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Environmental and habitats diversity in Iraq, Part 1: Central region

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Abstract

The area of Iraq is about 437.065 km^2, its territory encompasses the Mesopotamian alluvial plain, the northwestern end of the Zagros mountain range, and the eastern part of the Syrian desert, includes nine to eleven main terrestrial ecoregions, some of which can be classified as key ecoregions that covers larger areas of the country. Presence of these ecoregions resulted in a considerable environmental and habitat diversity. The present study includes 23 locations throughout 5 central governorates in Iraq: Babylon, Holy Karbala, Al-Najaf alashraf, Qadisiya, Wasit, these locations extended between the geographical coordinates 30º 48′ 19.36″ -32º 41′ N and 43º 29′ 25.89″ -45º 37′ 38″ E, with the altitude (minimum: 10; maximum: 344 and mean: 50.25± 73.062 m) above sea level. The study was carried out from 20th Sep.2013 to 3rd Nov. 2015.

Key words: Habitat; Environment; Ecoregions; Central; Iraq.

Introduction

Eight ecozones according to (1, 2) Nearctic, Palearctic, Afrotropic, Indomalaya, Australasia, Neotropic, Oceania, and Antractic. The Palearctic, is the largest of the eight ecozones that constituting the Earth's surface, it includes the terresterial ecoregion of Europe, Asia, North of the Himalaya foothills, northern Africa, and the northern and central parts of the Arabian Peninsula. The Palearctic ecozone consists of five smaller ecozones or subregions: the European Siberian; the Mediterranean Basin; the Sahara and Arabian Deserts; Western and Central Asian; and China and Japan. Two major rivers in the subregion western Asia of the Palaeartic are the Tigris, rises in the Taurus mountains of eastern Turkey and the Euphrates, rises in the mountains of Anatolia. Between these rivers is an ancient area called Mesopotamia, which was also known as the fertile crescent. The two rivers join together near Al Qurna in southern Iraq and flow to the Arabian gulf (3 and 4). The macro-ecosystems of the Iraq have been defined by the World Wildlife Fund & Nature Conservancy in their development of terrestrial, Freshwater, and marine "ecoregions" of the world, with their associated species and conservation status (867 terrestrial ecoregions are categorized within 14 biomes and eight biogeographic realms) (5).

There are five terrestrial biomes found in Palearictic realm of Iraq: Temperate broadleaf and mixed forests; Temperate grasslands, Savanas and shrublands; Flooded grasslands and Savannas; Mediterranean forests, woodlands and scrub; Deserts and Xeric shrublands. Iraq includes nine to eleven main terrestrial ecoregions, some of which can be classified as a key ecoregion that covers larger areas of the country, we excluded the ecoregions that are of very weak influence in the Iraqi habitats, and there is no large representation of the elements characterizing these ecoregions in Iraq and focusing only on that kinds of ecoregions, and this is based on the existing information (6,7, 8). The Freshwater and marine ecoregions of the world are also represented in Iraq including three different freshwater ecoregions (Arabian Interior, Lower Tigris and Euphrates, Upper Tigris and Euphrates, and one marine ecoregion (Arabian Gulf, which is part of the Western Indo-Pacific Realm. The presence of these ecozones resulted in a considerable biodiversity of both flora and fauna of Iraq. (9, 10, 11, 12)

Materials and Methods

- **Study Area**

The present study surveyed an area included 23 locations distributed in five governorates throughout central region in Iraq depending on an administrative maps: Babylon, Holy Karbala, Holy Najaf, Qadisiya, Wasit. The locations lied within the geographical coordinates 30º 48′ 19.36″ -32º 41′ N and 43º 29′ 25.89″ -45º 37′ 38″ E, and the altitude (10-344 m) above sea level which detected by using Garmin GPS map 60CSx device (Fig. 1). The study was carried out during the period from 20th Sep. 2013 to 3rd Nov. 2015. Photographs have been taken for all habitats (Plates 1-4), and all the ecological information for the visited sites have been provided according to literatures and environmental office related to each governorate, as below:

