

The role of temporary rain pools in attracting waterbirds in Basrah province, Iraq

Adil Fadhil Abbas

Department of ecology, college of science, University of Basrah.

E-mail: adil.abbas@uobasrah.edu.iq

Abstract:

The Present study focused on the census of waterbirds in three temporary rain pools in Basrah Province, namely Abu Al-Khaseeb, Hamdan, and Al- Kuzayza. The study lasted for two months, March and April of 2019. During the study period, 722 individuals of waterbirds belonging to eleven species were recorded, divided into two orders and five families. The order of Charadriiformes occupied the first rank with ten species: *Charadrius alexandrinus*, *Vanellus indicus*, *Philomachus pugnax*, *Tringa cinereus*, *Tringa nebularia* and *Sterna albifrons*. As for the second order Ciconiiformes, only one species *Egretta garzetta* has been recorded. In addition, relative abundance, diversity, richness, evenness, and dominance indices have been calculated.

Keywords: waterbirds, temporary rain pools, rainy season.

Introduction:

Iraq considered to be one of the world's most important areas for migratory birds. Due to its strategic geographical position, outward migratory flyways from Siberia to Africa converge (Boere and Stroud, 2006). Southern Iraq is characterized by the spread of vast waterbodies (wetlands) rich in vegetation (Al-Sheikhly; Al-Azawi, 2019), and a mild climate also characterizes it during the winter season (Salim *et al.*, 2006). These factors are attracting many migratory birds, especially waterbirds. In addition to being attractive to migratory birds, these waterbodies are nesting habitats for many resident birds (Habeeb, 2019). There are many types of waterbodies, but the main type located in southern Iraq is the marshes, with areas ranging from 8000 km² to more than 20,000 km² according

to the period in which this area was estimated, so it is one of the eleven largest wetlands in the world (Hussain, 2014). In addition, during the rainy season, temporary pools result from rainwater gathering in the depressions. According to the Ramsar Convention, temporary pools are usually small, less than 10 hectares (Ruiz, 2008), and if they contain migratory waterbirds, their size should be not less than 1-3 hectares. They are shallow wetlands characterized by alternating immersion and drought periods and whose hydrology is largely autonomous (Ramsar, 2002). Temporary pools are habitats with an expected annual dry period of 3-8 months, usually during summer and autumn (Ward, 1992). According to (Williams, 1997), temporary basins are classified as either alternating (with a periodic seasonal pattern of drought and flooding) or

episodic (unexpectedly flooded). To function properly, these habitats must undergo periodic periods of flooding and drought (Ruiz, 2008). Temporary pools are usually shallow areas with an impermeable floor and represent a small water catchment area (Zacharias, *et al.*, 2007). The volume of water depends on the balance between the amount of rain, evaporation, and infiltration into the ground (Keeley & Zedler 1996). In general, the species and numbers of many waterbirds in temporary pools depend on the area, depth, and isolation of those pools (Sebastián-González and Green 2014). The number of species and individuals of waterbirds increases with the increase in the size of temporary pools has an essential role for waterbirds, especially migratory ones, as they are considered resting, feeding, and drinking water areas (Brönmark & Hansson, 2005). Many studies highlight the waterbirds in southern Iraq, but most focused on large and permanent water bodies, especially the Hammar Marsh, Al-Hawizeh Marsh, and the Central Marshes, in addition to the edges of the rivers and the Shatt Al-Arab estuary. Scott (1995) mentioned that the number of waterbird species recorded in the marshes of southern Iraq amounted to 134 species. Previous studies on birds in southern Iraq are limited; Abed (2007), Surveyed waterbirds in two southern Iraqi marshes, including Hammar and Hawizeh marshes. In this study, 57 species were recorded. Abed (2008) studied waterbirds in three southern Iraqi

marshes, including East, West Hammar, and Hawizeh marsh. In this survey, 78 species were recorded. Habeeb (2008) During his study of waterbirds in East Hammar and Hwizeh marsh, 80 species were recorded. Fazaa *et al.* (2017) Surveyed birds in the central marshes of southern Iraq, where 32 species of waders and shorebirds were recorded. Abou-Turab *et al.* (2017) studied birds in small dispersed wetland areas in Basrah Province, where they recorded 34 species; most of them belong to the Charadriiformes order. Habeeb (2019) recorded 37 species belonging to four families of shorebirds and one family of wading birds in the eastern Hammar marsh and Shatt al-Arab estuary.

