to 2010.
- [6] Standards for Bird-Safe Buildings. SF. SAN FRANCISCO PLANNING DEPARTMENT — ADOPTED JULY 14, 2011.
- [7] Capital-of-silicon-valley-adopts-bird-friendly-building-guidelines/ birdwatchingdaily.com/blog/2015/03/06
- [8] Istanbul-the-third-most-accurate-global-airport-in-relation-to-the-movement-of-birds.dailysabah.com/arabic/istanbul/2016/07/08
- [9] Mansour Elbabour. 2015. Constitutional Protection for Environmental Rights in Libya. P6 https://works.bepress.com/mansour_elbabour/29/
- [10] Mansour M Elbabour. 2013 Juliana Lake: A Benghazi Wetland In Distress. EGU General Assembly.
- [11] Khaled Etayeb- April 2012. Report on restoration and extension of Lake Jeliana islet. Technical Report. Initiative PIM. [12]. Khaled Etayeb- March 2015. Results of the eighth winter waterbird census in Libya in January 2012. Biodiversity Journal.
- [13] Mansour Elbabour . 2012. The changing landscapes of Benghazi. Slideshow.
- [14] Sheppard, Christine. 2015. Bird-Friendly Building Design. p8.
- [15] Etayeb, K.S. 2002. Study of migratory and resident birds in Ras-Attalgha and western part of Farwa Island. M.Sc. Thesis, Zoology Department, University of Alfateh, Tripoli, Libya.
- [16] Golden Gate Audubon goldengateaudubon.org
- [17] American Bird Conservancy abcbirdtape.org
- [18] U.S Fish and Wildlife Service fws.gov
- [19] www.altair.com/c2r
- [20] <http://www.urbanhabitats.org/>

10. Appendix

[Tab.1]. The highest descending ratio in the mostly well known types. [3].

 <p>السنونو Barn Swallow (<i>Hirundo rustica</i>),</p>	 <p>الوقواق الأوراسي Eurasian Cuckoo (<i>Cuculus canorus</i>)</p>
 <p>الذعرة الصفراء Yellow Wagtail (<i>Motacilla flava</i>)</p>	 <p>قمرى European Turtle Dove (<i>Streptopelia turtur</i>)</p>

[Tab.2]. Types that disappeared from their sites. [3].

 <p>Eurasian Wryneck (<i>Jynx torquilla</i>) لواء أوراسي</p>	 <p>صرد أحمر الظهر Red-backed Shrike (<i>Lanius collurio</i>)</p>
---	---

[Tab.3]. Some interesting birds of Tripolitania territory. [3].

 <p>Barbary Partridge حجل بربري</p>	 <p>Black Wheatear أبلق صحراوي</p>
 <p>Eurasian Spoonbills (Platalea leucorodia أبو ملحقة</p>	 <p>Moussier's Redstart الحميراء</p>
 <p>Cream-coloured Courser الكروان الحسلي</p>	

[Tab.4]. Some interesting birds of Cyrenaica territory. [3].

<p>Greater Flamingo فلامنغو الكبير</p> 	<p>Collared Pratincole أبو اليسر مطوق</p> 
<p>Long-legged Buzzard عقاب طويل الساقين</p> 	<p>Lesser Short-toed Lark قنبرة قصيرة الأصابع</p> 
<p>Lesser Crested Tern خرشنة بنغالية</p> 	<p>White Stork الطلق الأبيض</p> 

[Tab.5]. Some interesting desert birds of Fezzan territory. [3].

<p>Desert Sparrow الدوري الصحراوي</p> 	<p>White-crowned Black Wheatear الأبلاق الأسود أبيض التاج</p> 	<p>Bar-tailed Lark قبرة يادية مصرية</p> 
---	---	---



Figure 1. The very rare Slender-billed Curlew. Libya. [5]. p6

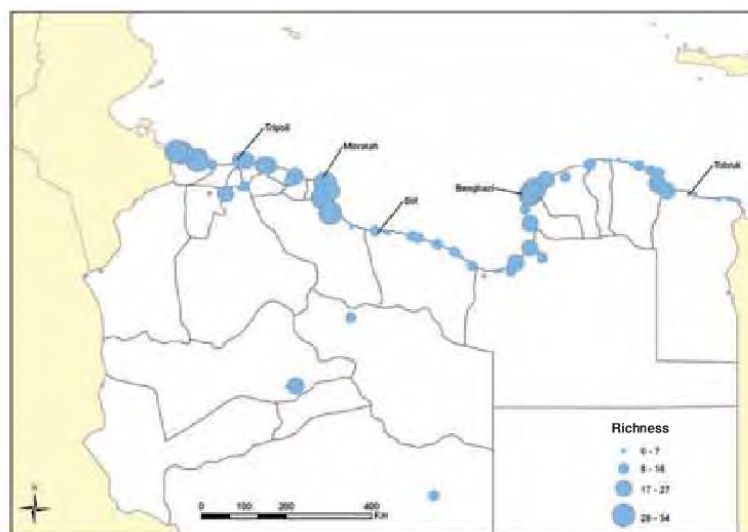


Fig. 11 Maximum species richness of waterbirds censused in Libyan wetlands from 2005 to 2010.