Babylon Governorate: Seven locations were surveyed (Plate 1: A-F), include:-

- Khagan village, Al-Showmali subdistrict \Hashimiya district: 32º 22′ 00.3″ N, 044º 46′ 07.4″ E.
- Al-Ubaid village, Al-Qasim subdistrict\Hashimiya district: 32º 13.729′ N, 044º 33.913′ E.
- Al-Hilla city\Hilla district: 32º 28′ 43.2″ N, 044º 24′ 59.2″ E.
- Abi Gharaq subdistrict \Hilla district: 32˚ 32.016′N, 044˚ 20.782′E.
- Al-Naby Ayub village\ Hilla district: 32º 20.767′ N, 044º 23.863′ E.
- Al-Nikhealah village\ Hilla district: 32º 25.776′ N, 044º 29.901′ E.
- Ibraheem Al-Khaleel village\ Hilla district: 32˚ 23.624′N, 044˚ 20.793′E.

AL-Najaf alashraf Governorate: Eight locations were surveyed (Plate 2: A-F), include:-

- Bahr Al-Najaf \AL-Najaf district: 31˚52′ 30.5″ N, 044˚15′ 47.2″ E.
- Madhlum village, Bahr Al-Najaf\Al-Najaf district: 31º 53′ 37.6″ N, 044º 16′ 25.4″ E.
- Um Groon called area \ Al-Najaf district: 31˚ 46′ 17.3″N, 044˚ 13′ 37.8″E.
- AL-Shabaka(Shbicha)subdistrict\Al-Najaf district: 30º 48′ 19.36″ N, 43º 40′ 5.87″ E.
- Al-Jaiyar area called\ AL-Mushkhab district: 31º 50′ 28.4″ N, 044º 30′ 13.7″ E.
- Al-Kufa city \ Kufa district: 32º 8′ 05.7″ N, , 44º 22′ 17.3″E.
- Al-Qizwiniya,Al-Abbasiya subdistrict\Kufa district: 32˚ 04′ 50.0″N, 044˚ 26′ 46.3″E.
- Al-Abbasiya, Al-Abbasiya subdistrict\ Kufa district: 32º 04′ 50″ N, 044º 26′ 46.3″ E.

Holy Karbala Governorate: Four locations were surveyed (Plate 3: A-C), include:-

- Ain- Tamor district: 32º 33′ 56.52″ N, 43º 29′ 25.89″ E.
- Al-Wadi (Cemetery)\Kerbala district: 32º 33.074′ N, 044º 04.402′E.
- Al- Kafeel village\ Kerbala district: 32º 32′ 53.6″ N, 044º 05′ 39.4″.
- Al-Razzaza lake\ Ain- Tamor district: 32º 41′ N, 43º 40′ E.

Wasit Governorate: One locality was surveyed (Plate 4: A), include:-

- Haur Al-Dalmaj\Kut district: 32º 07′ 55.3″ N, 45º 37′ 38″ E.

AL-Qadisiya Governorate: Three locations were surveyed (Plate 4: B-D), include:-

- Diwaniya district: 31º 56′ 28.8″ N, 044º 54′ 12.6″ E.
- Al-Shamiya district: 31º 58′ 17.1″N, 044º 36′ 36.4″ E.
- Hamza district: 31˚ 43′ 42.1″N, 044˚ 57′ 35.6″E.
- **Statistical Analysis**

Minimum, maximum, mean and standard deviation values for altitude data, have been calculated for all the visited locations by using Excel program (13).

A) Khagan village , Al-Showmali subdistrict Hashimiya district \ Babylon Province

B) Abi-Gharaq subdistrict, Hilla district Babylon Province

C) Al-Ubaid village, Al-Qasim subdistrict Hashimiya district\ Babylon Province

D) Al-Nikheala village, Hilla district Babylon Province

E) Al-Nabi Ayub village, Hilla district Babylon Province

F) Ibraheem Al-Khaleel village Hilla district \ Babylon Province

Plate 1. (A-F) Habitats of the visited locations in Babylon governorate.

Plate 2. (A-F) Habitats of the visited locations in Al- Najaf alashraf governorate.