Material and methods:

Study area:

The study was conducted in three sites of temporary waterbodies that form in the winter due to rain and then gradually disappear due to evaporation at the beginning of the summer. The first station is located in Abu Al-Khaseeb, N: 30°26'13" E: 47°53'22". The area of the station is 12862 m² or 1,2862 hectares. The second is located in Hamdan, N: 30°26'13" E: 47°53'22". It is a salt pool dries up completely at the beginning of summer and turns into saline land. Its area is 13630 m² or 1.363 hectares. The third is located near Al- Kuzayza bridge, N: 30°32'47" E: 47°45'20". It has an area of 18361 m² or 1,8361 hectares (Fig. 1).

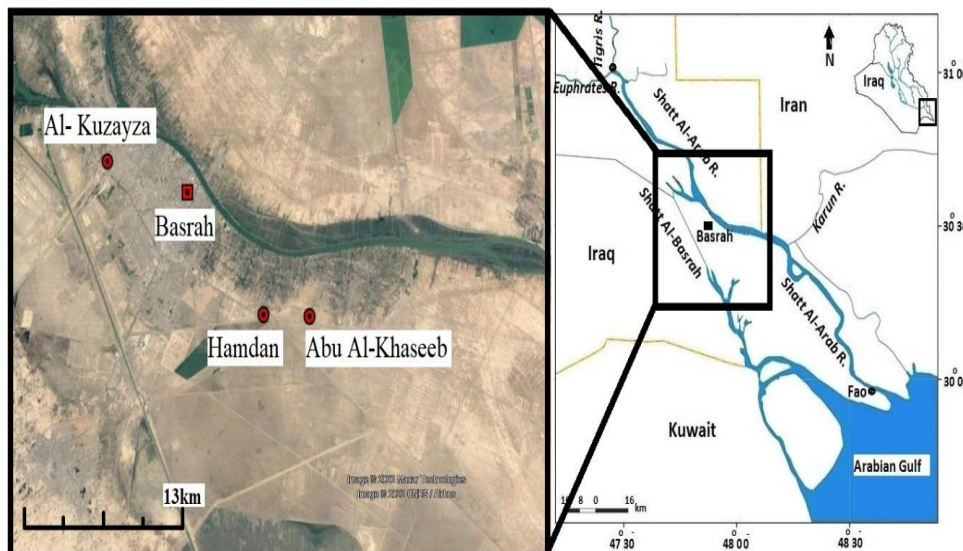


Fig. (1). Study area.

Fieldwork:

A survey of waterbirds was conducted in the three stations for two months, March and April 2019. Bird censusing method allows the observer to roam for a fixed time in a specified area, usually 20 minutes per 3-hectare area (Slater, 1994). The species was photographed using a Canon 7D camera and a Sigma 50-500 wildlife photography lens.

Results:

During the study period, which lasted for two consecutive months, in March and

April of 2019, 722 individuals were recorded belonging to eleven species of waterbirds distributed into two orders and five families (Table 1).

The number of birds during the study period is shown in Table (2).

The percentage of waterbird species of each order was shown in (Fig.2) Charadriiformes that occupied the first rank reached 91%, and Ciconiiformes that followed the second rank reached 9%.

Table (1). Species of birds recorded during the study period.