Figure 2. Maximum species richness of waterbirds censused in Libyan wetlands from 2005 to 2010.[5]. p30

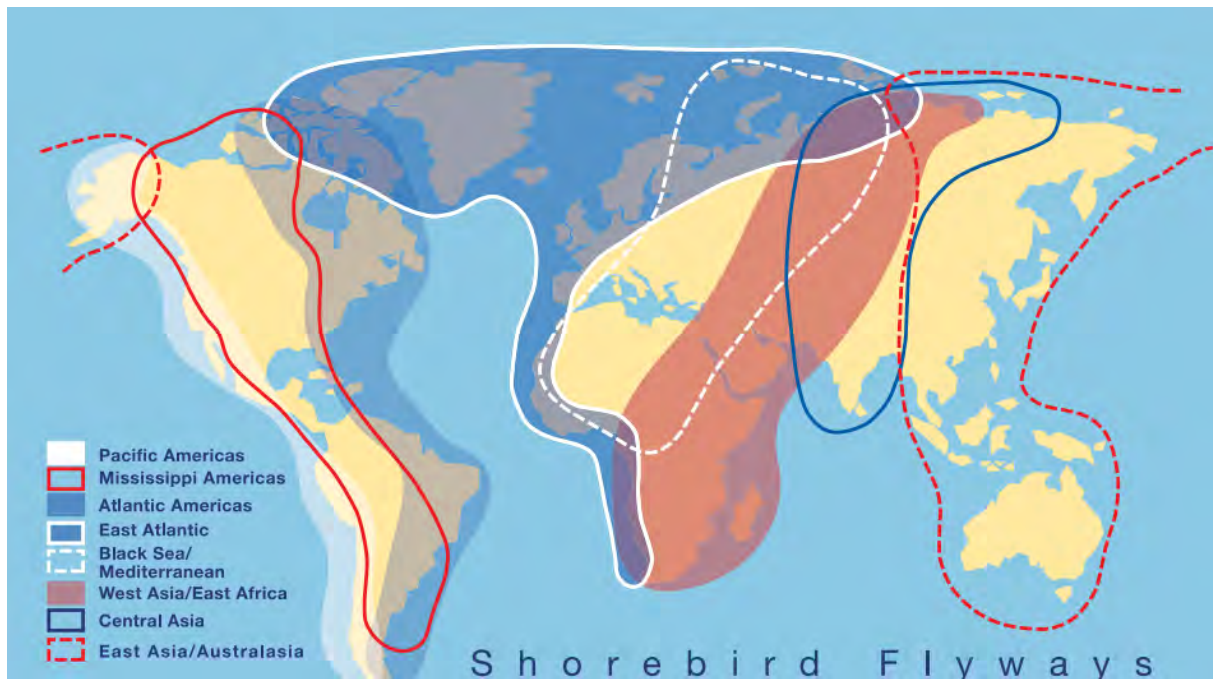


Figure 3. The eight broad flyways of waders/shorebirds. Source: International Wader Study Group. A more detailed evaluation by Brown et al. 2001 distinguishes five shore bird flyways in North America: Pacific-Asiatic, Intermountain West, Central, Mississippi, and Atlantic. [4].

AEWA Agreement Text and Annexes

Annex 1 a
Map of the Agreement Area



Figure 4. Geographical scope of AEWA (Contracting Parties as of August 2008). Source; AEWA Strategic Plan 2009 - 2017. p4.

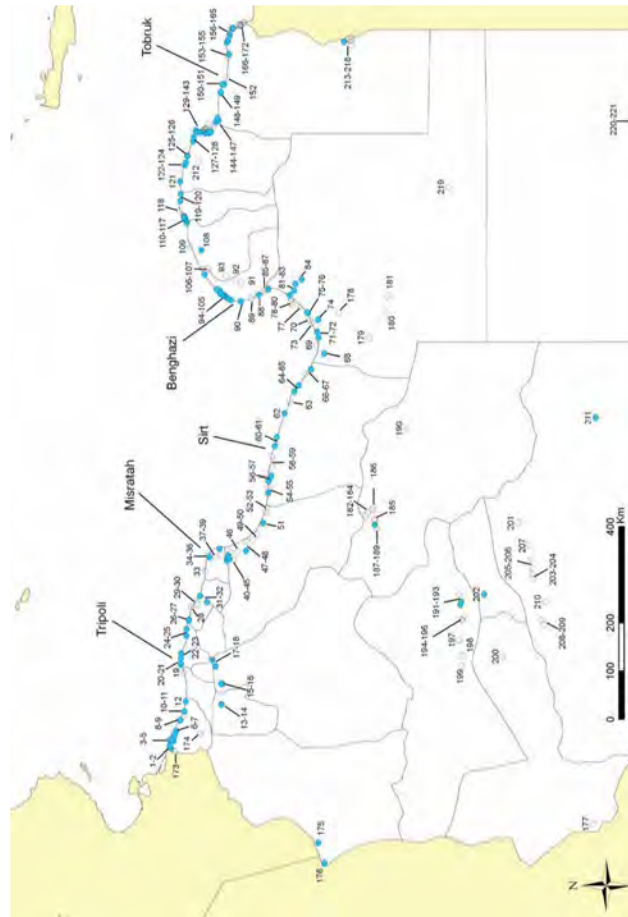


Figure 5. Atlas Map of Libyan wetlands.[5]. p40



Figure 6. Juliana Lake: A Benghazi Wetland In Distress. 2013. [10].



Figure 7. Juliana Lake: A Benghazi Wetland In Distress, Available from: Mansour M Elbabour, EGU General Assembly, 2013



The islet before restoration,
March 2012



The islet after restoration in April
2012

Figure 8. Report on restoration and extension of Lake Jeliana islet. [11].