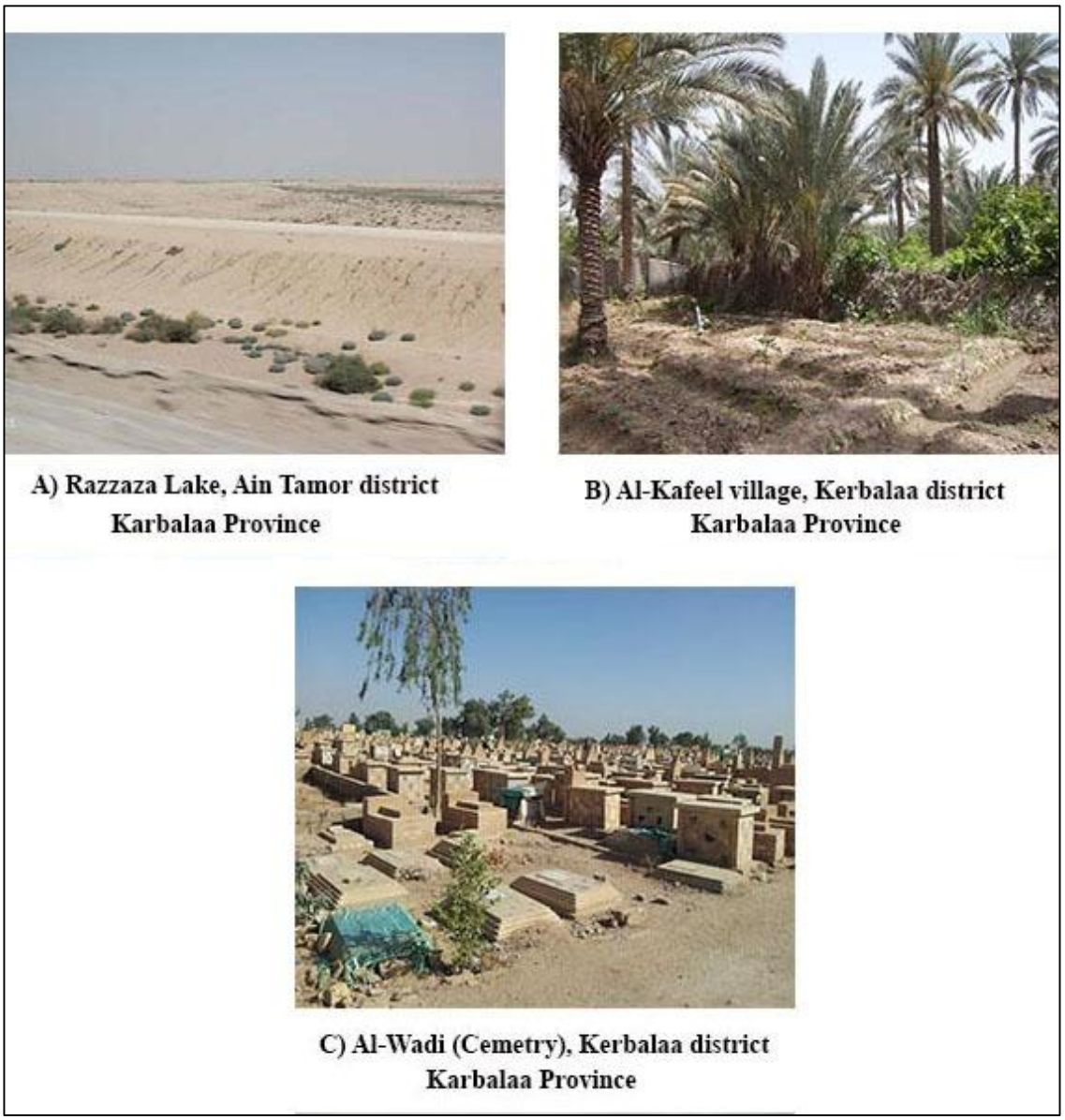

Plate 3. (A-C): Habitats of the visited locations in Holy Karbalaa governorate