Order	Family	Scientific Name	Common name	Status
Charadriiformes	Charadriidae	<i>Charadrius alexandrinus</i>	Kentish blover	RB
		<i>Vanellus indicus</i>	Red-wattled Lapwing	RB
	Scolopacidae	<i>Philomachus pugnax</i>	Ruff	WV&P M
		<i>Tringa cinereus</i>	Terek sand piper	WV&P M
		<i>Tringa nebularia</i>	Green shank	WV&P M
		<i>Limosa limosa</i>	Black –tailed godwit	WV&P M
		<i>Tringa stagnatilis</i>	Marsh sandpiper	WV&P M
		Recurvirostridae	<i>Himantopus himantopus</i>	Black-winged stilt
	Laridae	<i>Larus genei</i>	Slender-billed gull	RB
		<i>Sterna albifrons</i>	Little tern	BSV
Ciconiiformes	Ardeidae	<i>Egretta garzetta</i>	Little egret	R or BSV
Resident (R), Breeder (B) , Winter Visitor (WV), Summer Visitor(SV) Passage Migrant(PM),				

Table (2) Number of birds recorded during the study period.

Species	Abu Al-Khaseeb		Hamdan		Kuzayza	
	March	April	March	April	March	April
<i>Charadrius alexandrinus</i>	19	32	9	0	13	4
<i>Vanellus indicus</i>	7	15	0	0	16	7
<i>Philomachus pugnax</i>	12	4	117	0	61	19
<i>Tringa cinereus</i>	0	0	0	0	3	0
<i>Tringa nebularia</i>	21	7	0	0	7	0
<i>Limosa limosa</i>	47	19	0	0	0	0
<i>Tringa stagnatilis</i>	5	1	0	0	0	0
<i>Himantopus himantopus</i>	8	13	0	0	11	8
<i>Larus genei</i>	0	0	152	0	24	18
<i>Sterna albifrons</i>	2	0	0	0	7	5
<i>Egretta garzetta</i>	0	0	0	0	13	16

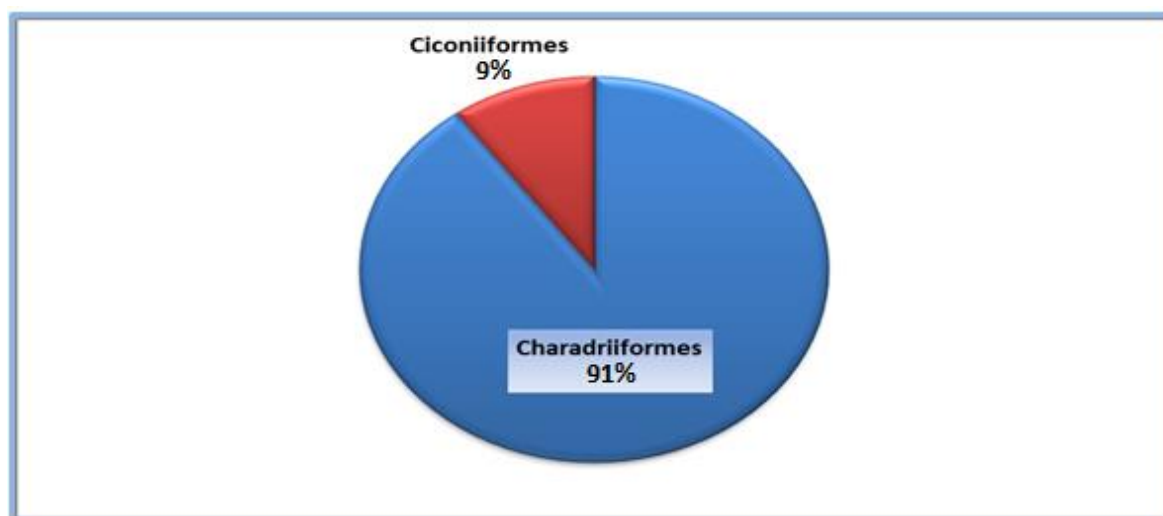


Figure (2) Percentage of waterbirds species in each order.

The percentage of waterbird species of each family was shown in (Fig.3). Scolopacidae occupied the first rank, reaching 50 %, Charadriidae and Laridae followed by the

second rank, were reached 20%. Finally, Recurvirostridae occupied the third rank, recorded at 10%.