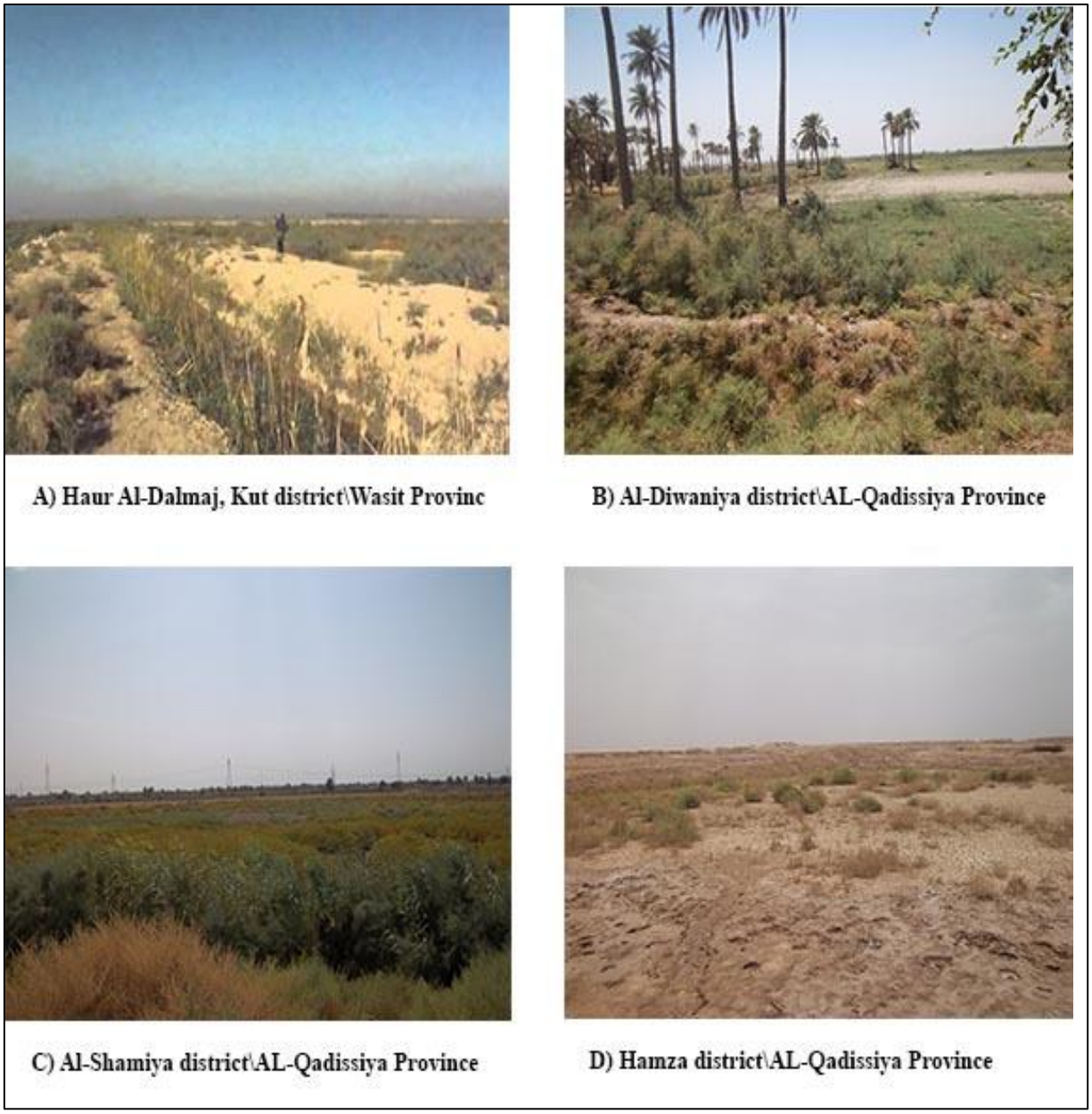

Plate 4. Habitats of the visited locations in governorates: (A) Wasit, (B-D) Qadisiya.