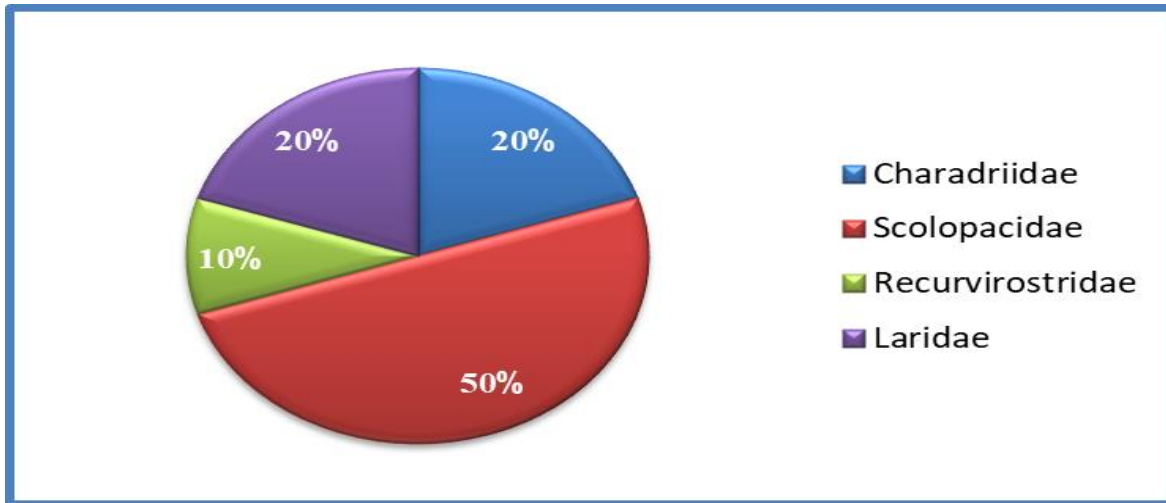


Figure (3) Percentage of waterbird species in each family.

Relative Abundance:

The relative abundance of bird species was calculated by their numbers recorded during the study period, *P. pugnax*, recorded the

highest relative abundance was reached 29.5%, while *T. cinereus* recorded the lowest relative abundance was reached 0.41% (Table 3).

Table (3) The relative abundance of bird species recorded during the study period

Species	R.A%
<i>C. alexandrinus</i>	10.66
<i>V. indicus</i>	6.23
<i>P. pugnax</i>	29.50
<i>T. cinereus</i>	0.41
<i>T. nebularia</i>	4.84
<i>L. limosa</i>	9.14
<i>T. stagnatilis</i>	0.83
<i>H. himantopus</i>	5.54
<i>L. genei</i>	26.86
<i>S. albifrons</i>	1.93
<i>E. garzetta</i>	4.01

Diversity indices:

Shannon-Wiener and Simpson's Indices calculated the diversity of bird species. The highest value for diversity when the two indices were in agreement was in March in Kuzayza station, where Shannon's value index was 1.85, and the value of Simpson's index

was 0.787. The number of recorded species was nine species, while the lowest value for diversity was in April for the Hamdan station; it was zero for both indicators, as no species were recorded in it due to the complete drying of the station (Fig.4).

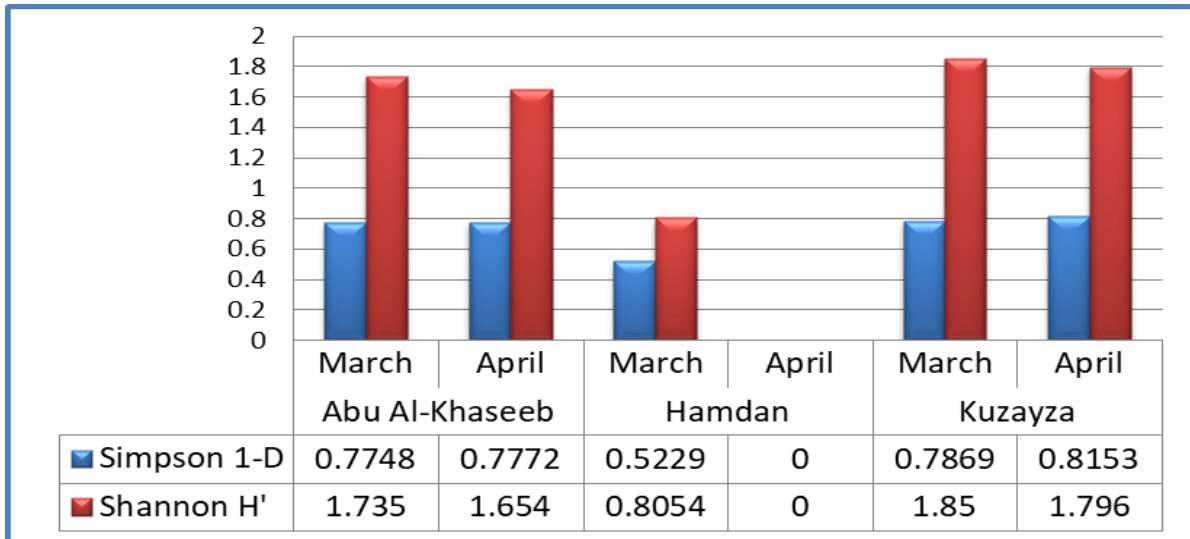


Figure (4) The values of the computed diversity indices during the study period.

Evenness index:

Pielous evenness index using to calculate evenness; the highest value recorded in Kuzayza station was 0.861 in April, while the

lowest evenness value was in Hamdan station, where it was recorded as zero due to the dryness of the pool (Fig.5).

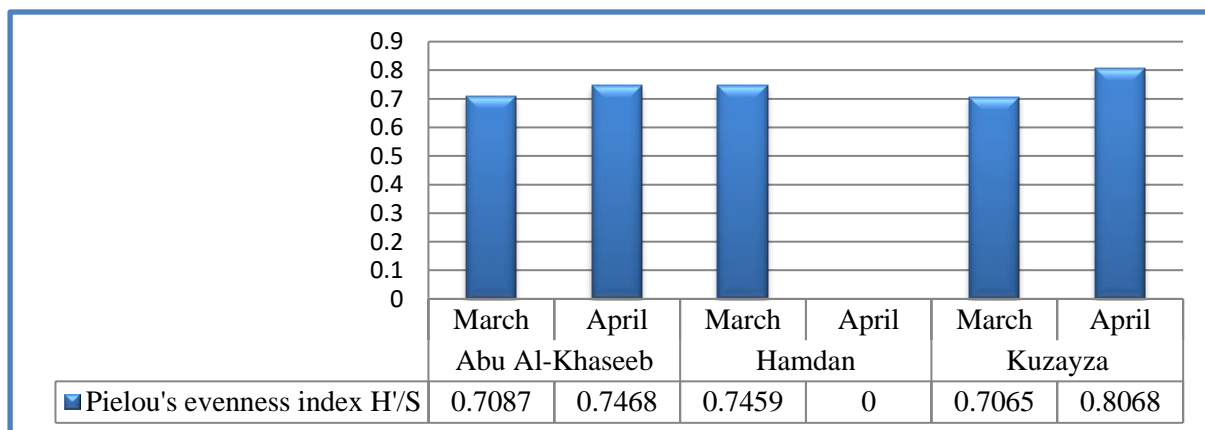


Figure (5) Evenness values during the study period.

Richness indices:

The richness values of birds were calculated using Margalef and Minhenick indices. The highest value of the Margalef index in March was in Kuzayza station, where the value of the Margalef index was 1.59, while the

highest value of the index was 0.798 in April, while the lowest value of the two indices in April was in Hamdan station, where it was recorded as zero due to the dryness of the pool (Fig.6).