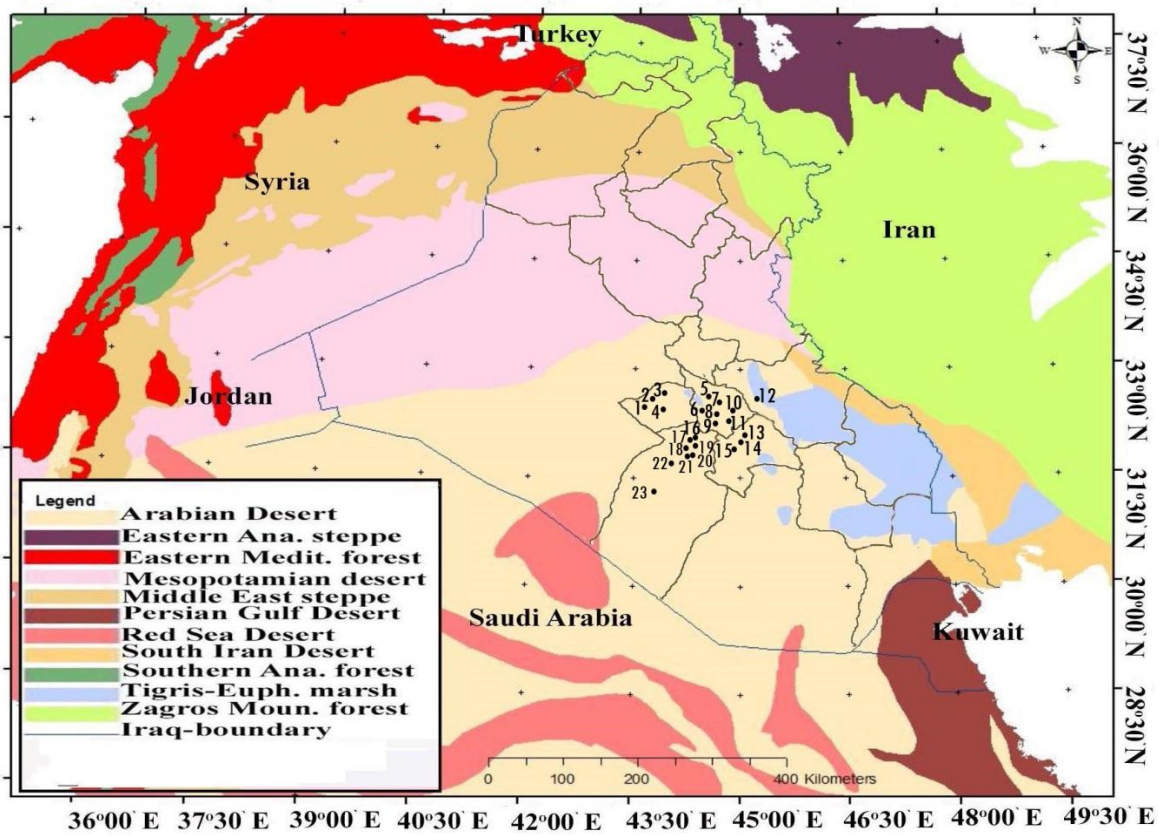

Fig. (1) Map of Iraq showing the 23 studied locations according to their geographical coordinates:- **Karbala'a**:- **1:** Ain- Tamor district; **2:** Al-Razzaza lake; **3**: Al-Kafeel village-Kerbala district E; **4:** Al-Wadi (Cemetry)-Karbala'a distric; **Babylon:- 5:**Al-Ubaid village-Al-Qasim subdistrict-Hashimiya district; **6:** Al-Showmali subdistrict - Khagan village- Hashimiya district; **7:** Al-Hilla city, Hilla district; **8:** Al-Naby Ayub village - Hilla district; **9:** Al-Nikhealah village-Hilla; **10:** Abi-Ghraq substrict, Hilla district; **11:** Ibraheem AL-Khaleel village Hilla district; **Wasit**:- **12:** Al-Dalmaj:; **Qadisiya**:- **13:** Diwaniya district; **14:** Hamza district; **15:** Al-Shamiya district. **Holy Najaf**:- **16:** Bahr Al-Najaf, Najaf district,; **17:** Madhlum village, Bahr Al-Najaf; **18:** Al-Jayir village, Al-Mushkhab district; **19:** Al-Kufa district; **20:** Al-Abbasiya county, Al-Kufa district; **21:** Al-Qizwiniya, Al-Abbasiya county, Al-Kufa district; **22:** Um Groon called area Al-Najaf district; **23:** Al-Shabaka, Al-Najaf district.