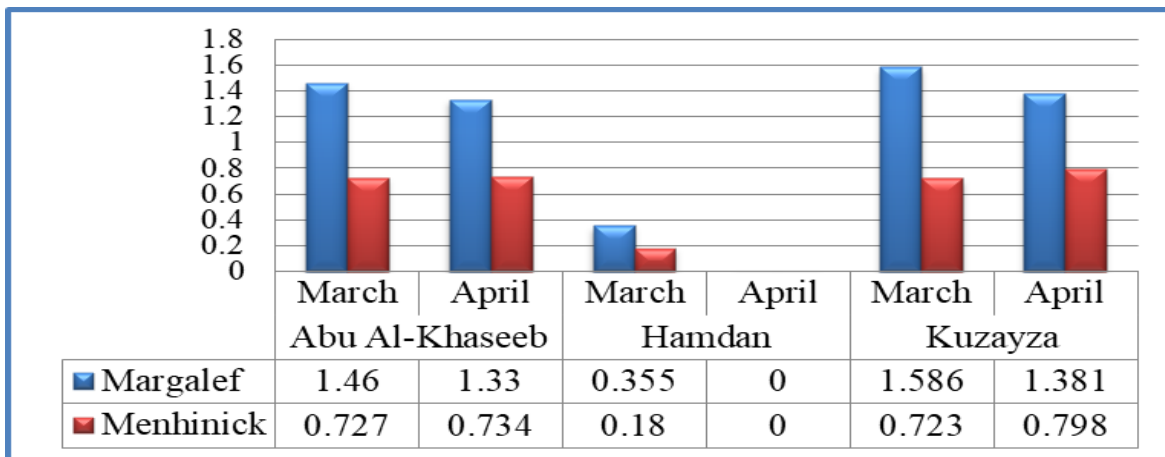


Figure (6) Richness values during the study period.

Dominance Indices:

Dominance was calculated using Berger and Parker's index. The highest value of the index was recorded in March in Hamdan station, which was 54.7% for the *Larus genei*, where

152 individuals out of 278 individuals distributed over three species were recorded, and the lowest value of dominance was in April at the same station when completely dried out (fig.,7).

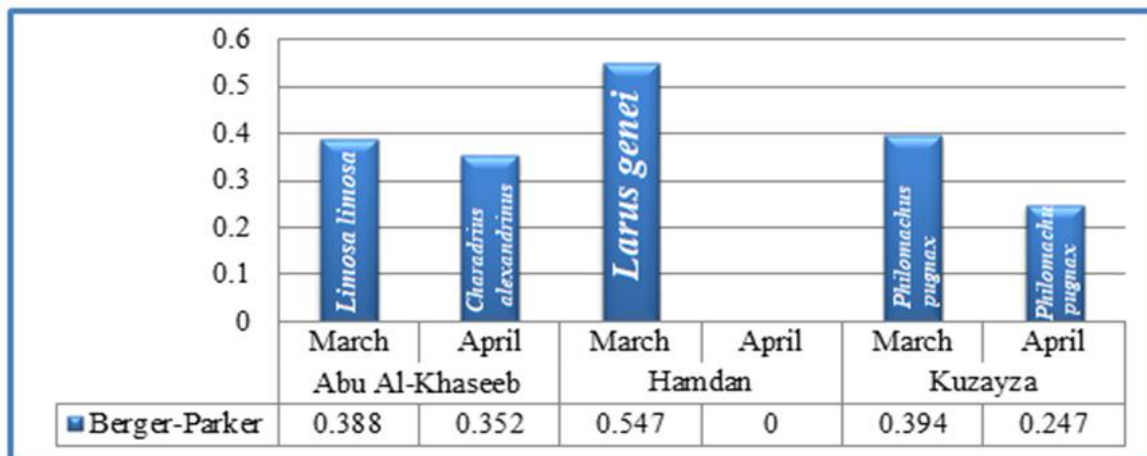


Figure (7) Dominance values during the study period.