Results and Discussion

Twenty three locations distributed in five governorates throughout central region in Iraq were visited: Babylon, Holy Karbala, Al-Najaf alashraf, Qadisiya, Wasit. The locations lied within the geographical coordinates 30º 48′ 19.36″ -32º 41′ N and 43º 29′ 25.89″ -45º 37′ 38″ E, and the altitude (minimum: 10; maximum: 344 and mean: 50.25± 73.062 m) above sea level, according to the figure (1) and the plates an environmental description for each governorate can be introduced depending on visited locations:-

Babylon: Seven locations were visited (30˚ 37′ 56.5″- 32˚ 32.016′ N and 044˚ 20.793′- 46˚ 41′ 16.1″ E) with elevation (minimum: 10, maximum: 148 and mean: 59 ±57.066 m) from sea level with their varied habitats from deserted areas with sand dunes and scattered oil fields civilized area consists of many houses with gardens, village with agricultural areas and some sub arid areas. Babylon is a governorate in central Iraq, it has an area of 5.603 km^2 with geographical coordinates: 32º 37′ N and 44º 33′ E, the provincial capital is

the city of Hillah on the branch of Euphrates river. It is situated in a predominantly agricultural region, which is extensively irrigated with water provided by the Hillah canal, producing a wide range of crops, fruit and textiles. The river runs exactly in the middle of the town, and it is surrounded by date palm trees and other forms of vegetation enhancing the weather and reducing the harmful effect of dust and the desert winds. (14). Also it located in both Tigris-Euphrates alluvial salt marsh (PA0906), Although bounded by deserts and dry shrubland, this region is characterized by marshlands and seasonally inundated plains in a basin covered by recent (Pleistocene and Holocene) alluvial deposits and forming a vast inland delta of the Euphrates, Tigris, and Karun rivers. The climate is subtropical, hot and arid (15) and the ecoregion Arabian Desert & East Sahero-Arabian Xeric Shrublands (PA1303) is a region of little rain fall (annual precipitation is 125 mm) with occasional oases. Daily temperature varies considerably reaching over 45 C° or higher in July and Aug. and dropping to the teens in Jan. and Feb. Occasional brackish salt flats also exist in some areas (16 and 17).

Holy Karbala'a: Four locations were visited (32˚ 31′ - 32˚ 31′ N and 43˚ 26′- 044˚ 05′ 39.4″ E) with an elevation (minimum 18, maximum 45 and mean 28.25± 57.066 m) and their habitats diverted from large wetland and the vast area of the lake vicinity represented by gypcrete, inland sabkha, depression fill, flood plain and aeolian sediments, civilized area consists of many houses with gardens; some sub arid and arid areas, arid and sub arid areas used for burying dead people, and village with cultivated agricultural fields and some sub arid areas. Karbala'a located about 105 km southwest of the capital Baghdad at 32º 27′ N, 43º 48′ E, it lies on the edge of the desert west of the Euphrates river and on the left side of Hussainiyya canal, Karbala'a experiences a hot desert climate with extremely hot, dry summers and cool winters (18-20). Almost all of the yearly precipitation received between Nov. and Apr. though no month is truly wet. The climate is damp, very hot in summer, and mild in autumn; its land is watered by the canals of the Euphrates river, it has many orchards, flat lands suitable for various forms of agriculture, and all sides of the city are surrounded by fruit trees and palm groves. Karbala'a resembles Babylon, it locates in both same ecoregions with occasional brackish salt flats exist in some areas, a few of which in Iraq have been utilized for water storage (e.g. Razaza lake) (9). The Bedouins (nomads) cross the region with seasons seeking pasture for their herds of goat, sheep and camels.