Discussion:

The study showed the importance of temporary rain ponds during the winter season, especially for Visiting and passing birds, as temporary resting stations. This study recorded five winter-visiting species: *P. pugnax*, *T. cinereus*, *T. nebularia*, *L. limosa*, *T. stagnatilis*, and one summer visitor, *S. albifrons*. *C. alexandrinus*, *V. indicus*, *H. himantopus*, *L. genei*, and *E. garzetta*. The study showed the importance of these

temporary pools during the rainy season only, as they dry up at the beginning of the summer when the temperature rises, as their depth is very low, not exceeding a few centimeters in some of them, as happened in the Hamdan station. Therefore, the values of their diversity were zero during April, and the other stations' areas shrunk, and the study confirmed this by recording a smaller number of species and individuals in the same month. The study showed that most of the recorded bird species belong to the order of Charadriiformes. This

agrees with (Al-Robaae, 1986; Abou-Turab *et al.*, 2017), being the most beneficiary of their ability to wade in these waterbodies of little depth, and they have adaptive beaks for feeding in such environments. The study demonstrated the importance of these temporary pools by recording many species and individuals in a minimal area, especially for the visiting species. In Abu Al-Khaseeb station, which calculated the area of the temporary pool as 12,862 m² or 1.2862 hectares, the number of birds was 121 individuals with eight species watched in March, and Hamdan station Which reached an area of 13630 m², or 1.3630 hectares, recorded 278 individuals with three species, as it was crowded with birds. This result was reflected on diversity values for Shannon's index on Abu Al- Khaseeb and Kuzayza stations, where they scored 1.735 and 1.85 for the two stations, respectively, and 1.628 and 1.796 in April, which is a good value for this index, while Hamdan station recorded 0.805 in March, for the same index that Only three species were recorded in it, but in April the index value was zero due to the dryness of the station, and no individual was recorded. This was reflected in Simpson's index as well. The index's values for the stations Abu Al Khaseeb, Kuzayza, and Hamdan were 0.775, 0.787, and 0.523, respectively, in March, and

0.772, 0.815, and zero, respectively, in April. The study confirmed that the richness values of Abu Al- Khaseeb and Kuzayza stations were higher than the Hamdan station due to the lack of species recorded in the Hamdan station. At the same time, there is a higher number of individuals in the Hamdan station than in the others, as the index of richness is direct with the number of species and inverse with the total number of individuals.

Conclusion

The study showed the importance of temporary rain pools to birds in general and to wading birds in particular, as well as their importance to migratory birds. The study confirmed that these pools have a periodic period specified in the rainy season only and dry up during the summer. The study showed that these temporary ponds attracting large numbers compared to their small areas, especially migratory birds.

Acknowledgements:

I want to acknowledge the Department of Ecology and Dr. Muhana Kassim Habeeb for their support during this research.

References:

- Abed, J. M. (2007) Status of water birds in restored Southern Iraqi Marshes. Marsh Bulletin, Vol. 2(1): 64-79,
- Abou Turab, M. K.; Abduzahra H. K; A-Nasir N; Al-Shammary A. Ch. (2017) The value of small dispersed wetland areas for bird; Case of study. Basrah Province/ Iraq. Mesopo. Environ. J. Vol.3: 63-73.
- Al-Robaae, K. H. (1986). The Observation of birds in the autumn migration in the vicinity of Basrah City-Iraq. Bull. Bas. Nat. mus., 16: 65-85.
- Al-Sheikhly, O. F. and Al-Azawi, A J. (2019) Migration pattern and wintering population of the Eurasian marsh harrier (*Circus aeruginosus*) in the Central Marshes, a wetland of international importance in southern Iraq. Raptor Journal 2019, 13: 127–137. DOI: <https://doi.org/10.2478/srj-2019-0004>.
- Boere, G. C. and Stroud, D. A. (2006) The flyway concept: what it is and what it isn't. Pp. 40–47 in G. C. Boere, C. A. Galbraith and D. A. Stroud, eds. Waterbirds around the world. Edinburgh, UK: The Stationery Office.
- Brönmark, C. and Hansson, L-A. (2005) The Biology of Lakes and Ponds. Oxford, United Kingdom: Oxford University Press. 2nd ed. 338 pp.
- Fazaa, N.A.; Dunn, J. C. and Whittingham, M.J. (2017) Distribution and community composition of birds in Iraq's central marsh. Inter. J. biod. 28 pp.

- Habeeb, M. K. (2019) Assessment of the biodiversity of some wader bird's assemblage in East Hammar marsh and Shatt al- Arab estuary. Ph.D. thesis. University of Basrah. College of science. 258 PP.
- Habeeb, M.K. (2008). Study of the nature of waterfowl's assemblage in some marshes of southern Iraq. Msc. Thesis. Basrah Univ. 115pp.
- Hussain, N.A.; Ali, A. H.; Hamza, H. A. & Lazem, L. A. (2014) Seasonal patterns of ecological indices for keystone animal's groups in three types of Iraqi marshes during 2005-2007. Mesopotamia Environmental Journal, 2014, Vol. 1, No. 1:7-17.
- Keeley, J.E.; Zedler, P.H. (1996) Characterization and global distribution of vernal pools. Ecology, conservation and management of Vernal Pool Ecosystems, Proceedings from a Conference, Section I: Past and Present Distribution and Physical and Biological Considerations. Sacramento: California Native Plant Society.
- Ramsar Convention Secretariat (2002) Tanzania Designates Rich New Ramsar Site. <http://www.ramsar.org/cda/en/ramsar-news-archives-2002-ramsar-bulletin-22689/main/ramsar/1-26-45-87^2268940000>.
- Ruiz, E. (2008) Management of Natura 2000 habitats. 3170 Mediterranean temporary ponds. European Commission (http://ec.europa.eu/environment/nature/natura2000/management/habitats/pdf/3170_Mediterranean_temporary_ponds.pdf).
- Salim, MA, R Porter, P Schiermacker-Hansen, S Christensen & S Al- Jbour. (2006) [Field guide to the birds of Iraq]. Nature Iraq/BirdLife International, Baghdad. [In Arabic].
- Scott, D. (1995) A directory of wetlands in the Middle East. Iraq. P: 223-301.
- Sebastián-González, E. & Green, A. J. (2014) Habitat use by waterbirds in relation to pond size, water depth, and isolation: lessons from a restoration in southern Spain. Restor. Ecol. 22, 311–318.
- Slater, P.J. (1994). Factors affecting the efficiency of the area search method of censusing birds in open forests and woodland. *Emu* 94:9-16.
- Ward, J.V. (1992) Aquatic Insect Ecology, 1. Biology and Habitat. John Wiley, New York.
- Williams, D.D. (1997) Temporary ponds and their invertebrate communities. Aquatic Conservation; marine and Freshwater Ecosystems 7. 105-117.
- Zacharias, I., Dimitriou, E., Dekker, A., Dorsman E. (2007) Overview of temporary ponds in the Mediterranean region: threats, management, and conservation issues. *J Environ Biol* 28(1):1–9.

دور برك الأمطار المؤقتة في جذب الطيور المائية في محافظة البصرة، العراق

عادل فاضل عباس

قسم البيئة، كلية العلوم، جامعة البصرة

المستخلص:

ركزت الدراسة الحالية على اعداد الطيور المائية في ثلاث برك مطرية مؤقتة في محافظة البصرة وهي أبو الخصيب، حمدان، الكزيزة. استمرت الدراسة لمدة شهرين، اذار ونيسان من عام 2019. سجل خلال فترة الدراسة 722 فردًا من الطيور المائية تنتمي إلى أحد عشر نوعًا، موزعة على رتبتي وخمس عائلات. احتلت رتبة Charadriiformes المرتبة الأولى بعشرة أنواع: *Charadrius alexandrinus*، *Vanellus indicus*، *Philomachus pugnax*، *Tringa*، *Tringa nebularia* و *Sterna albifrons*. أما بالنسبة للرتبة الثانية فكانت Ciconiiformes والتي سجل نوع واحد فقط فيها هو *Egretta garzetta*. بالإضافة إلى دراسة مؤشرات الوفرة النسبية والتنوع والثراء والتكافؤ والسيادة.