Al-Najaf alashraf: Eight locations were visited extended between 30˚ 48′ 19.36″-32˚ 8′ 05.7″N and 43˚ 40′ 5.87″-044˚ 30′ 13.7″E with elevation ranged from (minimum:15, maximum:334 and mean:59.66 ± 113.076 m) from sea level, and with habitats varied from wetland depression area, vast desert or semi desert areas, marsh-like area with limited cultivated orchards beyond and surrounded by vast desert or semi desert areas, sandy dunes and flat sands plains with scattered vegetation, and agricultural areas with livestock grazing, and civilized areas consists of many houses with gardens. Al-Najaf alashraf located in the southwestern portion of Iraq at 29º 50′ latitude and 32º 21′ longitude to the North and 42º 50′ and 44º 44′ longitude to the East, with total area of 28824 km², 5% of the region lies in the sedimentary plateau while the rest is located in the western hill. It lies on the shortest path between the abundantly producing fertile hill and the desert dune, known for its rich raw materials (21). The weather is dry and hot (42°C) in summer; cold (18°C) and less rainy in winter, because of its location in the ecoregions: Arabian Desert & East Sahero-Arabian Xeric Shrublands, Red Sea Nubo-Sindian Tropical Desert and Semi-Desert (PA1328) that occurs along the Saudi border and extend slightly into Iraq (22 and 23).

AL-Qadisiya: Three locations were visited extended between 31˚ 43′ 42.1″- 31˚ 58′ 17.1″ N and 044˚ 36 36.4″- 044˚ 57′ 35.6″ E , with an elevation ranged (minimum:35, maximum:55 and mean: 43.33±10.408m)

from sea level and their habitats are diversed from civilized and cultivated areas consists of many houses with gardens and some sub arid areas to arid and sub arid areas. Qadisiya locates between the lines along the 48º 24′- 48º 45′ and horizontal lines 31º 7′-32º 24′, it lies within easy sedimentary areas, and the part within the plains of the delta, also it resembles Babylon governorate where it locates in both same ecoregions, and considers a rural area with many plants are growing there such as rice, barley and dates (24), also, there is Shammiya river which is a branch of Euphrates splits the city. At 30 km to the south there are a lots of date palms and it splits by Hamza river (25, 26, 16).

Wasit: Is located in the central part of Iraq in the ecoregions: Mesopotamian Shrub Desert (PA1320) desert ecosystem, has little biological diversity; Tigris-Euphrates alluvial salt marsh; Arabian Desert & East Sahero-Arabian Xeric Shrublands; and South Iran Nubo- Sindian Desert and Semi-desert. It lies between the line along the 45º 45′ and horizontal line 32º 40′ and its area measures 17.153 km^2, most of it fit for agriculture, has irrigation sources as Tigris river and the most important crops harvested include wheat, barley, maize, rice, cotton, sunflower as well as other food products, namely vegetables and fruit, which cover large areas (27). Most farmlands use irrigation, whether directly or through implements. Average annual rainfall is 385 mm. Moreover, the region is flat and its climate alternates between that of the Mediterranean and that of the desert, which is hot and dry. Haur Delmaj the only site was visited with a geographical coordinates 32˚ 07′ 55.3″ N and 45˚ 37′ 38″ E with an elevation 13 m from sea level, this site listed as a wetland of international importance by (28), and has been identified as an "Important Bird Area" by Bird Life International. Haur Delmaj, is famous marsh that have a several types of yearly migrate birds cams from Asia and Europe and was listed by (29 , 30) as an important area for the Iraqi biodiversity since it lies within a semi-desert area and comprises terrestrial and aquatic habitats allowing a wide range of biodiversity components. The vertebrates are the most prominent group in the marsh especially birds and fishes and for a lesser extent reptiles and mammals. However, it is still poorly studied and further scientific work is required to understand the biodiversity and the relationships among the biotic and abiotic factors in the area (11, 31).

Conclusion

Current study is pointed that in an environment which varies in terms of topographical and vegetation structure it would create a mosaic of temperature and humidity within a relatively small area throughout the day. Anthropogenic activity (unmanaged grazing, plowing of lands, infrastructural developments, and clearance of forests) resulted in the decrease in the size of some populations and/or their diversity. In general, there are several abiotic and biotic parameters such as temperature, moisture (through rainfall and/or dew), wind speed and vegetation cover are affecting the diversity and ecology of both flora and fauna in Iraq

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